Black Canyon Hydroelectric Project
FERC Project No. P-14110
Aesthetic Resources Assessment
February 2014

Prepared for
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1 EXECUTIVE SUMMARY

The Aesthetic Resources Assessment ("Assessment") summarizes existing aesthetic resources in the area and evaluates these resources for potential conflicts with the proposed Black Canyon Hydroelectric Project ("Project"). Potential conflicts were identified and evaluated by selecting key observation points ("KOPs"), listed in the approved study plan and further supplemented during the summary of existing aesthetics resources. The KOPs and the Project were then assessed using an ArcGIS analysis and a photographic comparison of river flows in the North Fork Snoqualmie River ("North Fork").

The Assessment found that as a result of limited public access, current land management practices, complex topography, and alternative design decisions, the Project would have a relatively minor impact on the identified aesthetic resources. Project features are located predominantly on private lands and as a result relatively few people access the area. Property located near Project features contain locked gates and legal access requires the purchase of passes, unlike other easily accessible public natural areas nearby. Project features are not visible from the KOPs or these more heavily used public natural areas due to local topography. Current land management, namely heavy clear cutting may also act as a deterrent for viewers to visit the Project area, especially when popular aesthetic resources are already present in the area. Instream recreationists may briefly view the Project's intake structure in passing. Similarly, depending on North Fork flows and final Project design, instream recreationists may see the lower tunnel portal where the tailrace water would be returned to the North Fork. Additionally, Project operation would cause some alteration in the timing and volume of flow in the North Fork for the segment of river between the intake structure and tailrace exit location ("Project Reach"). However, for the limited number of viewers who could physically access the Project Reach, any alteration to river flow timing and volume would remain within the existing, natural range of flows.

As a result, the Assessment concludes by recommending that Project design consider: (1) placing the powerhouse and associated generating equipment underground; (2) locate the tailrace tunnel discharge on surface bedrock at the river's edge to minimize land clearing; (3) maintain a healthy vegetative shield between the North Fork and Project facilities; (4) minimize shoreline disturbance at the water intake structure; (5) follow best management practices in the design of facility lighting to minimize impacts to the natural lightscape; and (6) utilize and upgrade existing powerline corridors where feasible.

2 INTRODUCTION

Black Canyon Hydro, LLC, (BCH) ultimately plans to file an application for an original license for the Black Canyon Hydroelectric Project (Project), FERC Project Number P-14110, and associated facilities on the North Fork Snoqualmie River (North Fork), approximately 4-miles northeast of North Bend in King County, Washington. The Project has a proposed generating capacity of 25-megawatts (MW) and would be located predominantly on private lands. The combined maximum hydraulic capacity of the four project turbines would be 900 cubic feet per second (cfs). The run-of-river Project would divert water from an approximately 2.7-mile-section of the North Fork.

As required by the Integrated Licensing Process of FERC, BCH conducted several studies to evaluate a wide range of potential impacts associated with the Project. BCH will incorporate the information provided by these studies into ongoing Project design and operations planning. BCH conducted an environmental flows study within the segment of the North Fork that would be affected by the proposed Project. This portion of the river, which extends from approximately river mile (RM) 5.3 to RM 2.6, is referred to as the Project Reach. This document presents the study results as part of the overall program of studies evaluating how flow-dependent resources may be affected by the Project operations and informing how Project goals can be achieved.

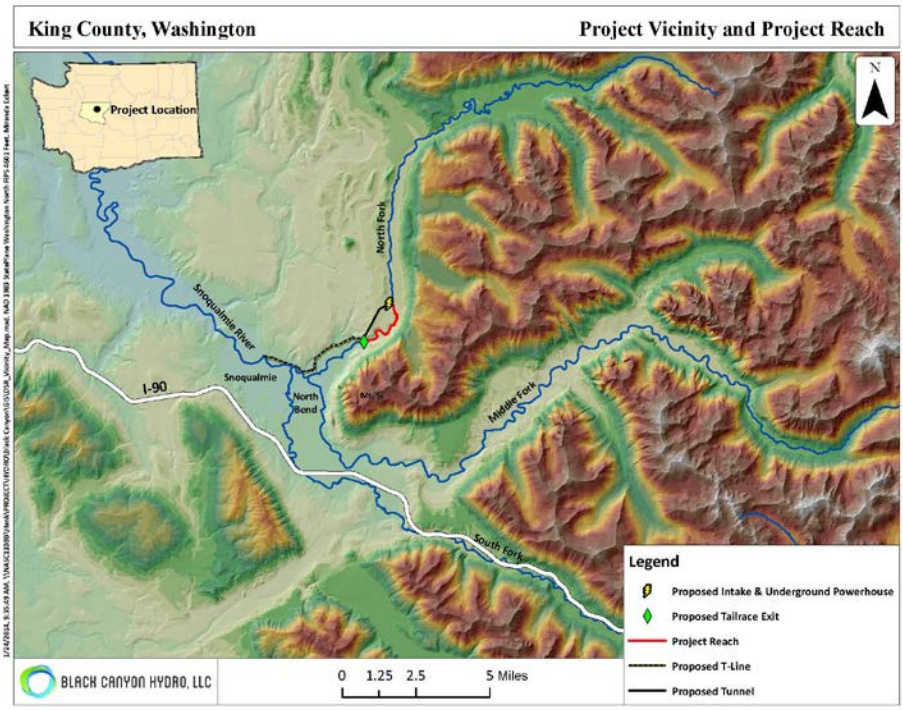

Figure 1. Project Vicinity and Project Reach

Intake

The following description of intake features reflects an evolution in Project design since the filing of the Pre-Application Document (PAD) through scoping, stakeholder comment, and study results. As a result of completing relevant studies, two possible design alternatives have been developed for the intake. These Alternatives are called Alternative C and D. Both alternatives involve bulk water screening located at approximately RM 5.3, on the same river bend and point-bar as Alternative A. Alternative C uses a vertical plate screening system, and Alternative D uses a horizontal plate screening system.

Both alternatives would have a (1) control sill to control the normal water surface elevation and maintain a consistent river bed elevation for a side channel bulk-water intake. The control sill would consist of a concrete weir with boulders inset on the surface over top of a sheet pile cutoff wall to capture hyporheic flow. The sill would be at the newly established grade of the river bed and would allow uninterrupted flow through a natural looking re-profiled river as a roughened channel series of step pools, riffles, and boulder weirs. (2) An intake structure with a coarse trashrack, jib crane, and radial gate with sluiceway located on the east bank of the river. Diverted water would be conveyed through; (3) an open channel to a; (4) head gate control structure and into a; (5) fish and debris screening structure. (6) Fish and debris would be screened and bypassed back into the river. Screened water would then flow through a power conduit to the underground powerhouse. (7) Access to the intake site would use an existing logging road and approximately 400 feet of new roadway extending to the intake site.

