

CHAPTER 11: VISUAL RESOURCES

Visual quality refers to how well the visual environment meets a viewer's preferences for the natural and built environment of an area. This can vary depending on the sensitivity of viewers and how much they are exposed to certain views. Impacts on views are typically identified through technical, institutional, and public considerations. Technical considerations are assessed using spatial dominance, scale and contrast, and compatibility of a project with the surrounding landscape. Institutional and public considerations are based on laws and policies that concern visual resources and public comments.

Key Findings for Visual Resources:

- Eightmile Lake sits in a basin with steep mountains on all sides.
- The shoreline is lined with downed trees and sparse vegetation, consisting mostly of grasses.
- The 2017 Jack Creek Fire burned most of the trees around the lake, and the area is now dominated by snags and small groups of trees interspersed throughout the landscape.
- The current dam is small in scale relative to the size of the lake.
- The dam is most prominent when water level is low.
- Sensitive views in the project area include hikers, campers, climbers, and backcountry skiers and snowboarders.
- Construction of the dam would cause moderate adverse impacts on the visual quality of the area surrounding the dam.
- Under the No Action Alternative, dam failure could occur, which would result in a high-water level reduction of 47 percent and damage to infrastructure downstream, which would be a significant impact.
- There are no significant unavoidable impacts on visual resources under the action alternatives.

11.1 Methodology

To assess the potential for significant adverse impacts on visual quality, aerial imagery and maps of the project area and vicinity were reviewed, and one site visit was conducted (in October 2020). The Google Earth Viewshed tool was used to estimate the potential visibility of various parts of the project. The results of this analysis were used to define a study area around Eightmile Lake that includes the extent of visibility of the dam and the lake. The study area for the visual analysis includes IPID's Special Warranty Deed Area and portions of the trail and access road where visual impacts could occur (**Figure 11-1**). The location for the proposed telemetry repeater station on Icicle Ridge was also reviewed.

Photographs were taken from locations where project impacts would likely be most visible, including the trail leading to the lake. In addition, photos were sourced from websites such as Washington Trails Association, AllTrails, and Gaia GPS that show photographs of the study area during different

seasons and from vantage points (such as adjacent ridges and trails) and reflect the visual experiences and expectations visitors have of an area.

Two key viewpoints (KVP) were selected (KVPs A and B), based on where people would have the highest potential to observe changes to the dam structure resulting from the project. KVP A is directly adjacent to the northeast portion of the existing dam spillway, and KVP B is near the camping area on the north side of the lake. (Figure 11-2). KVP C is an aerial view in the eastern portion of the lake looking west toward the dam. While KVP C is not a place a typical visitor would see the lake from, it provides a sense of what the dam looks like from the surrounding mountainsides, albeit closer to the dam than one would be on any of those vantage points. Photographs were taken at the KVP locations, then using commonly accepted protocols, visual simulations were prepared to assist in displaying the degree of impact the proposed dam replacement would have on the visual setting of the surrounding landscape.

The visual simulations were created by ESA using photos captured from field equipment, including an iPad Pro and a DJI drone. The iPad photos were taken using 35mm-equivalent wide-angle focal lengths, while the aerial drone images were captured at 24mm focal length. Due to the limited data signal and remoteness of the project area, photo locations were not captured with the images; therefore, locations were approximated using aerial images with reference to landscape features and vegetation. ESA developed a 3D model of existing conditions in the study area, including terrain and lake water levels. Photo locations and focal lengths were registered into a 3DS modeling program, and 3D sun and atmosphere conditions were applied based on notes taken when the photo was shot. ESA then used CAD to 3D model proposed dam structures based on design alternatives provided by Anchor QEA. Image renderings were compiled in Photoshop to create foreground screening elements (e.g., trees, structures, etc.) and subsurface lake bed textures. A selection of the visual simulation figures prepared for the project is included in this chapter to illustrate the impacts.

An analysis of the project's consistency with wilderness management regulations and guidelines can be found in Chapter 3, *Wilderness Character*. This visual analysis describes the visible physical changes expected from the project, and the degree to which they harmonize or contrast with the character of the project setting. Viewer sensitivity is discussed in Section 11.3, *Affected Environment*.

For the evaluation of short-term impacts (construction), impacts on visual resources are considered significant as follows:

- Impacts are considered significant if construction equipment and materials would be conspicuous from improved trails or camping areas and remain at the site for more than two full summer seasons, or if construction spanned more than two full summer seasons.

For the evaluation of long-term impacts (operational), impacts are considered significant as follows:

- Impacts are considered significant if the areal extent of the lake at high water were reduced by more than 10 percent, which is considered a substantial enough reduction that visitors who have seen the lake before would be aware of the reduced size and would impair the aesthetic experience of visiting the lake.
- Impacts from the dam would be considered significant if man-made objects that contrast strongly with the natural surroundings, such as mechanical or structural elements of the project, would be dominant in views from the main Eightmile Lake Trail along the northern shoreline of the lake, campsite area (KVP B), or surrounding shorelines of the lake.

Figure 11-1. Eightmile Dam Study Area for Visual Resources

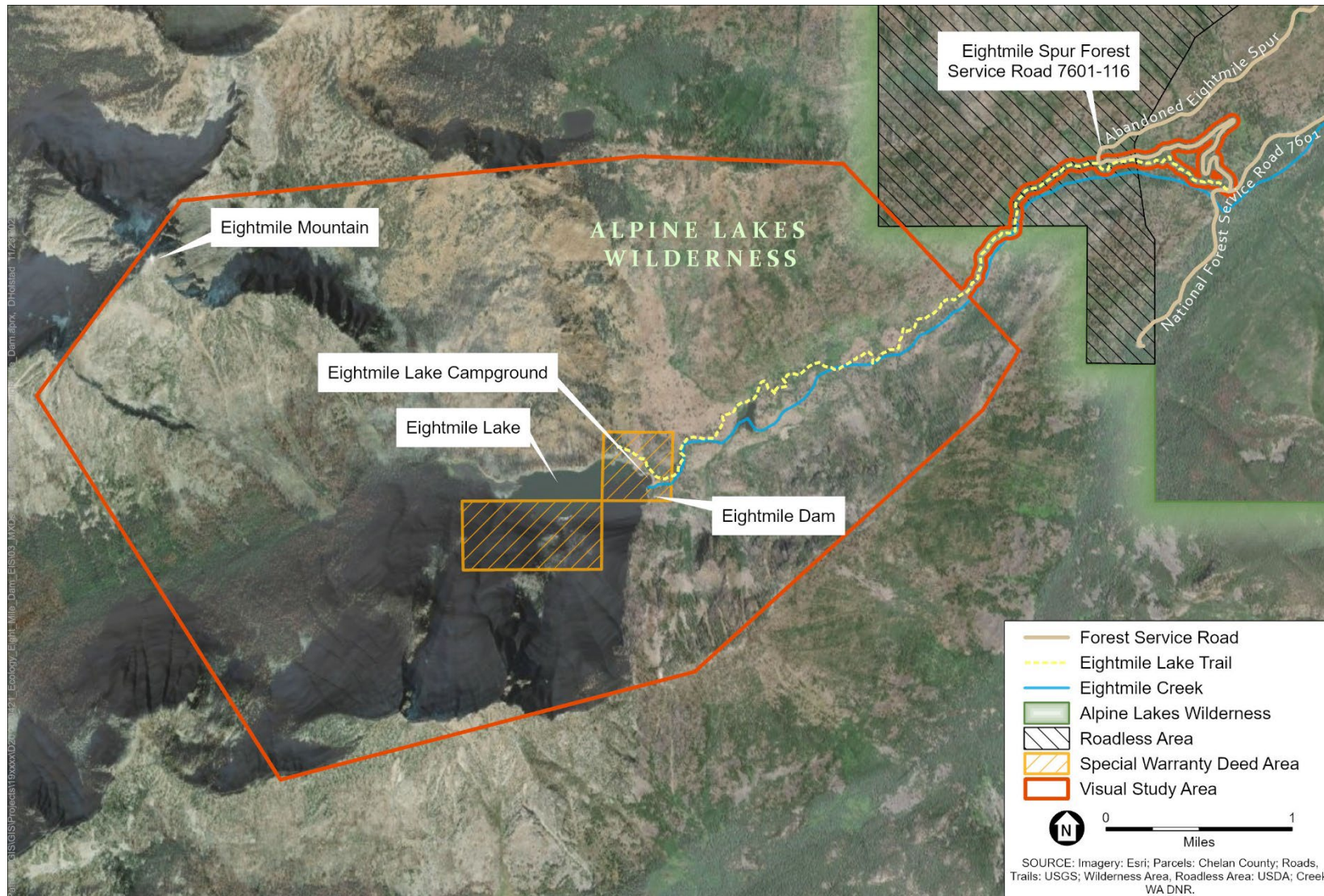
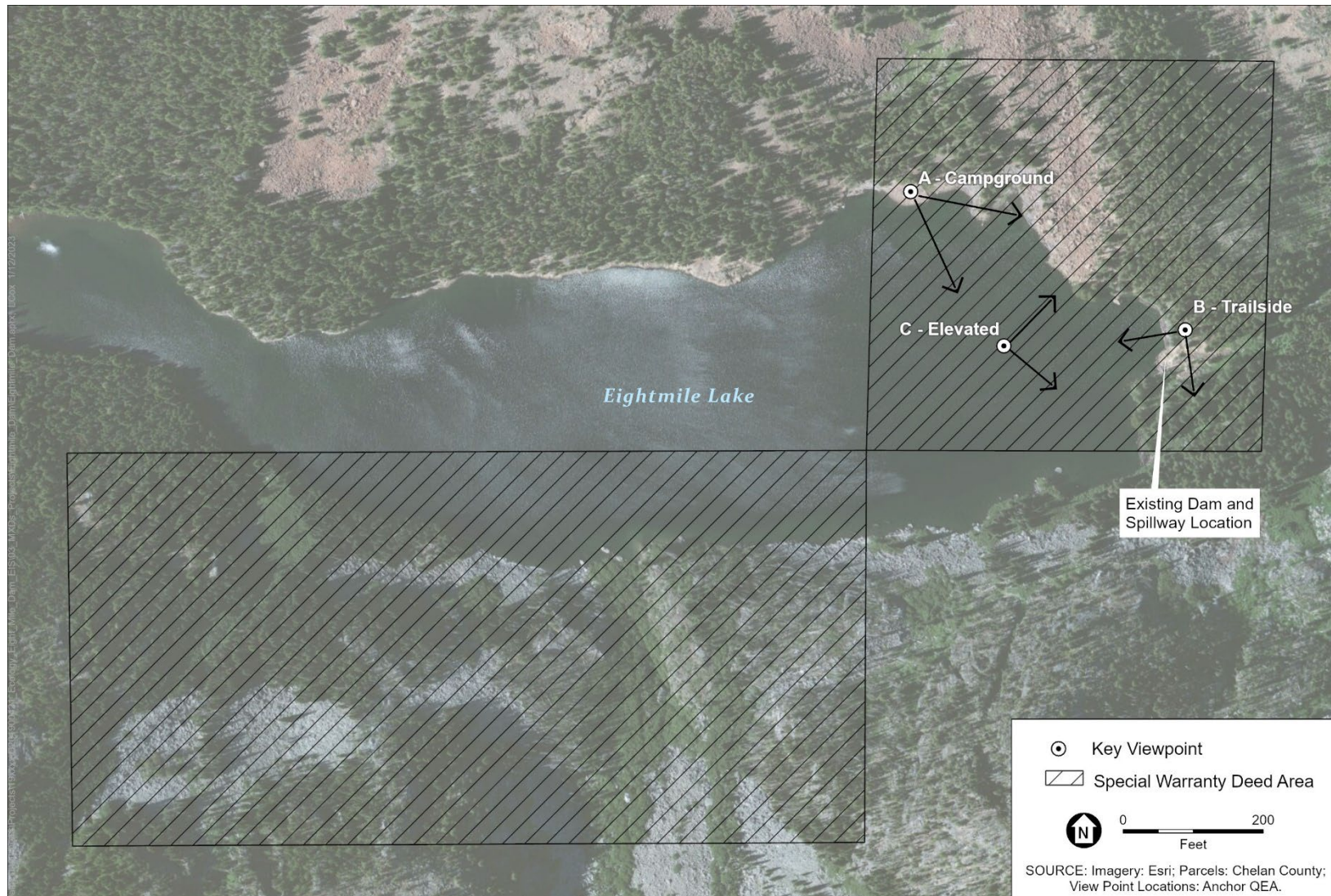


Figure 11-2. Key Viewpoint (KVP) Locations



11.2 Regulatory Context

Visual resources within the study area are protected by a variety of federal, state, and local plans, laws, and policies (Table 11-1). These plans and policies were reviewed to determine how well the project alternatives would meet viewer preferences in the study area. The policies reviewed generally promote the preservation of natural, scenic, and shoreline views.

Table 11-1. Regulations and Guidelines for Visual Resources Applicable in the Study Area

Program, Plan, or Policy	Description
Alpine Lakes Area Land Management Plan (USFS 1981)	Establishes visual quality management objectives with a goal to: <i>“Develop facilities and conduct management activities to create acceptable visual conditions in keeping with preservation of the wilderness character.”</i>
Washington State Shoreline Management Act of 1971 (Chapter 90.58 RCW)	All local jurisdictions with Shorelines of the State of Washington are required to adopt a Shoreline Master Program consistent with the Shoreline Management Act, which emphasizes proper shoreline land use, protection of shoreline environmental resources, and protection of the public’s right to access and use state shorelines.
Chelan County Shoreline Master (SMP) (Chelan County 2019)	Adopted on June 6, 2019, the plan provides policies protecting visual and physical access to shorelines as stated in Objective PA-1.4 of the SMP. <i>“Protect and enhance visual and physical access to shorelines where appropriate and in compliance with constitutional limitations.”</i>
Chelan County Comprehensive Plan 2017–2027 (Chelan County 2017)	Developed to meet the requirements of the Growth Management Act, the Chelan County Comprehensive Plan outlines the following policies regarding visual resources: <i>“3.4 Consider aesthetic quality as an important element in the design and development of recreational opportunities and facilities.”</i> <i>“Policy RE 2.4: Encourage the preservation and protection of unique, rare and fragile natural features, scenic vistas, unstable bluffs, and culturally significant features.”</i> <i>“Policy LU 4.1: Encourage development that is compatible with the natural environment and minimizes impacts to significant natural and scenic features.”</i>
Wenatchee National Forest Land and Resource Management Plan (Forest Plan) (USFS 1990)	Classifies visual quality within the Wenatchee National Forest according to how often areas are viewed by the public and the scenic variety of the area. The classifications range from preservation (which are areas that appear to be untouched by humans) to maximum modification (which are areas with changes in the landscape that are obvious to viewers).

The project is in the Alpine Lakes Wilderness, which is designated under the Wenatchee Forest Plan for preservation. However, the Alpine Lakes Area Land Management Plan recognizes that certain pre-

existing human modifications are allowed to continue and be maintained, such as the Eightmile Dam. The Special Warranty Deed includes provisions for maintaining and operating the dam; therefore, the continued presence and operation of a dam is assumed for the affected environment.

11.3 Affected Environment

This section describes the visual character of the study area.

11.3.1 Visual Characteristics

Eightmile Lake sits in a basin with steep mountains on all sides. The study area includes the lake and surrounding areas from where it can be viewed. The study area also extends northeast along the 3.3-mile trail from the lake down to the trailhead. The lake area has no roads, few maintained trails, and very limited evidence of human presence. The lake is visible from numerous peaks and ridges surrounding it, including Eightmile Mountain, Jack Ridge, and Cashmere Mountain, which are seasonally snowcapped (**Figure 11-3**).

For approximately 8 months of the year (from mid-October until late May or early June), much of the study area can be covered with snow, including the lake shoreline and the dam. Snow depth, extent of cover, and duration vary from year to year. When the snow has melted away, the rocky shoreline of the lake is exposed. This analysis focuses mainly on the period of the year when snow is not present, because that is primarily when the dam would be visible and when the area has the highest level of visitors.

The shoreline is lined with downed trees and sparse vegetation, consisting mostly of grasses. Prior to the Jack Creek Fire in 2017, upland areas around the lake were forested, primarily with conifers, such as various pine species and Douglas fir (USFS 2017a). Since the fire burned most of the trees, the area is now dominated by snags and groups of living trees interspersed throughout the landscape (**Figure 11-4**). Although the severity of the burn has likely reduced the regenerative properties of the site, it is anticipated that a forest similar to what was present prior to the fire will return in approximately 50 years. This forest will differ, however, by providing a more diversified structure with additional habitat and aesthetic features from the remaining standing snags and downed timbers.

The dam is at the east end of the lake and controls the lake's water level. The lake is fullest during spring and early summer snowmelt. For existing conditions, the water level is held at its highest level (elevation 4,667 feet with the current dam configuration) during the summer months until additional water is needed for irrigation diversion downstream. In late summer and early fall, the water level drops to its lowest level (approximately elevation 4,640 feet, and sometimes lower due to leakage through the dam and materials below the outlet pipe). When the water level is low, more of the rocky shoreline is visible, creating peninsulas that extend into the lake and a few small rocky islands. The western end of the lake is a wetland (**Figure 11-5**).

The existing dam is primarily constructed of rocks and concrete and is approximately 65 feet wide. The dam has a notch in the middle that allows water to flow through when the lake level is high enough; stop logs have historically been placed within the notch to control the flow rate of water. However, IPID has removed all of the stop logs that keep the lake at an elevation of 4,661 feet (**Figure 11-6**).

The outlet structure is a pipeline that runs underneath the dam structure releasing water to Eightmile Creek. The pipeline is not visible from any trail on either side of the dam; the only visual indication of the outlet is the presence of water moving downstream from the dam when the lake's water level is below the spillway.

Figure 11-3. View of Eightmile Lake Looking West from Dam



Figure 11-4. View Looking West along the North Shore of Eightmile Lake during a Low-Water Period in October 2020



Figure 11-5. View from the Wetland at the West End of the Lake Looking East toward Eightmile Lake



Figure 11-6. View of the Lake Side of Eightmile Dam during a Low-Water Period



Several monitoring structures, including a solar panel, are also located near the dam and adjacent to the Eightmile Lake Trail near the campsite locations. The structures are small in scale and painted in colors that do not contrast with the surrounding landscape (**Figure 11-7**). The headwall and spillway of the dam are visible from much of the lake's shoreline and several locations on the Eightmile Lake Trail on the north side of the lake. However, the dam is small in scale relative to the lake, covering less than 0.25 acre including the armored embankment on the north side of the dam (**Figure 11-8**). The dam structure is visible from the lake's shoreline and the Eightmile Lake Trail along the north side of the lake, but only intermittently along the trail and only from distances of 500 feet or more (**Figure 11-9**).

