TransAlta Ghost Power Plant WaterCharger Project

Alberta Utilities Commission – Filing 27109

Calgary River Users' Alliance – Statement of Concern

The TransAlta Ghost Power Plant WaterCharger battery storage project offers significant economic benefit to TransAlta hydroelectric operations and potential enhancement of the river's ecology, if better water management practices are implemented. The WaterCharger Project has the potential to reduce hydropeaking operations and the resulting flow fluctuations that have a negative impact on the downstream sport fishery. Calgary River Users' Alliance (CRUA) has engaged with the TransAlta WaterCharger Project Development Team to seek assurances that any changes made to hydropower operations to meet the WaterCharger battery storage needs will not impact the Bow River fishery. Although TransAlta is supportive of our concerns, there has not been any documents supplied to us to offset our concerns.

This "Statement of Concern" document discusses the implications of the current Bow River water management policies and ways in which the TransAlta WaterCharger Project could potentially enhance, or alternatively, further derogate the Bow River fishery. Calgary River Users Alliance (CRUA) is asking the Alberta Utilities Commission to direct TransAlta to support their claim that the WaterCharger Project is unlikely to impact to downstream fishery with appropriate documentation. A supplemental assessment may be needed to address our concerns.

1. TransAlta WaterCharger Battery Storage Project

1.1. Project Description:

TransAlta has applied to the Alberta Utilities Commission (AUC) to develop a battery energy storage system, referred to as a "WaterCharger", at the Bow River Ghost Hydroelectric Power Plant west of Cochrane. The electrical storage capacity

is rated at 180 megawatts ("MW") with up to two hours of battery discharge duration. TransAlta is planning for a two-phase approach to construction where Phase 1 would be constructed, energized, and tested by the end of 2023 before the construction of Phase 2. Pending availability of equipment and if market conditions are favorable, TransAlta is considering completing the full project in one phase of construction, with full project commissioning in 2023. The final configuration and layout of the battery energy storage system are not yet finalized and will be determined after the selection of a battery manufacturer. The total footprint for the entire site (Figure 1), including the battery modules, temporary construction facilities, and the distribution connection area will remain the same at approximately nine acres with approximately six and a half acres of land set aside for the batteries.

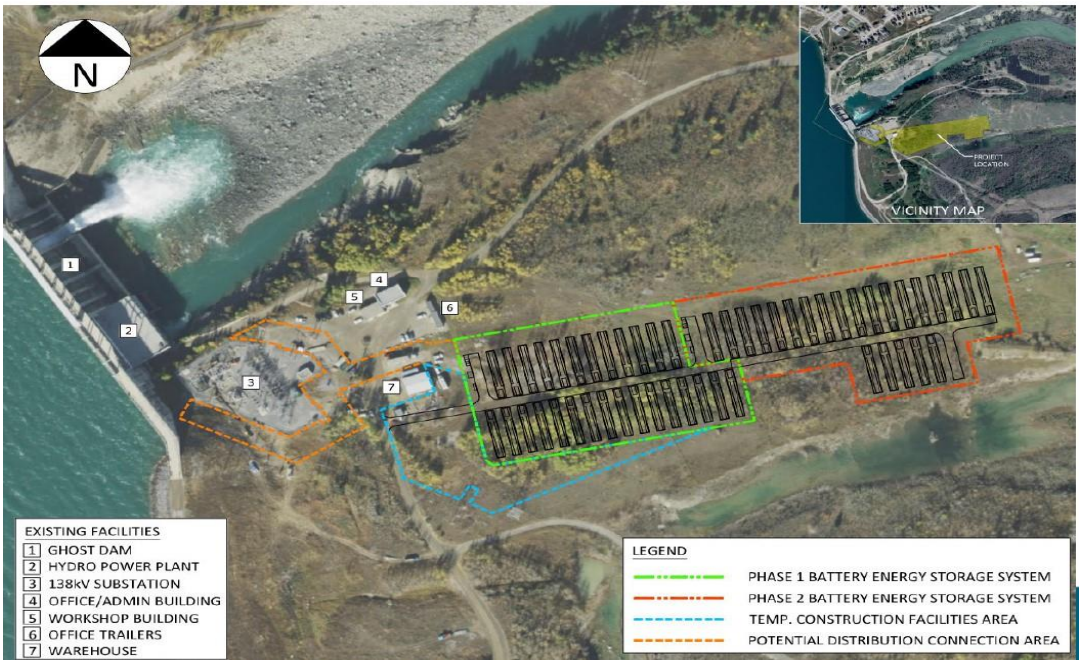


Figure 1 TransAlta Ghost Power Plant WaterCharger Footprint

1.2. AUC – Project Application # 27109 – January 22, 2022:

TA Alberta Hydro LP, by its general partner TA Alberta Hydro Inc. ("TransAlta"), hereby makes application for the WaterCharger Battery Energy Storage Project (the "Project") to the AUC pursuant to Section 11 and 18 of the Hydro and Electric Energy Act (HEEA), c H-16, R.S.A 2000, as amended to:

