BUREAU OF RECLAMATION

Environmental Assessment and Finding of No Significant Impact

71 Ranch – Avalanche Unit Irrigation Project

Pick-Sloan Missouri Basin Program - Canyon Ferry Unit

Montana Area Office - Missouri Basin Region

U.S. Department of the Interior

July 2023

Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Finding of No Significant Impact

Introduction

The Bureau of Reclamation (Reclamation) has prepared this Finding of No Significant Impact (FONSI) to comply with the Council on Environmental Quality's regulations for implementing procedural requirements of the National Environmental Policy Act (NEPA). The 71 Ranch-Avalanche Unit Irrigation Project Environmental Assessment (EA) documents the Proposed Federal Action, alternatives considered, a summary of environmental effects, and minimization measures aimed at reducing potential impacts, while the FONSI documents findings of that analysis. The 71 Ranch Irrigation Project EA is incorporated by reference.

Location

The Proposed Project would be located along the eastern shore of Canyon Ferry Reservoir in Sections 01, 07 ,11, 12, 13, 14, and 18 of Township 09 N, Range 01 E, Broadwater County, Montana.

Background

The United States constructed the Canyon Ferry Unit of the Pick-Sloan Missouri Basin Program, Montana, pursuant to the Flood Control Act (Act) of December 22, 1944. The Act authorized the use of waters of the Missouri River from storage in Canyon Ferry Reservoir for irrigation, municipal and industrial uses, flood control, power generation, and fish and wildlife purposes. Canyon Ferry Dam, Reservoir, and Powerplant make up the principal features of the Unit. The original project purposes were later supplemented for fish and wildlife conservation and recreation.

Proposed Federal Action

Reclamation proposes to issue a long-term (40-year) water service contract for the withdrawal of up to 2,880 acre-feet (AF) of water annually to irrigate approximately 960 acres of land. In addition, Reclamation proposes to issue a special use permit (SUP) to the 71 Ranch for the possession or occupancy of, or for extraction or disturbance of natural resources from land, facilities, or waterbodies under the jurisdiction of Reclamation.

The water service contract and associated SUP do not constitute a permanent water right, but rather an agreement between the 71 Ranch and Reclamation. In addition, this analysis does not provide for the subdivision of lands or form an irrigation district. Other actions would require separate

NEPA analysis to ensure compliance with environmental laws and Reclamation policy, directives, and standards.

Features of the Proposed Action include the construction of an irrigation pump station, installation of pumps, water pipelines, center pivots, electrical upgrades, and improvements to access roads.

Purpose and Need

The purpose of the Proposed Federal Action is to allow Reclamation to legally sell their available stored water for irrigation purposes to the 71 Ranch, Avalanche Unit.

The Proposed Action is needed to:

- Provide a secure and reliable irrigation water supply for approximately 960-acres.
- Allow 71 Ranch, Avalanche Unit to use available stored water from Canyon Ferry Reservoir to provide beneficial use.

Summary of Environmental Effects

Based on the evidence presented in the 71 Ranch, Avalanche Unit EA, Reclamation has drawn the following conclusions about the potential impacts of the Proposed Action:

Hydrological Resources

Water operations will be balanced to meet power generation, flood control, irrigation, lake and river recreation, fisheries, and municipal uses. The 2,880 AF of proposed annual irrigation water diversion is within the 300,000 AF of water available at Canyon Ferry Reservoir for water marketing each year.

Under the predicted water model, water levels within Canyon Ferry Reservoir will remain consistent with the existing condition; however, the withdrawal of 2,880 AF averaged throughout the irrigation season would theoretically reduce river releases by approximately 15 cfs during July, August, and September while operational targets for reservoir elevation are maintained. This is a maximum flow reduction of about 0.4 percent.

There will be a negligible effect on the hydroclimate, water quality, water quantity, reservoir levels, groundwater, wetlands, and hydropower production. In addition, the project will promote one of the intended purposes of the Pick-Sloan Missouri Basin Program by providing irrigation water.

Lands, Vegetation, and Soils

The project will create short-term disturbance to soils in the project area. Invasive weed species have a higher probability of invading disturbed soils. In areas where farming is the primary objective, weed treatment is an integral component of crop production and will continue. All

required permits and best management practices (BMPs – as described in the 71 Ranch, Avalanche Unit EA) for the protection of natural resources will be in place before construction commences.

Irrigation water is a known vector for the transportation of aquatic invasive species if pumps and pipes are moved from one location to another. The main concern with zebra and quagga mussels and aquatic weeds is the potential to clog water conveyance systems and pipelines associated with the project. Because of the design of the Proposed Action, the spread of invasive mussels or aquatic weeds will not occur.

Fish, Wildlife, and Avian Species

Under the predicted water model, water levels within Canyon Ferry Reservoir will remain consistent with the existing condition and there will be no impact on freshwater habitats that fish, wildlife, and avian species depend on. All in-water improvements will have controls in place, such as intake screens with 1-inch openings and low suction velocities (< .5 fps) to reduce impacts to fish. Short-term construction impacts will cease upon completion of the project.

Threatened and Endangered Species

There will be no effect on Canada lynx because of the Proposed Project.

Recreation

All in-water improvements will have control measures in place, such as low suction velocities and intake screens to reduce impacts on fish. Temporary impacts to fishing recreation may be experienced during construction because of heavy equipment, construction materials, and construction workers being onsite. The location of the pump station will reduce access to shoreline fishing areas. The pump station will be fenced with appropriate signage to prevent fishermen from accessing the shoreline in this area. Additionally, the access road to the proposed pump station will be restricted to authorized personnel only. Impacts to boating and swimming consist of buoys and signs near all in-water improvements to alert boaters and swimmers and improve public safety.

Air Quality, Noise, and Visuals

Construction activities will produce minimal impacts from particulate matter generation and noise from equipment. Noise levels are expected to increase during project construction, which may negatively impact the enjoyment of quiet spaces. Once construction activities are completed, the project area will return to preexisting levels of air quality and noise levels. Following completion of the Proposed Action, the water pumps will produce noise while in operation during the irrigation season; however, these sounds will be like existing levels of farming operations and recreational activities. Visually, the shoreline of Canyon Ferry Reservoir will be altered by the addition of the pump station, pump house, and water pipelines. Because of the location, this alteration will only be visible from the reservoir and not diminish the scenic integrity of the area. The Proposed Action will not impact air quality, noise, and visual properties in the area during operational periods.

Cultural, Historic, and Paleontological Resources

Intensive cultural resource inventories (Class III) of the APE were conducted in 2020 and 2021 with no cultural resources discovered. Reclamation consulted with the Montana State Historic Preservation Office which concurred with Reclamation's determination of No Historic Properties Affected. In addition, Reclamation consulted with the Montana Department of Natural Resources and Conservation, Division of Trust Land Management for the concurrence of No Effect to State-owned Heritage Properties.

Indian Trust Assets and Environmental Justice

There will be no effect on Indian Trust Assets or Environmental Justice because of the Proposed Action.

Cumulative Effects

Reclamation has examined the potential for significant environmental effects to hydrological resources, lands, soils, and vegetation, fish, wildlife, and avian species, threatened and endangered species, recreation, air quality, noise and visuals, and cultural, historic, and paleontological resources. Federal and State regulations designed to protect fish and wildlife resources, important habitats and sensitive areas, cultural and paleontological resources, human health and safety, and the public interest provide the legal basis for evaluations.

Significant population growth and development has been occurring in the upper Missouri River basin over the past 20 years. On average, Reclamation is processing 10-15 new requests for water service contracts each year. These new requests for water need to be balanced with the other authorized purposes of Canyon Ferry Dam and Reservoir.

Under the Proposed Action Alternative, Cumulative effects include:

- Negligible impacts to downstream water users because of the annual removal of 2,880 AF from the reservoir.
- Short-term impacts to surface water quality may occur during construction and from increased irrigation.
- Impacts to aquatic communities will be negligible providing all minimization measures are implemented. Impacts would be localized near the pump station due to pumping (long-term) and construction activities (short-term).
- Wildlife could experience temporary displacement during construction.
- The removal of vegetation could result in minimal impacts to wildlife and soils.
- The Proposed Action will not contribute to the decline of Canada lynx.

- Ground disturbing activities can spread noxious weed species; however, with the application of the proposed mitigation measures, impacts will be short-term. There will be no impacts from aquatic invasive species.
- There will be minimal impacts during construction from particulate matter generation from construction activities. Cumulatively, post-construction activities such as operating the irrigation system and farming could contribute to greenhouse gas emissions resulting in very minor impacts to air quality.
- The pump house will be visible from the reservoir, but not obtrusive. The scenic integrity of the area will not diminish because of the irrigation system since this is an area of existing agricultural activity.

Under the Proposed Action, Reclamation would enter into a long-term water service agreement with the 71 Ranch for up to 2,880 acre-feet of water annually. This water would no longer be available for other authorized purposes such as fish and wildlife, recreation, hydropower, etc. As described in the water quantity section, 2,880 acre-feet of water equates to approximately 0.4 % of the total available storage in Canyon Ferry Reservoir. Overall, cumulative impacts would be negligible in the project area.

Finding

Based on the analysis of the environmental impacts as described in the 71 Ranch, Avalanche Unit EA, Reclamation finds that all potentially significant issues and resource impacts have been identified, evaluated, addressed, and resolved. This FONSI serves to document the reasons why the Proposed Federal Action will not have a significant effect on the human environment; therefore, an Environmental Impact Statement will not be prepared. Implementation of the Proposed Federal Action may take place following approval of this decision document and completion of required contracting actions.

Approved:

RYAN NEWMAN Digitally signed by RYAN NEWMAN Date: 2023.07.20 20:03:58 -06'00' 7/20/2023

Ryan Newman Date
Area Manager
Montana Area Office
Missouri Basin Region

Environmental Assessment

71 Ranch, Avalanche Unit – Irrigation Project

Introduction

The Bureau of Reclamation (Reclamation), Montana Area Office proposes to issue a long-term (40-year) water service contract and associated Special Use Permit (SUP)to the 71 Ranch, Avalanche Unit. This Environmental Assessment (EA) evaluates the effects of potential impacts of the construction of a pump station, irrigation infrastructure, and withdrawal of up to 2,880 acre-feet (AF) of irrigation water at Canyon Ferry Reservoir. Reclamation owns and operates the Canyon Ferry Dam and holds the water right (#411 40923 00) for water stored in the reservoir.

Pick-Sloan Missouri Basin Program

The United States constructed the Canyon Ferry Unit of the Pick-Sloan Missouri Basin Program, Montana, pursuant to the Flood Control Act (Act) of December 22, 1944. The Act authorized the use of waters of the Missouri River from storage in Canyon Ferry Reservoir for irrigation, municipal, industrial uses, flood control, power generation, and fish and wildlife purposes. Canyon Ferry Dam, Reservoir, and Powerplant make up the principal features of the Unit. The original project purposes were later supplemented for fish and wildlife conservation and recreation.

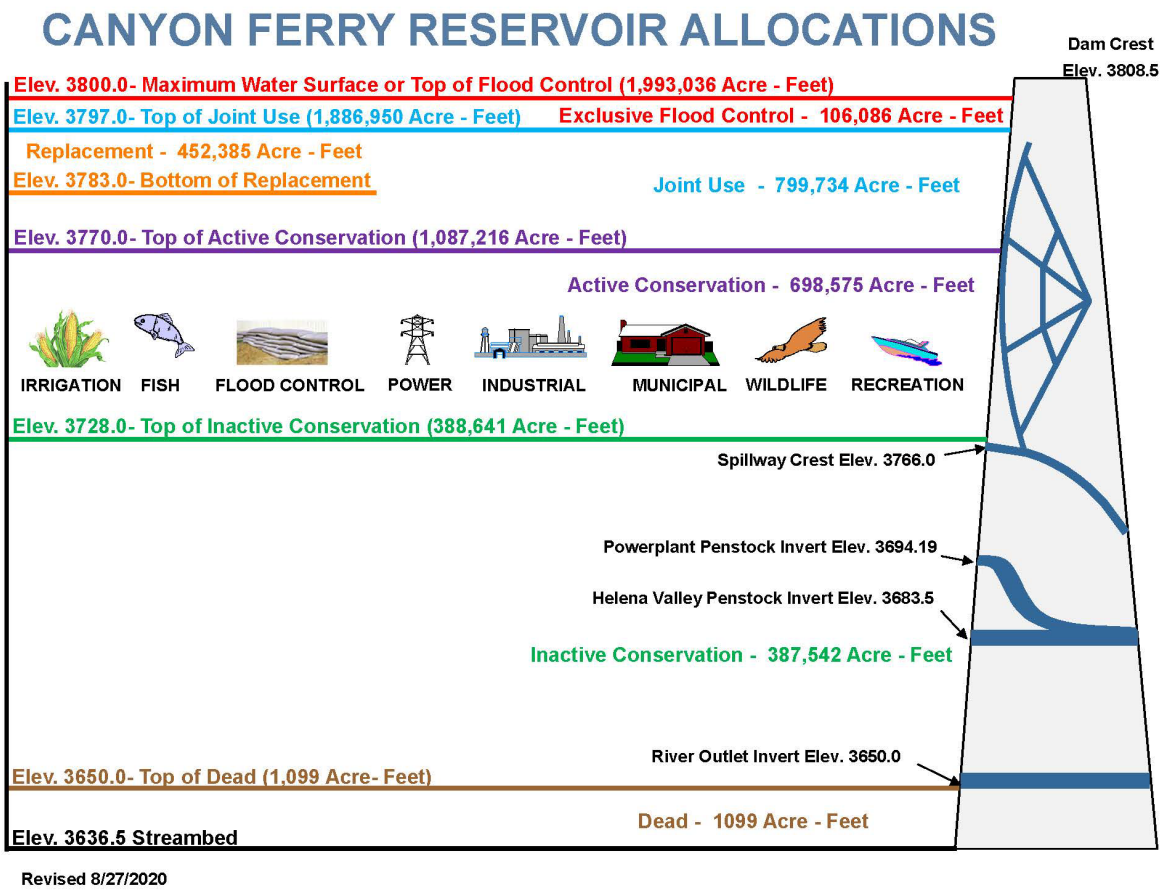
Canyon Ferry Unit

The Canyon Ferry Unit is a multiple-purpose project, contributing to electrical production, flood control, municipal water supply, and irrigation in the upper Missouri Basin. The Canyon Ferry Unit was constructed between 1949 and 1954. Principle features are the Canyon Ferry Dam, Reservoir, and Powerplant.

