Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project

Proponent Name:	Tent Mountain Pumped Hydro Limited Partnership (TMPHLP or "the Partnership")	**Date:**	6-Feb-2024
Project Name:	Tent Mountain Pumped Hydro Energy Storage (TM-PHES) Project.	**Company Contact name and information:**	Andrew Szojka, P.Eng. TM-PHES Development Manager Andrew_Szojka@transalta.com T: +1 (403) 267-2516 C: +1 (403) 807-7836
Name of company that will hold approval:	Tent Mountain Pumped Hydro Limited Partnership	**Company website:**	The project website is actively being redeveloped and will be shared with Alberta Environment and Protected Areas when it is final.
Type of project (e.g., water management, hydroelectric, etc.)	Closed loop Pumped Hydro Energy Storage (PHES) project with 4.9 GWh energy storage (15.5 hrs @ 320 MW)	**New project, expansion, additional phase or modification:**	New closed-loop PHES (hydropower). The project will be developed on previously disturbed industrial land that has been partially reclaimed. Land was a coal mine that ceased operation in the 1980s. Evolve is working with the regulatory body to obtain the

			reclamation certificate for those lands that are not fully reclaimed and are not part of the partnership.

Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

Project location (legal land description and municipality)	16 Km West of Coleman, within the Municipality of Crowsnest Pass, Alberta (Attachment A).	**Total project area (ha)**	The total project area will be refined during the next phase of engineering. The current estimated area: • TM-PHES: 950 • T-Line: 325
Indicate whether the project is on private, federal, or provincial land:	Mixed freehold and Crown land. The project will be located entirely in Alberta (~75%) on private land owned by the Partnership and the remaining (~25%) on Provincial Crown lands.	**List any parks/protected areas/conservation areas that may be impacted:**	None
Nearest First Nations Reserve (s) and Métis Settlements (name and km):	The nearest First Nation Reserve within Alberta is the Piikani Nation, approximately 70 km east of the proposed development. The TM-PHES Project is proposed entirely within Treaty 7 territory in southern Alberta. The TM-PHES Project has engaged with Treaty 7 Indigenous communities and Indigenous communities in British Columbia.	**Nearest waterway, water body (name and km):**	Crowsnest Creek is immediately adjacent to the project area. In addition, two low-grade pre-disturbed wetlands and ephemeral creeks have been identified within the Project footprint. It is expected that the Project will impact these two wetlands for the construction of the lower reservoir (Figure 1).

Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

Nearest provincial highway (# and distance):	Crowsnest Highway (Highway 3, approximately 5.5 Km from the Project)	**Potential annual water usage and source:**	The existing upper pond (Pit 4) receives inflows from snowmelt and rainfall runoff. The upper pond will form the upper reservoir of the PHES system. The lower reservoir will be formed by impoundment in the valley below the upper reservoir. Together with the connecting infrastructure of the intakes, penstock and powerhouse, the Project forms a 'closed loop' system. The entire Project is sited within an area of non-fish bearing watercourses (KingFisher, 2020). The existing water will cycle between the upper and lower reservoirs and will release water into the downstream environment to mirror seasonal flows in the receiving environment. The Project is planned to be a "net zero" operation.

Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

Expected types of air emissions (e.g., SO_2 NOx, CO_2, etc):	Station service would be supplied by power from the grid. Backup station service may be by diesel power generator. The Project will investigate options to provide station service backup power using renewable energy (zero emissions) options.	**Types of wastes generated and disposal location:**	Waste generated during construction will be managed per the Construction Environmental Management Plan (CEMP). All waste materials during construction or operations will be directed to approved waste management facilities or landfills.

Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

Brief Project Description *Include major project processes and products, components including capacity and size, infrastructure requirements and general project location.*

Tent Mountain Pumped Hydropower Energy Storage (TM PHES) Project (the Project) is a renewable energy development proposed by the partnership of TransAlta Corporation (TransAlta) and Evolve Power (Evolve). The project is located on a portion of a former industrial development near Crowsnest, Alberta, that was shuttered in the early 1980s and reclaimed. The project is expected to utilize a legacy footprint of a mine pit (Pit 4) as the upper reservoir of the proposed hydropower scheme. The proposed hydropower plant has a 320MW installed capacity with 8 - 16 hours of continuous generation at this stage of development, as illustrated in Figure 1.
 	
An initial assessment, including baseline environmental data (i.e., wildlife, vegetation, aquatics, soils, groundwater, hydrogeology, hydrology, and water quality) collection was initiated in 2019, which led to a market analysis in 2021.
 	
