Electronically filed February 6, 2014

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
ATTN: DHAC, PJ-12.2
888 First Street, N.E.
Washington, D.C. 20426

Project No. 14110-001 – Washington
Black Canyon Hydroelectric Project
Black Canyon Hydro, LLC

RE: Proposed Revisions to Noise Study Plan for 2014

Dear Secretary Bose,

Black Canyon Hydro (BCH) proposes certain revisions to the noise study plan due to new design changes and field observations affecting the Project.

Upon completion of substantial analysis, BCH proposes to relocate the powerhouse from the original tailrace location near Ernie's Grove upstream and directly underground at the proposed intake site(s). The relocation will offer greater project efficiency, security and compatibility with the surroundings. As a result of relocation, potential noise impacts at the tailrace site will be limited to construction of the primary access road and subsequent construction (excavation) of the Project tunnel and tailrace. Upon completion of the facilities and ground restoration there would be only infrequent maintenance inspection visits. All project facilities at the tailrace site, with the exception of the access road, would be underground upon completion of the Project with no above ground presence, occupancy or noise. The tunnel would exit directly to the river as mostly or entirely submerged flow.

BCH has considered a total of four different intake types at the two different locations previously identified in the original study plan. New proposed intake alternatives now referred to as "C" and "D" are also located on the river bend where alternative "A" is situated, but a little farther east.

Now after monitoring wildlife from early February 2013 to December 2013, only a handful of PHS species have been observed within or near the areas proposed for construction. These include Western Toad and Harlequin Duck observations by biologists within the actual river, Osprey seen flying overhead, Pileated Woodpeckers on snags, Columbian Black-Tailed Deer, Elk and possibly Gray

Wolf, the latter three all photographed by remote cameras. No threatened or endangered species have been documented and verified in the study area to date.

During late spring and throughout summer 2013 two large land use actions have occurred in immediate proximity to the Project tailrace site. The first involved clear-cut logging of an approximately 30 acre area on the hillside directly above Ernie's Grove to the north, and the second involved the widening of North Fork Road and installation of utilities along an approximately ¼ mile section for a new subdivision also adjacent to Ernie's Grove. Both of these land use actions were substantial and on-going over several weeks utilizing numerous types of heavy equipment. Both activities involved clearing and grading surface land areas much greater in magnitude than anticipated for the project. Based on direct observation by BCH field personnel and inquiry of local residents, the disturbance was perceived as minor, with noise limited to daylight hours between 7:00 am and 7:00pm. The majority of the residential areas nearby were screened by trees, separated by distance and/or elevation, very similar to the relative adjacency of the BCH Project tailrace and tunnel outlet facilities.

As a result of the above Project design revisions, actual observations of wildlife and recent heavy construction near Ernie's Grove, BCH believes a study plan change is warranted. The revised study plan and resulting study will evaluate the project changes, effects on wildlife and on Ernie's Grove area residents.

BCH has completed a preliminary noise study in accordance with the proposed revised study plan and has concurrently filed the study plan and study report. BCH will immediately initiate consultation with stakeholders. BCH will discuss this plan revision at the upcoming Project study results meeting and will file any comments received during the comment period thereafter with the FERC.

Sincerely,

Licensing Manager for
Black Canyon Hydro, LLC

BLACK CANYON HYDRO, LLC
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Black Canyon Hydroelectric Project
FERC Project No. P-14110
Noise Study Report
February 2014

Prepared for
Black Canyon Hydro, LLC
3633 Alderwood Avenue
Bellingham, WA 98225

Prepared by
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Seattle, WA 98103

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1.0 EXECUTIVE SUMMARY

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, 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. Confluence Environmental Company (Confluence) evaluated noise impacts associated with the proposed project. This document presents the study results.

Confluence measured ambient sound levels produced by flowing water at the locations of the intake and tailrace in January 2014 and recorded 71.1 dBA at the intake and 68.7 dBA at the tailrace. These sound levels were used to analyze the expected project construction and operation noise levels to determine effects to potentially noise-sensitive receptors. Potentially noise-sensitive receptors analyzed for this noise study include:

1. Residential area of Ernie's Grove
2. Snoqualmie Forest Raptor Campground
3. Avian species including Northern Spotted Owl.

Maximum construction-related noise was estimated to be between 110 and 126 dBA, and would attenuate to ambient sound levels before reaching potentially noise-sensitive receptor thresholds. Maximum operation-related noise was estimated to be between 54 and 68 dBA, and would not be distinguishable from ambient sound levels.

2.0 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.

3.0 PROJECT DESIGN

3.1 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.

3.2 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.

3.3 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.

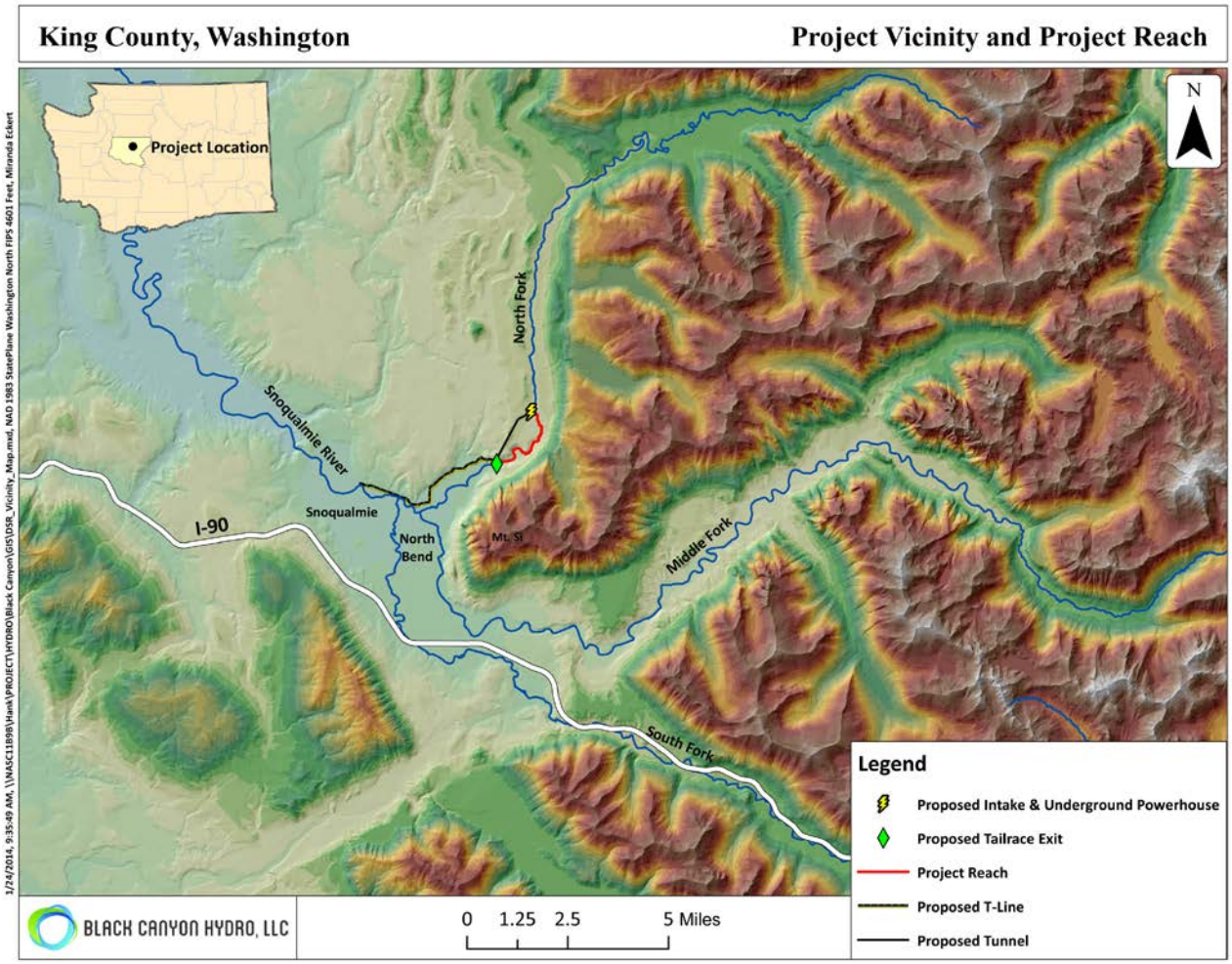
3.4 TRANSMISSION

Transmission would consist of a 34.5-kilovolt (kV) 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 RM 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- kV 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-kV to 115-kV.

3.5 SITE DESCRIPTION

The Project area includes two sites along the North Fork: the tailrace and the intake (Figure 1). The proposed tailrace is near Ernie's Grove at an elevation of approximately 500 feet. The river is confined in this area, with steep incline on both sides. There is a small waterfall upstream of the area, and many boulders are in the river. The area around the tailrace is completely forested. The proposed intake is at approximately 1,000 feet elevation. The river is somewhat confined with a moderate slope to the east, and a

steeper slope to the west. The river is flatter and wider than near the tailrace, and has many boulders. West of the river, the area is forested. East of the river, there is



approximately a 500-foot forest buffer and beyond that the area has largely been recently logged.

Figure 1. Project Vicinity and Project Reach

4.0 DESCRIPTION OF STUDY

In accordance with 18 CFR §5.11(d)(1), this section describes the goals and objectives of the study and the information that was obtained.

4.1 GOALS AND OBJECTIVES

The study was designed to achieve the following specific goals:

- Goal 1: Characterize existing ambient sound levels within the audible range of the project.
- Goal 2: Estimate noise levels that would be generated by construction activities (e.g., transport of equipment, materials, and personnel; blasting; use of heavy equipment).
- Goal 3: Estimate project-related noise levels (i.e., operational noise).
- Goal 4: Determine if construction activities and operation of the Project would be audible to sensitive wildlife, area residents, recreational users, or other potentially noise-sensitive receptors in the vicinity of the project.
- Goal 5: Propose measures, as needed, to reduce, avoid, or mitigate noise impacts.

The objectives of this study were to determine if noise levels associated with the construction and operation of the proposed Project would impact potentially noise-sensitive receptors, such as local residents and wildlife.

4.2 STUDY AREA

The study area for this analysis includes lands and waters within and adjacent to the Project boundary which are within audible range of the Project, including the residential area of Ernie's Grove. More specifically, the study area consists of those areas within the audible range (approximately ½ mile) of the Project area from and adjacent to the proposed intake structure (including the pooling area), along the tunnel, and to the tailrace site (Figure 2). The study area also includes locations within audible range of existing roads within the local access network providing access to the Project area as well as any proposed new or extended roads, including the proposed intake access road and proposed tailrace site access road.

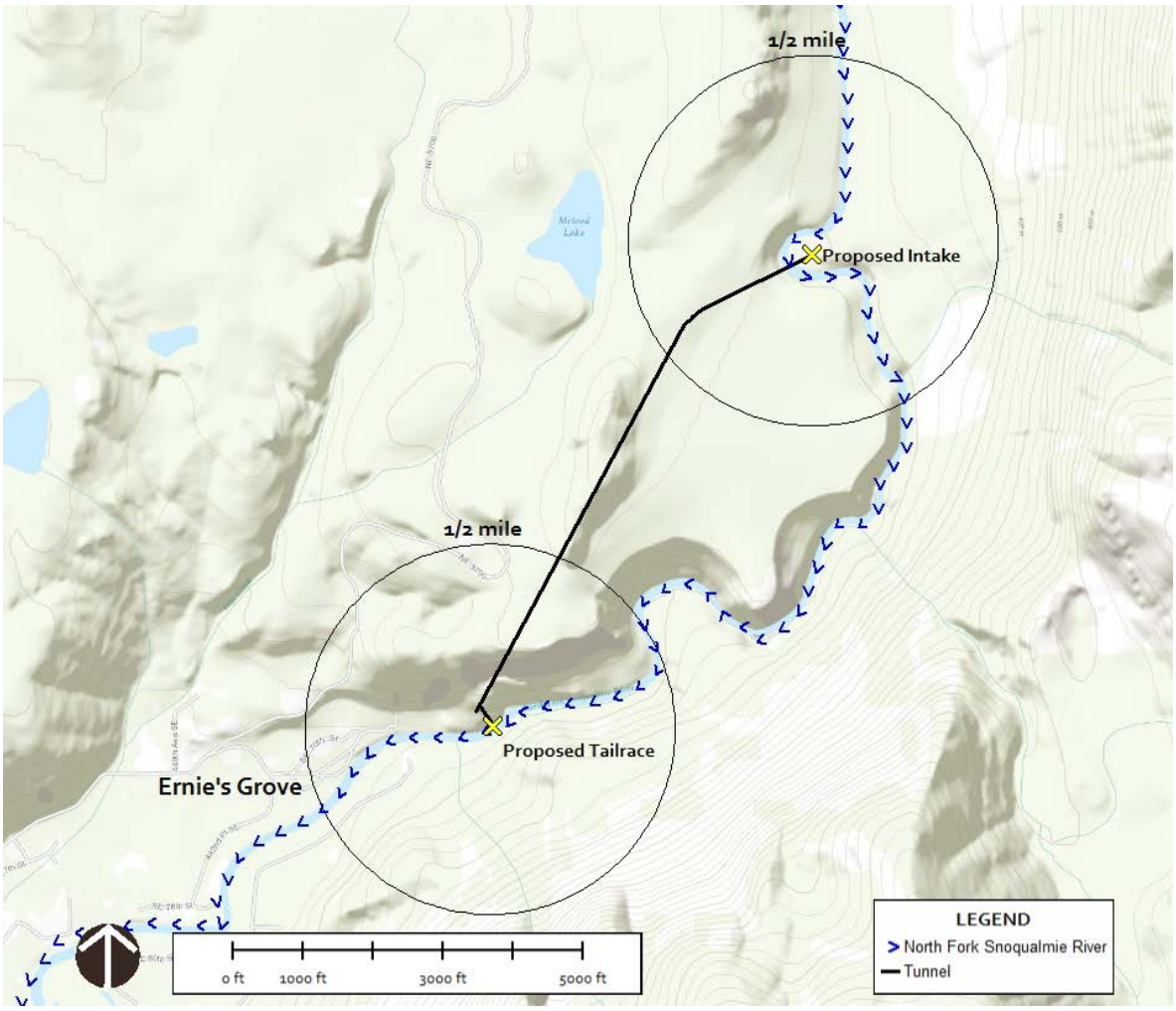


Figure 2. Project Study Area

4.3 NOISE ANALYSIS

Noise can have an effect on both humans and wildlife; for this analysis, those receptors are termed "potentially noise-sensitive receptors." The Washington State Department of Transportation (WSDOT) Manual for Biological Assessment (BA) Preparation for Transportation Projects (WSDOT 2013) has outlined steps for defining the extent of Project-related noise (Noise Impact Assessment). That methodology was used as a framework for this analysis. The steps WSDOT identifies are:

1) **Estimate the equipment noise level for the project.** This includes both construction and operation equipment.
2) **Estimate the background community or ambient sound level.**
3) **Estimate the traffic noise level.**
4) **Determine whether hard or soft site conditions exist.** A hard site is generally a flat hard surface, such as water, concrete, or hard-packed soil. A soft site includes unpacked earth and/or vegetation. Noise attenuates more quickly on a soft site.

5) **Determine whether the noise is point source or line source.** Point source noise originates from a single point, such as a pile driver, or rock drilling. Line source noise occurs along a line – such as traffic. It takes longer for line source noise to attenuate.
6) **Use the noise equations for solving attenuation distances.**

5.0 METHODS

In accordance with 18 CFR §5.11(d)(1) and §5.11(d)(5), this section provides a detailed description of the study methodology, including data collection and analysis techniques, objectively quantified information, and sampling strategy.