The Canyon Ferry Reservoir has a surface area of approximately 35,200 acres, at an elevation of 3,797 feet and a capacity of 1,886,950 AF with 106,086 AF of storage designated exclusively for flood control. The top three feet of capacity is allocated exclusively to flood control. The next 27 feet are allocated to joint conservation and flood control. The joint use capacity can be evacuated for flood control purposes only to the extent that refill during the spring runoff is reasonably assured. The conservation capacity was developed mainly for power generation and to provide replacement storage for irrigation developments located on the Missouri River and its tributaries. At full pool, approximately 6,400 acres are in Lewis and Clark County with the remaining 28,800 acres in Broadwater County. Reclamation owns and manages approximately 9,360 acres of land and 76 miles of shoreline adjacent to the Reservoir.

The Canyon Ferry Unit is a multiple-purpose project, contributing to electrical production, flood control, municipal water supply, and irrigation in the upper Missouri Basin. Construction of the Unit occurred between 1949 and 1954. Canyon Ferry Dam, Reservoir, and Powerplant make up the principal features of the Unit. Figure 1: depicts the Canyon Ferry Reservoir water allocations.

Figure 1: Canyon Ferry Reservoir Allocations



Canyon Ferry Reservoir – Operations Guidance Criteria

The only authorized water use from the Canyon Ferry Reservoir is for those water uses that are covered by a contract with Reclamation. Reclamation's water rights for the Canyon Ferry Reservoir water are either storage type rights or direct diversion rights. Reclamation has a storage right for 1,952,059 acre-feet. Northwestern Energy (NWE) has a storage right for 47,500 acre-feet, the storage capacity of the reservoir behind the original Canyon Ferry Dam. The direct diversion rights, totaling 7,190 cubic feet per second (cfs), include flows for the Helena Valley Irrigation District pumps, pump turbines, and the Canyon Ferry turbines. There are additional water rights that are senior to those claimed by Reclamation for water within the Canyon Ferry Reservoir. NWE owns seven hydropower dams downstream from the Canyon Ferry Dam on the Missouri River, all with water rights senior to the water rights associated with the Canyon Ferry Reservoir. These prior rights are satisfied through compliance with the terms in the 1972 Coordination Agreement between PPL Montana LLC and Reclamation (Reclamation, 2003).

The Reservoir is operated to provide flood control in cooperation with the US Army Corps of Engineers (USACE), to provide a water supply for power generation in cooperation with NWE, to provide water for irrigation, municipal and industrial uses, and to enhance recreation and fish and wildlife benefits. Operating criteria for the Canyon Ferry Reservoir relevant to this EA are as follows:

- Whenever an adequate water supply is available, the operation of the Canyon Ferry Reservoir is to maintain a minimum flow of 4,100 cfs in the Missouri River immediately below Holter Dam to protect the quality and quantity of the river fishery.
- Reclamation will maintain releases to the Missouri River at minimum desired flows during October and early November to protect brown trout spawning through the fall and winter. Reclamation will avoid dropping the Reservoir level during April and May to protect fish spawning in the Reservoir.
- Based on monthly forecasts prepared from January through June, releases are adjusted to allow storage to fill to elevation 3,797 (top of the joint-use pool) by the end of June.
- Reclamation will avoid dropping the Reservoir below elevation 3,774 to prevent exposing the Reservoir lakebed.
- Reclamation will attempt to release all water through the Canyon Ferry power plant and avoid spilling any water past the power plant, except during times of unusually heavy inflow or scheduled power plant maintenance.
- All operations are closely coordinated with NWE to maximize all the benefits provided by the Canyon Ferry Reservoir and the seven downstream NWE power plants on the Missouri River.
- After storage has peaked, usually in June or July, releases are adjusted to evacuate storage and provide adequate space to control the next season's snowmelt runoff.

Location of the 71 Ranch, Avalanche Unit Irrigation Project

The Proposed Project would be located along the eastern shore of Canyon Ferry Reservoir in Sections 01,07,11,12,13, 14, and 18 of Township 09 N, Range 01 E, Broadwater County, Montana.

Proposed Federal Action

Reclamation proposes to issue a long-term (40-year) water service contract for the withdrawal of up to 2,880 acre-feet (AF) of water annually to irrigate approximately 960 acres of land. In addition, Reclamation proposes to issue a special use permit (SUP) to the 71 Ranch for the possession or occupancy of, or for extraction or disturbance of natural resources from land, facilities, or waterbodies under the jurisdiction of Reclamation.

The water service contract and associated SUP do not constitute a permanent water right, but rather an agreement between the 71 Ranch and the United States. In addition, this analysis does not provide for the subdivision of lands or form an irrigation district. Other actions would require separate NEPA analysis to ensure compliance with environmental laws and Reclamation policy, directives, and standards.

Features of the Proposed Action include the construction of a pump station, installation of vertical turbine pumps, water pipelines, center pivots, electrical upgrades, improvements to access roads, use of temporary staging areas, and continued operation and maintenance (O&M) of the proposed system.

Purpose and Need

The purpose of the Proposed Federal Action is to allow Reclamation to legally sell their available stored water for irrigation purposes to the 71 Ranch, Avalanche Unit project area.

The Proposed Action is needed to:

- Provide a secure and reliable irrigation water supply for approximately 960 acres.
- Allow 71 Ranch, Avalanche Unit to use available stored water from Canyon Ferry Reservoir to provide beneficial use.

Alternatives

This section describes the alternatives developed to meet the purpose and need, as defined above. The National Environmental Policy Act (NEPA) §102(2)(E) directs Federal agencies to "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."

No Action Alternative

The No Action Alternative serves as a baseline from which to measure benefits and impacts to the human environment that may occur because of the Proposed Action. The baseline refers to the existing condition, including past, present, and ongoing activities or actions in the project area. Under the No Action Alternative, Reclamation would not issue a long-term water service contract to the 71 Ranch, Avalanche Unit, no construction would occur, and no water would be diverted from Canyon Ferry Reservoir.

Proposed Action Alternative

The Proposed Irrigation Project includes the construction of a pump station, installation of vertical turbine pumps, water pipelines, center pivots, electrical upgrades, improvements to access roads, use of temporary staging areas, and continued operation and maintenance (O&M) of the proposed system.

Up to 2,880 acre-feet (AF) of water would be withdrawn from Canyon Ferry Reservoir annually to the 71-Ranch, Avalanche Unit distribution system to irrigate approximately 960 acres of land. Implementation of the following would be necessary to complete the proposed action:

Pump House Station

The proposed pump house station would be located on the east shore of Canyon Ferry Reservoir, approximately 0.80 miles (4224') north of Goose Bay Marina and campground. The pump station would be offset approximately 35 feet from the existing high-water mark and above the high-water elevation (3800'). The station would house four vertical turbine pumps.

Specifics components of the pump house station include:

- The pump station building would be a wood framed structure with metal roofing constructed atop a concrete vault to house the centrifugal pumps and associated piping.
- The concrete pump vault would measure 16' 8" wide by 16' 8" in length. The top elevation for the vault would be at 3814' and extend underground to an elevation of 3770'.

- The operational controls would be placed atop the pump vault, housed in the pump station building, and surrounded by chain-link fencing for public safety. Operational controls include pump controls, valving, power supply and control, manifolding, and associated piping.
- The pump may exceed a decibel level of 80 dbA. At 100 feet away it would be heard at 40 dbA and at 1000 feet it would be 20 dbA. Goose Bay Marina is approximately 4224' from the station.
- A seven foot high chain link fence would be constructed adjacent to the pump house to provide protection for the irrigation pipeline as it exits the structure.

Vertical Turbine Pumps

The vertical turbine pumps are designed to move water vertically from underwater locations to the point of use. Vertical turbine pumps are designed so that the motor is located above ground for easy operation and maintenance. The pump impellers are in the submerged shaft of the pump that extend underwater. Four vertical turbine pumps would be located within the pump station.

- Each pump would be designed to convey approximately 1,775 gallons per minute (gpm) and have a design rate of 146 horsepower (hp).
- The total flow rate for the four vertical turbine pumps would equate to 7,100 gpm.
- The vertical turbine pump motors are located at the top of the pump stem, above ground, and housed within a building surrounded by chain-link fencing. All motor control systems and electrical controls will be located immediately adjacent to the pumps.

Pipelines

Water supply would come from a buried 36" diameter High-Density Polyethylene (HDPE) intake pipeline, Johnson Passive Intake Screen, and large Hydroburst screen cleaning system that would be installed into Canyon Ferry Reservoir and connected to the proposed pump station.

- All pipelines on Reclamation lands would be buried. In areas where the pipeline is buried under road crossings, the pipe would be inside a steel carrier pipe to protect the HDPE.
- The pipe would be configured with a check valve, flow meter, pressure gauge, and butterfly valve.
- The intake pipe would be 36-inch diameter HDPE.
- Total length of pipe would be approximately 1,295 feet.
- The Johnson Passive Intake Screen, attached to the end of the intake pipeline, would have 0.125-inch slot openings to allow for adequate flow while minimizing water velocities. The screen is designed with a maximum slot velocity of 0.46 fps and an average of 0.42 fps.
- The screen has a flow capacity of 10,000 gpm.
- The screen has an outside diameter of 46 inches and is approximately 10'-7" wide.

- The intake screens would extend out into the reservoir so that the bottom of the intake screens would be located at an elevation of about 3,771.90'.
- The screen would be outfitted with a large hydroburst cleaning system that includes an air receiver, air compressor, compressor motor, control panel, pressure transducer, pneumatic actuator, solenoid, and butterfly valve.

Construction of the proposed 36" diameter HDPE intake pipe would include a 40-foot-wide swath for construction. The intake pipeline would be buried a minimum of 36 inches below the ground surface, except for where it extends out into the reservoir.

All proposed piping from the pump station to proposed center pivots would be PVC pipe ranging in size from 10-inch to 24-inch diameters. All pipelines would have a minimum bury depth of 36 inches and a maximum construction footprint of 40 feet wide. Table 1 provides a summary of all proposed pipelines.

Table 1: Proposed Pipelines

Pipe Location	Pipe Size (in)	Pipe Type	Length (ft)
Intake Pipe	36	HDPE	1295
Pump Station to Center Pivot #1	24	PVC	2156
Center Pivot #1 to Center Pivot #2	18	PVC	2960
Center Pivot #2 to Center Pivot #3	12	PVC	2980
Center Pivot #2 to Center Pivot #4	12	PVC	2960
Center Pivot #1 to Center Pivot #6	15	PVC	6540
Center Pivot #6 to Center Pivot #5	10	PVC	2680
		Total	21571

Center Pivots

Six proposed center pivots would irrigate approximately 960 acres of land east of Canyon Ferry Reservoir. Center pivots #1 through #4 would each irrigate approximately 155 acres of land with a center pivot radius of approximately 1,475 feet, plus additional end gun coverage area. Center pivot #5 has a radius of approximately 1,075 feet with additional end gun coverage and an irrigated area of approximately 83 acres. Center pivot #6 is the largest center pivot with a radius of approximately 1,585 feet to irrigate approximately 180 acres with no additional end gun coverage. The proposed center pivots are designed to provide a flow rate of approximately 8 gpm/acre for crop demands during dry periods within the summer months. Appendix A, Drawing C-1 shows the location of all proposed center pivots, including irrigated acreages, end gun coverage areas, and proposed pipeline conveyances.

Electrical Upgrades

New power lines would be required to bring electricity to the proposed pump station and center pivots. This would include extensions from the existing overhead power line along Highway 284 to individual center pivots (pivots 3, 4, 5, and 6) and relocation of the existing power line on the west side of the project area to service the proposed pump station and center pivots 1 and 2. All electrical lines would be buried to a depth of 30 inches or greater, as required by MCA 60-4-402

(Rule 18.7.227). The extension from Highway 284 to center pivot #5 would be the only overhead power line and would transition to underground within the center pivot footprint. All proposed electrical transmission lines on Reclamation property would be buried. Total length of electrical transmission lines is approximately 20,106 feet. Appendix A, Drawing C-1 shows the location of all proposed electrical transmission lines.

Access Roads

An existing two-track road off Goose Bay Lane would be modified and improved for operation and maintenance access to the proposed pump station. All access roads on Reclamation-owned property would remain open for public use. Two access roads from Highway 284 would provide access to electrical metering near center pivots #3 and 4 as well as center pivot #6. Wherever possible, access roads would follow existing two-track roads. All proposed access road improvements would utilize the existing topography and minimize excavation and fill except as necessary to provide drivable grades. The total length of proposed access roads is approximately 5,440 feet. Appendix A, Drawing C-1 shows the location of all proposed access roads.

Staging Area

Staging areas near the proposed pump station site would be utilized for storage of pump station materials only. All other staging areas would be located on property owned by 71 Ranch.

Construction

Construction of the pump station, screen, hydroburst system, and intake pipeline would likely occur in the late winter or early spring when the reservoir level is low and is expected to take three to four months to complete. Construction would begin at the shoreline with the excavation and installation of the concrete vault. The excavation depth for the vault would be approximately 45 feet below the ground surface. After the vault is installed, piping for the intake line would be installed towards the reservoir. Earthen sloping, benching, shoring, a trench shield, or a combination would be utilized to safely install the intake pipeline with the use of an excavator. The end of the intake pipeline would extend into the reservoir to a bottom-of-pipe elevation of 3,771.90' and a top-of-pipe elevation of 3,774.90' to be below the Canyon Ferry Reservoir low water elevation of 3,775'. If water levels do not allow for installation to these elevations, the proposed intake pipeline would be installed as far into the reservoir as possible, depending on the water depth during the period of construction. The Johnson Passive Intake Screen with 0.125-inch slot openings would be installed at the end of the intake pipeline. The hydroburst system would be connected to the intake screen and proposed piping for the hydroburst cleaning system would be laid immediately adjacent to the proposed intake pipeline, within the same trench. The intake piping and hydroburst system piping trench would be properly backfilled and compacted to the original ground elevation.

Maintenance

The 71 Ranch would secure a special use permit (SUP) from Reclamation to construct, operate, and maintain the pump station and pipeline on Reclamation owned lands. The 71 Ranch would be responsible for O&M of the irrigation facilities on Reclamation and Avalanche Ranch properties. The proposed roads would provide access for Avalanche Ranch to perform routine O&M activities for the pump station and center pivots.