A pre-feasibility study was completed in 2022 that took the previous works into account, including all the additional geotechnical investigations for the mining expansion project. The pre-feasibility study concluded that no fatal flaws are identified at this stage of project development and with the following key project elements depicted in Figure 1:
 	
• Upper reservoir (former Pit 4)
  ○ Existing liquid impoundment/pond
  ○ Fed by snow and rainfall
• Upper intake (outlet during pump-back operations)
• Pipeline Conveyance – from upper intake to lower intake:
  ○ buried dual penstock pipes
  ○ vertical rock-cut shaft
  ○ vertical bend and high-pressure tunnel to the powerhouse
  ○ short tunnels between the powerhouse and lower intake
• Powerhouse – shaft style accommodation of four units of 80 MW fixed speed reversible Francis
• Lower intake – outlet during hydropower generation

Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

- Lower reservoir – impounded by North and South dams
    - The lower reservoir area is currently a series of low-grade ephemeral ponds confirmed as non-fish-bearing habitat (Kingfisher, 2019), with a natural fish barrier downstream of the Project, and characterized by:
        - Remnants of old borrow pits and excavations
        - Legacy mine workings (2 mine locations)
        - Seasonal flow
- Low-level outlet (LLO) for reservoir level control and riparian or low-frequency flood flow releases, and a free overflow emergency spillway (north dam only)
    - Mirror existing seasonal flow to the environment

In addition to the above components, upgrading access roads for construction and operation identifying the construction laydown (staging and assembly) areas, construction camp and office area, switchyard, transmission line, and any borrow, stockpile, material processing, and batch plant areas will be required.

Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

Figure 1: Current Visualization (2022) of the PHES Project Works at Tent Mountain

Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

Table 1 lists the current and proposed upper and lower reservoir characteristics.

Table 1. Proposed Upper and Lower Reservoir Characteristics

UPPER RESERVOIR	Full Supply Level (FSL)[1]	1800.00 masl
	Minimum Operating Level (MOL)[2]	1783.25 masl
	Water Level Fluctuation	16.75 m
	Active Volume[3]	3,550,000 m^3
LOWER RESERVOIR	Full Supply Level	1495.00 masl
	Minimum Operating Level	1480.00 masl
	Water Level Fluctuation	15 m
	Active Volume	3,550,000 m^3

[1] Prefeasibility Report refers to it as Maximum Operational Water Elevation
[2] Prefeasibility Report refers to it as Minimum Operational Water Elevation
[3] Prefeasibility Report refers to it as Operating Volume

The hydropower plant, (non-combustion based), was proposed as a shaft powerhouse in the pre-feasibility stage, accommodating four units of 80MW fixed speed reversible Francis turbines that would connect to the upper reservoir via dual buried steel penstock pipes and to the lower reservoir via short tunnels as illustrated in Figure 1.

Since the completion of the pre-feasibility study in 2022, a geotechnical investigation program was initiated in June 2023 with fieldwork carried out between July 1 and August 22 as per the environmental conditions of the Temporary Field Authorization (TFA). The results of the geotechnical investigation are being prepared and will form the basis of the next engineering stage, which is expected to commence in January 2024. The depth of overburden at the lower dam sites will require further engineering evaluation and possible adjustments to the location and type of the lower dams and powerhouse.

Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

One of the first tasks in the next engineering stage will be to investigate higher installed capacity (up to 400MW) and higher energy storage capacity (up to 5GWh), which will lock in the plant size, including the number of units and their types. This may increase to the lower reservoir dam crest elevations, a shift to their locations, and an increase in the operating range of the upper/lower reservoirs. The concept of the project layout will remain broadly unchanged.

The proposed development is wholly within the Province of Alberta. The land ownership is a mix of approximately 75% Freehold and 25% Crown lands, as illustrated in Figure 2. All lands within the proposed project footprint have been subject to prior commercial or industrial activities. There is an existing industrial Environmental Protection Enhancement Act (EPEA) approval held by Evolve. Evolve will continue to work with the Alberta Energy Regulator (AER) on this approval related to water quality monitoring and reporting.

