RECLAMATION

Managing Water in the West

Draft Environmental Assessment

Third Power Plant G19-G21 Modernization Project

Okanogan County, Washington

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region, Grand Coulee Power Office
Grand Coulee, Washington

November 2018

U.S. DEPARTMENT OF THE INTERIOR

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

MISSION OF THE BUREAU OF RECLAMATION

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.

Acronyms and Abbreviations

Acronym or Abbreviation	Description
7-DADMax	7-day average of the daily maximum temperatures
ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
BPA	Bonneville Power Administration
CCT	Colville Confederated Tribes (formally known as Confederated Tribes of the Colville Reservation)
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
EA	Environmental Assessment
Ecology	State of Washington Department of Ecology
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCRPS	Federal Columbia River Power System
GCPO	Grand Coulee Power Office
GCDSD	Grand Coulee Dam School District
IMPLAN	Impact Analysis for Planning
ITA	Indian Trust Assets
Lake Roosevelt	Franklin D. Roosevelt Lake
MOA	Memorandum of Agreement
MW	Mega Watts
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
National Register	National Register of Historic Places
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated biphenyl
PEL	Permissible Exposure Level
Reclamation	Bureau of Reclamation
SHPO	State Historic Preservation Office
SR	state route
TDG	total dissolved gas
TERO	Tribal Employment Rights Ordinances
THPO	Tribal Historic Preservation Office
TMDLs	total maximum daily loads
TPP	Third Powerplant
TPP Overhaul	Third Powerplant Generating Units Overhaul
Visitor Center	Grand Coulee Dam Visitor Center
WSDOT	Washington State Department of Transportation

This page intentionally left blank.

Table of Contents

List of Figures

List of Tables

Appendices

Chapter 1. Introduction

The Bureau of Reclamation (Reclamation) has prepared this environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and state laws and regulations. This Draft EA evaluates a proposal by Reclamation to modernize[1] three distinct power generation units (G-19 through G-21) on-site in the Grand Coulee Dam Third Power Plant (TPP) without affecting current operations. The current operations at Grand Coulee Dam, including reservoir operations, hydraulic capacity, power generation, and operations for flood risk management, would be maintained during implementation of this modernization project so as not to impact water quality, hydrology, or fisheries resources in Franklin D. Roosevelt Lake (Lake Roosevelt) or downstream in the Columbia River. This Draft EA for the TPP Project examines the human and environmental consequences of the different alternatives to address the proposed action.

1.1 Project Area

Grand Coulee Dam is located on the mainstem of the Columbia River approximately 90 miles west of Spokane in central Washington (see Figure 1-1). The project would occur on the east side of Grand Coulee Dam, where the TPP is located (see Figure 1-1). Both the TPP and the forebay dam are on Federal land located within the boundaries of the Colville Indian Reservation. Figure 1-1 outlines the project area and is discussed in more detail in Section 2.

The west side of the dam is located between the communities of Coulee Dam and Grand Coulee in Grant County, Washington. There are two other smaller communities in the area, with Elmer City just north of Coulee Dam in Okanogan County, and Electric City just west of Grand Coulee in Grant County. Washington State Highway 155 connects all four communities and the site of Grand Coulee Dam. The junction of State Highways 155 and 174 is on the westerly edge of the community of Grand Coulee. Grand Coulee Dam forms the western end of the Lake Roosevelt National Recreation Area. No construction would occur on the west side of the dam, but crew commuting to the site and the transportation of construction materials would pass through the west side via Highway 155 and Highway 174. Therefore, this EA addresses the potential impacts to the larger area in Chapter 3.

[1] Modernization is the upgrade of turbines and other equipment. New mechanical components can be made more superior with technology and design tools that weren't available when the powerplant was originally built in the mid-1970s. This results in more power and better durability and can be more environmentally advantageous because less dissolved gas (harmful to fish) is released downstream. Additionally, digital electronic controls to replace outdated analog technology provide better reliability and satisfy cybersecurity requirements.

1.2 Background

The Columbia Basin Project began with fund allocation for Grand Coulee Dam pursuant to the National Industrial Recovery Act of June 16, 1933. Construction of the original dam started in 1933 and was completed in 1942. The dam is 550 feet high and 5,673 feet long and impounds the river to a water surface approximately 350 feet above the old riverbed. The original dam was modified in the late 1960s with the addition of the TPP. The TPP was created by adding a 1,170-foot-long, 201-foot-high forebay dam along the right abutment at a 64-degree angle to the axis of Grand Coulee Dam. The turbines (units G-19 through G-24) that comprise the TPP were put in service in the mid-1970s.

Grand Coulee Dam is one of the Federally owned, large-scale, multipurpose facilities in the Federal Columbia River Power System (FCRPS). The FCRPS comprises 31 dams on the Columbia and lower Snake rivers, 14 of which are owned and operated by Reclamation and the U.S. Army Corps of Engineers (Corps), with the transmission system constructed and operated by the Bonneville Power Administration (BPA) to deliver hydroelectric power. The hydroelectric dams in the Columbia Basin have a maximum capacity of 22,500 megawatts and provide about 30 percent of the electricity used in the Pacific Northwest. Grand Coulee's TPP has an approximate maximum output of 4,200 megawatts, or roughly 18 percent of the FCRPS maximum output. Modernizing generating units 19 through 21 would help maintain reliable hydroelectricity generation in the TPP.

The *Third Power Plant Generating Units Overhaul Activities EA* was completed for the overhaul of units G22 through G24 in 2010 (Reclamation 2010). During the overhaul and refurbishing of G22 through G24, Reclamation learned that the original plan to mechanically overhaul/refurbish these units would not accomplish the goals of ensuring reliability of the units for another 40 years or more. On units G22 through G24, Reclamation had to replace more systems and components than originally planned, as they had more wear than expected and could not be refurbished or reused. In addition, piping and electrical systems were found to have significant wear and needed replacement to ensure reliability. A planning team consisting of senior officials from BPA and Reclamation determined that the replacement, rather than refurbishment, of major components would be more necessary for G19 through G21.

Figure 1-1. Project area

1.3 Operation and Maintenance Needs

The G19 through G21 unit generators at the TPP are original and should be rewound (i.e., stator coils removed and replaced) every 30 years. Thus, their life expectancies have been surpassed. In particular, they show problems stemming from age-related wear that could potentially result in increased hardware failures and forced outages, more-challenging repairs due to obsolescence and lack of spare parts, higher operation and maintenance costs, and longer down times. Their hydraulic efficiency[2] is low by current standards, and the turbines experience significant cavitation[3], which requires lengthy service outages and frequent repairs. Cavitation has caused extensive damage to key and auxiliary components, such as the runners and bearings, and the damaged components in turn result in poor operational performance of the generating units (see Appendix B). New, modernized generators, turbines, and auxiliary components would operate at a higher efficiency, experience less cavitation, and ensure another 40 years of reliable service.

The drawing of the generating unit in Appendix B identifies key components of the units and shows where the parts described below are located. Wear-related issues that need to be addressed include:

- Excessive wear on the operating ring bushing, causing shear pins to break and wicket gate stems to twist.
- Wicket gate seals are worn and allow excessive amounts of water to leak into the powerplant turbine pits. On the turbine bearing, packing box leakage has become excessive, causing drainage systems to work beyond original design parameters.
- As a result of worn wicket gate seals, an excessive amount of water is being discharged to the TPP sumps. In the event of a spill, non-polychlorinated biphenyl (PCB)-containing oil may be discharged to the sumps. The capacity of each sump's oil/water separator may be insufficient to process this excessive amount of oil and water. Oil could be released into the Columbia River in the event of a spill within the TPP. A substantial increase in oil/water separator capacity is needed to minimize the potential for such a release. New non-lubricated bushings and mechanical seals would help modernize these areas and mitigate long-term risks associated with worn seals and packing box failures.

[2] Hydraulic efficiency is the ability to transfer kinetic energy of water flow directly into electric energy. In hydropower generation, the efficiency rate can be as much as 95 percent without losing energy due to thermodynamic or chemical processes.

[3] Cavitation is the rapid formation and collapse of vapor pockets in a flowing liquid in regions of very low pressure, a frequent cause of structural damage to runners, propellers, pumps, etc.

- The head cover, thrust, and upper bracket assembly components have been assumed to be structurally sound on all units, but during the G22 through G24 modernization, welding deficiencies were discovered that could require additional work.
- Generator stators have out-of-tolerance air gap measurements, an indication that the rotor and stator are incurring excessive forces from the misalignment caused by worn turbine guide and generator thrust bearing failures.
- The rotor hub connection has been found to be a weak link in the design of the generator shaft-to-rotor coupling connection. This deficiency has resulted in excessive wear at the generator shaft-to-rotor hub connection.
- Rotors have lost their structural soundness at the rim, which is contributing to the air gap problems noted above. There is risk that the more the rim loosens, the internal spider arms (beams) connecting to the hub would also loosen, resulting in cracks, and possibly resulting in a catastrophic failure. There is a chance that during the final design and/or refurbishment process, the rotors ultimately would be replaced.
- The turbine shaft has yielded structurally due to excessive forces, and as a result is not plumb[4], so it would require replacement. The generator shaft has experienced wear, as indicated by the rotor hub connection noted above, and was originally designed to withstand a generating load of only 639 MW.

1.4 Proposed Action

Reclamation is proposing to modernize three generating units (G19 through G21) at the TPP at Grand Coulee Dam. The modernization would ensure continued, reliable hydropower production for 40 years or more and ensure that Reclamation would meet contractual obligations for power generation.

Reclamation has identified the following objectives for the Proposed Action.:

- At minimum, address damaged components, including the runners, shafts, stators, and wicket gates.
- Ensure that other aging auxiliary components, such as headcovers, thrust brackets, top covers, and rotors would provide future dependability for 40 years or more.
- Address wear in various wiring, piping, and containment systems so that they function reliably and properly and do not cause any safety or environmental issues due to failure.
- Maintain operations within current parameters of hydrologic capacity to prevent impacts to water quality, hydrology, and fisheries resources.

[4] Plumb refers to the ability to support load directly.

1.5 Purpose and Need for Proposed Action

The purpose of the proposal is to modernize the G19 through G21 power generating units at the TPP by replacing and/or refurbishing key components to ensure reliable powerplant operations for the next 40 years or more. The need for the proposed action is to ensure reliable hydropower generation at the TPP for the next 40 years or more while maintaining flood risk management requirements for downstream communities and current hydrologic operations and capacities and prevent impacts to water quality, hydrology, and fisheries resources that could result from multiple unit outages in the TPP. The current conditions of the hydroelectric generators, turbines, and auxiliary components contribute to growing safety-related concerns, potential limitations on plant operations, and increased risk to sustained long-term operation of the powerplant to satisfy Reclamation's contractual obligations and authorized purposes.

1.6 Public Notification and Scope of EA

Internal scoping was completed by Reclamation while initiating preparation of this draft EA. During a series of meetings and the incorporation of lessons learned during the overhaul of units G22 through G24, it was determined that the refurbishment and reuse of existing systems has proven to be a substandard option, and most components would need replacement rather than refurbishment. Operational breakdown of one or more systems is the primary issue of concern and must be addressed in order to continue to provide reliable hydropower generation. The Reclamation team identified resources that potentially could be impacted by implementing the Proposed Action, and these resources are discussed further in Chapter 3. The draft EA will be made available on the Reclamation website for public review, and an informal public review period will take place for 2 weeks after posting.

1.7 Authority

At its inception by Presidential Executive Order dated April 9, 1872, the former Colville Indian Reservation was in a different location and covered several million acres. Another Presidential Executive Order issued on July 2, 1872, moved the Colville Indian Reservation to its present location on the west side of the Columbia River and diminished its size to less than 3 million acres. On July 1, 1892, the north half of the Colville Indian Reservation was ceded to the United States by an Act of Congress. The 1892 cession of the north half reduced the reservation to 1.4 million acres, the acreage that is located within its boundaries today.

The Columbia Basin Project began with fund allocation for Grand Coulee Dam pursuant to the National Industrial Recovery Act of June 16, 1933. The project was specifically authorized for construction by the Rivers and Harbors Act approved August 30, 1935. The Columbia Basin Project Act of March 10, 1943 (57 Stat. 14), reauthorized the project, bringing it under the provisions of the Reclamation Project Act of 1939.

Construction of the TPP was authorized by Public Law 89-448 (80 Stat. 200) dated June 14, 1966, as amended by Public Law 89-561 (80 Stat. 714) dated September 7, 1966.

Chapter 2. Description of Alternatives

2.1 Introduction

This chapter presents the alternatives being considered for the Project. They are:

- Alternative A – No Action
- Alternative B – Third Power Plant Units G19-G21 Modernization; minimal refurbishment with a potential for full replacement of major unit systems and components (TPP G19-21 Modernization).

The EA for TPP Overhaul from 2010 previously covered Alternative A and several alternatives that included a basic mechanical overhaul, which included a permanent storage building situated near the TPP (see Figure 2-1). The 2010 selected alternative was to mechanically overhaul all six units through two contracts; units G22, G23, and G24 would be mechanically overhauled with mostly refurbished components, and Units G19, G20, and G21 would receive the same treatment, except that new generator windings would be provided to replace deteriorating pieces in the generator area as a separate additional contract scope of work.

Alternative B as described here is an updated approach that has evolved since 2010 as work in the TPP has commenced. This alternative, though more expensive, has been realized as a more sensible option considering that a do-nothing or refurbishment approach would result in more frequent repairs and/or premature component failures that would cost the government more money over time. Reclamation estimates that the construction-related work under Alternative B would take approximately 10 years to complete and would begin in 2023 or later, depending on contracting, design, material acquisitions, emergencies, or other delays. Because this would be a design-build project, Reclamation anticipates that a 3-year solicitation process would ensue to better define the final scope. Proposals would be received in year 1, the best proposals would be selected, and design would move forward in year 2 before the preferred contractor design would be selected. Year 3 would involve final design and some mobilization and site preparation, as well as procurement and manufacturing of major components. Year 4 would start the construction phase and involve delivery of new turbine runners and generator parts; disassembly of the first scheduled Unit (to be determined) would follow sometime in Year 5.

2.2 Alternative A – No Action

Under the No Action alternative previously considered in the 2010 EA, Reclamation would continue operating the G19 through G21 generating units with no scheduled component overhaul or modernization. The three units would continue generating power until a failure occurred, at which time the generating unit would be taken offline and repair work efforts would be undertaken. Age-related wear issues would remain and inevitably become worse

over time. Repair costs and time needed to refurbish wear on large parts or systems and/or obtain scarce replacement parts would contribute to the unit outage time. Unit components would be modernized slowly and overhauled (if time and resources allow) as failures occur until an inaccessible repair (such as a turbine wear ring) ultimately forced complete disassembly and necessary overhaul. As noted above, Alternative A was also covered in the original EA in 2010.

Figure 2-1. Existing site plan for the G22-G24 Overhaul Project

2.3 Alternative B – Third Power Plant Units G19-G21 Modernization with Potential for Full Replacement of Major Unit Systems and Components

Alternative B is the preferred alternative and includes a design-build option for the contractor to provide up to a full component replacement of each unit. This alternative, if pursued, would address the issues found during the recent 18-month forced outage of G21 and ensure that a 40-year goal for reliability is achieved. A design-build modernization of units G19 through G-21 would involve potential replacement of the major components shown in Appendix B.

Implementation of Alternative B would require additional laydown space and storage for new parts and delicate systems that need to be protected from the environment. A new runner and a new rotor would require a fabrication and heat treatment facility. A new stator would require a climate-controlled temporary building to store windings and laminations, and other temporary buildings could be required to store smaller miscellaneous parts to protect them from weathering conditions, which range from hot, dry summers to wet and frigid temperatures in the winter. Figure 2-2 outlines the potential site plan for the modernization, including the permanent buildings (TPP and Material Storage Building) and new temporary buildings on-site.

Figure 2-2. Depiction of potential site plan for G19-G21 Modernization Project

Throughout the course of the Project, the contractor would have temporary trailers on-site to serve as offices, restrooms, lunchrooms, etc. (see Figure 2-2). Reclamation would also provide the contractors with space for staging around the TPP and the industrial area, depending on what they request. New lower and upper brackets could be erected in the powerhouse where floor space was previously reserved for refurbishment of these large components. Shaft sections, head cover, operating ring, and bearings would likely be manufactured off-site and shipped in pieces that could be assembled on-site. A temporary machine shop with a sand blast and painting facility, similar to that erected for the G22-through-G24 project, likely would be necessary for this project.

Figure 2-3. Example visual simulation from the northwest (this visual simulation is not to scale)

Figure 2-4. Example visual simulation from the west bank of the Columbia River (this visual simulation is not to scale)

Upon completion of the project, estimated to be 10 years in duration, the temporary buildings would be removed from the site. Also, during the estimated 10 years of construction for the project, the contractor periodically would be allowed to work on the project 24 hours per day, 7 days a week.

2.4 Development of Alternatives

The alternatives were developed by identifying the key components and auxiliary features of these units in previous studies. Lessons learned during the overhaul of units G22 through G24 provided firsthand information regarding the true wear and tear on the TPP units. As a result, refurbishment and reuse of existing systems has proven to be a substandard option, as the quality assurance is not guaranteed on the refurbishment. Through the learning process, information to date has indicated a greater need for an approach that focuses on replacement in order to meet the primary objective of achieving reliability and use of units G19 through G24 for the next 40 years. New components can be made superior with technology and design tools that weren't available when the TPP was built. Quality assurance requirements

would be satisfied, eliminating the question of whether a refurbished component would last another overhaul cycle. Additionally, including industry experts[5] during the development of this project scope has reinforced the idea that more replacement of components is recommended.

By limiting work to one unit modernization under construction at a time, Reclamation would remain within current operations and hydraulic capacity, and there would be no expected change over baseline to water quality, hydrology, or fisheries resources due to implementation of this Project. This objective was echoed in public concerns brought forth during the scoping process for the overhaul of units G22 through G24.

