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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 Groundwater Study Plan

Dear Secretary Bose,

Black Canyon Hydro (BCH) proposes certain revisions to the groundwater study plan due to new 2013 field study observations and significant Project design changes.

The primary objective of the original groundwater study plan was to determine if there would be any interaction between the proposed Project development and operation on the capacity and sustainability of the City of Snoqualmie groundwater supply known as Canyon Springs.

BCH has subsequently completed a Preliminary Geotechnical Findings Report, filed concurrently on this date.

Based in part on the findings and recommendations of the report, BCH intends to relocate the powerhouse from the original tailrace location near Ernie's Grove upstream and directly underground at the proposed intake site. In addition, the tunnel corridor would be relocated both deeper than and farther to the west of the Canyon Springs aquifer recharge area in bedrock thereby reducing any significant potential for water exchange. The spatial relationship of the Canyon Springs water source and the proposed tunnel is shown on plan and cross section, Drawing No's 300 & 303 of the Preliminary Geotechnical Findings Report.

BCH has also considered a total of four different intake types at the two different locations previously identified in the original study plan. The new proposed intake facilities now referred to as alternatives "C" and "D" are also located on the river bend where alternative "A" is situated, but the actual bulk water intake structure is located farther upstream where bedrock outcropping is observed in mid-channel.

Based on the Preliminary Geotechnical Findings Report, the Project reach is located substantially incised within or immediately upon bedrock. Field observations throughout the dry season months document numerous seeps and springs entering the river throughout the Project reach. Discharge measurements at the intake site gage and lower site gage below the tailrace show a slight increase in discharge at the lower gage during the dry season indicating base flow contribution throughout the Project reach. In addition, lower water temperatures were also recorded at the lower gage than at the upper gage during the summer months as well. These observations tend to support the probability of a net discharge of groundwater to the Project reach.

BCH also notes that it is unlikely that the Project would be licensed to operate at any time that there was insufficient flows to maintain at least 50cfs minimum instream flow throughout the Project reach. Natural low flows fall below 50cfs routinely throughout the driest summer periods.

Based on the Preliminary Geotechnical Findings Report combined with the Project design revisions, BCH is now filing a revised 2014 Groundwater Study Plan and 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 Hydroelectric Project
FERC Project No. P-14110
Proposed 2014 Groundwater Study Plan
February 2014

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

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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 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.

PROJECT DESIGN

Intake

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

Both alternatives would have a (1) control sill to control the normal water surface elevation and maintain a consistent river bed elevation for a side channel bulk-water intake. The control sill would consist of a concrete weir with boulders inset on the surface over top of a sheet pile cutoff wall to capture hyporheic flow. The sill would be

at the newly established grade of the river bed and would allow uninterrupted flow through a natural looking re-profiled river as a roughened channel series of step pools, riffles, and boulder weirs. (2) An intake structure with a coarse trashrack, jib crane, and radial gate with sluiceway located on the east bank of the river. Diverted water would be conveyed through; (3) an open channel to a; (4) head gate control structure and into a; (5) fish and debris screening structure. (6) Fish and debris would be screened and bypassed back into the river. Screened water would then flow through a power conduit to the underground powerhouse. (7) Access to the intake site would use an existing logging road and approximately 400 feet of new roadway extending to the intake site.

Powerhouse

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

Tailrace

The tailrace will be an approximately (1) 8,600 foot long 12 foot diameter tunnel, and is anticipated to be constructed primarily in bedrock. The tailrace water return to the North Fork would be located at approximately the same location as proposed in the PAD at approximately RM 2.6.

Transmission

Transmission would consist of a 34.5-kilovolt (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.

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 this study is to evaluate existing groundwater supplies, particularly the City of Snoqualmie's water supply source (termed "Canyon Springs") that may be affected by construction and operation of the proposed project, and to assess the potential effects of the project on groundwater supply in the study area. If potential adverse impacts to water supply sources are identified, with a focus on the City of Snoqualmie's water supply source, the study will outline steps to monitor the groundwater system to identify impacts as early as possible and propose mitigation options to reduce any significant adverse impacts when identified.