The earthen embankment adjacent to the dam is approximately 100 feet in width and was eroded in 2018. Emergency repairs in 2018 included reshaping and hardening this embankment with native rock. This embankment is largely bare of vegetation and is more conspicuous than the dam itself as viewed from the trail and campsites along the lake. When the lake is at its highest, a 4-foot-high portion is visible from the lake side, and that is often partially obscured with wood debris that accumulates near the dam. Part of the maintenance at the dam includes removal and burning of woody debris that accumulates.

The dam structure is most prominent when water levels are low. **Figure 11-10** is an aerial photo that shows how far the water recedes during a low-water period. (Note that this photo was taken in 2015, a relatively low water year, and before the 2018 dam repair.)

Just to the northeast of the dam is an excavator that was used to perform the emergency repairs to the dam in 2018 (**Figure 11-7**). The excavator is not a permanent feature. Although it contrasts sharply with the surrounding area and is intermittently visible from the shoreline near the dam and surrounding area, it would be removed regardless of whether the project is implemented. As such, this analysis does not consider the presence or removal of the excavator as part of the project effects.

The dam and lake, as well as the Eightmile Lake Trail leading to them, can also be seen from nearby ridges and peaks and routes to nearby climbing destinations. However, from these distances, the dam is very small in scale and almost invisible to the naked eye. From these distances, the more noticeable aspect is the changing lake elevation, with associated exposed shorelines.

The visual setting of the trail is similar to that of the lake, with views of surrounding peaks and intermittent views of Eightmile Creek. The trail is dominated by conifers, deciduous trees and shrubs, and snags from the Jack Creek Fire (**Figure 11-11**). After the snowpack melts, wildflowers are often abundant throughout the trail.

The road to be used to access the lower portion of the trail (FSR 7601-116) is outside of the boundary of the Alpine Lakes Wilderness. Currently closed and overgrown with low shrubs and grass, this road is not visible from the main trail, except at the trailhead.

The repeater station site is located above Eightmile Lake on a ridgeline with a sweeping vista of surrounding peaks and valleys in the distance (**Figure 11-12**). The new station will be located adjacent to an existing Forest Service repeater. Because of the elevation, few large trees are present, and other plants occur only in low density. Bare ground is typical of this area.

Figure 11-7. Excavator and Monitoring Structure with Solar Panel



Figure 11-8. View from the North Side of Eightmile Lake, Looking East toward the Dam with the Lake near High Water

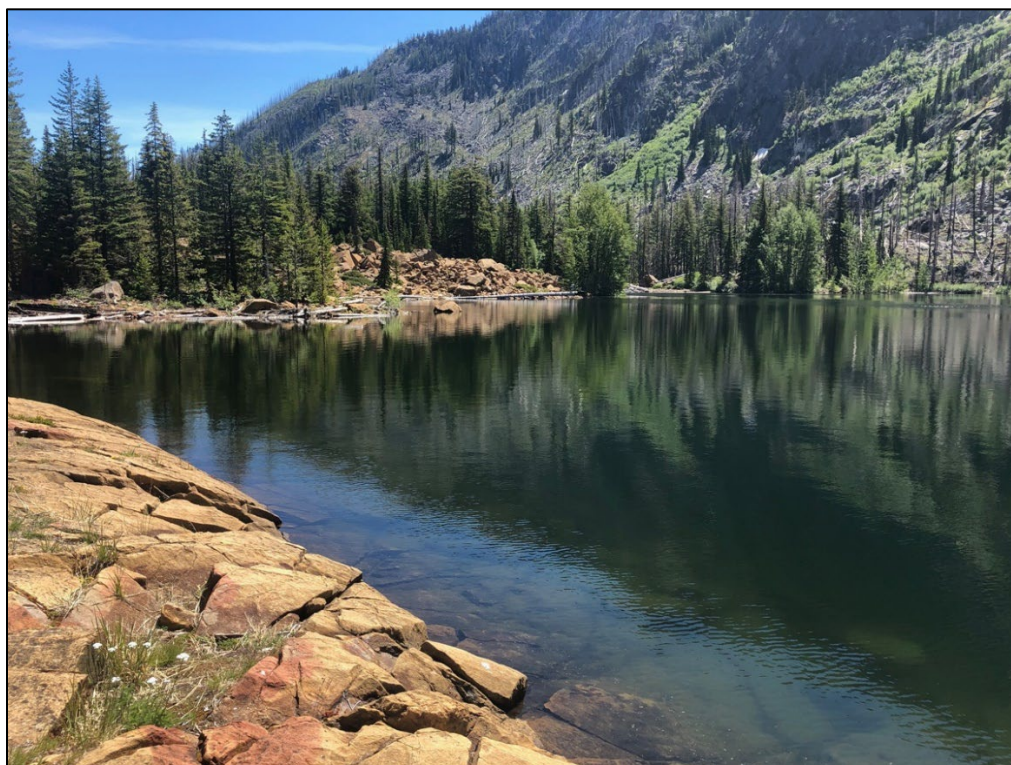


Figure 11-9. View of Eightmile Lake and Dam from Eightmile Lake Trail



Figure 11-10. Aerial View of Eightmile Lake Looking East toward Dam during Low-Water Period, September 30, 2015



Figure 11-11. Trees, Snags, and Low Brush along the Eightmile Lake Trail



Figure 11-12. Icicle Ridge Repeater Station Location



11.3.2 Viewers and Viewer Sensitivity

Because the project area is within the Alpine Lakes Wilderness, viewer sensitivity to man-made features in the area is high. Visitors come to the wilderness to experience pristine nature, and the visual experience is a large part of that. Sensitive viewers in the project area include hikers, campers, climbers, and backcountry skiers and snowboarders. Viewer prevalence would be the highest during summer, when temperatures are mild, precipitation is low, and access is easier. During the summer months, snow cover is also unlikely, making it likely the viewers would be able to see the dam and affected lake shore.

Winter visits to the study area are much more limited due to the seasonal closure of FSR 7601 because of snow. During winter, some or all of the dam is typically obscured by snow.

Both climbers and backcountry snow sport users are typically focused on reaching the higher reaches of the study area, whereas for many summer hikers and campers, the lake is their destination, or one of their destinations in the wilderness. Therefore, hikers and campers may have slightly higher viewer sensitivity than climbers and backcountry users. However, viewers visiting at any time of year are sensitive to the presence of man-made objects because they have exerted considerable effort to reach a place that is largely free from human interference with nature.

Hiking to the lake to fish is also a popular activity (see Chapter 10, *Recreation*, for a discussion of fishing). During a site visit in July 2021, fishing was occurring off of the main trail along the eastern and northeastern shorelines of Eightmile Lake, which is the area that surrounds the dam. Assuming this is typical, recreation users visiting the lake for fishing may be more likely to experience visual impacts from changes to the dam than other trail users, who might pass the dam without noticing it.

On the same site visit in July 2021, two visitors had packed in a stand-up paddleboard and launched it from the dam area. Because of wind on the lake that day, they did not paddle long, but this suggests that a subset of visitors may also see the dam from on the lake. The extent of boat use is likely low. Views from on the lake would be similar to views from the campsites and the shoreline next to the dam.

Other portions of the study area are not as heavily trafficked as the trail and campsite area. There are no developed trails on the south side of the lake and the terrain is rugged. Several parts of the northern shoreline have brushy vegetation, making it both difficult to get to them or to see the rest of the shoreline from them. The viewers most likely to see the dam and notice any visual change from the project are those using the trail and the campsites.

11.3.3 Key Viewpoints (KVPs)

The KVPs chosen for this analysis take into account both viewer sensitivity and the characteristics of the study area that affect where the dam could be seen from.

KVP A (**Figure 11-13**) is adjacent to the dam. To get to this viewpoint, a viewer would need to divert from the Eightmile Lake Trail on a side trail that terminates at the dam. While this location is not frequented by all travelers on the Eightmile Lake Trail, it is the location where the effects of the project would be most pronounced during construction. In addition, it is the only location where a viewer can see the downstream side of the dam.

KVP B (**Figure 11-14**) is adjacent to the campsite area. This location is on a promontory rock formation that extends into the lake's north shore, affording a sweeping view of nearly the entire lake. The view of the dam at KVP B is similar to views that can be obtained from locations on the Eightmile Lake Trail, but less obstructed by vegetation and topography. The distance from the KVP to the dam is approximately 1,400 feet (approximately $\frac{1}{4}$ mile).

KVP C (Figure 11-15) is an aerial view of the dam. The original photo was taken by drone in June 2021. This KVP, while not in a location that a viewer can go to, provides an overview of the dam setting, somewhat akin to a view from an adjacent mountainside.

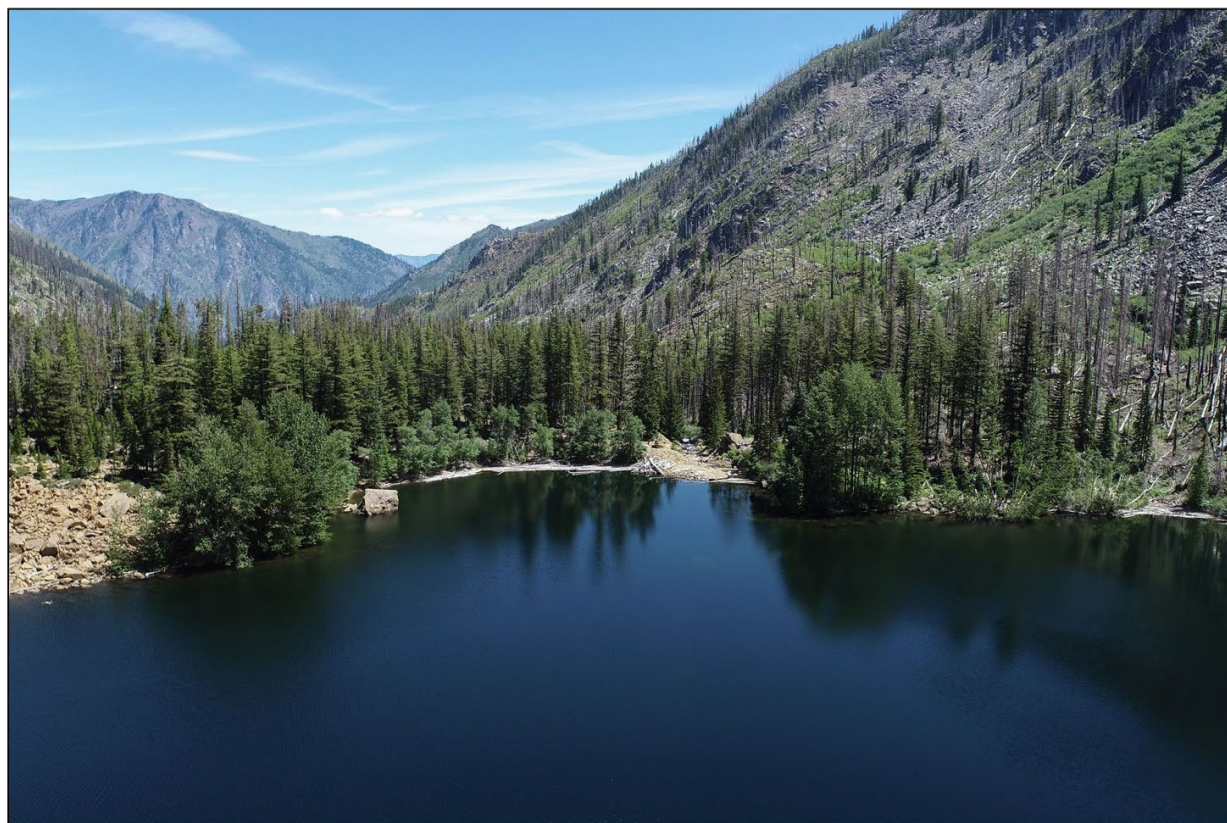
Figure 11-13. KVP A, Photo Facing Southwest Showing Existing Dam and East End of Lake in October 2020



Figure 11-14. KVP B, Photo Facing East Showing Existing Dam and Lake (water level below maximum high water) in October 2020



Figure 11-15. KVP C, Aerial Photo of Dam Looking East from Approximately 130 Feet above Eightmile Lake in June 2021



11.4 Construction Impacts

This section analyzes visual impacts during construction, including the use of helicopters, improving and using FSR 7601-116, and the construction of a new dam. Visual changes would include helicopter flights to and from the site, increased human construction activity, and the presence of the excavators and other construction tools, materials, and temporary worker encampment on the Special Warranty Deed land. Because the site is within a designated wilderness, all these materials and activities would strongly contrast with the existing setting.

The discussion below includes a section describing the transport of equipment and materials to the site that could be used under any action alternative, and a section describing the range of potential impacts from construction of the dam under the various alternatives.

Most of the work and staging would occur within areas near the dam that were disturbed when the dam was built or when emergency repairs were made in 2018. However, the dam is located in an area where users expect to encounter nature in a pristine state. A construction site with heavy equipment and stored construction materials will contrast strongly with these visual expectations, even if notice has been provided at the trailhead.

Aesthetic impacts from construction activity would be adverse in the short term and would occur during peak hiker usage in the area; however, these impacts would be temporary (lasting only for the anticipated duration of one construction season) and are therefore considered less-than-significant. Even if construction extended into a second season, impacts would not be considered significant.

11.4.1 Transportation of Equipment and Materials

Road Segment

A roughly three-quarter mile section of the currently closed FSR 7601-116 would be cleared from the Eightmile Lake Trailhead to allow authorized vehicles and light trucks to bring personnel and supplies closer to the site (**Figure 11-1**). The cleared portion of the road is within the Okanogan-Wenatchee National Forest and would terminate outside of the Alpine Lakes Wilderness. The road would not be used by the general public. The road would be approximately 10 feet wide, and improvements would include the removal of fallen trees and vegetation rooted in the roadway. No large, living trees would need to be removed. The last 100 feet of the road would be cleared to a width of 24 feet to allow parking, and the last 30 feet of the road would be cleared to a width of 30 feet to allow for vehicles to turn around. From the vehicle turnaround area at the end of the road, a trail would be cleared along an existing road grade to allow construction personnel to hike approximately 2,500 feet to a junction with the Eightmile Lake Trail that leads to the lake.

Clearing of the road would be visible to users of the Eightmile Lake Trail at the trailhead. Because of the location and contours of the road, only a short portion of the road is visible from the trailhead. The remainder of the cleared road and the trail from the staging area would be out of sight from users of the Eightmile Lake Trail, except where the trails would meet. The road would be open to personnel working on the dam for the duration of construction, which is estimated to last one season. After completion of the project, the road would remain closed to public vehicular use, and vegetation would be allowed return to the conditions prior to construction. These impacts are considered less-than-significant because the road is not in a designated wilderness, has been previously graded for a road, and would require a very limited amount of vegetation to be removed (primarily low brush and no large trees). Additionally, the road segment and parking/turnaround area would not be viewable from any existing recreational facilities, except at the trailhead and trail junction, and those areas would not contrast sharply with the existing setting.

Helicopter Use and Staging Area

Helicopters would be used to move all equipment and the majority of materials to and from the project site. Helicopters would be visible intermittently as they fly over recreational areas while delivering materials to the site. Views of the helicopters would contrast sharply with existing views of the wilderness, and would affect views throughout the study area. The number of helicopter trips and timing throughout the construction period would depend on the type and size of helicopter used, as described in Chapter 2, *Project Alternatives*.

If the larger helicopter is used (Option 1), the period of impact would be limited to 3 to 5 days at the beginning of the project, up to two flights per week during the construction process, and 2 days to remove material and equipment at the end of the project. The staging area for this option would be 15 percent larger than for Option 2 (a difference of approximately 1,300–1,800 square feet depending on the dam alternative), because the majority of materials would be brought to the site at the beginning of the project. The staging area would be located where the existing trail is, so the trail would be temporarily relocated. Approximately 20 to 30 trees would be removed for the staging area, along with brushy vegetation. Trail users would see the staging area and construction, and these views would contrast sharply with existing views.

If the smaller helicopter is used (Option 2), flights would occur daily 9 to 11 additional days over the construction period. Given the site's location in a wilderness, helicopter use under Option 2 would adversely affect more users during that season. However, because the staging area would be smaller than Option 1, up to 10 fewer trees would be removed. As a result, Option 2 may contrast less conspicuously with existing views from the trail.

Impacts on visual resources from the use of the helicopters under either option would be less-than-significant because helicopters would be used for one construction season (approximately 4 months). Even if unforeseen circumstances forced construction into a second season, helicopter use would not be considered significant under either helicopter option, because the impacts would affect a limited area and would not last more than two summer seasons. Under either option, the staging area would be small, approximately 0.25 acre, and would be restored after construction.

11.4.2 Dam Construction

Construction activities and materials would contrast the most with the visual setting when people first arrive at the lake on the rerouted trail. When approaching the lake from the trailhead, hikers would emerge from a relatively pristine forest to see a staging area with construction materials such as pipe, rebar, and concrete. The construction site would include two excavators and other construction equipment, and the worker camping area. Construction of the new dam would involve debris and vegetation removal, including up to 30 trees at the staging area and woody debris from the lake's edge. Some debris would be burned and some would be used to level the staging area. The removal of vegetation for the staging area would make the construction area more visible from the trail. The size of the staging area would vary by alternative, with Alternative 2 requiring the largest volume of materials to be stored on-site and therefore the largest staging area.

In addition, the lake would be drawn down as low as possible for the duration of the construction season, similar to the level shown in **Figure 11-10**. While similar low-water levels likely occurred in late summer before the dam was built, since the dam was built, the lake level has been held as high as possible until water is needed for irrigation. During construction of the project, the lake would appear as it does during the driest part of the year, but for the entire summer. The shorelines that would be exposed are generally of the same rock and sediment material as the existing shorelines; therefore, the exposed shoreline areas would not contrast with the setting. However, the reduced size of the lake would contrast sharply with the normal lake size in early to mid-summer. The reduced size of the lake would adversely affect viewers who are camping as well as those hiking past or coming to the lake on day hikes.

11.4.3 Conclusion – Construction

Construction of the dam would cause moderate adverse impacts on the visual quality of the area surrounding the dam, because viewer sensitivity to any type of construction involving heavy machinery in the wilderness would be high and the construction would be conspicuous, particularly near the dam. Lower water levels would further reduce the visual appeal of the lake. Either helicopter option would remove 30 trees and require between 5 and 16 full days of helicopter activity. However, impacts are considered **less-than-significant** because construction activities would be temporary, occurring over one season, with a possibility of stretching into a second season. However, if construction spanned more than two full seasons, construction impacts on the visual quality of the area would be considered significant.

11.5 Operational Impacts

This section analyzes the visual impacts from the operation of the alternatives, including impacts related to water level changes and the new dam structure at the site.

11.5.1 No Action Alternative

Under the No Action Alternative, views in the vicinity of the project would essentially remain the same, with the exception of the removal of the excavator that was used to make repairs in 2018.

Under the No Action Alternative, it is probable that DSO would exercise enforcement actions in accordance with WAC 173-175-620(3). This analysis does not address any emergency repairs that might be required for a partial dam failure. The visual impacts analyzed are the worst-case impacts of either total failure or the more likely scenario of the ordered removal of the dam. Under either scenario, the primary long-term visual impact would be a permanent lowering of the lake level.