Alternative B also accounts for the issue of limited floor and work space available in the powerhouse. There is a limit to how much work can take place simultaneously in the TPP due to limited physical space for machines and equipment laydown and storage of existing machinery parts. During the original construction, assembly of the units took place simultaneously while the plant was being built from the ground up, and there were no risks to other units being worked on for maintenance, so logistical issues for laydown space during construction were not a problem before this project was proposed.

2.5 Alternatives Considered but not Analyzed in Detail

The original plan under the congressional authorization for the TPP was to have 12 units of similar size stretching twice the length of the existing size and shape. Only six units, G19 through G24, were constructed. The existing north wall and door were designed as temporary structures, and Reclamation is still considering adding the final six units to the TPP at some time in the future. A brief look at extending the powerhouse building and foundation was performed in the 2010 EA and in the Value Engineering Study for this project. This alternative would provide for additional floor space and indoor facilities to support the new components that would be built for G19 through G21, but due to the significant costs and complex planning and design work that would be required for the future construction of units G25 through G30, this alternative was dismissed.

[5] Industry experts in hydropower facility construction include vendors experienced in building and/or modernization of dams that provide hydropower generation and effective flow through turbines.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Water Quality

3.1.1 Affected Environment

The qualitative and quantitative water quality criteria that protect the designated and potential uses for Lake Roosevelt and the Columbia River downstream of Grand Coulee Dam have been developed by the State of Washington. Chapter 173-201A of the Washington Administrative Code adopted August 1, 2016 (Ecology 2017), outlines the water quality standards for the State of Washington. Water quality standards also have been developed by the Confederated Tribes of the Colville Reservation (CCT) and the Spokane Tribe of Indians (Spokane Tribe 2010; Colville Tribe 2009). These standards are similar to the Washington State water quality standards and are applicable to portions of the affected area.

Section 303(d) of the Clean Water Act (CWA) requires states and tribes to identify water bodies that do not meet water quality standards. States and tribes must publish a list of these impaired waters every 2 years. The most recent water quality assessment (the 305(b) report and 303(d) list of impaired waters for the State of Washington) was approved by the U.S. Environmental Protection Agency (EPA) on July 22, 2016 (Ecology 2017). For lakes, rivers, and streams identified on this list, states and tribes must develop water quality improvement plans known as total maximum daily loads (TMDLs). These TMDLs establish the amount of a pollutant a water body can carry and still meet water quality standards. Elevated water temperature, low dissolved oxygen, and total dissolved gas (TDG) are primary water quality concerns in the Columbia River segments near Grand Coulee Dam. Water temperature and dissolved oxygen have been identified as Category 5 water quality concerns in the most recently approved water quality assessment; TDG is identified as Category 4A (Ecology 2017). Category 5 waters are identified as polluted waters that require a water improvement project. Category 4A waters are those for which there is already an EPA-approved TMDL plan in place and implemented.

In 2004, the State of Washington Department of Ecology (Ecology), with the EPA and in cooperation with the Spokane Tribe of Indians, developed the TDG TMDLs for the mid-Columbia River and Lake Roosevelt, which includes the areas above and below Grand Coulee Dam (Ecology 2004).

Applicable Water Quality Standards

Total Dissolved Gas

The TDG criteria, measured in percent saturation, does not apply when the river flow exceeds the 7-day, 10-year frequency flood (222,000 cfs at Grand Coulee) and may be adjusted to accommodate fish passage. All other times, TDG criteria must not exceed an average of 110 percent.

Temperature

Water temperature is measured by the 7-day average of the daily maximum temperatures (7-DADMax). Table 3-1 lists the temperature criteria for each of the aquatic life use categories designated for the Columbia River and Lake Roosevelt. The CCT have established temperature criteria of 16° C for the Columbia River and Lake Roosevelt (Colville Tribe 2009), while the Spokane temperature criteria is set at a 7-DADMax of 18.5° C. The most stringent standards for temperature are the Washington State standard for the Lake Roosevelt portion and the CCT standard for the Columbia River below Grand Coulee Dam; both of these standards are set at 16° C 7-DADMax.

Table 3-1. Columbia River aquatic life temperature criteria

Aquatic Life Use	Temperature Criteria
Core Summer Salmonid Habitat	16° C (53.6° F)
Salmonid Spawning, Rearing, and Migration	17.5° C (63.5° F)

Source: Ecology 2017

Dissolved Oxygen

The dissolved oxygen criteria, measured in mg/L, is based upon the 1-day minimum value. Table 3-2 lists the temperature criteria for each of the aquatic life use categories designated for the Columbia River and Lake Roosevelt.

Table 3-2 Columbia River aquatic life dissolved oxygen criteria (Ecology 2017)

Aquatic Life Use	Dissolved Oxygen Criteria
Core Summer Salmonid Habitat	9.5 mg/L
Salmonid Spawning, Rearing, and Migration	8.0 mg/L

Lake Roosevelt

Water quality conditions in Lake Roosevelt currently do not support the designated and potential uses. Elevated TDG, elevated water temperature, and low levels of dissolved oxygen have been determined to be the factors affecting the designated and potential uses (Ecology 2017). As part of an ongoing reservoir monitoring program for operating projects, Reclamation collects water quality data every 3 years from Lake Roosevelt. These samples are analyzed for chemical, physical, biological, and trace metal parameters. In addition, Reclamation has installed fixed monitoring locations (Hydromet stations) at the international boundary and the forebay of the reservoir. At these locations, surface water temperature is collected at midnight every day, and TDG information is collected every 15 minutes throughout the year.

TDG levels increase above the water quality criteria primarily through the release of water over dam spillways; however, other mechanisms also have the potential to cause elevated TDG. These include passing water through turbines, low-level ports, fishways, or locks; and natural processes, such as low barometric pressure, high water temperatures, or high levels of aquatic plant activity and growth. In the Columbia River, the majority of elevated TDG levels are the result of dam spillway flow. At Grand Coulee, water is spilled over the drum gates or through the outlet tubes, depending on forebay water surface elevation. Below elevation 1265 feet, only the outlet tubes are operable, and are known to generate more TDG than spill over the drum gates. In some instances, dams located upriver pass elevated TDG to projects downriver because there is not enough time or water turbulence to dissipate the elevated gases. This is the case with Lake Roosevelt. The Hydromet monitoring station at the international border shows TDG exceeding state and tribal water quality standards entering the reservoir. As this water passes through Lake Roosevelt, there is some change in TDG recorded at the forebay Hydromet station, but sometimes not enough to bring TDG levels within the established criteria. Figure 3-1 illustrates the monthly average TDG percentage measured at the international boundary and Grand Coulee forebay for water years 2007 through 2017.

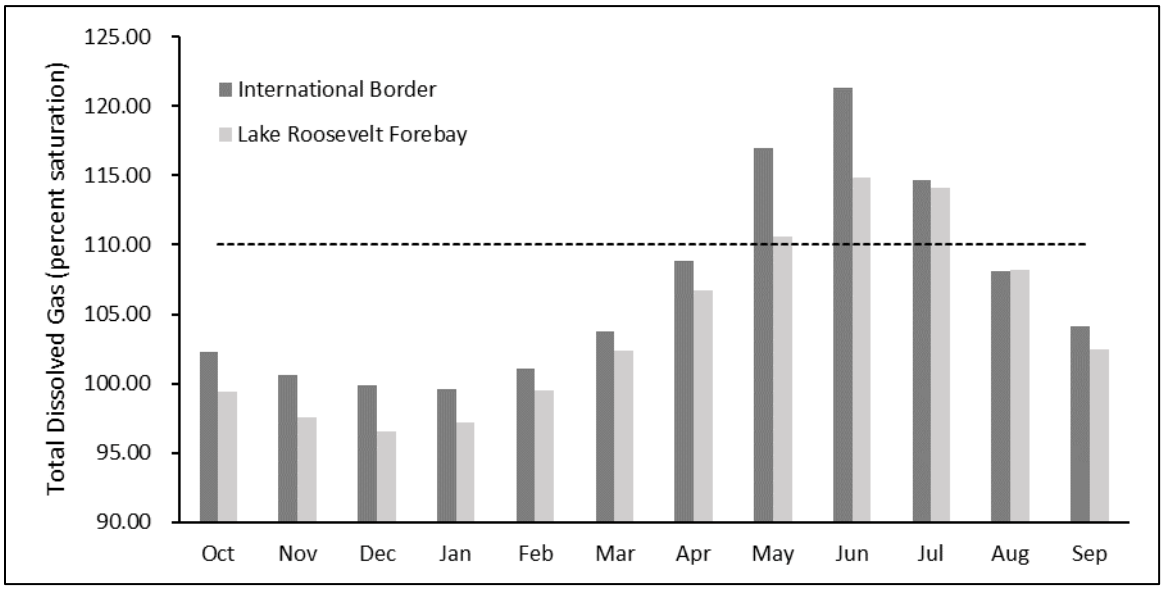


Figure 3-1. Monthly average TDG percentages for the Columbia River at the International Border and Grand Coulee Forebay (Lake Roosevelt) for the period spanning October 2007 through September 2017. The dashed line represents the 110 percent saturation criteria for TDG.

Water temperatures measured at the forebay Hydromet station often exceed water quality criteria. Generally, the surface waters of the reservoir reach 16° C by mid- to late July and remain above 16° C until the end of October. However, this is typical for lakes and reservoirs. Several reports and studies indicate that the upper portion of Lake Roosevelt does not stratify (i.e., form temperature layers), while the lower segment of the reservoir near the dam weakly stratifies. As with TDG issues in Lake Roosevelt, most of the temperature

issues are the result of upstream effects being passed through the reservoir due to very low retention time. Retention times are estimated to be between 20 and 60 days depending on the time of year and whether the reservoir is being drawn down for flood control (BPA 1996).

Columbia River Downstream of Grand Coulee

Water quality conditions in the Columbia River below Grand Coulee Dam, also known as Rufus Woods Lake, do not support the designated and potential uses. Elevated TDG, elevated water temperature, and low levels of dissolved oxygen are the factors affecting the designated and potential uses (Ecology 2017). Reclamation has installed a fixed monitoring station 6 miles downstream of Grand Coulee Dam. At this location, surface water temperature is collected at midnight every day, and TDG information is collected every 15 minutes throughout the year.

The Hydromet monitoring station at the Lake Roosevelt forebay shows TDG exceeding state and tribal water quality standards. Monthly average TDG values from the Hydromet station over the past 10 years indicate that TDG exceeds water quality criteria in May, June, and July. Figure 3-2 illustrates the monthly average TDG percentage measured at the Grand Coulee forebay and 6 miles below Grand Coulee for water years 2007 through 2017.

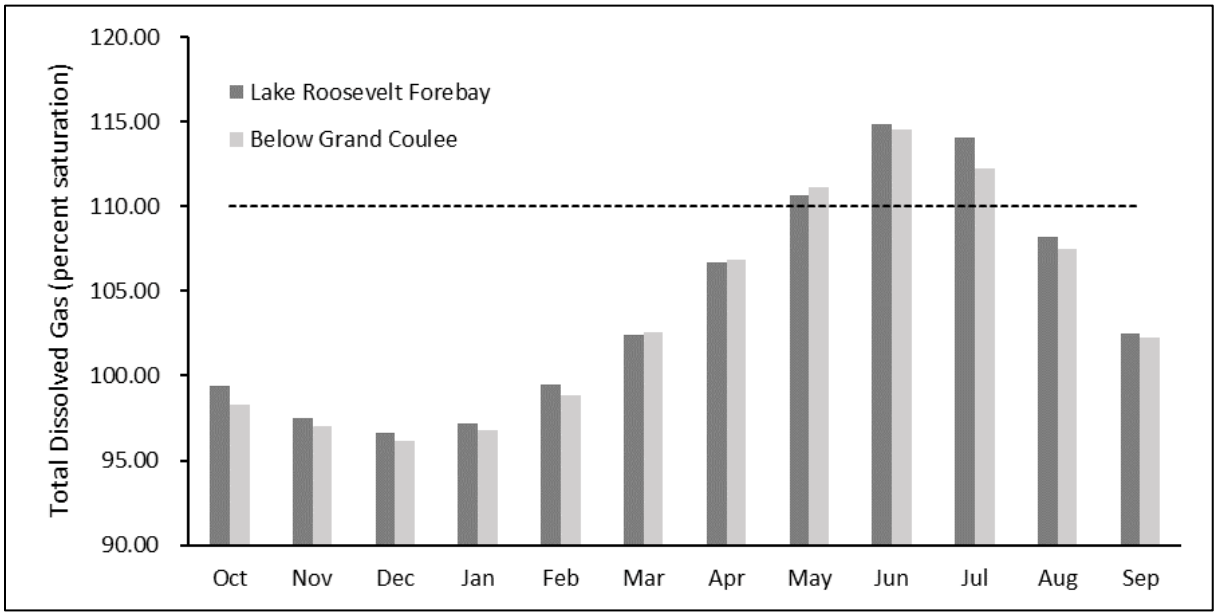


Figure 3-2. Monthly average TDG percentages for the Columbia River at the Grand Coulee Forebay (Lake Roosevelt) and Columbia River 6 miles downstream of Grand Coulee Dam for the period spanning October 2007 through September 2017. The dashed line represents the 110 percent saturation criteria for TDG.

Water temperatures measured at the Hydromet station 6 miles downstream of Grand Coulee Dam often exceed the most stringent of the established water quality criteria during the summer months. Generally, the surface waters of this segment reach 16° C by late July and remain above 16° C until the beginning of October (Reclamation 2018). The difference in

the onset of temperature exceedances between Lake Roosevelt and Rufus Woods Lake is likely the discharge of colder, denser water from the lower levels of Lake Roosevelt.

3.1.2 Environmental Consequences

Alternative A – No Action

Reclamation would continue operating the TPP generating units with the current maintenance and production schedules. Water quality conditions are not expected to change as a result of the No Action alternative until the potential failure of key generator components renders multiple units inoperable. At that time, the likelihood of spill events occurring at Grand Coulee would increase. TDG generation can occur during spill events; otherwise existing TDG is passed downstream through the powerplants. Currently, the Corps and Reclamation jointly operate Grand Coulee Dam and Chief Joseph Dam for TDG minimization (Corps 2009). Forced outages at Grand Coulee would limit the ability to jointly operate the two projects, potentially resulting in increased spill and TDG generation at Grand Coulee and potentially the Columbia River below Chief Joseph Dam.

The environmental consequences of the No Action alternative on temperature conditions within Lake Roosevelt and the reach of the Columbia River below Grand Coulee Dam also are not expected to change significantly over the short term. As the generation units fail, there would be the potential for some water temperature changes to occur in both Lake Roosevelt and in the Columbia River below the dam due to shifting operations and the potential for increased spill.

Alternative B – TPP G19-G21 Modernization

No water quality impacts from construction activities are anticipated as a result of the Reclamation plan to overhaul TPP units G19 through G21, including the construction of additional laydown space and storage facilities. A National Pollution Discharge Elimination System (NPDES) Permit for stormwater discharge, issued by Ecology, would be required for the construction activities associated with new storage facilities. This permit and the water quality certification from the State of Washington would prescribe the best management practices to reduce or eliminate stormwater runoff from the construction and parking lots in the construction zone.

No water quality impacts from operation activities are anticipated during the overhaul of the TPP generating units. Current operation and maintenance (O&M) schedules attempt to keep at least five TPP units in production during the months of December through August. More than one unit are typically removed from production in the fall months to perform needed maintenance. Joint operations with the Corps and Chief Joseph Dam can continue uninterrupted, minimizing spill events at Grand Coulee Dam and consequently minimizing TDG generation below the dam. This would not change during the overhaul and modernization of the individual TPP units. As a result, the effect on water temperature from operations throughout the overhaul period would be similar to the effect on water quality conditions from the existing conditions in both the reservoir and in the river below the dam.

3.2 Hazardous or Toxic Wastes

3.2.1 Affected Environment

The hazardous materials and substances used and the hazardous wastes produced are indirect by-products from the operation and maintenance of Grand Coulee Dam. These wastes are generated as part of the facility's O&M activities and include waste paints, solvents, used oils, lead, and asbestos (Ecology 2009). The lead and asbestos are accumulated as part of O&M activities associated with generation units.

As identified through sampling and on-going efforts to dispose of PCB-containing electrical equipment, the TPP is generally considered to have a non-PCB operational status[6]. Regardless of this consideration, the TPP continues to manage for disposal of oil-filled capacitors as PCB items. Other oil-filled electrical equipment for which sampling cannot be performed or the manufacture date is not discoverable are also managed for disposal as PCB-containing items.

Units G19 through G21 previously were equipped with asbestos-containing brake pads. The brake pads were removed from units G20 and G21, and all accessible areas were abated of brake dust. Generation unit G19 remains equipped with the original brake pads. Other areas are accessible only after the units are dismantled and are presumed to contain no asbestos-contaminated dust. Lead contamination is also an issue with the dust, since many of the metal components were originally coated with lead-based paint. Thus, all TPP units are managed with the presumption that they contain asbestos and lead dust.

The EPA has recently expressed concern regarding the potential for PCBs to be included in paints or caulks manufactured prior to 1979. As a result of these concerns, all painted surfaces scheduled for paint removal as part of any O&M activity would be sampled for both PCBs and lead.

Colville Tribal Law and Order Code, Chapter 4-13 Solid Waste, regulates solid and hazardous waste storage and disposal on CCT lands. According to Grand Coulee Solid and Hazardous Waste program management, no solid or hazardous wastes are authorized for disposal on Tribal lands.

