OUTLET STRUCTURE for BYPASSED REACH FLOWS

Water Temperature Profile Study for Pre-Design Information

First Draft

LAKE CHELAN HYDROELECTRIC PROJECT
FERC Project No. 637

July 23, 2004

Public Utility District No. 1 of Chelan County
Wenatchee, Washington

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SECTION 1: INTRODUCTION

Chelan County Public Utility District No. 1 (Chelan PUD) has submitted an application for a new license for the Lake Chelan Hydroelectric Project (LC Project). The license application, which was submitted to the Federal Energy Regulatory Commission, includes proposed protection, mitigation and enhancement measures (PMEs) for natural and social resources that are affected by the LC Project. The proposed PMEs were developed in a collaborative process with federal and state agencies and other interested parties to the relicensing proceeding and are included in the Lake Chelan Settlement Agreement (LCSA). The PMEs are described fully in documents submitted to FERC with the license application. These documents include the LCSA and a water quality certification, required under section 401 of the federal Clean Water Act (401 Certification), from the Washington Department of Ecology (WDOE). The LCSA includes PMEs related to the restoration of perennial instream flows to the Chelan River and protection, restoration and enhancement of fisheries resources in the Chelan River. The 401 Certification includes specific requirements pertaining to the achievement of these PME measures and confirmation that the LC Project will comply with water quality standards and other applicable requirements of state law.

The original 401 Certification was issued on March 27, 2003, and amended and reissued on April 21, 2003. This 401 Certification was appealed to the Washington State Pollution Control Hearings Board (PCHB). The PCHB issued Order No. 03-075 on April 21, 2004, upholding the 401 Certification, with nine specific clarifications. Following a 30-day waiting period for appeal of the PCHB order, WDOE issued a revised 401 Certification on June 1, 2004, which incorporated the clarifications contained in the PCHB order into the 401 Certification. One of the nine clarifications pertained to the LCSA (License Article 7 – Chelan River Fishery Plan) and the 401 Certification requirement that "Minimum flows shall be provided by Chelan PUD as soon as the structures needed to provide such flows are constructed, which shall occur no later than two years after the effective date of the license. The structures to be constructed are a new flow release structure at the dam and modification to the channel in Reach 4." (401 Certification III.ii.) and "Prior to the date such structures are completed, Chelan PUD shall make good faith effort to provide flows that agencies may request for the purpose of testing designs or structures or of gathering other data, including any water quality data." (401 Certification III.iv.) The clarification regarding this requirement is: "An additional study of water temperature at the dam face must be performed by Chelan PUD to determine how best to design the new outlet structure to maximize the potential for cold water withdrawal at the base of the dam." (401 Certification, X.D.)

Chelan PUD is proceeding with the planning and design phase of the construction of the flow release outlet structure for provision of minimum flows and managed flows to the Chelan River, consistent with the LCSA and 401 Certification. Feasibility analysis has identified two possible locations and pertinent design considerations for construction of the outlet structure and conveyance of flows to the Chelan River. These locations are on opposite sides of the Chelan Dam and have different approaches to withdrawing water from the base of the dam. To meet the requirements of the 401 Certification, this study plan is designed to determine if there are any

differences between these design options that would influence the "potential for cold water withdrawal" from the respective locations or design features of each option.

SECTION 2: STUDY GOAL

The outlet structure will be designed to withdraw from 80 cfs to approximately 500 cfs from the Chelan River immediately upstream from the dam. The temperature study will determine if there are differences during summer in the depths of temperature strata in the Chelan River at the face of the dam. This information will be used to assess whether there is any difference between the outlet structure options regarding their potential for cold water withdrawal. Pertinent information to be gathered includes the vertical temperature profile at the potential withdrawal locations, consistency of the bottom temperatures over time, a lateral profile of temperature strata at the dam face, and surveys of the vertical temperature profile in the Chelan River upstream from the dam.