The total capacity of the Project is 180 MW. The Project is considering options for storage duration of 1-2 hours, to be finalized with the battery vendor selection, with a resulting maximum storage capacity of up to 360 MWh**.**

- Requested Approval Date: June 30, 2022
- Expected Construction Start Date: March 1, 2023
- Expected in-service Date: December 31, 2023

2. The Impact of Hydroelectric Water Management Practices on the Bow River Basin Ecosystem.

Hydroelectric power generation for the WaterCharger Project will be supplied by the Ghost Power Plant within the constraints of the existing water license. Although hydropeaking power generation protocols have historically been used to optimize electrical power generation during high demand times of the day, the WaterCharger Batteries would allow for storage of electrical power generation during low-demand periods and delivery to the electrical grid during times of higher demand.

TransAlta's primary objectives of the project are to optimize the Ghost Power Plant electrical generating capacity and to deliver power to the electrical grid when demand and revenue are at their highest. But there are opportunities for better water management protocols that could enhance the ecology of the river and the world-class trout fishery downstream.

2.1. The Impact of Water Management Practices on the Bow River Fish Population:

The 2019 report by the Bow River Trout Foundation (BRTF) reviewed the impact of water management practices on the Bow River fish population [(1)]. The Bow River trout population in and downstream of Calgary has been declining for many years. The reasons for the decline are unknown, but researchers have suggested that a combination of catch-and-release mortality, flood events, whirling disease, and angling pressure may well have contributed to the trout population decline. More recently, Alberta Environment and Parks, Fishery Stewardship Branch has

investigated the impact of all possible reasons for the declining trout population into a cumulative effects model for the Bow River. Hydropeaking and down ramping of reservoir water discharge have been identified as significant contributors to declining fish populations.

Hydropeaking power generation protocol has come under considerable scrutiny in recent years. A large study conducted by a collaboration of researchers from the U.S. Geological Survey, Oregon State University, Utah State University, and Idaho State University [(2)] raises serious questions about the current practice of hydropeaking to meet electricity demand, which has nearly wiped-out local populations of some insects that feed local river ecosystems. The researchers' comments illustrate the concerns.

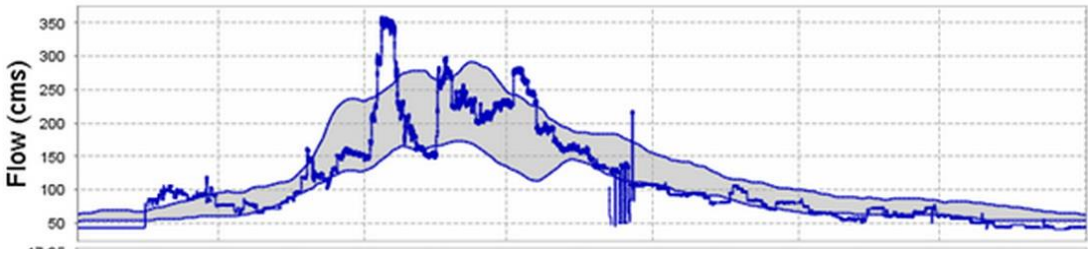
> "*Insects have evolved to live with occasional extreme floods and droughts, and gradual or seasonal changes in river levels. These large daily rises and peaks in river flow due to hydropower dams are not normal. Prior to the construction of dams, there were almost no major daily changes in river levels. This can interrupt the egg-laying practices of some species, and the impact of this is poorly appreciated. Until now no one really looked at this, and it's a serious problem.*" Hydroelectric power generation has an impact on insects that lay their eggs near the shore of streams, such as a mayfly, stonefly, or caddis fly. Under normal water conditions, the eggs are laid slightly below the water surface and soon hatch. But if the water level drops suddenly, they can be stranded, dry out and die before hatching. This research found a clear correlation between hydropeaking and the number of insect species present and an almost complete absence of certain insects in some parts of rivers where they should have been present. The researchers go on to say, *"The loss of these aquatic insects can have a major impact on fisheries and other aspects of ecosystem health".*

Historically the impact of the Ghost Power Plant hydropeaking operations had little impact on the daily variables of flows in and downstream of Calgary since the Bearspaw Reservoir cushioned the effect of daily flow variants. But with the introduction of the modified Bow River Water Management Protocol in 2014 the Bow River has seen extreme daily variability of flows during the timeline of the modified operation of April to July that would be similar to the impact of hydropeaking at the Ghost Hydroelectric Plant. There is, therefore, a need on the

part of regulators, fishery managers, and TransAlta, the hydroelectric operator, to modify current water management protocols to reduce the impact on the Bow River ecosystem, fishery, and the fish population itself.

