

MEMORANDUM

Northern Integrated Supply Project
Glade Reservoir
Larimer County 1041 - Utility Descriptions

B&V Project Number 403758
B&V File 188754/34.3000
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To: Larimer County Planning Department
From: Tim Engemoen and Mike Johnson, Black & Veatch

Introduction

This technical memorandum is written in support of Larimer County Planning Department's 1041 Permit for the Glade Unit construction and documents the existing and proposed utilities associated with the construction of the Glade Unit.

Project Background

The Northern Integrated Supply Project (NISP) will provide a new raw water supply to several municipal water providers in Northern Colorado. NISP includes the following facilities located in Larimer County: the Glade Unit; the Glade Pump Station; raw water distribution piping; and the relocation of U.S. Highway 287. The Glade Unit features the Glade Reservoir Dam, which is an earthen embankment that will impound an off-channel reservoir complete with the hydraulic structures required by the State Engineer's Office: the High Level Outlet Works (HLOW); Low Level Outlet Works (LLOW); and spillway. Glade Reservoir Dam is located just to the north of the junction of U.S Highway 287 and State Highway 14, about 10 miles northwest of Fort Collins. The Glade Unit includes an expansion of the existing Poudre Valley Canal (PVC) and a new forebay constructed downstream of the dam at an elevation that will allow delivery of water from the PVC by gravity. A Control Gate Structure will be constructed to control flow to the existing portion of the PVC downstream of the forebay. The existing PVC Diversion Structure will be demolished and rebuilt to allow increased diversion of flow from the Poudre River. A portion of the existing Munroe Gravity Canal alignment will be inundated by Glade Reservoir, this open canal will be replaced by the Munroe Canal Bypass (MCB), a conduit and several control structures that will convey flow beneath the reservoir. The Glade Unit also includes: the Glade Pump Station, which will pump water from the forebay into Glade Reservoir; the Electrical/Control building that will distribute power throughout the site and provide control of the various hydraulic features; the Surge Building that will house surge tanks to protect the pump station discharge conduit; and numerous buried conduits with control valve vaults that connect these facilities. Raw water will be conveyed off site via several buried conduits that are being constructed under different NISP contracts. The Glade Unit will include recreational amenities for the general public, including a Visitor Center, campgrounds, a boat ramp, trails and restroom facilities.

Glade Reservoir will submerge a portion of the existing U.S. Highway 287 alignment which will be relocated to the east of the reservoir. An existing power transmission line and several power

distribution lines will be inundated by the reservoir which will be relocated as part of the Glade Unit construction. A general location map of the Glade Unit facilities is presented on Figure 1.

