

# ATLIN HYDRO EXPANSION PROJECT

Project Overview - November 10, 2021

# Overview of Presentation

## 1. Project Purpose

- Clean energy shortfall
- Climate crisis
- Socio-economic benefits

## 2. Project Overview

## 3. Changes in the Environment

## 4. FAQs

# Regional clean energy shortfall

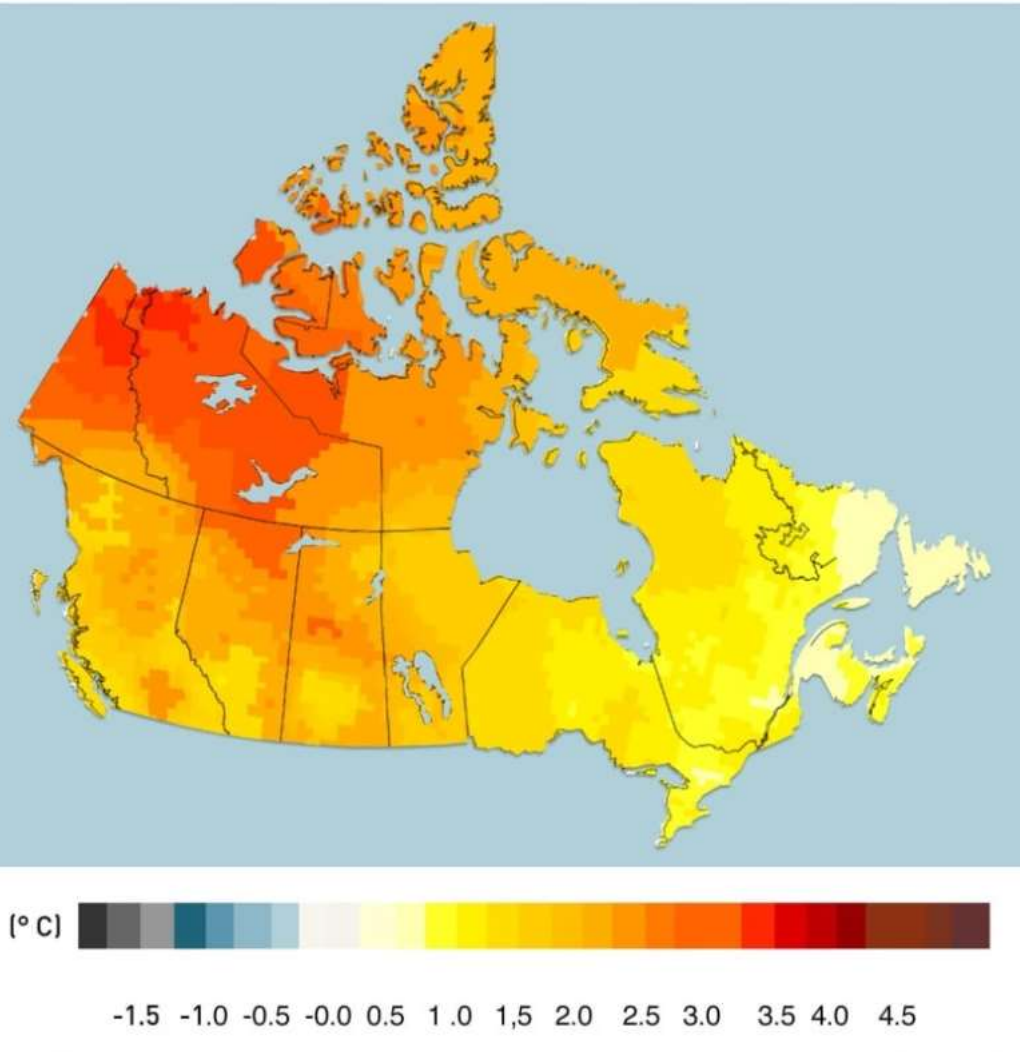
- ▶ Yukon Territory at full utilization of existing hydroelectric generation, is facing increased dependence on fossil fuels
- ▶ Need for winter production of energy during peak use
- ▶ National interest in developing clean energy projects for isolated, remote grids



# Why is providing clean energy in our region important?

- ▶ Climate change is the biggest existential threat to our way of life, with regional and global impacts - no one is unaffected by climate change.
  - ▶ Warming rates in the North are three times the rates of other places in Canada
  - ▶ Implications are widespread and profound, affecting everything from: agriculture/food security; water scarcity; flooding; wild fires; drought; forest health (insects); biodiversity; cultural way of life around the world.
  - ▶ High risk of positive feedback loops → “run away” climate change.
- ▶ 120 countries signed on to a goal of net zero GHG emissions by 2050, including Canada - an ambitious but necessary effort
  - ▶ European Green Deal - like Eisenhower’s “New Deal” with a focus on overhauling the economic foundations to green infrastructure and economies while creating new jobs (a Green Boom)
  - ▶ Canada has been increasing investment in green energy, including THIS project

## Observed changes in annual temperature 1948 and 2016



Source: Environment and  
Climate Change Canada

# Yukon's Energy Needs and the Project

- ▶ Yukon's climate change action plan requires that GHG emissions be reduced by 30% below 2010 levels by 2030, equivalent to 263 kilotonnes per year.
- ▶ Winter energy shortfall = 13 MW in winter peak.
- ▶ The Project would account for ~10% of that goal.
- ▶ The Project = 8.5 MW

# Why THIS Project?

- ▶ Winter energy
- ▶ Storage - not an intermittent energy source
  - ▶ While intermittent energy projects are important, e.g., wind, solar, run of river, they do not provide reliable energy, particularly in winter when Northerners energy needs are highest.
  - ▶ Makes the Project comparatively more expensive, but necessary due to the reliability of the energy source

# Why THIS Project?

- ▶ The Atlin Hydro Expansion Project will provide clean energy to our region, reducing GHG emissions by 27,500 tonnes annually, or 27 kilotonnes – that's over 9 million litres of diesel generation eliminated every year!
- ▶ First Nation-owned, local ownership, it provides capacity as well as energy, and its ready now
- ▶ The location of the Project is ideal, being within the land use planning area (Atlin East) where development is preferred, making use of existing access, linear disturbance, and other development footprints.