Affected Environment and Environmental Impacts

The Canyon Ferry drainage basin covers 15,900 square miles of southwestern Montana, east of the Continental Divide. The geography of the basin is characterized by its mountain ranges, forests, and broad river valleys. The climate is considered semi-arid with an average of 14" of precipitation annually. Land use is dominated by agriculture. Because of the dry climate, crops are irrigated where possible.

Certain areas around Canyon Ferry Reservoir are of special concern. These include areas with sensitive surface and groundwater resources, areas of high public use, and fish and wildlife habitat. Sensitive surface water areas include wetlands, floodplains, riparian areas, springs, streams, canals, ponds, and other areas where aquatic vegetation, shallow groundwater, groundwater recharge, and surface water occur.

Hydrological Resources

The proposed Avalanche Irrigation Project is located within the Upper Missouri (10030101) Hydrologic Unit Code (HUC). All streams in the project area flow into Canyon Ferry Reservoir, on to the Missouri River, the Mississippi River, and ultimately the Atlantic Ocean.

Water Quality

Water quality characteristics of greatest concern include chemicals, temperature, biological organisms, taste, odor, and floating material. The Missouri River and its tributaries have historically contained high sediment loading and naturally occurring high concentrations of metals. The State of Montana sets standards to maintain water quality. Rivers, streams, and lakes that do not meet these standards are classed as impaired waters on the 303(d) list. In addition, a total maximum daily load (TMDL) is a regulatory term in the Clean Water Act, describing a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

Canyon Ferry Reservoir exceeds the total maximum daily load (TMDL) for the presence of ammonia, arsenic, and thallium. The TMDL is the maximum amount of a pollutant a waterbody can receive and still support designated uses. Sampling includes bacteria, petroleum chemicals (oil, gas, and grease), pesticides, and other nutrients. In addition, limnological studies have been conducted on the reservoir. Findings indicate that arsenic is naturally occurring and primarily originates from geothermal springs in Yellowstone National Park, while trace amounts can be contributed to past mining activities on the east side of the reservoir. Nutrient levels in the reservoir fluctuate depending on climactic conditions and uses on adjacent properties.

Water Quantity

The Missouri River is the primary source of inflow to the reservoir. Filling of the reservoir begins in early May with peak storage occurring in late June to early July. Major tributaries to the reservoir include Duck Creek, Confederate Gulch, Hellgate Creek, Avalanche Creek, Magpie Creek, and Beaver Creek. In the spring and summer months, however, much of the water in these creeks is

diverted for irrigation, and only a small amount of water reaches the reservoir from these sources. Some inflow to the reservoir is contributed from gravel aquifers beneath the reservoir, but the amount of inflow is unknown.

Groundwater wells located near the project area are typically shallow and completed in the upper member of the Sixmile Creek Formation, which, based on its lithology and well yield, has excellent water bearing properties. There is one water well located within the project area. The average depth of the well is 178 feet below ground level (bgl), with an average static water level of 146 feet bgl (GWIC, 2022).

Wetlands

Executive Order (EO) 11990, and in Section 404 of the Clean Water Act require Federal agencies to avoid activities that affect wetlands and establishes permitting to regulate the discharge of dredged and filled materials into the waters of the United States.

During the field survey, 21 waterbodies and three wetlands were identified within the study area. Final wetland determination is the responsibility of the USACE.

Hydropower Generation

The power plant at the Canyon Ferry Dam has three 13.5-foot diameter penstocks that generate power from three 23,500-horsepower hydraulic turbines. The turbines have a nameplate capacity of 16.667 megawatts each, for a combined capacity of 50 megawatts. The power plant capacity is based on a flow of 6,400 cfs at a maximum head of 160 feet. During years when spills are not required to control the fill of the reservoir, about 93 percent of the water leaving the dam is released through the turbines, producing an average of 405 million kilowatt-hours of energy annually (USGS, 2017B).

Irrigation

The current amount of water available at Canyon Ferry Reservoir for water marketing purposes is estimated at 300,000 acre-feet. Existing irrigation usage of water within the reservoir includes:

- Helena Valley Unit - 18,308 AF
- Crow Creek Unit (Toston Irrigation District) - 6,490 AF
- East Bench Unit - 22,689 AF
- Miscellaneous supplemental water - 25,995 AF.

No Action Alternative

The No Action Alternative would not result in changes to water quality conditions within the project area. Current conditions would remain the same, Canyon Ferry Reservoir would continue to exceed the TMDL for the presence of ammonia, arsenic, and thallium.

Proposed Action Alternative

The Proposed Action Alternative would allow for the construction of a pump station, installation of vertical turbine pumps, water pipelines, center pivots, electrical upgrades, improvements to access roads, use of temporary staging areas, and continued operation and maintenance (O&M) of the proposed system. The proposed action would allow up to 2,880 AF of water from Canyon Ferry Reservoir to be diverted annually to the 71 Ranch, Avalanche Unit distribution system to irrigate approximately 960 acres of land.

Under this alternative, water operations would be balanced to meet power generation, flood control, irrigation, lake and river recreation, fisheries, and municipal uses. The 2,880 AF of proposed annual irrigation water diversion is within the 300,000 AF of total water available at Canyon Ferry Reservoir for water marketing.

The withdrawal of 2,880 AF averaged throughout the irrigation season would reduce river releases by approximately 15 cfs during the months of July, August, and September while operational targets for reservoir elevation are maintained. This is a maximum flow reduction of 0.4 percent. The 30-year average river release from Canyon Ferry reservoir is 5,445 cfs in July, 3,824 cfs in August, and 3,656 cfs in September. During dry water years when river releases are meeting minimum flow targets below Holter Dam, the impact to reservoir elevation is approximately 0.1 feet lower by September 30. The 30-year average elevation on September 30 is 3787.20 feet. Construction of the proposed 36" diameter HDPE intake pipe would include a 40-foot-wide swath for construction. The intake pipeline would be buried a minimum of 36 inches below the ground surface, except for where it extends out into the reservoir.

All proposed piping from the pump station to proposed center pivots would be PVC pipe ranging in size from 10-inch to 24-inch diameters. All pipelines would have a minimum bury depth of 36 inches and a maximum construction footprint of 40 feet wide. Table 1 provides a summary of all proposed pipelines.

The Proposed Action would have a negligible effect on the hydroclimate, water quality, water quantity, reservoir levels, groundwater, wetlands, and hydropower production. In addition, the project would promote an intended purpose of the Pick-Sloan Missouri Basin Program by providing irrigation water.

Minimization Measures

- Best management practices (BMPs) that may be used during construction include straw wattles, silt fences, straw bales, sediment basins, erosion control blankets, surface roughening, and diversion ditches.
- The disposal of waste material (topsoil, debris, excavated material, or other construction-related materials) within any water of the US or drainage way would be minimized to the extent possible.
- All fueling, servicing operations, and fuel storage would be conducted at least 100 feet away from streams, wetlands, and water bodies.
- Stockpiling locations would be limited to upland locations with a vegetative buffer.
- The limits (boundaries) for vegetation clearing and construction in wetlands would be identified by staking, flagging, and fencing to ensure that there is no additional impact from construction activities beyond the work zone.
- Construction staging areas would be limited to upland areas to avoid impacts to wetlands.
- The pump station, pipelines, electrical upgrades, and maintenance roads would be located to avoid and minimize the disturbance of wetlands for the Proposed Project.

Lands, Soils, and Vegetation

The proposed project location on the east side of Canyon Ferry Reservoir is moderately developed for farming and ranching. Native vegetation adjacent to the site is generally upland shrub habitat and consists of sagebrush/bluebunch wheatgrass and mountain mahogany/bluebunch wheatgrass habitat types.

Reclamation has categorized the areas around the shoreline by their land use function. Undeveloped areas, such as the proposed action area, provide valuable riparian and upland habitat for big game animals, waterfowl, non-game birds, and other species. Pipes and pumps related to irrigation systems have an impact on shoreline resources. Motorized access is prohibited in most undeveloped areas to reduce user conflicts and protect natural resources.

Canyon Ferry Reservoir shoreline is valued for its aesthetic appeal, lake access, recreational potential, and wildlife habitat. Shoreline protection and erosion control vary seasonally depending on reservoir elevations and soil properties, including soil structure and cohesiveness, slope, vegetative cover, wind exposure, and seasonal water elevations.

Soils

The soil is a major factor in the suitability of land for sustained irrigation. Its primary influence is on the productive capacity, but it may also influence production and development costs. Several soil characteristics must be evaluated to determine soil suitability for irrigation. Table 2 depicts the main soil types in the areas identified for irrigation.

Table 2: Soil Units in the Project Area

Unit Name **Map Unit Symbol**	**Drainage class**	**Rating**	**Acres in Area of Interest**	**Hydric Soil Rating**
Amesha loam **AoB**	Well drained	Prime farmland if irrigated	~1280	No
Amesha loam **AoC**	Well drained	Farmland of statewide importance	~140	No

Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and crops. It has the soil quality, growing season, and moisture supply needed to produce high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding (USDA SSDS, 2017).

Land that does not meet the criteria for prime or unique farmland is "farmland of statewide importance" to produce food, feed, fiber, forage, and oilseed crops. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable.

Noxious Weeds

Broadwater County has a weed management plan in effect with the mission: "To preserve and enhance the beauty and economic strength of Broadwater County, through control and removal of noxious weeds and invasive species; both on county lands, right-of-way's and in cooperation with private, state and federal land managers."

Montana Code Annotated 7- 22-2101 (8)(ii) gives a county the authority to list local invasive species of concern. These weeds are capable of rapid spread and invasion of lands, rendering lands unfit for beneficial uses.

Noxious, invasive weed species that can be found throughout the area includes spotted knapweed, diffuse knapweed, dalmatian toadflax, leafy spurge, Canada thistle, field bindweed, and houndstongue. Noxious weeds can readily spread in areas of vegetation removal and soil disturbance.

No Action Alternative

Under the No Action Alternative, lands and vegetation within the project area would remain consistent with current conditions. Existing invasive species would continue to persist.

Proposed Action Alternative

The Proposed Action Alternative includes the construction of a pump station, installation of vertical turbine pumps, water pipelines, center pivots, electrical upgrades, improvements to access roads, use of temporary staging areas, and continued operation and maintenance (O&M) of the proposed system. The proposed action would allow up to 2,880 AF of water from Canyon Ferry Reservoir to be diverted annually to the 71 Ranch, Avalanche Unit distribution system to irrigate approximately 960 acres of land.

This would include disturbance to soils in the Proposed Project area. Invasive weed species have a high probability of invading disturbed soils. Invasive weed seeds can be dispersed from motorized vehicles traveling within disturbed areas along roads and construction zones. In areas where farming is the primary objective, weed treatment is an integral component of crop production and would continue.

Irrigation water is a known vector for the transportation of AIS if pumps and pipes are moved from one location to another. The Proposed Action would include the installation of pumps, pipelines, and center pivots that are permanent in nature; these structures would not be moved from one area to another. The main concern with zebra and quagga mussels and aquatic weeds is the potential to clog water conveyance systems and pipelines associated with the project. The Proposed Action would not contribute to the spread of invasive mussels or aquatic weeds.

Minimization Measures

- Per the Canyon Ferry Reservoir Shoreline Management Plan, an erosion control proposal would be prepared in conjunction with the associated right-of-use authorization form.
- BMPs such as straw wattles, silt fence, straw bales, sediment basins, and earthen berms, erosion control blankets, surface roughening, seeding, check dams, preserving natural vegetation, and diversion ditches would be utilized during construction to reduce sedimentation and erosion.
- Montana County Weed Act rules for revegetation of rights-of-way and areas that have the potential for noxious weed infestation recommendations shall be followed.
- All equipment used during construction shall be inspected before and after each use to prevent the spread of invasive species.
- All areas disturbed during construction shall be re-seeded with an approved native seed mixture, followed by monitoring to ensure effectiveness.

Fish, Wildlife, and Avian Species

Fish and Wildlife Coordination Act (16 U.S.C. 661-667e; of 1934), as amended, expanded the instances in which diversions or modifications to water bodies would require consultation with the Fish and Wildlife Service. The 1958 amendments added provisions to recognize the contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. This authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

The Canyon Ferry Reservoir, Montana Act of 1998 (Title X, Public Law 105-277) authorized Reclamation to plan, develop, operate, and maintain opportunities for recreation and fish and wildlife resources. One of the operating objectives at Canyon Ferry is to provide desired river flow conditions to meet the needs of the downstream river fishery and to provide desired conditions for fish, wildlife, and recreational use in the reservoir and the river above the reservoir.

The land and water surrounding the project area offer abundant habitats that include forests, grasslands, and riparian and freshwater habitats. The area in general is known for hunting and fishing opportunities, as well as wildlife viewing. The 5,000-acre Canyon Ferry Wildlife Management Area (CFWMA) located at the southernmost end of the Reservoir provides habitat for wildlife and bird species. Further, the project area is within the Pacific Flyway which includes the most varied waterfowl habitat in North America.

Fish

The Montana Department of Fish Wildlife and Parks (FWP) manages the fishery within the reservoir. The stated goal of FWP is "to maintain a cost-effective multi-species fishery that maintains the current level of angler use during both the open water and ice fishing seasons." The Upper Missouri River Fisheries Management Plan provides management direction for the fisheries within the reservoir and the Missouri River. The Canyon Ferry operations are coordinated between

Reclamation, FWP, and NWE to provide desired flows for the river fishery as allowed by the available water supply.

Historically, anglers fished primarily for rainbow trout (*Oncorhynchus mykiss*) and yellow perch (*Perca flavescens*). However, the establishment of a walleye (*Sander vitreus*) population within the last 20 years has changed the fishery. The predatory nature of walleye has negatively affected the numbers of naturally reproducing species, as well as desired stocked species within the reservoir. In general, the FWP attempts to control the walleye population while simultaneously increasing rainbow trout and yellow perch populations via stocking and habitat enhancement projects.

The most abundant fish species consist of rainbow trout, yellow perch, and walleye and are the most sought-after species for anglers (MT FWP 2019). Other species include burbot and brown trout. Canyon Ferry Reservoir consistently ranks in the top five areas in Montana for days fished.