The study will be carried out to achieve the following objectives:

- Objective 1: Identify water rights holders, in addition to the City of Snoqualmie, that have groundwater or spring use rights in the study area that could be affected by the proposed project.
- Objective 2: Obtain records from the City of Snoqualmie regarding their use of the water source which may include daily, monthly, and annual volumes of water withdrawn and the percent of the City's requirements met therefrom. Determine current and future maximum use from this source.
- Objective 3: Estimate the range in storage capacity of the gravel aquifer at Canyon Springs by estimating the areal extent and depth of the aquifer, the porosity, the recharge from rainfall and the seasonal fluctuation.
- Objective 4: Conduct a preliminary geotechnical report in the area of the proposed intake**,** penstock, powerhouse and tailrace tunnel to estimate the depths to bedrock, degree of isolation and the probability of constructing said features without interfering with the groundwater storage, availability and certainty of the Canyon Springs municipal water source.

3 STUDY AREA

The groundwater study area will include:

- The areas within a defined portion of the watershed of the North Fork that are potentially within the zones of influence of the potentially affected City of Snoqualmie Canyon Springs aquifer recharge area.

4 RESOURCE MANAGEMENT GOALS

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

A primary focus is the "Canyon Springs" water resource and potential impacts to the City of Snoqualmie water supply collection system. The main resource management goal is to understand whether the municipal water supply that is derived from the perched groundwater zone would be adversely affected by the construction and operation of the proposed project. Compiling existing information on current uses, projected uses for the life of the proposed project, and hydrogeological information about the nature of the aquifer will allow prediction of any potential adverse impacts on municipal water supply.

Another resource management goal is to evaluate the potential for the diversion to have adverse impacts on wetlands, if any, within the study area. Wetland survey and identification will occur as part of the Vegetation Habitat, Rare Plants and Wildlife Study Plan. If any wetlands are found, this aspect of groundwater study will be carried out.

5 EXISTING INFORMATION

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

Canyon Springs is located upstream of the proposed tailrace, where the contact of an unconsolidated sand and gravel unit with the underlying bedrock is exposed in the canyon wall on the northwest side of the river. The hydrogeologic unit of focus in the study area is the predominantly glacially-derived outwash and alluvial sands and gravels with a thickness of approximately 300-feet and with an apparent perched groundwater zone. This unit is underlain by relatively impermeable pre-Tertiary metasediments and metavolcanics. Upstream of the proposed tailrace location, the geologic contact between the outwash gravels with the underlying bedrock is exposed as the river downcuts through the contact. The perched groundwater discharges as springs that form at the exposed contact.

Based on information provided by the Washington State Department of Ecology's Water Rights Explorer, there are four water rights holders in the study area, as shown below:

File Number	Name of Record	Document Type	Water Right Class	Priority Date	CFS	Source
S1-28645	Snohomish County PUD 1	New App	Surface water	01/11/10	30	Unnamed
S1-24092	Black Creek Hydro, Inc.	Certificate	Surface water	04/08/82	40	Black Creek
S1-06205CWRIS	Snoqualmie City	Certificate	Surface water	10/18/44	2	Canyon Springs
G1-26617(A)	City of North Bend	Permit	Ground water	06/16/92	2.646[1] 3.094[2]	Well NB-3

Note(s)
1. Maximum gallons per minute
2. Maximum acre-feet per year
cfs = cubic feet per second

Of the four water rights holders identified, only the City of Snoqualmie, File Number S1-06205CWRIS, appears to be in the study area and has any potential to be affected by the project. BCH observed the location of this water source during a site visit on August 2, 2012. Water is extracted by the City of Snoqualmie with a passive collector, described as a perforated drain pipe, which is positioned to collect up to 2 cfs. Canyon Springs is interpreted to be located at an exposure of the contact between the coarse glacial outwash with the relatively impermeable bedrock below. This stratigraphic contact is exposed in the wall of Black Canyon. The river has down-cut through the contact of the units and water is discharged at a high rate as a surface spring. On the day observed, a significant amount of surface water flowed from the area, despite the City's passive collection system in place.