Under a DSO enforcement order, the dam structure and outlet pipe would likely be removed. This would result in the high-water level of the lake being lowered to the level of the bottom of the outlet pipe where it crosses under the dam, which is at an approximate level of 4,648 feet; however, due to additional seepage through the landslide deposits that underlie the dam, the lake level would continue to drop to an approximate elevation of 4,640 feet. **Figure 11-16a** is a simulation (aerial view) showing what the east end of the lake would look like after dam removal. **Figure 11-16b** is a simulation from KVP B showing what the lake could look like after dam removal. The lake's high- and low-water levels would be approximately 27 feet lower than the current water levels at the lake. The high level of the lake would be similar to the current low level, reducing the lake area by approximately 47 percent, and as the season progressed the lake would continue to reduce in size. What is currently valued as one of the most accessible lakes in the Alpine Lakes Wilderness would be substantially smaller, and would lose much of its visual appeal as a result. This would be considered a significant impact on the visual quality because the lake's area would be reduced by greater than 10 percent.

Figure 11-16a. Photo Simulation of East End of Eightmile Lake with Dam Removed



Figure 11-16b. Photo Simulation of the Water Level of Eightmile Lake from KVP B with Dam Removed



The effects of a dam failure could vary greatly depending on the size of the failure, and there could be considerable additional damage downstream. A failure could spread portions of the dam and outlet pipe downstream, which would contrast with the wilderness area but would likely be out of view from the trail and of limited extent. A failure could also cause severe scouring and loss of vegetation along the streambed both inside and outside of the wilderness, as well as the loss of structures downstream. Within the wilderness, it is assumed that this would not be restored and would be left to regenerate on its own. Visual impacts in the wilderness would not be considered significant, but some of the scenic quality of the area downstream of Eightmile Lake could be altered by the loss of vegetation. Little Eightmile Lake could be heavily altered because it is largely filled with vegetation during the growing season, and scouring could remove the lakebed sediment and possibly alter the lake outlet level. Flooding could also damage land and structures downstream of the wilderness area on Icicle Creek and the Wenatchee River. Damage to structures, roadways, and agricultural fields could temporarily impact the scenic rural character of the area, to the extent that the damage is visible from public places, or limit access to the area. Impacts could be significant if they could not be readily repaired.

11.5.2 Alternative 1: Narrow Spillway with Gates

Alternative 1 would construct a new 65-foot-wide dam with an earthen embankment and reinforced concrete structure with automated control gates on top of the primary spillway. Under Alternative 1, the lake could be filled to an elevation of 4,671 feet, which IPID reports as the historic high-water level of the lake. The dam proposed under Alternative 1 would be larger than the current dam, which is reduced from its original constructed height, with the addition of the 4-foot-high automated gates that would be raised in the spring until mid-summer. Visual impacts from the new dam would include a higher crest when the gates are raised and a more modernized looking dam in an area with limited evidence of mechanization. The dam would appear as a dominant feature when viewed from areas directly adjacent to it (KVP A) (**Figures 11-17a and 11-17b**). The current dam is also a dominant feature in the landscape (**Figure 11-12**) from KVP A. The new dam would be larger and have more strong straight lines and man-made materials that contrast with the setting. The newer concrete material would also contrast with native rock, whereas the existing dam includes some native rock and therefore contrasts less.

Similar to existing conditions from most other viewpoints, including the main Eightmile Lake Trail, campsite area (KVP B and KVP C, **Figures 11-18 through 11-20**), and shoreline, the dam would appear as a subordinate feature in the background of views. The dam would be the most distinct in the landscape in the initial years following construction; over time, the dam would become weathered, and vegetation would regrow in cleared areas, helping to blend the dam into the landscape. As shown in the simulations, the higher water levels would likely inundate and kill small areas of trees on each side of the dam. With time, these trees would also likely fall into the lake and either be removed from the lake or decompose.

Figure 11-17a. Simulated View from KVP A of Alternative 1 with Gates in Raised Position (water level 4,671 feet)



Figure 11-17b. Simulated view from KVP A of Alternative 1 with Gates in Lowered Position (water level 4,667 feet)



Figure 11-18a. Simulated View of Alternative 1 from KVP B with Gates in Lowered Position (water level 4,667 feet)



Figure 11-18b. Simulated View of Alternative 1 from KVP B with Gates in Raised Position (water level 4,671 feet)



Figure 11-19a. View of Existing Dam from KVP C (water level approximately 4,667 feet)



Figure 11-19b. Simulated View of Alternative 1 from KVP C (water level 4,671 feet)



The automated gates would be made of steel with straight edges and be a conspicuous man-made object in the wilderness area. However, once vegetation is re-established where the staging area was located, the gates would be seen mainly by people who leave the main trail and walk to the dam. From the upstream (lake) side of the dam, the gates would only be visible when they are needed to allow water to flow over them; thus, they would be obscured by flowing water. The wing walls would be visible on the sides and between the gates but would also be small in scale when viewed from Eightmile Lake Trail or other shoreline areas (**Figures 11-18a and 11-18b**).

This alternative would change the lake's shoreline during the summer and fall when recreational use at the lake is highest. The timing of the water level changes would remain similar to current conditions, with high-water levels present in the late spring to mid-summer, and the low-water levels beginning mid to late summer through fall. From late spring to mid-summer, the lake would be held at a water level of 4,671 feet, which would make the lake six percent (4.8 acres) larger than with the current high-water level (see **Table 2-1**). However, 4,671 feet is reported by IPID as the high-water level of the lake before the dam was built as well as after it was built but before it eroded (pers. comm, Jantzer, 2021). This higher water level would inundate existing portions of the shoreline, resulting in visual changes in mid-ground and background views around the lake (**Figures 11-17a and 11-18b**). Changes in the lake level would contrast with existing conditions where some areas would be submerged, such as the wetland at the west end of the lake and rocky, brushy areas along other shores. Some vegetation in these areas would likely die as a result of inundation. While some people would see the inundation of these areas as adversely affecting views, others would likely see the larger lake size as a visual benefit.

Because this alternative would allow more water to be stored than at present, relative to current water management, the lake would, on average, retain more water later into the summer than it does at present.

Alternative 1 and all action alternatives would allow the lake to be lowered to a water level of 4,636 feet, 4 feet lower than the current dam allows without pumping. Beginning in the mid- to late summer as water is released, the lake's water level would be slowly lowered to this low-water level, resulting in a lake six percent (2.5 acres) smaller than with the current low-water level of approximately 4,640 feet (see **Table 2-1**). Lower water levels at the lake would expose more shoreline area, consisting of native rock and woody debris that was previously under water. These areas would be similar in appearance to low-water conditions at present, but more extensive. Water levels would be at the lowest in the late fall. The lower low-water level with this and all action alternatives would change fore- and mid-ground views from both shoreline KVPs because there would be a greater area of exposed lakebed, but this is similar to the condition that occurs with the current dam at low water (**Figure 11-10**). Under any of the action alternatives, mid-ground and background views would still provide views of a lake (**Figure 11-20b**).

Alternative 1 and all action alternatives would have small telecommunications stations to monitor and control the outlet on the dam similar to the existing condition. This installation would be similar in scale and character to existing installations and therefore would not substantially increase the degree of contrast that these installations have with the project setting.

Operational impacts from Alternative 1 would be **less-than-significant** because the dam and associated man-made features would not become dominant in views from the main Eightmile Lake Trail, campsite area, or surrounding shorelines, and the lake would not be reduced in size by more than 10 percent.

Figure 11-20a. Simulated View from KVP B of Alternative 1 (water at elevation 4,642 feet)



Figure 11-20b. Simulated view from KVP B of Alternative 1 – Water at Lowest Level without Pumping (elevation 4,636 feet)



11.5.3 **Alternative 2: Wide Spillway without Gates**

The dam proposed under Alternative 2 would be a more prominent feature in the landscape when compared to the existing dam, and compared to Alternatives 1 and 3. The dam would be an earthen embankment and reinforced concrete dam approximately 180 feet long, approximately three times the width of the existing spillway. **Figure 11-21** shows the view from KVP A, where the entire foreground would be covered by the embankment and contrast with the existing setting. The dam would have a concrete wall that would form a straight concrete edge 180 feet long that would be visible whenever water was not going over it, which would include much of the summer recreation season. Although most of the wall would be covered with native rock, this long, straight line, along with the wing walls on the dam, would contrast with the wilderness area. The rock armoring on the downstream side of the dam would also need to be kept clear of trees, in contrast to the generally brushy and wooded shoreline around most of the lake. Although the dam would dominate views from KVP A, it would remain subordinate in views from viewpoints along the Eightmile Lake Trail and other locations along the shore (**Figures 11-22 and 11-23**).

This alternative would also have a higher dam crest, like Alternative 1, but it would not be retractable. The water level would remain at elevation 4,671 feet throughout the spring and mid-summer season until water is needed for irrigation. During the high-water period, the lake would be 4.8 acres larger than at present, and the wetland vegetation composition at the west end would likely be altered, including the recruitment of woody vegetation. As with Alternative 1, at the high-water level, only the wing walls would be visible from KVP B and similar viewpoints along Eightmile Lake Trail (**Figure 11-22**). From higher elevations, the downstream embankment would be more visible than Alternative 1, but the dam would not be a dominant feature (**Figure 11-23**).

Impacts from low-water levels under Alternative 2 would be similar to those described for Alternative 1, with a low-water level of 4,636 feet (**Figure 11-20b**). The wide spillway dam in Alternative 2 would be more apparent than Alternative 1 from KVP B at low-water levels because of the greater width of the embankment, but the embankment would be made of native rock and would not be a dominant feature from most vantage points in the study area.

As with Alternative 1, the higher water level would inundate existing portions of the shoreline, resulting in visual changes to mid-ground and background views around the lake (**Figures 11-21, 11-22, and 11-23**). Changes in the lake level would contrast with existing conditions where some areas would be submerged, similar to Alternative 1, but Alternative 2 would hold these high-water levels for longer. Some vegetation in these areas would die as a result of inundation. While some people would see the inundation of these areas as adversely affecting views, others would likely see the larger lake size as a visual benefit.

Like Alternative 1, Alternative 2 would allow more water to be stored than at present, and the lake would on average retain more water later into the summer than it does at present.

Operational impacts from Alternative 2 would be **less-than-significant** because the dam and associated man-made features would not become dominant in views from the main Eightmile Lake Trail, campsite area, or surrounding shorelines, and the lake would not be reduced in size by more than 10 percent.

Figure 11-21. Simulated View from KVP A of Alternative 2 at Maximum Water Level (4,671 feet)



Figure 11-22. Simulated View from KVP B of Alternative 2 at Maximum Water Level (4,671 feet)



Figure 11-23. Simulated View from KVP C of Alternative 2 at Maximum Water Level (4,671 feet)



11.5.4 Alternative 3: Narrow Spillway without Gates

The dam constructed under Alternative 3 would be identical to the dam proposed under Alternative 1, with the exception of the mechanical gates. **Figure 11-24** shows a simulated view of the dam from KVP A. Compared to Alternative 1, Alternative 3 would contrast less with the project setting because it would have fewer angular and man-made parts that contrast with the wilderness surrounding the dam.

Under Alternative 3, the high-water level of the lake would remain the same as existing conditions at 4,667 feet, the same elevation that Alternative 1 would have when the gates were down (**Figures 11-17b and 11-18a**). As a result, there would be no substantial change in the size of the lake or to the vegetation around the lake from high-water levels. Lake levels would be managed similarly to the way they are at present; thus, water levels would on average be lower in the summer than they would be under Alternatives 1 and 2.

Impacts from the low-water level of Alternative 3 would be the same as those described for Alternative 1.

Operational impacts from Alternative 3 would be **less-than-significant** because the dam and associated man-made features would not become dominant in views from the main Eightmile Lake Trail, campsite area, or surrounding shorelines, and the lake would not be reduced in size by more than 10 percent.

Figure 11-24. Simulated View from KVP A of Alternative 3 at Maximum Water Level (4,667 feet)



11.5.5 Repeater Station (Common to All Action Alternatives)

The repeater station would be placed on a ridge in the Wenatchee National Forest outside of the Alpine Lakes Wilderness that is not accessible by an improved trail. It is relatively small in scale and would be placed in an area where similar communications equipment is currently located. Therefore, it would not contrast strongly with the existing setting. The new station will be placed next to an existing Forest Service repeater station. The impact of the repeater station would be **less-than-significant** because of the small size of the structure, co-location with Forest Service equipment, and the remote location.

11.6 Avoidance, Minimization, and Mitigation Measures

This section describes the mitigation measures proposed that would reduce and compensate for impacts on visual resources from the construction and operation of the project.

11.6.1 Construction

Measures to reduce impacts on visual resources from construction include:

- Minimize clearing area for staging and construction activities.
- Establish and maintain clear construction boundaries.
- Maintain detour trail around site during construction.

- After construction is complete, restore trail and cleared areas to Forest Service standards, consistent with the Wilderness and Backcountry Site Restoration Guide (Therrell et al. 2006).
- Coordinate with the Forest Service to forewarn visitors of potential disruption of wilderness experience due to construction activities, including notice to people seeking reservations through the lottery and to those awarded reservations.
- Provide signage to alert trail users regarding construction activity, including dates and hours of helicopter use, heavy equipment operation, and blasting with explosives.
- Provide a general description of work period and work impacts, including potential areas that will be closed to the public such as the staging and construction areas, prior to the Forest Service lottery for overnight permits in the Enchantment Permit Area.
- Design constructed features to match the natural environment to the extent feasible.
- Provide alert of construction on the Forest Service Website for *Alpine Lakes Wilderness: Okanogan-Wenatchee*.

11.6.2 **Provide notification and signage at the Leavenworth Operation**

Measures to reduce impacts on visual resources from operation of the dam include:

- During design of the dam, specify materials and colors that will visually blend with the landscape around the dam, to the extent feasible.
- In the dam design, minimize the use of long, linear, and sharp rectangular edges to the extent feasible to reduce the contrast of the structure with the natural surroundings.
- Plant and allow low-growing vegetation, such as grasses and herbaceous plants, on the armored downstream face of the dam to the extent that this is compatible with safe operation of the dam.

11.7 **Significant Unavoidable Adverse Impacts**

It is unavoidable that some recreationists would find that impacts from construction detract from the visual quality of the study area. However, because construction is anticipated to last for one season and all disturbed areas would be restored following construction, **less-than-significant impacts** on the visual quality of the study area are anticipated during construction. During operation, the project would result in **less-than-significant** impacts on visual quality. From most viewpoints, including the main Eightmile Lake Trail, campsite area (KVP B and KVP C), shoreline, and surrounding peaks, the dam would not be a dominant feature and would blend into the background of the landscape. From KVP A, any new dam would be visible and contrast with existing conditions; however, there is an existing dam there so the changes are considered **less-than-significant**. Additionally, operation of Alternatives 1, 2, and 3 would still provide views of a lake and would not reduce the lake area by greater than 10 percent.

Under the No Action Alternative, dam failure could occur, which would result in a high-water level reduction of 47 percent and damage to infrastructure downstream. Due to the potential reduction in the water level of the lake and the contrast in views from the current condition, potential impacts from the No Action Alternative are considered **significant**.

CHAPTER 12: PUBLIC SAFETY

Public safety concerns for the project primarily consist of the potential failure of the current Eightmile Dam and the impacts a failure would have downstream. Failure of the structure could have impacts on the health and safety of people, the environment, infrastructure, livestock, and buildings downstream of the dam.

12.1 Methodology

The public safety analysis examined how construction and operation of Eightmile Dam could affect public safety. The study area for public safety encompasses the area downstream of the dam that would be affected in the event of dam failure. The downstream area extends from Eightmile Dam to the Wenatchee River and includes portions of Eightmile and Icicle creeks. The downstream study area ends where the water level from the dam failure would no longer be distinguishable from normal water levels, as determined by evaluations conducted by IPID and DSO (Anchor QEA 2019) (Figure 12-1).

Key Findings for Public Safety:

- The nearly 100-year of Eightmile Dam was classified by Ecology's DSO in 2018 as a high hazard dam due to potential loss of human life and property downstream if the dam were to fail.
- Increased peak runoff into Eightmile Lake caused by fire damage within the watershed, which, combined with debris piling up on the dam, could increase the risk of dam failure.
- Catastrophic failure would send an estimated additional 14,800 cfs of streamflow into Icicle Creek during a natural high flow event.
- About 150 downstream residences are at risk of being damaged or destroyed if the dam failed.
- There is a potential for loss of life downstream if the dam failed.
- There are no significant unavoidable impacts on public safety under any of the action alternatives.
- The action alternatives would substantially reduce the risk of a catastrophic dam failure and have a considerable benefit to public safety.
- The No Action Alternative would not comply with DSO safety standards, and presents the highest risk of dam failure of all alternatives. As such, it is considered a potentially significant adverse impact to public safety.

For the evaluation of construction impacts, impacts are considered significant as follows:

- Impacts are considered significant if construction activities would not comply with applicable federal and state safety requirements, and/or result in conditions that would negatively affect the health and safety of members of the public, including construction workers and people located downstream on Icicle Creek and the Wenatchee River.

For the evaluation of operational impacts, impacts are considered significant as follows:

- Impacts are considered significant if the dam is unable to meet DSO safety standards, and/or applicable local and state guidelines and policies, and operation of the dam puts downstream residents, structures, and recreationists at risk in the event of dam failure.

12.2 Regulatory Context

Public safety is protected by a variety of federal, state, and local plans, as well as laws and policies (Table 12-1). These plans and policies were reviewed to determine how well the project alternatives would comply with public safety in the study area. The policies reviewed generally provide guidance and regulations related to dam safety.

Table 12-1. Regulations and Guidelines Applicable in the Study Area

Program, Plan, or Policy	Description
33 U.S. Code 467f, National Dam Safety Program	Establishes and maintains a coordinated national dam safety program that is administered by the Federal Emergency Management Agency (FEMA).
Federal Guidelines for Dam Safety Risk Management (FEMA P-1025; FEMA 2015)	Provides guidance for dam safety and operation.
Dam Safety, Washington Administrative Code (WAC) 173-175	Provides comprehensive regulation and supervision of dams to reasonably secure safety of life and property. Includes oversight on the design, construction, operation, maintenance, and supervision of dams. Requires all dam designs to meet earthquake and hydrologic/hydraulic design criteria outlined in Ecology's Dam Safety Office (DSO) Guidelines. Rules are administered by Ecology's DSO.
Dam Safety Guidelines Part II – Project Planning and Approval of Construction or Modification (Ecology 1992)	Provides dam owners, operators, and design engineers with information on activities, procedures, and requirements involved in the planning, design, construction, operation, and maintenance of dams.
Water Resources Program Policy (DSO) POL 5102 (Ecology 1999a)	Existing statutes, rules, and policies regarding matters of dam safety are applicable to dams that are constructed with a potential active capacity to store 10 acre-feet or more of water as measured at the dam crest elevation.
Water Resources Program Policy (DSO) 5406 (Ecology 1999b)	Requires a surficial inspection on older dams constructed without DSO approval to assess structural integrity and safety of the facility. If the inspection indicates serious problems with the dam, the concerns must be addressed in a timely manner.
Water Resources Program Policy (DSO) 5701 (Ecology 1999c)	Requires a Dam Safety Emergency Action Plan (EAP) to be prepared and maintained, identifying appropriate procedures and agency protocols to be followed in response to emergency situations on dams where there is a potential for loss of life.
Spills and Discharges into the Environment (WAC 173-303-145)	Establishes requirements for spill or discharge of dangerous waste or hazardous substances into the environment.