It has been found through inspection and air monitoring that the asbestos and lead dust are trapped in an oily film that covers virtually all internal surfaces of the units. Personal air monitoring results have not revealed any airborne concentrations of asbestos within an order of magnitude of the Occupational Safety and Health Administration (OSHA) Permissible Exposure Level (PEL) (>0.1 fiber per cubic centimeter of air as an eight (8) hour time-weighted average). Personal air sampling for airborne concentrations of lead-contaminated dust also revealed concentrations well below the PEL for lead (0.050 milligrams per cubic

[6] The TPP used to have excitation transformers that contained PCBs, which have been removed and replaced by water-cooled transformers. The old units contained more than 50 ppm PCBs, which is a trigger for Federal facilities to be considered PCB-contaminated.

meter (mg/m^3). Health hazards associated with these contaminated dusts are perceived to be minimal (Andrews 2009a).

The Grand Coulee Powerplant Safety Office has established work planning steps to ensure that O&M activities are performed to protect worker health and safety. Work supervisors are instructed to adhere to the Reclamation Safety and Health Standard Section 4 to ensure that all known and foreseeable hazards are identified and mitigated prior to beginning work. Past O&M work activities have been preceded by a thorough cleaning of accessible surfaces (DeWinkler 2017).

3.2.2 Environmental Consequences

Alternative A – No Action

Reclamation would continue operating the TPP generating units. Current maintenance and production schedules would be adjusted as necessary to meet operational parameters and contractual obligations for power generation. Hazardous materials and waste would continue to be managed as they are at this present time. Used oils, lead- and asbestos-contaminated dusts, and potential PCB-containing and lead-based paints would continue to be analyzed for content and removed and disposed of as determined by the O&M schedule.

Alternative B – TPP G19-G21 Modernization

The Grand Coulee Power Office (GCPO), managing office of Grand Coulee Dam, is regulated as a Medium Quantity Generator of hazardous/dangerous waste according to Ecology regulation. The internal parts of generating units within the TPP are coated with a thin film of oil that has encased dust particles potentially containing lead, asbestos, and/or PCBs. There is a potential for the exposure of GCPO employees and contractor employees working in the TPP and proposed material storage building during the dismantling and refurbishing of the generating units. Potential routes of exposure are inhalation and ingestion of contaminated dusts.

It is anticipated that regulated hazardous wastes would be generated as part of the Proposed Action in quantities greater than during general O&M activities. Dismantling and cleaning of generator unit components would generate additional quantities of used oils, solvents, and detergent-based wastes that may contain lead-, asbestos-, and/or PCB-contaminated dust. Refurbishing of metal parts may require the removal of paint and the repainting of those parts using non-lead-based paints. These activities would lead to the generation of sandblast media containing lead-based paint chips, waste paints, PCBs, and solvents. An elevated amount of waste generation may increase potential exposure through inhalation, ingestion, and dermal absorption.

As a result of increased waste generation, it is anticipated that there would be a small increase in the transportation of solid and hazardous wastes for recycling or disposal. As per the Federal Resource Conservation and Recovery Act and State of Washington Dangerous Waste Regulations, hazardous and dangerous waste management is tightly regulated and

requires strict controls for its generation, transportation, and disposal or recycling. This process is commonly referred to as cradle-to-grave management and requires, among other things, contingency and emergency response planning throughout all phases of the management process. Also, no appreciable impact is anticipated relative to available hazardous/dangerous waste disposal capacity resulting from the proposed action.

Contracted work performed at the TPP follows criteria provided in the contract specifications that ensure worker health and safety and the proper treatment, temporary storage, and disposal of hazardous/dangerous wastes. Contract specifications require either a Negative Initial Exposure Assessment or the implementation of appropriate engineering controls for any contracted work area where the potential exists for airborne concentrations of lead or asbestos. OSHA PELs for worker exposure to hazardous substances are not to be exceeded.

Further safeguards are provided through Reclamation Manual Policy ENV P01 and Directives and Standards ENV 02-02 and ENV 05-01 requiring that Reclamation must ensure that hazardous/dangerous wastes generated on Reclamation property through its own or contracted activities are properly treated, stored, and disposed of in accordance with applicable environmental rules, regulations, and standards, and that hazardous/dangerous wastes are recycled whenever possible.

Implementation of established worker safety standards and contract specifications would protect workers from potential exposure to hazardous/dangerous wastes. Release of hazardous/dangerous wastes to the environment would be prevented by implementation of waste management standard operation procedures, contract specifications, and Federal, state, and local environmental regulations. The Preferred Alternative represents a minimal increased potential for human or environmental exposure to hazardous/dangerous wastes. However, the measures discussed above would prevent exposure that would result in a significant impact.

3.3 Transportation

3.3.1 Affected Environment

Transportation Access

Access to and from the Grand Coulee Dam area requires the use of State Routes (SR) 17, 21, 155, 174, and 28/283, and possibly U.S. Highway 2. Several routes to the dam can be accessed from Interstate Highway 90, about 60 miles south of the dam (Figure 3-3).

Near Grand Coulee Dam, where most of the impacts to traffic would occur, either SR 155 or SR 174 would have to be traveled to get to SR 155 to access the staging area of the TPP near the north-east section of the dam (Figure 3-3). SR 155 generally provides one travel lane in each direction and is classified by the Washington State Department of Transportation (WSDOT) as a minor arterial. From its intersection with SR 174, the highway continues north through the town of Grand Coulee and past Grand Coulee Dam and the Grand Coulee Dam Visitor Center. Near the Visitor Center, SR 155 provides three travel lanes and extends

uphill beyond the dam crest, with the added third lane providing for southbound travel through the grade ascent. The road continues through the northern area of Grand Coulee, then crosses the Columbia River on the Grand Coulee Bridge (about ½-mile downstream of the dam) to the town of Coulee Dam. SR 155 crosses the Columbia River on the downstream side of Grand Coulee Dam, connecting Grant County to the south with Okanagan County to the north; it is also used by vehicles to access SR 174 and the local communities of Coulee Dam, Grand Coulee, Elmer City, and Electric City. The Grand Coulee Bridge, also known as the Columbia River Bridge, provides the only Columbia River crossing between SR 17 in Bridgeport, Washington (approximately 30 miles to the west), and Keller Ferry along SR 21 (about 10 miles to the east) (Reclamation 2018).

Figure 3-3. Grand Coulee Dam and local towns where traffic would be most impacted by the G19-G21 modernization.

The Grand Coulee Bridge, completed in 1935, was designed to support heavy loads for the construction of Grand Coulee Dam, where vehicles crossing the bridge can weigh up to 20,000 pounds per vehicle axle. The bridge provides one lane in each direction and has a restricted height of 14 feet 3 inches. The road turns 90 degrees at the end of the bridge and has a yellow flashing signal and a posted 15 mile-per-hour speed limit. However, traffic becomes congested on the east and west approaches to the bridge when large trucks are crossing and require more than a single lane due to their wide load. The bridge provides access between portions of the Grand Coulee Powerplant for both the east and west sides of the complex via Roosevelt Way and SR 155 in east Coulee Dam (Reclamation 2018). Restricted access to the TPP staging area can also be achieved by going across Grand Coulee Dam. The dam crest served as an alternate to SR 155, as a secondary route over the Columbia River prior to 2001, and then it was closed to public access for security concerns. This road over the dam is still used by Reclamation personnel for local access, but only for work-related purposes (Snavely 2016).

Existing Traffic

The Grand Coulee Dam is the most popular attraction in the area, and about 225,000 tourists visited the dam during 2016 in an estimated 64,000 vehicles. Peak tourism visitation usually occurs during the month of July each year, around the Fourth of July holiday. The daily peak visitation in July 2016 was 2,356 visitors in 673 vehicles (Snavely 2016). The Visitor Center is open throughout the year from 9:00 am to 5:00 pm except on Thanksgiving Day, Christmas Day, and New Year's Day. The Visitor Center has extended hours starting on the Saturday before Memorial Day until September 30, to coincide with the nightly laser light show that began in 1989. The laser light show is about 35 minutes long and is shown on the face of the dam and on the three powerhouses; it can be seen from most locations downstream of the dam and attracts large numbers of viewers each night. In addition to the laser light show, the annual fireworks show from atop the dam has resulted in notable traffic congestion each year during the Fourth of July holiday period. Events in the area during the Memorial Day and Labor Day weekends may also result in local traffic congestion (Hall 2016). Annual average 24-hour traffic volumes (two-way), rounded to the nearest thousand vehicles, on State Route 155 near Grand Coulee Dam since 2012 are shown in Table 3-3 (WSDOT 2018). The Annual Traffic Report for 2017 is not yet available.

Table 3-3. Annual average 24-hour traffic volumes (two-way) on State Route 155 near Grand Coulee Dam (WSDOT 2018)

State Route	Milepost	Location	2012	2013	2014	2015	2016	2017
155	25.68	East of Junction SR 174 (before Junction SR 174 Wye Conn)	4,400	4,400	4,700	4,400	4,600	no data

State Route	Milepost	Location	2012	2013	2014	2015	2016	2017
155	25.73	East of Junction SR 174 (after Junction SR 174 Wye Conn)	5,200	5,300	5,500	5,100	5,300	no data
155	28.05	Southern Entrance- City of Coulee Dam (after junction Grant Ave)	5,200	4,800	4,900	5,000	4,900	no data
155	28.49	Southern Entrance- City of Coulee Dam (after junction Roosevelt Way)	3,000	2,700	2,700	2,800	2,800	no data

Grand Coulee Dam employees and tourists visiting the dam comprise the bulk of traffic congestion at and near the dam, as well as in the surrounding area. While many employees work during the day, the three hydroelectric powerplants require 24-hour management divided among three 8-hour shifts. Currently about 500 employees work for Reclamation at Grand Coulee Dam's three powerhouses, John W. Keys III Pumping Plant, Visitor Center, numerous offices, and other associated facilities. Several government contractors also work at these facilities, many who live in apartment rentals, hotels, campgrounds, and other temporary rental housing. However, most of the Grand Coulee Dam government and longer-term or perennial contractor employees commute from the nearby towns of Electric City, Grand Coulee, and Elmer City, or travel from the towns of Almira, Bridgeport, Coulee City, Davenport, Hartline, Nespelem, and Wilbur (Snavely 2016).

Grand Coulee Dam employees and contractors from more distant communities such as Moses Lake and Spokane often use carpools and vanpools to commute to and from work. Near Grand Coulee Dam, commuting by bicycle is encouraged through subsidies from the Department of the Interior to reduce their own carbon footprint and the overall commuter carbon footprint. Also, Grant County Transit provides bus service (18 seats) twice a day, one round trip during the morning and one during the evening, via SR 155, between Moses Lake and Grand Coulee Dam, with seven to nine stops along the way (Snavely 2016). Most daily traffic in the vicinity of the dam occurs between 4:00 and 5:00 pm during the summer season when Grand Coulee Dam workers depart for the day and while tourist season is in full swing; however, current summer season peak-hour traffic congestion is accepted as the normal daily pattern by local residents (Hall 2016).

Vehicle Accidents

The 2018 Grand Coulee G1 through G18 Generating Units Modernization and Overhaul Final EA includes a 5-year history of reported vehicle accidents from the WSDOT; seven accidents were reported from 2011 to 2015 in the immediate vicinity. All of the reported accidents were between the Visitor Center and Bureau Road (also known locally as

Reclamation Road); five of the seven accidents resulted in some form of bodily injury, and the other two accidents resulted only in property damage (Reclamation 2018).

WSDOT also compiles vehicular accident data from all accidents that are reported. The accident data by WSDOT is collected every year for each county and includes all of the paved roads, as well as unimproved roads within each specific county. A summary of vehicular accidents for 2015 (the most recent available data) shows the total amount of vehicular collisions and those resulting in minor, serious, and fatal injuries and the number of accidents resulting in only property damage in the five-county area (WSDOT 2018) (Table 3-4).

Table 3-4. Collision summary of Douglas, Ferry, Grant, Lincoln, and Okanogan Counties for 2015 (WSDOT 2018)

County (all roads)	Total Collisions	Fatal Collisions	Serious Injury Collisions	Minor Injury Collisions	Only Property Damage Collisions	Unknown Injury Collisions
Douglas	551	3	8	155	336	19
Ferry	78	2	3	34	38	1
Grant	1,514	13	20	390	1,023	68
Lincoln	191	3	5	40	138	5
Okanogan	494	6	13	124	327	24

Although there may be some government and contract employees that commute from towns and cities as far away as Moses Lake and Spokane, most employees are from local towns and communities in Douglas, Ferry, Grant, Lincoln, and Okanogan Counties. The focus of this traffic analysis is on traffic-related issues resulting from moving equipment to and from the third powerhouse for the G19 through G21 Modernization Project and the personnel required for the duration of the project. Equipment that is transported to Grand Coulee Dam for the G19 through G21 Modernization Project would contribute to increased traffic congestion, but only for the period when it is in route. However, the additional personnel required to work on-site for this project would contribute to local traffic daily for the duration of their stay.

3.3.2 Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, Reclamation would continue to operate Grand Coulee Dam's G19 through G21 hydroelectric turbines with no immediate system improvements. However, the G19 through G21 turbines are the original equipment from the 1970s and are now showing age-related wear that will eventually lead to system failures, forcing unplanned outages. As the turbines age, it becomes more challenging to find replacement parts due to obsolescence, leading to longer down times. With the No Action alternative, maintenance on the turbines would be lengthy and drawn-out, possibly requiring additional contractor employees.

Alternative B – TPP G19-G21 Modernization

Under Alternative B, the preferred alternative, Reclamation would modernize units G19 through G21 over a 10-year period beginning in 2020 and ending approximately by 2030. The modernization would allow each unit to have a life expectancy of approximately 40 years. Most of the work performed to modernize G19 through G21 would be performed on-site inside the TPP and the adjacent area by both Reclamation and contractor employees. Approximately 10 to 20 additional full-time workers would be added for the task, and most, if not all, would be temporary contract employees. While some of the additional workers may already reside locally, others may come from outside the commuting area.

Transportation Access

Transportation to the TPP would not be impacted for majority of time for the duration of the project. However, transporting the major components would likely be done via railroad and then modular trailer. Previously, the large transformers for G19 and G20 were transported to Coulee City by railway to Odair, immediately west of the town. The major components of each turbine (e.g., rotor, bearing bracket, generator, turbine shaft, intermediate shaft, and inner and outer head cover) also would likely be shipped via railway because of their size and distance from the manufacturer. From the Odair railway facility, a large mobile crane would be used to unload each piece from the train and onto a heavy-haul transport trailer. For each train shipment of the major components for each turbine, it would take approximately three to six trips by the heavy-haul trailer to transport the oversize loads to the TPP. Each turbine would take more than 1 year to rebuild, so the local transport of the major components would not happen during consecutive years but would occur during 3 separate years. The route from Odair would use an immediate county road to access SR 155, then travel approximately 31 miles along Banks Lake, through the towns of Electric City, Grand Coulee, and Coulee Dam to Marina Way (a Reclamation-owned road) to get to the staging area for the TPP (Clark 2018).

The heavy-haul trailer with the oversize loads requires permitting and coordination with WSDOT. It would take several hours for each truck load during the day, and items would be moved during off-peak hours as much as practical and would not affect emergency medical services. Due to the size of the turbine components, truck shipments from Odair to the TPP may qualify as a super-load (WAC 468-38-405), for which WSDOT would specifically analyze each trip because some pieces would exceed 16 feet wide or high, 125 feet in length, and 200,000 lbs. Therefore, an oversize/overweight permit would be required for every trip in which, upon approval, the driver would carry and adhere to a packet of instructions and conditions specifying the dates and times of travel, specific information regarding each load, and the planned route. For the super-loads, additional lanes of traffic may be blocked during the trip while having pilot/escort cars and flaggers to regulate traffic and watch for overhead electrical lines, as well as other vertical and horizontal clearances. The super-loads would also display flags on all four corners and at extreme ends of all protrusions, projections, and

overhangs. An overweight/oversize load sign (7 feet wide and 1.5 feet high) would also be mounted on the front and rear of the transport vehicle (WSDOT 2018).

Traffic

Aside from the super-load shipments of the major components for each of the three turbines, daily traffic is expected to be minimal. Approximately 10 to 20 additional workers would be required to be on-site at the TPP full-time for the G19 through G21 rebuild task during the normal work week (Monday through Friday), likely between the hours of 6:00 am and 6:00 pm. However, additional worktimes and work periods may be necessary to keep the project on track and to accommodate for any unforeseen project or material shortcomings. A total of 20 full-time workers added (throughout the G19-G21 construction phase) would result in a minimum of about 40 additional one-way work trips per workday; for 10 workers, 20 additional one-way trips per workday at minimum would take place. Commuter traffic on SR 155 between mile markers 25.68 and 28.49 would experience a slight increase in daily traffic rates, but the overall average daily one- or two-way traffic rates would be less than 1 percent of the existing total traffic volume as measured in recent years. Carpooling, ridesharing, or use of vanpools or shuttles by the G19-G21 rebuild workers would alleviate the slight increase to daily traffic volumes.

Supplies and equipment that are not delivered in the super-load or oversize/overweight trucking loads would be delivered in smaller-size vehicles. SR 155 and SR 174 may experience a slight increase during the G19-G21 rebuild process. However, some of the equipment may still be shipped via railway to Odair, where it would then have to be transported to Coulee Dam, so the route along SR 155 from Coulee City to the town of Coulee Dam and to Marina Way may experience a slight increase in traffic but not enough to generate a noticeable impact to local traffic.

Parking

If parking proves to be more of an issue than anticipated, Reclamation may also designate a temporary parking lot somewhere north of the TPP and within the paved area but out of the way of any areas that would be used for equipment staging or lay-down. It may be possible to designate another parking area to the north, but on the unpaved area next to Marina Way. By designating or establishing temporary parking areas for the G19-G21 contract employees, parking for visitors and Reclamation employees would not be adversely impacted. Routine deliveries for maintenance-related materials and equipment would also not be adversely impacted.