Water that is to be diverted at the proposed intake location (40 to 900 cfs) is at times only a fraction of the total discharge of the North Fork. All diverted water is returned to the river at the tailrace. There is a 2.7-mile Project Reach that will continue to have significant flow rates at or above typical natural low flows even when the Project is in operation. Flows will be maintained between prescribed minimum flow requirements up to peak natural discharges.

6 NEXUS TO PROJECT

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

Construction and operation of the Black Canyon Hydroelectric Project could affect groundwater supplies in the study area in the absence of siting and constructing facilities in a manner to avoid interference with groundwater supplies.

This study will help define the potential for effects of the project on the groundwater storage capacity in the perched aquifer, and whether, and to what degree, the municipal water utilization rates could be seasonally impacted by diverting the surface water during the project operation. If significant impacts could occur, based on the study results, the study will propose mitigation options, including early warning monitoring, operational changes, and alternative supply measures so municipal supply is affected.

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 and a schedule for carrying out and concluding the study (see "Schedule" heading below).

This section lays out specific methods to address the study objectives identified above.

The proposed methodology for each of the study objectives are discussed below:

7.1 Identify Water Right Holders

In addition to the City of Snoqualmie, BCH will identify other water rights holders that have groundwater or spring use rights in the study area that could be affected by the proposed project by obtaining records from the Washington State Department of Ecology.

7.2 Records Request to City of Snoqualmie

BCH will request records from the City of Snoqualmie of their use of the Canyon Springs water source, including daily, monthly and annual volumes of water removed; the percentage of the City's requirements that Canyon Springs represents, what the additional water sources for the City are, and projected use of the water source for the duration of

the proposed project life. Water quality information will be requested for use in the water quality study, including any information on current treatment of the water prior to use as a municipal water supply. Information collected that is relevant to this and other study plans will be organized and summarized, and evaluated for use in subsequent tasks.

7.3 Estimate Aquifer Conditions

BCH will use available information to estimate aquifer conditions. Boring logs from two deep borings in the study area provide information on the soil gradation and stratigraphy. From this information, and surficial geologic mapping from earlier studies, BCH can make preliminary estimates of the aquifer parameters, including areal extent and depth of the aquifer, the porosity, hydraulic conductivity, storage capacity, recharge from rainfall, and how the groundwater supply fluctuates seasonally.

7.4 Preliminary Geotechnical Survey to Estimate Depth to Bedrock

BCH will conduct a preliminary geotechnical survey in the area to estimate the depths to bedrock where physical access is permitted. Depending on site access constraints, additional geophysical surveys may be conducted up slope from Canyon Springs, at the proposed intake and powerhouse sites, and along the water conveyance tunnel alignment, to further evaluate variations in the depth to the top of the bedrock across the site. The geophysical methods to be used will be a combination of seismic refraction, electrical resistivity tomography, and multi-channel analysis of surface waves.

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. 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. BCH understands that any changes to the ILP plan and schedule will be noticed by FERC staff.

Additionally, both BCH and the City of Snoqualmie believe it would be helpful to maintain a regular progress reporting directly with the City of Snoqualmie on issues related to "Canyon Springs." BCH representatives have met periodically with City of Snoqualmie staff to review and exchange pertinent information regarding this investigation.

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 at least 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*
Identify water rights holders in study area. Obtain and evaluate City of Snoqualmie information on "Canyon Springs" use. Estimate aquifer conditions	May 2013
Geophysical survey	August 2012
Draft Initial Study Report	Spring 2014
Initial Study Report Due	Per FERC, 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.

Total costs for a groundwater study are shown in Table 2 below.