Program, Plan, or Policy	Description
Washington State Water Code (Chapter 90.03 RCW)	Promotes the use of public waters in a fashion that provides for obtaining maximum net benefits from both diversionary uses and the retention of waters within streams and lakes in sufficient quantity and quality to protect instream and natural values and rights.
Occupational Health and Safety Administration Standards – 29 Code of Federal Regulations (CFR)	Promotes the mission of worker safety and health, and outlines standards for working in all types of construction environments.
Washington State Department of Labor and Industries – Safety and Health Rules (WAC 296-24)	Supports worker safety in Washington State; develops and enforces safety and health standards for construction workers in the state.

The dam safety guidelines provide guidance in the selection of appropriate design and performance goals for critical project elements (Ecology 1992). Design and performance goals for critical project elements are selected based on a design step format with eight design steps, wherein goals range from an annual exceedance probability (AEP) of 1 in 500 at Design Step 1, stepping up to 1 in 3,333 for Design Step 3 if there is the potential for the loss of one to three lives. The AEP increases (Design Step 4 at 1 in 10,000 through Design Step 8 at 1 in 1,000,000) with increasing lives, critical infrastructure at risk, and potential environmental consequences; the scheme terminates in theoretical maximum events. An initial assessment of the design step for a dam can be generally related to the downstream hazard classification. For example, using Ecology's DSO guidelines, an initial Design Step of 3 or 4 would be recommended for a significant, hazard class 2D dam (economic loss appreciable, 1 or 2 inhabited structures, population at risk 1 to 6 people); or a Design Step 8 would be recommended for a high, hazard class 1A dam (economic loss extreme, more than 100 inhabited structures, population at risk more than 300). Eightmile Dam will be designed to meet Design Step 8 at 1 in 1,000,000.

12.3 Affected Environment

12.3.1 Existing Conditions

Eightmile Dam was built nearly 100 years ago in the 1920s. Dam construction resulted in the impoundment of water from Eightmile Creek for use by the IPID. IPID reports that the high-water level established by the dam was originally 4,671 feet above sea level. However, it is unclear when the reservoir was last held at this level. Ecology's DSO regulates dams in Washington through the administration of state laws and rules to protect people and property located downstream of dams and ensure that dam safety is a priority. In 2018, the DSO gave Eightmile Dam a downstream hazard classification rating of "high hazard" to describe the potential for loss of human life and/or property damage if the dam were to fail and release water in the reservoir into downstream areas (Appendix A). The DSO considers the dam vulnerable in the event of a large storm due to changed conditions in the watershed both above and below the dam, as well as damage to the dam itself. The Jack Creek Fire in 2017 burned a significant forested area in the watershed, creating conditions for more rapid runoff. Increased peak runoff into Eightmile Lake, which, combined with debris piling up on the dam, could increase the risk of dam failure, putting approximately 150 downstream residences at risk if the dam fails. The dam was also partially eroded more than 25 years ago, and the outlet pipe was damaged. Repairs to the dam were performed in 2018 as there was concern that further damage to the dam would occur due to a storm and increased runoff rates that follow. The dam still does not meet dam safety standards and is considered to be in unsatisfactory condition and at risk for potential failure.

12.3.2 Dam Failure

A worst-case scenario dam break analysis of an overtopping failure was performed in 2019 (Anchor QEA 2019). If catastrophic dam failure occurred, it would contribute an estimated additional 14,800 cfs of streamflow to Icicle Creek during a natural high-flow event. For comparison, peak flows have been recorded at 11,000 cfs in November 2015, 15,700 cfs in November 2006, and 19,800 in November 1995 (Anchor QEA 2019). An overtopping failure would result in downstream flooding and pose a safety risk to people who reside downstream in the Icicle Creek Area. **Figure 12-1** illustrates the downstream inundation area. Modeling results concluded that the peak discharge from the dam breach would not significantly attenuate in Eightmile Creek due to the steep and confined geometry of the creek. The inundation mapping illustrates the expected flood levels in Icicle Creek and extends approximately 4 miles downstream of the confluence with the Wenatchee River (**Figure 12-1**). There are approximately 150 residences along Icicle Creek, many of which include structures within the area that would be flooded if the dam failed. The Icicle Island Club is a private residential community 5 miles south of Leavenworth. During a dam failure event, some of these homes and others along Icicle Creek would be at a significant risk of being severely damaged or destroyed. Flooding would not only threaten homes, but would also pose a risk to other infrastructure such as roadways and bridges, barns, and other residential developments as well as animals and livestock. Roads and bridge crossings that could be directly affected include: FSR 7601 and FSR 112, a bridge over Icicle Creek at RM 7, two bridge crossings near Icicle Island, a bridge crossing near the downstream end of the LNFH channel, and the bridge at Leavenworth Road (Anchor QEA 2019). Dam failure at Eightmile Lake could also raise water levels on the Wenatchee River and damage infrastructure if the river were already at or near flood stage.

Floodwaters could also pose a danger to any people using recreational resources downstream of the dam, such as the Eightmile/Caroline Zone in the Enchantment Permit Area or other recreational opportunities along Icicle Creek and the Wenatchee River. Hikers and other recreationists could be seriously injured or die if dam failure were to occur when hikers were present.

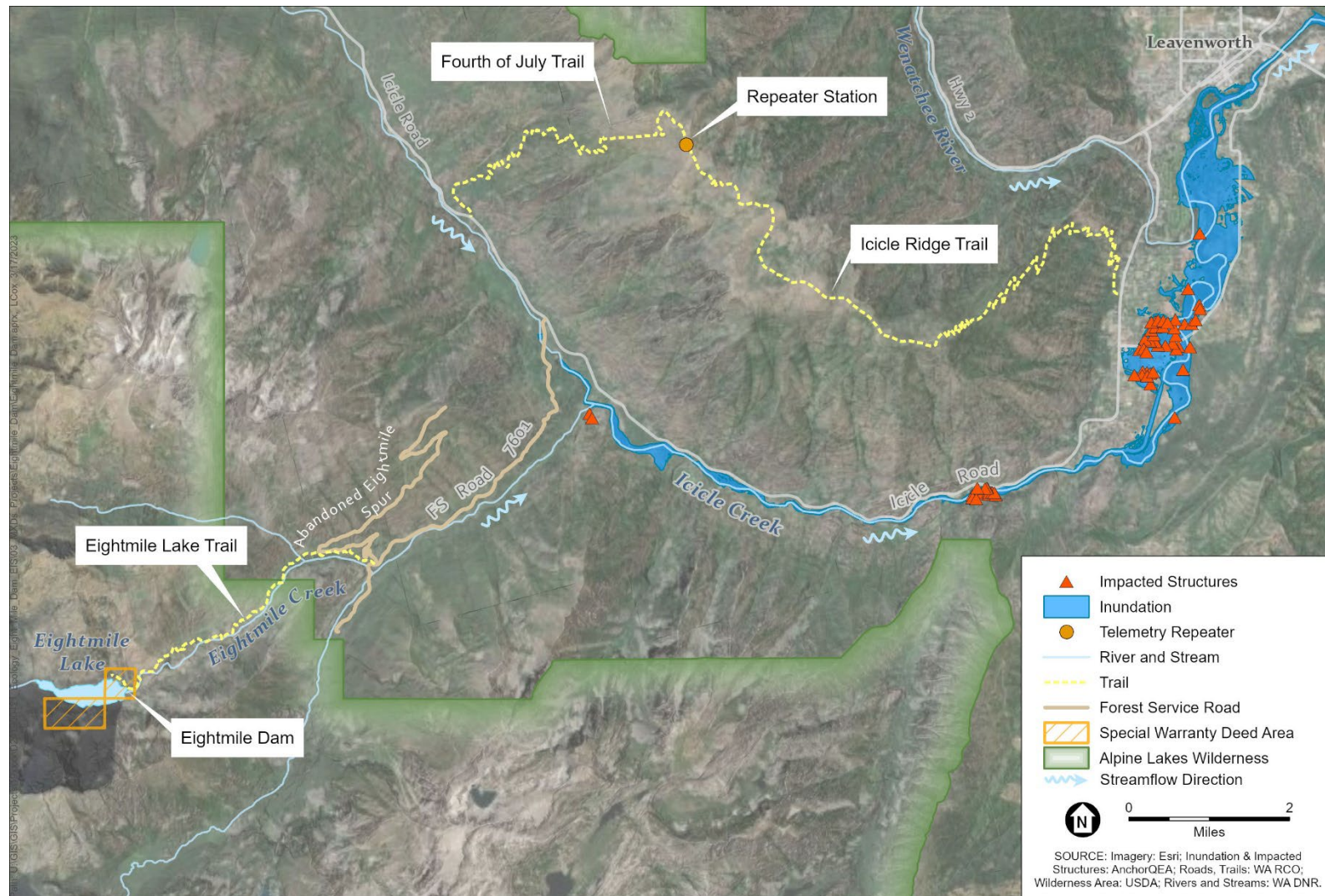
Floodwaters can also pose a risk to public health if they become contaminated. No known contaminated sites are located in the downstream area of the dam on Icicle Creek; however, floodwater can be contaminated in a variety of other ways, including coming into contact with chemicals stored on or above the ground, agricultural chemicals, and septic and wastewater treatment systems. These contaminated waters are health hazards if the public comes in contact with them through direct physical contact, ingestion, or open wounds (OSHA 2005). Additionally, the lower portion of Icicle Creek is identified as impaired for dichlorodiphenyldichloroethylene (4,4'-DDE) and polychlorinated biphenyls (PCBs) in Ecology's current EPA-approved 303(d) list (Hobbs and Friese 2016); please see Chapter 4, *Surface Water*, for more information on water quality in Icicle Creek.

12.3.3 Flood Warning System

Chelan County has an emergency management department that provides training, outreach, planning, and coordination for hazard events, as well as natural hazard planning documents like the Chelan Emergency Action Plan (CEMP)(Chelan County 2020).

The Chelan County Department of Emergency Management sends out mass notifications via the Chelan County AlertSense system through text message, email, pager, or voicemail to alert the public about emergency and non-emergency issues. Emergency issues can relate to specific hazards with actions that require evacuation or shelter in place. Non-emergency issues can include significant police, fire responses, or transportation problems (Chelan County 2022).

Figure 12-1. Downstream Inundation Area



12.4 Construction Impacts

Construction impacts on public safety could include potential impacts on construction workers involved in building the new dam, or members of the public who could be affected directly or indirectly during construction. Impacts could occur from the transportation of equipment and materials, and construction activities related to dam construction or the road improvements. IPID is planning to self-construct the dam using workers hired directly by IPID, and will use a helicopter contractor for helicopter transport. Impacts from these components are described below, followed by a comparison of the alternatives considered.

12.4.1 Transportation of Equipment and Materials

Helicopter

All construction methods would include the use of helicopters to transport equipment and materials. As described in Chapter 2, two helicopter options are being considered: use of only a heavy-lift helicopter (requiring fewer trips), and use of a heavy-lift helicopter combined with a smaller helicopter (requiring more trips). IPID would contract with a local licensed helicopter service with the capability of providing helicopters and certified pilots. Helicopter use in construction is a common practice and has been used by IPID for work within the IPID drainage area without an accident. However, the use of helicopters includes the risk of equipment malfunction or other types of accidents, and when helicopter accidents occur there are often casualties. The smaller helicopter option would entail relatively greater risk of an accident, as more helicopter trips would be required.

In the State of Washington, helicopters used for construction are regulated under the Department of Labor and Industries under Chapter 296-829 WAC, *Helicopters Used as Lifting Machines*. All construction use of helicopters at Eightmile Dam will be required to comply with applicable requirements for helicopter use, along with applicable requirements under the Federal Aviation Administration (FAA). The Forest Service requests to be informed of flights through their Aircraft Dispatcher at the Central Washington Interagency Communications Center to make sure the airspace is deconflicted with other potential flights. Compliance with these requirements would reduce potential construction-related risks from helicopter use to a **less-than-significant** level of potential impact.

Road Segment

The proposed construction includes improving a section of the previously closed FSR-7601 outside of the wilderness area to improve access to the site. Without an access road, construction workers would access the site by hiking approximately 3 miles to the construction site. Allowing use of the previously closed road to the point where it ends would shorten the hike for construction personnel by approximately 0.7 mile, and would eliminate approximately 400 feet of elevation gain from the hike. Risks to construction workers from hiking include slips, trips, and falls, as well as fatigue and heat-related illnesses during peak summer temperatures or unseasonal cold temperatures. By shortening the distance and elevation gain of the hike, these risks would be slightly reduced. The road access would provide improved access to emergency services, reducing response time if emergency services by foot are needed.

12.4.2 Dam Construction

Similar to most construction projects, the potential short-term impacts on health and safety from the construction of the dam include the risk that construction workers could have an accident while

working at the site. Construction workers would camp at the site for approximately 15 to 20 weeks, with each crew staying at the site for the work week, and hiking out for the weekends. The project construction would be accelerated as much as possible to complete the construction within one season, which could increase standard risk factors associated with fatigue and other factors. The remote location creates additional safety risks for crews, including extreme weather, wildlife, and the potential for increased response time in the case of accidents. All construction activities would need to be approved by DSO, Washington Labor and Industries (L&I), and the Forest Service for those areas outside the Special Warranty Deed Area. A Dam Safety Construction Permit is required before constructing, modifying, or repairing any dam or controlling works for storage of 10 or more acre-feet of water. The application process requires approval of the construction plans and specifications, as well as a Construction Inspection Plan. The application also requires approval of a dam's Operation and Maintenance (O&M) Plan and Emergency Action Plan (EAP). An O&M Plan is required for all projects and is used to develop an O&M Manual following completion of the project. An EAP is required for those projects where a dam failure could pose a threat to life. Both plans must be approved before the project can be implemented. Ecology's DSO reviews and administers all dam permits in Washington to ensure compliance with state and federal construction and operation requirements.

While not anticipated, blasting with explosives may be needed to remove large rock deposits. If blasting occurs, construction workers and hikers in the region could be at risk if they inadvertently enter the blasting zone. Notices will be posted as far in advance of the blasting as possible, and the Eightmile Lake Trail will be closed during the brief period of blasting, which is expected to last less than one full day. IPID will have personnel on the Eightmile Lake Trail to stop hikers from entering a potentially dangerous zone should any blasting be necessary. Refer to Chapter 10, *Recreation Resources*, for additional information.

Because work would be conducted during the summer months, there may be an elevated risk of wildfire in the adjacent area, with associated risk from smoke or wildfire. Because of the remote location of the dam, the fire danger level will be carefully monitored to ensure that construction workers are not placed in danger. The construction plan approved by DSO will include provisions for fire avoidance and evacuation protocols should a wildfire occur in the area.

Construction activities at Eightmile Dam could pose a risk of starting fires in the area from the storage of fuel on-site, sparks or flames from construction equipment, camping equipment, and cigarette use associated with construction workers. Although the risk of a fire starting from construction is low because of anticipated requirements for fire avoidance, the risk cannot be completely eliminated.

Workers camping at the site would increase the potential for human waste contamination in the vicinity of the campsite, which could enter Eightmile Lake or its outlet. The campsite will be subject to waste disposal regulations that reduce but not eliminate this risk. A portable latrine will be maintained on-site and removed at the completion of construction.

With implementation and monitoring of a Health and Safety Plan, the public safety impact on construction workers would be **less-than-significant**.

During construction activities, including excavation, grading, and other non-blasting related construction activities, the construction area around the dam would remain closed to visitors. Members of the public could experience public safety impacts from construction if construction workers started a fire or spilled hazardous materials, or if hikers and/or campers were inadvertently within the construction zone during blasting with explosives. As noted above, all construction activities will require approval of detailed construction plans to avoid fires, store and use hazardous materials, and any blasting that may be required. All construction activities will be approved by Ecology's DSO and be consistent with applicable L&I requirements, which is expected to reduce the potential impacts on the public to levels that are **less-than-significant**.

12.4.3 No Action Alternative

Under the No Action Alternative, no construction would occur; however, there would be a risk of dam failure, which could lead to additional emergency repairs, which would be similar to those conducted in 2018. In addition, if DSO were to require abatement or removal of the dam, impacts similar to those described for construction would occur. Removal would likely require the use of helicopters for access. The duration of removal activities would be substantially shorter than for construction of any of the action alternatives, but construction-related risks to workers would still be present. If emergency repairs or abatement measures are required, impacts on construction workers would likely be **less-than-significant**.

12.4.4 Alternative 1: Narrow Spillway with Gates

Under Alternative 1, construction workers would be at risk during construction due to the potential for accidents, as described above. Workers are expected to camp at the site for approximately 15 to 20 weeks, and would work to complete the dam as quickly as possible to finish the construction in one season. As noted, this could result in an increased risk of accidents, which would require close coordination and monitoring by Ecology's construction inspectors or their designee.

Public safety impacts on the public would be as described above in Section 12.4.2, *Dam Construction*. Construction impacts on public health and safety would be **less-than-significant**.

12.4.5 Alternative 2: Wide Spillway without Gates

Because this alternative requires the longest construction time of the action alternatives, workers would be exposed to accidents, potential exposure to wildfires, wildlife encounters, and factors associated with fatigue for a longer period of time, which would slightly increase risks to their health and safety. However, this increased risk is not likely to be substantial. Construction impacts on public health and safety would be **less-than-significant**. Public safety impacts on the public would be as described above in Section 12.4.2, *Dam Construction*.

12.4.6 Alternative 3: Narrow Spillway without Gates

Potential public safety risks are considered to be similar to those under Alternative 1. Construction impacts on public health and safety would be **less-than-significant**. Public safety impacts on the public would be as described above in Section 12.4.2, *Dam Construction*.

12.5 Operational Impacts

Operational impacts are those long-term impacts that would result from implementation of the project.

12.5.1 No Action Alternative

Under the No Action Alternative, no dam improvements would be undertaken. The dam would continue in its current condition until either the dam fails, or DSO determines that abatement of the dam is required. Potential risk to residents and infrastructure downstream of Eightmile Lake from dam failure would continue, and would be expected to worsen in the future, as the structure ages and flows into Eightmile Lake increase/become more variable associated with changing climate conditions. Ecology's DSO has characterized Eightmile Dam as a 1B Hazard Dam, which is defined as having an at-risk downstream population of 31–300 people. A catastrophic dam failure could have potentially life-threatening impacts on downstream residents, structures, wildlife, and vegetation.