The Noise Study includes the following study elements:

- Literature Review. Existing relevant literature and data sources were identified, compiled, and reviewed to provide context and inform the analysis.
- Noise Analysis. This effort included estimation of noise levels generated from construction and operation of the proposed Project; identification of potentially noise-sensitive receptors within the study area; and analysis of the impact of estimated noise levels to potentially noise-sensitive receptors.
- Mitigation Measures. Steps to reduce, avoid, or mitigate noise impacts were identified.

The following sections identify specific methods used to address each study goal identified in Section 4.1.

5.1 GOAL 1: CHARACTERIZE EXISTING AMBIENT SOUND LEVELS WITHIN THE AUDIBLE RANGE OF THE PROJECT

To accomplish this goal, Confluence evaluated the acoustical footprint of the proposed project during both the construction and operational phases. This entailed the evaluation of potentially noise-sensitive receptors (people and wildlife) within ½ mile of Project construction areas and primary construction traffic corridors. Confluence then measured the existing sound environment at locations where potentially noise-sensitive receptors were located. These locations were based on existing land use and typical associated occupancies and permitted activities.

One source of ambient sound in the study area is traffic. Additional sound sources that were characterized include ambient river sound in the vicinity of the intake and tailrace locations.

5.1.1 Define Extent of the Boundary for the Noise Assessment

To determine the extent of the boundary for the noise assessment, Confluence reviewed publicly available zoning and land-use data as well as digital topographic maps, aerial photos, and published information on existing sound sources including vehicular traffic, and details of nearby land ownership to determine the ambient sound levels.

Initially, Confluence looked at an approximately ½-mile area around all constructed aspects of the Project, as required in the Study Plan (BCH, 2013). This included the proposed intake, powerhouse, and tailrace.

The extent of the boundary was then determined using the Noise Impact Assessment methods described by WSDOT (2013) (described above in Section 4.3) to calculate the distance construction and operation noise would travel before it attenuates to ambient sound levels (See Section 5.4.1).

5.1.2 Ambient Sound Level Observation and Estimation

To estimate the ambient sound levels in residential areas, Confluence used the population density of North Bend and the environmental background sound level values for population densities as described in WSDOT (2013).

In addition, Confluence measured ambient sound levels at the intake and tailrace locations on January 17, 2014, using an AMPROBE SM-10 sound level meter. The goal of measuring ambient sound levels was twofold: (1) to determine if ambient sound is in fact typical and consistent with ambient sounds anticipated to occur as a result of the land uses and associated activities within the study area (i.e., are the sound levels measured similar to the values published in WSDOT 2013), and (2) to provide a basis for developing quantitative and qualitative conclusions regarding the potential for any disruptive noise impacts that may result during construction and/or operation of the Project.

Confluence recorded the dates, times, locations, and average sound levels within the study area. Confluence also recorded the types of sounds heard (e.g., water, equipment, etc.), relative loudness, duration, and re-occurrence at each date, time, and location. Observational periods were 5 to 15 minutes at each location.

5.2 GOAL 2: ESTIMATE NOISE LEVELS THAT WOULD BE GENERATED BY CONSTRUCTION ACTIVITIES

Of the three built Project elements — intake, powerhouse and tailrace— two were analyzed for noise. The powerhouse is underground, beneath the intake, and its construction is encompassed in the intake discussion, so it will not be referenced specifically subsequently.

For the intake and tailrace, construction noises are expected to include on-site construction activities, staging area activities, transportation of materials to and from staging and construction areas, and, potentially, blasting of rock (tailrace and intake sites). Activities in the construction and staging areas could include operation of heavy construction equipment, including excavators, bulldozers, loaders, cranes, pneumatic drills, rock-breakers, compressors, hand-tools, and other machinery.

Noise levels generated during the construction of the Project were estimated using the equipment noise values published in WSDOT (2013) and the methods for determining the noise levels produced when several pieces of equipment are operating at the same time also described in WSDOT (2013).

5.3 GOAL 3: PREDICT PROJECT-RELATED NOISE LEVELS

Noise levels generated during the operational phase of the Project were also estimated using the equipment noise values published in WSDOT (2013) and the methods for determining the noise levels produced when several pieces of equipment are operating at the same time also described in WSDOT (2013).

Because little to no noise data exist for the types of equipment used during the operation of the Project, Confluence measured operational noise at an existing hydroelectric facility in the Snoqualmie watershed – The Black Creek Hydroelectric Project (FERC Project No. 6221). Both ambient sound and operational noise levels were measured using the AMPROBE SM-10 sound level meter. Ambient sound included Black Creek and surrounding environmental sounds. Operational noise included the movement of the trashrack and attached sprayer.

The Black Creek Hydroelectric Project is a 3.8 MW facility and while it is a smaller project than the one proposed and located on a smaller, quieter waterway, the trashrack and sprayer system will illustrate the difference in noise levels when a trashrack and sprayer system is operating versus ambient conditions.

5.4 GOAL 4: DETERMINE IF CONSTRUCTION ACTIVITIES AND OPERATION OF THE PROJECT WOULD BE AUDIBLE TO SENSITIVE WILDLIFE, AREA RESIDENTS, RECREATIONAL USERS, OR OTHER POTENTIALLY NOISE-SENSITIVE RECEPTORS IN THE VICINITY OF THE PROJECT

To identify potentially noise-sensitive receptors, Confluence reviewed Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) Maps (WDFW 2014), topographic maps, studies in the area, and neighboring property information. The Project area is actively managed as timberlands by Hancock Forest Management, has been frequently altered by human activities, and may have diminished use as habitat for sensitive wildlife species. However, active management of timberlands

does not rule it out as habitat for sensitive species, especially common raptors and nocturnal species such as peregrine falcons, ospreys, Northern Goshawks, and bats, for example. The Noise Study included an evaluation of potential noise effects on wildlife species within the Project area and on other lands within audible range of the Project.

5.4.1 Noise Calculations

To calculate the extent of noise impacts from construction and operation activities of the two Project built elements, Confluence used the WSDOT (2013) noise equation. This equation determines the distance point source construction noise travels before it attenuates to a desired sound level.

<u>Equation:</u>

$$D = D_0 * 10^{((\text{Construction Noise} - \text{Ambient Sound in dBA})/\alpha)}$$

Where:
D = the distance from the noise source
D_0 = the reference measurement distance
α = 25 for soft ground or 20 for hard ground

The value from the above equation is a radial distance from the originating point that is then drawn onto a figure for further analysis.

5.4.2 Noise Level Analysis

Results of the construction noise estimates and operational noise assessments were tabulated and compared with (1) King County Code (KCC) 12.88 thresholds, and (2) measured ambient sound levels. Results were also tabulated for the disturbance and injury sound level thresholds of potentially noise-sensitive receptors.

Finally, Confluence evaluated how noise emitted by the construction and operation of the Project may potentially affect resources and potentially noise-sensitive receptors.

5.5 GOAL 5: PROPOSE MEASURES, AS NEEDED, TO REDUCE, AVOID, OR MITIGATE NOISE IMPACTS

Where significant noise impacts were anticipated to likely occur, noise mitigation measures were identified. Potential mitigation for construction activities were based on a qualitative review of the expected effectiveness of noise-mitigation techniques, such as timelines, adjustments to seasonal-timing, time of day, haul routes, and wildlife work windows.

6.0 RESULTS

The results of the study are presented using the same study elements as those defined in the previous methods discussion.

6.1 LITERATURE REVIEW

Confluence reviewed Snohomish County Public Utility District FERC applications for Calligan and Hancock creeks, other hydroelectric noise studies, Black Canyon study reports, WDFW PHS data, KCC 12.88, the WSDOT BA Manual (WSDOT 2013), U.S. Fish and Wildlife Service (USFWS) avian noise thresholds, and a variety of maps.

WSDOT (2013) provides a chart of sound levels and human response (Table 1), for reference to the sound levels discussed in this analysis.

Table 1. Sound Levels and Human Response[1]

Common Sounds	Noise Level (dB)	Effect
Rocket launching pad	180	Irreversible hearing loss
Air raid siren	140	Painfully loud
Thunderclap	130	
Jet takeoff (200 feet) Auto horn (3 feet)	120	Maximum vocal effort
Pile driver Rock concert	110	Extremely loud
Garbage truck	100	Very loud
Heavy truck (950 feet)	90	Very annoying Hearing damage (8 hr)
Alarm clock (2 feet)	80	Annoying
Noisy restaurant Freeway traffic Business office	70	Telephone use difficult
Air conditioning unit Conversational speech	60	Intrusive
Light auto traffic (100 feet)	50	Quiet
Living room Bedroom	40	
Library	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Hearing begins

[1]Source: WSDOT 2013

6.1.1 Ambient Sound Level

Because of the lack of data available in the literature, to determine average ambient conditions in river and forest environments, Confluence consulted a noise expert and the WSDOT BA Manual (2013). The noise expert reported that river sound levels are highly variable, depending on water flow, but may be between 50 to 59 dBA in a free-flowing area (i.e., no waterfalls), and 55 to 68 dBA near waterfalls (Wallace 2014). Additionally, WSDOT (2013) reports that in a 1996 U.S. Forest Service study in the Mt Baker-Snoqualmie National Forest, ambient forest sound levels were between 52 and 60 dBA.

6.1.2 Potentially Noise-Sensitive Receptors

Both residential and recreation areas exist within ½ mile of the proposed Project (Figure 3). Ernie's Grove is a small residential community about ½ mile west of the proposed tailrace, along the North Fork. Snoqualmie Forest Raptor Campground is about ½ mile NNE of the proposed intake. The population density of North Bend (of which Ernie's Grove is a part) is 2,048 people per square mile (Advameg 2014). According to WSDOT (2013), environmental background sound levels based on the population density of North Bend is 50 dBA L_{eq}. This value was used as the background sound level at Ernie's Grove.

Hancock Forest Management operates the Raptor Campground year-round and issues a maximum of 200 permits for the three campgrounds in the Snoqualmie Forest (Hancock 2013). No data exist for the ambient sound levels at the campground, except for the measurements recorded by Confluence (see Section 6.2). At the time of these measurements, there were no campers within the campground. However, an extensive noise assessment was conducted at Clear Lake Campground in the Arapaho-Roosevelt National Forest, Colorado (HDR 2011). Environmental sound levels at the Clear Lake Campground ranged from 39 to 51 dBA L_{eq}, with an average of 46 dBA L_{eq} .

WDFW has identified a Northern Spotted Owl Management Area in the area of the proposed intake (Figure 3). WDFW does not put specific restrictions on land use on private lands within a management area. In addition, the Vegetation Habitat, Rare Plants and Wildlife Study Report (BCH 2014a) also identified northern goshawk, peregrine falcon, and harlequin duck as possibly present in the area. However, the report also noted that no raptor nests were identified in the study area, which includes the proposed intake and tailrace locations.

Ernie's Grove, the Snoqualmie Forest Raptor Campground, the Northern Spotted Owls, and the other avian species identified in BCH 2014a were all considered potentially noise-sensitive receptors. Noise level thresholds were then determined for these potentially noise-sensitive receptors. These thresholds are summarized in Table 2.

The Project area, Ernie's Grove, and the Snoqualmie Forest Raptor Campground are located in unincorporated King County. The Project area and the Snoqualmie Forest Raptor Campground are zoned as rural. Ernie's Grove is zoned residential. KCC 12.88.020 specifies the maximum permissible sound level for receiving properties for construction in these zoning designations (Table 2). The maximum permissible sound levels were used as the threshold values for potentially noise-sensitive human receptors. However, it is important to note that the ambient sound levels associated with the river (68 dBA) are louder than the KCC maximum permissible sound levels (52 dBA) and estimated environmental background sound levels based on the population density (50 dBA).

USFWS (2003) reported thresholds for Northern Spotted Owl detectability, alert, behavioral effects, and harassment/injury. There is not much information on the effects of noise impacts for the avian species identified in the Vegetation Habitat, Rare Plants and Wildlife Study Report (BCH 2014a); therefore, it was assumed that noise levels protective of the Northern Spotted Owl would be protective of these species as well. The Behavioral Effects Threshold reported by USWFS (2003) was used as the threshold value for potentially noise-sensitive wildlife receptors.

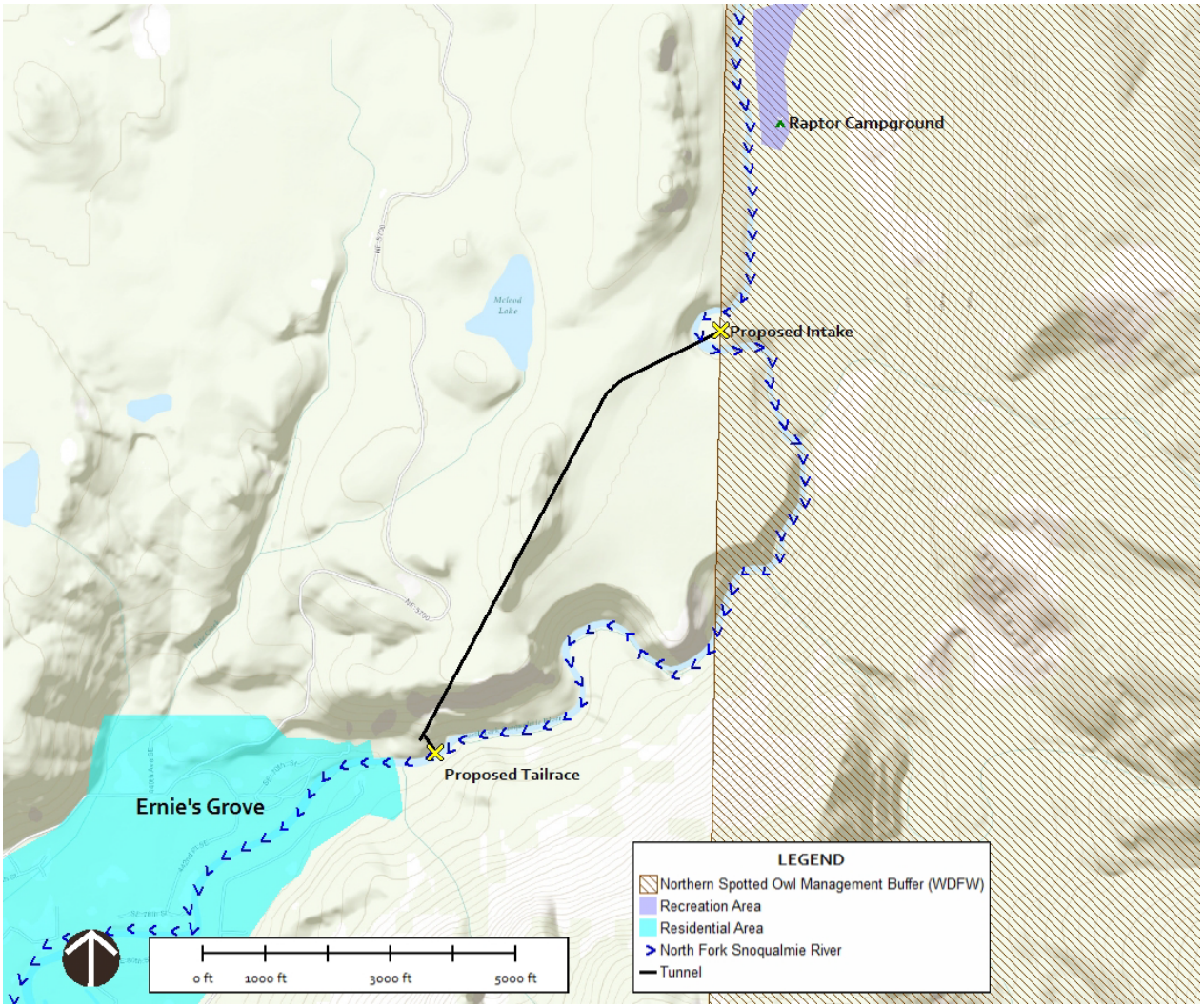


Figure 3. Potentially Noise-Sensitive Receptors

Table 2. Summary of Noise Level Thresholds for Potentially Noise-Sensitive Receptors

Threshold	Sound Level
Maximum permissible sound level for receiving properties in rural zoning[1]	49 dBA_{RMS}
Maximum permissible sound level for receiving properties in residential zoning[1]	52 dBA_{RMS}
Northern Spotted Owl/Marbled Murrelet Detectability Threshold[2]	4 dB above ambient
Northern Spotted Owl/Marbled Murrelet Alert Threshold[2]	57 dBA L_{max}
Northern Spotted Owl/Marbled Murrelet Behavioral Effects Threshold[2]	70 dBA L_{max}
Northern Spotted Owl/Marbled Murrelet Harassment/Injury Threshold[2]	92 dBA L_{max}

[1] Source: KCC 12.88.020
[2] USFWS 2003

6.2 COLLECTED NOISE DATA

Ambient sound levels were recorded at five locations at the Project site: near the tailrace location, near the intake location, in the forest between the intake location and the "intake access" road, the "intake access" road, and at the Raptor Campground. The weather was foggy, and the wind was still at all locations. The recorded sound levels and sources are presented in Table 3. Figure 4 shows the location of each site.