Safety

As a result of Alternative B, the overall traffic volume on SR 155 in the immediate vicinity of Grand Coulee Dam would experience the largest increase. Both commuter traffic and trucking traffic near the dam would see a slight increase, but the total number of additional vehicles may not be significant enough to change the rate of vehicular collisions. However, there are not many vehicular collisions in the immediate vicinity of the dam (Reclamation

2018). Additional trucking traffic from Odair and Coulee City would occur infrequently, and the super-loads of equipment would occur even less frequently. Further, the super-loads would have to travel at a greatly reduced speed and be accompanied by escort cars, and flagging would be used to alert oncoming traffic, making collisions less likely. Oversize and overweight trucking vehicles may also be required to have escort cars and flagging in addition to having to display a large Oversize Load sign.

Table 3-5 shows traffic data from 2015 of the five-county area where the more populated counties have more licensed drivers, more registered vehicles, and appear to travel more. However, licensed drivers in the two less-populated counties traveled more in their vehicles on average than the three counties with a larger population and had fewer vehicular collisions (see Table 3-4).

Table 3-5. Exposure data for vehicle miles traveled, registered vehicles, licensed drivers, and population estimate of the five-county area in 2015 (WSDOT 2018)

Exposure (2015)	Vehicle Miles Traveled (in 1,000s)	Registered Passenger Vehicles	Licensed Drivers	Population (2015 estimate)
Douglas	403,934	39,928	29,493	39,990
Ferry	121,167	8,452	5,546	7,710
Grant	1,073,533	92,087	66,292	93,930
Lincoln	312,337	13,969	9,168	10,720
Okanogan	538,593	46,003	32,476	41,860
Washington State	59,652,504	6,252,554	6,252,554	7,061,410

3.3.3 Mitigation

Alternative A – No Action

No mitigation is required.

Alternative B - G19 – G21 Modernization

Transportation of super-loads and oversize/overweight loads by modular trailers would adhere to state permit requirements for moving large equipment on SR 155 to the TPP and would be performed during periods that are less likely to adversely impact transportation. Coordination with emergency service providers for public safety during transport of super-load and oversize/overweight loads would occur in advance of any super-load or oversize/overweight load transport.

Potential parking shortages at the TPP would be addressed by assigning parking areas in the nearby paved lot but away from the staging area, and additional parking may be designated in nearby unpaved lots. No additional mitigation would be needed for either of these alternatives, as they are temporary in nature.

3.4 Socioeconomics

This section presents an assessment of existing conditions and estimates of the regional economic impacts resulting from changes in construction expenditures for each action alternative. The regional economic impact analysis considers both the initial, or direct, impact on the primary affected industries and the secondary, or indirect, impacts resulting from those industries that provide inputs to the directly affected primary industries. The analysis also includes induced impacts, or the changes in economic activity stemming from household spending of income earned by those employed in the sectors of the economy impacted either directly or indirectly. These secondary impacts are often referred to as multiplier effects.

3.4.1 Affected Environment

This section describes the social and economic conditions in a five-county project area that includes Douglas, Grant, Ferry, Lincoln, and Okanogan Counties in the State of Washington. Grand Coulee Dam and Powerplant and the immediate area are located at the intersection of Douglas, Grant, and Okanogan Counties, and are close to the southern tip of Ferry County. The key parameters include the study area population, industry output, employment, and labor income.

Population

The estimated population and the changes in the population in the study area, Washington State, and the United States are presented in Table 3-6. The population of the five-county study area has been increasing since 2000, with most of the population increases occurring in Grant and Douglas Counties. The population of the study area has increased approximately 20 percent from 164,309 to 197,018. The project area has experienced average growth rates similar to those in the State of Washington and the national average.

Table 3-6. TPP project area population by county, based on 2017 U.S. Census data

Study Area	2000	2010	2017	Average Annual Growth Rate	
				2000 to 2010	2010 to 2017
Douglas	32,603	38,431	41,945	1.7%	1.3%
Ferry	7,260	7,551	7,594	0.4%	0.1%
Grant	74,698	89,120	95,158	1.8%	1.0%
Lincoln	10,184	10,570	10,579	0.4%	0.0%
Okanogan	39,564	41,120	41,742	0.4%	0.2%
Project Area Total	164,309	186,792	197,018	1.3%	0.8%

Study Area	2000	2010	2017	Average Annual Growth Rate	
				2000 to 2010	2010 to 2017
WA State	5,894,143	6,724,540	7,405,743	1.3%	1.4%
United States	282,162,411	309,346,863	325,719,178	0.9%	0.8%

Source: U.S. Census Bureau 2017

In terms of land area, the CCT reservation is about 1.4 million acres, with more than half located in southern Okanogan County and the remainder in southern Ferry County, and a small amount of trust land in Chelan County. The CCT had a population of 7,587 in the year 2000 Census count, 7,687 in 2010, and more currently (based on a 5-year interval estimate for the 2012 to 2016 timeframe), an estimated 7,478 residents (U.S. Census Bureau 2010b). About half of the CCT enrolled members live on or near the reservation. One of the larger towns on the reservation is Coulee Dam, which had a year 2000 population of 1,044 and a 2010 population of 1,098. About an hour drive to the east, the Spokane Tribe of Indians Reservation is located along the southern border of Stevens County.

Local School Enrollments

The Grand Coulee Dam School District (GCDSD) provides public primary education for the Grand Coulee EA vicinity, including the town of Coulee Dam and the city of Grand Coulee. The district operates three schools in the town of Coulee Dam, including Lake Roosevelt Elementary School, Lake Roosevelt Junior/Senior High School, and Lake Roosevelt Alternative School. Based on the Washington State Report Card data, GCDSD's enrollment in October 2016 was 719 students (OSPI 2017a). The GCDSD employed 41 classroom teachers, and their budget relies on state funds (63 percent), Federal funds (23 percent), local sources (14 percent), and very few other sources (OSPI 2017b).

Employment

Figure 3-4 displays average employment by industry for the project area. In 2002, an estimated 59,000 people were employed in the five-county study area (Washington State Employment Security Department 2016). By 2015, average annual employment increased approximately 23 percent to nearly 73,000 (Washington State Employment Security Department 2016). Employment in the study area is concentrated in the agricultural, forestry, fishing, and hunting sector, as well as local, state, and county government. These two sectors account for approximately 51 percent of jobs in the study area. Retail trade, manufacturing, health care, and accommodation and food services are also growing industries, accounting for a combined 31 percent of total employment.

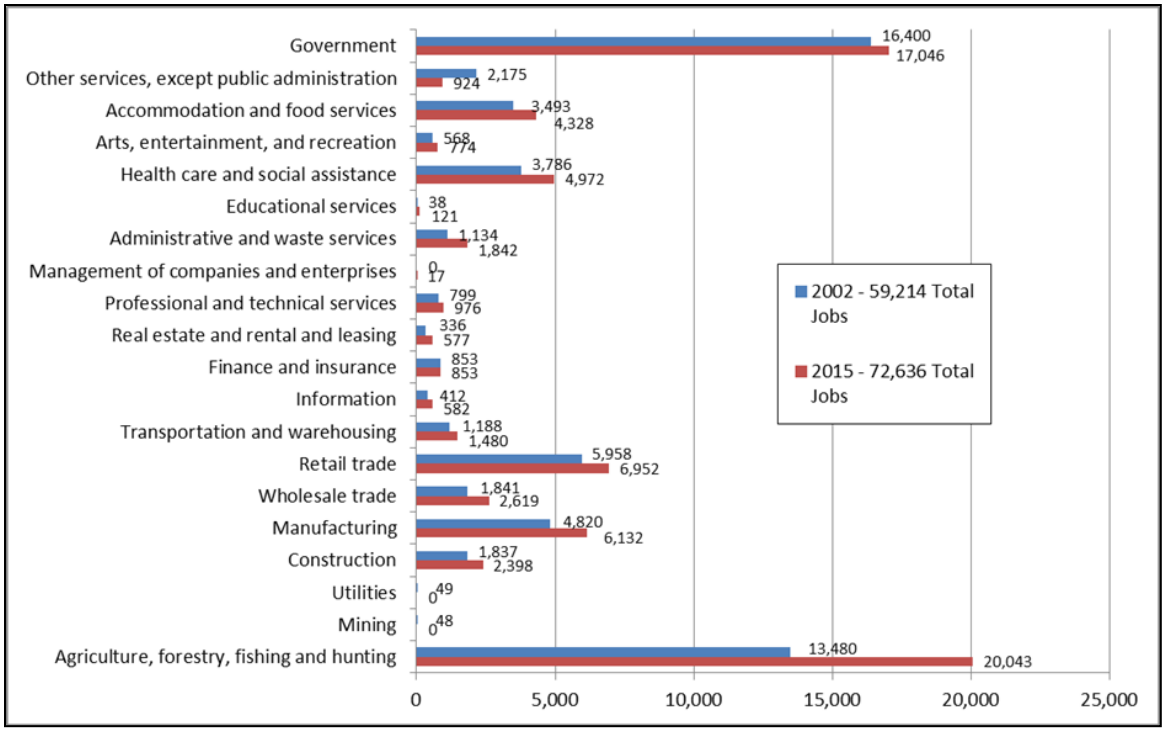


Figure 3-4. Project Area Covered Employment, 2002 and 2015 (Washington State Employment Security Department 2016)

Unemployment

Unemployment rate trends for the five-county study area, Washington State, and the United States are shown in Figure 3-5. In general, the project area's unemployment rate has trended higher than the state's average and has experienced greater volatility. From 1990 to 2001, the study area has experienced an unemployment rate two to three points more than the state (Washington Employment Security Department 2016, U.S. Bureau of Labor Statistics 2016). Starting in 2001, the study area's unemployment rate has been less than 2 points below the state average; it equaled the state average in 2009. With the national economic recession from 2007 to 2009, unemployment rose in the study area, the state, and the nation. Since 2010, the unemployment rate for the study area has declined each year, from a high of 10.7 percent in 2010 to 6.9 percent in 2015 (Washington Employment Security Department 2016, U.S. Bureau of Labor Statistics 2016).

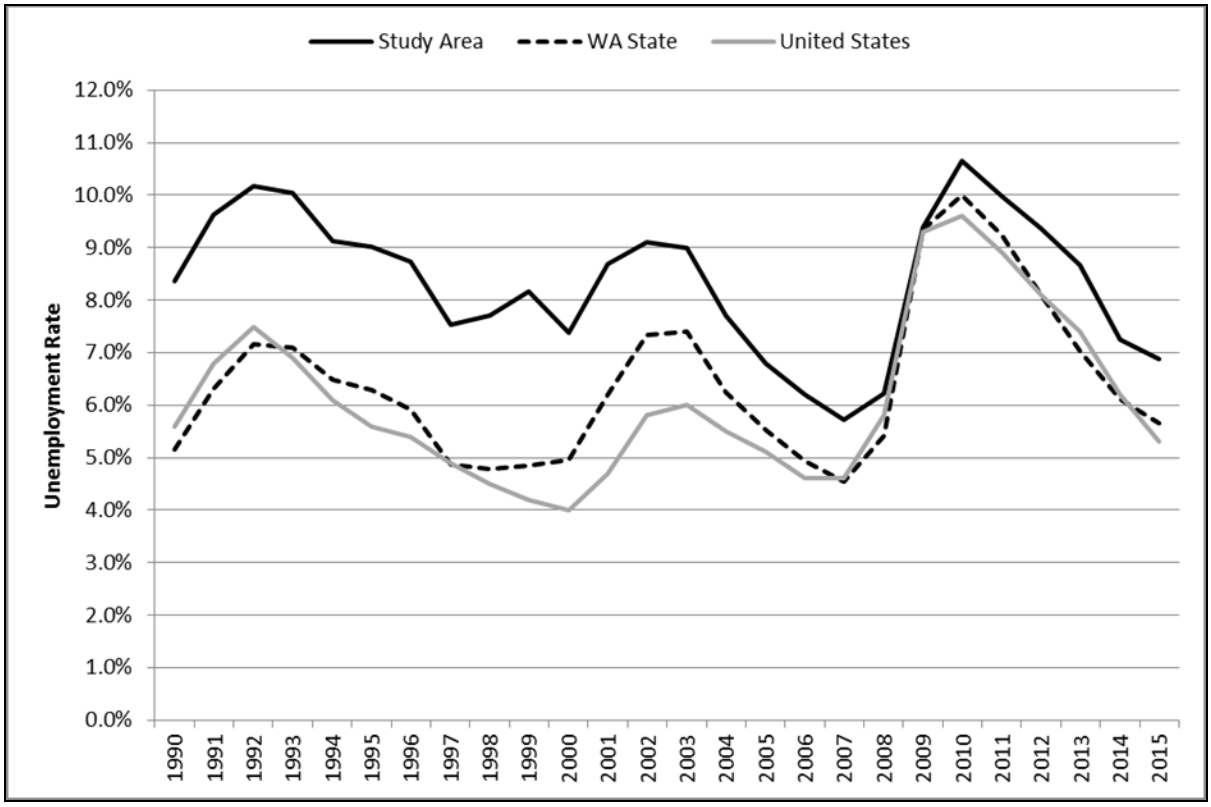


Figure 3-5. Unemployment rate for the study area, Washington State and the U.S., 1990-2015 (Washington Employment Security Department 2016, U.S. Bureau of Labor Statistics 2016)

Payroll by Industry

Table 3-7 presents the taxable wages by industry in the project area. Covered payroll includes the total wages and taxable wages from quarterly unemployment tax forms filed by employers in the study area. The government sector generates the largest portion of payroll in the region (32.5 percent of total regional payroll). The next-largest sector is related to agriculture, forestry, fish, and hunting (19.1 percent of total payroll). Ranking third is the manufacturing sector (11.8 percent of total payroll) (Washington State Employment Security Department 2016)).

Table 3-7. Project Area covered payroll by industry, 2015

Industry	Covered Payroll, 2015 (millions)	Percent of Total
Agriculture, forestry, fishing and hunting	$479.1	19.1%
Mining	$0.0	0.0%
Utilities	$0.0	0.0%
Construction	$99.5	4.0%

Industry	Covered Payroll, 2015 (millions)	Percent of Total
Manufacturing	$296.3	11.8%
Wholesale trade	$130.6	5.2%
Retail trade	$185.5	7.4%
Transportation and warehousing	$57.7	2.3%
Information	$26.8	1.1%
Finance and insurance	$38.2	1.5%
Real estate and rental and leasing	$14.8	0.6%
Professional and technical services	$58.9	2.3%
Management of companies and enterprises	$1.3	0.1%
Administrative and waste services	$40.8	1.6%
Educational services	$2.1	0.1%
Health care and social assistance	$163.1	6.5%
Arts, entertainment, and recreation	$14.9	0.6%
Accommodation and food services	$66.5	2.6%
Other services, except public administration	$20.3	0.8%
Government	$817.7	32.5%
Total	**$2,514.0**	**100.0%**

Source: Washington State Employment Security Department 2016

3.4.2 Environmental Consequences

The Project is not expected to change the study area population, since there would be a maximum of about 103 workers in one year, with fewer in most years; the majority are expected to be temporary workers who likely would not relocate permanently. Construction activities associated with the alternatives would result in positive economic output at the five-county regional level.

Changes in the socioeconomic resources resulting from changes in construction and operation were evaluated in terms of their direct impact on population, employment (labor

force and unemployment rate), income, and overall economic development. In addition to the direct economic effects, the Project would result in secondary (indirect and induced) economic effects. The changes in the socioeconomic resources are a direct result of the changes in employment (number of workers during project construction) and income (measured as expenditures during project construction) in the study area.

A widely used modeling package, Impact Analysis for Planning (IMPLAN 2016), was used to assess the regional economic effects stemming from construction expenditures for each action alternative. The IMPLAN model is an input-output modeling system that estimates the effects of economic changes in an economic region. The common measures of regional economic impacts include employment, regional output (expressed as sales), and income.

Input-output models measure commodity flows from producers to intermediate and final consumers. Purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until the cycle of purchases within the region ends.

These indirect and induced effects (the effects of household spending) were mathematically derived using a set of multipliers. The multipliers describe the change of output for every regional industry caused by a $1 change in final demand for any given industry. The IMPLAN model data files are compiled from a variety of sources for the study area, including the U.S. Bureau of Economic Analysis, the U.S. Bureau of Labor, and the U.S. Census Bureau. This analysis used 2013 IMPLAN data and multipliers, the most current data available to the Bureau of Reclamation.

Overall, this analysis assumed that a majority of the construction expenditures would be funded from sources outside the study area, although it would vary by tasks and years. Money from outside the region spent on goods and services within the region would contribute to regional economic impacts, as opposed to when money originates from within the study region for purchases outside the region, which is much less likely to generate regional economic impacts.

In terms of the contractor workforce, it was assumed that some would move temporarily to the region and others would commute from within the five-county region. For this reason, some portion of wages would be spent inside the study area during the10-year construction period.

Alternative A – No Action

No additional construction or modernization is anticipated for this alternative; therefore, minimal regional impacts related to construction would be generated. Reclamation would continue operating the project without scheduled system improvements. The maintenance schedule would be followed with allowances for emergency repairs or replacements. Repair costs and time needed to obtain replacement parts would continue to increase based on the aging technology and the scarcity of the replacement parts. There likely would be no funding

spent on safety improvements or a concentrated series of other equipment replacements, modifications, and improvements, until a breakdown occurs.

Alternative B – TPP G19-G21 Modernization

Regional Economic Effects of Construction

The economic impacts were estimated for the five-county regional study area distributed throughout the construction period, shown in Table 3-9. These regional impacts would not occur uniformly each year; instead, they would vary year to year proportionate to annual expenditures. The majority of the estimated employment, output, and income impacts are due to local expenditures on regionally sourced materials and wages earned by the workforce involved in construction activities. As with any model, the accuracy of the results depends on the accuracy of the inputs. Cost estimates are preliminary and may change as engineering design is refined.