The No Action Alternative presents the highest risk of dam failure of all alternatives, and does not meet the safety standards of Ecology's DSO. As such, the No Action Alternative has potentially **significant adverse impacts** on public safety. Potential dam failure at Eightmile Lake would be considered a **significant unavoidable adverse impact**. The No Action Alternative would not meet the project objectives as described in Chapter 1, Section 1.4.

12.5.2 **Alternative 1: Narrow Spillway with Gates**

The design of the new dam must follow DSO standards for safe construction and operation. This includes designing the dam to withstand a million-year storm (recurrence of once every one million years). As part of this process, DSO will review engineering design reports, and construction plans and specifications for the new dam to ensure consistency with applicable requirements. As described above under Construction, the dam permit application process requires approval of the construction plans and specifications, as well as a Construction Inspection Plan. The application also requires approval of a dam's Operation and Maintenance (O&M) Plan and Emergency Action Plan (EAP). An O&M Plan is required for all projects and is used to develop an O&M Manual following completion of the project. An EAP is required for those projects where a dam failure could pose a threat to life. Both plans must be approved before the project can be implemented.

The EAP would be updated and shared with Chelan County emergency management agencies responsible for developing community emergency response plans. The EAP will include inundation maps identifying high-water areas downstream of the dam in the event of a catastrophic structure failure. Chelan County would need to review the EAP and the inundation maps and update evacuation plans for areas downstream of the dam, to prepare in the event of a catastrophic failure of the structure.

The design, as well as proposed operation and maintenance of Alternative 1, will be approved by DSO prior to construction, and as such will comply with all applicable safety requirements and will be operated and maintained in accordance with current safety requirements. While no dam can be considered risk-free, it will substantially reduce the potential for a catastrophic dam failure. Alternative 1 would meet the project objective of complying with DSO regulations for a high hazard dam, and represents a considerable **benefit** to public safety.

12.5.3 **Alternative 2: Wide Spillway without Gates**

Operational impacts on public safety for Alternative 2 would be the same as those described for Alternative 1. Public safety would benefit from the restoration of the dam to be consistent with DSO design requirements. Alternative 2 would meet the project objective of complying with DSO regulations for a high hazard dam, and represents a considerable **benefit** to public safety.

12.5.4 **Alternative 3: Narrow Spillway without Gates**

Operational impacts on public safety for Alternative 3 would be the same as those discussed under Alternatives 1 and 2. Public safety would benefit from the restoration of the dam to be consistent with DSO design requirements. Alternative 3 would meet the project objective of complying with DSO regulations for a high hazard dam, and represents a considerable **benefit** to public safety.

12.6 Avoidance, Minimization, and Mitigation Measures

12.6.1 Construction

The following measures will be implemented to protect public safety during construction activities.

- All construction activities, including use of helicopters, construction equipment, blasting with explosives (if needed), worker safety protocols for working in remote areas, fire prevention protocols, and spill prevention measures will be in compliance with Ecology's DSO requirements, Washington L&I requirements, and general construction BMPs to promote worker and public safety.
- Construction will be monitored as required by Ecology and be conducted in accordance with the conditions of the Dam Safety Construction Permit.
- Preparation of and adherence to a Health and Safety Plan will minimize risks to construction workers.
- Construction workers would be trained for work in remote forested areas, and would be equipped with firefighting equipment, wildlife repellent, and other safety equipment as required by Ecology and L&I.
- Notice of construction will be posted at the trailhead, on the Forest Service website and at the office, [recreation.gov](https://www.recreation.gov), popular hiking websites, and other locations to ensure that the construction schedule is well publicized as far as possible in advance of construction.
- Blasting with explosives, if needed, will be publicized as far in advance as possible, at least 10 days in advance of the blasting. IPID and Ecology will coordinate with the Forest Service regarding recreation permit holders who may be restricted from accessing the Alpine Lakes Wilderness due to a potential temporary trail closure.

12.6.2 Operation

The following measures will be implemented to protect public safety during operation of the dam.

- IPID will prepare an O&M Plan to ensure that the dam is operated and maintained in accordance with all DSO requirements, which will reduce long-term risk from the facility.
- IPID's application for a dam permit will include an EAP, to be approved by Ecology with input from local emergency management officials, to outline required steps in the event of a failure. This plan is designed to reduce risks to downstream people and structures.

12.7 Significant Unavoidable Adverse Impacts

Risk to public safety is greatest associated with the No Action Alternative, which would result in Eightmile Dam remaining in its current condition and is considered by DSO to be a high hazard dam, exposing downstream residents and recreational users to a potentially catastrophic flood event if the dam fails. The potential failure of the dam, if it occurred, would be a **significant unavoidable adverse impact**.

Impacts resulting from Alternatives 1, 2, or 3 would not result in significant unavoidable adverse impacts on public safety. Implementation of any of the action alternatives would meet the project

objective of complying with DSO regulations for a high hazard dam, and represents a considerable **benefit** to public safety.

CHAPTER 13: HISTORIC AND CULTURAL RESOURCES

This chapter: (1) summarizes cultural resources regulations relevant to the Eightmile Dam Rebuild and Restoration Project, (2) describes the historic and cultural context of the project area, (3) describes existing cultural resources within the project area, (4) reports the results of cultural resources surveys conducted in previously unevaluated portions of the project area, and (5) evaluates potential operational and construction impacts on cultural resources for each of the project alternatives as presented in Chapter 2.

Key Findings for Cultural Resources

- A cultural resources assessment, including background research and field surveys for built environment and archaeological resources, has been conducted for portions of the Area of Potential Effects (APE) not previously subject to survey actions.
- No recorded archaeological sites potentially eligible for or listed in local, state, or federal registers are within or adjacent to the project area.
- One historic-aged built environment resource, Eightmile Lake Dam, is within the project area; the dam is recommended Not Eligible for listing in local, state, or federal registers due to its lack of critical integrity, resulting from multiple historic and modern period modifications that limit its ability to convey its association with past events, or clearly depict its original form, materials, or construction methods.
- One historic period archaeological site, FSR 7601-116, a circa 1970 double-track road prism, is within the project area and has been recommended as Not Eligible for listing in the National Register of Historic Places (NRHP).
- The area is known to have been heavily utilized by Indigenous people throughout the precontact, ethnographic, and modern periods. There are likely unrecorded archaeological sites and Traditional Cultural Properties in the study area.
- **Each of the action alternatives would result in no significant impacts** on known cultural resources.
- **The No Action Alternative would likely result in significant impacts** on cultural resources. If the dam were to fail, the resulting high-energy downstream flows would erode and scour the banks of Eightmile and Icicle creeks, which have a very high probability of containing precontact and historic period archaeological sites.
- The operation and maintenance of the facility is not likely to cause additional impacts on cultural resources due to the project being within previously disturbed areas, unlikely to contain unrecorded cultural resources.

For this analysis, a cultural resource is any district, site, building, structure, or object that has been listed in, has been determined to be eligible for listing in, or may be eligible for listing in the National Register of Historic Places (NRHP) and Washington Heritage Register (WHR). Cultural resources include archaeological isolates, sites, and districts; human remains and cemeteries; historic built environment resources; and traditional cultural properties (TCPs).

The project area contains two recorded cultural resources, the Eightmile Dam and FSR 7601-116. The historic dam does not appear to be individually eligible for listing on local, state, or national historic registers, but it may contribute to a potential historic district, which encompasses the historic

irrigation facilities within the Alpine Lakes Wilderness, the potential Alpine Lakes Irrigation Historic District (ALIHD). FSR 7601-116 is historic in age, having been built prior to 1970. Due to the road's current unmaintained condition, it has been recorded and evaluated as an archaeological site and has been recommended as being Not Eligible for listing in the NRHP. Full discussion of these resources will be provided in an accompanying Cultural Resources Assessment (Ostrander et al. 2023).

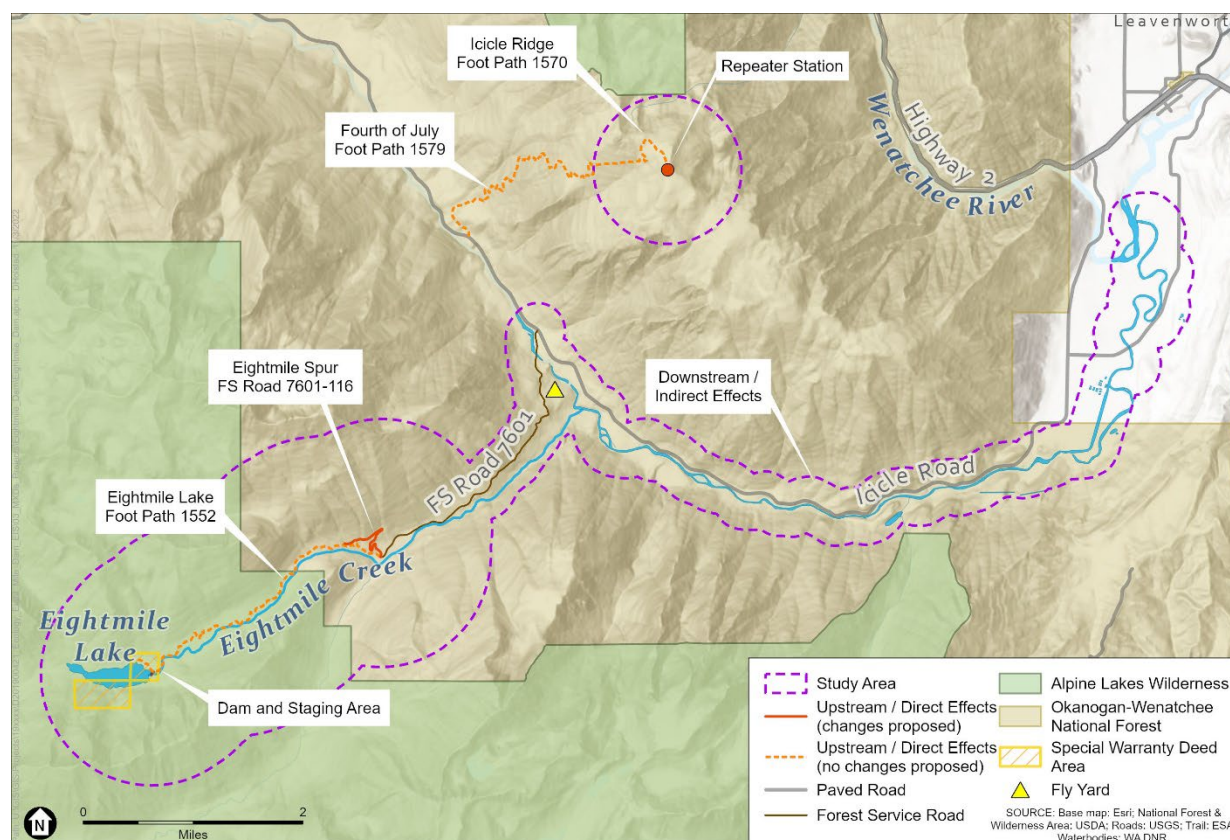
Information about existing policies and regulations is current as of the time of publication. The data on recorded cultural resources and their environmental setting were obtained from existing studies, database searches, historical maps, and historical registers. This chapter also describes current conditions and discusses Indigenous place names, and TCPs within the study area. Finally, this analysis acknowledges that tribes hold complete knowledge of their history. The following section has been prepared based on published materials by non-Native people from the 19th, 20th, and 21st centuries. These materials often do not present the full and accurate understanding of tribal history and knowledge. The authors acknowledge that these sources inherently contain deficiencies and use of them is not intended to substitute or supersede historic knowledge held within the tribes. A discussion of cultural resources significant to tribes is also presented in Chapter 14, *Tribal Resources*.

The project area is located within the Alpine Lakes Wilderness of the Okanogan-Wenatchee National Forest in Chelan County and includes Eightmile Lake and Eightmile Creek; it also includes Icicle Creek downstream to its confluence with the Wenatchee River in Leavenworth, Washington. The Alpine Lakes Wilderness is managed by the Forest Service. For this chapter, the **cultural resources study area** is based on the potential upstream (direct) and downstream (indirect) effects, as follows:

- **Upstream / Direct Effects:** Eightmile Lake perimeter, including the IPID dam; a short segment of FSR 7601-116, a segment of National Forest System Trail 1552 (Eightmile Lake Trail; non-motorized trail) between Eightmile Lake and FSR 7601-116, fly yard, the Icicle communications Repeater Station, National Forest System Trail 1579 (Fourth of July; non-motorized trail), and a segment of National Forest System Trail 1570 (Icicle Ridge; non-motorized trail).
- **Downstream / Indirect Effects:** FSR 7601, Eightmile Creek, and Icicle Creek to its confluence with the Wenatchee River.

The cultural resources study area is defined as a 1-mile buffer around the Upstream / Direct Effects area, and an approximate 0.25-mile buffer around the Downstream / Indirect Effects area, which extends from the dam structure down to where Icicle Creek reaches its confluence with the Wenatchee River, beginning 1-mile downstream of FSR 7601-116 (**Figure 13-1**). This narrower study area for Downstream / Indirect Effects was selected so that the discussion focuses on resources more directly associated within the drainages, rather than the wider landscape.

Figure 13-1. Cultural Resources Study Area for the Eightmile Dam Rebuild and Restoration Project.



13.1 Research Methodology

13.1.1 Existing Conditions

This section describes the methods used to analyze cultural resources within the cultural resources study area. A literature review and database search were conducted in December 2020 and May 2022 to identify existing and the potential for existing cultural resources and Indigenous place names, and TCPs within the study area. The Upstream / Direct Impacts area was initially partially surveyed during predesign work for this project (Anchor QEA 2018c). In October 2021, ESA completed an archaeological field surface survey along the FSR 7601-116 and repeater location (Ostrander et al. 2023); additionally, ESA documented the Eightmile Dam. An archaeological site form was completed for FSR 7601-116, and a Washington State Historic Property Inventory was completed for the Eightmile Dam (Ostrander et al. 2023).

Information about recorded and potential cultural resources and their environmental setting was obtained from existing studies, database searches, and relevant historic and archival resources. The following sources were reviewed:

- The Washington State Department of Archaeology and Historic Preservation (DAHP)'s *Washington Information System for Architectural and Archaeological Records Data* (WISAARD) for previously completed cultural resources studies and previously recorded archaeological, ethnographic, and historic resources located within the study area.

- Digital collections of Washington State Archives.
- Digital collections of University of Washington and Western Washington University archives.
- Icicle Irrigation District consultation and archives.
- Confederate Tribes and Bands of the Yakama Nation website.
- Yakama Nation Museum and Cultural Center website.
- The Confederated Tribes of the Colville Reservation website.
- Published ethnographic studies and historic contexts.
- Contributions of ethnographic information relevant to the APE provided by the Yakama Nation (YN 2022).
- Contributions of ethnographic information relevant to the APE provided by the Confederated Tribes of the Colville Reservation.
- Archives of the Okanogan-Wenatchee National Forest.
- Other relevant online resources and historic maps.

Impacts on known cultural resources were assessed according to criteria for assessing Eligibility for the NRHP according to Section 106 of the National Historic Preservation Act (Section 106). The field survey effort to identify and assess potential Historic Properties was conducted in previously unsurveyed portions of the Upstream/Direct Effects study area, specifically the proposed repeater location and helicopter landing area on Icicle Ridge near Fourth of July Creek, and along the proposed motorized access route utilizing the path of FSR 7601-116. Finally, a field visit was made to record the current conditions of the Eightmile Dam.

13.1.2 National Register of Historic Places

This report evaluates known resources under the criteria established by the National Historic Preservation Act (NHPA) to evaluate resources for their potential eligibility to be listed in the NRHP. For a property to qualify for the National Register, it must meet one of the NRHP criteria for evaluation by being associated with an important historic context and retaining historic integrity of those features necessary to convey its significance (NPS 1997).

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess critical integrity and meet at least one of the following criteria:

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

Historic Registers

Historic Registers are official listings of historically significant resources. The Washington State Historic Preservation Office (SHPO) reviews, processes, and maintains national and state register lists for Washington sites.

National Register of Historic Places (NRHP): Districts, sites, buildings, structures, and objects that have been identified and documented as being significant in American history, architecture, archaeology, engineering, or culture. These resources are found throughout the country and are at least 50 years old. Some exceptions are made for age and exceptional significance.

Washington Heritage Register (WHR): The same criteria as NRHP. This is an honorary designation, and sites that are listed on the NRHP are automatically added to the WHR.

Other historic registers include the Washington Heritage Barn Register and can include city and county listings. No local historic registers were identified for the Eightmile Dam Rebuild and Restoration Project.

If a resource is listed in or eligible for listing in a historic register, impacts on this resource from a project must be considered and potentially mitigated depending on project activities.

- B. That are associated with the lives of significant persons in or 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 history or prehistory.

Properties must also retain integrity. Integrity is the ability of a property to convey its significance. The seven aspects of integrity are: location, design, setting, materials, workmanship, feeling, and association. To be listed in the NRHP, a property must not only be shown to be significant under the National Register criteria, but it also must have integrity.

Historic Properties either retain integrity (that is, convey their significance) or they do not. To retain historic integrity, a property will always possess several, and usually most, of the aspects. The retention of specific aspects of integrity is paramount for a property to convey its significance. Determining which of these aspects are most important to a particular property requires knowing why, where, and when the property is significant. The evaluation of integrity is sometimes a subjective judgment, but it must always be grounded in an understanding of a property's physical features and how they relate to its significance.

13.1.3 Previous Cultural Resources Work for Eightmile Dam

A cultural resources assessment discipline report was prepared as a part of the Icicle Creek Water Resources Management Strategy PEIS in 2018 (Anchor QEA 2018c). This report related to multiple projects, one of which was repair and upgrade work for the Eightmile Dam. This project design and cultural resources assessment work was conducted in 2016, prior to flood damage and erosion at the dam caused by impacts of the 2017 Jack Creek Fire. During this work, an archeological surface survey was conducted along the accessible margins of Eightmile Lake and along the path of Eightmile Lake Trail. During this effort, Eightmile Dam was documented and recorded as an archaeological site and recommended as potentially Eligible for the NRHP as an individual listing, and as a contributing element of a potentially NRHP-eligible historic district, the Alpine Lakes Irrigation Historic District (ALIHD). The potential ALIHD was defined as including four irrigation water release systems within the Alpine Lakes Wilderness, these are located at Square Lake, Klonauqua Lake, Eightmile Lake, and Colchuck Lake.

At that time, Eightmile Dam was recorded on an archaeological site form; however, the site form was never filed with DAHP, likely as a result of the Eightmile Dam not being in ruins, but rather still functioning as a piece of historic-aged built environment infrastructure; in this state, it would be more accurately recorded as a built environment resource, rather than archaeological site. The four resources of the potential ALIHD were recommended Eligible for NRHP individually and as a district under the following criteria (Anchor QEA 2018c: 39):

- Criterion A for their association with historically significant and controversial water management in Chelan County.
- Criterion B for the unique style influenced by the extremely difficult terrain and constraints of mid-century construction methods.
- Criterion D for the potential to yield data about early 20th century engineering and construction.