Powerhouse

The powerhouse location would be located underground beneath the selected intake site. This would include a (1) 450-feet tall, 30-foot diameter vertical shaft to allow space for the power penstock(s), elevator, stairs, ducting, mechanical, and electrical chases. Screened water from the intake screen system would be delivered down a (2) vertical power penstock(s) to the powerhouse. The powerhouse would (3) use four Pelton Turbines each rated at 6.25-MW, as well as appurtenant facilities. The (4) powerhouse substation and (5) elevator building would be located near the intake structure.

Tailrace

The tailrace will be an approximately (1) 8,600 foot long 12 foot diameter tunnel, and is anticipated to be constructed primarily in bedrock. The tailrace water return to the North

Fork would be located at approximately the same location as proposed in the PAD at approximately RM 2.6.

Transmission

Transmission would consist of a 34.5-kilovolt underground transmission line and overhead transmission that transmits project power to the regional grid. The transmission line would be sited predominantly on an existing power line corridor. The transmission line would originate at the powerhouse substation located at the intake site at river mile 5.3. Subsurface transmission would follow the vertical shaft to the underground powerhouse, and down the 1.6 mile long tunnel. After exiting the tunnel the transmission would travel underground 1.0 miles on new and existing roads then 4.2 miles as 34.5-kilovolt overhead transmission line predominantly following an existing power line corridor to the point of interconnection. The point of interconnection is located at an existing overhead transmission line near the intersection of 396th Drive SE and SE Reinig Road approximately 0.4 miles from the City of Snoqualmie. A new switch and substation would be added at the point of interconnection to transform voltage from 34.5-kilovolt to 115-kilovolt.

3 DESCRIPTION OF STUDY

The objectives of this Aesthetic Resources Assessment are to:

- Summarizes existing aesthetic resources in the vicinity of the Project;
- Identify key observation points that might be affected aesthetically by the Project's construction or operation;
- Evaluate the key observation points for potential conflicts with Project construction and operation;
- Where conflicts are identified, provide possible prevention, mitigation, and enhancement measures.

4 METHODS

4.1 Resource Summary

Aesthetic resources were defined as property, facilities, or natural features potentially in view of the Project from either private properties, natural areas accessible to the public, or other informal recreation sites.

Resources were identified through the FERC scoping process, during the revision of study plans, and from stakeholders. Many of these identifications were made from general comments not necessarily directed at this Assessment. For example, the

comment by the Washington Department of Natural Resources identifying the Mount Si Natural Resources Conservation Area as an important resource resulted in its inclusion as an aesthetic resource. Further desktop research was performed by BCH staff using online and print resources from both government and non-government organizations. Management plans, maps, internal studies, website descriptions, and other appropriate sources were reviewed.

4.2 Identification of Key Observation Points

BCH staff listed key observation points that had been identified by BCH staff during the FERC scoping process in the Proposed Aesthetic Resource Assessment Study Plan filed formally in September 2012. This allowed for stakeholders to suggest addition, removal, or adjustment of KOPs as necessary. KOPs were listed again in the Study Plan filed with the FERC in January 2013. No comments indicating that the proposed KOPs were inappropriate or insufficient were received. However, BCH staff did add an additional mid-canyon KOP, shown below as "Black Creek Tailrace" (the KOP is located at the tailrace of the existing hydropower project described above in the Introduction section).

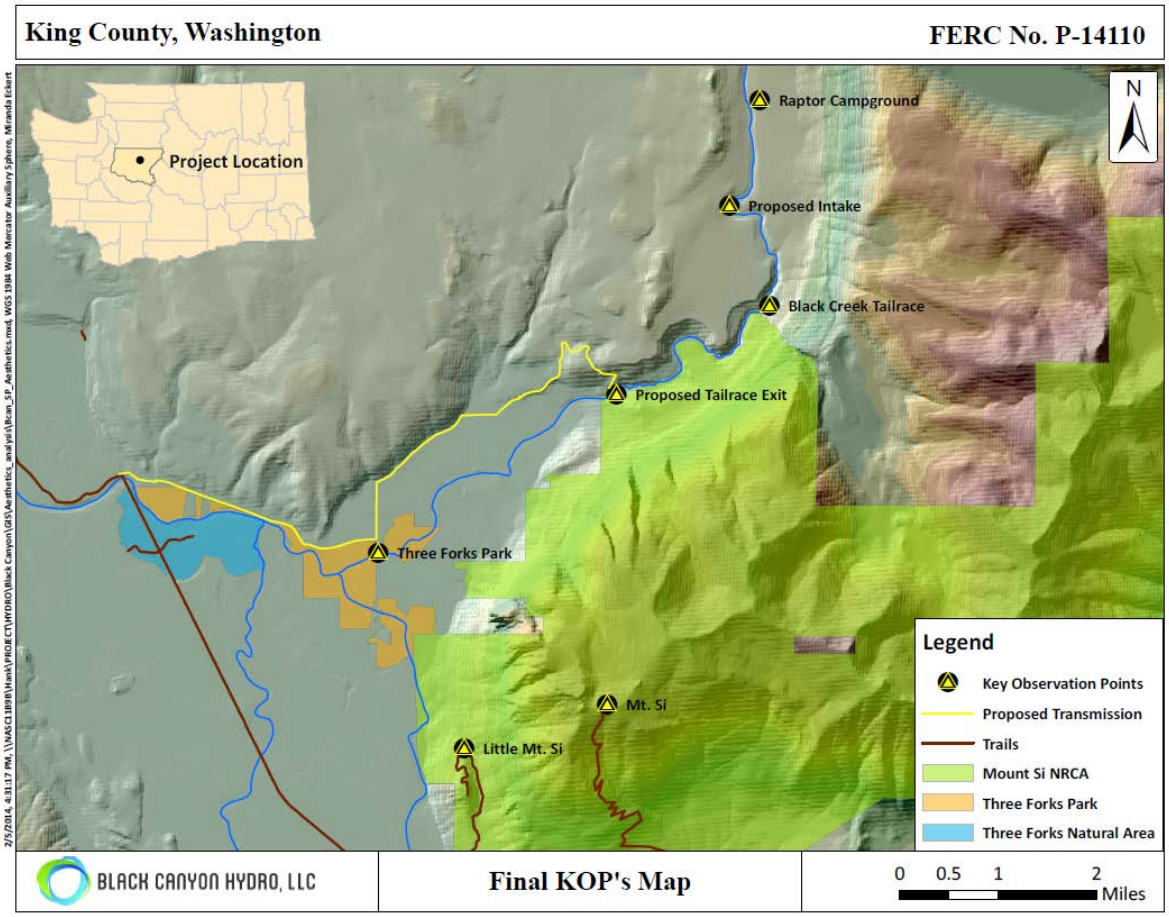

Figure 2. KOPs Map

4.3 Review Potential Conflicts

Potential conflicts were primarily identified by performing a spatial analysis of visibility using ArcGIS tools (See the Recreation Resources and Whitewater Boating Study Report for a description of how these flows were identified.). Secondarily, photographs were taken at two KOPs, the Project intake location and a mid-canyon location, at a range of flows relevant to potential instream recreationists. The completion of these two tasks allowed for an analysis of possible Project effects.