# Capacity and Energy

- ▶ Capacity is how much is available at one point in time (often understood as “installed capacity”)
- ▶ Energy is how much is used over time.
- ▶ When we use only a little energy, having extra capacity is fine.
- ▶ BUT
- ▶ When we need a lot of energy and we can't provide what is needed, we will have to burn diesel engines or other fossil fuel engines
- ▶ Yukon is short on capacity (ability to meet energy needs in winter)

# Socio-economic Benefits

- ▶ The existing Atlin Hydro Power project was successfully commissioned in 2009, and has been operated successfully for over 10-years by Atlinites.
- ▶ The TRTFN group of companies mandate is to promote economic development, and exports bring new money into Atlin. **This Project would have large dividend benefits and multi-generational socio-economic benefits → green jobs.**
- ▶ **Benefits** - are spread all around Atlin through local purchases of goods and services (food, fuel, hotel, aviation, employment).

# What are the Benefits?

- ▶ The project would continue to diversify the economic base of the Atlin community, providing (directly or indirectly) varied employment opportunities and room for advancement.
- ▶ Intangible benefits to community health and well-being are likely to result over the long term due to the influence of local ownership, economic independence, and control over resources (Conference Board of Canada report)
- ▶ Opportunities for individual personal growth and new, more challenging positions.

# Community Benefits

- ▶ Keeping revenues in the community, and thus, people in the community. When members of our community benefit, through training and employment, that keeps people and their families here in Atlin, then we all benefit.
- ▶ Investment in social programs and local initiatives.
- ▶ Benefits of own-source revenues to First Nations.
- ▶ Commitment to facilitate trail development and accessibility in lower Pine Creek area and Pine Creek trail.
- ▶ Contribution to local tax base.

# Employment Benefits

- ▶ The project would provide direct employment during construction and *operations* - trades, labour, heavy equipment, cooks, technicians, professionals, (e.g. environmental professionals, accountants, project managers), administrators, etc.
- ▶ The equivalent of an estimated 176 full-time employment (FTE) positions over a 3-4-year construction period would be created, and approximately 6- 8 full-time employment positions for operations and maintenance over the life span of the project.
- ▶ Employment positions may include hydro plant operators, transmission line technicians, environmental monitor and safety officers, trades, computer technicians, and management positions.
- ▶ Indirect employment opportunities from operations, (e.g. wildlife monitoring contracts with TRTFN), as well as dividend investments that always result in more employment opportunities.

# Property taxes

- ▶ The existing hydro project pays over \$112,000 each year in property taxes.
- ▶ About half of this contributes to the local tax base: School Taxes \$ 12,500 Atlin Improvement District \$ 40,500
- ▶ The Hydro Expansion Project is estimated to pay about 3 times these property tax amounts, or more

# Dividend benefits - Perspective

- ▶ The first hydro project and its Dividend Benefits, provided the financial resources to invest in more equipment, more training for everyone interested in Atlin. Together this has increased our capacity to take on more projects and contracts, and has created significant and increasing employment for people in Atlin over the past decade.
- ▶ This benefitted the whole community. 15 years ago, we had 2.5 people on our payroll. Today we have over 12 permanent staff and have had up to 60 people on payroll in recent years.
- ▶ 50% of our employees have been Tlingit and 50% have been non-Tlingit. With seasonal and year round employees our payroll is in the millions annually - all paid to Atlinites.
- ▶ The Hydro Expansion Project is expected to provide similar but enhanced benefits to all of us, and future generations, over a longer period of time. These hydro projects help provide a solid foundation for economic development in Atlin, keeping revenues in the community, and thus, people in the community.

# Where does the Hydro money go?

\$ Hydro Revenue

```
graph TD; A["$ Hydro Revenue"] --> B["Financing Payments (50%)"]; A --> C["Operations & Maintenance Wages and Expenses (30-38%)"]; A --> D["Profit (12-20%)"]; C --- E["Local employment and contracting, technical support, parts and supplies, management..."]; D --- F["Investment in Job Creation, Business Growth, Training & STEP, New Projects, and TRTFN Environment & Culture priorities..."];
```

Financing Payments (50%)

Operations & Maintenance Wages and Expenses (30-38%)

*Local employment and contracting, technical support, parts and supplies, management...*

Profit (12-20%)

*Investment in Job Creation, Business Growth, Training & STEP, New Projects, and TRTFN Environment & Culture priorities...*



# PROJECT OVERVIEW

# Transmission Line

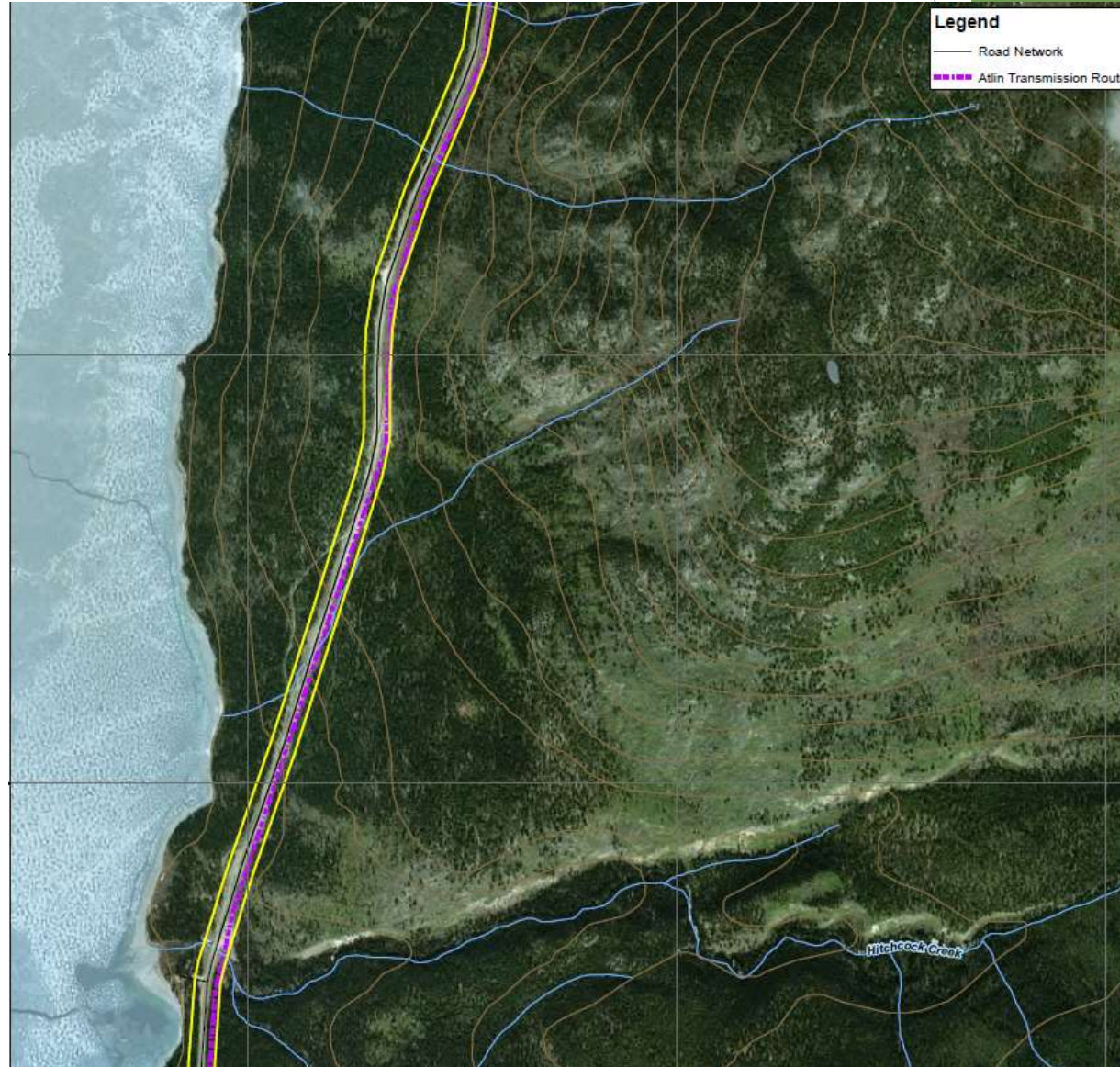
- ▶ 92 km, 69 Kv line from substation at upper powerhouse to Jake's Corner
- ▶ Predominantly located within/overlapping the Atlin Road Right-of- Way (ROW)
- ▶ Clearing limits at the current design require 26 m total, or 13 m clearance on each side of the pole line
- ▶ Wooden poles with ~80 - 100 m between poles, and 3-strands of wire.
- ▶ Pole size will generally be 55 ft, but poles may be shorter or taller to meet terrain requirements