This, to a great degree, was achieved in 2021 once the Bow River modified operations reverted to historical operating protocols in early July. Hydropeaking power generation was limited to a short period during July (Figure 2), but presumably, run-of-the-river power generation continued for the remainder of the year.

Bow River Flows below Ghost Reservoir - 2021



Bow River Flows below Bearspaw Reservoir- 2021

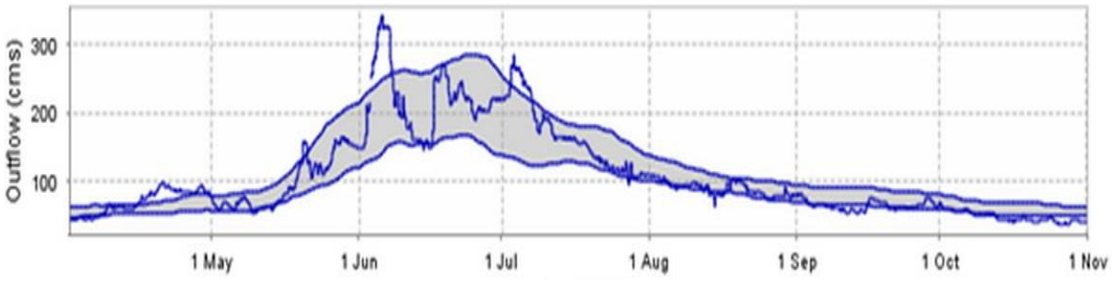


Figure 2: A comparison of 2021 Bow River Flows below Ghost Reservoir and Bearspaw Reservoir

Downstream of the Bearspaw Reservoir flows were extremely stable for the entire summer months (Figure 2). But it is important to recognize that the mountain snowpack was low in the spring of 2021, the run-off from the mountains was early, and rainfall across the Bow Basin was low throughout the spring and summer months. These conditions combined with what was perceived as improved water release protocols at the Ghost Reservoir resulted in some of the best fishing conditions seen since the 2013 flood. We are hoping for this to continue in future years.

3. Deployment of Energy Storage to Improve Environmental Outcomes of Hydropower.

The opportunity to integrate energy storage systems into hydropower plants was investigated by the US Department of Energy, Pacific Northwest Laboratory in 2021 [3]. Several case studies and modeling projects demonstrated that hydroelectric energy storage facilities offer benefits to the ecology of the river downstream of hydropeaking operations. To meet system peak electrical power demands, energy storage plants combined with a reduced surge of water during hydropeaking time slots could reduce the impact on the downstream fishery (Figure 3).

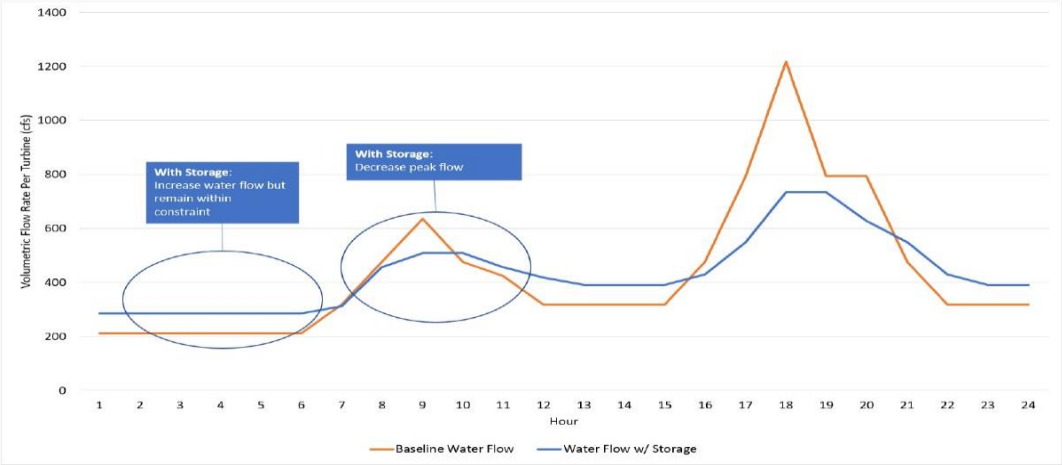


Figure 3: An illustration of the change in flows with the inclusion of hydroelectric energy storage plants. US Department of Energy, Pacific Northwest Laboratory 2021