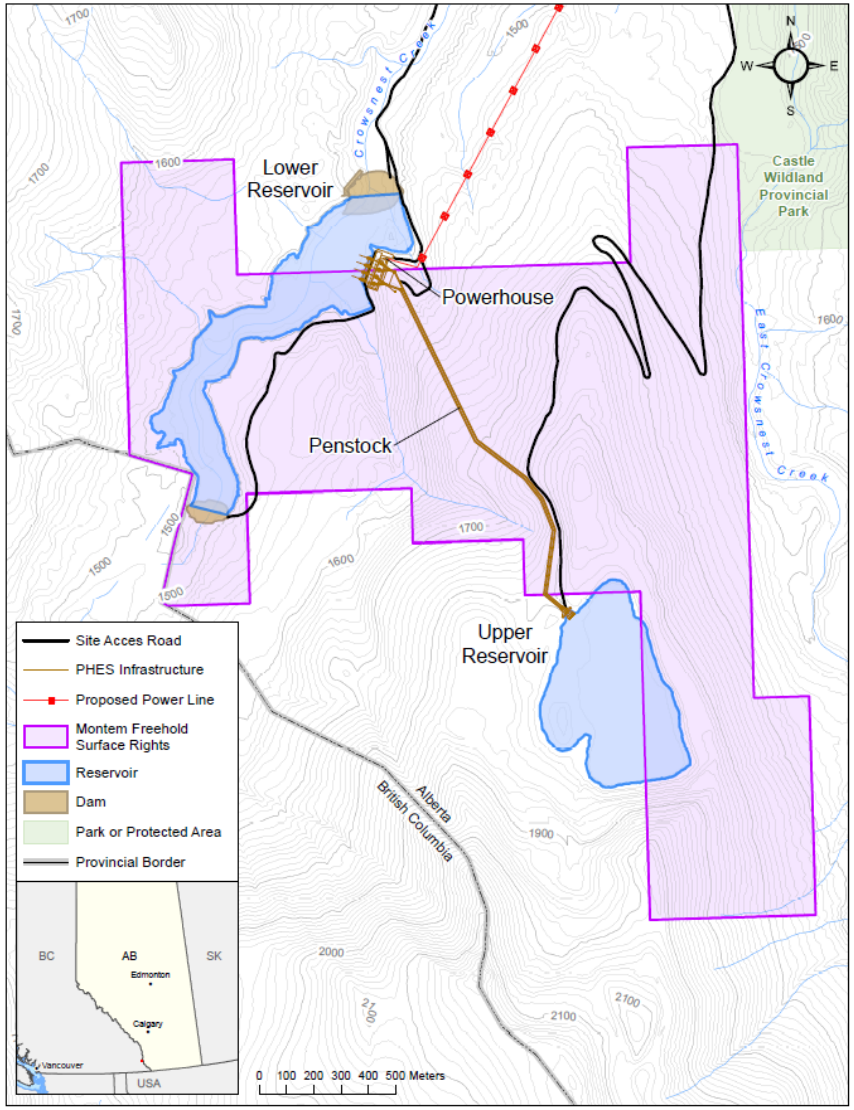


Figure 2: Tent Mountain PHES Infrastructure versus Lands

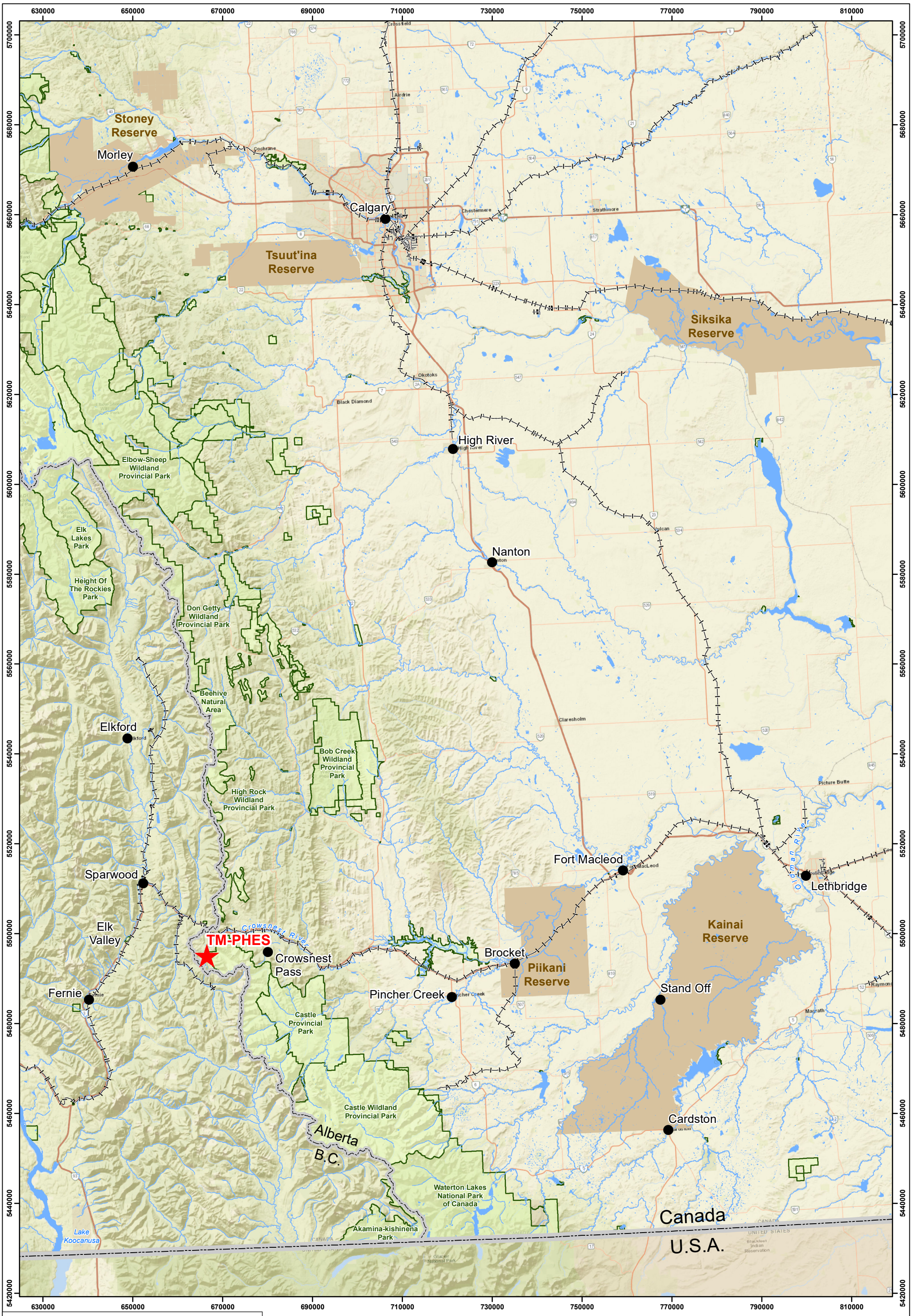
Project Summary Table – Tent Mountain Pumped Hydro Energy Storage Project (cont'd)

The upper reservoir (former Pit 4) impoundment and lower reservoir area, which will require two dams to establish appropriate retention, are non-fish bearing. There is a waterfall located downstream of the lower reservoir and outside the Project footprint that acts as a natural fish barrier (KingFisher, 2020). The ephemeral streams above the falls within the planned development area seasonally freeze to the bottom.

References

KingFisher Aquatics. 2020. Tent Mountain Mine. Existing Aquatic Conditions Report.

ATTACHMENT A



Project Location
City/Town
Railway
International Border
Provincial Border
Watercourse
Waterbody
Indigenous Reserve
Park or Protected Area

ATTACHMENT A

0 5 10 20 30 40 50 Km

N

evolve
transalta
CHARTWELL

Tent Mountain Pumped Hydro Limited Partnership

TM-PHES General Location

Drawn By: MC	Scale: 1:750,000
Check By: NA	Date: 2024-02-02
Design By:	Sheet: 1 of 1
Comp. Files:	Dwg. No.: CRGL_2022_004

Coordinate System: NAD 1983 UTM Zone 11N

670000

690000

5500000

High Rock
Wildland
Provincial Park

Coleman

Crowsnest River

Crowsnest Lake

Island
Lake

Alberta
B.C.

Crowsnest Creek

West Crowsnest Creek

East Crowsnest Creek

TM-PHES

Castle Wildland
Provincial Park

Blairmore

Bellevue

Hillcrest

Castle
Provincial
Park

40

3

670000

690000

- Township
- Highway
- Access Road
- Railway
- Provincial Border
- Watercourse
- Waterbody
- Park or Protected Area
- Project Area

ATTACHMENT A

0 1 2 3 4 5 10 Km

N

evolve
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CHARTWELL

Tent Mountain Pumped
Hydro Limited Partnership

TM-PHES Regional Location

Drawn By: MC	Scale:
Check By: NA	Date: 2024-02-02
Design By:	Sheet: 1 of 1
Comp. Files:	Dwg. No.: CRGL_2024_002

Coordinate System: NAD 1983 UTM Zone 11N