Power poles on Alaska Highway.

# Transmission Line - Alignment

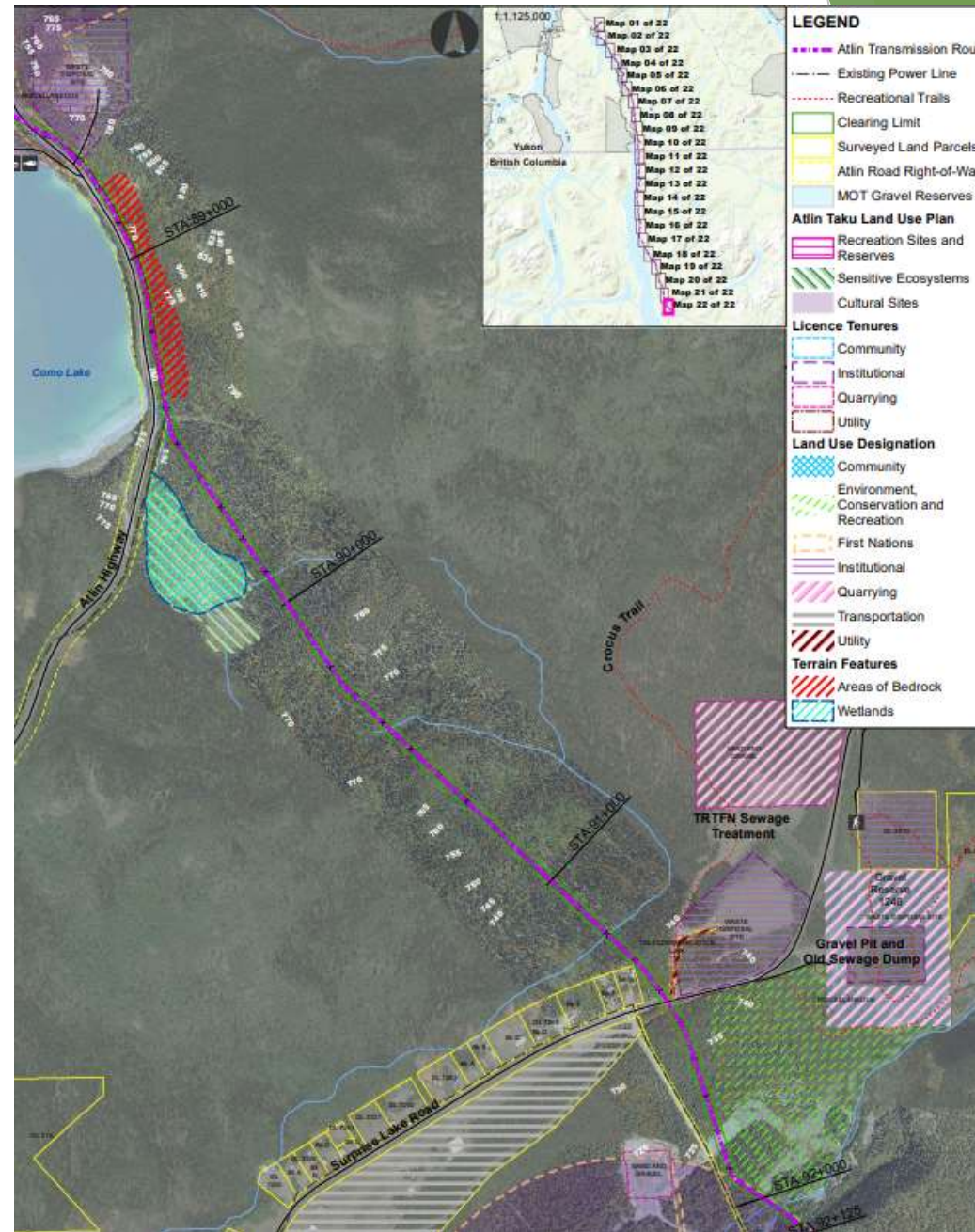
- ▶ Transmission line along Atlin Highway is predominantly within existing ROW
- ▶ Routed generally along the east side of the highway (opposite the lake view).
- ▶ Alignment will avoid Indian Lake-Hitchcock Conservancy and other tenured/private land.





# Transmission Line

69kV Transmission line from switchyard to Atlin highway near Como Lake, ~2 km outside of ROW.