SECTION 3: STUDY AREA

The study area will extend from the face of the Chelan Dam to the beginning of the Chelan River at the outlet of Lake Chelan. The primary area of focus will be at the face of the dam and intake structure, concentrating in the areas identified as options for construction of the outlet structure. Additional vertical temperature profile data will be collected upstream of the dam at the old highway bridge and at the new highway bridge (Figure 3-1).

Temperature Survey Site

Figure 3-1: Chelan River Vertical Temperature Profile Survey Sites

SECTION 4: STUDY METHODOLOGY

4.1 Fixed Monitoring Sites

Fixed monitoring will be conducted at the two locations being considered for the location of the outlet structure. These locations are at the face of the intake structure for a 17 foot power tunnel (intake site) that was never used (Figure 4-1) and at the face of the trash sluiceway on the north end of the spillway (spillway site) (Figure 4-2). The fixed monitoring will be done by anchoring temperature logging devices at the elevations representative of the water depths that the proposed outlet structures will draw from during operation for discharge of 320 cfs. At the 17 foot power tunnel intake, the water will primarily be drawn into the structure from El. 1070.5 up to 1-2 feet above that elevation, depending on trashrack design. At the trash sluiceway location, the proposed elevation of the gate is El. 1072 (bottom) to 1077 (top), which could withdraw water from up to El. 1080 at full discharge (Figure 4-3). The temperature logging devices (Figure 4-4) will be Hydrolab MiniSonde® Series 4a (MiniSonde), which have a range of -5.0 – 50.0 °C, accuracy of ±0.1°C and resolution of 0.01°C (Hydrolab specification data, Hydrolab Corporation). The temperature loggers are factory calibrated and do not require field calibration. The temperature loggers will be suspended from cables at fixed depths at El. 1070 and El. 1080 for the intake site and El.1072 and El. 1080 for the spillway site. The temperature loggers will be set to record temperatures at 30 minute intervals. The temperature data will be downloaded four times during the study, approximately at 10 day intervals.

4.2 Mobile Monitoring

Vertical temperature profiles will be taken at several locations across the face of the dam, including at the intake site and spillway site. Other locations will include the upstream end of the intake structure, middle of the intake structure for the 14 foot power tunnel that supplies water to the powerhouse, and the middle of the spillway section of the dam. Additional vertical temperature profiles will be taken at the sites shown in Figure 3-1 to evaluate the extent and consistency of temperature stratification in the Chelan River upstream from the dam. Vertical temperature profile measurements will be made four times during the study, approximately at 10 day intervals. The temperatures will be measured using a MiniSonde, connected to a handheld Survey® 4a data logger.

4.3 Analysis and Reporting

Temperature data will be compiled into an MSExcel spreadsheet, with graphical summaries. A data report will be prepared that provides the details of the sampling methodology, data collection locations, summary of results, and findings regarding temperature profiles at the potential outlet structure locations and any relative differences in the potential for cold water withdrawal between these locations.