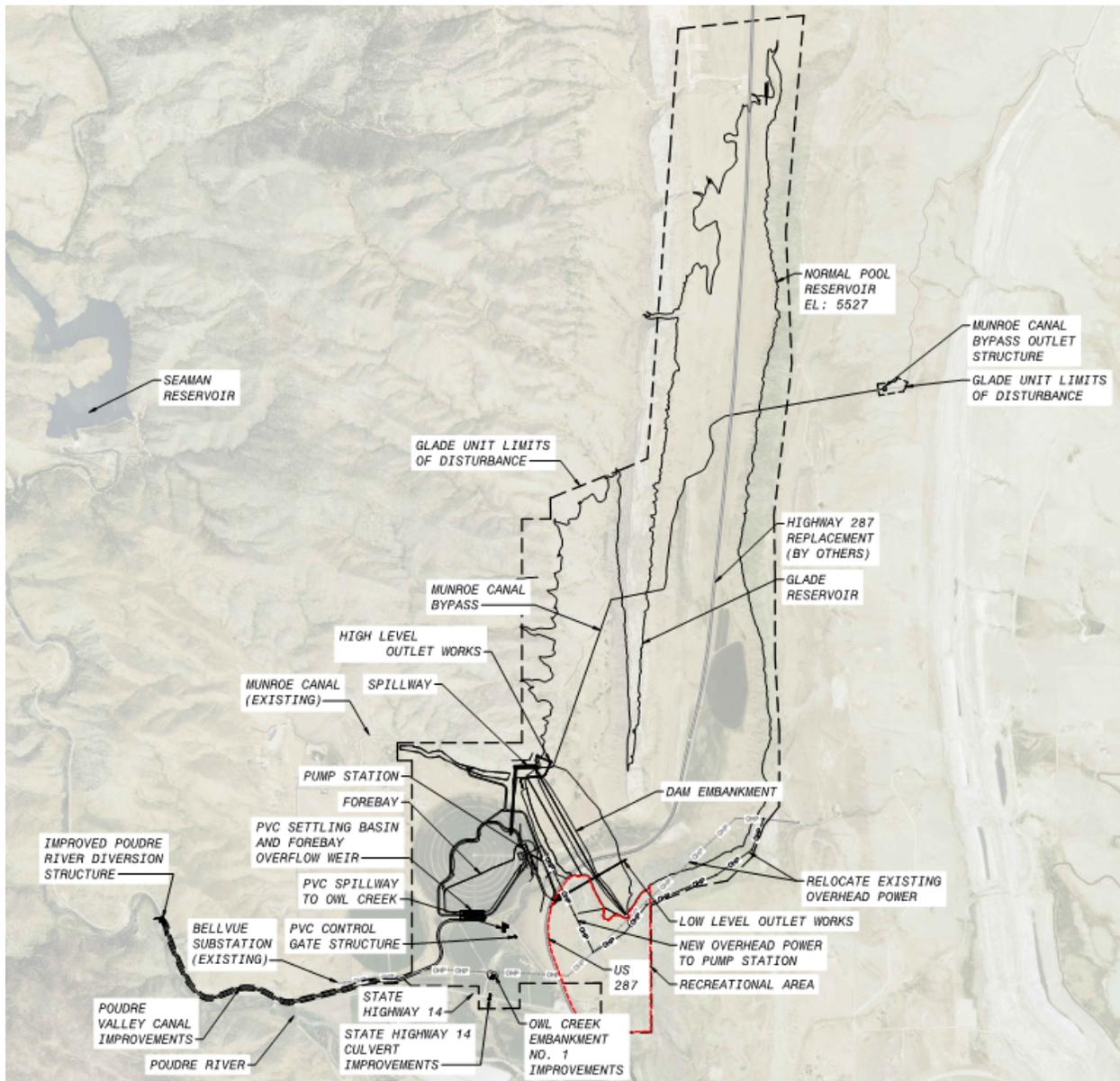


Figure 1 - Glade Unit Overview

The NISP Water Activity Enterprise (NISP Enterprise or Enterprise) assumes financial responsibility for construction of all infrastructure required for the project. The Enterprise is a permanent entity with access to adequate funds to cover project construction and maintenance. The Enterprise's budget will include routine and capital maintenance funds. Northern Water's past performance under other USACE permits demonstrates its commitment to assure that projects will be fully implemented and maintained by the Enterprise.

Existing Site Utilities

There are existing utilities located at the project site including electrical, communications, and water utilities. The water utilities include potable water lines in Highway 14 near the future dam embankment footprint and several irrigation lines that are connected to the Munroe Canal flowing through the project site delivering raw water to agricultural fields in the area. There is a group of electrical and communications utilities that run south to north, moving through the dam foundation area and up to the West Valley. These utilities are shown to feed power and communications to communities near Bellvue, Colorado. Additionally, there is a major fiber utility running along the side of U.S. Highway 287. Field surveying will be completed during detailed design to accurately locate each of these facilities, but that work has not yet been completed. All existing utilities impacted by Glade Unit infrastructure will be relocated with no permanent reduction to the types and amounts of service provided.

New Site Utilities

The Glade Unit will include numerous facilities that require utility services. including the Pump Station, Electrical/Control Building, Surge Building, HLOW Control House, LLOW gate chamber, MCB structures/vaults (inlet structure, outlet structure, transfer valve vault), Poudre River Diversion Structure, Forebay Inlet/Outlet Structure, PVC Delivery Structure, various site utility vaults that house raw water valves and meters, and the recreational facilities.

The new utilities required during and after completion of construction include electrical, communications, potable water, and sanitary facilities. The following sections describe the main utilities that will be provided. Detailed site plans depicting the locations and routing of all the new utilities will be developed as the design of these facilities progresses.

Potable Water

Potable water will be supplied to facilities that are planned to be accessible to the public or are regularly accessed by the staff who will maintain the Glade Unit. These facilities include the Pump Station, Electrical/Control Building and Surge Building that will be regularly accessed by staff maintaining the facility. Public access to facilities is described in the memo on recreational facilities, and is planned to include a Visitor's Center, campgrounds, and shower facilities. It is possible that other facilities will require potable water as well, but exact details have not yet been finalized and will be done so in detailed design. Potable water will be provided from the West Fort Collins Water District, which currently supplies four individual taps for different existing facilities that will be abandoned as part of this construction. Those taps will be consolidated into two separate taps, one for maintenance facilities and the other for recreational facilities. The static water pressure in this vicinity at the KOA campground is typically between 40 and 45 pounds per square inch (psi). That pressure should be adequate to serve those facilities which are located on the valley floor below the dam. Those facilities located above the valley floor at or near the elevation of the reservoir will be served with an on-site booster pumping system that will increase the water pressure to serve these higher elevations. All potable water systems will be installed in accordance with Colorado Department of Public Health and Environment (CDPHE) design criteria.