No record of this determination being reviewed by DAHP has been identified during the research effort. Additionally, the recommendation under Criterion B appears to be in error. Criterion B relates to association with important persons. The text of the nomination under Criterion B in the assessment appears to more accurately describe Criterion C, which relates to association with

significant materials, feats of engineering, or design. For the purposes of discussion in this EIS, the assumption is that the use of Criterion B in the original report was in error.

It should also be noted that the 2017 Jack Creek Fire and the emergency repairs to Eightmile Dam following this event have resulted in the dam being critically altered from its condition during this initial recording in 2016.

13.1.4 Impacts Methodology

Information on recorded and identified archaeological sites, historic structures, cemeteries, and TCPs within the study area was identified and compared with information on the EIS alternatives to assess potential impacts on cultural resources. To identify the potential for impacts from flood inundation, a geographic information system (GIS) map of inundation levels under the alternatives and various flood scenarios was reviewed. Other discipline reports were reviewed to identify impacts on water rights, transportation, and dam safety as they relate to impacts on cultural resources. Impacts are possible if construction or operations would result in removal, disturbance, grading, burial, erosion, contamination, or other ground-disturbing effects; changes in setting; and temporary and/or permanent exposure to noise, dust, and vibration.

Identification of Construction Impacts

Thresholds for potential significant impacts on cultural resources were defined based on the criteria used to assess adverse impacts for cultural resources listed or eligible for listing in the NRHP and the WHR. Construction impacts on archaeological resources would be an irreversible and permanent impact as these resources are non-renewable and any impact on the depositional integrity (i.e., context) of a protected archaeological resource would be significant. In the State of Washington, protected archaeological resources include all precontact archaeological sites (regardless of NRHP eligibility status) and all historic sites determined eligible for listing in the NRHP. Impacts on historic resources could also be reversible or irreversible (permanent). For example, permanent impacts could occur during construction if construction activity results in structural damage to a historic resource.

Archaeological Resources

For this analysis, significant construction impacts on archaeological resources are defined as follows:

- **Significant:** Archaeological resources are non-renewable, and any impact on the depositional integrity (i.e., context) of a protected archaeological resource would be considered a significant long-term impact. Any ground disturbance or modifications to the ground surface that impacts a protected archaeological site would be significant. Depending on the archaeological resource, impacts could be mitigated through resource-specific measures (e.g., minimizing the amount of disturbance, avoidance, documentation, or data recovery).

Historic Built Environment Resources

This analysis considers the potential impacts on a historic resource's integrity. Integrity is the ability of a historic resource to convey its significance. Integrity consists of seven qualities (location, design, setting, materials, workmanship, feeling, and association). For this analysis, significant construction impacts on historic resources are defined as follows:

- **Significant:** Significant construction impacts are defined in this analysis as those that are irreversible and permanently diminish the ability for a historic resource to convey its significance. For an impact to be considered significant, it must result in a

decrease in the Historic Property's aspects of integrity that contribute to its ability to be listed on a register.

Identification of Operational Impacts

The project is expected to cause long-term (operational) impacts/changes/modifications to cultural resources as well as indirect impacts on cultural resources.

Archaeological Resources

For this analysis, the magnitude of long-term (operational) impacts on archaeological resources would be the same as described for construction.

Historic Built Environment Resources

For this analysis, long-term (operational) impacts on historic resources are considered significant as follows:

- **Significant:** Impacts are considered significant if they permanently diminish the integrity of a historic resource's essential physical features such that the resource is no longer able to convey its significance for which it is listed or potentially eligible for listing in a historic register.

13.2 Regulatory Context

Cultural resources within the study area are protected by several federal and state regulations, plans, and policies. Federal laws, regulations, and policies are presented in **Table 13-1**, and state laws, regulations, and policies are presented in **Table 13-2**.

Chelan County and the City of Leavenworth do not have formal Historic Preservation Programs. Preservation programs here are guided by federal and state laws and regulations.

Table 13-1. Federal Laws and Regulations Applicable in the Study Area

Regulation or Policy	Description
National Historic Preservation Act (NHPA) (Title 54 U.S.C.) Section 106 of the NHPA (36 CFR Part 800)	The NHPA was approved on October 15, 1966 for the management and preservation of historical and archaeological sites. Under this act, the NRHP, National Historic Landmarks List, State Historic Preservation Offices (SHPO), and Tribal Historic Preservation Offices (THPO) were created. Washington State's SHPO is the DAHP, which is the state agency that administers NHPA compliance in Washington. The procedures for implementing the NHPA are detailed in the Protection of Historic Places regulations. Section 106 of the NHPA requires federal agencies to consider the effects of project undertakings, project approvals, or project funding on historic properties. This process requires consultation with the relevant THPO, Native American tribes, and Native Hawaiian organizations.
Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. Chapter 32)	Enacted on November 16, 1990, NAGPRA establishes rights for lineal descendants, Native Americans and tribes, and Native Hawaiian organizations to repatriate their culturally affiliated items, including human remains, associated and unassociated funerary objects, sacred objects, and objects of cultural

Regulation or Policy	Description
	patrimony. NAGPRA includes provisions for unclaimed and culturally unidentifiable Native American cultural items and the intentional and inadvertent discovery of Native American cultural items on federal and tribal lands only.
Archaeological Resources Protection Act (ARPA) (16 U.S.C. Chapter 1B)	ARPA was enacted to strengthen the permitting procedures required for conducting archaeological fieldwork on federal and reservation lands. Includes ownership acknowledgement, preservation of objects and associated records in a “suitable” institution, and prohibits public disclosure.
Procedures for State, Tribal, and Local Government Historic Preservation Programs (36 CFR Part 61)	Federal regulation authorizing state and tribal historic preservation programs and certifies local governments to carry out the purpose of the NHPA. This is the basis for historic preservation programs and ordinances.

Table 13-2. State Regulations and Guidelines Applicable in the Study Area

Regulation or Policy	Description
State Environmental Policy Act (SEPA) (RCW 43.21C, WAC 197-11-330)	SEPA requires government decision-makers to consider the likely environmental consequences of a proposal and require mitigation measures.
Governor’s Executive Order 21-02	Washington State Governor’s Executive Order 21-02 (GEO 21-02, formerly GEO 05-05) requires agencies to consult, or delegate consultation to non-state recipients of state funds, with DAHP and affected tribes on the potential effects of projects on cultural resources proposed in state-funded construction or acquisition projects that will not undergo Section 106 review, including grant or pass-through funding that culminates in construction or land acquisitions, to determine potential effects to cultural resources. It requires that the state agency provide documentation of that consultation to DAHP.
Washington Heritage Register (Senate Bill 363; RCW 27.34.200, WAC 25-12)	Created March 19, 1971, Executive Session of the State of Washington Advisory Council on Historic Preservation and maintained by DAHP. Actions affecting resources listed on this register by any subdivision of state government or recipient of state funds must comply with SEPA and Executive Order 21-02.
Archaeological Sites and Resources (RCW 27.53)	Relates to the conservation, preservation, and protection of archaeological sites and resources.
Archaeological Site Public Disclosure Exemption (RCW 42.56.300)	Restricts the distribution of information about the location of archaeological sites to the public for the protection and preservation of those sites.
Human Remains (RCW 68.50)	Relates to the protection, management, and processes in the care of human remains.
Indian Graves and Records (RCW 27.44)	Relates to the protection, management, and processes in the care of Native American cemeteries, historic graves, and related records.

Regulation or Policy	Description
Abandoned and Historic Cemeteries and Historic Graves (RCW 68.60)	Relates to the preservation and protection of abandoned and historic cemeteries and graves including human remains.
Archaeological Excavation and Removal Permit (WAC 25-48)	Relates to the procedures of application for and review processes of archaeological excavations and removals; permits are issued by DAHP.

13.3 Affected Environment

This section presents a broad overview of the archaeological, cultural, and historic context of the cultural resources study area and existing resources. The cultural resources study area includes the Upstream / Direct Effects, Downstream / Indirect Effects and buffer as described on page 13-2 and shown in **Figure 13-1**. This context is organized into three subsections—archaeological, cultural, and historic—with additional focused subsections. It is primarily based on information published in 20th and 21st century ethnographic studies, histories, maps, and online resources. Information in the cultural section is organized into two subsections based on cultural groups and bodies of ethnographic information: *Cultural Context—Wenatchapam* and *Cultural Context—Wenatchi*. The cultural contexts have been developed from two distinct bodies of knowledge. The Wenatchapam context has been adapted from contextual information provided by the Yakama Nation and is based on knowledge held by the tribe about cultural use and practice within the study area (YN 2022). This knowledge has been shared to the extent necessary to provide context, but does not represent a complete history of the area. This knowledge shared by the tribe was on an as-needed basis.

The second subsection is derived from a literature review of published in 20th and 21st century ethnographic studies, histories, maps, and online resources, and is augmented by sources provided by the Confederated Tribes of the Colville Reservation. While the Confederated Tribes of the Colville Reservation have provided information to inform this section, it should not be taken as a statement by the tribe, but rather presenting a context based on publicly available literature that has then been commented on, reviewed, and supplemented by information held by the Confederated Tribes of the Colville Reservation.

The ethnographic record can vary in spelling and interpretations. The context provided below utilizes spelling from the tribes when known. Information shared by the Yakama Nation was also incorporated into the Wenatchi context.

Archaeological Context

The study area is within the upland mountains of the region referred to by archaeologists as the South-Central Plateau culture area (Ames et al. 1998; Chatters and Pokotylo 1998:73). The South-Central Plateau culture area encompasses the Mid-Columbia River basin from the Columbia River's confluence with the Yakima to Spokane rivers and includes the Yakima and Wenatchee River drainages. It is bounded on the west by the Cascade Mountains. Use of this region during the precontact-era can also be understood through traditional knowledge and cultural practices of the region's Indigenous people.

Archaeological understanding of the South-Central Plateau is primarily based on investigations of riverine sites east of the study area where more known sites exist. The chronology of the region is broken into four periods, based on these riverine sites but also informs the use of uplands. The chronological periods and characteristics were developed in previous research and span from

approximately 11,500 BC to 1720 AD (Ames et al. 1998; Ames and Marshall 1980; Boreson and Galm 1997; Chatters and Pokotylo 1998:78; Galm et al. 1981; Galm and Matsen 1985; Ray 1933; Schalk 1983). The upland mountain setting also suggests that the study area was used by Indigenous peoples on the west side of the Cascades. The Puget Sound region has been broken into five periods that are similar in characteristics to the Plateau but utilize a different chronology (Ames and Maschner 1999; Blukis Onat et al. 2001; Kidd 1964; Kopperl et al. 2016; Matson and Coupland 1995; Nelson 1990). These five periods span from approximately 14,000 calibrated years before present (BP) to 200 calibrated BP. Artifacts, features, and scientific dating provide guidance to associate a specific time period to an archaeological site. These can include a variety of lithic and bone tools such as projectile points, scrapers, flakes, hammerstones, antler wedges, needles, and bone awls. Ornamental items can include marine shell beads, soapstone pipe stems, and ochre. Processing, gathering, and food storage tools can include antler digging sticks, hopper mortar bases, weirs, and woven baskets. Seasonal and permanent campsite and village features can include evidence of pit houses, longhouses, hearths, and food storage buildings, among others.

Alpine lakes, such as Eightmile Lake, would have been attractive camp and gathering locations for both Plateau peoples as well as groups seasonally migrating between the Plateau and west side of the Cascades. The lake headwaters would have been important gathering locations for these two interconnected cultural groups. Data recovery excavations at the drainage for the Wenatchee River at Lake Wenatchee have recorded a dense material record, encountering artifacts indicative of both regions. While this excavation is approximately 20 miles north of Eightmile Lake, it provides material evidence of a long-interconnected history between cultural groups who have used seasonally available passes in the mountains to navigate a shared landscape. The known precontact-era sites within the study area have not been conclusively dated. However, known sites have produced artifact assemblages containing materials commonly associated with Plateau Period 1B sites (13,000 BP–9000/8400 BP), such as river mussel shell and hammerstones as well as side-notched projectile point types commonly associated with Period III (5900 BP–230 BP) sites. Based on the current understanding of settlement patterns in the South-Central Plateau, use of the study area would likely have been related to seasonal resource gathering and may contain associated base camps.

Cultural Context—Wenatchapam

This section has been adapted from a report prepared by the Yakama Nation and provided to Ecology on December 6, 2022 (YN 2022).

The study area is within the traditional territory of *Wenatchapam*, a signatory Band to the 1855 Treaty, and a multi-lingual group who likely used *Ichishkinsinwit* or Sahaptin as their first language. *Ichishkinsinwit* is of the land and rooted in the principles of the Creator's law *Nami Tamanwit*. This language originates from the air and water sounds created through the natural landscape and its features. This language is used in the longhouse to honor and bless the resources that sustained life. The language is interwoven into the cultural practices, the physical locations, as well as the overall understanding and connection to the land and communication with the Creator. The honoring of resources and blessings is a fundamental principle of the *Wenatchapam* people. The *Wenatchapam* people followed a practice known as, *Nami Tamanwit*, which was a practice and procedure that was distinct from that of tribes to the north and in particular those who resided in the greater Okanogan Valley and along the portions of the coastline (YN 2022).

The *Wenatchapam*, along with the *Entiatnapam*, *Chelanpam*, and *Methowpam*, are a part of the larger tribe known as the *Pisquouse*. *Pisquouse* is also shown in the ethnographic record as “Pisquouse” and “Pisquows” (Gibbs 1854; Hodge 1910:263, 932; Lahren 1998:488; Spier 1936:14). Hodge (1910: 932) notes Wenatchi as “probably a band of the Pisquows, formerly on the Wenatchee r.” and were located on both the Yaka[i]ma Reservation in 1850 and with the Colville in 1910; further Hodge translates Yaka[i]ma *winātshi* to “river issuing from a canyon.” Hodge (1910:

263) notes the *Pisquows* name may have been derived from the Yaka[i]ma word *pisko* meaning “bend in the river” and states the “Pisquows proper or remnant of them are now on the Yakama Reservation.” Ethnographers further connect the *Pisquouse* to the Yaka[i]ma through intermarriage (Gibbs 1854:412; Mooney 1896:736). The *Pisquouse* travelled great distances including, but not limited to, along the Fraser River in British Columbia (YN 2022:6). The *Wenatchapam* followed a seasonal subsistence pattern from the Columbia River to the crest of the Cascade Mountains (YN 2022).

The traditional territory of the *Wenatchapam* is within the Wenatchee River drainage where other tribes may maintain some level of use. However, the use they maintained was controlled traditionally and politically by the *Wenatchapam* leaders whom elected a representative to sign the Yakama Treaty of 1855 (YN 2022).

The *Pisquouse* were signatory to the Yakama Treaty of 1855 (12 Stat. 951) by way of *La-hoom* (*Pisquouse/Entiatnapam*) and *Tecolekun* (*Pisquouse/Wenatchapam*). *Tecolekun* was elected as a representative by leadership to represent the Wenatchee, Columbia, Entiat, and Chelan. He was also recognized in this capacity by both parties present at the Walla Walla council grounds¹(YN 2022).

Ichishkinsinwit provides further traditional description for *Wenatchapam* and *Pisquouse*. The sound *Wenatcha* reflects the turbulent water that flows through the mountain, the water, and air come through a canyon (*weh*), fall (*nah*), and crash on the rocks (*tchah*). The name is used both to identify the characteristics of the river, today known as the Wenatchee, itself or to identify the *Wenatchapam* fishery, which is also known as *Speliyis Wanawish* as part of the creation story to the fishery. The suffix *pam* refers to people from the place *Wenatcha*. Specifically, its meaning is further characterized by the people that are from the water (the giver of life) that flows into the river where the water comes through a canyon and crashes on the rocks. Therefore, the *Wenatchapam* are defined by name as those from the watershed of the Wenatchee River (YN 2022). The *Pisquouse* or *pítxkayús* is an *Ichishkinsinwit* name that means, “the people who go up into the mountains” (Oliver and Meninick 2022 as cited in YN 2022). Additionally, “*pítxkanus*” is associated with the mountains (Beavert and Hargus 2009 as cited in YN 2022).

The earliest known recorded use of the word *Wanatcha* was from the notes of the Lewis and Clark Expedition in October of 1805; maps also included the spelling *Wah na á chée* (Clark 1805). Tribal leaders, including the Great Chief *Cutsanim* who resided near the confluence of today’s Wenatchee River, provided the translation. *Cutsanim* or *paxat-sa-nim* relates to the five sacred figures known as part of the traditional oral story of the history of the *Shyikes* and *Wenatchapam* (YN 2022).

The *Wenatchapam* often intermarried with the *Pshwanwapam* who occupied the upper portions of the Yakima River watershed and the western shores of the Mid-Columbia. In particular, the gathering place known as *Teanaway* or *Teanawins* was a place where many *Pshwanwapam* and *Wanatchapam* found their significant others. This gathering place was hosted by the *Pshwanwapam* in their traditional territory. This relation is further described in oral history as it relates to the *Wáwpu* or goat people/hunters (YN 2022).

Researchers have presented this understanding, finding that the *Pisquouse* were heavily intermarried with the Yakama as discussed above (Mooney 1896:736; Gibbs 1854:412) to the extent it was observed they “have almost lost their nationality” (Gibbs 1854:412).

The traditional use area of the *Wenatchapam* extended into the Yakima River watershed on the relationship held by *Wenatchapam* and *Pshwanwapam* who often participated in traditional use and festival events in a way that overlaps. The *Wanatchapam* maintained close ties with the neighboring

¹ See *Yakima Tribe v. the United States* (Defendant). 1963. *Confederated Tribes of the Colville Reservation, et al* (Intervenor). (July 29, 1963). Before the Indian Claims Commission, Docket 161. In *Indian Claims Commission Decisions*. Vol. 12; Part A. Native American Rights Fund. Boulder CA.

Pshwanwapam through marriage and shared language (Ray 1936; Schuster 1998; Anasatsio 1972). The *Pshwanwapam* (often discussed as Yakama, Kittitas, or Upper Yakama) are the people who are from the water where the rocks fall into the river, the name and description referring to the Yakima River watershed, whose fishery was controlled and managed by the *Pshwanwapam* (YN 2022).

Traditional use or Usual and Accustomed places define a different understanding than traditional territory and span a much greater area. This distinction is important for intertribal use of an area; traditional territory refers to an area under a group's exclusive political control while traditional use area defines an area a group may have used as a guest (YN 2022). Ray (1936:21) states: "...Thus, the hunting territory of one group might be quite open to use by another even though the bounds be highly specific. This freedom of use was the rule among many of the Salish groups. But among the Yakima [sic], for example, outsiders were required to obtain formal permission from a chief before hunting grounds might be used and even then the length of time was definitely limited." Specific practices, ceremonies, and covenants were conducted before entering or using another tribe's land. In the case of the *Pshwanwapam* and *Wenatchapam*, they were bands of different tribes (YN 2022).