Aquatic Invasive Species

Aquatic invasive species (AIS) are plants, animals, or pathogens not native to Montana that can cause harm to the environment and economy. In Montana, invasive zebra mussels (*Dreissena polymorpha*) and quagga mussels (*D. bugensis*) were detected for the first time in 2016. AIS are primarily spread from water to water by human activity. Once established in a water body, complete eradication is usually impossible or prohibitively expensive, which is why prevention is so important.

Common carp *(Cyprinus carpio*), found in Canyon Ferry Reservoir, compete with the more desirable sport fish, their bottom-feeding muddies the water, and they reduce the available food for waterfowl. They are extremely hardy omnivores, meaning that they eat almost anything. Carp can reach a weight of 40 pounds in productive waters. In Montana, carp attain their greatest numbers in lakes and reservoirs.

Terrestrial Wildlife

Terrestrial wildlife species that may occur within the project area include black bear (*Ursus americanus*), elk (*Cervus canadensis*), gray wolf (*Canis lupus*), mountain lion (*Puma concolor*), mule deer (*Odocoileus hemionus*), whitetail deer (*O. virginianus*), and pronghorn (*Antilocapra americana*).

The project area is in FWP Region 3, hunting district (HD) 391. The Hensley Ranch block management area (BMA) is partly located within the project boundary; it is a Type II BMA that allows walk-in hunting only. The landowner may place hunter limits on the Hensley Ranch property at any time.

Avian Species

The project area lies along the east shore of Canyon Ferry Reservoir within the Pacific Flyway. In addition, the project area is north of the CFWMA, which provides access to hunting, fishing, wildlife viewing, and other recreational opportunities. The CFWMA is among the designated "birding hotspots" for bird watching in Montana. The vicinity surrounding the site provides resting grounds for birds on their spring and fall migrations, as well as nesting and breeding grounds.

The following laws are set forth for the protection of avian species:

- The Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250) as amended, provides for the protection of these eagles.
- The Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128) as amended regulates impacts to these species such as direct mortality, habitat degradation, and/or displacement of birds.

No Action Alternative

The No Action Alternative would not change the project area from the current conditions, farming and ranching operations would continue, as would fishing and hunting for game animals and certain migratory bird species. Current fish and wildlife management and trends would continue.

Proposed Action Alternative

The Proposed Action Alternative includes the construction of a pump station, installation of pipelines, electrical upgrades, and access roads. The irrigation system would remove approximately 2,880 AF of water annually from the reservoir. This withdrawal, when averaged throughout the irrigation season would reduce river releases by approximately 15 cfs during the months of July, August, and September while operational targets for reservoir elevation are maintained. This is a maximum flow reduction of 0.3 percent. During dry water years when river releases are meeting minimum flow targets below Holter Dam, the impact to reservoir elevation is approximately 0.1 feet lower by September 30.

All Proposed Action in-water improvements would have controls in place, such as low suction velocities (< .5 fps) and intake screens with 1-inch openings to reduce impacts to fish; therefore, having minimal impacts on the fishery resource.

Short-term impacts to wildlife from the Proposed Project would include displacement due to noise and traffic from construction activities. Impacts would be temporary and would cease upon completion of construction.

Minimization Measures

- Power lines would be buried to minimize impacts to birds.
- If bald or golden eagles or their nests are sighted during construction, all work within one mile of the eagle would cease and the USFWS would be contacted immediately. Work would resume after the bird(s) leave(s) the area, the nesting season has been completed, or it is determined by the USFWS that continued work activities would have no significant effect on the eagles.

Threatened and Endangered Species

The study area for threatened and endangered species is based on the potential direct and indirect effects of the Proposed Project on federally listed species (50 CFR 402.02). The aquatic and terrestrial environments are the focus of the assessment of federally listed species that may be influenced by the proposed project. Therefore, the study area consists of all areas where direct project impacts would occur. The baseline from which to measure effects includes the past and ongoing human and natural factors leading to the status of the species, their habitats, and ecosystems in the study area.

The US Fish and Wildlife Service's Information Planning and Consulting (IPaC) database indicates that one listed species that may occur within the project area. The Table 3 provides a list and associated designation.

Table 3: Endangered Species Act Listed Species

Scientific Name	Common Name	Status-
Lynx Canadensis	Canada Lynx	Threatened

Canada Lynx

The Canada Lynx is a medium-sized cat with long legs, large paws, long tufts on the ears, and a short, black-tipped tail. Typical habitat for the lynx is subalpine or boreal forests with deep snow and high-density populations of snowshoe hares, the principal prey of lynx. The Proposed Project is at a lower elevation where there is no documentation of Canada lynx. Suitable habitat for the Canada lynx is found north, west, and east of the project area. Due to the lack of suitable or critical habitat for the lynx, it is unlikely that they would be found within the project area. The Proposed Project would not affect the Canada Lynx.

No Action Alternative

Under the No Action Alternative, current conditions would remain the same. There would be no effect on Canada lynx.

Proposed Action Alternative

Under the Proposed Action, land use would remain the same, the only change would be additional water available for irrigation use. There would be no effect on Canada lynx, as there is no documented occurrence in the project area. In addition, the area does not provide habitat suitable for the lynx.

Recreation

The Reclamation-managed land area surrounding Canyon Ferry Reservoir covers 9,360 acres with 1,000 acres developed for public use and 8,360 acres considered undeveloped. The water surface of the Reservoir covers an area of 32,798 acres open for recreational use, except for the area within the immediate vicinity of the Dam. Water-based recreation such as fishing and boating provide popular recreation activities. Reclamation property includes 11 campgrounds with 233 campsites, six picnic

areas, nine swimming beaches, 11 boat launch ramps, three marinas, and two RV parks. Hellgate and Goose Bay campgrounds are nearest to the project area.

Water-based recreation includes boating, boating-related activities, and swimming. Sportfishing is one of the main recreational opportunities in the reservoir. Hunting for both small and large game animals is popular along the Missouri River and its tributaries. Camping is also a popular activity. Recreation has grown far beyond original expectations as recreation facilities have become more developed and the opportunities have increased. Recreation is also a source of income for businesses catering to boating, hunting, fishing, camping, and other activities.

No Action Alternative

The No Action Alternative would not impact fishing, boating, swimming, camping, or hunting within the project area. The existing opportunities would remain unchanged and recreational activities would continue.

Proposed Action Alternative

The Proposed Action Alternative includes the construction of a pump station, installation of pipelines, center pivots, electrical upgrades, and improvements to access roads. All Proposed Action in-water improvements would have controls in place to reduce impacts to fish, therefore, having minimal impacts on fishing recreation. Temporary impacts to fishing recreation may be experienced during construction because of heavy equipment, construction materials, and construction workers being onsite. Water demand under the Proposed Action would not have a negative impact on the reservoir water level; therefore, fishing recreation would not be impacted. However, the proposed pump station would reduce access to shoreline fishing in that focused area. Additionally, the access road to the proposed pump station would be restricted to authorized personnel only.

The Proposed Action would have a negligible impact on reservoir water levels. Impacts to boating and swimming would consist of placing buoys and signs near all in-water improvements to alert boaters and swimmers; however, these efforts would improve public safety.

Minimization Measures

- Buoys and signage would be placed near all in-water structures to alert boaters and swimmers.
- The pump station area would be fenced to prevent access to this area.

Air Quality, Noise, and Visuals

Air Quality

The Clean Air Act, as amended, requires the Environmental Protection Agency (EPA) to establish air quality standards for pollutants considered harmful to public health and the environment by setting limits on emission levels of various types of air pollutants. Criteria pollutants tracked under EPA's National Ambient Air Quality Standards (NAAQS) include SO2 (sulfur dioxide), PM (particulate matter), NO2 (nitrogen dioxide), O3 (ozone), Pb (lead), and CO (carbon monoxide).

According to EPA's AirData interactive map, there are no monitoring stations for the six criteria pollutants within the project area (EPA, 2021). According to the EPA AirData interactive map, the closest active monitoring site is the Rossiter Pump House located approximately 17 miles northwest of the project area. This site monitors fine particulate matter ($PM_{2.5}$) levels to inform of potential health risks.

The principal sources of Montana's Greenhouse Gas (GHG) emissions are electricity use (excluding electricity exports) and agriculture, each accounting for about 27% of Montana's gross GHG emissions (IPCC 2007). The next largest contributor to emissions is the transportation sector. According to the Montana GHG Inventory and Reference Case Projections (1990-2020), Montana's gross GHG emissions are rising at about the same rate as the nation.

The project area has minor sources of air pollution that include vehicular traffic, home heating, agriculture, and dust storms. On occasion, exposed areas with erodible soils, such as roads, plowed fields, and reservoir mudflats exposed during low water events produce dust pollution. In addition, wildfires throughout the region often contribute to poor air quality during the summer months.

Noise

The project area can best be described as a rural area with minor noise resulting from transportation in the area, whether boating traffic on the reservoir or vehicular traffic on Highway 284 and other local roads. According to the EPA, outdoor noise levels range from 30 to 40 decibels (db) in wilderness areas to 85 to 90 db in urban areas.

The primary source of noise in the area comes from marine transportation such as boats and jet skis, as well as vehicular traffic and agricultural activities. During the summer months, boats, jet skis, campers, and other recreational equipment generate noise during the daylight hours, with lower amounts of noise at night.

Montana has established noise standards for all vessels. Operation of a motorboat or personal watercraft that emits noise over 86 db at 50 feet or emits exhaust noise over 90 db measured one meter from the muffler at idle speed is unlawful. No-wake zones, policy adoption, and law enforcement help regulate noise levels at the reservoir.

For vehicular transportation, MCA 61-9-435 states that a motor vehicle with an exhaust system that emits noise over 95 db is unlawful. Highway 284 is the major transportation route and extends about 1.5 miles through the project area. The two-lane highway is classified as a major collector that averages 625 vehicles daily. Additionally, local roads funnel traffic to Highway 284 and contribute to noise in the project area. Vehicle noise from all traffic routes within the project area is typically minor due to noise restrictions on most vehicles. Other sources of noise within the project area come from tractors, center pivots, and other agricultural equipment.

Visuals

From a visual perspective, Canyon Ferry Reservoir generally appears rural and remote. The northern end of the reservoir offers views of Ponderosa Pine-studded rolling hills on the north, east, and west sides of Canyon Ferry Reservoir, with the water surface stretching to the south. The hills vary in size and height and offer topographic and vegetative cover that masks portions of development in the area. The Big Belt (east) and the Elkhorn (west) mountains provide scenic vistas across the reservoir.

Recreation areas near the Proposed Project boundary include the Hellgate and Goose Bay Campgrounds as well as Avalanche Gulch. These areas located along the eastern shoreline of Canyon Ferry Reservoir are lower in elevation than the adjacent plains; as a result, Highway 284 is not generally visible from within each campground.

No Action Alternative

Under the No Action Alternative, effects to air quality, noise, and visuals within the study area would remain consistent with the condition. The project area has minor sources of air pollution from transportation and agricultural activities.

Proposed Action Alternative

The Proposed Action Alternative includes the construction of a pump station, installation of pipelines, electrical upgrades, and access roads. During this short construction period, the local area would experience very minor changes to air quality resulting from construction equipment and soil disturbance. The construction period would also generate additional noise in the immediate area. Both air quality and noise from project construction would be very minor and would cease upon completion. Following completion of the Proposed Action, the water pumps would produce noise while in operation during the irrigation season; however, these sounds would be like existing levels of farming operations and recreational activities. Visually, the shoreline of Canyon Ferry Reservoir would be altered by the addition of the pump station house and water pipelines. Because of the location, this alteration would only be visible from the reservoir and would not greatly diminish the scenic integrity of the area. The Proposed Action would not impact air quality, noise, or visual properties in the area during operational periods.

Minimization Measures

- The pump house would be constructed utilizing materials and colors consistent with the surrounding environment.
- Responsible farming management practices would be utilized to minimize emissions and air quality concerns during construction.
- Pumps would be designed to ensure compliance with all applicable State of Montana and EPA noise limits/regulations.

Cultural, Historic, and Paleontological Resources

Section 106 of the National Historic Preservation Act of 1966 (NHPA) must be applied for federal undertakings. A cultural resource, or as defined by Code of Federal Regulations 36 CFR §800.16 (l) (1) Historic property, means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

Cultural resource sites are evaluated by criteria set forth by the National Register Criteria for Evaluation. Sites determined eligible for listing in the NRHP are treated the same as if they were listed in the NHRP. An adverse effect to an eligible site or the loss of the resource must be mitigated through implementation of an approved mitigation plan. Reclamation, as the lead federal agency for the NHPA, will consider the effects of the proposed undertaking on historic properties in consultation with the Montana State Historic Preservation Office (SHPO), and/or Tribal Historic Preservation Office (THPO) should properties of cultural significance to tribes be discovered during the inventory. Additionally, Reclamation will consult with the Montana DNRC as part of the proposed undertaking is located on state land under the jurisdiction of DNRC. Reclamation will consult with the Advisory Council on Historic Preservation (ACHP) on adverse effect determinations. The ACHP will then determine its level of participation. Mitigation would be implemented if necessary.

The Paleontological Resources Preservation Act of 2009 directs Reclamation and other federal agencies to issue regulations for the management and protection of paleontological resources. The Montana Antiquities Act, as amended (1995), provides the law for paleontological resource management on state lands. Should any paleontological resources be discovered during construction, all work will be stopped, and Reclamation, the SHPO and the DNRC on state land, and all appropriate authorities will be contacted.

No Action Alternative

Under the No Action Alternative, current conditions would remain the same. There would be no effect on cultural, historic, or paleontological resources.

Proposed Action Alternative

In compliance with Section 106, a Class III cultural resource inventory was conducted by archaeological contractor Ethnoscience, Inc. of Billings, Montana. Historic properties were located during the inventory. Reclamation consulted with the Montana State Historic Preservation Office (SHPO). Reclamation made a determination of no adverse effect with concurrence from the Montana State Historic Preservation Office (SHPO). In addition, Reclamation consulted with the Montana Department of Natural Resources and Conservation (DNRC) as the cultural resource

inventory corridor extended slightly onto DNRC land; however, the undertaking will not impact state land. The DNRC consulted with the SHPO under the Montana Antiquities Act with a determination of no effect to heritage properties on state land.

Under the Proposed Action Alternative, it has been determined that no adverse effect to historic properties would occur.