Raw Water

The purpose of the Glade Unit is to provide a raw water supply for the municipal water suppliers who are participants in the project. Therefore, the raw water system comprises the majority of the utilities on the site. Figure 2 is a schematic of the proposed raw water infrastructure at the Glade Unit. Under normal operating conditions, the system will function as follows:

- Raw water is diverted from the Poudre River via the Diversion Structure and routed to the forebay inlet via the enlarged portion of the PVC. Flow that is required to continue past the Glade Unit in the PVC is metered and controlled after the forebay.
- Raw water is pumped from the forebay into Glade Reservoir via the Low Level Outlet Works.
- Raw water is withdrawn from Glade Reservoir via the High Level Outlet Works.
- Raw water is distributed to the NISP participants directly and delivered back to the Poudre River for participant use via two separate raw water conduits.

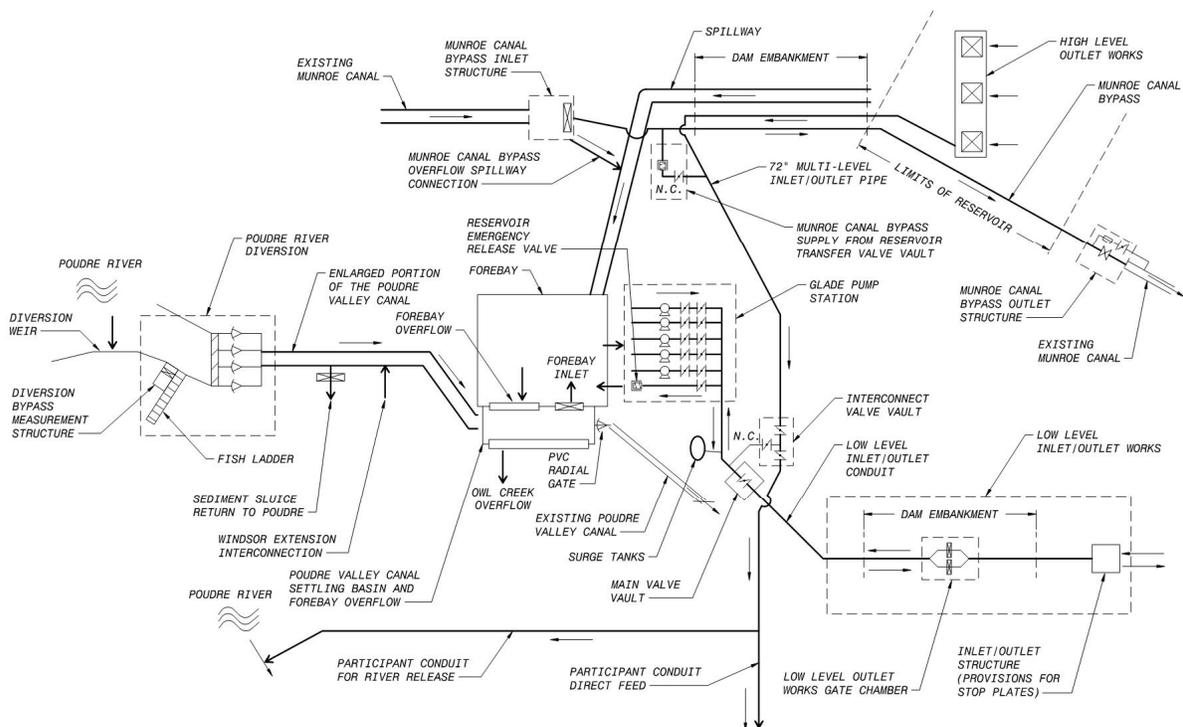


Figure 2 - Glade Unit Raw Water Schematic

That portion of the existing Munro Gravity Canal that will be inundated by the reservoir is also shown schematically in Figure 2. This is also a raw water conveyance system but will generally be operated independently of the Glade Unit and continue to flow by gravity.

This system is also designed to accommodate a wide variety of flows within the raw water system that are not normal operation but might be necessary during rain events or abnormal operations at the Glade Unit. These include:

- Wasteway for the PVC. In the event that the Pump Station trips off-line while the PVC is running at capacity, there is an Owl Creek Overflow that will allow this flow to be routed back to the Poudre River under Highway 14.
- Reservoir Emergency Release. In the event that the level in Glade Reservoir has to be lowered for any reason, the Low Level Outlet Works can be used to release flow to the Forebay. If the forebay is full, there is a Forebay Overflow that directs excess flow to the Owl Creek Overflow and then the Poudre River.
- Glade Spillway Activation. If the drainage area upstream of Glade Reservoir experiences a significant storm event that causes the reservoir level to rise above the spillway crest, the spillway will activate and discharge into the Forebay. The Forebay Overflow will activate once the Forebay is full and discharge this flow into Owl Creek via the Owl Creek Overflow.