4.4 Identification of Possible Prevention, Mitigation and Enhancement Measures

If Project operation or construction was found to impact aesthetic resources, PM&E measures were identified. Strategies included avoidance, detour, and scale and timing minimization.

5 RESULTS

5.1 Resource Summary

The following aesthetic resources were documented:

5.1.1 Ernie's Grove

Ernie's Grove is a small unincorporated community located along the North Fork downstream of the Project.

5.1.2 Hancock Forest Management's Snoqualmie Forest

Snoqualmie Forest is generally located north of Snoqualmie and North Bend, east of Carnation and Duvall, south of Highway 2 and west of the Alpine Lakes Wilderness Area. The Snoqualmie Forest is owned by Hancock Forest Management (HFM) who manages approximately 90,000 acres as a commercial tree farm.

5.1.3 Mount Si Natural Resources Conservation Area

The Mount Si Natural Resources Conservation Area (Mt. Si NRCA) is located approximately thirty miles east of Seattle. Approximately 4,670 acres were acquired through the funding and transfer of lands from school trust land status to NRCA status. The Mt. Si NRCA was designated to protect numerous resources including outstanding geologic features, examples of old growth forest, wildflower communities, and wildlife habitat (Washington DNR 1997).

5.1.4 Three Forks Natural Area

The Three Forks Natural Area is 266 acres of open space west of the Mt. Si NRCA that is owned and managed by the King County Parks Division. It is situated at the confluence of the south fork, north fork and middle fork of the Snoqualmie River. It has views of Mount Si and is dominated by riverine, riparian, and wetland habitat. The area is a fragile ecosystem, but it can withstand low impact public use at specific locations (Combs-Bauer 1997). It is also a popular take-out location for whitewater boaters completing their run of the Black Canyon.

5.1.5 Mount Si Trail

The four mile hike begins at the Mount Si Natural Resources Conservation Area parking lot and climbs from about 700-feet to 3,700-feet. The Mount Si Trailhead is located 2.5-miles along the Mount Si Road at the major access point for the NRCA. The parking lot is designed to hold 160 cars, but more than 200 cars have been parked there (Combs-Bauer 1997). When the parking lot overflows, the trail is also very crowded and interaction between users is high. There are reports of over 400 people hiking the trail in a single afternoon. Visitors use the trailhead to picnic, wander through the 1/5-mile long barrier-free trail, hike to Snag Flat Interpretive Area or hike the 8-mile round-trip trail to the summit of Mount Si year around and in all weather.

The Washington Department of Natural Resources discourages scrambling and hiking on the "Haystack" (top of Mount Si):

> Although very hazardous, some people 'scramble' up the Haystack – a large rock outcrop that is the summit of Mount Si. King County Search and Rescue has been called a number of times to assist people injured and killed during a climb on the Haystack. There have been a number of deaths from falls. Rocks accidently dislodged by people on the Haystack are another serious safety concern (Combs-Bauer 1997).

Figure 3. Photograph from the "Haystack" looking north[1]

5.1.6 Little Mount Si Trail

The Little Mount Si trail is approximately 2.5 miles long and terminates at the top of Little Mount Si at 1,576-feet of elevation. Little Si is part of the Mount Si NRCA, managed by the Washington Department of Natural Resources. The trail is more popular in the winter when weather conditions discourage users from climbing the Mount Si trail. The trail is popular with families, children, rock climbers (located about one mile up the trail) and people hiking to the summit. Similar to Mount Si, Little Mount Si has views of the Upper Snoqualmie Valley.

5.1.7 HFM's Raptor Campground

Overnight camping is allowed by HFM in designated camping areas in the Snoqualmie Forest for those who purchase camping permits along with either a motorized or non-motorized access permit. HFM sells 200 camping permits for the camping season and camping permit holders may only camp in designated areas. One designated camping area, Raptor Campground, is located approximately ¾ of a mile from the Project's potential intake locations. The camp sites consist of crushed rock placed adjacent to a logging road to form approximately a half dozen level pads. These sites are located in the middle of clear cut timberland.

[1] "Traverse – Panorama from Mt. Si summit." n.d. *Panoramio: Google Maps*. Web. 11 Dec. 2013.

Figure 4. Campsites at Raptor Campground

5.1.8 "Waterline" Informal Trail

The City of Snoqualmie ("City") accesses the City's Canyon Spring's water supply via a trail. Canyon Springs is located on the north hillside bank of the North Fork, approximately 60-feet above the riverbed, located on 20 acres owned by the City. Access to the springs is by the "waterline" trail, which parallels the buried waterline from the springs to a disinfection building located on SE 70th Street at the end of Ernie's Grove. The first section of the waterline is maintained by the City and this maintained section is used by residents of Ernie's Grove mainly for walking with occasional bicycle use. The lack of parking, posted "No Trespassing" signs, and informal interviews with residents suggests only local use. This is an informal trail and users are trespassing.