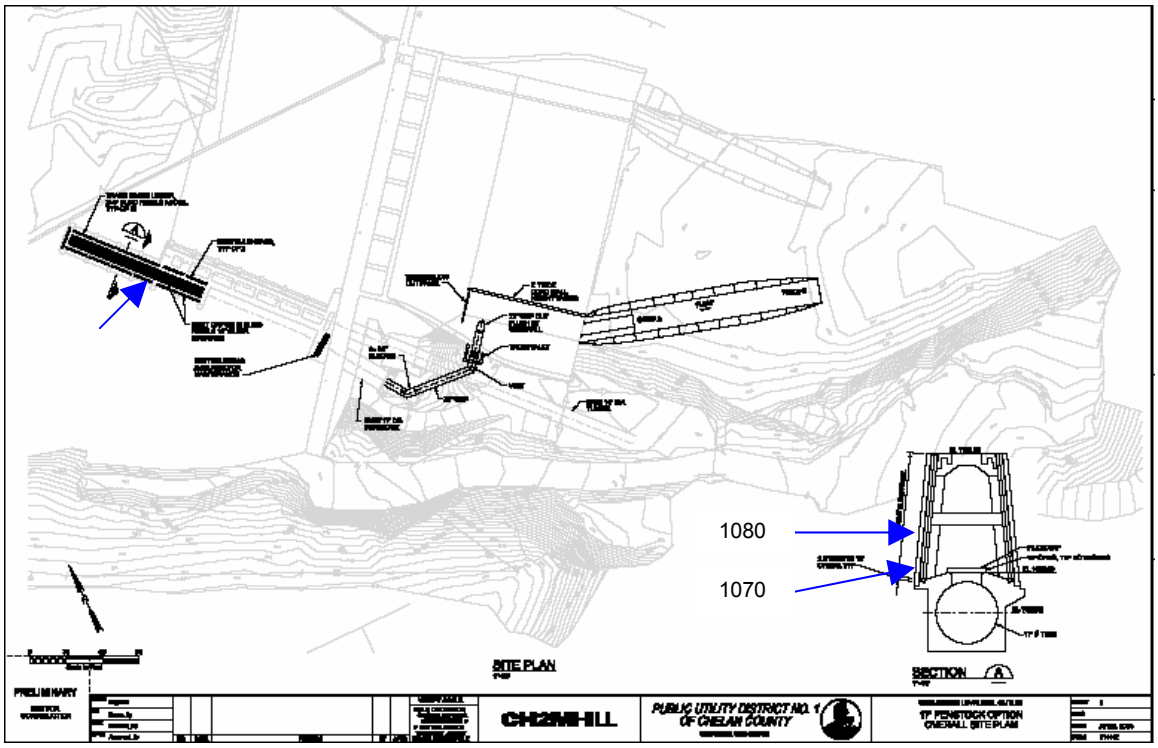

Figure 4-1: Potential Outlet Structure Using the Existing Intake for the 17-Foot Future Power Tunnel with Location of Fixed Temperature Monitoring Site (Arrows)