Minimization Measures

- Should any cultural resources be found during construction, work would be halted, and Reclamation and other appropriate agencies would be contacted. The 71 Ranch, Avalanche Unit would work with Reclamation and all appropriate agencies to determine the appropriate steps to avoid any effects on cultural, historical, and paleontological resources.
- Should any human remains, funerary objects, sacred objects, or objects of cultural patrimony be discovered inadvertently during construction or project activity, work would be halted in the area and a reasonable effort made to protect the discovery. Reclamation, the Montana State Archaeologist, the DNRC Archaeologist, County Coroner (for human remains on private and state lands), and other appropriate agencies would be immediately contacted by telephone along with written confirmation to Reclamation with respect to Federal lands. The 71 Ranch, Avalanche Unit would work with Reclamation and all appropriate agencies to determine the appropriate steps to proceed according to the Native American Graves Protection and Repatriation Act of 1990 and the Montana Human Skeletal Remains and Burial Protection.

Indian Trust Assets and Environmental Justice

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States for Indian tribes or individuals, or property that the United States is otherwise charged by law to protect. This is consistent with the Indian Self-Determination and Education Assistance Act (25 CFR Part 900.6) which defines a trust resource as "an interest in land, water, minerals, funds, or other assets or property which is held by the United State in trust for an Indian tribe or an individual Indian or which is held by an Indian tribe or Indian subject to a restriction on alienation imposed by the United States." It is the policy of Reclamation to carry out its activities in a manner which protects ITAs and avoids adverse impacts when possible.

Federal agencies are required to consider the impacts of Federal actions on minority and low-income populations and communities, as well as the equity of the distribution of benefits and risks of those decisions. If significant impacts to minority and low-income populations and communities are identified during the scoping and/or planning process, the environmental document should clearly evaluate and state the environmental consequences of the Proposed Project.

No Action Alternative

Under the No Action Alternative, current conditions would remain the same. There would be no effect on ITAs or Environmental Justice.

Proposed Action Alternative

There would be no effect on ITAs or Environmental Justice because of the Proposed Action.

Cumulative Impacts

Cumulative effects are the impact on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions (40 CFR § 1508.7). As required by NEPA, Reclamation has prepared this assessment in consideration of cumulative impacts related to the alternatives considered in the EA.

Reclamation has examined the potential for significant environmental effects to hydrological resources, lands, soils, and vegetation, fish, wildlife, and avian species, threatened and endangered species, recreation, air quality, noise and visuals, and cultural, historic, and paleontological resources. Federal and State regulations designed to protect fish and wildlife resources, important habitats and sensitive areas, cultural and paleontological resources, human health and safety, and the public interest provide the legal basis for evaluations.

The Canyon Ferry Unit of the Pick-Sloan Missouri Basin Program was authorized as a multiple-purpose project, contributing to electrical production, flood control, municipal water supply, and irrigation in the upper Missouri Basin. The original project purposes were later supplemented for fish and wildlife conservation and recreational usage.

Past and ongoing activities that may occur within or near the study area include livestock grazing, agricultural production, recreation, home-site development, and routine road maintenance. Future actions in the area include continued operation and maintenance to Canyon Ferry Dam and appurtenant structures. Cumulatively, these past actions and associated activities have altered the landscape within the project area and shaped the existing condition.

No Action Alternative

Under the No Action Alternative, the 71 Ranch, Avalanche Unit would not receive 2,880 AF of water withdrawal annually from Canyon Ferry Reservoir for irrigation. The irrigation pump station, water pipelines, electrical upgrades, or access roads would not be constructed. Current uses in the area would continue without the benefit of contract water for crops.

Proposed Action Alternative

The Proposed Action would result in the issuance of a long-term water service contract to the 71 Ranch, Avalanche Unit. Cumulative effects would include:

- Minimal impacts to downstream water users would result from the annual removal of 2,880 AF from the reservoir.

- Minimal impacts to surface water quality would occur during construction and from increased irrigation.
- Impacts to aquatic communities would be negligible providing all minimization measures are implemented. Impacts would be localized near the pump station due to pumping (long-term) and construction activities (short-term).
- Wildlife could experience temporary displacement during construction.
- Minimal impacts to wildlife and soils would result from the removal of vegetation.
- Implementation of minimization measures would decrease or eliminate any impact on eagles and migratory birds.
- The Proposed Action would not contribute to the decline of Canada lynx.
- Ground disturbing activities have the potential to spread noxious weed species; however, with the application of the proposed mitigation measures, impacts would be short-term. There would be no impacts from AIS species.
- There would be minimal impacts during construction from particulate matter generation from construction activities. Cumulatively, post-construction activities such as operating the irrigation system and farming could contribute to greenhouse gas emissions but would result in minuscule impacts to air quality.
- The pump station would be visible from the reservoir, but not obtrusive. The scenic integrity of the area would not diminish because of the irrigation system since this is an area of existing agricultural activity.

Under this Alternative, temporary direct impacts would include minor construction traffic, noise, dust, and vehicle emissions in the project area. Land disturbing impacts associated with the construction of an irrigation pump station, water pipelines, electrical upgrades, and access roads could cause short-term erosion and sedimentation. Construction noises may temporarily displace wildlife that inhabits the area, but they would return to favorable conditions upon completion of construction activities.

The Proposed Action would provide long-term improvements for water delivery to 960 acres, thus improving crop production over the long term. Overall, cumulative impacts would be negligible in the project area since only minor features would be added to the landscape.

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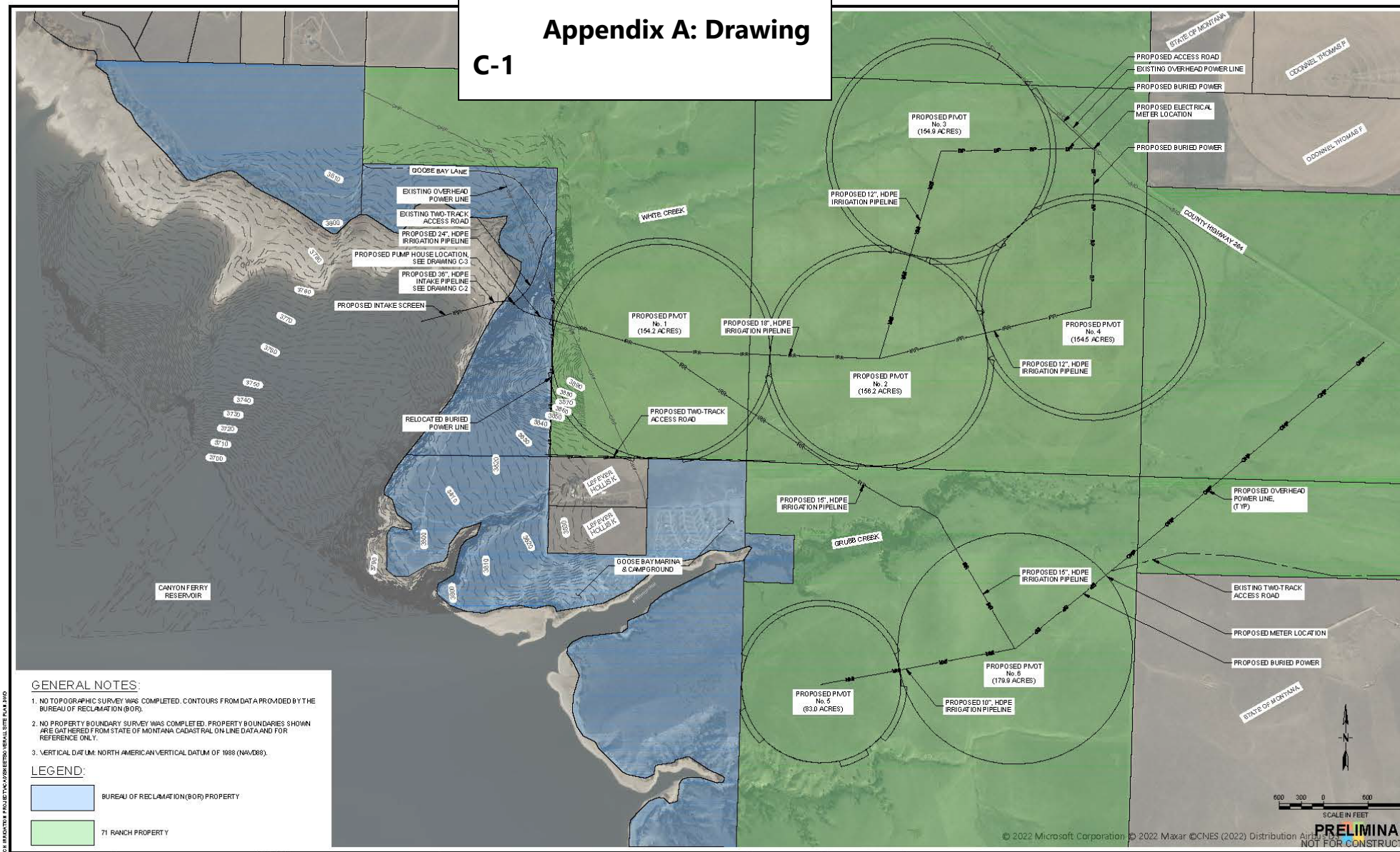
Appendix A: Drawing C-1



GENERAL NOTES:

1. NO TOPOGRAPHIC SURVEY WAS COMPLETED. CONTOURS FROM DATA PROVIDED BY THE BUREAU OF RECLAMATION (BOR).
2. NO PROPERTY BOUNDARY SURVEY WAS COMPLETED. PROPERTY BOUNDARIES SHOWN ARE GATHERED FROM STATE OF MONTANA CADASTRAL ON-LINE DATA AND FOR REFERENCE ONLY.
3. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

LEGEND:

BUREAU OF RECLAMATION (BOR) PROPERTY

71 RANCH PROPERTY

VERIFY SCALE
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MODIFY SCALE ACCORDINGLY!

REVISIONS

NO.	DESCRIPTION	BY	DATE

PLOTTED BY GARY VERTO ON Jun/23/2022

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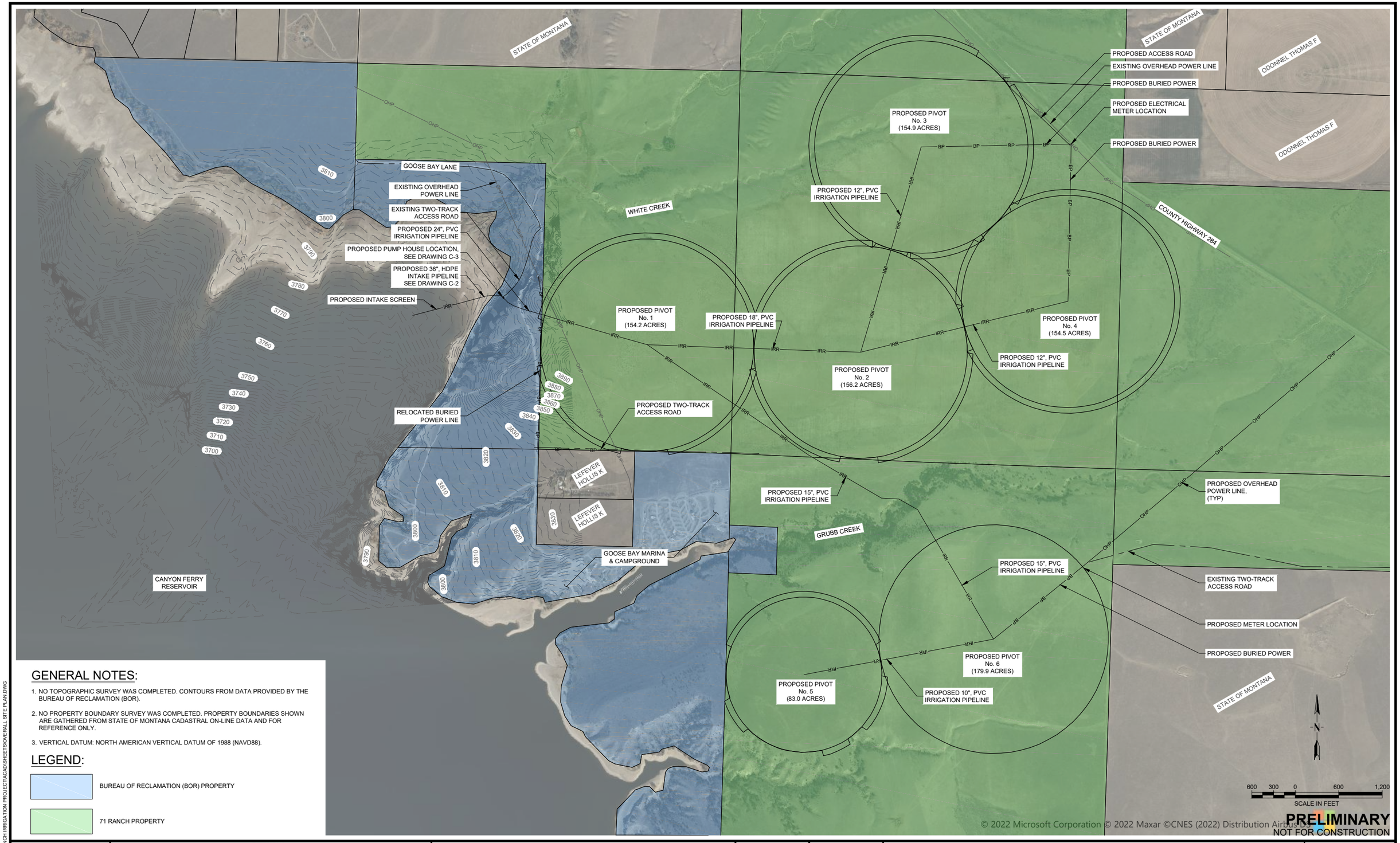
DSGN. BY:	GPV
APPR. BY:	GPV
DATE:	06/2022
Q.C. REVIEW BY:	
DATE:	

AVALANCHE RANCH IRRIGATION PROJECT
BROADWATER COUNTY MONTANA
OVERALL SITE PLAN

PROJECT NUMB 10150.001
SHEET NUMBE 1
DRAWING NUMB C-1

Appendix A



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R:\10150\001_AVALANCHE RANCH IRRIGATION PROJECT\ACAD\SHEETS\OVERALL SITE PLAN.DWG

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AVALANCHE RANCH IRRIGATION PROJECT