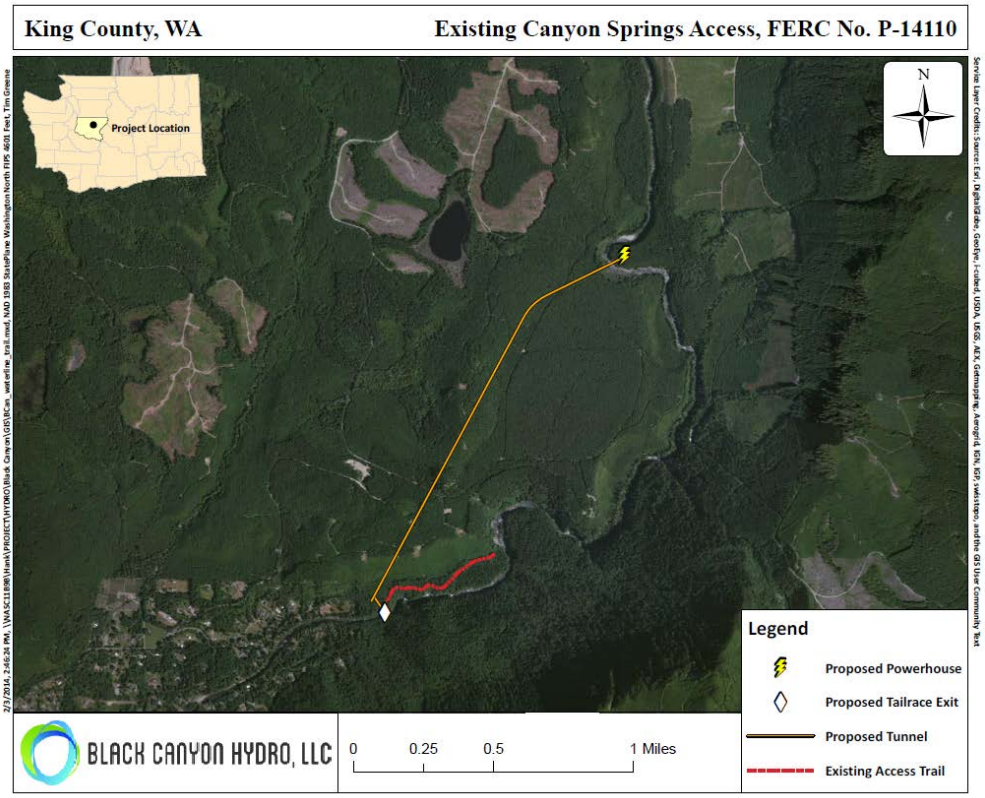

Figure 5. "Waterline" Informal Trail Map

Figure 6. Photograph of "Waterline" Informal Trail

5.2 Identification of Key Observation Points

As described under Methods, section 4.2, KOPs being evaluated in the Assessment include views from the top of the Mount Si and Little Mount Si Trails, campsites within HFM property to the northeast of the Project area, and a parking area near the Three Forks Natural Area. Other KOPs on the North Fork itself include the proposed intake, tailrace exit location, and from mid-Black Canyon.

5.3 Review Potential Conflicts

5.3.1 ArcGIS "Observer Points" Tool Spatial Analysis

After performing the Observer Points spatial analysis, with either the intake or tailrace locations selected as Observer Points, the output maps show visually all locations where those points (the primary Project features) are visible from. This analysis shows whether or not Project features are visible at the different selected KOPs and might create an aesthetic conflict. Notably, this analysis assumes bare ground without any tree or vegetation cover. This method showed the maximum potential visibility and overestimates the current and expected future viewable area. For example, the analysis of the tailrace location shows it being visible from a wide area, where from the ground it is only visible from a small area in its immediate vicinity.