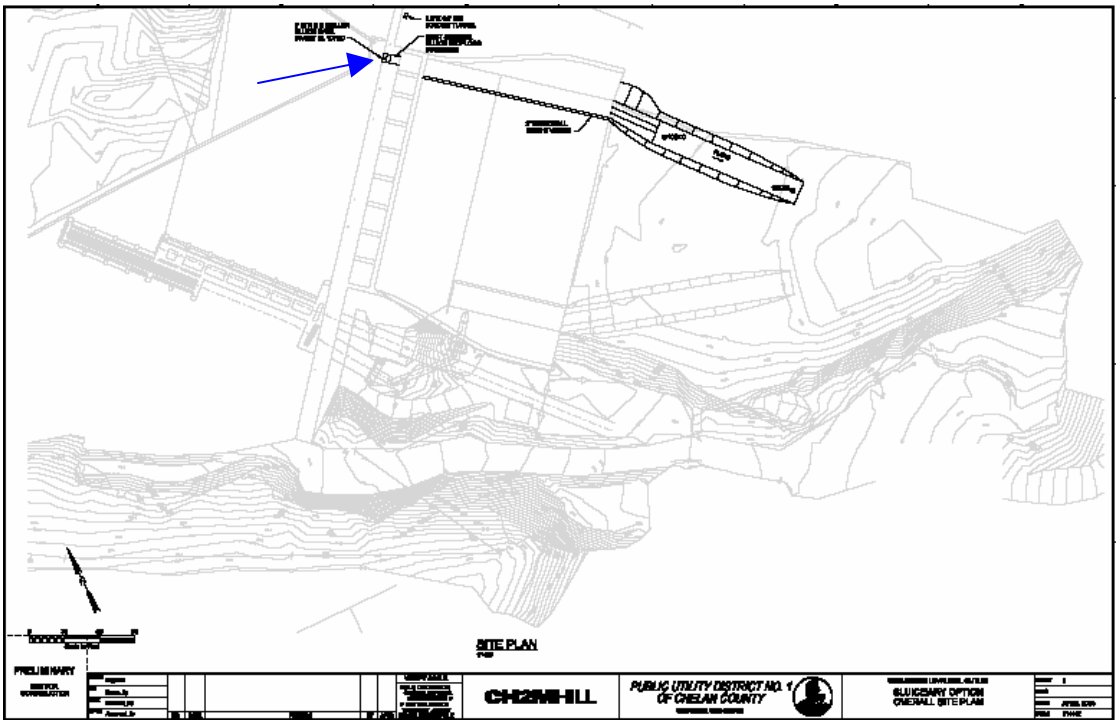

Figure 4-2: Potential Outlet Structure at the Existing Spillway Trash Sluiceway

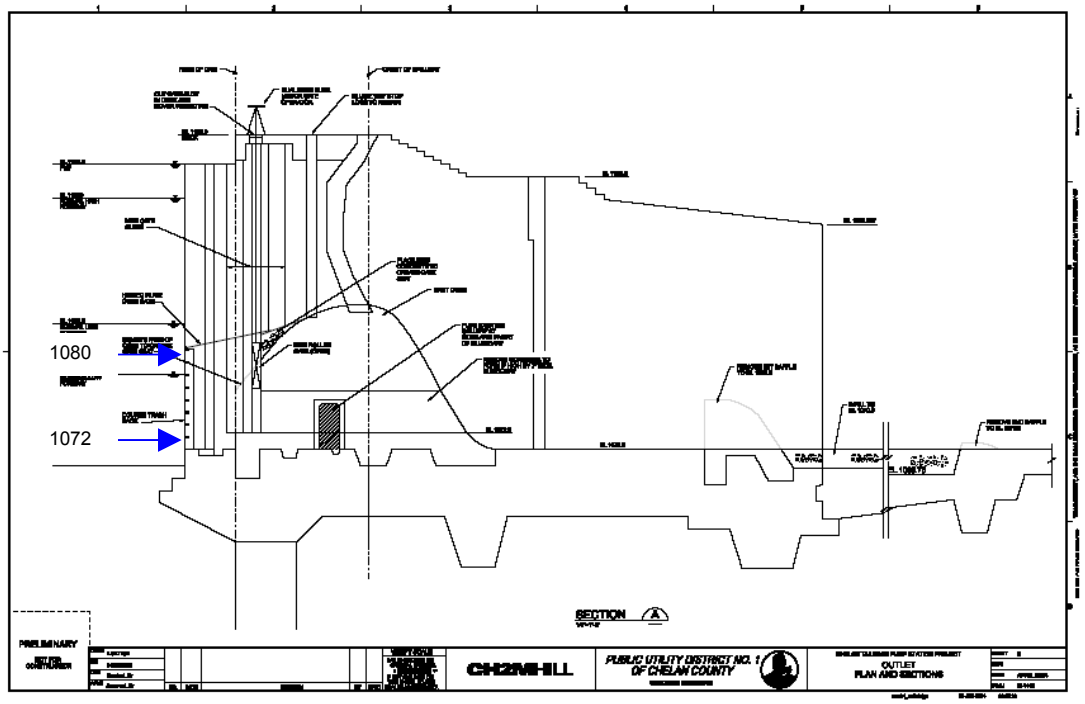

Figure 4-3: Location of Fixed Temperature Monitoring Site (Arrows) at Potential Outlet Structure at the Existing Spillway Trash Sluiceway

Figure 4-4: MiniSonde Temperature Logger Used for Fixed and Mobile Monitoring

SECTION 5: SCHEDULE AND TASK LIST

Ecology Review of study plan	July 26 – 28
Study plan revision per Ecology (all subsequent dates may shift based on Ecology revisions)	Last Week July
Deployment of Fixed Monitors	Last Week July
Mobile Surveys	First Week August
And Downloads	Third Week August
	First Week September
	Mid September (remove equipment)
Data Compilation	Late September
Data Report to CRFF	October
Final Report to CRFF	December.