During the Yakama Wars in 1855, a Wenatchapam leader, *Sulktalthscosum* (Chief Moses), led a diverse group of followers, including some from well outside of the Wenatchapam traditional homelands (Northern Salish Tribes and Paiute). Chief Moses went against many of the established leaders at the time, and his style was considered nontraditional (YN 2022).

Chief Moses refused to recognize the Treaty with the Yakama in 1855 and petitioned the United States government for the establishment of a reservation. In 1879, the Columbia Reservation was established on his behalf (Miller 1998). Chief Moses later relinquished the Columbia Reservation and relocated to the Colville Reservation.

The Yakama Nation considers the project area to be within at least two separate TCPs, which the tribe has not been afforded the opportunity to document formally.

Cultural Context – Wenatchi

According to the Confederated Tribes of the Colville Reservation, the study area is within the traditional lands of the *šnpəšqʷáwšəxʷ* or Wenatchi (meaning "People in the between") (Bouchard et al. 1988:135-145; CTCR 2021a). Ethnographic records also list Wenatchi known as the Wenatchee / Wenatshapam / P'Squosa people, who according to Miller (1998) speak a Columbian *nxəʔamxcin* Interior Salish language; (Bouchard et al. 1988:135-145; CTCR 2021a; Kincade et al. 1998:51; Miller 1998:253; Spier 1936:14). The *šnpəšqʷáwšəxʷ* are considered part of the Middle Columbia River Salishan culture group, of which several distinct tribes of the Plateau Culture share similarities in subsistence patterns, structures, and other cultural practices (Miller 1998:253-270; Spier 1936). Descendants of the *šnpəšqʷáwšəxʷ* include but are not limited to members of today's federally recognized Confederated Tribes of the Colville Reservation and the Confederated Tribes and Bands of the Yakama Nation. Indigenous peoples of this region have been using the study area and its vicinity for various levels of habitation, resource gathering, travel, and other traditional cultural practices since time immemorial.

Villages associated with *šnpəšqʷáwšəxʷ* were located along Icicle Creek, the Wenatchee and middle Columbia rivers, along with other permanent and seasonal campsites ideal for resource gathering, hunting, and travel. The *šnpəšqʷáwšəxʷ* village located at the mouth of Icicle Creek, within the Downstream / Indirect Effects portion of the study area, was a large trade center and included a significant fishery known for its abundance of salmon. At the height of fishing season, thousands of *šnpəšqʷáwšəxʷ* and neighboring tribes would congregate here to share in its bounty (CTCR 2021a; Miller 1998; Ray 1936). Tribal members recall the description of Icicle Creek "running red" due to its plentiful salmon runs (Thompson 2002). This traditional fishery, also known as the Wenatshapam Fishery, or Wenatcha, or Spelyis Wanawish, as discussed above along with nearby rivers, tributaries,

valleys, and mountain ranges, continue to be important resources for subsistence, teachings, and practice of traditional cultural lifeways for area tribes. The Confederated Tribes of the Colville Reservation confirmed there are named places within the project area not available for public record (personal communication, Downes 2022). Additionally, along with the fishery, published documents identified the following named place within the Upstream / Direct Effects and Downstream /Indirect Effects study areas: *Na'sik-elt* is a named used for what is known today as Icicle Creek; the original word means "narrow bottom canyon, or gorge" (Sylvester 1943, as cited in personal communication, Downes 2022). Ethnographic records can include information that may have been misinterpreted or imprecisely documented when initially recorded. It is possible that the locations known today as, Eightmile Lake and Eightmile Creek, along with surrounding geographical features, may have associated place names. The Wenatchee River is named for the people that resided along its course. As discussed above, *Wenatcha* and "*Wah-na á chée*" were used in records from the Lewis and Clark Expedition in October of 1805. Additionally, Wenatchee in Yakama is "*winatshi*," meaning "river issuing from a canyon" (YN 2022). Archival resources indicate it was also known as "*Pisquouse*," "*Wenatshapan[m]*," and "*Wah-na-a-cha*" (Judge 1925:20). The villages of *sčəmə́w's* (meaning "narrow in the middle") and *šnp̓əšq'áwšəx'* were located at and near the present location of Leavenworth (Miller 1998:254 [no. 112]; Ray 1936:119, 142[no. 8]; Spier 1936:14 [no. 5]; Teit 1928). These names may refer to the same or related place, and additional unpublished named places may be present in the study area and its vicinity.

Tribes do not limit use or significance on the natural world. Animals, plants, geological, atmospheric, and astrological features play a role in traditional oral stories and cultural practices. Thousands of species have documented use. The traditional *šnp̓əšq'áwšəx'* diet is based on fishing, hunting, and gathering of roots, bulbs, and berries. Salmon is a dietary staple; traditionally, the First Salmon Ceremony includes several days of rites connected to the materials used to create the weirs, the river, the catch, and the processing of the salmon (Miller 1998). Other water resources include sturgeon, suckers, Pacific lamprey, trout, roe, and shellfish (Miller 1998). Seasonal camps would be set up in the mountains and foothills for hunting and gathering, with some families staying through the winter months (Miller 1998). Mountain goat, deer, elk, and other alpine game supplemented fishing resources throughout the year. Several species also hunted for use (but not for consumption) include but are not limited to coyote, mink, wolf, and land otter. A wide variety of plants serve many purposes in traditional practices; these include but are not limited to willow shoots, cedar roots, bast, tules, cattails, Oregon grape, birch, fir, cottonwood, pine, sagebrush, and hemp. One of the *šnp̓əšq'áwšəx'* traditional camas and root gathering places and campsites located within present-day Leavenworth has been recorded as a TCP (Leavenworth Camas Harvesting Area–45CH928). Important cultural plants for the Confederated Tribes of the Colville Reservation include but are not limited to: huckleberries, foamberry or soapberry, bitterroot, white camas, chuckluse or Canby's biscuitroot, Indian potatoes or lance-leaf spring-beauty, Indian carrots or yampah, cous-cous or Canby's lovage, black camas, Indian hemp or hemp dogbane, tule or hardstem bulrush, little white camas or northern biscuitroot, and Western sweet-cicely or sweet-root (CTCR 2022).

Mountain pass trails ran throughout the Cascade Mountains and allowed for trade and access among the interior tribes and those west of the mountain range (CTCR 2021b; Gibbs 1877:167). These trails were also used by non-Indigenous groups as settlement in the valley increased. Surveyor records from the late 19th and early 20th centuries show trails along Eightmile and Icicle creeks as well as leading from the Wenatchee River and dotting the Cascades (USGS 1904; U.S. Surveyor General 1892, 1907, 1913, 1917, 1924).

The 1855 Treaty of Yakama, held at Walla Walla, established the Yakama Reservation (Lahren 1998:488). In addition to establishing the Yakama Reservation, the Treaty, as ratified on April 15 1859 in article 10 specified, "*a tract of land not exceeding in quantity one township situated at the forks of the Pisquouse or Wenatshapan Fishery; which reservation was to be surveyed and marked out whenever the President may direct subject to the provisions and restrictions the same as other*

Indian reservations” (as quoted in Judge 1925: 20). In a 1910 letter to the Honorable Commission of Indian Affairs, Department of the Interior, Washington D.C. John Hermilt and Louis Judge, wrote to recognize the tract thus referred to in the treaty, “*would have been located below the forks of what are now the Wenatchee and Icicle Rivers, just at or below the present town of Leavenworth, and that treaty should have made it clear that this was for the Pisuouse of Wenatchee Indians*” (Hermilt and Judge 1910 as cited Judge 1925: 22).

Boundaries were never properly surveyed or recognized for the Wenatchi Reservation, and the šnpəšqʷáwšəxʷ were encouraged to relocate to the Moses-Columbia Reservation, created under executive order and later revoked (CTCR 2021a; Lahren 1998; Mass 1983; Thompson 2002). The study area is within the area that was to have been included in the reservation land for the šnpəšqʷáwšəxʷ located at the forks of the Wenatchee and Icicle rivers (Judge 1925:22; Miller 1998; WDFW 2017). Many šnpəšqʷáwšəxʷ remained on their land, applying for homesteads, but fees and taxes forced many to relocate to the Colville Reservation (CTCR 2021a; Thompson 2002).

According to the Confederated Tribes of the Colville Reservation, they have registered Icicle Creek (nsi'qəl 't) as a TCP from Johnny Creek to the confluence with the Wenatchee River (personal communication, Downes 2022).

Historic Context

Overview

Water, logging, and mining resources within the present-day central Cascades have played a key role in the development of its surrounding valleys. Evidence of these 19th century to early 20th century activities can still be found spread throughout the Okanogan-Wenatchee National Forest and neighboring national forests as identified in the archaeological and archival record (Bruce et al. 1994; Carter 1978; Valenta 2012). Roads created to provide access to these mining activities contribute to the boundaries of the current Alpine Lakes Wilderness (Lindholdt 2019). A small settlement was established at Icicle (current Leavenworth), and eventually platted in 1893. The town was later renamed for Charles Leavenworth, an investor who purchased several tracts of land along the proposed Great Northern Railroad route through the Wenatchee Valley (Arksey 2010). The late 19th century included several individual and small cooperative irrigation efforts that coincided with the completion of the Great Northern Railroad in 1892 (Bruce et al. 1994). Irrigation districts were formed to build, manage, and improve irrigation works. These districts became municipal corporations with the capacity to issue bonds via property and water rights, condemn right-of-way, and conduct levy assessments (Dorpat and McCoy 1998). Leavenworth was incorporated in 1906.

At the turn of the 20th century, state officials recognized a need for salmon hatcheries. Recreational and subsistence fishing and trapping activities had been depleting resources in the area. Recreational campsites were in place along Icicle Creek in the early 20th century, and at least 5,000 visitors traversed the Icicle Trail in 1916 (Bruce et al. 1994). By 1938, the Bureau of Reclamation sought to build a fish hatchery along Icicle Creek with storage facilities located at the high-altitude alpine lakes. The Leavenworth National Fish Hatchery (LNFH) and its residential complex were completed in 1941 and brought with it job opportunities for the community (Bruce et al. 1994; USFWS 1997).

Alpine Lakes Wilderness

Eightmile Lake is located within the Alpine Lakes Wilderness. Interest in a protected Alpine Wilderness by conservation groups in the 1950s and 1960s led to two proposed areas: the Alpine Lakes and the Enchantments. In the 1960s, the Forest Service was expanding its road system including along Icicle Creek (Icicle Road/Forest Service [FS]-76) (Marsh 2007; USGS 1966, 1967,

1977). According to historical maps and aerial imagery, FSR 7601-116 / Eightmile Spur Road was in place by at least 1975 (USFS 1962, 1966, 1969, 1975a, 1975b). In 1964, U.S. Congress passed the Wilderness Act, which established wilderness areas administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness. Trails leading to Eightmile Lake were in place by the 1960s (NETROnline 2021; USFS 1962; USGS 1967). Many early 20th century trails throughout the national forests were developed from the initial Indigenous, early settlement, and surveyor routes, with additional “trunk lines” created for fire patrols; shelters would be built along trails for workers (Bruce et al. 1994). Civilian Conservation Corps workers helped develop many of the existing trails within the central Cascades prior to World War II; a campsite at Eightmile Lake was in place by 1936 (Bruce et al. 1994). In July 1976, the Alpine Lakes Area Management Act created a 940,516-acre area in the Mt. Baker-Snoqualmie and Wenatchee National Forests (USFS 1979). The area included an Alpine Lakes Wilderness and Intended Wilderness lands and surrounding multi-use management lands (USFS 1979). U.S. Congress expanded the Alpine Lakes Wilderness by 22,000 acres in 2014 (Lindholdt 2019); the wilderness is approximately 414,322 acres. Eightmile Lake is within the Enchantment Permit Area (see Chapter 10, *Recreation*). Permit and reservation systems were established to help manage camping and trail overuse. The wilderness and intended wilderness have contributed to recreational, tourism, and economic development of the surrounding area.

Icicle Irrigation District/Eightmile Dam

The earliest cooperative irrigation companies in the Peshastin area began in the 1800s, with the Icicle Irrigation District (IID) and Peshastin Irrigation District (PID) formed in the early 1900s. Eightmile Dam was one of several water storage facilities constructed during the early part of the 20th century by the IID and PID. The IID and PID constructed their first dams at Colchuck Lake and Klonauqua Lake in the early 1920s, and the dams at Square Lake and Eightmile Lake later on. The USFWS constructed dams at Upper Snow Lake, Lower Snow Lake, and Nada Lake in the 1930s and early 1940s (Bundy 2016). The Icicle Irrigation Company (IIC) was established in 1910 to construct a series of irrigation canals to serve the agricultural needs of the surrounding community, with the Icicle Creek Canal completed in 1913. In 1918, the IID was formed, taking over management of the resources maintained by the former IIC (Spokesman-Review 1918). From 1915 into the 1930s, the IIC and later IID worked to modernize the system, removing most of the wood flume channels and replacing them with concrete cast-in-place structures (personal communication, Jantzer 2021). Construction of Eightmile Dam began in 1927 and was completed in 1929 (IID 1927a, 1929). Original design drawings detail a stone and cement mortar dam extending 35 feet deep to a concrete base, supporting a timber crib spillway and 36-inch concrete outlet pipe with a rock retaining wall in the creek channel (IID 1927b). Between the 1960s and 1970s, another series of extensive modernization projects were completed, upgrading the entire system, including replacing the original wood stave pipes. Prior to 1973, flooding resulted in 30 feet of the earthen embankment of the dam being washed away (IID 1973). During the 1990s, another large flood event resulted in runoff overtopping Eightmile Dam and washed away a 15-foot-wide portion of the earthen dam element (Polly 2018). In 2015, the outlet pipe partially collapsed as a result of deterioration of the original logs used to form the pipe. In 2018, necessary emergency repairs resulting from the 2017 Jack Creek Fire resulted in a large section of the earthen portion of the dam being removed and replaced, installation of riprap, replacement of the 13-foot-wide spillway with a 68-foot spillway to accommodate more runoff, and the removal and replacement of the original pipe and ditch (Polly 2018). A Washington State Historic Property Inventory (HPI) form, which further details the dam and its significance, has been completed by ESA for this EIS (Ostrander et al. 2023).

Existing Resources

A review of DAHP's WISAARD database identified multiple cultural resources studies completed within the study area; the majority of these have been conducted downstream of Eightmile Lake. These studies include descriptions of precontact and settlement land use of the study area and its vicinity. Surveyors have identified several cultural resources, including archaeological sites, historic-aged built environment resources, a cemetery, and a TCP.

Upstream / Direct Effects / Eightmile Dam and Lake

No historic register-listed built environment resources, cemeteries, or TCPs have been recorded or mapped in WISAARD within the study area (DAHP 2020, 2022). However, the Eightmile Dam is of historic age, and was recorded as an archaeological site during the preliminary assessment for this project as discussed above (Anchor QEA 2018c). The site was recommended individually Eligible, and to be part of a historic district comprising the historic-aged irrigation dams within the greater Alpine Lakes Wilderness. DAHP never reviewed the site assessment or site form, and as a result did not issue a Smithsonian trinomial (a three-part ID number given to recorded cultural resources) for Eightmile Dam, and no DAHP evaluation of the built environment resource or the eligibility recommendations from Anchor QEA (2018c) was conducted. As of the time of this EIS assessment, the resource has no existing records within the DAHP WISAARD database (DAHP 2020, 2022). For the purposes of this EIS, the dam is considered a built environment feature, not an archaeological site.

The full historic context of Eightmile Dam, its NRHP evaluation, integrity discussion, and accompanying HPI form are found in the Cultural Resources Assessment (Ostrander et al. 2023). ESA's evaluations found that the 2017 Jack Creek Fire and subsequent rebuild and modification to the dam resulted in a critical loss of integrity based on changes to the dam's form, design, and materials compared to the condition in which the dam was originally recorded.

Eightmile Dam no longer retains sufficient integrity to reflect its association with Criterion C or D, due to the significant modifications described above as part of the 2018 dam repair project, but does appear to retain sufficient integrity to reflect its associations with water management in Chelan County (Criterion A). As such, it would be considered a contributing element to the potentially NRHP-eligible ALIHD. For a property to be eligible for listing in the NRHP, it must be significant under at least one of the criteria and possess integrity. The dam is recommended Not Eligible for individual listing in the NRHP under any criteria and does not retain sufficient integrity to convey its potential significance as an individual resource. As a contributor to the ALIHD, Eightmile Dam does appear to retain sufficient integrity to reflect its associations with water management in Chelan County (Criterion A), and as such would be considered Eligible under the National Register as a contributor to the potential ALIHD. Under this listing status, continued maintenance and operation of the dam as an active irrigation property is critical to maintaining its integrity of association with irrigation activities in the local region.

Cultural Resources Surveys

One cultural resources survey, consisting of an archaeological surface survey along the existing Eightmile Lake Trail and of Eightmile Lake itself, was conducted in 2016. The survey identified the Eightmile Dam as being potentially Eligible for listing in the NRHP (Anchor QEA 2018c). A cultural resources survey was previously conducted by the Forest Service that covers the area containing the helicopter fly yard (Fink 1996a). No cultural resources were observed during this identification effort. Additionally, a cultural resources survey of the proposed road improvement along FSR 7601-116, and at the proposed repeater location and its associated non-motorized access route along the existing Fourth of July Creek Trail #1579 and Icicle Ridge Trail #1570, was conducted by ESA

(Ostrander et al. 2023) as a part of this EIS assessment. A full description of that effort is included in Ostrander et al. (2023).

Archaeological Sites

At the onset of this effort, a single archaeological site, a small A-frame timber cabin associated with fur trappers circa 1920s–1950s, has been recorded and mapped in WISAARD in the study area (DAHP 2022). This site was destroyed by wildfire in 1994 (Fink 1996b). ESA recorded an additional archaeological site during the archaeological survey for this EIS (Ostrander et al. 2023). The site, the circa 1970 road prism of FSR 7601-116, consists of the double-track engineered road prism along the approximately 1-mile portion of the roadway that is proposed for modification as part of this project. No other features besides the engineered prism were identified during the survey.

Historic Register-Listed Built Environment Resources

No historic register-listed built environment resources have been recorded and mapped in WISAARD within the study area (DAHP 2022). As discussed above, Eightmile Dam itself was recorded as part of the preliminary cultural resources assessment for this project as an archaeology site, and the resource was recommended as potentially Eligible for listing on the NRHP by the surveyors (Anchor QEA 2018c). This recommendation was not reviewed and commented on by DAHP, and since this recording, Eightmile Dam has been damaged and subsequently rebuilt, resulting in a change in its overall historic integrity.

Historic-Aged Built Environment Resources

No built environment resources determined eligible for listing in or listed in the NRHP have been recorded and mapped within the study area (DAHP 2022). The Eightmile Dam was built ca. 1927 and has been recorded as part of the PEIS work.

Cemeteries

No cemeteries have been recorded and mapped in WISAARD within the Upstream/Direct Effects (Eightmile Dam and Lake) portion of the study area (DAHP 2022).