Table 2. Level of Effort and Cost

Task	Labor and Expenses
Identify Water Rights Holders in Study Area	$1,000
Obtain and Evaluate City of Snoqualmie Information on Canyon Springs Use	$4,000
Estimate Aquifer Conditions	$8,000
Geophysical Survey	$27,000 (initial phase)
Complete Initial Study Report	$4,000
Total	$44,000

11 REFERENCES

A reference list has been developed that provide sources of information that are pertinent to this study plan and that will be used in the proposed study. Relevant references include the following:

Bethel, John. 2004. An Overview of the Geology and Geomorphology of the Snoqualmie River Watershed, Prepared for King County Water and Land Resources Division Watershed Team, p. 51.

Booth, D. B. 1990. Surficial Geologic Map of the Skykomish and Snoqualmie Rivers Area, Snohomish and King Counties, Washington: U.S. Geological Survey Miscellaneous Investigations Series Map I-1745, 2 sheets, scale 1:50,000, with 22 p. text.

Booth, D. B. 1986. The formation of ice-marginal embankments into ice-dammed lakes in the eastern Puget Lowland, Washington, U.S.A., during the late Pleistocene: Boreas, v. 15, no. 3, p. 209-264.

Booth, D. B. 1984. Glacier dynamics and the development of glacial landforms in the eastern Puget Lowland, Washington: University of Washington Doctor of Philosophy thesis, 217 p., 1 plate.

Booth, D. B. and Hallet, B. 1993. Channel networks carved by subglacial water: observations and reconstructions of the eastern Puget Lowland of Washington; Geological Society of America Bulletin, v. 105, p. 67-683.

Bradford, D. C.; Waters, A. C. 1934. The Tolt River earthquake and its bearing on the structure of the Cascade Range: Seismological Society of America Bulletin, v. 24, no. 2, p. 695-707.

Dragovich, J. D.; Littke, H. A.; Anderson, M. L.; Hartog, R.; Wessel, G. R.; DuFrane, A. S.; Walsh, T. J.; MacDonald Jr., J. H.; Mangano, J. F. and Cakir, R. 2009. Geologic Map of the Snoqualmie 7.5-Minute Quadrangle, King County, Washington: Washington Division of Geology and Earth Resources Geologic Map, GM-75, scale 1:24,000, 2 sheets.

Dragovich, J. D.; Logan, R. L.; Schasse, H. W.; Walsh, T. J.; Lingley Jr., W. S.; Norman, D. K.; Gertsel, W. J.; Lapen, T. J.; Schuster, J. E. and Meyers, K. D. 2002. Geologic Map of Washington – Northwest Quadrant: Washington Division of Geology and Earth Resources Geologic Map, GM-50, scale 1:250,000, 3 sheets, with 72 p. text.

Kremer, D. E. 1959. The geology of the Preston-Mt. Si area: University of Washington Master thesis, 103 p., 1 plate.

Tabor, R. W.; Frizzell, V. A., Jr.; Booth, D. B.; Whetten, J. T.; Waitt, R. B. 2000. Geologic map of the Snoqualmie Pass 30 X 60 minute quadrangle, Washington: U.S. Geological Survey Geologic Investigations Series Map I-2538, 1 sheet, scale 1:100,000, with 57 p. text. [http://geopubs.wr.usgs.gov/i-map/i2538/]

Tabor, R. W.; Frizzell, V. A., Jr.; Booth, D. B.; Whetten, J. T.; Waitt, R. B., Jr.; Zartman, R. E. 1982. Preliminary geologic map of the Skykomish River 1:100,000 Quadrangle, Washington, U.S. Geological Survey Open-File Report: 82-747, 1 sheet, scale 1:100,000, with 31 p. text.

Tabor, R. W.; Frizzell, V. A., Jr.; Booth, D. B.; Whetten, J. T.; Waitt, R. B., Jr.; Zartman, R. E. 1993. Preliminary geologic map of the Skykomish River Quadrangle, Washington, U.S. Geological Survey Miscellaneous Investigations Series Map I-1963, 1 sheet, scale 1:100,000, with 42 p. text. [http://pubs.usgs.gov/imap/i1963/skygm.pdf].

12 APPENDIX A: Groundwater Study Area