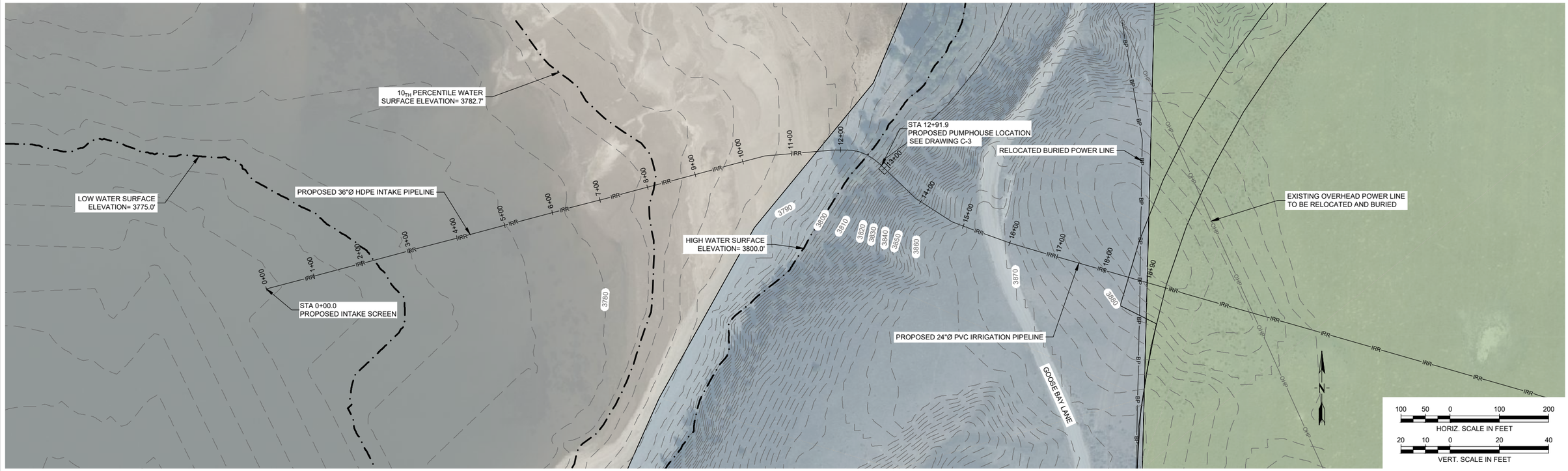
BROADWATER COUNTY MONTANA

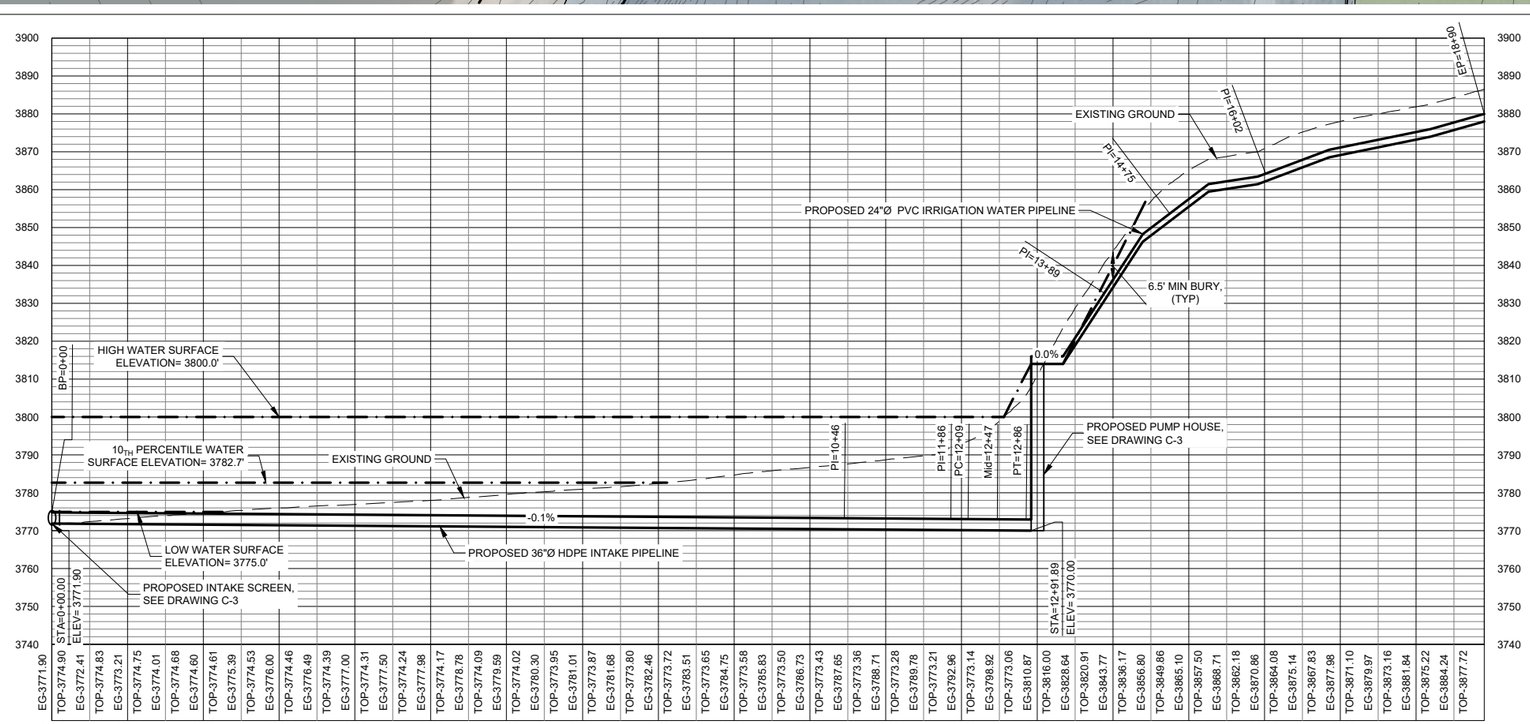
OVERALL SITE PLAN

PROJECT NUMBER 10150.001

SHEET NUMBER 1

DRAWING NUMBER C-1





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AVALANCHE RANCH IRRIGATION PROJECT
BROADWATER COUNTY MONTANA
INTAKE PIPELINE PLAN AND PROFILE

PROJECT NUMBER 10150.001
SHEET NUMBER 2
DRAWING NUMBER C-2

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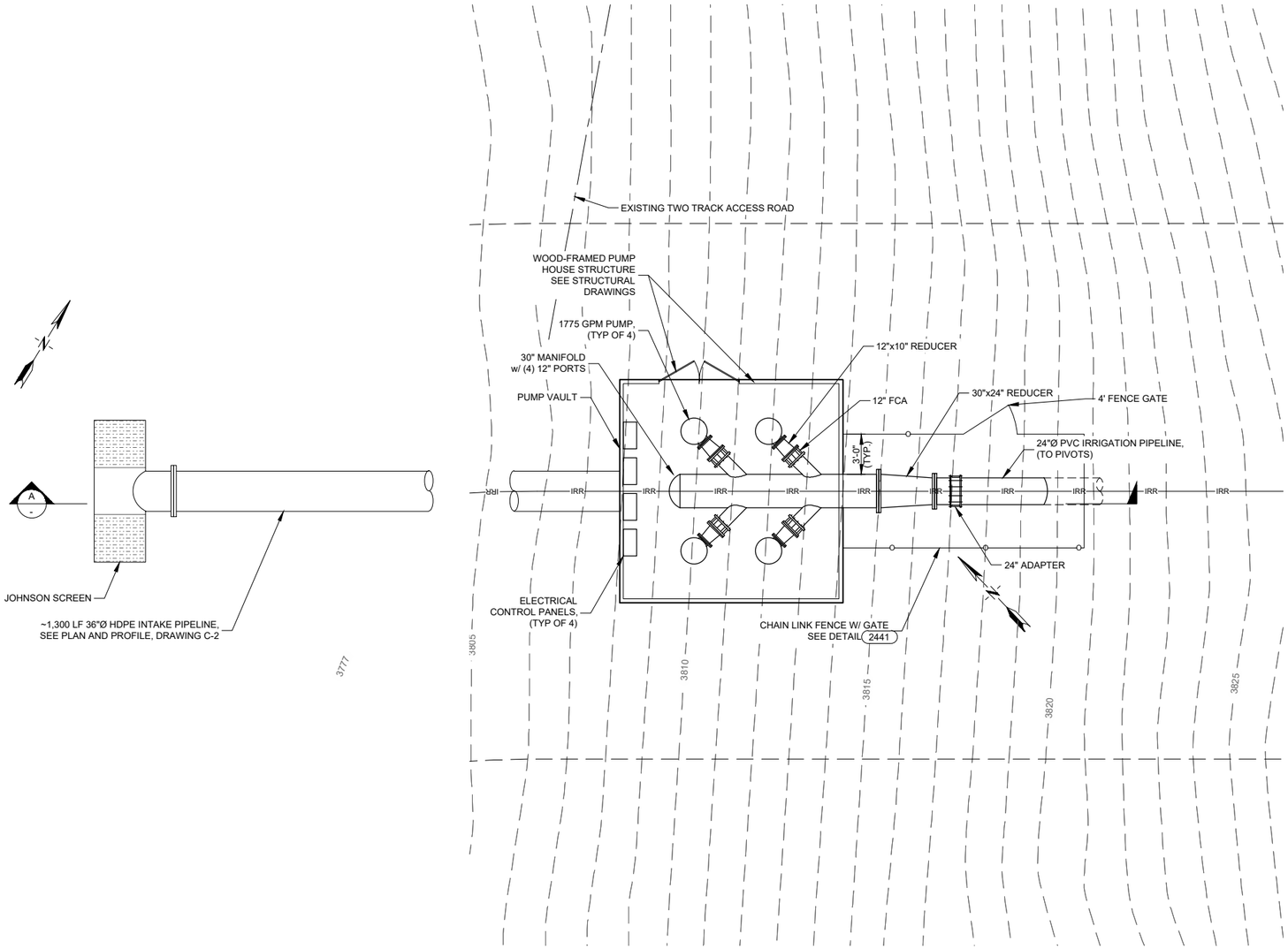
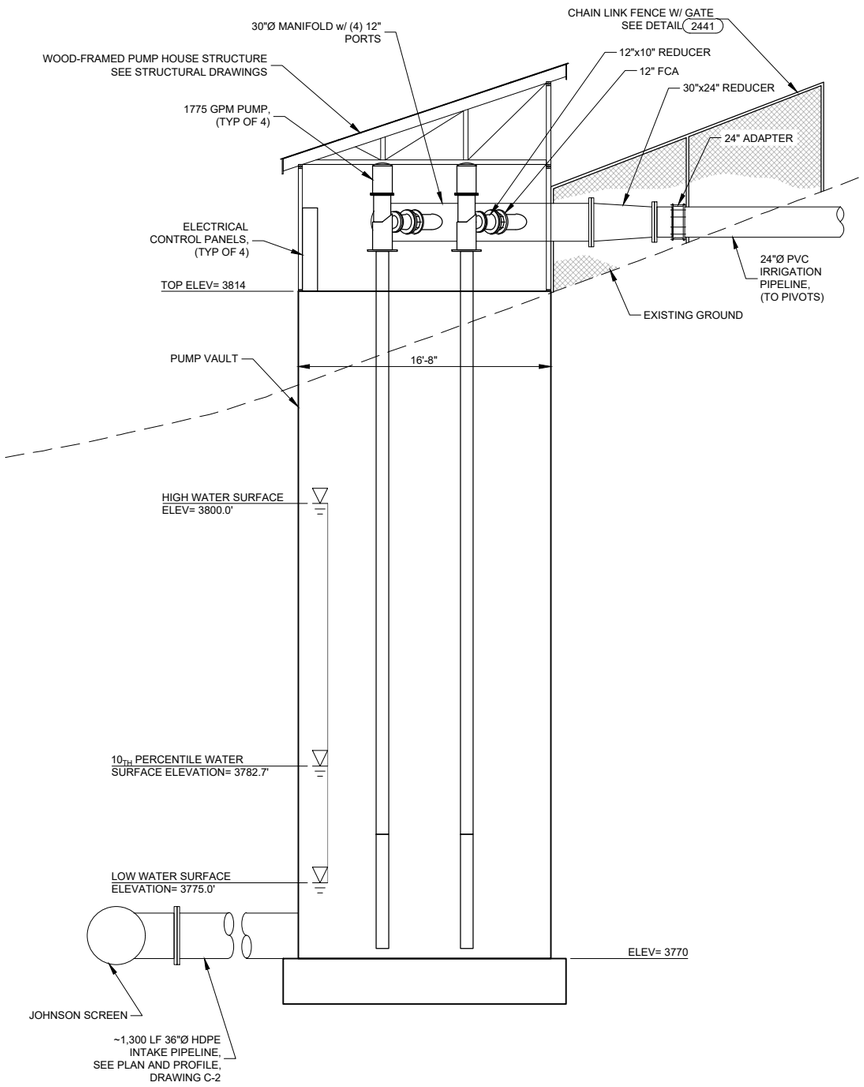


PUMPHOUSE PLAN

SCALE: 1" = 5'-0"



A - PUMPHOUSE SECTION

SCALE: 1" = 5'-0"

PRELIMINARY
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DATE:

AVALANCHE RANCH IRRIGATION PROJECT

BROADWATER COUNTY MONTANA

PUMPHOUSE PLAN AND ELEVATION

PROJECT NUMBER 10150.001

SHEET NUMBER 3

DRAWING NUMBER C-3

GENERAL STRUCTURAL NOTES

GENERAL

1. BASIC DESIGN CODE: INTERNATIONAL BUILDING CODE, 2021 EDITION CONCRETE STRUCTURES: ACI 350, ACI 318.

2. ALL MATERIALS, WORKMANSHIP AND DESIGN BY OTHERS SHALL CONFORM TO THE 2021 IBC UNLESS NOTED OTHERWISE BY DRAWINGS AND SPECIFICATIONS.