Traditional Cultural Properties

No TCPs have been recorded and mapped in WISAARD within the Upstream/Direct Effects (Eightmile Dam and Lake) portion of the study area (DAHP 2022). During comment review for this EIS, the Yakama Nation indicated that two or more TCPs overlap the project area.

Downstream / Indirect Effects / Icicle Creek

Cultural Resource Surveys

Twenty-three cultural resources surveys were identified within the Downstream / Indirect Effects portion of the study area (DAHP 2022). Fifteen of these identified no cultural resources. The remaining eight surveys identified at least one cultural resource. One survey, conducted in 1983, noted the traditional fishery located at the confluence of Icicle Creek and the Wenatchee River; the surveyors also documented the potential of a “major seasonal use campsite,” and an isolated precontact-period artifact was recorded in the vicinity of the Eightmile Creek Campground (Maas 1983). Surveys conducted in 2017 and 2018 on Icicle Creek recorded portions of the historic City of Leavenworth water system, including a water intake structure and screen house, built circa 1940s–1950s and a water control structure built ca. 1920–1960 (Lancaster 2017, 2018). A survey conducted in 1996 at the site of the LNFH recorded three debris scatters dating from the late 1800s

to 1940s (Speulda 1996). A survey conducted in 2018 at a potential pump site located northeast of the confluence of Icicle Creek and the Wenatchee River recorded a scatter of debris dating from the 1930s to 1960s (Taylor and Pierson 2018).

Archaeological Sites

Twelve archaeological sites have been recorded and mapped within the Downstream / Indirect Effects portion of the study area (DAHP 2022). Nine locations are precontact sites; of these, one site has been determined Eligible for listing in the NRHP. This determined Eligible site was identified during survey work in 2018 and consists of a lithic artifact scatter, fire-modified rock (FMR), charcoal fragments, shell, and a projectile point near the confluence of Icicle Creek and the Wenatchee River (Tarman 2018a). The remaining precontact sites include one lithic scatter, two lithic isolate sites, two rock shelter sites with lithic scatters, one rock art site, and two cultural modified peeled cedar trees that contain a total of five trees whose bark was harvested for basketry and other uses (Baugh et al. 1995; Christensen et al. 1995; Duncan and Fink 1997; Krauthoefer and Steinmetz 1995, Query et al. 1995a, 1995b; Steinmetz et al. 1995a, 1995b). These sites are either not eligible for listing in the NRHP (isolate sites) or have not yet been evaluated for listing in the NRHP by DAHP (DAHP 2022). Some of the precontact sites contain lithic artifacts that have been disturbed by modern camping activity. The precontact-period archaeological sites do not have known chronological context.

Previously recorded historic-era archaeological resources are comprised of three sites. Two are related to historic-era water structures. The sites both date from the early to mid-1900s, and have been determined Not Eligible for inclusion in the NRHP (Lancaster 2017; Tarman 2018b). The third site is an historic debris scatter dating to ca. 1900s to 1960s; this site has not yet been evaluated for listing in the NRHP by DAHP (DAHP 2022).

Historic Register-Listed Built Environment Resources

Two register-listed properties have been recorded and mapped in WISAARD within the Downstream/Indirect Effects portion of the study area (DAHP 2022).

The LNFH (45CH582/ DAHP Property ID 700015), located at 12790 Fish Hatchery Road, is listed in the NRHP and the WHR. The hatchery complex was built between 1939 and 1941, and occupies 158 acres on both banks of Icicle Creek south of the confluence of Icicle Creek and the Wenatchee River (Speulda 1997).

The Colokum Dairy Farm, located at 9024 E Leavenworth Road, is listed on the Washington Heritage Barn Register. The farmhouse, barn, milkhouse, and pasteurizing building were all built in about 1920, and were listed as being in good to fair condition in 2015. The farm has not yet been evaluated for listing in the NRHP by DAHP (DAHP Property ID 585743) (DAHP 2022).

Historic-aged Built Environment Resources

Five historic-aged built environment resources have been recorded and mapped in WISAARD within the Downstream/Indirect Effects portion of the study area (DAHP 2022). Four of these resources include public works features and an RV park and have been determined Not Eligible for listing in the NRHP by DAHP (DAHP Property IDs 716087, 716099, 716426, 716428) (DAHP 2020). The remaining resource (DAHP Property ID 85445) is part of the Icicle Canal Company Irrigation System, and has not yet been evaluated for listing in the NRHP by DAHP (DAHP 2022). These resources were built between 1905 and 1969. Additionally, 22 resources have been assigned DAHP Property IDs and mapped in WISAARD within the study area. These resources have been minimally recorded based on available assessor data. No formal survey, evaluation, or determination is associated with these resources.

Cemeteries

One cemetery has been recorded and mapped in WISAARD within the Downstream/Indirect Effects portion of the study area. Mountain View Cemetery (45CH740) is a municipal cemetery of the City of Leavenworth. It occupies 7.4 acres, and is located at the intersection of Cemetery Road and Icicle Road. One of the earliest burials belongs to Tom Nolan and dates to 1907 (Find A Grave 2020). The City of Leavenworth dedicated the plat in 1957 (DAHP 2020). The cemetery is well-maintained and in current use, and currently contains more than 1,600 memorials (Find A Grave 2020).

Traditional Cultural Properties

No TCPs have been recorded and mapped in WISAARD within the Downstream/Indirect Effects portion of the study area (DAHP 2020). However, one TCP has been recorded and mapped in WISAARD in the general vicinity, approximately 1.5 miles north of the confluence of Icicle Creek and the Wenatchee River. During comment review of this EIS, the Confederated Tribes of the Colville Reservation indicated that a TCP has been recorded by them within the study area.

Summary

Table 13-3 provides a summary of the existing cultural resources, including resources recorded by ESA for this project and resources previously recorded. The table is separated into four columns for the Direct and Indirect project and study areas.

As discussed previously under *Cultural Context*, village sites were identified at Leavenworth and the confluence of Icicle Creek, and several place names and names associated with the people who have traditionally utilized this area. Additional unpublished locations may be present in the study area and its vicinity.

Table 13-3. Summary of Existing Cultural Resources recorded in WISAARD in the Study Area

Resource	Upstream / Direct Effects		Downstream / Indirect Effects	
	Project Area	Study Area	Project Area	Study Area
Cultural Resources Surveys	3	None	2*	21
Archaeological Site	1	1	1	11
Historic Register Listed Properties	None	None	1	1
Historic Properties	1	None	None	27
Cemeteries	None	None	None	1
Traditional Cultural Places	None	None	None	None**

*One survey project area overlaps Icicle Creek; typically, surveys were conducted on land either adjacent to within 0.25 mile of the creek. No surveys were identified near FSR 7601 or Eightmile Creek.

**Just beyond study area, one TCP recorded 1.5 miles north of the confluence of Icicle Creek and Wenatchee River.

13.3.1 Cultural Resources Survey

To identify and assess potential effects to cultural resources within the direct project area, ESA conducted a pedestrian cultural resources survey of the two portions of the direct project area that had not been previously surveyed for cultural resources: the proposed access route along FSR 7610-116, and the access route and repeater location on Icicle Ridge (see **Figure 13-1**). ESA also recorded the existing Eightmile Dam as a historic built environment resource on a Washington State HPI form (Ostrander et al. 2023). As part of the PEIS work, a surface archaeological survey was conducted

along the Eightmile Lake Trail and the accessible margins of Eightmile Lake, including the proposed footprint of construction for the dam alternatives and the associated staging areas (Anchor QEA 2018c). This work identified the presence of the historic Eightmile Dam; no other resources were recorded. The Forest Service has previously surveyed the location of the helicopter access fly yard for cultural resources; no built environment resources, archaeological sites, or TCPs were recorded as a result of that work (Fink 1996a).

ESA's cultural resources survey effort identified the presence of the historic built environment resource, the Eightmile Dam, and recorded FSR 7601-116 as a historic-period archaeological site. No other cultural resources were identified in the Upstream/Direct Effects portion of the study area. No survey work was conducted as a part of this EIS in the Downstream/Indirect Effects portion of the study area.

FSR 7601-116 is recommended as Not Eligible for listing in the NRHP due to its lack of association with important events, persons, design features, or use of materials, and it was found to be unable to provide new important information about history. The circa 1970 road alignment lacks associated features or materials, other than its road prism and alignment, that could provide additional sources of data about its construction or use.

13.4 Construction Impacts

Construction (short-term) impacts would be related to the specific footprint of disturbance required to allow access for materials, equipment, and work crews. For access routes, this is defined as the footprint of disturbance required to improve the existing FSR 7601-116, or temporarily reroute the non-motorized trails around the construction area. The footprint of disturbance necessary for staging areas or landing pads at the construction zone is also a construction impact. The final construction impact is the footprint of disturbance necessary for the demolition of the existing dam facility, installation of the Icicle Ridge repeater station, and the construction of the selected alternative.

The No Action Alternative would not have a construction phase, and as a result would not have any short-term construction related impacts on cultural resources. The impacts for Alternative 1 (Narrow Spillway with Automated Gates), Alternative 2 (Wide Spillway without Gates), and Alternative 3 (Narrow Spillway without Gates) would be similar, and the action-specific discussions below apply to all three action alternatives.

Construction Activities

The construction activities, including demolition of the existing facility, would result in the destruction of the existing Eightmile Dam. No features or elements of the current built environment structure, other than its location and course of the spillway, would be retained. While Eightmile Dam was recommended Not Eligible for individual listing in the NRHP, it is potentially Eligible as a contributor to a potential ALIHD under Criterion A (association with water management in Chelan County). Proposed construction activities under the action alternatives would result in the removal and destruction of the currently existing dam facility. However, it would be replaced with a facility that retains the critical integrity of location and setting. Alternations from the action alternatives would not impact Eightmile Dam's continued eligibility under Criterion A, as the dam would continue to function in its historic role, and its historic association with water management in Chelan County would be unaltered. As such, project impacts would result in no significant adverse impact on historic properties.

Helicopter Access

Helicopter access would not directly or indirectly impact any recorded cultural resources. The cultural resources survey for the PEIS was conducted along the banks of Eightmile Lake (Anchor QEA 2018c). That survey did not identify any high probability areas for encountering buried cultural resources, or make recommendations for additional survey work within the area surrounding the lake. The environment surrounding Eightmile Lake is predominantly comprised of active talus slopes and seasonal channels for melt drainage. This environment is primarily erosional, rather than depositional, and is not likely to contain intact buried cultural resources. This environment is where helicopter takeoff and landing would occur at Eightmile Lake, and as a result this action is not expected to have any impact on cultural resources. Flights would originate from an existing fly yard and not result in any alterations to the site. The fly yard location was previously surveyed for cultural resources, and none were identified (Fink 1996a).

Helicopters would also likely be used to transport required materials to the repeater location on Icicle Ridge. That portion of the project area was surveyed for cultural resources and none were identified (Ostrander et al. 2023). Use of the helicopters would be associated with a temporary increase in noise in the general area. Use of helicopters is expected to have no significant impacts on known and recorded cultural resources.

Overland Motorized Access

Overland motorized access is not expected to result in a direct or indirect impact on known eligible cultural resources. Unknown or unrecorded TCPs may exist within the project area. The motorized access haul route within FSR 7601-116 is a historic-period archeological site. However, the road is recommended Not Eligible for listing in the NRHP. Furthermore, its use as a conveyance is in line with historic practice in the area. The archaeological survey along the road found that previous work done in the historic period to construct the roadway has significantly reshaped the immediate area, and no other archaeological sites or historic-aged built environment resources are recorded within this portion of the study area.

Non-motorized Wilderness Access

The use of a non-motorized wilderness access path along the route of the existing Eightmile Lake Trail or to the repeater station would not result in direct or indirect impacts on any known cultural resources. The existing Eightmile Lake Trail was surveyed for cultural resources under the PEIS (Anchor QEA 2018c). That survey did not identify any high-probability areas for encountering buried cultural resources, or make recommendations for additional survey work along the existing trail. The trail to the repeater station would be used only seldomly to access the site, as installation and maintenance would be conducted via helicopter, and as a result would not result in direct or indirect impacts on any known cultural resources. As indicated on Figure 2-13 (Chapter 2), portions of the Eightmile Lake Trail near the dam would need to be temporarily rerouted during construction. Minor vegetation and topsoil removal may be needed in some areas for the temporary trail and would result in no direct or indirect impacts on any known cultural resources.

13.5 Operational Impacts

Operational (long-term) impacts are those effects that occur as a result of the selected alternative both within the area of Upstream/Direct Effect at and around Eightmile Lake, as well as the Downstream/Indirect Effect portion of the study area. Operational (long-term impacts) on cultural resources are considered fairly consistent for all of the action alternatives. The area of direct impacts

for the action alternatives contains a single archaeological site, which is recommended Not Eligible for listing on the NRHP: the historic FSR 7601-116; and a single potentially contributing built environment element (Eightmile Dam) of a potentially NRHP-eligible Historic District, the ALIHD.

The only significant impact possible as a result of long-term operation of the dam facility would be if the dam structure were to fail, and a high-energy flood inundation were sent down from Eightmile Lake into Eightmile and Icicle creeks. The event of dam failure would have significant impacts on the Downstream/Indirect Effects area of impacts. However, this failure is most likely to occur under the No Action Alternative, as the upgrades under the action alternatives greatly reduce the likelihood of this occurring.

Changes in lake level as a result of operation are not expected to impact cultural resources. No archaeological sites have been identified within or in close proximity to the lake margin. The environments at the edge of the lake are active talus slopes, bedrock exposures, or areas heavily disturbed as a result of construction or operation of the Eightmile Dam. None of these environments would be expected to be capable of burying and preserving archaeological materials.

No Action Alternative

The No Action Alternative may present a significant risk to cultural resources due to the risk of catastrophic dam failure, and resulting high-energy flooding along the Downstream/Indirect Effects portion of the study area. Catastrophic failure would likely result in a high-energy flood to flow down from Eightmile Lake into Eightmile and Icicle creeks. This flooding is a risk to recorded archaeological sites and built environment resources.

Overbank flooding also poses a risk to unrecorded archaeological sites along the waterway until Icicle Creek meets its confluence with the Wenatchee River. The near-bank environment that would be impacted by the high-energy flow in the event of a dam failure is considered very high probability for containing both precontact- and historic-period resources. The streambanks from Eightmile Lake down to Icicle Creek's confluence with the Wenatchee River have not yet been fully surveyed for cultural resources.

The portions of the Downstream/Indirect Effects portion of the study area contain both historic-period and precontact archaeological sites. One precontact campsite (45CH943) is listed on the NRHP (Tarman 2018a). Eight other precontact sites that have either been determined Not Eligible or are unevaluated for listing in the NRHP are within the Downstream/Indirect Effects study area. These sites are in close proximity to Eightmile and Icicle creeks, and each of these resources may be significantly impacted in the event of a catastrophic overbank flooding event. No recorded NRHP-eligible or listed historic period archaeological sites would be impacted.

One NRHP-listed built environment resource, the LNFH (45CH582), is within the Downstream/Indirect Effects portion of the study area and may be significantly impacted in the event of a catastrophic dam failure. The 158-acre complex, built between 1939 and 1941, is listed in the NRHP and WHR.

Overbank flooding from a catastrophic dam failure may also significantly impact historic-aged built environment resources that have not yet been evaluated for the NRHP. The Colokum Dairy Farm, approximately 0.35 mile east of the confluence of Icicle Creek and the Wenatchee River, is listed on the Washington Heritage Barn Register. The farmhouse, barn, milkhouse, and pasteurizing building were all built in about 1920, and were listed as being in good to fair condition in 2015. Additionally, a portion of the Icicle Creek Canal Company Irrigation System is within the Downstream/Indirect Effects portion of the study area.

Alternative 1: Narrow Spillway with Automated Gates

Alternative 1 is not expected to have long-term operational impacts on cultural resources. Because FSR 7601-116 is not considered Eligible to be listed in federal, state, or local historic registers, the modification and use of the historic-period road prism as part of the access infrastructure for the Eightmile Dam is not considered an impact. While the Eightmile Dam itself is potentially Eligible for listing in the NRHP as a contributor to the ALIHD, its operation in a modified form would not impact its ability to be listed in the NRHP. This is due to the dam's eligibility for the NRHP being based on its association with providing irrigation capacity to Chelan County. As such, its continued operation and use as an irrigation facility are integral to its register status. The operation of the facility would not impact any known cultural resources, and the threat to unrecorded cultural resources would be significantly lower than current conditions as the risk of failure from the dam structure and the resulting erosive flow would be mitigated. The primary risk from long-term operation would continue to be associated with erosion of streambanks due to water flow resulting in the exposure or destruction of buried archaeological materials.

Alternative 2: Wide Spillway without Gates

Alternative 2 is not expected to have long-term operational impacts on cultural resources. The impacts and analysis for this alternative are the same as Alternative 1.

Alternative 3: Narrow Spillway without Gates

Alternative 3 is not expected to have long-term operational impacts on cultural resources. The impacts and analysis for this alternative are the same as Alternative 1.

13.6 Avoidance, Minimization, and Mitigation Measures

The project would avoid and minimize impacts on cultural resources by focusing the project impacts from construction and operations within previously disturbed areas to the extent possible. The repeater location along Icicle Ridge already includes existing Forest Service facilities, and the IPID repeater would be co-located within the same area. Similarly, both the motorized and non-motorized access routes are along existing paths in the form of FSR 7601-116 and the Eightmile Lake Trail #1552. The temporarily relocated portions of trail adjacent to Eightmile Dam will be restored following construction, and access will return to the original trail. Finally, the construction and operations footprint for the action alternatives is largely within an area that has historically contained the existing Eightmile Dam and spoils from the original construction. The use of these previously disturbed areas to the greatest extent possible minimizes the risk the project will encounter currently unknown archaeological resources, or impact Native American traditional practices.

While the action alternatives will result in changes to the existing dam structure, those actions are recommended as not constituting an adverse effect, due to the dam's previous alternations and resulting loss of historic integrity. Still, the proposed changes will alter the facility further. To record the previous conditions of Eightmile Dam, a reconnaissance-level HPI form has been completed and provides documentation of the conditions and materials present circa 2020 (Ostrander et al. 2023).

While no impacts on cultural resources requiring mitigation have been identified, there is the potential that yet-unknown resources may be encountered during project construction. To mitigate for this possibility, the project would have a Cultural Resources Inadvertent Discovery Plan (IDP) in place during construction. The plan would be developed between the Section 106 consulting parties

and have procedures to follow in the event that potential cultural resources are identified during construction activities. Native American tribes would continue to be consulted during the design, development, and selection process and construction actions. This would be conducted through the Section 106 process, for which the Forest Service is functioning as Lead Agency.

13.7 Significant Unavoidable Adverse Impacts

There are no significant unavoidable impacts on known cultural resources. The No Action Alternative has the highest potential to cause significant impacts on known cultural resources, should the dam fail. The action alternatives would result in **no significant impacts** on cultural resources.