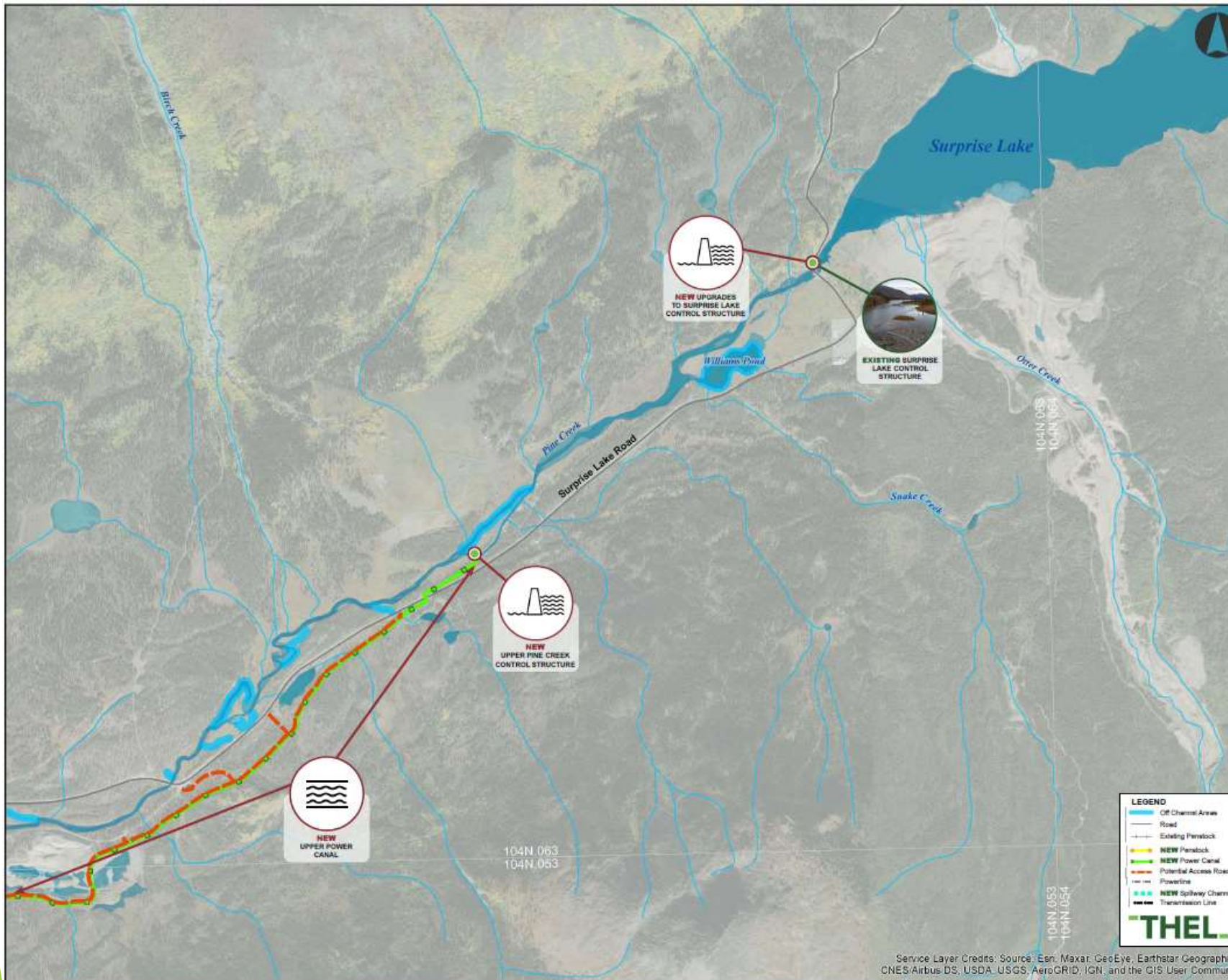


# Generation Overview

## *Project Summary of New Facilities*

1. Upgrade the Surprise Lake control structure (rockfill weir) to increase full storage range of Surprise Lake to a 2.0 m range (911.85 - 913.85)
2. Develop an additional (upper) powerhouse beside the existing powerhouse on Pine Creek that will generate 5.8 MW of power;
3. Divert flows from upper Pine Creek (Upper Pine Creek Control Structure) into a power canal with a head-pond and into a penstock paralleling the existing penstock, to feed the new upper powerhouse;
4. Develop new (lower) powerhouse on lower Pine Creek with a tailrace into Atlin Lake;
5. Divert flows from Pine Creek and from Spruce Creek (Lower Pine Creek Control Structure) into a new head-pond and penstock paralleling Pine Creek, to feed the new lower powerhouse.





**EXISTING INFRASTRUCTURE**

**EXISTING SURPRISE LAKE CONTROL STRUCTURE**  
 The current structure has a weir crest of 913.15m to provide storage for the existing Xelit Ltd hydro facility.

**NEW INFRASTRUCTURE**

**NEW UPPER PINE CREEK CONTROL STRUCTURE**  
 This new structure will divert a maximum flow of 4.7 m<sup>3</sup>/s from Pine Creek into the upper power canal and to the upper powerhouse.

**NEW UPGRADES TO SURPRISE LAKE CONTROL STRUCTURE**  
 The upgrades will increase the storage range by increasing the height of the weir structure by 0.7m and excavating sediment to lower the low supply level by approximately 0.2m.

**NEW UPPER POWER CANAL**  
 The upper power canal will convey water from the new upper pine creek control structure to the upper penstock. The canal is about 8km long and uses a historical mining ditch from the early 1900's.