Figure 7. Photograph of Preferred Alternative(s) Site

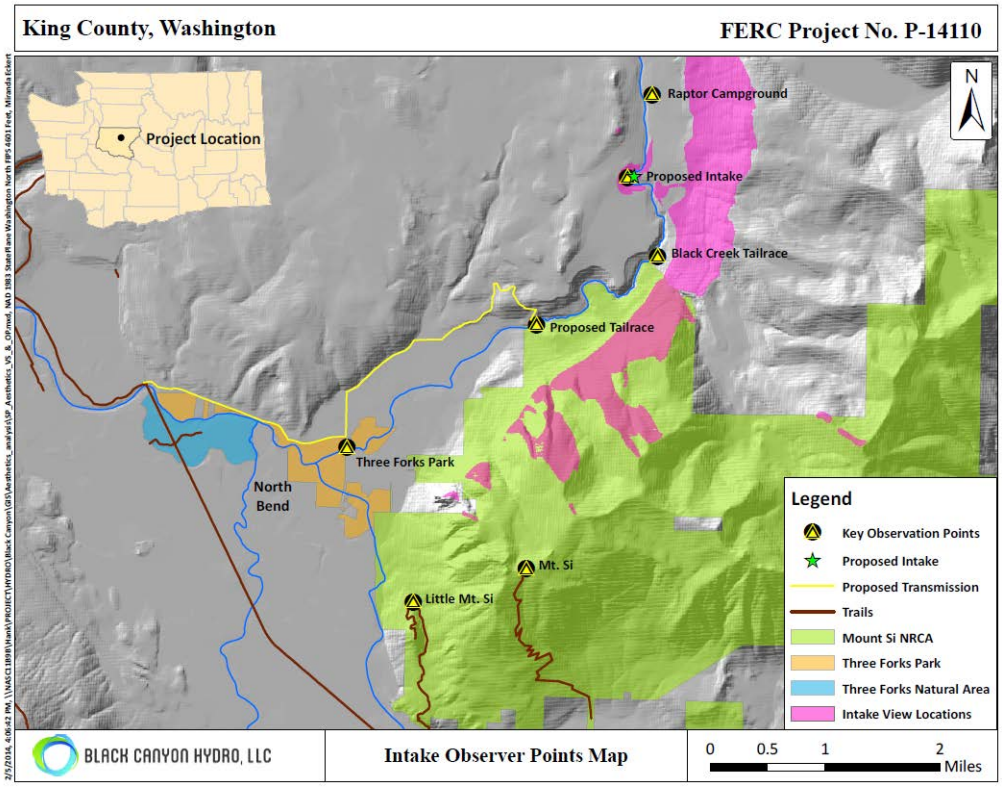

Figure 8. Intake Observer Points Map

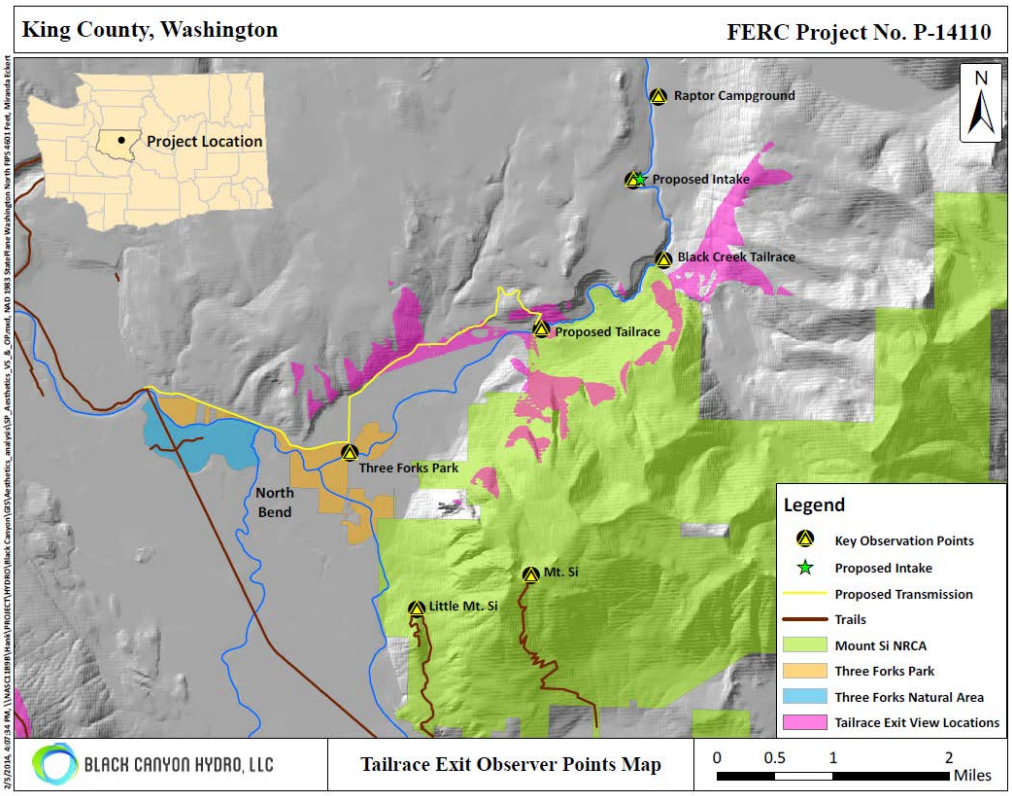

Figure 9. Tailrace Exit Observation Points Map

5.3.2 ArcGIS "Viewshed" Tool Analysis

A viewshed analysis used the remaining KOPs to show the maximum visual range of a person standing at any given KOP. As with the Observer Points tool, the viewshed analysis assumes bare ground. For example, this analysis showed the maximum visual extent any user could see if standing in Raptor Campground. As shown below in Figure 10, from Raptor Campground none of the Project features or other KOPs are visible.

Also, a viewer would not see Project features from either the Mount Si or Little Si trails. The Three Forks Park map shows the proposed tailrace as potentially being visible; however this is an error due to the tool's assumption that the earth is bare.