Table 3-9 shows estimated construction expenditures, measured in 2018 dollars, expected to be made inside the study region. The Project's total regional design and construction costs associated with the construction is estimated to be $27.3 million. Construction expenditures made outside the five-county area were considered leakages and would have no impact on the local economy. Some construction items (specialized equipment and skilled labor) are more likely to be purchased or sourced outside the region and brought to the construction site because of their high cost and lack of availability in the region.

The employment reported below is the potential total of all jobs generated directly and indirectly from project-related expenditures estimated to occur within the study area. Local expenditure dollar amounts for Alternative B were entered into the IMPLAN model by year, and outputs were the resulting estimated jobs, output dollar amounts generated, and labor income, shown in Table 3-9.

Table 3-8. Construction impacts in the five-county study area (Reclamation estimates of local expenditures, by year, in 2018 dollars)

Years	Estimated Local Expenditures*	Employment	Output	Labor Income
2022	$2,184,470	19.9	$2,924,486	$909,879
2023	$5,804,401	51.4	$7,544,383	$2,347,242
2024	$5,659,982	48.7	$7,142,401	$2,222,175
2025	$3,965,991	6.4	$4,858,964	$1,511,742
2026	$2,291,271	18.6	$2,725,406	$847,941
2027	$2,294,847	18.1	$2,650,154	$824,528
2028	$2,292,696	17.5	$2,570,555	$799,762
2029	$1,506,476	11.2	$1,639,855	$510,199
2030	$726,708	5.2	$768,008	$238,946
2031	$535,762	3.7	$549,719	$171,031
2032	$107,396	0.8	$110,193	$34,284
Total	**$27,370,000**	**201.5**	**$33,484,124**	**$10,417,729**

* The estimated local expenditures are in 2018 dollars and are not present-valued for the future years; however, the totals that were run in the IMPLAN model were present-valued.

The potential number of on-site construction jobs would vary over the 10-year period and was estimated to be up to a maximum of roughly 103 workers, which is expected to occur during part of year 2024 and most of year 2025. The greatest average number of workers in any given year would be 89 (year 2025), and the average number of workers over the approximately 10-year period would be about 60. Any impacts would be minimal, since the number of workers who may relocate temporarily is relatively low for most of the 10-year construction period, as shown in Table 3-9 below.

Table 3-9. Estimated number of contract employees by task and timeframe for Alternative B

Project Description	Construction Schedule for Alternative B	Range of Total Number of Contract Employees*	Percent Local Employees	Percent Non-Local Employees	Percent of Non-Local Employees Temporarily Relocating in Region
Main Unit G21-G24 transformer replacement	Mar 2022 - Nov 2022	10-12	20%	80%	10%
Mobilization and site work	Mar 2023 – Sept 2024	12-15	50%	50%	10%
North door replacement	Mar 2023 – Sept 2024	12-15	20%	80%	10%
Turbine runners	Sept 2022 – Sept 2025	8-10	20%	80%	10%
Turbine and generator shaft assemblies	Sept 2022 - Jun 2025	6-8	25%	75%	10%
Generator rotor, stator, windings and assoc.	Sept 2022 - Jun 2029	12-15	20%	80%	10%
Upper and lower brackets	Dec 2024 - Jun 2029	8-10	25%	75%	10%
Turbine head cover and operating ring assembly	Oct 2022 - Sept 2025	8-10	20%	80%	10%
Thrust and guide bearing systems	Sept 2022 - Sept 2025	4-6	25%	75%	10%
Wicket gates	Jan 2023 – Jun 2025	6-8	25%	75%	10%
Cooling water and oil piping systems	Sept 2024 – Jan 2032	4-6	50%	50%	10%

Project Description	Construction Schedule for Alternative B	Range of Total Number of Contract Employees*	Percent Local Employees	Percent Non-Local Employees	Percent of Non-Local Employees Temporarily Relocating in Region
Unit control boards, and relays	Sept 2026 – Mar 2032	4-6	0%	100%	0%
General overhaul/modernization of Unit G19	Sept 2024 – Feb 2027	8-10	75%	25%	10%
General overhaul/modernization of Unit G20	Mar 2027 – Sept 2029	8-10	75%	25%	10%
General overhaul/modernization of Unit G21	Oct 2029 – Mar 2032	8-10	75%	25%	10%
Fixed Wheel Gate Refurbishment	Nov 2024 – Dec 2030	8-10	50%	50%	10%
Penstock, scroll case, and draft tube recoating	Jan 2025 – Aug 2031	8-10	25%	75%	0%

* This is an estimate of the total number of contract employees that may be onsite during the life of the given project.

Source: Reclamation's 2017 estimates

School Enrollment

Reclamation does not expect the contractor workforce to relocate permanently to the communities surrounding Grand Coulee during their specific work assignments. This assumption is based on the understanding that construction workers typically move from job site to job site for the duration of their work. They use temporary accommodations such as motels/hotels, RV parks, and campgrounds during the week, and return home when they are off work. However, it is possible that some of the contractor workforce may temporarily relocate to the area and enroll their school-age children in the local schools.

For the proposed project, Reclamation conservatively assumed 10 percent of the total workers would relocate into the region temporarily and enroll one child in the GCDSD. Based on an assumption that an estimated 10 percent of the workforce may relocate temporarily, and that there could be a peak of 103 employees during years 2024 and 2025, there could be 10 employees who may relocate their families. If it is assumed that half of that number may bring a child, it could result in an increased enrollment of five students. This estimate is considered high because it is based on the maximum anticipated number of workers, and the peak number includes overlapping tasks within each year. However, multiple different contracts would take place over the Project duration, and they would be spaced out according to which components are being worked on at that time. The quantity of work occurring at one time is limited by space within the powerhouses for equipment, material, and laydown.

In Washington, most of the large school entitlement programs (basic education, special education, learning assistance, and bilingual education) are tied to student enrollment and fluctuate as enrollment changes throughout the school year. Thus, while the reduction in funding has implications for the GCDSD's short- and long-range planning and budgeting, the majority of the funding lag is expected to have a duration of less than one academic year. After that time, state and Federal funding levels would increase in response to the added student population. The increase in student population could also increase the student-to-instructional-staff ratio, depending on the grade distribution of the additional students.

Tribal Employment Rights Ordinance

Tribal Employment Rights Ordinances (TERO) extend Indian preference hiring to all construction projects on or near an Indian Reservation. A TERO program monitors and enforces employment and contracting rights of Indians and ensures their rights are protected and exerted. Portions of the work associated with the modernization and overhaul of the generating units would be located on or near the CCT Reservation, and it is also located about 70 miles east to the Spokane Tribe of Indians Reservation.

The CCT have enacted a TERO (Colville Tribal Law and Order Code, Title 10 Employment and Contracting Chapter 10-1 Tribal Employment Rights [CCT 2009]) and other ordinances that may be applicable to this work. Tribal ordinances would be included among the laws, codes, and regulations covered by the Permits and Responsibilities clause of the Reclamation

contract for the work. Reclamation's contractor would be directed to contact the CCT Tribal Employment Rights Office for information about these requirements, which could involve fee assessments on certain portions of work. However, Reclamation's Contracting Officer is not a party to enforcing Indian preference requirements; it is a matter solely between the Tribe and the contractor.

Operation and Maintenance

The impacts associated with the construction phase are temporary and, as such, different from the long-term effects associated with the operational phase of the Project. Operational impacts would consist of long-term effects and changes in the local economy from secondary expenditures of additional workers, such as at local eateries and gas stations, and from long-term effects associated with revenue from property taxes, payroll taxes, or income taxes. However, it is expected that operation and maintenance work would continue to be accomplished by current Reclamation employees or contractors who already reside within the region. Therefore, no new jobs or changes in population would be expected within the study area as a result of long-term operations of the project.

The action alternative would not be expected to have any long-term impacts to socioeconomic conditions within the study area.

3.5 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," dated February 11, 1994, requires Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities, as well as the equity of the distribution of the benefits and risks.

Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group should bear a disproportionate share of negative impacts. Indicators often include analyzing racial and ethnic populations, income, unemployment, poverty rates, and housing conditions in the study area.

3.5.1 Affected Environment

The area around Grand Coulee Dam and its reservoir, Lake Roosevelt, is located in Douglas, Ferry, Grant, Lincoln, and Okanogan Counties. These counties were selected as the local study area. Table 3-10 provides the numbers and percentages of population in 2010 for seven racial categories (White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other Race, and Two or More Races), the total minority population, and the Hispanic or Latino population (a minority ethnic group) for each county, the combined five-county study area, and the state of Washington (U.S. Census Bureau 2010a).

Table 3-10. Race and ethnicity in the project area (U.S. Census Bureau 2010a)

Category	Douglas County		Ferry County		Grant County		Study Area Lincoln County		Okanogan County		Total Study Area		State of Washington	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Total Population	37,565	—	7,520	—	88,098	—	10,248	—	40,552	—	183,983	—	6,465,755	—
White	35,446	94.4	5,902	78.5	83,034	94.3	9,735	95.0	34,378	84.8	168,495	91.6	5,201,398	80.4
Black or African American	382	1.0	17	0.2	1,147	1.3	28	0.3	280	0.7	1,854	1.0	220,417	3.4
American Indian and Alaska Native	713	1.9	1,319	17.5	1,482	1.7	262	2.6	4,612	11.4	8,388	4.6	91,437	1.4
Asian	371	1.0	23	0.3	1,079	1.2	30	0.3	313	0.8	1,816	1.0	424,531	6.6
Native Hawaiian and Other Pacific Islander	72	0.2	7	0.1	98	0.1	7	0.1	36	0.1	220	0.1	28,884	0.4
Population of two or more races	581	1.5	252	3.4	1,258	1.4	186	1.8	933	2.3	3,210	1.7	244,250	3.8
Total Racial Minority Population	2,119	5.6	1,618	21.5	5,064	5.7	513	5.0	6,174	15.2	15,488	8.4	1,009,519	15.6
Not Hispanic or Latino	27,507	73.2	7,257	96.5	55,694	63.2	9,946	97.1	33.494	82.6	133,898	72.8	5,841,930	90.4
Hispanic or Latino	10,058	26.8	263	3.5	32,404	36.8	302	2.9	7,058	17.4	50,085	27.2	623,825	9.8

Source: U.S. Census Bureau 2010a

The proportion of American Indians within the local study area is more than three times greater than the proportion within the State of Washington overall, largely as a result of the presence of the CCT within the study area and the nearby Spokane Tribe of Indians Reservation. Conversely, the proportion of persons who are Asian or Black or African American is substantially less than for the State of Washington. While the total racial minority population of the five-county study area, at 8.4 percent, is also less than the state's percentage of 15.6, the Hispanic or Latino representation within the study area is nearly three times greater than at the state level, at 27.2 percent and 9.6 percent, respectively.

Table 3-11 provides income, poverty, unemployment, and housing information for each county and the state for the year 2010 (U.S. Census Bureau 2010b). Low-income populations are identified by several socioeconomic characteristics. As categorized by the 2010 Census, specific characteristics include income (median family and per capita), percentage of the population below poverty (families and individuals), unemployment rates, and general housing conditions.

Median family income and per capita income for the five counties are less than those in the state as a whole. Compared to the State of Washington, the study area has greater percentages of families and individuals below the poverty level. The CCT median household, inflation-adjusted income, at $34,554, is lower than the study area as a whole. Approximately 24 percent of CCT families were below the poverty level, which is about twice the rate for the study area and three times the number of families living below the poverty level state-wide (US Census Bureau 2016).

Table 3-11. Income, poverty, unemployment, and housing in the project area

Category	Douglas County	Ferry County	Grant County	Lincoln County	Okanogan County	State of Wash.
Income						
Median Family Income	$55,363	$43,529	$48,907	$50,899	$48,159	$68,457
Per Capita Income	$22,522	$26,283	$19,205	$24,127	$19,367	$29,320
Percent Below Poverty Level						
Families	12.0	12.0	14.4	8.1	14.2	7.9
Individuals	14.3	19.1	19.0	12.6	19.6	11.8
Percent Unemployed	7.0	15.0	10.2	4.5	8.7	7.0
Housing						
Housing Units Occupied (%)	86.8	72.5	85.6	76.6	74.3	90.8
Owners (%)	70.0	71.9	62.7	78.0	68.4	63.9
Renters (%)	30.0	28.1	37.3	22.0	31.6	36.1

Category	Douglas County	Ferry County	Grant County	Lincoln County	Okanogan County	State of Wash.
Housing Units Vacant (%)	13.2	27.5	14.4	23.4	25.7	9.2
For rent	1.5	1.0	2.7	1.6	1.5	2.5
Seasonal*	6.5	20.2	7.7	14.2	18.2	3.1
1.01 or More Occupants per Room	5.6	1.5	7.8	2.6	2.9	2.4
Lacking Complete Plumbing Facilities (%)	0.4	2.3	0.1	1.2	0.8	0.5

* For seasonal, recreational, or occasional use.
Source: U.S. Census Bureau 2016

Unemployment is another indicator of low income in relation to environmental justice. In 2009, unemployment in three of the five counties was greater than the state's 7.0 percent unemployment rate. Douglas County's unemployment rate matched the state's rate at 7.0 percent, while Lincoln County's unemployment rate was 4.5 percent. The CCT unemployment rate in the 2012-to-2016 timeframe was the highest in the project area at 17 percent (Census 2012-2016) and has been the case over time, according to Tribal website information (Confederated Tribes of the Colville Reservation 2018).

Table 3-11 displays the types of housing occupancy data, collected in the 2010 Census, showing that overall housing availability is generally less in the study area than the State of Washington as a whole. Among the counties in the project area, housing availability was lowest in Grant and Douglas Counties. In comparison, the CCT had about 19 percent of units vacant, and of those, 2.3 percent were for rent and 11.1 percent were for seasonal, recreational, or occasional use (Census 2010). The percentage of reservation housing units that were owner-occupied was about 63 percent, with 36 percent renter-occupied (U.S. Census Bureau 2016).

Substandard housing units are typically identified as being overcrowded and/or lacking complete plumbing facilities. The percentage of occupied housing units with 1.01 or more occupants per room was greater in four of the five study area counties than the 2.4 percent for the state, with the highest percentage in Douglas County. The percentage of housing units lacking complete plumbing facilities in the study area was less than the state percentage of 0.5 percent in both Douglas and Grant Counties.

3.5.2 Environmental Consequences

Impact Indicator/Methods for Evaluating Impacts

An environmental justice analysis evaluates the effects of potential adverse environmental impacts on natural resources and associated human health impacts, as well as socioeconomic

impacts, to identify and describe disproportionate adverse effects to minority and/or low-income populations. Environmental justice impacts would be considered significant if the project resulted in disproportionate adverse impacts to minority and/or low-income populations.

Alternative A – No Action

No natural resource or socioeconomic impacts adversely affecting minority and low-income populations have been identified for the No Action Alternative; therefore, there are no environmental justice impacts.

Alternative B – TPP G19-G21 Modernization

Alternative B could include as many as 103 on-site construction-related workers in years 2024 and 2025, and fewer the rest of the 10-year construction period. Some portion of these jobs likely would be filled by persons coming into the study area from outside, although the number can only be roughly estimated. It is assumed that most non-local workers would commute from other surrounding areas to the work site part of each week and return home. Of the workers coming from elsewhere, it is assumed that overall, only about 10 percent would decide to relocate to the area temporarily, and some may rent properties. Others who commute may stay in hotels, camp, stay in nearby RV parks, or some combination for extended periods of time or for work days (also refer to the Socioeconomics section in this chapter).

In terms of available housing in the area, research conducted for previous construction-related projects at Grand Coulee confirmed anecdotal information that there are many factors at the local and regional levels that influence the demand, supply, and cost of rental and owner-occupied housing. The existing demand for rental housing in the project area is generally considered to be high relative to the currently available supply, and Alternative B would be expected to contribute somewhat to that demand; however, it is not reasonably foreseeable that this would result in adverse impacts that would disproportionately affect minority or low-income populations.

3.6 Cultural Resources

This section addresses the affected environment and the environmental consequences of the Project on cultural resources. Cultural resources include cultural landscapes, ethnographic resources, historic places, properties of traditional and cultural importance, artifacts and documents, buildings, structures, archaeological sites, districts, and objects.

Chapter 3.9 Indian Sacred Sites provides additional information about the existing conditions and potential environmental consequences to properties of traditional and cultural importance (such as Indian sacred sites) to Native American tribes. As part of the Section 106 consultation process, Reclamation has consulted with the Tribal Historic Preservation Officer (THPO) for the CCT regarding archaeological and built environment areas of potential effects (APE). Copies of this correspondence are included in Appendix A.

Implementing regulations for Section 106 of the National Historic Preservation Act (NHPA), found at 36 CFR 800.8, encourage close coordination with NEPA and require Federal agencies to consider the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places (National Register). The lead Federal agency would provide opportunities to comment on the impacts the project may have on cultural resources to the Native American tribes and other interested parties.

Reclamation, as the lead agency responsible for compliance with Section 106 of the NHPA, is responsible for ensuring that cultural resource studies have been conducted to the degree required to effectively identify historic properties within the APE. These literature reviews and pedestrian inventories have been completed as part of the 2010 Third Powerplant Generating Units Overhaul (TPP Overhaul) EA and the recently completed G1-G18 Modernization and Overhaul EA.

Avoidance of adverse effects to historic properties through project design remains the preferred method for mitigating impacts on cultural resources.

3.6.1 Affected Environment

Reclamation has identified historic properties that could be impacted by the Project. 36 CFR 800.16 (l) (1) defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior."

The Criteria for Evaluation (36 CFR Part 60) are the basis for determining whether a building, structure, object, site, or district is eligible for listing on the National Register. Significance is evaluated by applying the four National Register criteria, which define the kind of significance that a property can represent. A resource need only meet one of the four criteria to be eligible for listing in the National Register. These criteria are as follows:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in prehistory or history.

Properties must retain integrity adequate to demonstrate their significance under the relevant criteria. Properties generally must be at least 50 years of age to be eligible for listing on the National Register unless they are proven to have exceptional importance.