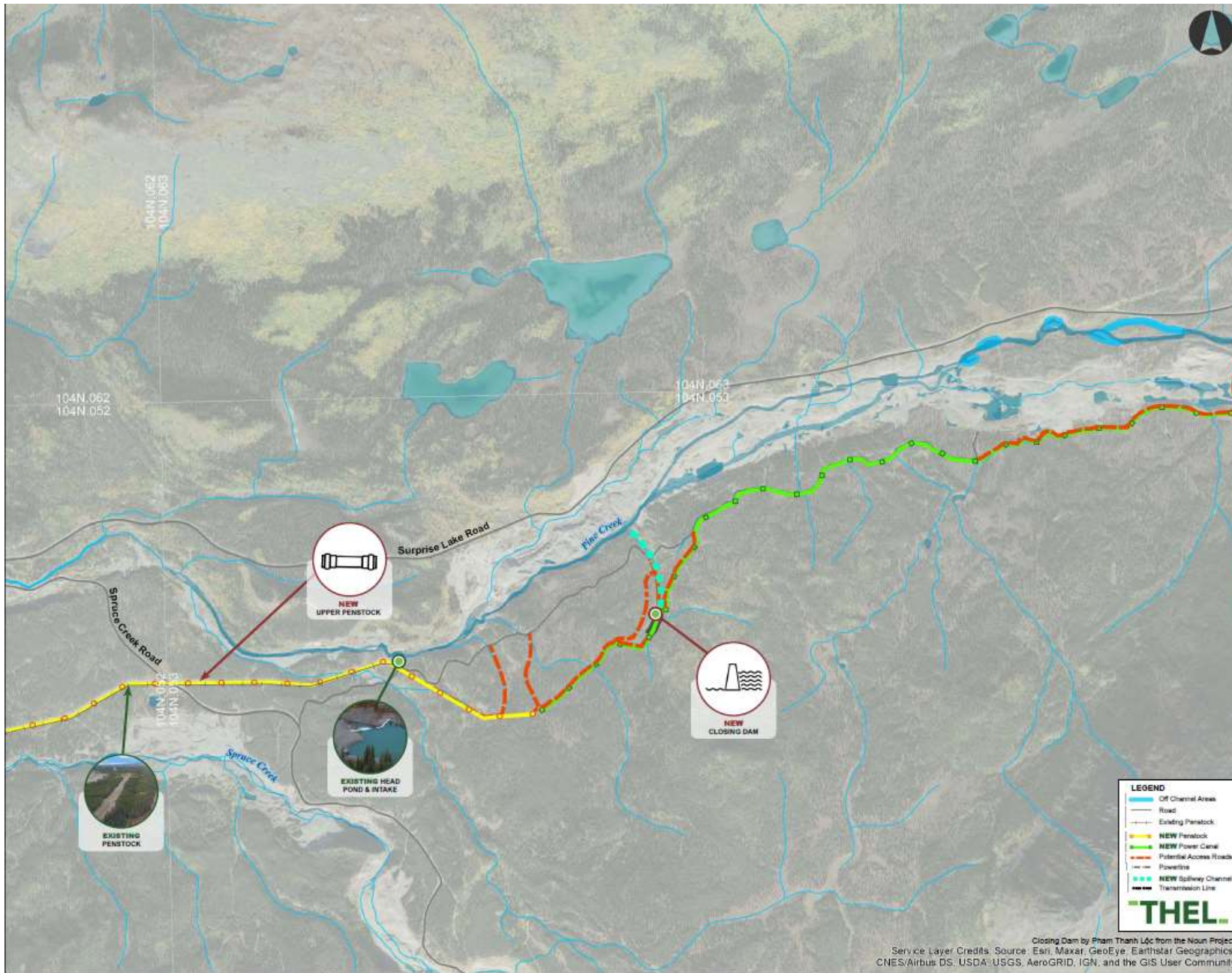
**LEGEND**

- Off Channel Areas
- Road
- Existing Penstock
- NEW Penstock
- NEW Power Canal
- Potential Access Roads
- Powerline
- NEW Spillway Channel
- Transmission Line

**THEL**

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





Closing Dam by Phạm Thanh Lộc from the Noun Project  
 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar/Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

### EXISTING INFRASTRUCTURE



**EXISTING HEAD POND AND INTAKE**  
 The headpond on Pine Creek currently diverts flow from Pine Creek into the existing upper penstock. This is part of the Xelit Ltd. Existing facility and will be unchanged by the project.

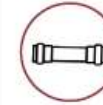


**EXISTING PENSTOCK**  
 The penstock is used for the existing Xelit Ltd hydro facility and will be unchanged by the project. The new penstock will take water from upper pine creek to the new powerhouse will follow the same route as the existing upper penstock.

### NEW INFRASTRUCTURE

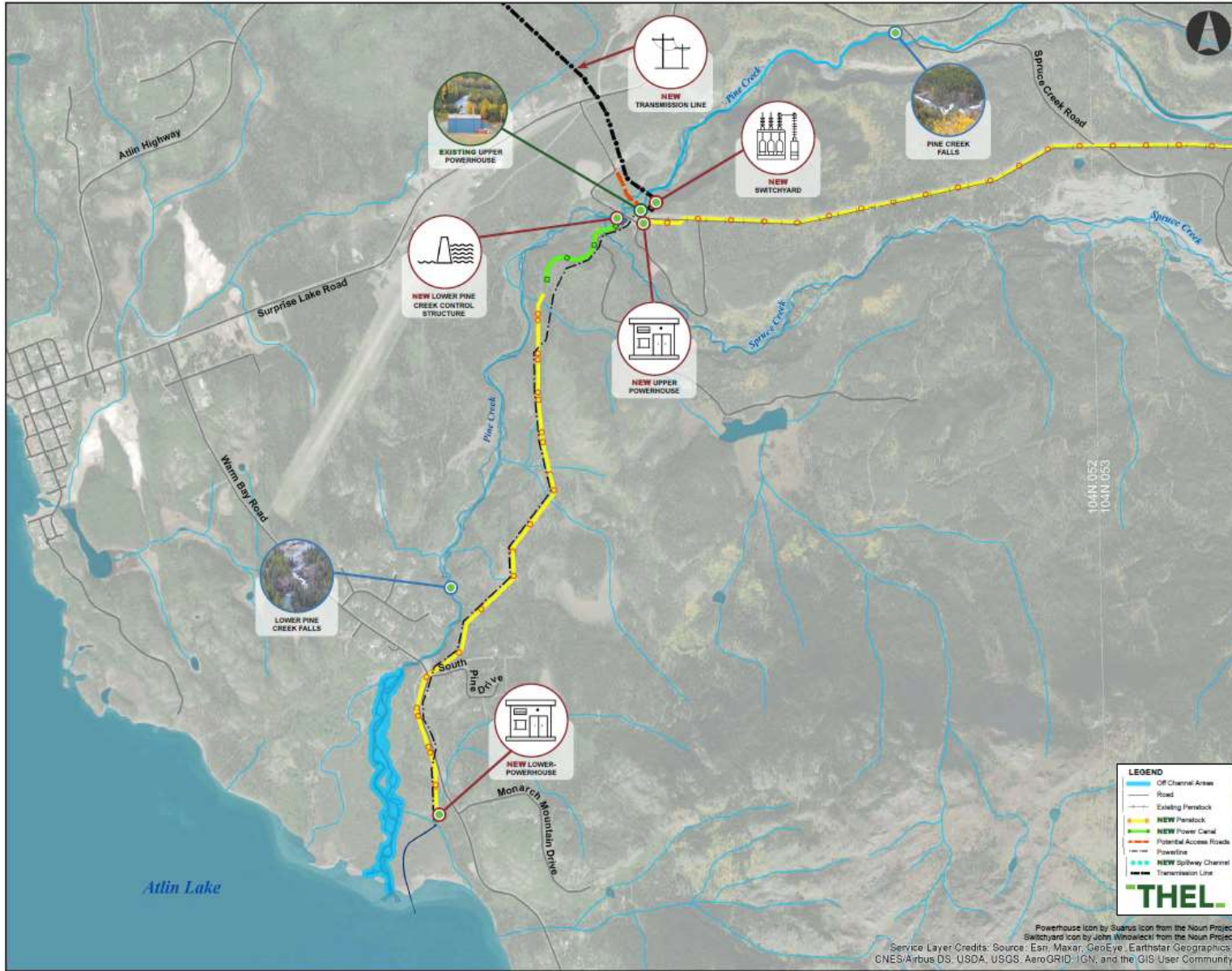


**NEW CLOSING DAM**  
 A closing dam and spillway for the headpond will be constructed. The closing dam will allow the power canal to cross a small valley.