Table 3. Sound Level Measurements at Project Site

Site #	Location	Sound Source	Distance from Sound Source (ft)	Recorded Sound Level (dBA)
1	Proposed Tailrace	water	3	68.2
2	Proposed Intake	water	3	71.1
3	Forest Edge near Proposed Intake	water	330	51.2
4	Proposed Intake Road	water	630	48.7
5	Campground near Proposed Intake	water	3500	46.5

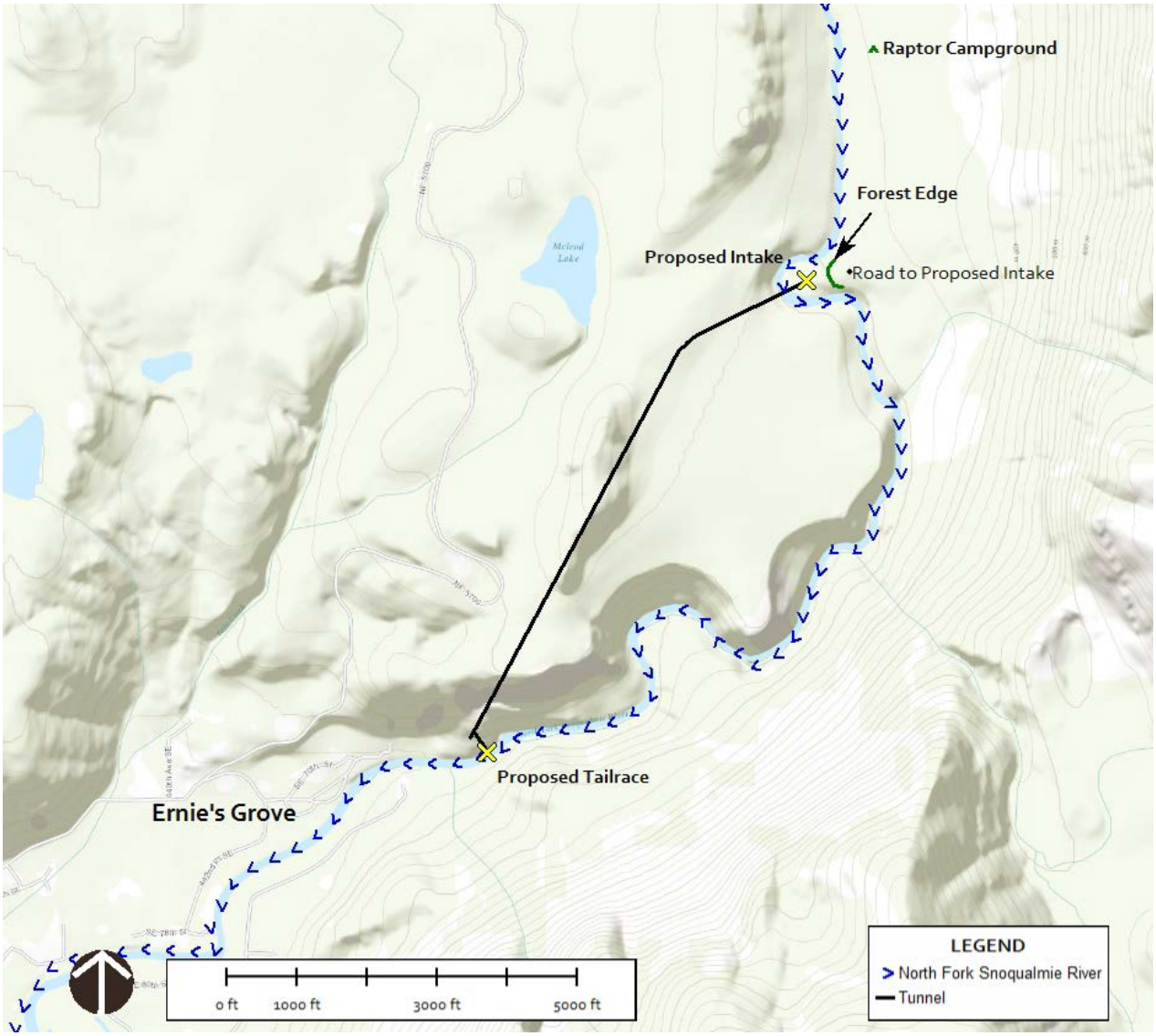


Figure 4. Noise Sampling Locations

During data collection, river flows ranged from 619 to 624 cfs (USGS 2014) which generated sound levels of 68.2 to 71.1 dBA, depending on location. These recorded sound levels are a little higher than the expected values of 55 to 68 dBA. Because these are the only data available for the area, the recorded values were used in the noise impact assessment. It should be noted that mean annual flow was 653 cfs between 1991-2012 (BHC 2014b) and average river flows equal or exceed 619 to 624 cfs 30 to 35% of the year (Confluence 2014); therefore, ambient sound levels throughout the year are likely similar to those recorded.

In addition to measuring ambient sound levels at the locations mentioned above, Confluence measured ambient sound levels at Black Creek and noise levels from the nearby Black Creek Hydroelectric Facility when the trashrack was in operation. The trashrack operation is expected to be the loudest operational sound. These data were

collected because a similar but larger trashrack system could be used in the proposed Project. If a similar system were used at the proposed facility, it is expected to be double in size.

Sound levels were recorded 15 feet from the trashrack. Regardless of whether the trashrack was on or off, the sound levels measured 59 dBA. This indicates that ambient sound levels were louder than the trashrack. However, for the purpose of the noise impact assessment, 59 dBA was used as the noise level of a single trashrack system.

6.3 NOISE ANALYSIS

Using the WSDOT noise impact assessment methods (See Section 4.3 and 5.0), the distances were calculated over which construction and operation-related noise levels would attenuate to ambient sound levels. The distances were also calculated for attenuation of construction and operation-related noise to potentially noise-sensitive receptor threshold values. These distances define the extent of the noise assessment boundary. Appendix B contains spreadsheets used for calculating the various attenuation distances.

For the noise impact assessment, the following assumptions were made:

1. The Project area was determined to have “soft-site” conditions because of the forested areas and steep topography surrounding the Project area.
2. The construction and operation noise-generating activities were determined to be “point sources” because the equipment would remain in place or within a very confined area for extended periods of time.
3. The recorded sound levels were used as the ambient sound levels used in the noise impact assessment.
4. Equipment traffic on road network would be similar to existing conditions.

6.3.1 Construction

As stated above, the equipment noise level during Project construction was estimated by identifying the type of equipment and the measured noise levels. Table 4 contains a complete list of equipment to be used in Project construction, along with their corresponding noise level from WSDOT (2013) and where the equipment would be used (i.e., proposed intake or tailrace locations).

Table 4. Project Construction Equipment and Noise Levels

Equipment	Impact Device?	Actual Measured Average L_{max} at 50 feet[1]	Location Used[2]
Backhoe	N	78	A,B
Blasting (rock slope production)	Y	126	B
Chain Saw	N	84	A,B
Compactor (ground)	N	83	A,B
Compressor (air)	N	78	A,B
Concrete Mixer Truck	N	79	A,B
Concrete Pump Truck	N	81	A
Concrete Saw	N	90	A
Crane	N	81	A,B
Dozer	N	82	A,B
Drill Rig Truck	N	79	A,B
Excavator	N	81	A,B
Flat Bed Truck	N	74	A,B
Front End Loader	N	79	A,B
Generator	N	81	A,B
Grader	N	89	A,B
Impact Pile Driver	Y	110	A,B
Mounted Impact Hammer (hoe ram)	Y	90	B
Pickup Truck	N	75	A,B
Pumps	N	81	A,B
Rock Drill	N	81	B

[1] Per WSDOT 2013

[2]Location A = Proposed Intake; Location B = Proposed Tailrace

Using the noise levels identified above in Table 4 and following the noise impact assessment methods, noise generated from construction activities near the intake would attenuate to ambient sound levels within 118 feet of the construction activities, and noise generated from construction activities near the tailrace would attenuate to ambient sound levels within 627 feet of the construction activities (Table 5 and Figures 5 and 6). Noise generated from construction activities near the intake would attenuate to the King County maximum permissible sound levels within 687 feet of the construction activities, and noise generated from construction activities near the tailrace would attenuate to King County maximum permissible sound levels within 2,736 feet of the construction activities (Table 5 and Figures 5 and 6). It is important to note that elevated noise levels from

construction-related activities either at the intake or tailrace would attenuate to ambient sound levels before reaching the Ernie's Grove community (Figures 5 and 6).

Finally, noise generated from construction activities near the intake would attenuate to the behavioral effects threshold sound level within 131 feet of the construction activities, and noise generated from construction activities near the tailrace would attenuate to the behavioral effects threshold sound levels within 521 feet of the construction activities (Table 5 and Figures 5 and 6). Table 5 summarizes the attenuation distances for construction-related noise.

Table 5. Summary of Calculated Project Construction Noise Attenuation Distances

Activity and Location	Anticipated Max. Noise Level (dBA)	Distance (ft) to Attenuate to		
		Ambient Condition	Maximum Permissible Sound Level in Designated [illegible][1]	Behavioral Effects Threshold for Avian Species[2]
Construction				
Proposed Intake	110	118	687	131
Proposed Tailrace	126	627	2,736	521