Archeological

Although most of the work for the proposed upgrade would occur inside the generating units, staging and laydown areas would be required to facilitate construction. These locations would be used temporarily for storage of supplies and equipment during construction. Use of these areas would have no impact on built-environment resources but have been evaluated for archaeological effects.

A records search for archaeological resources within 1 mile (1609.34 meters) of the archaeological APE identified 15 archaeological sites. The only historic property identified within the archaeological APE was the Grand Coulee Dam historic district. Of the 15 resources within the study area, nine are pre-contact sites and six are historic sites. There are two National Register-eligible archeological properties within the study areas: 45GR146, a pre-contact site, and 45GR662, a historic site. The other 13 archaeological sites within 1 mile of the APE remain unevaluated for National Register eligibility at this time.

Investigation of proposed staging areas, including archaeological survey, was conducted as part of compliance with NHPA Section 106 (McFarland and Ferry, 2016) for the G1-G18 Modernization and Overhaul Project in 2017. No pre-contact archeological resources were identified during investigation. Only non-contributing historic debris and post-demolition fragmentary infrastructure associated with the dam and construction of the TPP were noted.

The primary reason that archeological resources have not been recorded in the project area is the extensive disturbance that happened during the construction of the original Grand Coulee Dam from 1933 to 1942, as well as construction of the TPP from 1967 to 1974. Comparison of topographic maps developed at the start of the construction of Grand Coulee Dam in 1934 with current conditions show that the northern end of the TPP occupies what was once a broad terrace with a west-northwest aspect that sloped gently down to the river (Hess 2010).

Construction dramatically altered the original landscape. The elevation of the landform near the TPP was about 1170 feet above sea level in 1934. At present, the TPP and the parking area to the northwest of the TPP rest on a surface with an elevation of about 1013 feet above sea level, indicating that almost 160 feet of sediment and rock were removed prior to the construction of the TPP. The amount removed to create the current flat area decreases toward the western edge of the original terrace; however, even there, about 90 feet of overburden was removed. The area of extensive disturbance related to construction of the TPP extends well to the north, going beyond the paved powerplant service road (Hess 2010).

Buildings and Structures

The Project would require the replacement of equipment in the TPP, one of the largest hydropower generating facilities in the world. In 2006, the State Historic Preservation Office (SHPO) concurred with Reclamation's determination that the Grand Coulee "dam, power plants, pumping plants, industrial area [southwest of dam] and associated facilities" are part of the historic complex eligible for listing in the National Register. This determination includes the TPP.

Reclamation has consulted with the CCT on the National Register eligibility of the TPP. The THPO and Colville Business Council signed a Memorandum of Agreement (MOA) to resolve adverse effects from the initial phase of the overhaul on April 19, 2010, concurring with Reclamation's determination that the TPP and Forebay Dam meet the criteria for listing a property in the National Register.

The Grand Coulee Dam complex is eligible for the listing in the National Register at the national level as a historic district that meets National Register Criteria A and C. It is eligible under National Register Criterion A for its association with the public works programs of the New Deal era, as well as the transition from creating dams for irrigation to multi-purpose projects built for flood control and electrical generation. The Grand Coulee Dam complex is also eligible as a historic district under National Register Criterion C for its method of construction. The dam is one of the largest concrete structures in the world and reflects Reclamation's pioneering innovations in construction technology. Constructed during a period of increasing standardization, Grand Coulee's mechanical systems have not been identified as particularly innovative. The concrete dam, powerplants, and other contributing resources have retained their original spatial organization, materials, and architectural finishes.

The TPP has been determined to be individually eligible for listing on the National Register. Though it is not yet 50 years old, the design of the powerplant by Marcel Breuer, one of the preeminent Modernist architects of the 20th century, establishes the exceptional importance that is required to meet National Register Criteria Consideration G: "A property achieving significance within the past 50 years if it is of exceptional importance."[7]

A character-defining feature is a prominent or distinctive aspect, quality, or characteristic of a historic property that contributes significantly to its physical character. Character-defining elements include the overall shape of the building, its materials, craftsmanship, decorative details, interior spaces and features, as well as the various aspects of its site and environment (NPS 1988). Character-defining features are those that contribute to the significance of a property, and thus, generally date to a property's period of significance.

The TPP site includes character-defining features that contribute to the property's historical and architectural significance and relate to all seven aspects of integrity. Character-defining features of the site include the TPP's architectural design and materials.

Since the disturbed landscape around the TPP is not considered contributing to the Grand Coulee historic district, and since addition of these temporary buildings does not affect historic character, no separate visual effect APE is being consulted on.

[7] National Register Criteria for Evaluation and Criteria Considerations can be found online at https://www.nps.gov/nr/publications/bulletins/nrb15/nrb15_2.htm.

3.6.2 Environmental Consequences

Significance Criteria

Historic properties were analyzed under Section 106 of the NHPA to determine effects from the project. This NHPA analysis assesses known or foreseeable project actions that would result in loss of historic integrity affecting the National Register eligibility of the Grand Coulee Dam historic district.

The Advisory Council on Historic Preservation (ACHP) regulations implementing Section 106 of the NHPA create a process through which Criteria of Adverse Effect are applied. These criteria are used to determine whether the project could change the characteristics that qualify a property for inclusion in the National Register in a manner that would diminish the historic integrity of the property. There are two findings for effects on historic properties: No Adverse Effect and Adverse Effect. If no historic properties are present, a determination of No Historic Property Affected can be applied. Adverse effects include, but are not limited to, the following: Demolition or alteration of the property; introduction of visual, audible, or atmospheric elements that are out of character with the setting of the historic property; and physical encroachment upon an archaeological site.

A determination of adverse effect under Section 106 does not automatically translate to a finding of Significant Impact under NEPA. Adverse effects can be considered minor, or not significant, impacts.

Under NEPA, direct impacts to historic properties are those that are caused by the action and occur at the same time and place. They are not limited to physical impacts to the property; they can also include impacts to the setting. The context and intensity of impacts must be considered. The intensity of an impact refers to the degree to which the action may impact or cause loss or destruction to significant cultural resources. This intensity may be categorized as Minor, Not Significant, or Significant. Indirect impacts are caused by the action and are later in time or farther removed in distance but still are reasonably foreseeable, such as changes in land use patterns and related effects on air quality. Cumulative impacts result from the Proposed Action's incremental impact when added to those of other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Direct impacts to archaeological resources may result from ground-disturbing activities such as construction, staging, or laydown associated with upgrading the generating units. Although changes in reservoir level during repair of the generating units could constitute a direct effect on reservoir shoreline sites, this fluctuation would not be in excess of what occurs during normal operation of the dam, and so cannot be considered an impact separate from routine operating procedures.

Indirect impacts may include disturbance, destruction, and/or increased damage to pre-contact and historic archaeological sites because of increased public use or activities in the resource area.

Alternative A – No Action

No historic properties would be affected by Alternative A – No Action.

Archaeological

Alternative A, the No Action alternative, would have no adverse effect and no impact to National Register-eligible archaeological resources.

Buildings and Structures

Alternative A, the No Action alternative, would have no adverse effect and no significant impact to historic properties.

Alternative B – G19 – G21 Modernization

Archaeological

Alternative B, the modernization or replacement of generating units G19-G21, would have no effect and no significant impact to National Register-eligible archaeological resources. No National Register-eligible archaeological resources were identified within the APE, including in any of the proposed staging and laydown areas that would be used to support Alternative B.

Buildings and Structures

No adverse effects or significant impacts to historic properties have been identified based on modernization of the G19-G21 generating units. National Register eligibility of the TPP is based on its architectural design and not on the generating units themselves. Many of the changes are not easily visible, as they occur in remote equipment galleries or are buried or underwater when in use.

One of the proposed project actions has the potential to affect the historically significant design of the TPP. Installation of a new service door at the north end of the plant would alter the original design of the powerplant. However, as detailed in the attached Section 106 report, Reclamation cultural resources professionals have been engaged in the design of the new service door from the beginning of the process and have been able to assist the design team in avoiding adverse effects to Marcel Breuer's important Modernist design. Installation of the new door as given in the North Door feasibility study would result in No Adverse Effect to historic properties and No Significant Impact to the human environment.

3.7 Visual Resources

3.7.1 Affected Environment

In the built environment, visual appealing structures tend to be designed on the principal that function follows form and mirror the basic elements of line, form, color, and texture found in the natural environment. This important interplay is demonstrated in the construction of the Grand Coulee Dam. As one of the largest structures built (550 feet high and 5,223 feet long),

the Grand Coulee often dominates the existing viewshed, depending on viewer location. However, the visual intrusions created by the dam have been mitigated by its design. The top of the dam mirrors the horizon, while the colors and material easily blend into the background. The crest road is built on a series of arches that spans the full length of the dam and is reflected in the forms that comprise the third power house.

Viewer sensitivity is a measurement of the viewer's perception as it relates to the visual resources of an existing environment. Grand Coulee Dam has high viewer sensitivity, as it has become the focal point for the nearby communities. Reclamation-managed recreational sites such FDR Memorial Park and the Visitor's Center Park intertwine the history of the dam with the its form and function. Dam operators entertain and educate the visitors to the area on the importance of renewable energy with a nightly light show, and businesses mount pictures of the original construction and sell dam memorabilia. Mason City Park interprets its history through a series of monuments and interpretive signs. Recreational tourism has become an important economic resource for these communities (Reclamation 2016). The visual sensitivities of the local tribes are discussed in Section 3.6 Cultural Resources.

3.7.2 Environmental Consequences

Alternative A – No Action

There would be no impacts to visual resources under the No Action alternative.

Alternative B – TPP G19 – G21 Modernization

Impacts to visual resources derived from the modernization of the TPP are limited to construction activities that occur outside of the existing buildings and include the visual intrusions created by the placement of the temporary buildings. Under the proposed action, 13 buildings would be placed on location near the TPP for a term of 10 years. The largest of these buildings would be approximately 125 feet by 350 feet and would have a height of 30 feet. This building would be dwarfed by the TPP, which is approximately 300 feet by 1,000 feet and is approximately 50 feet tall. The remaining buildings are substantially smaller and vary in size, adding interest to the site. All buildings would be tightly grouped and placed based on functionality and work flow processes.

The temporary buildings could be seen from various locations within 5 miles of dam. Outside of this distance, the buildings would blend into the background. Measures would be taken to mitigate the visual effects of the various temporary buildings that would be erected during the G19-G21 Modernization Project. Although these buildings would be temporary, specifications would be written into the design that would require these buildings to incorporate color and texture of the existing rock and dryland terrain. An architectural rendering of this design concept is (in development), an example of the color, texture incorporation is shown in Figure 3-6.

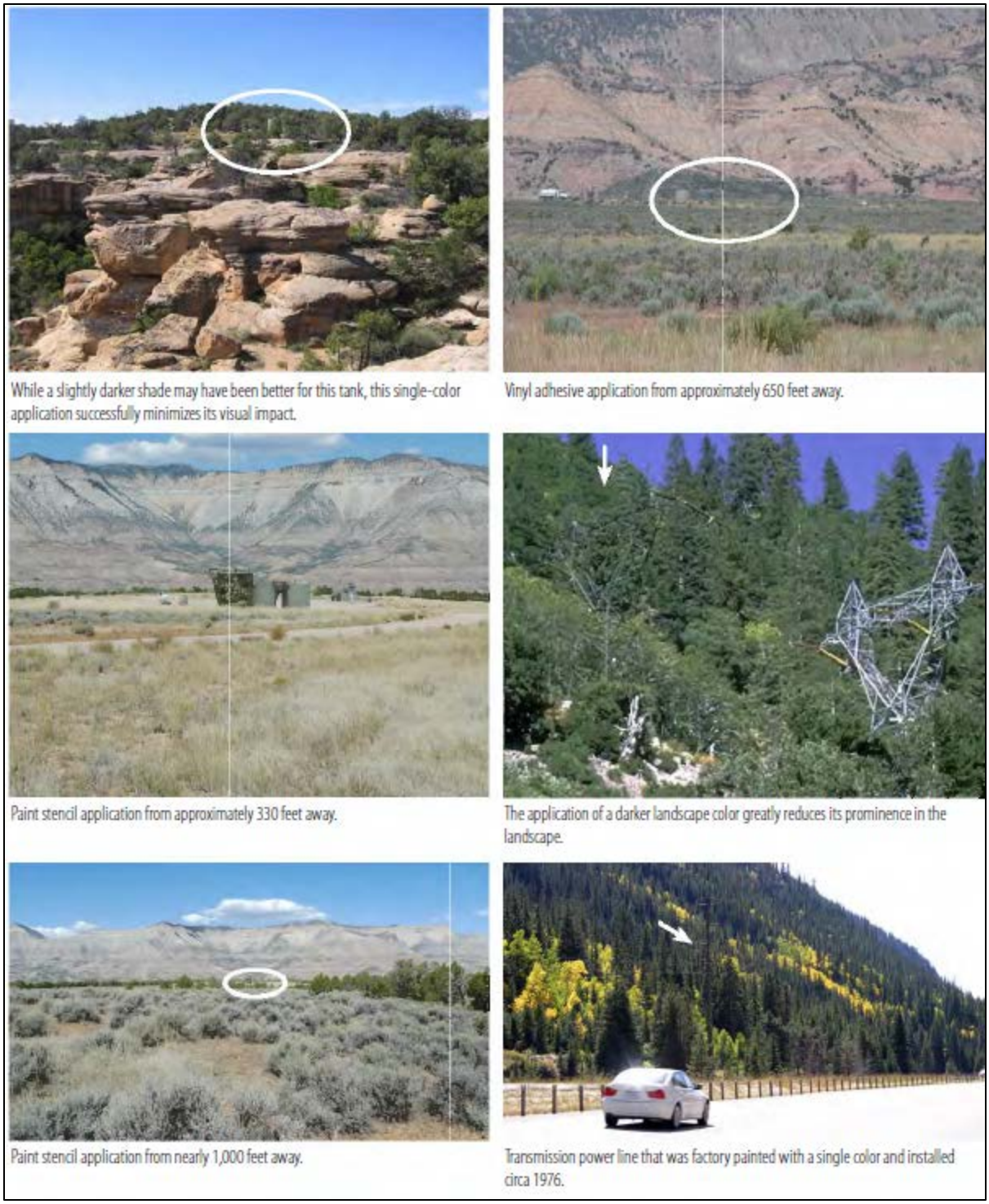


Figure 3-6. Example of texture and camouflage constructed and blended into the landscape (Bureau of Land Management 2015)

The construction materials for these buildings would be determined in the final contract specifications and would have a non-reflective surface, which would help to mitigate the visual intrusions. The color schemes for these building would be derived based the existing

color of the dam and TPP. The overall visual quality would not be substantially impacted because the elements' line, form, and color produced by the dam would be repeated in the buildings.

During the life of the project, the increase in activity may be seen but would not draw the attention of the casual observer. Because of the integration with the local communities, this is not likely to conflict with the viewers' expectations, and visual sensitivity would not be impacted. All impacts to visual resources are presumed to be short-term, as the buildings would be removed after the modernization activities have concluded.

3.8 Indian Trust Assets

3.8.1 Affected Environment

The Secretary of the Interior has defined Indian Trust Assets (ITA) as "lands, natural resources, money, or other assets held by the Federal government in trust or that are restricted against alienation for Indian tribes and individual Indians" [Interior Departmental Manual 303 DM 2, Secretarial Order No. 3215]. Reclamation usually takes this to mean that ITAs include water rights, lands, minerals, hunting and fishing rights, money, and claims (Reclamation 1994).

Following this definition, Reclamation has not identified any potential ITAs within the area to be directly affected by the proposed project. All of the proposed construction activities would take place within Federal lands withdrawn or acquired by the United States for project purposes, and they are not held in trust for the CCT or for individual Indians. Congress also expressly directed the Secretary of the Interior (54 Stat. 703) to not establish "rights of hunting, fishing, and boating to the Indians in the areas" withdrawn for project purposes. Therefore, no reserved hunting or fishing rights exist in the project area.

However, the CCT have ITAs related to water rights on the Columbia River, which is directly adjacent to the project area. The CCT have water rights within the Colville Reservation, and they have asserted claims for analogous rights in the waters that border the Colville Reservation, including the Columbia River (Columbia River Initiative Agreement in Principle between the State of Washington and the CCT, January 4, 2005).

3.8.2 Environmental Consequences

Impact Indicator/Methods for Evaluating Impacts

The purpose of this discussion is to determine if implementation of the Proposed Action would appreciably impact the current ITAs that may be in the project area. This is a qualitative analysis that identifies the affected environment and perceived variables subsequent to the implementation of the Proposed Action. The indicator variable used in this analysis is the potential for the project, during either construction or operation, to affect access to ITAs or to reduce their value.

Alternative A – No Action and Alternative B – TPP G19-G21 Modernization

Alternatives A (No Action) and Alternative B (TPP G19-G21 Modernization) would not result in any significant negative effects on ITAs. The project would not involve actions on trust lands, and it would not further reduce the ability of Indians to hunt, fish, and boat in the Colville Reservation. The project would not affect the amount of water available in the Columbia River below Grand Coulee Dam and would not affect any water rights that might be claimed by the CCT.

3.9 Indian Sacred Sites

Executive Order 13007, signed by President Clinton on May 24, 1996, defines a sacred site as:

> *Any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site [E.O. 13007, Section 1 (b) (iii)].*

3.9.1 Affected Environment

The Grand Coulee Dam sits within the traditional territory of the Nespelem Tribe. The Nespelem are one of 12 Federally recognized tribes who are incorporated as the CCT. The Sanpoil and the Moses-Columbia, also incorporated as part of the CCT, occupied adjacent traditional territories to the east and south of the Project.

The CCT have not specifically identified any sacred sites within the immediate vicinity of the proposed project area. A number of locations with traditional Indian place names and traditional cultural value are present in the general area of Grand Coulee Dam, but the CCT have not specifically identified these sites as having established religious significance or ceremonial use.