3. DESIGN CRITERIA
   SEISMIC DESIGN: SITE CLASSIFICATION = D , OCCUPANCY IMPORTANCE FACTOR = 1.0
   SITE GROUND MOTION: Ss = 0.583, Fa = 1.33, S1 = 0.184, Fv = 2.23
   SEISMIC DESIGN CATEGORY 'D'
   SEISMIC RESISTANCE SYSTEM: WOOD SHEAR WALL
   BASIC WIND SPEED 90 MPH, EXPOSURE C, IMPORTANCE FACTOR 1.0
   ROOF LIVE LOAD (SNOW) 40 PSF

4. STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH CIVIL, MECHANICAL, ELECTRICAL DRAWINGS FOR BIDDING AND CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

5. DRAWINGS INDICATE GENERAL AND TYPICAL DETAILS OF CONSTRUCTION. WHERE CONDITIONS ARE NOT SPECIFICALLY INDICATED BUT ARE OF SIMILAR CHARACTER TO DETAILS SHOWN, SIMILAR DETAILS OF CONSTRUCTION SHALL BE USED, SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER.

6. REPETITIVE FEATURES ARE NOT DRAWN IN THEIR ENTIRETY AND SHALL BE PROVIDED AND CONSTRUCTED COMPLETELY AS IF DRAWN IN FULL.

7. VERIFY ALL ROUGH-IN DIMENSIONS FOR EQUIPMENT PROVIDED IN THIS CONTRACT, OR BY OTHERS.

8. VERIFY SIZE AND LOCATION OF, AND PROVIDE; ALL OPENINGS THROUGH ROOFS, FLOORS, AND WALLS; ACCESS DOORS FURRING, CURBS, ANCHORS, AND INSERTS. PROVIDE ALL BASES, AND BLOCKING REQUIRED FOR ACCESSORIES, MECHANICAL, ELECTRICAL, AND OTHER EQUIPMENT.

9. LINE OF EXISTING GRADES, AS SHOWN ON THE BUILDING AND STRUCTURE ELEVATIONS AND SECTIONS ARE APPROXIMATE. THESE GRADES ARE SHOWN AT THE BUILDING FACE OR AT THE SECTION END EXCEPT AS NOTED.

10. UNLESS OTHERWISE NOTED, PLAN DIMENSIONS ARE TO COLUMN GRID ON CENTERLINES, NOMINAL SURFACE OF MASONRY, FACE OF STUDS AND FACE OF CONCRETE WALLS.

11. "FLOOR LINE" REFERS TO TOP OF CONCRETE SLABS. FINISH FLOORING IS INSTALLED ABOVE THE FLOOR LINE. FOR DEPRESSED FLOORS AND CURBS, SEE STRUCTURAL DRAWINGS.

12. WHERE DOOR IS LOCATED NEAR CORNER OF ROOM AND IS NOT LOCATED BY DIMENSION ON PLAN OR DETAILS. DIMENSION SHALL BE 4 INCHES FROM FACE OF STUD (WALL) TO FACE OF ROUGH OPENING.

EXCAVATION, FOUNDATIONS, BACKFILL

1. GEOTECHNICAL PARAMETERS SHALL BE PER PRESCRIPTIVE REQUIREMENTS AS DEFINED IN THE 2021 IBC.

2. DATA ON INDICATED SUBSURFACE CONDITIONS ARE NOT INTENDED AS REPRESENTATIONS OR WARRANTIES OF CONTINUITY OF SUCH CONDITIONS. IT IS EXPRESSLY UNDERSTOOD THAT OWNER AND ENGINEER WILL NOT BE RESPONSIBLE FOR INTERPRETATIONS OR CONCLUSIONS DRAWN THEREFROM BY THE CONTRACTOR. THE DATA ARE MADE AVAILABLE FOR CONVENIENCE OF THE CONTRACTOR.

3. STABILITY OF CONSTRUCTION EXCAVATION AND WORKER SAFETY ARE THE RESPONSIBILITY OF THE CONTRACTOR. BASED UPON THE GEOTECHNICAL REPORT, TEMPORARY CONSTRUCTION EXCAVATIONS TO BE PLANNED IN ACCORDANCE WITH OSHA PROVISIONS SHOULD ASSUME TYPE A AND TYPE C MATERIAL CONDITIONS. SEE REPORT FOR MORE DETAILS.

4. SHORE ALL EXCAVATIONS AND PROVIDE DE-WATERING SYSTEMS AS REQUIRED FOR THE WORK AND TO PREVENT SUBSIDENCE OR DAMAGE TO ADJACENT EXISTING STRUCTURES, UTILITIES, STREETS, ETC. DESIGN OF SHORING AND DE-WATERING SYSTEM IS THE CONTRACTOR'S RESPONSIBILITY. COMPLY WITH ALL GOVERNING LOCAL, STATE AND FEDERAL REGULATIONS. DEWATERING DURING CONSTRUCTION MUST MAINTAIN GROUNDWATER LEVEL A MINIMUM OF 2 FEET BELOW LOWEST POINT OF EXCAVATION.

5. PROPER DRAINAGE SHALL BE MAINTAINED DURING CONSTRUCTION TO KEEP SURFACE RUNOFF FROM ENTERING THE EXCAVATIONS AND DIRECTED AWAY FROM THE STRUCTURE.

6. BACKFILL IMMEDIATELY AROUND BURIED STRUCTURES REQUIRES IMPORTED ENGINEERED STRUCTURAL FILL, LEAN CLAY, AND TOPSOIL WHERE APPROPRIATE SEE SPECIFICATIONS FOR DETAILS ON REQUIREMENTS FOR BACKFILL AROUND STRUCTURES,

7. USE ONLY HAND OPERATED COMPACTION EQUIPMENT WITHIN 5 FT. OF STRUCTURES.

PRECAST CONCRETE

1. CONCRETE MINIMUM 28-DAY COMPRESSIVE STRENGTH FOR PRESTRESSING MEMBERS SHALL BE 6000 PSI. CONCRETE STRENGTH AT TRANSFER OF PRESTRESS SHALL BE 4000 PSI.

2. MILL STEEL REINFORCING SHALL CONFORM TO ASTM A615 EXCEPT BARS WHICH MEET ASTM A706 SHALL BE PROVIDED WHERE THE BARS IS TO BE WELDED.
   PRE STRESSING STEEL STRANDS SHALL BE ASTM A416 GRADE 270, SEVEN WIRE.

3. ALL REINFORCING AND CONNECTING DETAILS SHOWN ARE FOR SERVICE LOADS ONLY. THE PRECAST/PRE-STRESSING CONCRETE SUPPLIER SHALL DESIGN AND PROVIDE ALL MILD STEEL REINFORCING, PRE STRESSING, AND CONNECTION DETAILS NECESSARY FOR HANDLING, SHIPPING, AND ERECTION LOADS. SUBMIT SHOP DRAWINGS AND DESIGN CALCULATIONS TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS AND CALCULATIONS SHALL BEAR THE STAMP OF A LICENSED STRUCTURAL ENGINEER IN THE STATE OF MONTANA.

4. THE PRECAST/PRESTRESSED CONCRETE SUPPLIER SHALL DESIGN THE PRECAST/PRE-STRESSED MEMBERS IN ACCORDANCE TO THE REFERENCED DESIGN CODES FOR THE LIVE AND DEAD LOADS SHOWN ON THE PLANS IN ADDITION TO THE MEMBER DEAD LOAD AND ANY APPLICABLE COLLATERAL LOADS. SHOP DRAWINGS AND CALCULATIONS SHALL BEAR THE STAMP OF A REGISTERED LICENSED STRUCTURAL ENGINEER IN RESPONSIBLE CHARGE OF THE THEIR PRODUCTION.

5. DEFLECTION LIMITS/CRITERIA
   BEAMS---------- L/600 (LIVE LOAD), L/480 (TOTAL LOAD)
   HOLLOW CORE SLABS---- L/600 (LIVE LOAD), L/480 (TOTAL LOAD)

6. ALL THREADED INSERTS SHALL BE AS MANUFACTURED BY SUPERIOR, BURK, OR AS APPROVED. LOOP INSERTS SHALL BE THE WELD NUT TYPE.

7. OPENINGS IN STRUCTURAL PRECAST ELEMENTS FOR GROUTING ANCHOR BOLTS, REINFORCING STEEL, AND EMBEDS SHALL BE PROVIDED BY THE PRECAST/PRESTRESSED CONCRETE MANUFACTURER.

8. PRESTRESSED MEMBERS MAY BE DRILLED OR "SHOT" PROVIDED NO CONTACT IS MADE WITH PRESTRESSING STEEL AND IT IS ACCOMPLISHED IN SUCH A MANNER THAT NO OBJECTIONABLE SPALLING OCCURS, SUCH DRILLING SHALL BE COORDINATED WITH THE PRESTRESSED/PRECAST CONCRETE MANUFACTURER AT NO TIME SHALL ANY AREA CONTAINING PRESTRESSING STEEL BE DRILLED WITHOUT THE PRECAST/PRESTRESSED CONCRETE MANUFACTURER'S PRIOR APPROVAL.

9. OPENINGS IN STRUCTURAL PRECAST ELEMENTS LARGER THAN OR EQUAL TO 4" IN DIAMETER AND ALL OPENINGS SHOWN ON THE DRAWINGS SHALL BE CAST BY PRECAST/PRESTRESSED CONCRETE MANUFACTURER OPENINGS IN STRUCTURAL PRECAST ELEMENTS NOT SHOWN ON THE DRAWINGS AND LESS THAN 4" IN DIAMETER MAY BE CORE DRILLED OR SAW CUT NEATLY. DO NOT CUT REINFORCING WITHOUT THE MANUFACTURER'S APPROVAL.

10. PROVIDE ADDITIONAL DESIGN CALCULATIONS AND DETAILING FOR PRECAST/PRESTRESED MEMBERS TO MEET 3 HOUR FIRE RATINGS (SEE DRAWINGS FOR LOCATIONS).

ROUGH CARPENTRY:

1. MATERIALS:
   A. 2x DIMENSIONAL LUMBER: DOUGLAS FIR-LARCH NUMBER 1.
   B. 4x DIMENSIONAL LUMBER: DOUGLAS FIR-LARCH NUMBER 1.
   C. PRESSURE-TREATED 2x AND 4x LUMBER: HEM-FIR NUMBER 2.
   D. TIMBERS: DOUGLAS FIR-LARCH NUMBER 1.
   E. GLUED LAMINATED TIMBERS:
      a. SIMPLE SPAN BEAMS: 24F-V4 DF/DF
      b. CONTINUOUS AND CANTILEVER BEAMS: 24F-V8 DF/DF
      c. COLUMNS AND TRUSS MEMBERS: 2-DF-L2
      d. GLULAM MEMBERS EXPOSED TO VIEW SHALL CONFORM TO AITC ARCHITECTURAL APPEARANCE GRADE.
   F. LAMINATED VENEER LUMBER: MINIMUM DESIGN PROPERTIES OF F_B = 2,900 PSI, E = 2,000,000 PSI, F_V = 285 PSI
   G. LAMINATED STRAND LUMBER: MINIMUM DESIGN PROPERTIES OF F_B = 2,800 PSI, E = 1,800,000 PSI, F_V = 600 PSI
   H. PARALLEL STRAND LUMBER: MINIMUM DESIGN PROPERTIES OF F_B = 2,900 PSI, E = 2,000,000 PSI, F_V = 290 PSI
   I. WOOD I-JOISTS: AS INDICATED ON THE PLANS
   J. FASTENERS:
      a. NAILS: COMMON WIRE NAILS, ASTM F1667
      b. WOOD SCREWS: CARBON OR STAINLESS STEEL, ANSI/ASME B18.6.1
      c. LAG SCREWS AND BOLTS: ASTM A307
      d. BENT ANCHOR BOLTS: ASTM A36
      e. NUTS: ASTM A563
      f. WASHERS: ASTM F436
      g. PROPRIETARY FASTENERS: AS INDICATED ON THE PLANS
   K. FRAMING CONNECTORS: SIMPSON STRONG-TIE
2. DIMENSIONAL LUMBER AND TIMBERS SHALL BE GRADED AND MARKED ACCORDING TO THE WESTERN WOOD PRODUCTS ASSOCIATION (WWPA) OR WEST COAST LUMBER INSPECTION BUREAU (WCLIB) GRADING RULES. MEMBERS THAT ARE EXPOSED TO VIEW SHALL NOT BE STAMPED AND A CERTIFICATE OF COMPLIANCE BY THE MANUFACTURER SHALL BE PROVIDED IN LIEU OF MARKING.
3. DIMENSIONAL LUMBER SHALL BE DELIVERED WITH MOISTURE CONTENT LESS THAN 19% AND SURFACED S4S. TIMBERS SHALL BE DELIVERED WITH MOISTURE CONTENT LESS THAN 15%.
4. UNLESS NOTED OTHERWISE, ANCHOR SILL PLATES FOR WOOD STUD WALLS TO THE FOUNDATION WITH 5/8" DIAMETER x 7" EMBEDMENT ANCHOR BOLTS AT 4'-0" ON CENTER. PROVIDE AT LEAST TWO ANCHORS IN EACH SILL PLATE. PROVIDE 1/4" THICK x 3" SQUARE WASHER PLATES BELOW NUTS OF ANCHOR BOLTS.
5. WOOD STUD BEARING WALLS THAT WILL NOT BE SHEATHED WITH WOOD STRUCTURAL PANELS SHALL HAVE CONTINUOUS BLOCKING AT 4'-0" ON CENTER INSTALLED PRIOR TO CONSTRUCTING THE FLOOR OR ROOF FRAMING THAT THE WALL SUPPORTS.
6. PROVIDE LEAD HOLES FOR LAG SCREWS AND WOOD SCREWS WHERE WOOD IS SUSCEPTIBLE TO SPLITTING.
7. BUILT-UP STUDS COLUMNS SHALL BE PROVIDED TO SUPPORT FLOOR AND ROOF BEAMS THAT FRAME INTO WOOD STUD BEARING WALLS. THE STUD COLUMNS SHALL MATCH THE WIDTH OF THE BEAM, MINIMUM, AND BE CONTINUOUS TO THE FOUNDATION.
8. FASTEN BUILT-UP STUD COLUMNS, KING STUDS, AND JACK/TRIMMER STUDS AS FOLLOWS:
   A. 2x4 STUDS: (1) ROW OF 10d NAILS AT 6" ON CENTER, STAGGERED, BETWEEN EACH LAMINATION.
   B. 2x6 STUDS: (2) ROWS OF 10d NAILS AT 8" ON CENTER, BETWEEN EACH LAMINATION.
9. PROVIDE DOUBLE TOP PLATES ON BEARING STUD WALLS. AT SPLICES, LAP PLATES 48", MINIMUM, AND FASTEN PLATES WITH (2) ROWS OF 10d NAILS AT 6" ON CENTER.
10. EXTERIOR FASTENERS AND FRAMING CONNECTORS AND FASTENERS AND CONNECTORS FOR PRESSURE-TREATED LUMBER SHALL BE EITHER STAINLESS STEEL OR HOT-DIP GALVANIZED CARBON STEEL. FASTENERS AND CONNECTORS MUST BE OF COMPATIBLE MATERIAL TO PREVENT GALVANIC CORROSION.
11. ALL NON-BEARING PARTITION WALLS SHALL BE INSTALLED WITH A GAP BETWEEN THE TOP PLATE OF THE WALL AND FLOOR OR ROOF FRAMING. THE PARTITIONS SHALL BE ANCHORED TO THE FRAMING WITH A CONNECTOR THAT BRACES THE WALL WHILE PERMITTING THE FRAMING TO FREELY DEFLECT.
12. FOR CONNECTIONS NOT SHOWN OR SPECIFIED ON THE PLANS, UTILIZE THE IBC FASTENING SCHEDULE.