[1] Source: KCC 12.88.020
[2] USFWS 2003

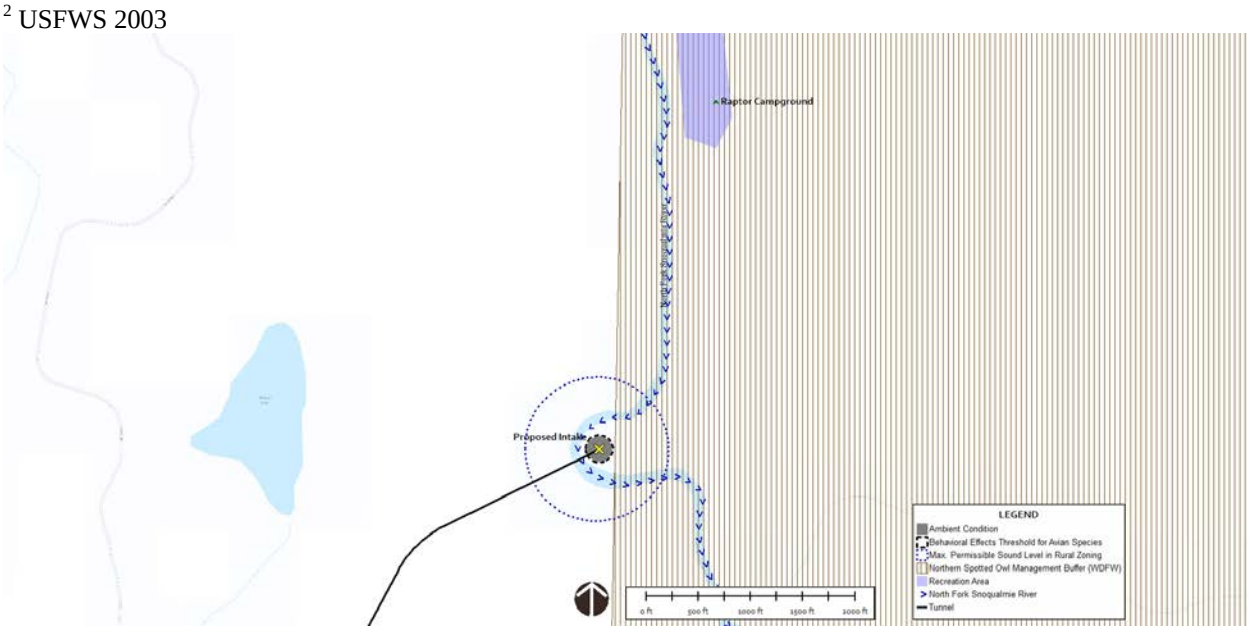


Figure 5. Extent of Project Construction Noise Effects at Proposed Intake

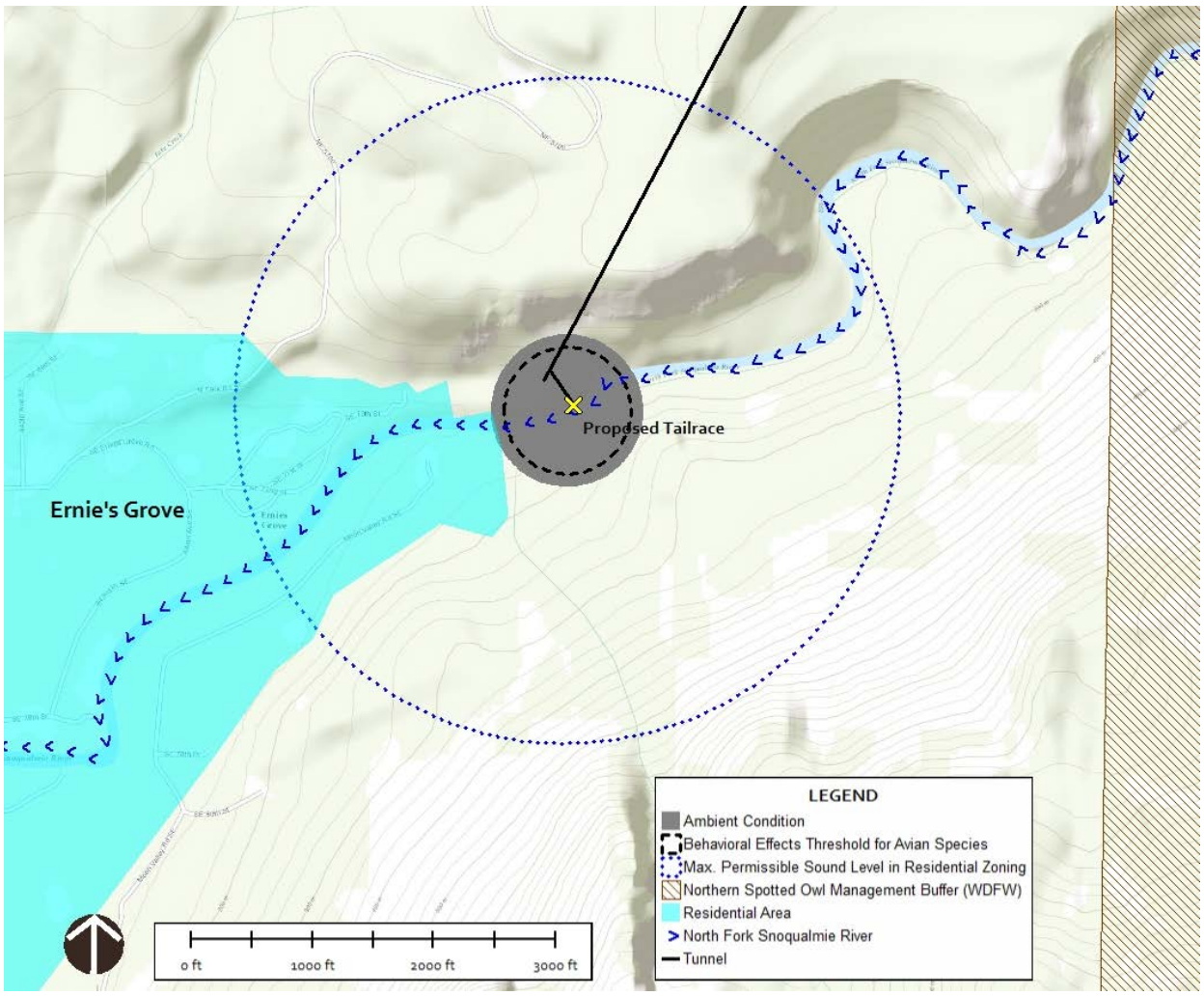


Figure 6. Extent of Project Construction Noise Effects at Proposed Tailrace

Based on the noise assessment, construction-related noise at the proposed intake location would attenuate to ambient conditions before potentially noise-sensitive receptor thresholds. Therefore, construction-related noise levels would not impact potentially noise-sensitive receptor beyond 118 feet, when construction-related noise levels attenuate to ambient sound levels.

Based on the noise assessment, construction-related noise at the proposed tailrace location would attenuate to ambient conditions before potentially noise-sensitive receptor thresholds in residential areas. Therefore, construction-related noise levels would not impact potentially noise-sensitive receptors in residential areas beyond 627 feet, when construction-related noise levels attenuate to ambient conditions. Construction-related noise would attenuate to the behavioral effects threshold for avian species (70 dBA) before attenuation to ambient sound levels.

6.3.2 Operation

As stated above, the equipment noise level during Project operation was estimated by identifying the type of equipment used during operation, and associated measured noise levels. Most of the noise-generating equipment will be underground and would not produce noise audible on the surface. At the intake, the trashrack system is expected to be the loudest piece of equipment that would be present above ground and produce audible noise. WThe proposed trash rack system has not been determined, but we can assume that ambient sound and operational noise would be proportional to that at the Black Creek Hydroelectric Facility. Thus, operational noise of the proposed hydroelectric facility at the intake is not expected to exceed ambient sound. For the purpose of the noise impact assessment, it is assumed two trashrack systems similar to the one used at the Black Creek facility could be placed in tandem and used simultaneously during operation of the Project. Using the rules of decibel addition described in WSDOT 2013 and assuming a single trashrack system generates a noise level of 59 dBA; two systems would generate a noise level of 62 dBA. Thus 62 dBA was used as the expected operational noise level for the noise impact assessment.

Operation-related noise at the tailrace would be the noise associated with water returning to the creek bed. It is expected that the returning water would generate noise levels similar to ambient conditions. Therefore, operation-related noise at the tailrace was estimated to be 68 dBA, the sound level recorded during our survey.

Therefore, noise generated from operation near the intake would attenuate to ambient sound levels within 1 foot of the operation activities, and noise generated from operation activities near the tailrace would attenuate to ambient sound levels within 3 feet of the operation activities (Table 6 and Figures 7 and 8). Noise generated from operation activities near the intake would attenuate to the King County maximum permissible sound levels within 4 feet of the operation activities, and noise generated from operation activities near the tailrace would attenuate to King County maximum permissible sound levels within 13 feet of the operation activities (Table 6 and Figures 7 and 8). It is important to note that elevated noise levels from operation-related activities either at the intake or tailrace would attenuate to ambient sound levels before reaching the Ernie's Grove community (Figures 7 and 8).

Finally, noise generated from operation activities near the intake would attenuate to the behavioral effects threshold sound level within 1 foot of the operation activities, and noise generated from operation activities near the tailrace would attenuate to the behavioral effects threshold sound levels within 2 feet of the operation activities (Table 6 and Figures 7 and 8). Table 6 summarizes the attenuation distances for operation-related noise.

Table 6. Summary of Project Operation Noise Attenuation Distances

Activity and Location	Anticipated Max. Noise Level (dBA)	Distance (ft) to Attenuate to		
		Ambient Condition	Maximum Permissible Sound Level in Residential Zoning[1]	Behavioral Effects Threshold for Avian Species[2]
Operation				
Proposed Intake	54	1	4	1
Proposed Tailrace	68	3	13	2

[1] Source: KCC 12.88.020

[2] USFWS 2003

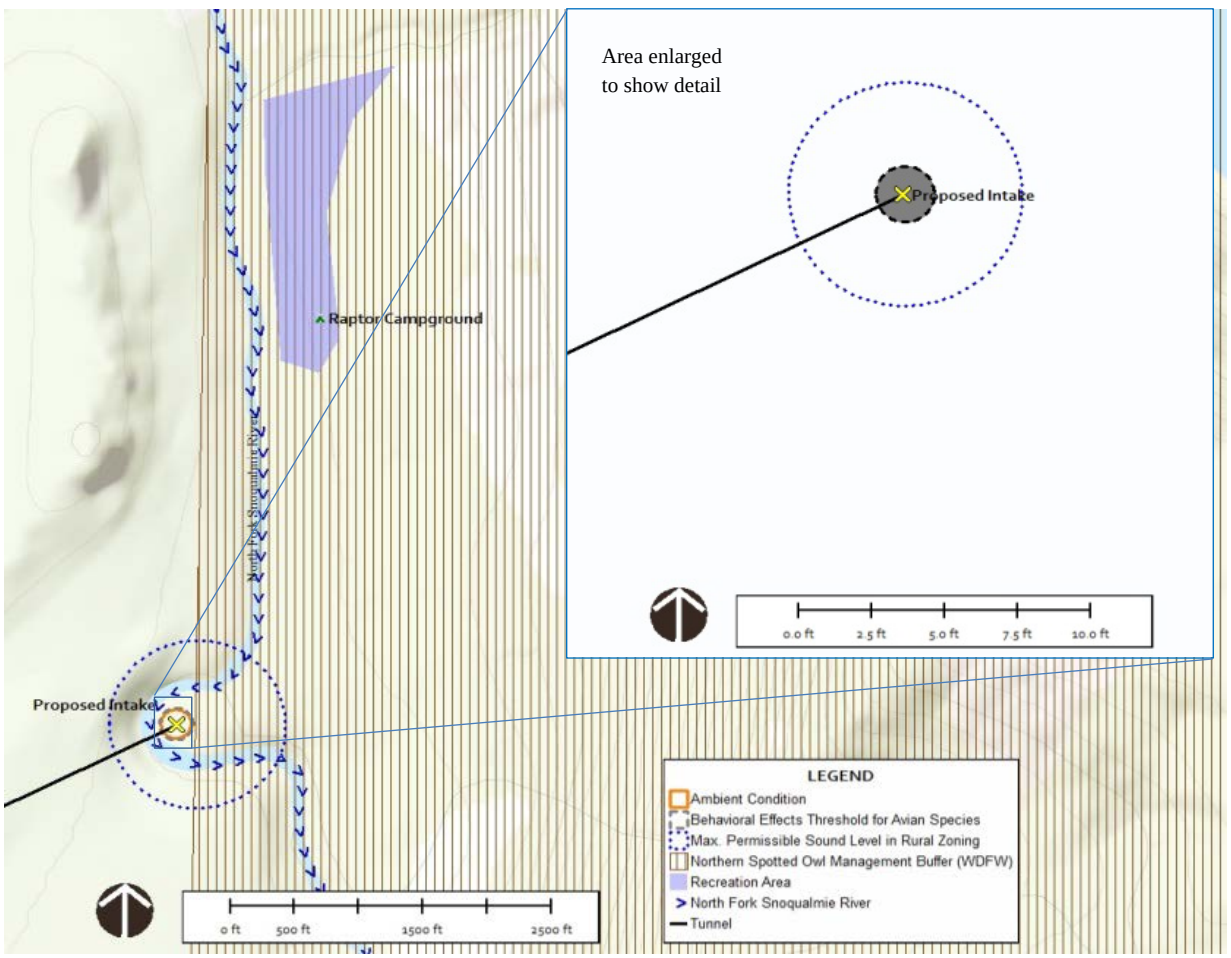


Figure 7. Extent of Project Operation Noise Effects at Proposed Intake

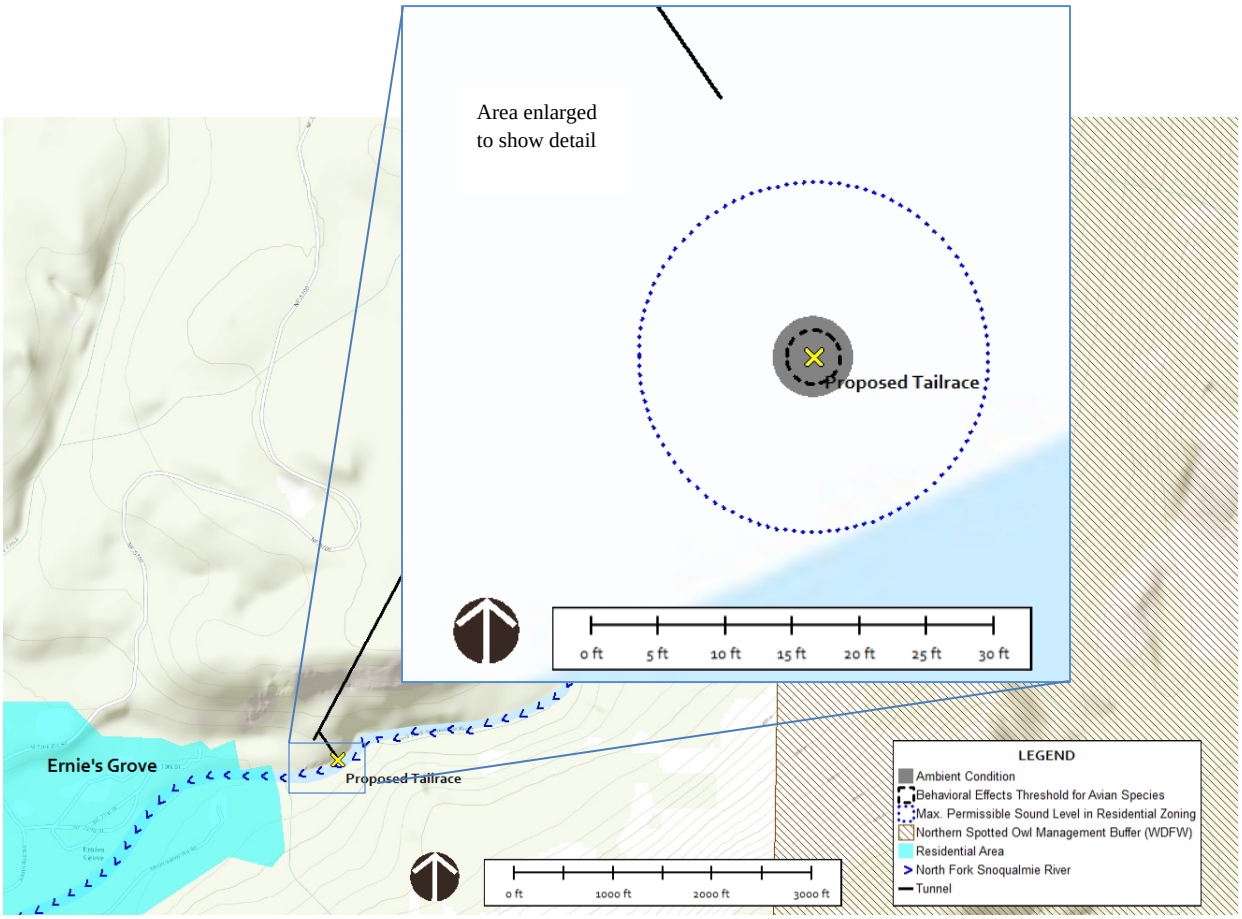


Figure 8. Extent of Project Operation Noise Effects at Proposed Tailrace

Because operation-related noise would attenuate to ambient conditions within a matter of a few feet, operation of the Project is not expected to increase sound levels above ambient conditions.

Additionally, operation of the facility is not expected to result in increased traffic in the area, as routine visits to the facility would coincide with visits to the existing Black Creek facility. The Black Creek facility is approximately 1.5 miles from the intake location and utilizes the same road network.

7.0 MITIGATION MEASURES

In order to minimize impact to potentially noise-sensitive receptors, the following mitigation measures are suggested:

- Use haul routes that minimize increased noise levels to potentially noise-sensitive receptors. For example, heavy equipment, such as dump trucks, could use the existing logging roads rather than County roads. This greatly reduces the amount of heavy equipment traveling near the Ernie's Grove residential area.

- Make efforts to minimize time that loudest equipment is in operation.

8.0 CONCLUSIONS

- Based on review of existing literature, ambient sound levels in the Project location (both intake and tailrace locations) were estimated to be between 50 and 68 dBA. Measured sound levels were between 68.7 and 71.1 dBA. Ambient sound levels were as loud as or louder than threshold values for potentially noise-sensitive receptors. Therefore, noise impacts are generally limited to the distance to where Project related noise levels attenuated to ambient sound levels.

- Potentially noise-sensitive receptors in the vicinity of the Project location include Ernie's Grove, a residential community, the Snoqualmie Forest Raptor Campground, Northern Spotted Owl, northern goshawk, peregrine falcon, and harlequin duck.

- The maximum construction-related noise was estimated to be between 110 and 126 dBA, depending on activities.

- Operation-related noise was estimated to be between 54 and 68 dBA.

- At the proposed intake location, construction-related noise was estimated to attenuate to ambient sound levels within 118 feet. The construction-related noise would attenuate to ambient sound levels before attenuating to potentially noise-sensitive receptor threshold values.

- At the proposed tailrace location, construction-related noise was estimated to attenuate to ambient sound levels within 627 feet. The construction-related noise would attenuate to ambient sound levels before attenuating to potentially noise-sensitive receptor threshold values for residents.

- At the proposed intake location, operation-related noise was estimated to attenuate to ambient sound levels within 1 foot. That is, the operation-related noise would not be distinguishable from ambient sound levels.

- At the proposed tailrace location, operation-related noise was estimated to attenuate to ambient sound levels within 3 feet. That is, the operation-related noise would not be distinguishable from ambient sound levels.