Members of the CCT often generally recognize that many aspects of the natural environment should be considered sacred, including water, land, air, and various plant and animal species. In their Cultural Resources Management Plan (CCT 2006), the CCT group sacred sites with traditional cultural properties and properties of traditional religious and cultural importance to Tribes.

Local landforms with Salish place-names are associated with stories and legends that remain important to the cultural continuity of the CCT and other regional tribes. In addition to living near the Columbia River and fishing its waters, Tribal members traditionally exploited root crops in the wetlands and traversed the river bottom and the rocky slopes above the river channel for a variety of other resources. Stacked rock cairns and rock art panels present on

rocky slopes surrounding the Grand Coulee Dam denote places where Tribal members have sought, and still seek, spiritual power (George 2003).

3.9.2 Environmental Consequences

Alternative A – No Action

There are no impacts to Indian sacred sites from the No Action Alternative.

Alternative B – TPP G19-G21 Modernization

Based upon the review of existing information and consultations with the CCT THPO, implementation of Alternative B would not result in direct or indirect impacts to sacred sites.

Chapter 4. Cumulative Impacts

4.1 Water Quality Cumulative Impacts

In high water years, spill is sometimes required to meet flood control requirements. If one of the TPP units is out of service and another unit has a problem that forces it out of service, there may be a need to increase spill. This may increase TDG, especially if this occurs while the reservoir is below elevation 1,265. Below this elevation, spill must occur through the outlet tubes, which are known to generate more TDG than the drum gates.

4.2 Transportation Cumulative Impacts

Other projects identified in the Grand Coulee area include the TPP Overhaul, John W. Keys III Pump-Generating Plant Modernization Project, and construction of a new fire station. Construction traffic generated by the Preferred Alternative would add to that generated by these three projects. As shown on Table 4-1, the combined increase as the result of the TPP, and the John W. Keys III Pump-Generating Plant Modernization Project is expected to be about 1.8 percent in the average daily two-way traffic on SR 155 (Grand Coulee Final EA G1-G18 2018).

Table 4-1. Cumulative trip growth

Project	Milepost 25.73	Milepost 28.04	Year	Trips	% Trip Growth
TPP	5,100	5,300	2018	40	.8
John W. Keys III Pump-Generating Plant Modernization Project	5,700	5,400	2010	32	1.2
Fire Station[a]	5,300	No data	2013	No data	No data
Cumulative Trip Growth				**92**	**1.8**

As addressed above, the additional contract workers and deliveries associated with either alternative is expected to add a negligible number of vehicles to the cumulative traffic volumes in the vicinity of the dam, and all roadways are expected to operate in an acceptable manner. No cumulative effects related to access, traffic, parking, or safety are anticipated as a result of the Project alternatives.

4.3 Hazardous Waste Cumulative Impacts

The small amount of waste generated within the TPP Overhaul project would not prevent the hazardous waste recycling or disposal activities associated with this Project. Therefore, there would be no cumulative impacts as a result of implementation of the proposed action.

4.4 Socioeconomic Cumulative Impacts

Other projects identified in the Grand Coulee area include the TPP Overhaul, John W. Keys III Pump-Generating Plant Modernization Project, and construction of a new fire station. It is anticipated that the new fire station would be complete before the Project begins. Programmed maintenance, overhauls, and construction of the Project would be concurrent with activities at the TPP and John W. Keys III Pump-Generating Plant and would contribute to cumulative regional economic impacts. While these and other actions in the region would provide an important beneficial contribution to economic activity over a multi-year period, the cumulative regional economic effects of these actions would still be very small relative to the overall regional economy.

The presence of five additional students in the school district during the construction phase of the Grand Coulee EA project is not anticipated to have long-term implications, even in the presence of the other projects identified, because: (1) Reclamation considers the estimate of potential student enrollment to be high, because it assumes that all of the contract workforce would be present at the same time, which is not anticipated to occur; and (2) school funding, which typically fluctuates throughout the school year, depending on enrollment, would not be expected to lag more than one academic year. In addition, the amount of work that can occur at one time is limited by space within the powerhouses for equipment, material, and laydown. Thus, cumulative impacts associated with increased school enrollment are expected to be small and temporary.

4.5 Environmental Justice Cumulative Impacts

The Project and other attractants to persons moving into or remaining within the Project vicinity and study area would contribute to the demand for housing and could influence upward pressure on the cost of housing to some small degree; however, this is not expected to create an environmental justice impact when considered with the other related actions.

4.6 Cultural Resources Cumulative Impacts

Reclamation is completing two other large overhaul projects within the Grand Coulee Dam Historic District: the G1- G18 Modernization (FONSI issued August 2018) and the John W. Keys III Pump-Generating Plant Modernization Project (FONSI issued March 2012). Both projects were reviewed under Section 106 of the NHPA, which culminated in agreements to mitigate for adverse effects to historic properties.

The work being completed for these other projects focuses primarily on replacement of equipment. Heavy use and critical engineering considerations necessitate the eventual replacement of hydroelectric equipment; when viewed collectively, the multiple overhaul projects would not have a significant cumulative impact.

Impacts from repair and maintenance, or even complete replacement of the mechanical systems of the property, do not constitute a significant cumulative impact. There would be a beneficial impact to the Grand Coulee Dam Historic District because the property would remain in good condition. The repairs would ensure continuity of use and preservation of the historic resource.

4.7 Indian Sacred Sites Cumulative Impacts

There are no impacts from implementation of the action alternative. Therefore, there are no cumulative impacts when considered with the other related actions.

4.8 Indian Trust Assets Cumulative Impacts

There are no impacts from implementation of the action alternative. Therefore, there are no cumulative impacts when considered with the other related actions.

Chapter 5. Consultation and Coordination

This chapter briefly describes the overall environmental consultation and coordination with responsible agencies associated with the local, state, and Federal laws, regulations, executive orders, and policies that are pertinent to the Project. Specific individuals were consulted to gather information and data about the project area and applicable requirements, as part of consultation, or for permit applications.

5.1 National Environmental Policy Act

NEPA requires that the action agency use a public disclosure process to determine whether there are any environmental impacts associated with proposed federal actions. If there are no significant environmental impacts, a Finding of No Significant Impacts (FONSI) can be signed to complete the NEPA compliance.

5.2 National Historic Preservation Act

The NHPA was enacted in 1966 and is used to protect historical properties. The Act required the Federal government to partner with states, local governments, and Native American tribes to identify and protect eligible properties. All Federal actions must be analyzed to assess for possible effects on these properties. The process for implementing the NHPA is defined in Federal regulations (30 CFR 800) and includes consultation with the SHPO, THPO, and ACHP.

Reclamation first initiated consultation under Section 106 of the NHPA with the Colville THPO and the Washington SHPO in April 2009, requesting their concurrence with an Area of Potential Effects (APE) that included both an area of direct physical effects created by ground-disturbing activities, and a broader area of visual effects (i.e., that area over which the proposed structures might be visible). By May, both the THPO and the SHPO had concurred with the APE. Later that same month, Reclamation initiated consultation regarding the level of effort to be used to identify historic properties. The SHPO had no specific comments about the proposed level of effort, and the THPO responded with a letter dated May 28, 2009, which said, in part,

> *"Based on the information available at this time, we determined that the draft chapter regarding traditional cultural properties (TCPs) contains adequate information to address this issue based on the scale and nature of the proposed undertaking. We feel the information provided satisfies the intent of our October 24, 2005 protocol for TCP background research guidance. We do not require further background information nor is a research permit required to obtain additional information related to the project area."*

Reclamation submitted its draft cultural resources report to the SHPO and THPO in August 2009, along with a request that both agencies concur with Reclamation's Finding of Adverse Effects for the project's effects on the TPP. Both agencies concurred with this finding in September 2009.

After confirming that the ACHP did not want to participate in the consultation regarding resolution of these adverse effects, Reclamation began consulting with the THPO regarding a Memorandum of Agreement (MOA) for the project. Because the adverse effects were limited to a property within the Colville Reservation, Reclamation consulted with the THPO only. A draft MOA was provided to the THPO in late October 2009. The THPO responded in November 2009 and initially declined to sign the MOA because of concerns about Reclamation's lack of compliance with the Section 106 process on Lake Roosevelt. The Power Office Manager and the THPO met in December 2009 to discuss the situation, and Reclamation addressed the THPO's comments in writing in January 2010.

Due to revisions in the design of the project, Reclamation consulted with the THPO again about the APE in late January 2010, and the THPO concurred with the reduced APE in early February 2010. Using this new APE, Reclamation sent the THPO a revised version of the MOA later in February 2010. The THPO concurred with the revised MOA in early March 2010 and provided some minor comments.

Reclamation finalized the MOA and signed it on March 13, 2010. The THPO and the Chair of the Colville Business Council signed the MOA on April 19, 2010. The MOA was filed with the ACHP on April 22, 2010.

Reclamation staff reviewed the project, as proposed in this EA, and compared this with the findings from the original Section 106 MOA for treatment of adverse effects as issued in 2010. Reclamation staff met with the CCT THPO on August 14, 2018, to determine the level of effort for Section 106 for the proposed project revisions. The THPO noted that the 2010 MOA adequately covered the adverse effects for the project and requested additional information regarding the effects of adding the north door to the TPP. That consultation effort remains in progress.

5.3 Endangered Species Act

The Endangered Species Act (ESA) requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat. As part of the ESA's Section 7 process, an agency must request information from the USFWS and NOAA Fisheries regarding whether any threatened and endangered species occur within or near the action area. The agency then must evaluate impacts to those species. If the action may affect any listed species, the agency must consult with the USFWS and/or NOAA Fisheries to ensure that the project would not jeopardize listed species or destroy or adversely modify their critical habitat. Reclamation did not request a list from NOAA, as there are no threatened or endangered species listed by NOAA in the Columbia River above Grand Coulee Dam. Reclamation analyzed the impacts of the

project on the species listed and concluded that there would be no effect on listed species or their critical habitat with implementation of the Proposed Action.

5.4 Tribal Coordination and Consultation

A scoping letter was sent to the CCT and the Spokane Tribe of Indians to involve and address any questions or concerns related to the proposed actions for the original 2009/2010 EA. No indication was received from the tribes that any comments or concerns existed or that further consultation was warranted.

During discussions between Reclamation staff and the CCT THPO in 2018, concern with the visual impacts of the construction of additional buildings was discussed. CCT THPO requested a continued Section 106 effort related to the finding of effects for the installation of the north door on the TPP.

5.5 Secretarial Order 3175: Department Responsibilities for Indian Trust Assets

Indian Trust Assets are legal interests in property held in trust by the United States (with the Secretary of the Interior acting as trustee) for Indian tribes or Indian individuals. Examples of ITAs are lands, minerals, hunting and fishing rights, and water rights. In many cases, ITAs are on-reservation; however, they may also be found off-reservation.

The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or Indian individuals by treaties, statutes, and executive orders. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that officials from Federal agencies, including Reclamation, take all actions reasonably necessary to protect ITAs when administering programs under their control. This project would comply with Secretarial Order 3175.

5.6 Executive Order 13007: Indian Sacred Sites

Executive Order 13007, dated May 24, 1996, instructs Federal agencies to promote accommodation of access to, and protect the physical integrity of, American Indian sacred sites. A sacred site is a specific, discrete, and narrowly delineated location on Federal land. An Indian tribe or an Indian individual determined to be an appropriately authoritative representative of an Indian religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion, provided that the tribe or individual is an appropriate authoritative representative of an Indian religion. This project would comply with Executive Order 13007.

5.7 Clean Water Act

5.7.1 Section 401

A Federal permit to conduct an activity that causes discharges into navigable waters is issued only after Ecology certifies that existing water quality standards would not be violated if the permit were issued. Reclamation would submit the appropriate applications to Ecology to apply for Section 401 project review and certification. Ecology would review the project's CWA Section 401 and Section 404 permit applications for compliance with Washington water quality standards and grant certification if the permits comply with these standards.

5.7.2 Section 402

This section of the CWA authorizes NPDES for the discharge of pollutants, such as stormwater. The EPA Region 10 provides a general permit for discharges from construction activities. The contractor would issue a Notice of Intent to receive coverage under this general permit and would prepare a stormwater pollution prevention plan.

5.7.3 Section 404

When dredged or fill material discharges into waters of the United States, including wetlands, it requires authorization from the Corps in accordance with the provisions of Section 404 of the CWA. Section 404 permits issued by the Corps may be an individual permit, or a permit authorized under the nationwide permit (NWP) process. The Corps determines whether the proposed project meets the general, national, and regional conditions associated with the NWP process. If not, the project is reviewed under the individual permit process.

5.8 Executive Order 12898: Environmental Justice

EO 12898, dated February 11, 1994, instructs Federal agencies, to the greatest extent practicable and permitted by law, to make achieving environmental justice part of its mission by addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. Environmental justice means the fair treatment of people of all races, income, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs. This project would comply with Executive Order 1289.

Chapter 6. Literature Cited

Andrews. Christ B. 2009a. Safety & Occupational Health Specialist, Grand Coulee Power Office. Oral communication April 21, 2009.

Andrews, Christ B. 2009b. Safety & Occupational Health Specialist, Grand Coulee Power Office. Electronic communication April 15, 2009.

Army Corps of Engineers (Corps). 2009.Water Quality Plan for Total Dissolved Gas and Water Temperature in the Mainstem Columbia and Snake Rivers. U.S. Army Corps of Engineers, Northwestern Division, Portland, Oregon. Available at: www.nwd-wc.usace.army.mil/tmt/wq/studies/wq_plan/wq200814.pdf.

Bonneville Power Administration (BPA). 1996. Measurement of Lake Roosevelt Biota in Relation to Reservoir Operations. 1993 Technical Report, Project No. 199404300, BPA Report DOE?/BP-32148-1. Bonneville Power Administration, Portland, Oregon. Available at: http://www.lrf.org/index.php?option=com_edocman&task=document.download&id=167

Bureau of Land Management. (2015). The Use of Color for Camouflage Concealment of Facilities: April 2015. https://www.blm.gov/documents/national-office/blm-library/technical-note/use-color-camouflage-concealment-facilities. Accessed on November 15, 2018.

Bureau of Reclamation. 1994. Indian Trust Asset Policy and NEPA Implementing Procedures: Questions and Answers about the Policy and Procedures. Bureau of Reclamation, Native American Affairs Office, Denver, Colorado. http://www.usbr.gov/us/albuq/envdocs/ea/sanjuanchama/Attachment1.pdf. Accessed online August 3, 2009.

Bureau of Reclamation (Reclamation). 2016. Cultural History. U.S. Department of Interior, Bureau of Reclamation, Grand Coulee Power Office, Grand Coulee, WA. https://www.usbr.gov/pn/grandcoulee/history/cultural/index.html. Accessed online November 8, 2018.

Bureau of Reclamation (Reclamation). 2010. Environmental Assessment Third Powerplant Generating Units Overhaul Activities, Grand Coulee Project, Washington. U.S. Dept. of the Interior, Bureau of Reclamation, Grand Coulee Power Office, Grand Coulee, WA.

Bureau of Reclamation (Reclamation). 2018. Final Environmental Assessment, Grand Coulee G1 through G18 Generating Units Modernization and Overhaul, Grand Coulee Project, Washington. U.S. Dept. of the Interior, Bureau of Reclamation, Pacific Northwest Region Office, Boise, ID.

CCT. 2006. Final Cultural Resources Management Plan. Prepared by the History/Archaeology Program, Confederated Tribes of the Colville Reservation. Nespelem, Washington.

Colville Confederated Tribes. 2018. Tribal website, Facts about the Confederated Tribes of the Colville Reservation. http://www.colvilletribes.com/facts. Accessed September 2018.

Clark, B. 2018, personal communication. Email Correspondence, Civil Engineer, Grand Coulee Dam. Subject: described route, type and number of equipment to be transported. U.S. Bureau of Reclamation, Grand Coulee, WA. August 14, 2018.

Colville Tribe. 2009. Colville Tribal Law and Order Code, Title 4, natural Resources and the Environment, Chapter 4-8 Water Quality Standards. Available at: https://www.cct-cbc.com/current-code/.

DeWinkler, Jeff. 2017. Environmental Protection Specialist, Grand Coulee Power Office. Personal communication (e-mail) with Denny Mengel, CH2M. January 5, 2017.

D. P. McFarland and J. D. Ferry. "Archaeological Resources Review for the Bureau of Reclamation Grand Coulee Dam G1-G18 Modernization and Overhaul Project, Grant County, Washington" September 2016. On file at Grand Coulee Power Office.

George, M. (ed.). 2003. Traditional Cultural Property Overview Report and Native American Place Name Document for Traditional Territories of the Confederated Tribes of the Colville Reservation; Grand Coulee Dam Project Area, North Central Washington. BPA Contract #99-BI-16653. Nespelem, Washington: Colville Confederated Tribes History/Archaeology Program.

Hall, L. 2016. Personal Communication with Mike Usen (AICP) on Nov. 22, 2016. Interim Police Chief, Coulee Dam, WA *In* Bureau of Reclamation. 2018. Final Environmental Assessment, Grand Coulee G1 through G18 Generating Units Modernization and Overhaul, Grand Coulee Project, Washington. U.S. Dept. of the Interior, Bureau of Reclamation, Pacific Northwest Region Office, Boise, ID.

Hess, Sean C. 2010. Effects of the Third Power Plant Overhaul Project on Historic Properties. Report prepared by the Grand Coulee Power Office. Report submitted to the Washington State Historic Preservation Office and the Colville Tribal Historic Preservation Office.

IMPLAN Group, LLC. 2013. IMPLAN System (data and software), 16740 Birkdale Commons Parkway, Suite 206, Hunterville, NC 28078. www.IMPLAN.com.