**NEW UPPER PENSTOCK**  
 Water diverted from upper Pine Creek will traverse through the power canal, to an intake headpond and into a penstock. The new penstock will run adjacent to the existing penstock, ultimately ending at the new upper powerhouse. By placing the existing and new penstock adjacent to one another it reduces the amount of clearing needed.





**EXISTING INFRASTRUCTURE**

**EXISTING UPPER POWERHOUSE**  
 The existing facility is owned and operated by Xelit Ltd, a sister company to THEL. This facility produces 2.1 MW and will continue to function with the addition of the project. Water is currently diverted from upper Pine Creek and conveyed in the existing penstock to the facility. The new penstock will follow the same route as the existing penstock.

**NEW INFRASTRUCTURE**

**NEW LOWER PINE CREEK CONTROL STRUCTURE**  
 This new structure will divert maximum flow of 6.0 m<sup>3</sup>/s from Pine Creek into the lower penstock and to the lower powerhouse.

**NEW SWITCHYARD**  
 This will be a switchyard and substation to take power from both lower and upper powerplants and direct the power into the new transmission line to the Yukon.

**NEW UPPER POWERHOUSE**  
 The new powerhouse will have an installed capacity of 5.7 MW using a Francis turbine. The building will be added to the existing powerhouse that is part of the existing Xelit Ltd. hydro facility. Power from the new lower powerhouse will be conveyed using a buried powerline along the same corridor as the lower penstock.

**NEW LOWER POWERHOUSE**  
 The lower powerhouse will have an installed capacity of 2.8 MW using a Francis turbine to generate power. The lower powerhouse use water recycled from the upper power plant via the new power canal and lower penstock. The power will be sent to the new switch yard via a buried 25kV powerline that will follow the same route as the lower penstock.

**NEW TRANSMISSION LINE**  
 A new 69kV transmission line will convey power from the switchyard to Jakes Corners in Yukon Territory. For most of the route, the line will follow the Atlin Highway right-of-way. A substation will be located at each terminus of the transmission line.

**NATURAL AREAS**

**PINE CREEK FALLS**  
 A natural waterfall on Pine Creek valued locally for its aesthetics. Flows over the falls will be reduced to less than 1 m<sup>3</sup>/sec, to about 10 - 15% of the mean annual discharge of Pine Creek.

**LOWER PINE CREEK FALLS**  
 The flows at this natural waterfall will be reduced to no less than 0.5 - 0.8 m<sup>3</sup>/sec. The falls is likely a barrier to fish passage currently and will continue to be with the project.

Powerhouse icon by Suavis icon from the Noun Project  
 Switchyard icon by John Winiowiecki from the Noun Project  
 Service Layer Credits: Source : Esri, Maxar, GeoEye, Earthstar, Geographic  
 CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