9.0 REFERENCES

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Appendix A. Study Revision Consultation Record

Electronically filed December 20, 2013

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
ATTN: DHAC, PJ-12.2
888 First Street, N.E.
Washington, D.C. 20426

Project No. 14110-001 – Washington
Black Canyon Hydroelectric Project
Black Canyon Hydro, LLC

RE: Revisions to noise study plan

Dear Secretary Bose,

Black Canyon Hydro (BCH) proposes certain revisions to the noise study plan due to new design changes and field observations affecting the project.

Upon completion of substantial analysis, BCH proposes to relocate the powerhouse from the original tailrace location near Ernie's Grove upstream and directly underground at the proposed intake site(s). The relocation will offer greater project efficiency, security and compatibility with the surroundings. As a result of relocation, potential noise impacts at the tailrace site will be limited to construction of the primary access road and subsequent construction (excavation) of the Project tunnel and tailrace. Upon completion of the facilities and ground restoration there would be only infrequent maintenance inspection visits. All project facilities at the tailrace site, with the exception of the access road, would be underground upon completion of the project with no above ground presence, occupancy or noise. The tunnel would exit directly to the river as mostly or entirely submerged flow.

BCH has now also considered a total of four different intake types at the two different locations previously identified in the original study plan. New proposed intake alternatives now referred to as "C" and "D" are also located on the river bend where alternative "A" is situated, but a little farther east.

Now after three seasons of wildlife monitoring from early February 2013 to present (December, 2013), only a handful of PHS species have been observed within or near the proposed areas for construction. These include Western Toad and Harlequin Duck observations by biologists within the actual river, Osprey seen flying overhead, Pileated Woodpeckers on snags, Columbian Black-Tailed Deer, Elk and possibly Gray Wolf, the latter three all photographed by remote

cameras. No threatened or endangered species have been observed in the study area to date.

During the late spring and throughout summer 2013 two large land use actions have occurred in immediate proximity to the Project tailrace site. The first involved clear-cut logging of an approximately 30 acre area on the hillside directly above Ernie's Grove to the north, and the second involved the widening of North Fork Road and installation of utilities along an approximately ¼ mile section for a new subdivision also adjacent to Ernie's Grove. Both of these land use actions were substantial and on-going over several weeks utilizing numerous types of heavy equipment. Both activities involved clearing and grading surface land areas much greater in magnitude than anticipated for the project. Based on direct observation by BCH field personnel and inquiry of local residents, the disturbance was perceived as minor, with noise limited to daylight hours between 7:00 am and 7:00pm. The majority of the residential areas nearby were screened by trees, separated by distance and/or elevation, very similar to the relative adjacency of the BCH Project tailrace and tunnel outlet facilities.

As a result of the above Project design revisions, actual observations of wildlife and recent heavy construction near Ernie's Grove, BCH believes that an appropriate noise impact assessment can be carried out adequately based on estimation and characterization of ambient sound and noise levels associated with the underlying land uses and occupancies in and around Ernie's Grove and the intake site. The tailrace site represents the area of greatest potential human interaction. Moving the powerhouse to the intake site substantially reduces this potential. The intake may have potential to affect wildlife, but few area residents if any at all. Such potential can be estimated based on tabled construction noises from manuals and their projection and dissipation with increasing distance and groundcover type. Potential effects on wildlife may be estimated as well based on timing and their relative sensitivity. The revised study plan will account for the project changes, wildlife observations to date and the coincidental observed effects of recent heavy construction adjacent to Ernie's Grove on area residents. The study will be able to identify the greatest potential effects and measures to reduce them as necessary.

Sincerely,

Licensing Manager for
Black Canyon Hydro, LLC

BLACK CANYON HYDRO, LLC
3633 ALDERWOOD AVENUE • BELLINGHAM, WA 98225 • 360-738-9999
WWW.BLACKCANYONHYDRO.COM

Black Canyon Hydroelectric Project
FERC Project No. P-14110
Revised Noise Study Plan
December 2013

Prepared for
Black Canyon Hydro, LLC
3633 Alderwood Avenue
Bellingham, WA 98225

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List of Tables

1 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 generation capacity of 25 megawatts (MW) and would be located entirely on private lands.

Intake Alternative A

Alternative A would consist of the following new facilities: (1) an 8-foot-high, 162.4-foot-long inflatable rubber diversion with an associated water intake structure; (2) a natural or roughened fish passage channel; (3) a variable pooling area behind the diversion with a normal water surface elevation of 971 feet above mean sea level and a maximum pooling of 2.83 acres; (4) a power conduit tunnel consisting of an approximately 450-foot-deep vertical tunnel into an approximately 8,350-foot-long, 9-foot-diameter horizontal tunnel and penstock; and (5) for access, Alternative A would utilize an existing logging road to minimize disturbance, and require only 825-feet of additional road.

Intake Alternative B

Alternative B would consist of the following new facilities: (1) a control sill to maintain a consistent river bottom elevation, which would allow water, fish, sediment, large woody debris, and whitewater recreationists to pass unimpeded, with an associated water intake structure; (2) a power conduit tunnel consisting of an approximately 450-foot-deep vertical tunnel into an approximately 9,175-foot-long, 9-foot-diameter horizontal tunnel and penstock; and (3) for access, Alternative B would utilize an existing logging road to minimize disturbance, and require only 500-feet of additional road.

Intake Alternatives C and D

Intake Alternatives C and D involve bulk water screening alternatives located on the same river bend and point-bar as Alternative A. Alternative C uses a vertical screen type system with excluded fish and bypass water returning to the river. Alternative D uses a horizontal screening system with bypass water returning to the river as well. Both alternatives incorporate a new fixed elevation sill control in-river, with roughened boulder channel downstream thereof. Bulk water would be diverted off-river from the pool area established upstream of the control sill. Water, fish, sediment and debris load would continue to be transported downstream in the main channel.

Powerhouse

The powerhouse location for all alternatives, A-D, would be located underground beneath the selected intake site. Water from the intake screen system would be delivered straight down a vertical shaft to the powerhouse via steel penstock. After generation, water will be returned to the river via an approximate 8200 foot long non-pressurized underground tunnel exiting as a submerged tailrace into the river at Ernie's Grove. The exit location will be in the same approximate location as the powerhouse was originally proposed in the PAD. The powerhouse at the intake site would include two Francis turbine generator units, one rated at 16 MW and the other rated at 9 MW, as well as appurtenant facilities. Additionally, a temporary, 2,600-foot-long construction access road would extend from the tailrace site to the North Fork Road (while avoiding Ernie's Grove).

Transmission

As presented in the PAD, transmission would consist of a 4.2-mile-long, 115-kilovolt overhead transmission line that transmits project power to the regional grid (transmission line would be an over-build of an existing transmission line with only approximately 0.65 miles of new transmission). However, an additional option, depending on minimum instream flow requirements, land use designations, and cost, may be to have the Project connect to the existing 34 kV transmission line running from the existing Black Creek Hydroelectric Project to Snoqualmie Falls. A transmission line could be run in either direction from the powerhouse to the point of connection with either of the existing transmission corridors described above. From the intake structure a buried or overhead transmission line would only have to travel approximately 6,745-feet along an existing logging road through clear cuts.

The project would operate in run-of-river mode. The combined maximum hydraulic capacity of the two project turbines would be 900 cubic feet per second (cfs). The project would divert water from a 2.6-mile-section of the North Fork Snoqualmie River.

BCH filed a Notice of Intent (NOI) and the associated Pre-Application Document (PAD) to commence the FERC Integrated Licensing Process on March 27, 2012. In response to the subsequent study requests filed by FERC staff and other stakeholders and as detailed in 18 CFR 5.11, BCH is required to submit relevant resource study plans. This includes a study of noise near the Project Reach which follows the requirements of 18 CFR 5.11(b)-(e).

2 STUDY DESCRIPTION AND OBJECTIVES

In accordance with 18 CFR §5.11(d)(1), this section describes the goals and objectives of the study and the information to be obtained. The goal of the noise assessment is to determine whether noise from construction and operation of the project, including project facilities and transport and staging areas, might affect area residents, private property owners, recreational users, cultural resources, and noise-sensitive wildlife species in the vicinity of project. The study will be designed to address the following specific goals:

- Characterize existing ambient noise levels within the audible range of the project;
- Estimate noise levels that would be generated by construction activities (e.g., transport of equipment, materials, and personnel; blasting; use of heavy equipment);
- Predict project-related sound levels;
- Determine if construction activities and operation of the project would be audible to sensitive wildlife, area residents, recreational users, or other sensitive receptors in the vicinity of the project; and
- Propose measures, as needed, to reduce, avoid, or mitigate noise impacts.

3 STUDY AREA

The proposed study area for this analysis includes lands and waters within and adjacent to the Project boundary which are within audible range of the project, including the residential areas of Ernie's Grove. More specifically, the study area consists of those areas within audible range of the project area from and adjacent to the proposed intake structure (including the pooling area), along the tunnel, and to the tailrace site. It also includes locations within audible range of existing roads within the local access network providing access to the project area as well as any proposed new or extended roads, including the proposed intake access road and proposed tailrace site access road. The initial phase of the Noise Study will define the boundaries of the study area based on review of maps of the project vicinity.

4 RESOURCE MANAGEMENT GOALS

In accordance with 18 CFR §5.11(d)(2), this section describes resources management goals of agencies or Indian tribes with jurisdiction over the resources to be studied.

BCH is not aware of any applicable resource management goals of agencies or Indian tribes with jurisdiction over noise within the vicinity of the Project. Additionally, none

were indicated by the FERC in their Noise Assessment Study Request. However, BCH would appreciate any stakeholder input on this subject.

5 EXISTING INFORMATION

In accordance with 18 CFR §5.11(d)(3), this section describes existing information on noise at the Project, and the need for additional information.

The project reach between the intake diversion structure and the tailrace site is approximately 2.6 miles long. The project area is zoned for forestry and has historically been managed as a commercial tree farm. Extensive commercial forestry operations are one significant source of noise in the area. The Project is also located adjacent to the Mount Si Natural Resources Conservation Area (NRCA), with the Project Reach adjacent to the NRCA boundary.

Recreational users are common, particularly hunters, fishers, river kayakers, and holders of access permits issued by Hancock Forest Management (HFM). These access permits allow recreational access to lands owned by HFM and also allow collection of firewood. Ernie's Grove, an unincorporated community, is located immediately downstream of the proposed project area.

Completion of the Noise Study will require the following additional information:

- Estimate existing ambient noise levels from handbook references;
- Estimate noise levels generated from construction and operation of the proposed Project;
- Identify potential sensitive noise receptors, including key habitat for noise-sensitive wildlife, within the study area; and
- Identify potential measures to reduce, avoid, or mitigate noise impacts, if necessary.

6 NEXUS TO PROJECT

In accordance with 18 CFR §5.11(d)(4), this section describes any nexus between Project operations and effects of noise.

Noise generated during construction and operation of the proposed project could adversely affect area residents, private property owners, and recreational users in the vicinity of the project and associated staging and construction areas. Although the project would be located several miles from the nearest city (North Bend), the associated

infrastructure, the need for tunnel excavation, and material hauling could have potential noise effects on residents of Ernie's Grove, nearby private property owners, recreational users, and wildlife. The results of this study will help define the effects of the project and will inform the potential need to reduce, avoid, or mitigate noise impacts.

7 METHODS

In accordance with 18 CFR §5.11(d)(1) and §5.11(d)(5), this section provides a detailed description of the proposed study methodology, including data collection and analysis techniques, or objectively quantified information, sampling strategy, and a schedule including data collection and analysis techniques, or objectively quantified information, sampling strategy, and a schedule including appropriate field season(s) and the duration (see "Schedule" heading below for schedule).

7.1 Characterize Existing Ambient Noise Levels within the Audible Range of the Project

To accomplish this goal, BCH must first evaluate the acoustical footprint of the proposed project during both the construction and operational phases. This will entail evaluation of potentially sensitive noise receptors (people and wildlife) within ½ mile of project construction areas and primary construction traffic corridors. With the area of potential impacts defined, BCH will characterize the existing noise environment at potential receptors considered to be sensitive to project-related noise based on existing land use and typical associated occupancies and permitted activities. Traffic noise will be evaluated based on existing estimated traffic volume counts for the local road network within the project area. Existing traffic noise will be evaluated based on estimated hourly peak and average vehicle data and standard traffic mix estimates from the Washington State Department of Transportation (WSDOT). BCH will use the data generated during this evaluation to characterize existing ambient noise levels in the study area. Additional noise sources that may be characterized include ambient river noise and typical noise that may occur as a result of logging activity and other area natural resource harvesting and recreational uses.

7.1.1 Define Extent of the Boundary for the Noise Assessment

BCH will review publically available zoning and land-use data as well as digital topographic maps, aerial photos and information on existing sound sources including vehicular traffic and details of nearby land ownership to define the extent of potential impacts related to Project construction and operation. BCH anticipates noise-sensitive receptors may include nearby residential areas, camping, park and other recreational use

areas, critical wildlife habitat (identified through "Wildlife, Vegetation, and Sensitive Habitats Study Plan) and other areas of casual human use and interest.

7.1.2 Ambient Sound Level Observation and Estimation

Once the extent of the noise assessment boundary has been defined (anticipated boundary is ½ mile radius around both intake and powerhouse sites), BCH will conduct sound observation and estimation site visits at representative dates, times and locations within the study area to characterize the ambient soundscape. Observers will determine if ambient sound is in fact typical and consistent with ambient sounds estimated and anticipated to occur as a result of the underlying land uses and associated activities within the study area. Field observers will note the types of sounds heard, relative loudness, duration and re-occurrence at each date, time and location in an effort to determine typical ambient sounds within the study area. Observational periods may range from 10 minutes to ½ hour at each location. Stationary recording devices may be deployed in lieu of an observer's actual presence and observation. The ultimate goal of ambient sound level observation and estimation will be to provide a basis for developing quantitative and qualitative conclusions regarding the potential for any disruptive noise impacts that may result during construction and/or operation of the Project.

7.2 Estimate Noise Levels That Would Be Generated by Construction

Construction noises are expected to include on-site construction activities, staging area activities, transportation of materials to and from staging and construction areas, and potentially blasting. Activities in the construction and staging areas could include operation of heavy construction equipment, including excavators, bulldozers, loaders, cranes, pneumatic drills, rock-breakers, compressors, hand-tools, and other machinery. To estimate noise levels from these activities, BCH will use a combination of techniques based on the types of construction source being evaluated. Noise estimates will be completed for the noise-sensitive locations identified during the analysis described in Section 7.1.1.

7.2.1 Estimate Construction Equipment Noise

Noise from typical construction equipment will be estimated using the Washington State Department of Transportation (WSDOT) **Manual for Biological Assessment Preparation for Transportation Projects - Advanced Training Manual - Version 2013, Chapter 7, Noise Impact Assessment.**

7.3 Predict Project Operations Related Sound Levels

Sound levels generated during the operational phase of the project will be estimated using noise level details of each source of equipment proposed as part of Project operations (i.e., generators, compressors, cooling towers, turbines, etc.) and the geographical location of each noise source within the proposed Project site layout.

7.4 Determine if Construction Activities and Operation of the Project Would Be Audible to Area Residents, Recreational Users, or Other Sensitive Receptors in the Vicinity Of The Project.

Results of the construction noise estimates and operational noise assessments will be tabulated and compared with applicable King County sound level limits for construction and facility operation, respectively. Results will be tabulated for the noise-sensitive locations identified based on the evaluation described in Section 7.1.1.