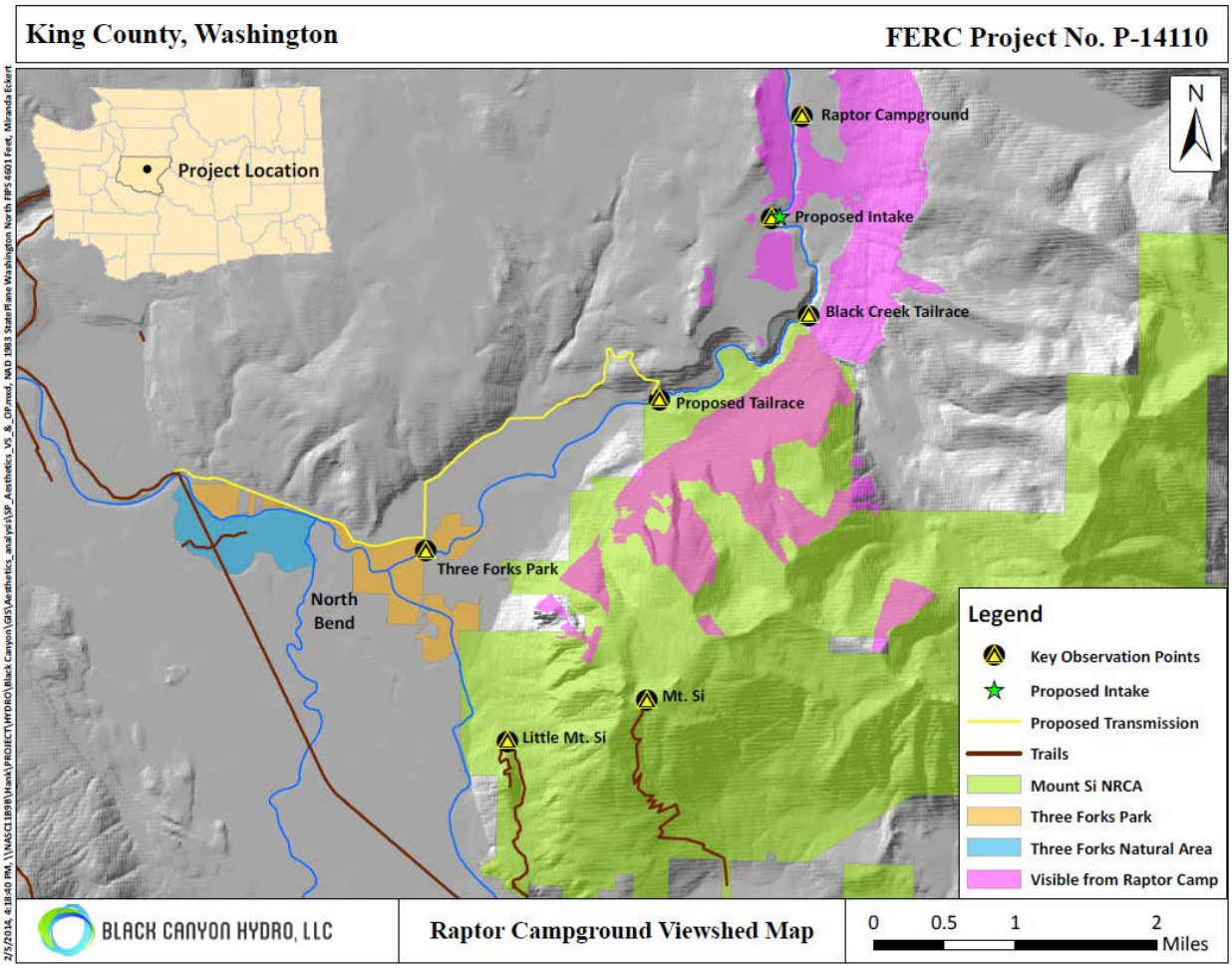

Figure 10. Raptor Campground Viewshed Map

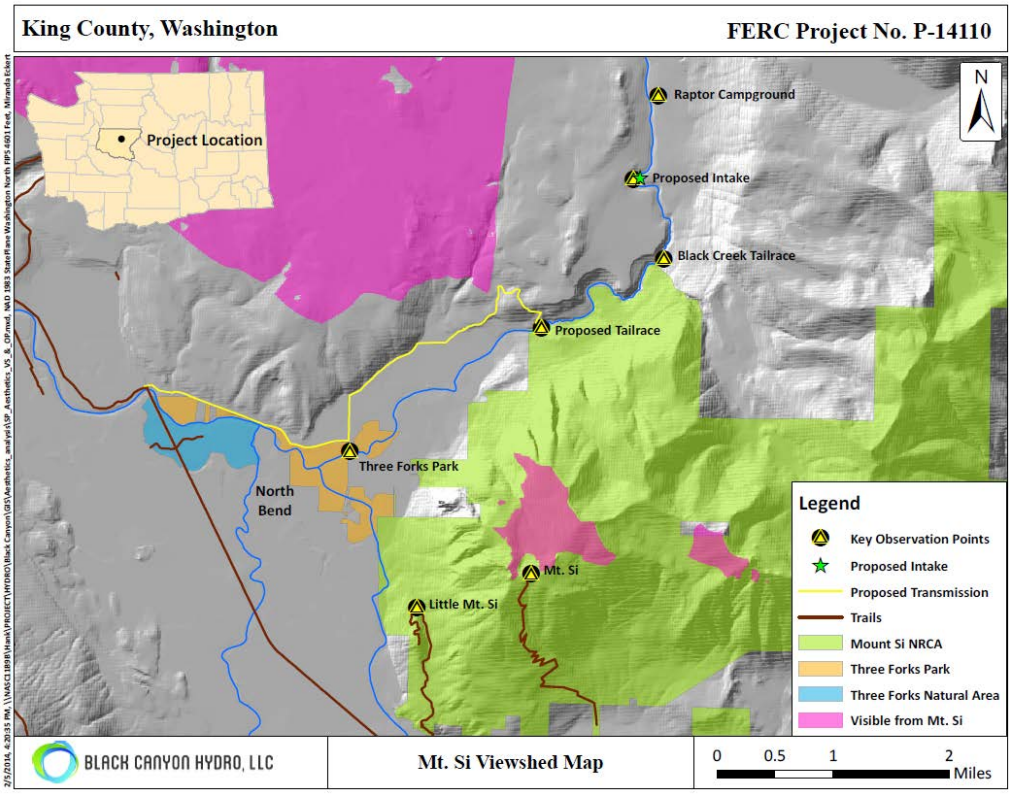

Figure 11. Mount Si Viewshed Map

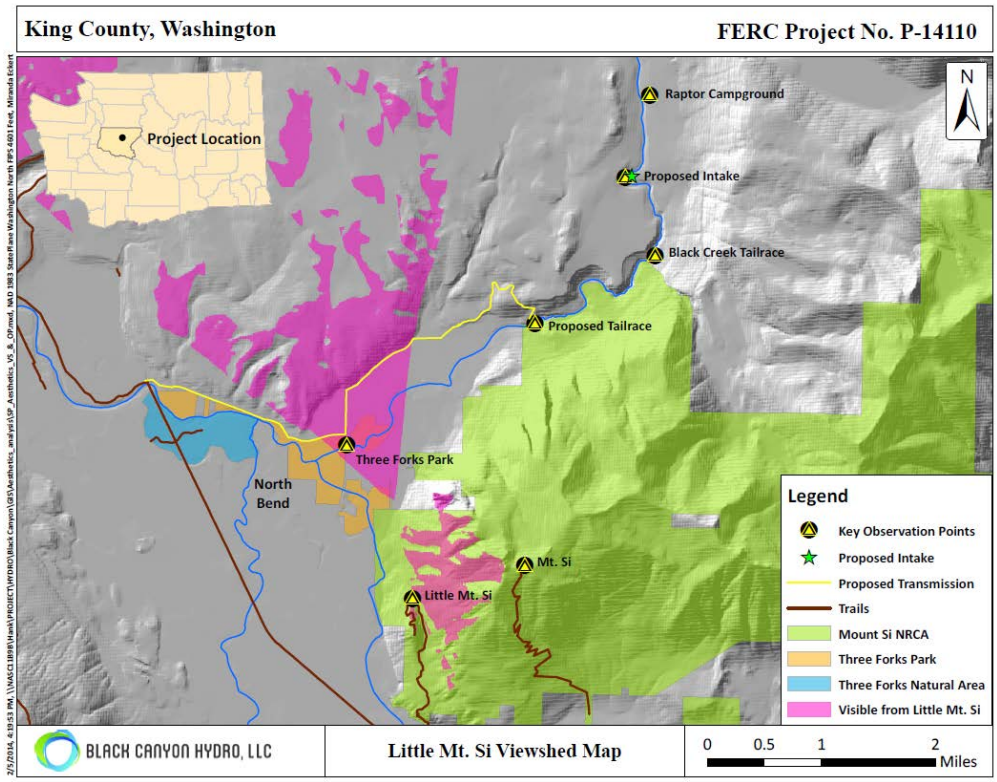

Figure 12. Little Mount Si Viewshed Map

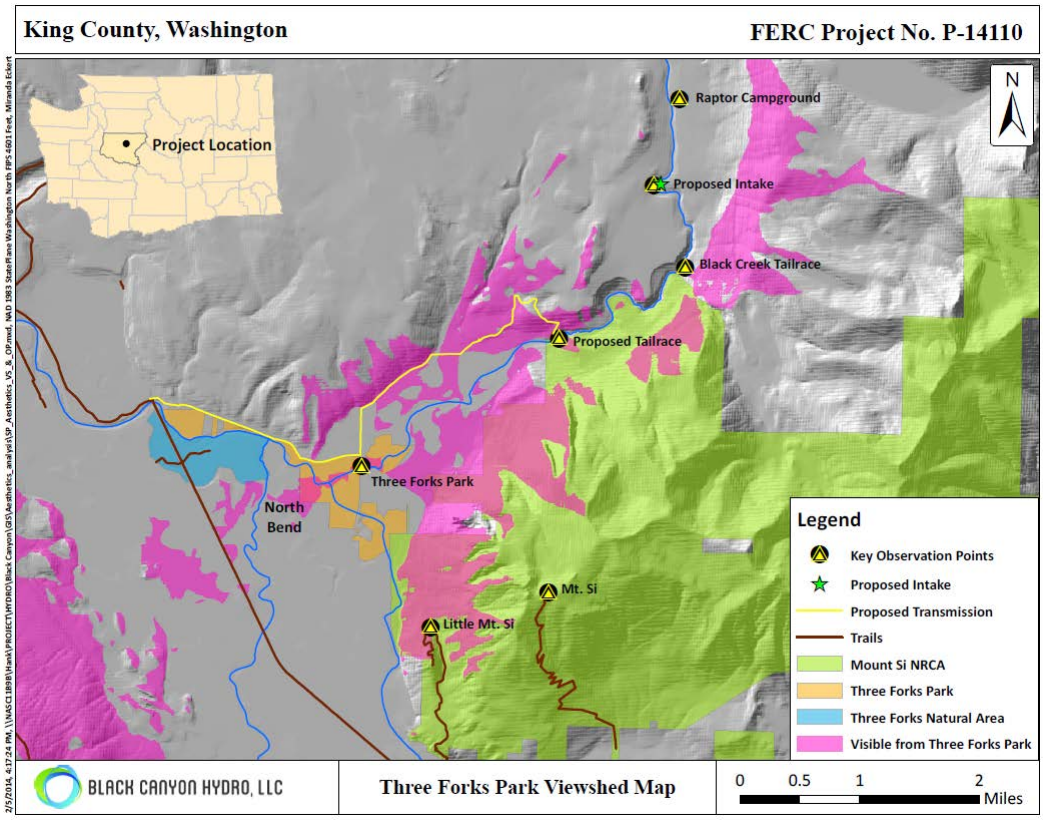

Figure 13. Three Forks Park Viewshed Map

5.3.3 Flow Comparison Photographs

To allow stakeholder evaluation of aesthetics of instream KOPs at different flows, photographs were taken at a range of different boatable and fishable flows as a means to assess aesthetics for instream recreationists. Additionally, the comparisons allow for stakeholders to generally evaluate the natural character of the North Fork (e.g., color and appearance of flowing, flatwater, and falls) and adjacent riparian areas.

A series of photographs were taken at both the intake and mid-canyon KOPs. Flows were photographed from the bank at a flow near the annual low, a "technical kayaking" flow, within the range of a "standard kayaking flow," and at a "big water kayaking" flow (See Recreation Resources and Whitewater Boating Study Report for discussion of flow types). Listed flows are described as measured at the USGS 12142000 gage located approximately 4.3 miles upstream of the proposed intake consistent with the recreation study discussion of flows. The time of day was recorded when photographed and flow estimates are based on the nearest 15-minute interval. This range of flows allows for an evaluation of how the natural character of the North Fork (and visibility of riparian areas fluctuates within existing and post-project flows.

Mid-Canyon Flow Comparison

Photographs were taken approximately 1.0 RM downstream from the intake location representative of a typical canyon river segment. It is also near the midpoint of a whitewater boating run through the canyon.

Figure 14. Mid-Canyon KOP at 46 cfs (9/29/2012)

Figure 15. Mid-Canyon KOP at 345 cfs (3/20/2011)

Figure 16. Mid-Canyon KOP at 670 cfs (7/6/2012)

Figure 17. Mid-Canyon KOP at 1,380 cfs (6/2/2012)

Intake Flow Comparison

The second flow comparison was made at a KOP on the east side of the North Fork immediately upstream of the proposed intake location. Photographs were taken from the perspective of a viewer on the shore or in the margins of the river.

Figure 18. Intake KOP at 101 cfs (7/25/2013)

Figure 19. Intake KOP at 388 cfs (10/6/2013)

Figure 20. Intake KOP at 585 cfs (5/2/2013)

Figure 21. Intake KOP at 1,380 cfs (6/21/2013)

5.3.4 Effects Analysis of Project Features

This section describes whether the landscape will change, as viewed from the KOPs, with the addition of specific project features.

5.3.4.1 Intake

The only KOP either preferred intake structure would be visible from is the Intake KOP where between 400 and 1,126 feet of shoreline would be interrupted. Unavoidably, users within the waterway might see a structure on the river bank when traveling along the river. However, the shape of the river, surrounding timberland, and topography would minimize this visual impact. Additionally, there will be some visual changes in the waterway at the intake location due to construction of a boulder weir extending across the river. However, the boulder weir will be capped with river rock to blend with existing conditions (see the Fish Passage Study Report for a detailed discussion of intake alternative design and a picture of a boulder weir).

Figure 22. Photograph of the Project intake and powerhouse location.

Temporary construction impacts would be ground disturbing activities (including temporary construction "laydown" areas).