Sanitary Sewer

The NISP Participants are actively seeking to acquire the existing KOA Campground at the U.S. Highway 287 and State Highway 14 intersection for incorporation into the Recreation Concept Master Plan. There is an existing On-site Wastewater Treatment System (OWTS) consisting of a septic tank and leach field that serves the existing KOA Campground. This existing installation will be utilized for a possible semi-permanent construction camp that could be in place for the five-year period of construction on this site. After construction is complete, this existing facility will be utilized to serve a portion of the recreational facilities that will be located onsite. Additional septic tanks and leach fields will be installed to serve those facilities that have sanitary systems, with one system to serve the Pump Station, Electrical/Control Building and Surge Building and another system(s) to serve the Visitor Center and recreational facilities located at the elevation of the reservoir.

Electric

The largest power draw from the new facilities associated with this project will be for the pump station which will require an approximate 40 mega-volt ampere (MVA) power supply. The pump station is located within Xcel Energy's service area and they currently plan to serve the pump station and associated facilities. Currently, Xcel does not have any transmission assets that are located near the pump station, so they will likely submit an interconnection request to Tri-State Generation and Transmission (G&T) to allow Xcel to tap an existing Tri-State G&T 115 kV transmission line to provide service to the pump station.

A substation will be required at the pump station to reduce the power supply voltage from transmission voltage (likely 115 kV) to medium voltage (15 kV).

The existing Tri-State G&T 115 kV transmission line near the proposed dam's left abutment will need to be relocated to avoid the dam and reservoir inundation area.

In addition to the new pump station, this project includes the expansion of existing facilities (Munroe Canal Outlet, Poudre Valley Diversion Structure, and Owl Creek) and construction of new facilities which will require improvements to the current electrical service to accommodate new process mechanical loads.

Power distribution across the project site will be conducted with the utilization of distribution transformers, switchboards, motor control centers (MCCs), and panelboards as determined during detailed design. In addition, we anticipate utilization of existing services for the previously established facilities at the Munroe Canal Outlet, Poudre River Diversion Structure, and improvements along Owl Creek. The extent of the utilization or improvement of service and distribution will be determined during detailed design. It is anticipated that some of the ancillary structures including proposed recreation facilities will require separate, distribution level power supplies separately metered from the local utility. All power distribution will follow the National Electric Code (NEC).

Communications

It is anticipated that radio links will be used for most of the communication between the different structures associated with the Glade Unit and for communication back to Northern Water's operation center. It is possible that some control cable or fiber will be installed at the recreation area and between other select structures if radio communication will not be possible. These details will be finalized during detailed design.

Fire Protection

The local fire protection district is the Poudre Fire Authority. The nearest station is Station 7 located at 2817 N. Overland Trail in Laporte, which is approximately 4 miles southeast of the Glade recreational facilities.

The Livermore Fire Protection District (LFPD) also provides service to the northern portion of Glade Reservoir. The nearest station is Station 1 located at 311 W CR 74E in Livermore, which is approximately 4 miles north of the northern tip of Glade Reservoir. NISP staff have met with LFPD staff to discuss the project. As part of those conversations, NISP has committed to providing a water storage tank (up to 10,000 gallons in size) at a location determined by the LFPD for their use in staging water for fire-fighting purposes. This tank will be provided by the start of construction to increase LFPD's fire-fighting and emergency-response capabilities. LFPD staff also indicated that Glade Reservoir will provide a strategic water source for future aerial firefighting efforts.

Road Infrastructure

The Glade Unit recreational facilities will be accessed by the existing U.S. Highway 287, just north of Ted's Place. U.S. Highway 287 is being relocated to the east as part of the Glade Unit construction beginning near the intersection with West County Road 56. It is anticipated that the existing U.S.

Highway 287 north of this realignment point will be classified as State Highway 14 as this portion of the roadway will still provide access to State Highway 14 and will continue north of Ted's Place to provide access to the Glade recreational facilities. The classification of the portion of the road north of the intersection with the State Highway 14 is still to be determined. New paved roads will be constructed within the footprint of the recreational area to provide access to the camp grounds and other recreational facilities and it is anticipated those will be private roads.

Conclusion

The construction of the Glade Unit will require the relocation of some existing utilities and the installation of several new utilities that will be installed at different structures throughout the Glade Unit. Detailed site plans depicting the utilities will be completed during detailed design but have not yet been developed.