Further, predicted construction and operational noise levels will be evaluated for dispersal and attenuation with increasing distance from their source and compared with the ambient sound level measurement data collected at each noise-sensitive receptor location. Conclusions on the potential for perceived sound level impacts and audibility of operation and construction will be based on estimated increases over ambient levels. The severity of perceived impacts will be based on the time of day during which the sound level are estimated, and the overall level of ambient noise (i.e., very quiet rural environments are typically more sensitive to extraneous noise sources).

Potential noise impacts on wildlife will also be taken into consideration when conducting the noise analysis. The project area is actively managed as timberlands, has been frequently altered by human activities, and may have diminished use as habitat for sensitive wildlife species. However, active management of timberlands does not rule it out as habitat for sensitive species, especially common raptors and nocturnal species such as peregrine falcons, ospreys, Northern Goshawks, and bats for example. The noise study will include an evaluation of potential noise effects on wildlife species within the project area and on other lands within audible range of the project. The Washington Department of Fish and Wildlife and the U.S. Fish and Wildlife Service also maintain species specific recommendations for disturbance buffers, which may be used for species of concern identified in the "Wildlife, Vegetation, and Sensitive Habitats Study Plan."

BCH will evaluate how noise emitted by the various phases of the project may potentially affect resources and sensitive receptors.

7.5 Propose Measures, as Needed, to Reduce, Avoid, or Mitigate Noise Impacts

If significant noise impacts are likely to occur, then noise mitigation may be considered. Noise mitigation may include equipment substitutions, soundproofing enclosures, barrier walls, and restrictions on operational periods. Potential mitigation for construction activities will be based on a qualitative review of the expected effectiveness of noise-mitigation techniques, such as mufflers, equipment enclosures, alternative back-up alarms, adjustments to seasonal-timing, time of day, etc. The expected mitigating effect of operational noise mitigation will be estimated.

8 PROGRESS REPORTING

In accordance with 18 CFR §5.11(b)(3), this section describes provisions for periodic progress reports, including the manner and extent to which information will be shared; and the time allotted for technical review of the analysis and results.

Study reports will be submitted as required by the FERC Integrated Licensing Process (ILP). It is BCH's understanding that any changes to the ILP plan and schedule will be noticed by FERC staff.

Prior to the completion of the Initial Study Report, BCH will provide an opportunity for technical review of the draft study results and analysis. When the draft version of the Initial Study Report has been completed, it will be posted to the project website (www.blackcanyonhydro.com) and BCH will send notice of its availability by e-mail to contacts included on the mailing list identified in the "Revised Communication and Information Protocol" (filed electronically with the FERC on November 27, 2012). Stakeholders will have 15-days from the issuance of this notice to provide written comments to BCH through the project website's "Contact" tab.

9 SCHEDULE

In accordance with 18 CFR §5.11(b)(2), the schedule for conducting the study is provided in Table 1 below.

Table 1. Resource Study Schedule

Component	Completion Date*
Define Boundary	December 2013
Sound Level Measurements	2013
Draft Report	Late 2013
Draft Initial Study Report Notice & Informal Comment Period	Winter 2013
Initial Study Report filed with FERC	February 6, 2014

*Dates based on schedule created and presented by FERC in Scoping Document 1 and subject to change.

10 LEVEL OF EFFORT AND COST

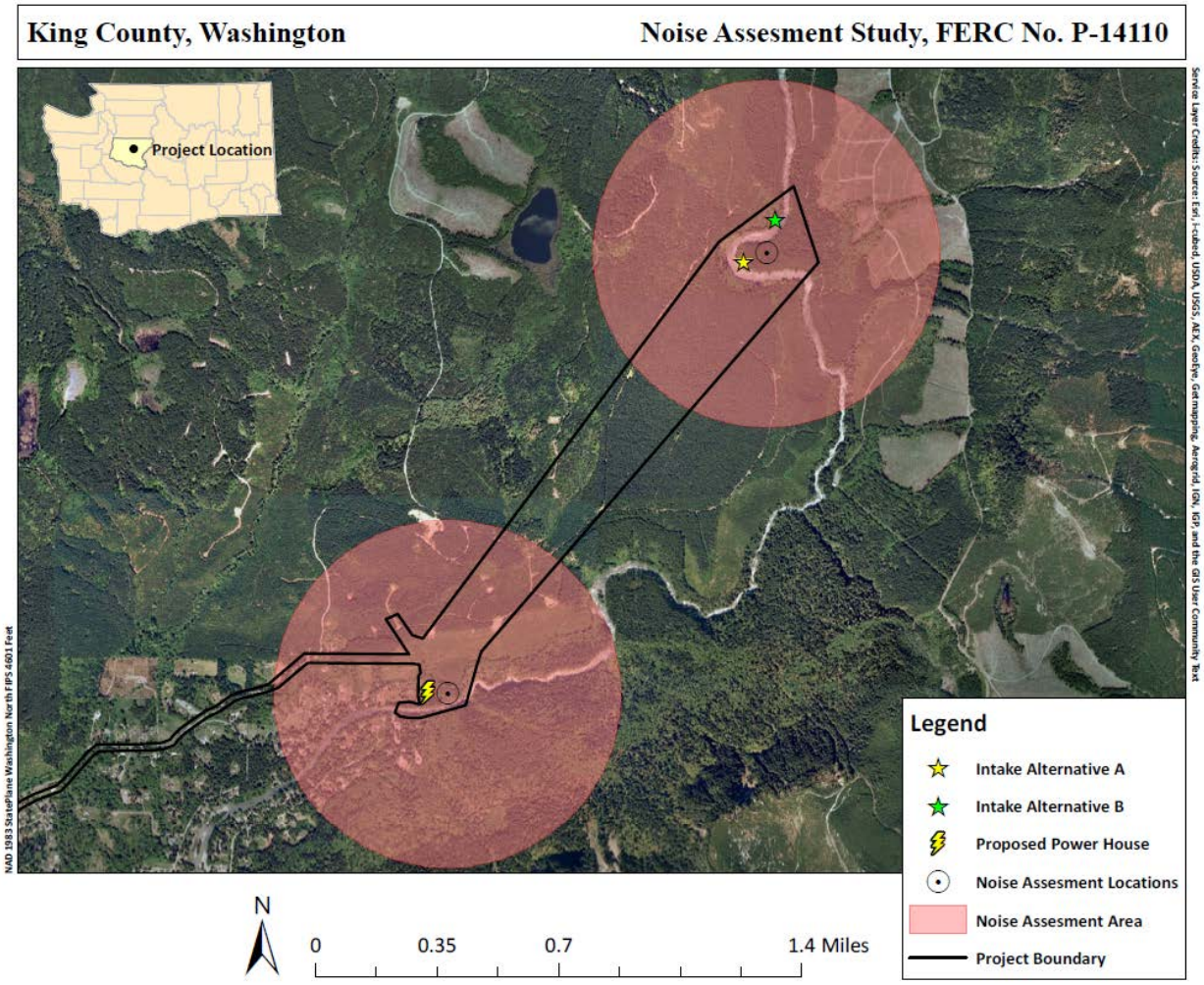
In accordance with 18 CFR §5.11(d)(6), the anticipated level of effort and cost are provided in Table 2 below.

The estimated cost of this work is approximately $14,000 depending on the extent of the impact area and the number of sites studies. One or two technicians would be expected to conduct the assessment, evaluate impacts, propose measures, and draft and finalize maps and reports.

Table 2. Level of Effort and Cost

Task	Labor and Expenses
Existing Conditions Data Collection	$3,000
Construction Noise Impacts Assessment	$3,000
Project Noise Impacts Assessment	$1,500
Noise Mitigation Assessment	$1,500
Technical Report& Revision	$3,000
Draft Report	$2,000
Total	$14,000

11 APPENDIX A: Anticipated Assessment Boundary & Measurement Locations



Alex Grant <alexgrant@tollhouseenergy.com>

Noise Study Plan Revision

1 message

Alex Grant <alexgrant@tollhouseenergy.com> Fri, Dec 20, 2013 at 5:18 PM
Bcc: Anne Savery <asavery@tulaliptribes-nsn.gov>, "Applegate, Brock A (DFW)" <Brock.Applegate@dfw.wa.gov>, Chris Spens <cspens@tollhouseenergy.com>, "darylwilliams@tulaliptribes-nsn.gov" <darylwilliams@tulaliptribes-nsn.gov>, "Ellis, Elizabeth" <elizabeth.ellis@dnr.wa.gov>, "jstangell@hnrg.com" <jstangell@hnrg.com>, "Kaje, Janne" <Janne.Kaje@kingcounty.gov>, "Kannadaguli, Monika (ECY)" <MKAN461@ecy.wa.gov>, Kate Miller <kmiller@tu.org>, Marjorie <suncatcher100@comcast.net>, Matthew Baerwalde <Mattb@snoqualmienation.com>, "Maynard, Chris (ECY)" <cmay461@ecy.wa.gov>, Pat Anderson <PAnderson@ci.snoqualmie.wa.us>, "rgarrow@northbendwa.gov" <rgarrow@northbendwa.gov>, Rich Bowers <Rich@hydroreform.org>, "Rochelle Knust (DNR)" <rochelle.knust@dnr.wa.gov>, "rr.wolfe@comcast.net" <rr.wolfe@comcast.net>, "Sandin, Randy" <randy.sandin@kingcounty.gov>, Susan Rosebrough <susan_rosebrough@nps.gov>, Thomas O'Keefe <okeefe@americanwhitewater.org>, "thrllc@hotmail.com" <thrllc@hotmail.com>, "tim_romanski@fws.gov" <tim_romanski@fws.gov>

Black Canyon Hydro, LLC has filed a revision to the Noise Study Plan with FERC today. Attached is a copy of that filing with a cover letter describing the circumstances warranting these changes and a revised study plan detailing what changes were made.

Thanks,

Alex Grant

--

Alex Grant | Licensing Coordinator | Whitewater Engineering | 3633 Alderwood Avenue, Bellingham, WA 98225 | Tel: 360-738-9999 | www.TollhouseEnergy.com

Whitewater Engineering is a Tollhouse Energy Company

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2 attachments

Cover_Letter_FINAL.pdf
78K

Noise_Study_Plan_REVISION_FINAL.pdf
251K

Submission ID	451950
Submission Description	Revision to Noise Study Plan of Black Canyon Hydro, LLC under P-14110.
Submission Date	12/20/2013 8:14:26 PM
Filed Date	12/23/2013 8:30:00 AM
Current Status	Final

Dockets

Docket	Description
P-14110-001	NOI/PAD/ILP

Files

Security Level	Filename
Public	Cover_Letter_FINAL.pdf
Public	Noise_Study_Plan_REVISION_FINAL.pdf

Filing Party/Contacts

Filing Party	Signer (Representative)	Other Contacts (Principal)
Black Canyon Hydro, LLC	cspens@tollhouseenergy.com	alexgrant@tollhouseenergy.com

Alex Grant <alexgrant@tollhouseenergy.com>

RE: Noise Study Plan Revision--Black Canyon Hydro

1 message

Applegate, Brock A (DFW) <Brock.Applegate@dfw.wa.gov> Mon, Dec 23, 2013 at 10:42 AM
To: Alex Grant <alexgrant@tollhouseenergy.com>

Hi Alex, Gray Wolves are State Endangered and unless something changed here recently, Federally Endangered. I am commenting on your statement than no threatened and endangered species have been found thus far. Perhaps you meant no threatened and endangered species have been found conclusively in the project area.

Thanks for forwarding us a copy of the letter and the revised Noise Study Plan.

Sincerely, Brock

Brock Applegate

Major Projects Mitigation Biologist

Washington Department of Fish and Wildlife

16018 Mill Creek Boulevard
Mill Creek, WA 98012-1541

(425) 775-1311 x310

(360) 789-0578 (cell)

(425) 338-1066 (fax)

From: Alex Grant [mailto:alexgrant@tollhouseenergy.com]
Sent: Friday, December 20, 2013 5:19 PM
Subject: Noise Study Plan Revision

Black Canyon Hydro, LLC has filed a revision to the Noise Study Plan with FERC today. Attached is a copy of that filing with a cover letter describing the circumstances warranting these changes and a revised study plan detailing what changes were made.

Thanks,

Alex Grant

--

Alex Grant | Licensing Coordinator | Whitewater Engineering | 3633 Alderwood Avenue, Bellingham, WA 98225 | Tel: 360-738-9999 | www.TollhouseEnergy.com

Whitewater Engineering is a Tollhouse Energy Company

This e-mail message and any attachments are confidential. Any dissemination or use of this information by a person other than the intended recipient is unauthorized. If you are not the intended recipient, please notify me by return e-mail, do not open any attachment and delete this communication and any copy. Thank you

Alex Grant <alexgrant@tollhouseenergy.com>

FERC Acceptance for Filing in P-14110-001

1 message

eFiling@ferc.gov <eFiling@ferc.gov> Mon, Dec 23, 2013 at 5:05 AM
To: alexgrant@tollhouseenergy.com, efilingacceptance@ferc.gov

Acceptance for Filing

The FERC Office of the Secretary has accepted the following electronic submission for filing (Acceptance for filing does not constitute approval of any application or self-certifying notice):

-Accession No.: 201312235059
-Docket(s) No.: P-14110-001
-Filed By: Black Canyon Hydro, LLC
-Signed By: Chris Spens
-Filing Type: ILP Proposed Study Plan or Revised Study Plan
-Filing Desc: Revision to Noise Study Plan of Black Canyon Hydro, LLC under P-14110.
-Submission Date/Time: 12/20/2013 8:14:26 PM
-Filed Date: 12/23/2013 8:30:00 AM

Your submission is now part of the record for the above Docket(s) and available in FERC's eLibrary system at:

http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20131223-5059

If you would like to receive e-mail notification when additional documents are added to the above docket(s), you can eSubscribe by docket at:

https://ferconline.ferc.gov/eSubscription.aspx

There may be a 10 minute delay before the document appears in eLibrary.

Thank you again for using the FERC Electronic Filing System. If you need to contact us for any reason:

E-Mail: efiling@ferc.gov mailto:efiling@ferc.gov (do not send filings to this address)
Voice Mail: 202-502-8258.

Black Canyon Hydroelectric Project
FERC Project No. P-14110
Revised Noise Study Plan
January 2013

Prepared for
Black Canyon Hydro, LLC
3633 Alderwood Avenue
Bellingham, WA 98225

Table of Contents

List of Tables

1 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 generation capacity of 25 megawatts (MW) and would be located entirely on private lands.

Intake Alternative A

Alternative A would consist of the following new facilities: (1) an 8-foot-high, 162.4-foot-long inflatable rubber diversion with an associated water intake structure; (2) a natural or roughened fish passage channel; (3) a variable pooling area behind the diversion with a normal water surface elevation of 971 feet above mean sea level and a maximum pooling of 2.83 acres; (4) a power conduit tunnel consisting of an approximately 450-foot-deep vertical tunnel into an approximately 8,350-foot-long, 9-foot-diameter horizontal tunnel and penstock; and (5) for access, Alternative A would utilize an existing logging road to minimize disturbance, and require only 825-feet of additional road.

Intake Alternative B

Alternative B would consist of the following new facilities: (1) a control sill to maintain a consistent river bottom elevation, which would allow water, fish, sediment, large woody debris, and whitewater recreationists to pass unimpeded, with an associated water intake structure; (2) a power conduit tunnel consisting of an approximately 450-foot-deep vertical tunnel into an approximately 9,175-foot-long, 9-foot-diameter horizontal tunnel and penstock; and (3) for access, Alternative B would utilize an existing logging road to minimize disturbance, and require only 500-feet of additional road.