Calgary River Users Alliance (CRUA) has been a participant in the TransAlta Water Charge Stakeholder Engagements since October 2021. We are generally supportive of the proposal but have some reservations on the impact on the downstream fishery. We have reviewed the applicant's environmental assessment that is site-specific and lacks an analysis of potential changes to water management protocols that could be implemented to optimize battery storage

capacity and electrical supply under completion of Stage 2 of the project. Our concerns were expressed in the following email dated, 27 December 2021:

> A cursory review of the environmental assessment documents appears to satisfy our concerns. Nevertheless, the Calgary River Users Alliance position is that the WaterCharger Project has the potential to change the water management operations of the Ghost Reservoir hydroelectric power plant. **To what degree the current hydropeaking operations could change due to increased power generation capacity outside of the current peak electrical window of operations is unclear.**
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> The attached article, "Deployment of Energy Storage to Improve Environmental Outcomes of Hydropower", (referenced above) offers a useful review of the potential improvements that could be derived from changing the hydropower operation from peak hydro to a modified "run-or-the-river" power generation and water management protocol. This we believe would have a positive impact on the Bow River fishery downstream of the Ghost Power Plant.
>
> The Bow River fishery is considered an important driver to the local economy, generating more than $25 million annually. When combined with other river recreational activities the economic contribution will exceed $50 million annually. Stabilizing flows between Ghost and Bearspaw Reservoirs will further stimulate river recreation use and enhance river users' safety. We, therefore, encourage TransAlta Corporation to look beyond increased power generation opportunities to an integrated environmental enhancement initiative that supports social-economic needs.

The TransAlta response is consistent with the reference to our concerns in the Stakeholder Engagement Report, AUC Rule 007 – Participant Involvement Program (PIP)– WaterCharger Battery Storage Project

> 8.1.14. Water flows/Ghost Lake fluctuations (p15)
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> Concerns regarding how this Project may affect water flows and fluctuations were raised throughout the PIP. TransAlta indicated that this

project would not lead to fluctuations in the lake levels or have a significant effect on water flows in the Bow River beyond what is considered the normal operation of the Ghost hydro-electric facility. The Project will not affect the lake levels as the Project is being developed to provide stability to the electrical grid without altering the normal operation of the Ghost hydro-electric facility. The Ghost Reservoir will still run down every spring per an existing agreement with the Province of Alberta. A stakeholder group provided information to TransAlta to consider operating the battery facility with the Ghost hydro-facility as a modified run-of-the-river power generation facility, rather than TransAlta WaterCharger Battery Storage Project Participant Involvement Program AUC Rule 007 – Participant Involvement Program – WaterCharger Battery Storage Project 16 a peaking hydro facility. TransAlta responded that it recognizes the needs of downstream river users and respects the environmental and economic significance of the Bow River ecosystem, including the fishery. TransAlta places significant importance on environmental compliance and continued environmental impact mitigation while seeking to deliver low-cost and reliable electricity. TransAlta also added that it did not believe that it would be economically feasible for the company to pursue integrated energy storage and run-of-river project at Ghost in today's energy-only merchant market. However, the co-location of the WaterCharger Project at the Ghost Hydro facility may enable TransAlta to consider this innovative approach in the future as market and grid requirements continue to evolve.

Statement of Concern:

1. The response by TransAlta to our concerns that the Ghost Power Plant – Water Charger Project would not lead to fluctuations in the lake levels or have a significant effect on water flows in the Bow River beyond what is considered the normal operation of the hydroelectric facility are not substantiated by any modeling data or reports.

2. Even if the Ghost Power Plant does operate within the license agreement water management guidelines, there is no assurance that the Bow River flows will be stable enough to maintain a sustainable trout population and protect a world-class fishery downstream of the Bearspaw Reservoir.

3. Calgary River Users Alliance (CRUA) is encouraged that TransAlta will consider the innovated approach to run-of-the-river hydropower in the future, but there is a need for TransAlta to substantiate their claim that the Bow River fishery will not be affected by whatever changes to water management change take place to support the WaterCharger project's economic viability.

4. We are therefore asking the Alberta Utilities Commission to direct TransAlta to support their claim that the WaterCharger Project is unlikely to impact to downstream fishery with appropriate documentation. A supplemental assessment may be needed to address our concerns.

Reference:

1. **Flow Management for Hydropower Extirpates Aquatic Insects, Undermining River Food Webs**. Theodore Kennedy, T**.** et al. https://academic.oup.com/bioscience/article/66/7/561/2463266

2. **The Impact of Water Management on the Bow River Fish Population. Bow River Trout Foundation, 2019.** https://www.calgaryriverusers.org/wp-content/uploads/2021/11/Bow-River-Trout-Populations-and-Water-Management.pdf

3. **Deployment of Energy Storage to Improve Environmental Outcomes of Hydropower**. White Paper, Pacific Northwest National Laboratory, 2021. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-SA-157672.pdf?_hsmi=2