Reclamation 2018. Thermal Regime of the Columbia River at Lake Roosevelt. 2018. Bureau of Reclamation, Boise, Idaho. Available at: https://www.usbr.gov/pn/hydromet/gcl-profiles/Final%20GCL%20Temperature%20Combined%20Policy%20_062818_acc.pdf

Snavely, I. 2016. Personal Communication with Mike Usen (AICP) on Nov. 14-15, 2016. Supervisory Reclamation Guide, Grand Coulee Power Office *In* Bureau of Reclamation. 2018. Final Environmental Assessment, Grand Coulee G1 through G18 Generating Units Modernization and Overhaul, Grand Coulee Project, Washington. U.S. Dept. of the Interior, Bureau of Reclamation, Pacific Northwest Region Office, Boise, ID.

Spokane Tribe. 2010. Spokane Tribe of Indians Surface Water Quality Standards. 2010. Resolution 2010-173. Available at: http://www.spokanetribe.com/upload/FCKeditor/Final%20Revised%20Water%20Quality%20Standards.pdf

U.S. Bureau of Labor Statistics. 2016. Local Area Unemployment Statistics. https://www.bls.gov/data/#unemployment.
U.S. Census Bureau. 2010a. American FactFinder. Detailed 2009 Population Estimates. Douglas, Ferry, Grant, Lincoln, and Okanogan County and State of Washington. http://factfinder.census.gov/. Accessed September 2011.

U.S. Census Bureau. 2010b. American FactFinder. American Community Survey 5 year Estimates. Douglas, Ferry, Grant, Lincoln, and Okanogan County. http://factfinder.census.gov/. Accessed September 2011.

U.S. Census Bureau. 2016. American FactFinder. American Community Survey 5 year Estimates. My tribal areas. http://factfinder.census.gov/. Accessed September 2018.

U.S. Census Bureau. 2017. American FactFinder. American Community Survey 5 year Estimates. Douglas, Ferry, Grant, Lincoln, and Okanogan County and State of Washington. http://factfinder.census.gov/. Accessed September 2018.

Washington State Department of Ecology (Ecology). 2004. Total Maximum Daily Load for Total Dissolved Gas in the Mid-Columbia River and Lake Roosevelt Submittal Report. Publication No. 04-03-002. Washington State Department of Ecology, Water Quality Program, Olympia, Washington. http://www.ecy.wa.gov/biblio/0403002.html.

Washington State Department of Ecology (Ecology). 2009. Washington State Department of Ecology. 2009. Dangerous Waste Site Identification Forms, a component of the Dangerous Waste Annual Report. February 18, 2009.

Washington State Department of Ecology (Ecology). 2017. Water Quality Standards for Surface Waters of the State of Washington – Chapter 173-201A WAC. Adopted August 1, 2016, Published 2006, Revised October 2017, Available at: https://fortress.wa.gov/ecy/publications/SummaryPages/0610091.html

Washington State Department of Labor and Industries. 2017. Prevailing Wage Rates for Public Works Contracts – Journey Level Rates. Internet site: https://fortress.wa.gov/lni/wagelookup/prvWagelookup.aspx. Accessed on March 1, 2017.

Washington State Employment Security Department. 2016. Labor Market County Profiles. Available at: https://www.esd.wa.gov/labormarketinfo/county-profiles. Accessed on March 9, 2017.

Washington State Office of Financial Management. 2016. Historical estimates of April 1 population and housing for the state, counties, and cities. Available at: http://www.ofm.wa.gov/pop/april1/hseries/default.asp. Accessed on March 9, 2017.

Washington State Department of Transportation (WSDOT). 2018. Washington State Department of Transportation. Olympia, WA. Accessed July - Aug. 2018. https://www.wsdot.wa.gov/

Washington State Department of Transportation (WSDOT). 2018. Washington State Department of Transportation. Olympia, WA. Accessed July - Aug. 2018. http://www.wsdot.wa.gov/CommercialVehicle/permitting.htm

Washington State Department of Transportation (WSDOT). 2018. 2015 Annual Collision Summary. Washington State Department of Transportation. Olympia, WA. http://www.wsdot.wa.gov/mapsdata/crash/pdf/2015_Annual_Collision_Summary.pdf

Appendix A – Section 106 Consultation: Area of Potential Effects and Plans for Identification of Historic Properties

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Grand Coulee Power Office
P.O. Box 620
Grand Coulee, WA 99133-0620

IN REPLY REFER TO:

GCPO-1000
ENV-3.00

JUL 23 2018

VIA CERTIFIED MAIL

Mr. Guy Moura, Tribal Historic Preservation Officer
Confederated Tribes of the Colville Reservation
P.O. Box 150
Nespelem, WA 99155
Guy.Moura@colvilletribes.com

Subject: Grand Coulee Third Powerplant G19 – G21 Overhaul, Initiation of Section 106 consultation, APE, and Level of Effort to Identify Historic Properties. (Tracking No. U18-05:18.001)

Dear Mr. Moura:

The Bureau of Reclamation (Reclamation) is proposing to conduct a modernization project on generating units G19 – G21 at the Grand Coulee Third Powerplant. The purpose of the modernization is to replace or upgrade existing components of the plant that are exhibiting substantial age-related wear and design deficiencies, and to increase the operational reliability of generating facility.

While the project is still at an early stage in the design process, we do have adequate information on alternatives and project goals to establish an area of potential effect (APE). As documented in the attached report, the areas potentially affected are located on federal lands within the external boundaries of the Confederated Tribes of the Colville Reservation.

In light of this, unless otherwise advised by you, Reclamation is initiating consultation with the Tribal Historic Preservation Officer in lieu of the Washington Department of Archeology and Historic Preservation, as directed in 36 CFR 800.2(c)(2)(A). We have also included a description of our approach to identification of historic properties within the APE. We look forward to your comment and concurrence.

If you have questions, please contact Shawn Lingo, Reclamation Historian, at (509) 633-6113.

Sincerely,

Coleman W. Smith, Jr.

Coleman W. Smith, Jr.
Power Manager

Enclosure

Grand Coulee Dam Third Powerplant G19 – G21 Modernization

Area of Potential Effects and Plans for Identification of Historic Properties

Overview

Reclamation is proposing to modernize three generating units (G19-G21) at the Third Powerplant (TPP) at Grand Coulee Dam. The modernization would ensure continued, reliable hydropower production for the foreseeable future and ensure that Reclamation would meet power generation obligations. In order to achieve these goals the Modernization will focus on replacement of damaged generating components. The project will ensure that generating operations are maintained to prevent impacts to water quality, hydrology, and fisheries resources.

Purpose and Need

Many of the TPP's principal components have reached or exceeded their intended service life. Current conditions of the hydroelectric generators, turbines and auxiliary systems contribute to growing safety-related concerns, potential limitations on plant operations, and increased risk to Reclamation's ability to meet its obligations and authorized purposes.

The *Third Powerplant Generating Units Overhaul Activities Environmental Assessment* was completed for the overhaul of units G19 – G24 in 2010. During the overhaul of G22-G24, Reclamation has learned that the original plan to refurbish these units would not accomplish the goals of ensuring reliability. More system and component replacement was required for the overhaul of units G22-G24 than Reclamation had originally expected. Reclamation planners have determined that overhaul of G19-G21 will require a fundamentally different approach to the project, necessitating complete replacement of major components and possibly of entire generating units.

Preliminary Design Options

Alternative A: No Action

If the generating units are not modernized, O&M requirements would increase and production capacity and reliability would decrease. The loss of revenue from interrupted public power generation would be substantial. If this decrease in production and reliability occurs, Reclamation may not be able to meet its historical mission and obligations for power generation.

Alternative B: G19 – G21 Modernization

The planned modernization is still in the early stages of planning. Reclamation is looking for design-build solutions that will result in long-term reliability. This may require total replacement of the generating units to meet the demand of the next forty years of operational service. Possible fabrication of new runners, stators, and rotors would require additional temporary laydown and work facilities. Construction of a new service door at the north end of the TPP may be necessary.

Area of Potential Effects

Based on the project description provided above, the project has the potential to result in direct physical effects to the ground surface at the staging areas. The project also has the potential to affect the built environment, especially the exterior of the TPP. The project does not have the potential to result in visual effects to the surrounding viewshed as no additional permanent structures will be added to the existing industrial complex. These three kinds of effects provide the basis for determining the APE.

APE for Ground Surface-Disturbing Activities

The APE for ground-disturbing activities includes the potential staging areas and the areas occupied by the new temporary work facilities in the APE.

APE for Activities that may disturb the Built Environment

The APE for activities that may affect the historic built environment is limited to the physical extent of the TPP.

APE for Visual Effects of the Project

The modernization project will take place within the existing Grand Coulee industrial complex. No permanent facilities will be constructed and so there is no potential for change to the area's existing industrial historic character. No visual effects APE is included for this project.

Level of Effort to be Used to Identify Historic Properties

Archeological Resources and Traditional Cultural Properties

Reclamation has already reviewed construction records on file at the Grand Coulee Power Office to determine the extent of previous disturbance in the ground disturbance APE. A complete archeological survey and inventory of the APE was conducted in 2016 in preparation for the G1 – G18 Modernization project, which would use the same staging areas. Its findings have been reviewed for the G19 – G21 Modernization.

There are no existing archeological historic properties or traditional cultural properties remaining within the APE. Discussion and documentation of the effects of construction of the TPP on cultural resources and traditional lifeways is given in the 2010 report *Effects of the Third Power Plant Overhaul on Historic Properties* by Sean Hess, Ph.D. This report is available on file at the Grand Coulee Power Office.

Historic Structures

The Grand Coulee Third Powerplant has been determined eligible for the National Register of Historic Places, and is the only historic structure in the APE. A historian meeting the Secretary of the Interior's professional qualification standards will prepare documentation of the historic built environment to meet Section 106 requirements.

Third Powerplant G19 - G21 Modernization
Project Location and Area of Potential Effects

Area of Potential Effects

Project Location

Third Power Plant

Lingo, Shawn <slingo@usbr.gov>

Third Powerplant meeting yesterday

Clark, Brian <bdclark@usbr.gov> Thu, Aug 16, 2018 at 7:39 AM
To: "Guy Moura (HSY)" <Guy.Moura@colvilletribes.com>
Cc: "Lingo, Shawn" <slingo@usbr.gov>, Derek Beery <dbeery@usbr.gov>

Thanks Guy. I appreciate everyone's effort on this.

Feel free to ask me any follow up questions if compelled to do so.

Brian D. Clark, Project Manager/PMP

Bureau of Reclamation, GCPO-1102

(509) 633-9693

On Wed, Aug 15, 2018 at 2:49 PM, Guy Moura (HSY) <Guy.Moura@colvilletribes.com> wrote:

> Shawn, Derek, and Brian,
>
> Thank you for meeting with me. I appreciate your efforts. We reached enough common ground and shared understanding that I am satisfied that I can concur with the original finding of No Historic properties Affected.
>
> Iim Iəmt, qeʔciéẃyeẃ (thank you)
>
> Guy Moura
>
> Program Manager, History/Archaeology
>
> Tribal Historic Preservation Officer
>
> Confederated Tribes of the Colville Reservation
>
> (509) 634-2695
>
> **From:** Lingo, Shawn [mailto:slingo@usbr.gov]
> **Sent:** Wednesday, August 15, 2018 2:23 PM
> **To:** Guy Moura (HSY); Derek Beery
> **Cc:** Brian Clark
> **Subject:** Third Powerplant meeting yesterday
>
> Guy – Thanks for taking time yesterday to meet with us about the TPP modernization. It was good to be able talk face to face about our perspectives for the project.
>
> We understand the imp[ortance you placed on definite measures that need to be taken to soften the visual impacts of the planned temporary buildings. Based on our discussion, something more than simply painting the buildings a uniform color should be part of the design specifications. What this might be is not clear at the moment, but could range from trying to camouflage the new buildings or break up their silhouette, to perhaps taking the opposite tack and enhancing some of them with pictorial murals. The buildings would be in place for a period of ten years.

It was good to get some agreement that the direct effects APE was the primary consideration. I'd like to clarify that since the disturbed landscape around the TPP is not considered contributing to the Grand Coulee historic district and since addition of these temporary buildings does not affect historic character, no separate visual effect APE is being consulted on.

The similarity of our thinking that enlargement of the north service door of the TPP probably does not constitute an adverse effect is also encouraging. We will continue to work on the design aspects of the project and consult with you in order to achieve a consensus that the modernization work will result in no adverse effect to historic properties.

Thanks again,

Regards,

Shawn Lingo, Historian

U.S. Bureau of Reclamation, Grand Coulee Power Office

PO Box 620

Grand Coulee, WA 99133

509-633-6113

Appendix B – Cross-section Drawing of Generating Units 19, 20, and 21

UNITS 19, 20, 21
690MW

COVER PLATES
HEIGHT: 8'-8 ⅜"
DIAMETER : 65'-1"
TOTAL WEIGHT : 74 TONS

STUB SHAFT
HEIGHT: 5'-1 ¾"
DIAMETER : 7'-6"
TOTAL WEIGHT :12.5 TONS

ROTOR
HEIGHT:13'-7 ⅜"
DIAMETER : 59'-11 ⅜"
TOTAL WEIGHT : 1338 TONS

BEARING BRACKET
HEIGHT: 13'-3"
DIAMETER : 45'-2"
TOTAL WEIGHT : 260 TONS

THRUST BEARING RUNNER
HEIGHT: 2'-6"
DIAMETER : 13'-6"
TOTAL WEIGHT : 49 TONS

GENERATOR SHAFT
HEIGHT: 23'-0"
DIAMETER : 11'-2"
TOTAL WEIGHT : 123 TONS

TURBINE SHAFT
HEIGHT: 20'-9 ⅜"
DIAMETER : 11'-1 ⅜"
TOTAL WEIGHT : 194 TONS

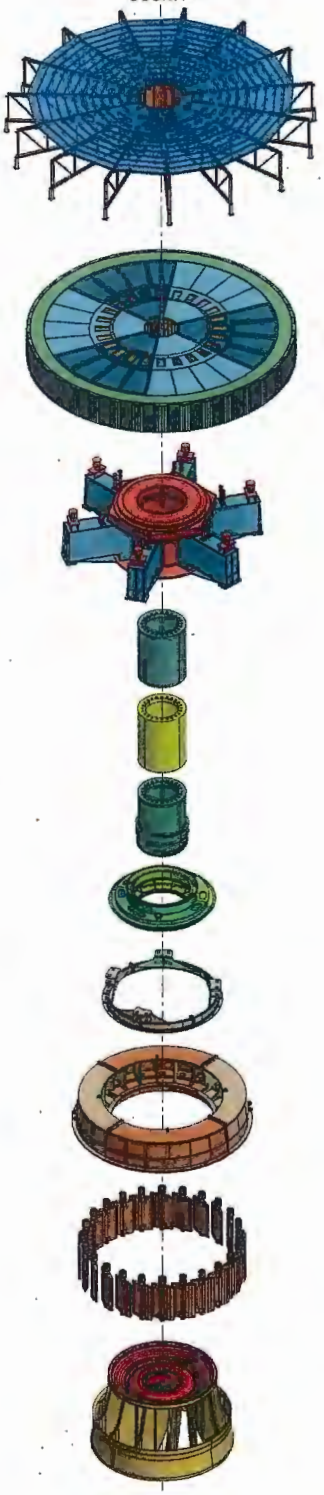
GATE OPERATING RING
HEIGHT: 4'-3"
DIAMETER : 25'-0"
TOTAL WEIGHT : 31.75 TONS

HEAD COVER
HEIGHT: 5'-8 ⅜ "
DIAMETER : 39'-2"
TOTAL WEIGHT : 243 TONS

WICKET GATES
SIZE: 15.3' x 3.8' x 1.4'.
TOTAL WEIGHT : 32 x 7.02 TONS EACH
= 224.64 TONS

RUNNER
HEIGHT: 15'-7 ⅞ "
DIAMETER : 32'-8 ½ "
TOTAL WEIGHT : 496 TONS

UNITS 22, 23, 24
805MW



COVER PLATES
HEIGHT: 11'-11"
DIAMETER : 71'-10"
TOTAL WEIGHT : 44.5 TONS

ROTOR
HEIGHT : 8'-0"
DIAMETER : 61'-6"
TOTAL WEIGHT : 1480 TONS

BEARING BRACKET
HEIGHT : 13'-6"
DIAMETER : 46'-2"
TOTAL WEIGHT : 275 TONS

GENERATOR SHAFT
WEIGHT : 74 TONS
HEIGHT : 14'-2 ⅜"
DIAMETER : 11'-0"

INTERMEDIATE SHAFT
WEIGHT : 74 TONS
HEIGHT : 14'-8 ⅞"
DIAMETER : 11'-0"

TURBINE SHAFT
WEIGHT : 80 TONS
HEIGHT : 14'-8 ⅞"
DIAMETER : 13'-1"

INNER HEAD COVER
HEIGHT : 6'-0 ½"
DIAMETER : 24'-3"
TOTAL WEIGHT : 67 TONS

GATE OPERATING RING
HEIGHT : 4'-6 ¾"
DIAMETER : 27'-5"
TOTAL WEIGHT : XXX

OUTER HEAD COVER
HEIGHT : 7'-8"
DIAMETER : 40'-11"
TOTAL WEIGHT : 260 TONS

WICKET GATES
SIZE: 11.75' x 5.3' x 1.57'
TOTAL WEIGHT : 24 x 10.8 TONS EACH
= 259.2 TONS

RUNNER
HEIGHT : 18'-4"
DIAMETER : 52'-5"
TOTAL WEIGHT : 430 TONS

ALWAYS THINK SAFETY

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLUMBIA BASIN PROJECT – WASHINGTON

GRAND COULEE POWER OFFICE

THIRD POWER PLANT

GENERATOR UNITS

MAJOR COMPONENTS INFORMATION

DESIGNED
DRAWN
CHECKED
SUBMITTED
APPROVED
DATE

MWH

DWG. NO. 3PP - R - 115