During construction there would also be a temporary increase in vehicle traffic. However, this change would be temporary and visible to few people in an area where commercial logging occurs. Large vehicles traveling area roads are already a constant presence.

5.3.4.2 Powerhouse

A revision from earlier proposals by BCH is to locate the powerhouse and associated generating equipment in an underground powerhouse below the intake structure. This has been proposed to avoid and mitigate impacts on a number of resources, including aesthetics. As a result, the only surface additions would be a small structure at the top of the access shaft in the area already impacted by the intake structure and its associated facilities. An underground powerhouse would not be visible at any KOPs.

5.3.4.3 Tailrace

While the ArcGIS analysis indicated the tailrace could be visible from the Three Forks Natural Area, a field reconnaissance showed that the tailrace exit location would not be visible. The tailrace tunnel would be visible only from within the waterway. The tailrace tunnel discharge would likely only be visible to kayakers at most flows during the year. At low flows other users may be able to access the tailrace tunnel discharge location by traveling up the margins of the North Fork.

5.3.4.4 Transmission

Two possible transmission route alternatives have been identified. The first alternative, overbuilding 4.2-miles of an existing powerline would provide minimal changes over existing conditions (See Figures 23 and 24 for a comparison). Only 0.65 miles of new transmission would be required under this alternative and, depending on feasibility, consideration would be given to burying this short segment to remove new visual impacts on this area. This first route would be visible from several KOPs, but locating transmission within existing powerline corridors will mitigate aesthetic impacts.

The second transmission alternative would require approximately 1.2-miles of new transmission and would follow an existing logging road through clear cut timberlands near the intake structure before connecting to an existing buried transmission line to Snoqualmie Falls. Aesthetic impacts on KOPs would be minimal because this route would place any new transmission near the intake location which is obstructed from most KOPs. However, this route would likely travel through Raptor Campground.

Figure 23. Photograph of existing area transmission

Figure 24. Photograph of typical high voltage transmission line with distribution underbuild

5.3.4.5 Road Extensions

Road access to the Project intake and powerhouse site would utilize existing logging roads to get within approximately 375-feet of the site. A new gravel road would be constructed the remaining 375-feet to the site.

To access the lower tunnel portal and tailrace discharge site, approximately 2,510-feet of new gravel road would be constructed and 275-feet of improvements to existing roads would be completed. Construction of a new access road to the lower tunnel portal site would significantly reduce the use of existing roads through Ernie's Grove and mitigate aesthetic impacts on viewers in Ernie's Grove.

5.3.5 Natural Lightscape

Operation and construction of Project facilities would require the use of lighting at night. Inefficient and excessive night lighting causes significant loss of energy globally and creates light pollution. Light pollution can be defined as any modification of the natural light environment. In order to reduce energy loss and light pollution impacts, BCH staff would consult best management practices described in the Practical Guide for Lighting to Reduce Light Pollution and Save Energy (Practical Guide 2008) during construction planning, Project design, and in developing operating plans.