Powerhouse

The power conduit tunnel and penstock from either Alternative A or B would terminate at the powerhouse proposed upstream of Ernie's Grove. Initially, the PAD described the powerhouse as being a metal building approximately 60-feet-wide by 100-feet-long. However, as a result of construction from the power conduit tunnel, an underground powerhouse of similar dimensions may be feasible. Tailrace dimensions have also been revised from a 60-foot-wide by 100-foot-long tailrace, to a 24-foot-wide by 200-foot-long tailrace. Whether above or below ground, the powerhouse would include two Francis turbine generator units, one rated at 16 MW and the other rated at 9 MW, as well as appurtenant facilities (switchyard, maintenance building, etc.). Additionally, a

temporary, 2,600-foot-long construction access road would extend from the powerhouse to the North Fork Road (while avoiding Ernie's Grove).

Transmission

As presented in the PAD, transmission would consist of a 4.2-mile-long, 115-kilovolt overhead transmission line that transmits project power to the regional grid (transmission line would be an over-build of an existing transmission line with only approximately 0.65 miles of new transmission). However, an additional option, depending on minimum instream flow requirements, land use designations, and cost, may be to have the Project connect to the existing 34 kV transmission line running from the existing Black Creek Hydroelectric Project to Snoqualmie Falls. A transmission line could be run from the powerhouse back through the power conduit to the intake structure. From the intake structure a buried or overhead transmission line would only have to travel approximately 6,745-feet along an existing logging road through clear cuts.

The project would operate in run-of-river mode. The combined maximum hydraulic capacity of the two project turbines would be 900 cubic feet per second (cfs). The project would divert water from a 2.6-mile-section of the North Fork Snoqualmie River.

BCH filed a Notice of Intent (NOI) and the associated Pre-Application Document (PAD) to commence the FERC Integrated Licensing Process on March 27, 2012. In response to the subsequent study requests filed by FERC staff and other stakeholders and as detailed in 18 CFR 5.11, BCH is required to submit relevant resource study plans. This includes a study of noise near the Project Reach which follows the requirements of 18 CFR 5.11(b)-(e).

2 STUDY DESCRIPTION AND OBJECTIVES

In accordance with 18 CFR §5.11(d)(1), this section describes the goals and objectives of the study and the information to be obtained. The goal of the noise assessment is to determine whether noise from construction and operation of the project, including project facilities and transport and staging areas, might affect area residents, private property owners, recreational users, cultural resources, and noise-sensitive wildlife species in the vicinity of project. The study will be designed to address the following specific goals:

- Characterize existing ambient noise levels within the audible range of the project;
- Estimate noise levels that would be generated by construction activities (e.g., transport of equipment, materials, and personnel; blasting; use of heavy equipment);

- Predict project-related sound levels;
- Determine if construction activities and operation of the project would be audible to sensitive wildlife, area residents, recreational users, or other sensitive receptors in the vicinity of the project; and
- Propose measures, as needed, to reduce, avoid, or mitigate noise impacts.

3 STUDY AREA

The proposed study area for this analysis includes lands and waters within and adjacent to the Project boundary which are within audible range of the project, including the residential areas of Ernie's Grove. More specifically, the study area consists of those areas within audible range of the project area from and adjacent to the proposed intake structure (including the pooling area), along the tunnel, and to the powerhouse, including the tailrace. It also includes locations within audible range of existing roads within and local access roads providing access to the project area as well as proposed new or extended roads, including the proposed intake access road and proposed powerhouse access road. The initial phase of the Noise Study will more accurately define the boundaries of the study area based on review of maps of the project vicinity.

4 RESOURCE MANAGEMENT GOALS

In accordance with 18 CFR §5.11(d)(2), this section describes resources management goals of agencies or Indian tribes with jurisdiction over the resources to be studied.

BCH is not aware of any applicable resource management goals of agencies or Indian tribes with jurisdiction over noise within the vicinity of the Project. Additionally, none were indicated by the FERC in their Noise Assessment Study Request. However, BCH would appreciate any stakeholder input on this subject.

5 EXISTING INFORMATION

In accordance with 18 CFR §5.11(d)(3), this section describes existing information on noise at the Project, and the need for additional information.

The project reach between the intake diversion structure and the powerhouse is approximately 2.6 miles long. The project area is zoned for forestry and has historically been managed as a commercial tree farm. Extensive commercial forestry operations are one significant source of noise in the area. The Project is also located adjacent to the

Mount Si Natural Resources Conservation Area (NRCA), with the Project Reach adjacent to the NRCA boundary.

Recreational users are common, particularly hunters, river kayakers, and holders of access permits issued by Hancock Forest Management (HFM). These access permits allow recreational access to lands owned by HFM and also allow collection of firewood. Ernie's Grove, an unincorporated community, is located immediately downstream of the proposed project area.

Completion of the Noise Study will require the following additional information:

- Existing ambient noise levels;
- Noise levels generated from construction and operation of the proposed Project;
- Potential sensitive noise receptors, including key habitat for noise-sensitive wildlife, within the study area; and
- Potential measures to reduce, avoid, or mitigate noise impacts, if necessary.

6 NEXUS TO PROJECT

In accordance with 18 CFR §5.11(d)(4), this section describes any nexus between Project operations and effects of noise.

Noise generated during construction and operation of the proposed project could adversely affect area residents, private property owners, and recreational users in the vicinity of the project and associated staging and construction areas. Although the project would be located several miles from the nearest city (North Bend), the associated infrastructure, the need for tunnel excavation, and material hauling could have potential noise effects on residents of Ernie's Grove, nearby private property owners, recreational users, and wildlife. The results of this study will help define the effects of the project and will inform the potential need to reduce, avoid, or mitigate noise impacts.

7 METHODS

In accordance with 18 CFR §5.11(d)(1) and §5.11(d)(5), this section provides a detailed description of the proposed study methodology, including data collection and analysis techniques, or objectively quantified information, sampling strategy, and a schedule including data collection and analysis techniques, or objectively quantified information, sampling strategy, and a schedule including appropriate field season(s) and the duration (see "Schedule" heading below for schedule).

7.1 Characterize Existing Ambient Noise Levels within the Audible Range of the Project

To accomplish this goal, BCH must first evaluate the acoustical footprint of the proposed project during both the construction and operational phases. With the area of potential impacts defined, BCH will measure and characterize the noise environment at receptors considered to be sensitive to project-related noise. Because traffic during construction and operation will pass residential locations and other sensitive receptors, traffic noise is an important element of the project. To evaluate noise generated by project-related vehicle traffic, hourly peak and average vehicle data and standard traffic mix estimates from the Washington State Department of Transportation (WSDOT) will be necessary. BCH will use the data generated during this evaluation to characterize existing ambient noise levels in the study area. Additional noise sources that may be characterized include ambient river noise and periodic noise as a result of logging activity and other area resource extraction activities.

7.1.1 Define Extent of the Boundary for the Noise Assessment

BCH will review maps in computer-aided design (CAD) format of the proposed Project site and of the construction areas, including staging and transportation routes. BCH will review publically available zoning and land-use data as well as digital topographic maps, information on existing sound sources (including vehicular traffic), and details of nearby land ownership to define the extent of potential impacts related to Project construction and operation. BCH anticipates noise-sensitive receptors will include nearby locations where quiet is germane to a receptor's use. These areas include (but are not limited to) residential areas, parks, churches, cemeteries, schools, critical wildlife habitat (identified through "Wildlife, Vegetation, and Sensitive Habitats Study Plan), and sites of cultural significance to Native Americans.

7.1.2 Sound Level Measurements

Once the extent of the noise assessment boundary has been defined (anticipated boundary is ½ mile radius around both intake and powerhouse sites), BCH will conduct sound-level measurements to characterize the existing ambient noise levels at selected receptor locations. BCH anticipates sound level measurements will be required in Ernie's Grove near the powerhouse location and near the two possible intake locations (up to a maximum of five measurement locations if additional locations are determined necessary). The "Wildlife, Vegetation, and Sensitive Habitats Study Plan" may identify particular species of concern which may necessitate additional noise sampling (or modeling). Measurements will be conducted by field technicians trained in deployment

and operation of sound level measurement instruments and in collecting data measurements from these instruments. BCH will collect sound-level measurements at each identified measurement site four times. Measurements will be collected at each site once in the fall (defined as September, October, and November), once in the winter (defined as December, January, and February), once in the spring (defined as March, April, and May), and once in the summer (defined as June, July, and August). Further, when taking the four sound-level measurements, BCH will collect data once in the morning, once in the afternoon, once in the evening, and once at night.

Measurements will be taken with International Electrotechnical Commission Standard 61672-1-2003-compliant Type 1 integrating sound-level meters capable of recording and storing sound level metrics suitable to comparison with applicable King County noise criteria (KCC 12.88). Further, the collected sound level data will be sufficient to characterize the ambient noise environment relative to sound-level frequencies (defined over the audible range of human hearing) and types of existing noise sources (i.e., traffic, birds, residential noises, etc.). The ultimate goal of ambient sound level measurements will be to provide a basis for developing quantitative and qualitative conclusions regarding the potential for noise impacts following predictive noise modeling.

BCH will deploy sound-level meters during periods of dry, calm weather. Should inclement weather disrupt or interfere with sound-level data, repeat measurements or extended measurement periods may be required.

7.2 Estimate Noise Levels That Would Be Generated by Construction Activities

Construction noises are expected to include on-site construction activities, staging area activities, transportation of materials to and from staging and construction areas, and blasting. Activities in the construction and staging areas could include operation of heavy construction equipment, including excavators, bulldozers, loaders, cranes, pneumatic drills, rock-breakers, compressors, hand-tools, and other machinery. To estimate noise levels from these activities, BCH will use a combination of techniques based on the types of construction source being evaluated. Noise estimates will be completed for the noise-sensitive locations identified during the analysis described in Section 7.1.1.

Noise from typical construction equipment will be estimated using the Federal Highways Administration (FHWA) Roadway Construction Noise Model (RCNM). The RCNM contains a data base of typical noise levels from standard construction equipment and

allows the user to predict noise levels based on receptor distances and equipment usage. Although this model was developed to estimate noise levels from roadway construction, it is often used to estimate noise levels generated during other construction projects.

Noise levels from construction equipment that are not defined in RCNM but that are expected to be used as part of the construction of this Project, and that are expected to be acoustically significant, will be further assessed using alternate methods. These alternate methods may include predictive noise modeling using equipment manufacturer data combined with predictive noise modeling using the CadnaA noise model (defined below).

Blasting noise will be evaluated through literature review of typical blasting noises and/or predictive noise modeling using CadnaA.

Noise related to transportation of materials to and from the active construction and staging areas will be estimated using the FHWA Traffic Noise Model (TNM) version 2.5. TNM allows for consideration of vehicle mixes (i.e., volume of heavy trucks, medium trucks, or light-duty vehicles), vehicle speeds, topography, and other parameters. TNM also allows for assessment of traffic noise levels at multiple noise-sensitive receptors. Topographical information collected as part of the review described in Section 7.1.1 will be used to construct the TNM model.

The noise modeling area can be determined via preliminary noise modeling runs using worst-case assumptions of meteorology, surface reflectivity and vegetation, significant construction and operation equipment noise sources, and traffic.

Noise levels during the construction and operational phases will be calculated for the entire noise modeling domain using the CadnaA noise model, Version 4.0.135, based on the International Standards Organization (ISO) guidance for noise modeling ISO 9613-2. The CadnaA noise model is a comprehensive noise prediction tool that allows for consideration of multiple noise sources and multiple noise receptor locations. Further it allows for consideration of complex topography, intervening ground type, vegetation, intervening structures such as buildings, meteorology, receptor locations, and other parameters. The model accounts for terrain and allows for assessment of both point and linear sources, such as roads. Blasting is an impulse noise that is also handled by the model, but ground-borne vibration is not included. The model accounts for increases in roadway grades where noise generated by traffic, especially heavy trucks, would be expected to be higher.

Although the model allows for determination of noise shielding provided by vegetation, model runs with and without vegetation may be needed to provide a worst-case assessment of noise in the event portions of the study area are logged or burned by wildfire.

The CadnaA model has been proposed in lieu of the SPreAD noise prediction tool suggested by FERC to provide a more comprehensive and dynamic approach to assessing noise levels and responding to changes in project design. Unlike the SPreAD tool which calculates levels from a single source at a single receiver, CadnaA allows the user to evaluate multiple noise sources and multiple receivers built into a 3-dimensional model that accounts for topography, various ground cover types, meteorological conditions, and various other elements that may affect noise transmission. Once built, the model can be easily manipulated to assess changes in design or source/receptor locations. In addition, sound level isopleths can be generated to visually assess the range extent of noise from specific equipment or scenarios. The level of effort required to evaluate noise levels through a limited number of CadnaA runs is comparable if not more cost effective than defining multiple SPreAD scenarios.

7.3 Predict Project-Related Sound Levels

Sound levels generated during the operational phase of the project will be estimated using noise level details of each source of equipment proposed as part of Project operations (i.e., generators, compressors, cooling towers, turbines, etc.) and the geographical location of each noise source within the proposed Project site layout. Noise modeling will be completed using the CadnaA noise model, version 4.0.135 or later, based on ISO 9613-2 guidance (Section 7.2). Noise estimates will be completed for the noise-sensitive locations identified during the analysis described in Section 7.1.1.

The CadnaA model will be developed using sound level data of equipment and activities proposed for the Project, as well as details about geographic location and operating extents of all equipment. The model will include detailed terrain information for the entire project site as provide by the project developers. The model will use the topographical data for the project vicinity (i.e., extending out toward noise-sensitive receptors) to be collected as described in Section 7.1.1.

Sound level information for operation equipment shall be made available in 1/1 or 1/3 octave sound pressure levels at a specified distance or sound power levels. For sound

source data that are not available for inclusion in the noise model, BCH proposes taking sound level measurements of representative sources (e.g., measurements at a facility similar to the proposed Project). As an example of a representative source, the Twin Falls project, a small 24 MW hydroelectric facility located on the South Fork Snoqualmie River, approximately five miles southeast of North Bend, Washington, might be selected. Major project features include: (a) a 65-foot long, 9-foot high collapsible steel diversion weir; (b) two 450-foot long by 8-foot diameter vertical intake shafts conveying water to an underground powerhouse; (c) a 3,820-foot long outlet tunnel; (d) two 12,000 kilowatt (kW) generating unites with a combined hydraulic capacity of 710 cfs; and (e) a 1.1-mile long project bypass reach. Twin Falls might be used as a representative source because it is similar in size, operates in a run-of-river mode, includes long vertical shafts to deliver water to an underground powerhouse, and uses a collapsible diversion structure.

7.4 Determine if Construction Activities and Operation of the Project Would Be Audible to Area Residents, Recreational Users, or Other Sensitive Receptors in the Vicinity Of The Project

Results of the construction noise estimates and operational noise modeling assessments will be tabulated and compared with applicable King County sound level limits for construction and facility operation, respectively. Results will be tabulated for the noise-sensitive locations identified based on the evaluation described in Section 7.1.1.

Further, predicted construction and operational noise levels will be compared with the ambient sound level measurement data collected at each noise-sensitive receptor location. Conclusions on the potential for perceived sound level impacts and audibility of operation and construction will be based on estimated increases over ambient levels. In general, sound levels that are 3 to 5 decibels (A-weighted scale) (dBA) greater than ambient conditions can be expected to be audible at noise-sensitive locations. The severity of perceived impacts will be based on the time of day during which the sound level are estimated, and the overall level of ambient noise (i.e., very quiet rural environments are typically more sensitive to extraneous noise sources).