WOOD STRUCTURAL PANEL SHEATHING:

1. WOOD STRUCTURAL PANELS SHALL BE IN ACCORDANCE PS 1, STRUCTURAL PLYWOOD , AND/OR PS 2, PERFORMANCE STANDARD FOR WOOD-BASED STRUCTURAL-USE PANELS .
2. ALL WOOD STRUCTURAL PANELS SHALL BE APA RATED SHEATHING, EXPOSURE 1 PLYWOOD OR OSB.
3. PLACE FLOOR AND ROOF SHEATHING W/ THE LONG AXIS PERPENDICULAR TO SUPPORTS & STAGGER 48-INCHES.
4. DRIVE SHEATHING NAILS (OR OTHER SPECIFIED ATTACHMENTS) FLUSH WITH BUT NOT FRACTURING, THE WOOD PANEL SURFACE.
5. BLOCK ALL EDGES OF SHEARWALL SHEATHING.
6. NAIL ROOF SHEATHING TO FRAMING. FASTENING PATTERN IS AS FOLLOWS: 8d NAILS @ 6" ON CENTER AT ALL PANEL EDGES AND 8d NAILS @ 12" ON CENTER AT INTERIOR PANEL SUPPORTS.

PRE-ENGINEERED / FABRICATED WOOD TRUSSES:

1. TRUSSES SHALL BE DESIGNED IN STRICT ACCORDANCE WITH ALL APPLICABLE REQUIREMENTS OF THE IBC.
2. TRUSSES SHALL BE DESIGNED FOR SNOW AND LIVE LOADS SHOWN PLUS ALL DEAD LOADS INFERRED OR LISTED IN THE DRAWINGS.
3. SUBMIT SHOP DRAWINGS AND CALCULATIONS STAMPED BY AN ENGINEER LICENSED IN THE STATE OF MONTANA TO THE ARCHITECT/ENGINEER FOR REVIEW PRIOR TO FABRICATION.
4. MAX. LIVE (SNOW) LOAD DEFLECTION FOR WOOD TRUSSES SHALL NOT EXCEED L/360 OR 3/4", WHICHEVER IS MORE STRINGENT. TOTAL LOAD DEFLECTION SHALL NOT EXCEED L/240.
5. TRUSS BRIDGING SHALL BE PROVIDED AS REQUIRED BY THE MANUFACTURER.
6. EACH TRUSS SHALL BE LEGIBLY BRANDED, MARKED OR OTHERWISE HAVE PERMANENTLY AFFIXED THERETO THE FOLLOWING INFORMATION LOCATED WITHIN 2 FEET OF THE CENTER OF THE SPAN ON THE FACE OF THE BOTTOM CHORD:
   A. IDENTITY OF THE COMPANY MANUFACTURING THE TRUSS, B) THE DESIGN LOAD, AND C) THE SPACING OF THE TRUSS.
7. TRUSS MEMBERS SHALL NOT BE NOTCHED, DRILLED, OR MODIFIED IN THE FIELD UNLESS CERTIFIED IN WRITING BY THE TRUSS ENGINEER AND APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.
8. UNLESS NOTED OTHERWISE ON PLANS PROVIDE THE FOLLOWING HARDWARE AT ALL TRUSS TO TRUSS CONNECTIONS:
   - MONO TRUSS TO GIRDER TRUSS - SIMPSON LUS26
   - SKEWED MONO TRUSS TO HIP GIRDER TRUSS - SIMPSON U26
   - HIP GIRDER TRUSS TO GIRDER TRUSS - SIMPSON HHU26-2

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AVALANCHE RANCH IRRIGATION PROJECT
BROADWATER COUNTY MONTANA

GENERAL STRUCTURAL NOTES

PROJECT NUMBER 10150.001
SHEET NUMBER 4
DRAWING NUMBER S-1

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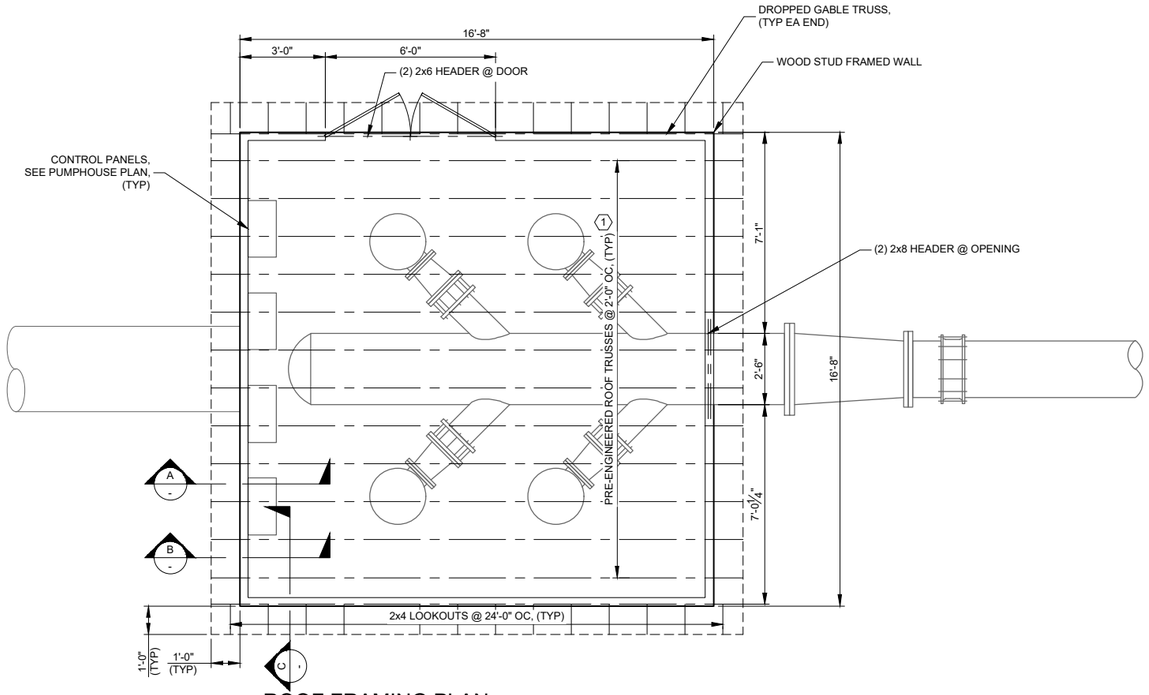
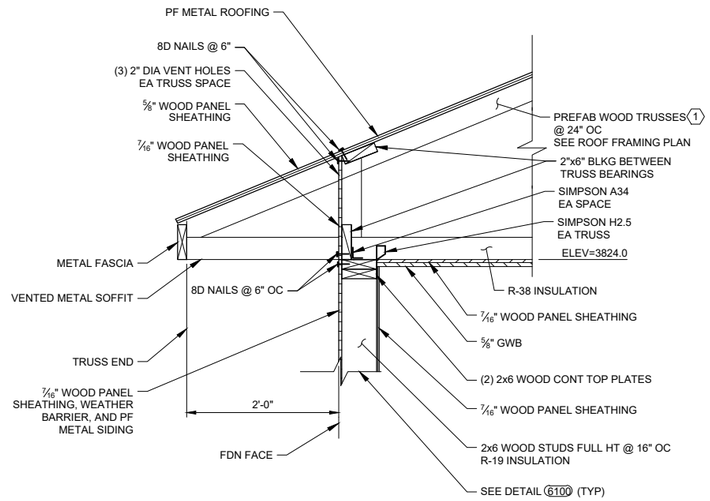


ROOF FRAMING PLAN

SCALE: 3/8" = 1'-0"

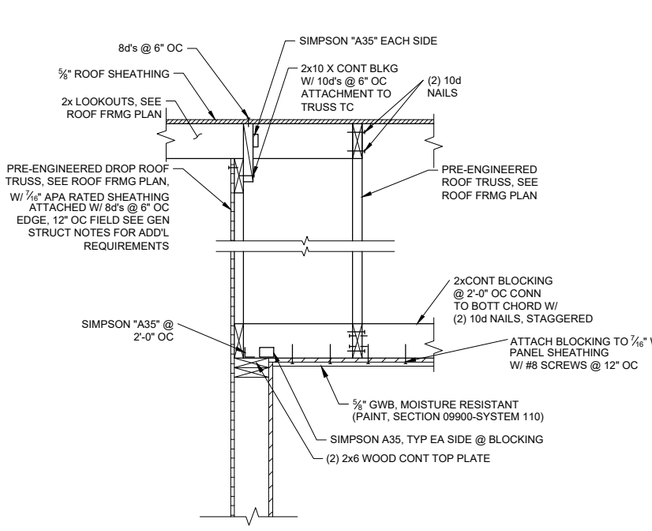
KEY NOTES

1. PRE-ENGINEERED WOOD TRUSS SHAPE (GABLED OR HIP) AND PITCH TBD BY OWNER.



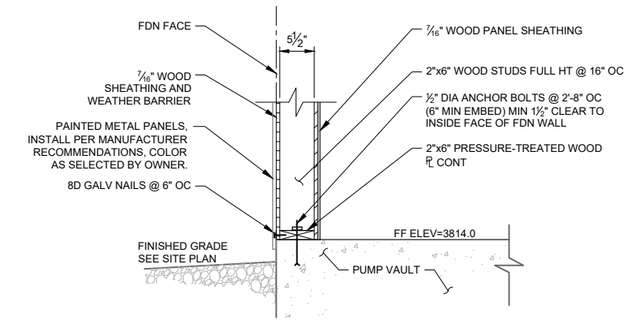
A SECTION

SCALE: 1" = 1'-0"



C SECTION

SCALE: 1" = 1'-0"



B SECTION

SCALE: 1" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.
MODIFY SCALE ACCORDINGLY!

REVISIONS

NO.	DESCRIPTION	BY	DATE

PLOTTED BY:GARY VERT ON Jun/08/2023

Morrison Maierle
engineers ▪ surveyors ▪ planners ▪ scientists
1 Engineering Place
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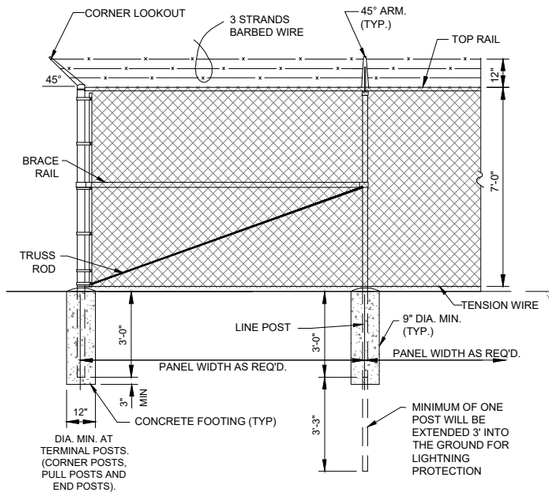
406.442.3050
www.m-m.net

DRAWN BY: DAH
DSGN. BY: MJB
APPR. BY: MJB
DATE: 06/2022
Q.C. REVIEW BY: _____
DATE: _____

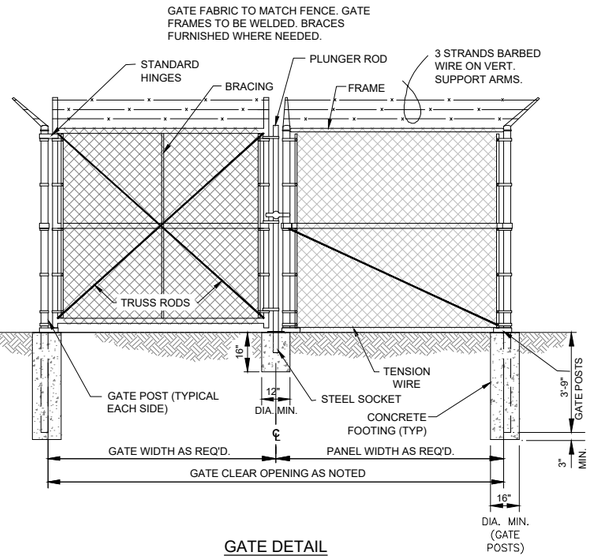
AVALANCHE RANCH IRRIGATION PROJECT
BROADWATER COUNTY MONTANA
STRUCTURAL PLAN, SECTIONS, & DETAILS

PROJECT NUMBER 10150.001
SHEET NUMBER 5
DRAWING NUMBER S-2

R:\10150\001_AVALANCHE RANCH IRRIGATION PROJECT\ACAD\SHEETS\STRUCTURAL.DWG



TYPICAL CORNER PANEL



GATE DETAIL

7 FOOT CHAIN LINK FENCE & GATE DETAIL (2441)

N.T.S.

PRELIMINARY
NOT FOR CONSTRUCTION

VERIFY SCALE!

THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.

MODIFY SCALE ACCORDINGLY!

REVISIONS

NO.	DESCRIPTION	BY	DATE

PLOTTED BY:GARY VERT ON Jun/08/2023

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DRAWN BY: DAH
DSGN. BY: GPV
APPR. BY: GPV
DATE: 06/2022

Q.C. REVIEW
BY: _____
DATE: _____

AVALANCHE RANCH IRRIGATION PROJECT
BROADWATER COUNTY MONTANA
STANDARD DETAILS

PROJECT NUMBER 10150.001
SHEET NUMBER 6
DRAWING NUMBER D-1

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