As a result, BCH staff would utilize the following general guidelines from the Practical Guide:

- Assess Lighting Requirements
- Direct Light Where It Is Needed
- Avoid Glare
- Plan Your Lighting System According to Pre-Defined Needs

5.3.6 Scenic Viewpoint Creation or Enhancement

No formal or informal scenic viewpoints have been identified in the immediate vicinity of the Project. The only viewpoints in the greater area are those at the Mount Si and Little Si trails and overlooking Snoqualmie Falls on the main stem of the Snoqualmie River. Poor access due to limited public property and difficult terrain may contribute to the absence of formal viewpoints within the Project area. The fact that there exist formal viewpoints in more attractive locations in the region may have also limited the creation of informal scenic viewpoints. As a result, BCH staff has not identified potential locations for scenic viewpoint creation or enhancement of existing viewpoints at this stage.

5.4 Identification of Potential Prevention, Mitigation, and Enhancement Measures

1. Initiate Best Management Practices (BMPs) during construction and operation to minimize impact on the Natural Lightscape (see Practical Guide for Lighting to Reduce Light Pollution and Save Energy, 2008).
2. Utilize plant vegetation to minimize view of Project facilities by instream users and any terrestrial visitors near the intake and powerhouse locations.
3. Consider the length of disturbed shoreline visible from the North Fork when choosing a final intake alternative for the Preliminary Licensing Proposal.
4. Move the location of the powerhouse away from Ernie's Grove and near the intake location where relatively few people visit.
5. Redesign the powerhouse from an aboveground structure to an underground structure (minimizing surface effects, noise, light, etc.).
6. As feasible, locate the Project transmission line within existing powerline corridors.

6 DISCUSSION

The Project will have a relatively minor impact on aesthetic resources due to limited resources, limited public access, current land management, and the area's difficult topography.

The intake structure and underground powerhouse have been located on private property that is managed for commercial timber production. Forestry practices have severely altered the landscape in this area (see Figure 22). The amount of land that would be disturbed is extremely minor relative to the high volume of land being actively altered and disturbed through logging. Also, the number of potential viewers at the intake and powerhouse site who might be impacted is minimal, as public access is limited by the number of permits sold by the property owner. Instream recreationists will briefly view the Project's intake structure and associated facilities while traveling through the river corridor. Minimization of shoreline disturbance will mitigate this impact as feasible. The small number of terrestrial viewers who do purchase permits and visit the minimal amount of property from where the intake is visible (see Recreation Resources and Whitewater Boating Study Report) would have their view of the site obstructed by the vegetation screens identified as a mitigation measure.

Potential aesthetic impacts of other Project features have been minimized or avoided as well. The tailrace exit is located in a canyon segment of the North Fork where steep slopes and cliffs prevent clear views. At most flows, when river margins are covered in

water, only boaters would be able to access this location. Viewers who do reach the tailrace exit would be limited to low flow periods when river margins can be safely travelled. The proposed transmission routes use existing powerline corridors for the majority of their route as a means to minimize new impacts.

Beyond the aesthetic impact of individual Project features at a localized, site level, the Assessment also identified aesthetic resources in the larger region that might have had their aesthetic qualities diminished by the appearance of Project features. However, from these KOPs, the Project is obstructed from view by area topography and ground cover. The only specific Project features viewable from any KOPs (Three Forks Natural Area, Mount Si and Little Mount Si trailheads) would be new overhead powerlines. However, this new transmission would be sited within existing transmission corridors traveling through an urban environment (the cities of North Bend and Snoqualmie) where this type of transmission is common. Also, the KOPs on Mount Si and Little Mount Si are a significant distance from the transmission corridor and at a much higher elevation. It is unlikely a viewer would be able to visually identify the difference between existing transmission and the proposed change (See Figures 23 and 24).

A run-of-river hydroelectric facility would unavoidably alter the timing of flow within the river segment between the water's diversions and return points. Specifically, this Project could divert up to 900 cfs from an approximately 2.7-mile long segment of the North Fork. The primary mitigating factor to this diversion is that the flow in the Project Reach would remain within the existing, natural flow range of the North Fork. The flows that would occur during Project operation already occur on a regular basis.

The Project Reach travels through a steep, forested canyon, with sheer vertical walls and cliffs for much of its distance. Visibility for terrestrial viewers who either trespass across private property or purchase access passes would be limited as the canyon and forest make it physically difficult to access locations where the Project Reach would be visible.

There is a one bank of a section of the Project Reach that does have public property adjacent to it. The Mount Si NRCA is adjacent to approximately 1.5 river miles of the Project Reach. However, this portion of the NRCA is managed as a "Passive Zone" with higher elevations classified as part of the "Primitive Zone." The Passive Zone "acts as a buffer to protect the Primitive Zone by absorbing or lessening the impacts from the more concentrated public use areas. This zone is primarily undeveloped for public use due to

environmental and access constraints" (Combs-Bauer 1997). No formal trails are known to exist in this specific portion of the NRCA near the river.

The Primitive Zone is not likely to be accessed by viewers:

> There will be few visitors to this zone due to the extremely steep cliff faces and remoteness of the area… There are a limited number of the most primitive trails resembling wildlife trails that are not maintained or signed… To reach the Primitive Zone, a hiker must travel between 6 to 13 steep miles one way (Combs-Bauer 1997).

Additionally, alteration to flow in the Project Reach could impact two viewer groups. Viewers who might have accessed the informal "waterline" trail, which has limited views of the Project Reach, and whitewater boaters. Generally, the trail is set back from the river and screened by forest or blocked by steep terrain, minimizing its impact on trail viewers. The limited number of expert whitewater boaters capable of running the Class V+ run through the canyon would also see changes to flow timing. However, this visual impact would be minor as it is simply an alteration of river flow within the existing range.

Finally, possible impacts on the natural lightscape and night sky have been identified as a potential aesthetic issue. However, these impacts are easily mitigated through design measures and selection of appropriate lighting sources. Generally, BCH staff will minimize the amount of lighting needed, direct the light only where needed, avoid glare, and plan the lighting system according to specific, pre-defined needs.

7 REFERENCES

Combs-Bauer, S., and McNamara, D. *Mount Si NRCA Supplement Public Use Plan*. Washington Department of Natural Resources. 1997

Practical Guide for Lighting to Reduce Light Pollution and Save Energy. Practical Guide, ASTROLab du Mont-Megantic. 2008

Washington Department of Natural Resources. *Mount Si NRCA Management Plan*. 1997