Conclusions on adherence to the King County limits and perceived impacts will be made for each receptor during all four calendar seasons.

Potential noise impacts on wildlife will also be taken into consideration when conducting the noise analysis. The project area is actively managed as timberlands, has been frequently altered by human activities, and may have diminished use as habitat for

sensitive wildlife species. However, active management of timberlands does not rule it out as habitat for sensitive species, especially common raptors and nocturnal species (peregrine falcons, ospreys, Northern Goshawks, and bats for example). Also, the nearby Mount Si NRCA contains areas of old growth forest that may provide habitat for a variety of sensitive wildlife species, including the peregrine falcon, marbled murrelet, and spotted owl, and portions of the adjacent Mt. Baker-Snoqualmie National Forest also may lie within audible range of the project. The noise study will include an evaluation of potential noise effects on wildlife species within the project area and on other lands within audible range of the project. The Washington Department of Fish and Wildlife and the U.S. Fish and Wildlife Service also maintain species specific recommendations for disturbance buffers, which may be used for species of concern identified in the "Wildlife, Vegetation, and Sensitive Habitats Study Plan."

We assume the applicable analysis would include an evaluation of how noise from the project would affect lands in the Mt. Baker-Snoqualmie National Forest under the Northwest Forest Plan. BCH will evaluate how noise emitted by the various phases of the project may potentially affect resources and sensitive receptors.

7.5 Propose Measures, as Needed, to Reduce, Avoid, or Mitigate Noise Impacts

If significant noise impacts are predicted (i.e., noise levels exceed King County limits or ambient conditions by at least 3 dBA), noise mitigation may be considered. Noise mitigation may include equipment substitutions, soundproofing enclosures, barrier walls, and restrictions on operational periods. Potential mitigation for construction activities will be based on a qualitative review of the expected effectiveness of noise-mitigation techniques, such as mufflers, equipment enclosures, alternative back-up alarms, adjustments to seasonal-timing, time of day, etc. The expected mitigating effect of operational noise mitigation will be estimated using the CadnaA noise model.

8 PROGRESS REPORTING

In accordance with 18 CFR §5.11(b)(3), this section describes provisions for periodic progress reports, including the manner and extent to which information will be shared; and the time allotted for technical review of the analysis and results.

Study reports will be submitted as required by the FERC Integrated Licensing Process (ILP). The most recent schedule, issued by FERC in Appendix B of Scoping Document 1, includes a number of opportunities for progress reports, exchange of analysis and results between stakeholders, and information sharing. After proposed study plans are

filed with FERC there will be a study plan meeting and comment period before a revised study plan is filled and a comment period passes. Once studies begin, the ILP also has deadlines for an Initial Study Report to be submitted, an Initial Study Report Meeting, and an Initial Study Report Meeting Summary. However, this schedule is subject to change by FERC staff and should not necessarily be relied upon. It is BCH's understanding that any changes to the ILP plan and schedule will be noticed by FERC staff.

Prior to the completion of the Initial Study Report, BCH will provide an opportunity for technical review of the draft study results and analysis. When the draft version of the Initial Study Report has been completed, it will be posted to the project website (www.blackcanyonhydro.com) and BCH will send notice of its availability by e-mail to contacts included on the mailing list identified in the "Revised Communication and Information Protocol" (filed electronically with the FERC on November 27, 2012). Stakeholders will have 15-days from the issuance of this notice to provide written comments to BCH through the project website's "Contact" tab.

9 SCHEDULE

In accordance with 18 CFR §5.11(b)(2), the schedule for conducting the study is provided in Table 1 below.

Table 1. Resource Study Schedule

Component	Completion Date*
Define Boundary	Early 2013
Sound Level Measurements	2013 (one sampling during each season)
Draft Report	Late 2013
Draft Initial Study Report Notice & Informal Comment Period	Winter 2013
Initial Study Report filed with FERC	February 6, 2014

*Dates based on schedule created and presented by FERC in Scoping Document 1 and subject to change.

10 LEVEL OF EFFORT AND COST

In accordance with 18 CFR §5.11(d)(6), the anticipated level of effort and cost are provided in Table 2 below.

The estimated cost of this work is approximately $56,590 depending on the extent of the impact area and the number of sites studies. One or two technicians would be expected to

conduct the assessment, evaluate impacts, propose measures, and draft and finalize maps and reports.

Table 2. Level of Effort and Cost

Task	Labor and Expenses
Existing Conditions (SLM) Data Collection	$11,290
SLM Data Analysis	$10,400
Construction Noise Impacts Assessment	$7,600
Project Noise Impacts Assessment	$5,500
Noise Mitigation Assessment	$4,400
Technical Report, Meeting, & Revision	$13,400
Draft Report	$4,000
Total	$56,590

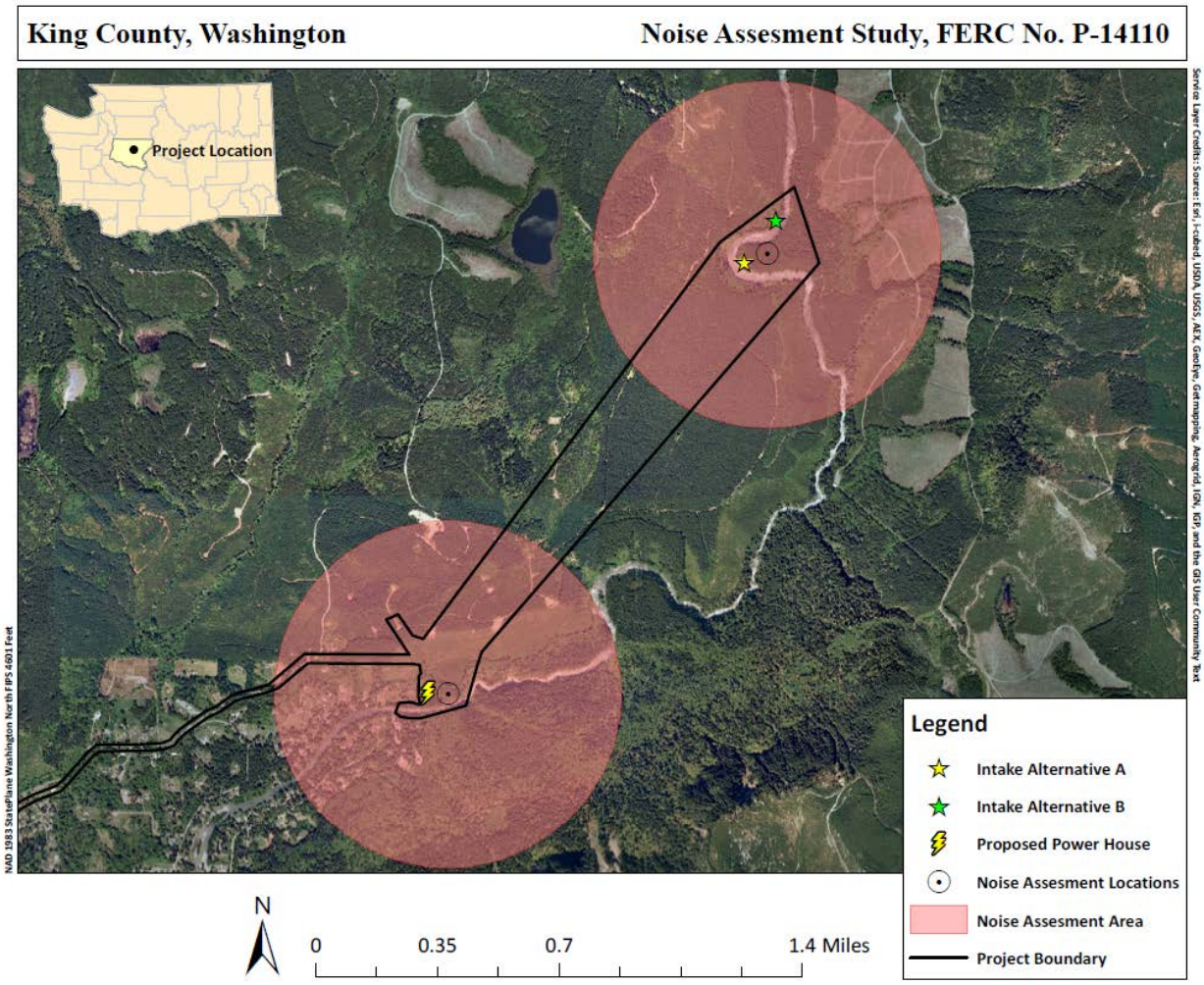
11 REFERENCES

King County. 2012. "King County Code, Title 12, Public Peace, Safety and Morals, Chapter 12.88 Environmental Sound Levels." http://www.kingcounty.gov/council/legislation/kc_code/15_Title_12.aspx#_Toc322610558. Accessed August 7, 2012.

USFS (US Forest Service). 1990. "Mt. Baker-Snoqualmie National Forest land and resource management plan." Department of Agriculture, Seattle, Washington. June 1990. pp. E 217 223.

USDA and USDOI (U.S. Department of Agriculture/U.S. Department of the Interior), 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. April 13, 1994.

12 APPENDIX A: Anticipated Assessment Boundary & Measurement Locations



Appendix B. Noise Calculation Spreadsheets

Noise Impact Assessment - Extent of Noise Impacts During Project Construction at Intake

Input Values		
Ambient Noise Level	**71.1**	**dBA**
Construction Noise Level	**111**	**dBA**
Construction Noise Type	Point Source	
Site Type	Soft	
Avian Behavioral Effects Threshold	**70**	dBA
KCC Maximum Permissible Sound Threshold	**52**	dBA
Reference Measurement Distance	**3**	feet

Traffic Noise
Line Source - 3 dB attenuation rate

Construction Noise Type
Line Source - 3 dB attenuation rate
Point Source - 6 dB attenuation rate

Site Type
Hard Site - flat, hard surface such as water, concrete, or hard-packed soil
Soft site - normal ground cover or unpacked earth additional 1.5 dB attenuation rate

Calculate

Calculated Results		
Distance for Construction Noise to Attenuate to Avian Behavioral Effects Threshold	131	**feet**
Distance for Construction Noise to Attenuate to KCC Maximum Permissible Sound Threshold	687	**feet**
Distance for Construction Noise to Attenuate to Ambient Noise	118	**feet**

Distance for Noise to attenuate from upper to lower level

$D = D_0 * 10^{((\text{Upper Noise Level - Lower Noise Level})/\alpha)}$

D_0 = reference meaurement distance (50 feet is the standard)

For Point Sources:
$\alpha_{soft} = 25$, $\alpha_{hard} = 20$

For Line Sources:
$\alpha_{soft} = 15$, $\alpha_{hard} = 10$

For construction noise attenuation to traffic noise:
$\alpha = 10$

Noise Impact Assessment - Extent of Noise Impacts During Project Operation at Intake

Input Values		
Ambient Noise Level	**71.1**	**dBA**
Construction Noise Level	**54**	**dBA**
Construction Noise Type	Point Source	
Site Type	Soft	
Avian Behavioral Effects Threshold	**70**	dBA
KCC Maximum Permissible Sound Threshold	**52**	dBA
Reference Measurement Distance	**3**	feet

Traffic Noise
Line Source - 3 dB attenuation rate

Construction Noise Type
Line Source - 3 dB attenuation rate
Point Source - 6 dB attenuation rate

Site Type
Hard Site - flat, hard surface such as water, concrete, or hard-packed soil
Soft site - normal ground cover or unpacked earth additional 1.5 dB attenuation rate

Calculate

Calculated Results		
Distance for Construction Noise to Attenuate to Avian Behavioral Effects Threshold	1	**feet**
Distance for Construction Noise to Attenuate to KCC Maximum Permissible Sound Threshold	4	**feet**
Distance for Construction Noise to Attenuate to Ambient Noise	1	**feet**

Distance for Noise to attenuate from upper to lower level

$D = D_0 * 10^{((\text{Upper Noise Level - Lower Noise Level})/\alpha)}$

D_0 = reference meaurement distance (50 feet is the standard)

For Point Sources:
$\alpha_{soft} = 25$, $\alpha_{hard} = 20$

For Line Sources:
$\alpha_{soft} = 15$, $\alpha_{hard} = 10$

For construction noise attenuation to traffic noise:
$\alpha = 10$

Noise Impact Assessment - Extent of Noise Impacts During Project Construction at Tailrace

Input Values		
Ambient Noise Level	**68**	**dBA**
Construction Noise Level	**126**	**dBA**
Construction Noise Type	Point Source	
Site Type	Soft	
Avian Behavioral Effects Threshold	**70**	dBA
KCC Maximum Permissible Sound Threshold	**52**	dBA
Reference Measurement Distance	**3**	feet

Calculate

Traffic Noise
Line Source - 3 dB attenuation rate

Construction Noise Type
Line Source - 3 dB attenuation rate
Point Source - 6 dB attenuation rate

Site Type
Hard Site - flat, hard surface such as water, concrete, or hard-packed soil
Soft site - normal ground cover or unpacked earth additional 1.5 dB attenuation rate

Calculated Results		
Distance for Construction Noise to Attenuate to Avian Behavioral Effects Threshold	521	**feet**
Distance for Construction Noise to Attenuate to KCC Maximum Permissible Sound Threshold	2736	**feet**
Distance for Construction Noise to Attenuate to Ambient Noise	627	**feet**

Distance for Noise to attenuate from upper to lower level

$D = D_0 * 10^{((\text{Upper Noise Level - Lower Noise Level})/\alpha)}$

D_0 = reference meaurement distance (50 feet is the standard)

For Point Sources:
$\alpha_{soft} = 25$, $\alpha_{hard} = 20$

For Line Sources:
$\alpha_{soft} = 15$, $\alpha_{hard} = 10$

For construction noise attenuation to traffic noise:
$\alpha = 10$

Noise Impact Assessment - Extent of Noise Impacts During Project Operation at Tailrace

Input Values		
Ambient Noise Level	**68**	**dBA**
Construction Noise Level	**68**	**dBA**
Construction Noise Type	Point Source	
Site Type	Soft	
Avian Behavioral Effects Threshold	**70**	dBA
KCC Maximum Permissible Sound Threshold	**52**	dBA
Reference Measurement Distance	**3**	feet

Traffic Noise
Line Source - 3 dB attenuation rate

Construction Noise Type
Line Source - 3 dB attenuation rate
Point Source - 6 dB attenuation rate

Site Type
Hard Site - flat, hard surface such as water, concrete, or hard-packed soil
Soft site - normal ground cover or unpacked earth additional 1.5 dB attenuation rate

Calculate

Calculated Results		
Distance for Construction Noise to Attenuate to Avian Behavioral Effects Threshold	2	**feet**
Distance for Construction Noise to Attenuate to KCC Maximum Permissible Sound Threshold	13	**feet**
Distance for Construction Noise to Attenuate to Ambient Noise	3	**feet**

Distance for Noise to attenuate from upper to lower level

$D = D_0 * 10^{((\text{Upper Noise Level - Lower Noise Level})/\alpha)}$

D_0 = reference meaurement distance (50 feet is the standard)

For Point Sources:
$\alpha_{soft} = 25$, $\alpha_{hard} = 20$

For Line Sources:
$\alpha_{soft} = 15$, $\alpha_{hard} = 10$

For construction noise attenuation to traffic noise:
$\alpha = 10$