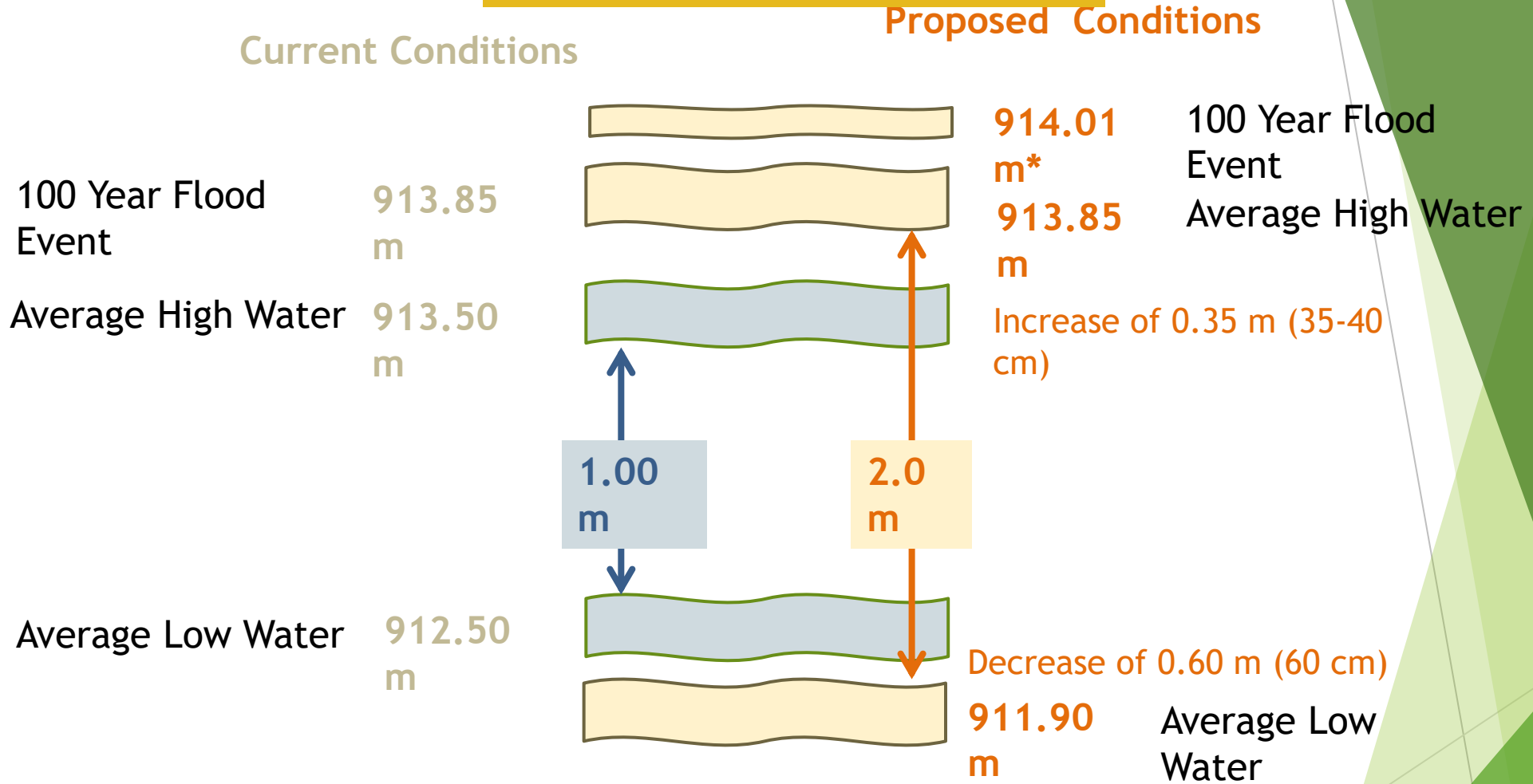
# Operation scheme

- ▶ Operation scheme for flow management assumes *maximizing* winter generation for 6 months of the year.
- ▶ Generation will occur in September and October, at about 65% of generation capacity, and then increase through to March. Generation will slow-down and end in late spring, (e.g. May)
- ▶ Summer generation will only occur on rare occasions at the request of YEC for things such as maintenance or emergencies.

# Storage Range

- Storage range options on Surprise Lake investigated for 2.0 m to up to 2.5 m.
- 2.0 m was selected for several reasons, including having fewer impacts in terms of inundation.
- 2.0 m high at 913.85 m is the flood level elevation currently permitted, while the full supply level is 913.15 m.
- Increasing the low range will require excavating at the outlet ~ 185 m downstream of the Surprise Lake bridge, and ~ 200 m upstream.

# Change in Average High/Low Water



\* The modeled flood happening about once every 100 years is at 914.2 m, however, THEL is proposing to manage flood levels at 914.01 m as a mitigation measure.

# Change in Full/Low Supply Level

Current Conditions

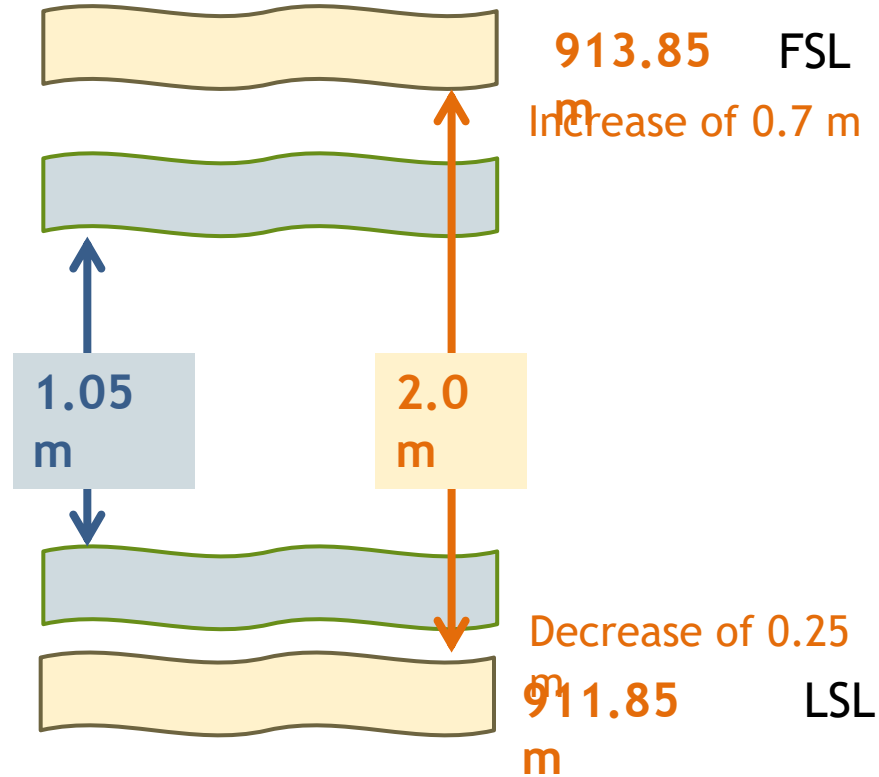
Proposed Conditions

Full Supply Level  
(= FSL;  
Average High  
Water)

913.15  
m

Low Supply Level  
(= LSL; Average  
Low Water)

912.10  
m



Low supply level is the level that the lake can be drawn down to, while full supply level refers to the water level elevation that is the required amount of water for operations, corresponding to the weir crest height. However, high water and full supply level are not always the same, as is presently the case where the FSL is 913.15 m, but high water is 913.5 m. For the proposed Project, the FSL and the average high water will generally be the same.

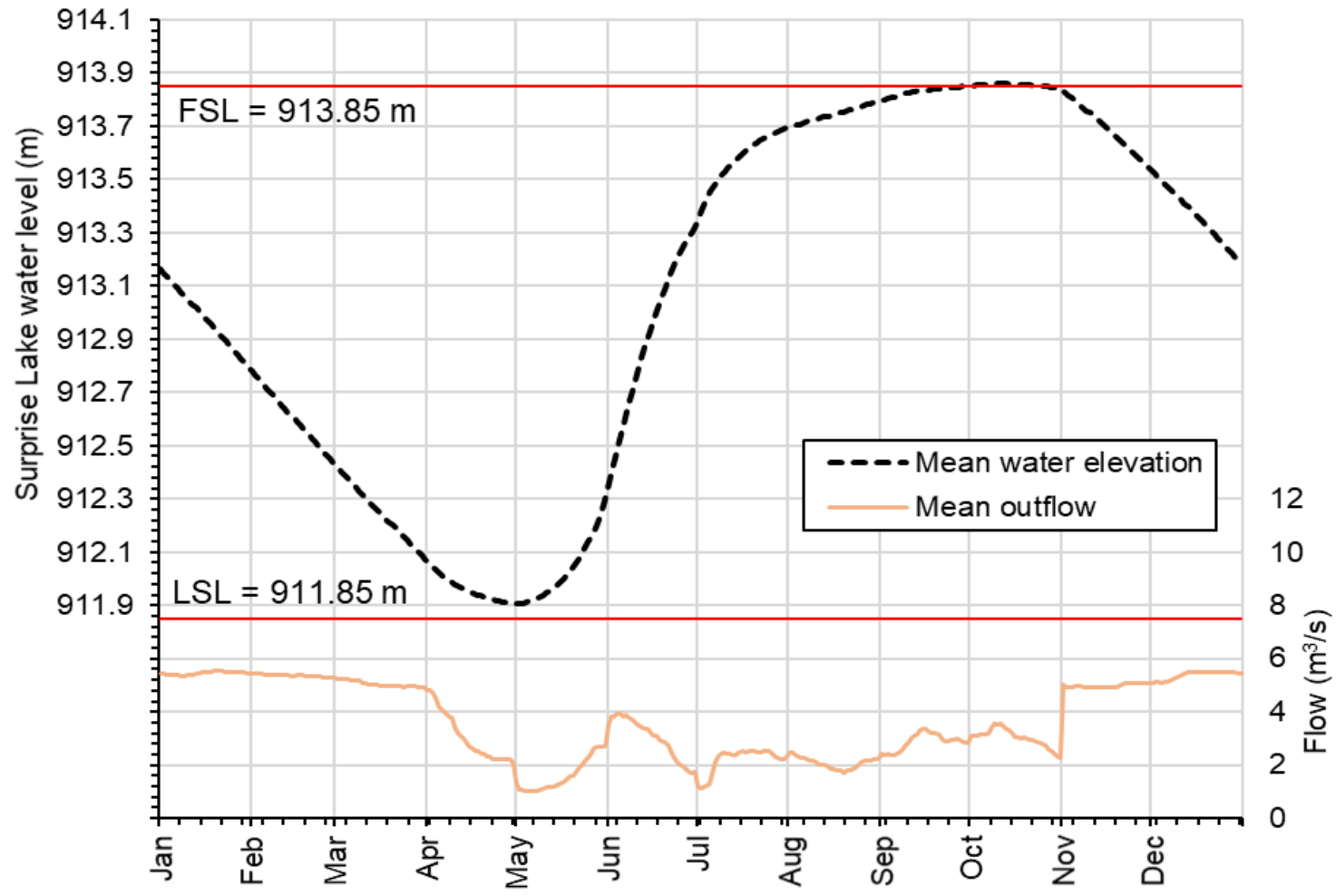
The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The central area is white, providing a clean space for the text.

# Changes to the Environment



# What will happen on Surprise Lake?

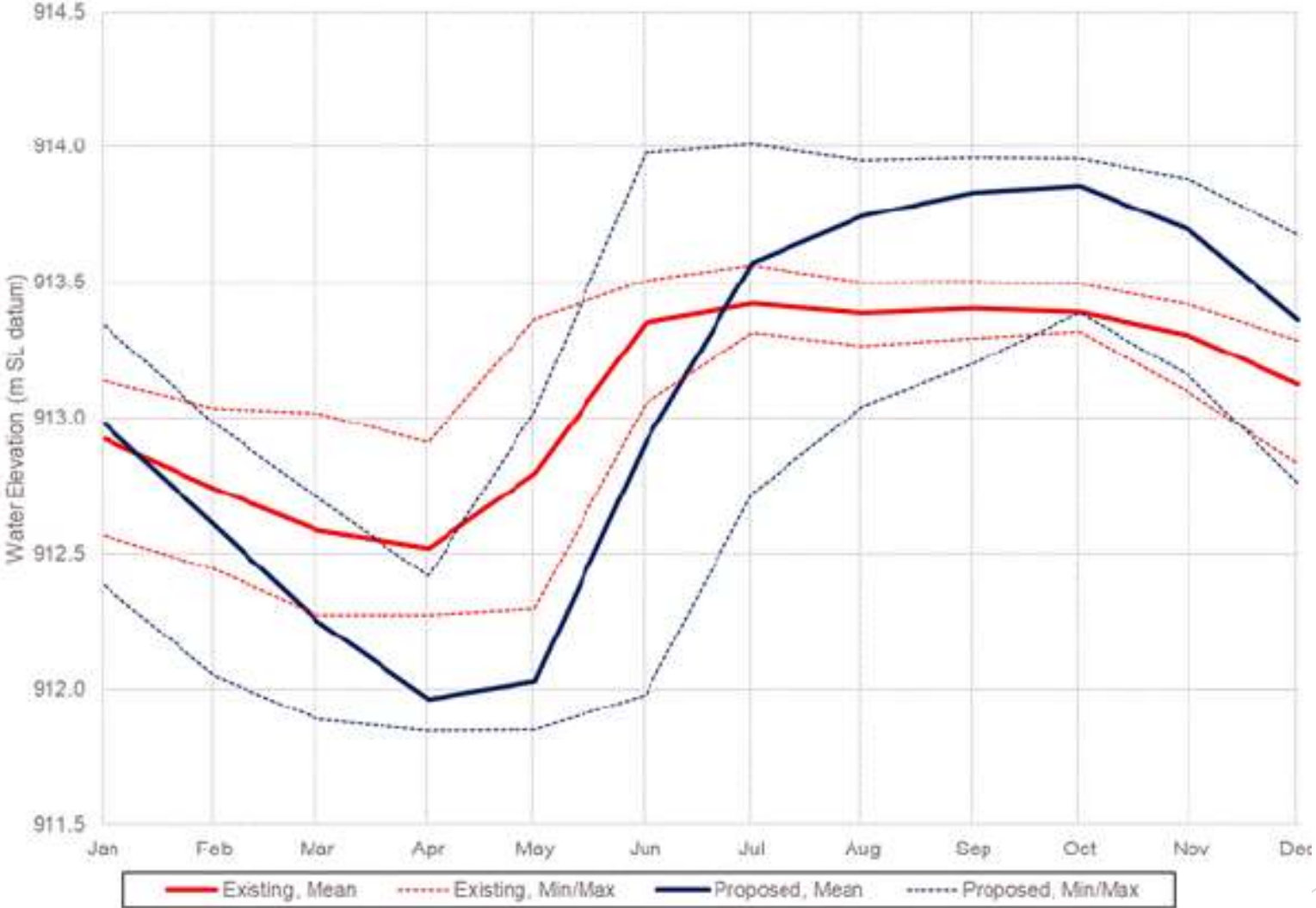
- ▶ The maximum monthly average change in lake elevation with the proposed Project would be 0.5 m.
- ▶ Low water would be in April and May.
- ▶ The lake would fill over the summer months with high water occurring in October. Currently, high water (913.4 m) is reached about the third week of June. Under the proposed Project, this water level would likely not be reached until later in the season (e.g. ~2<sup>nd</sup> week of July)
- ▶ Based on this information, inundation (flooding over land) of low-lying areas would occur from mid-July into the winter, encompassing approximately 32 hectares (ha) of the lakeshore.
- ▶ Surprise Lake is steep-sided, so a lot of the inundation occurs at low-lying areas at the mouths of creeks, including Boulder, Ruby, Cracker, and Pine/Cup creeks.



Proposed monthly water elevations



### Surprise Lake





Conceptualization of Granite Creek beach early July (913.35 m)

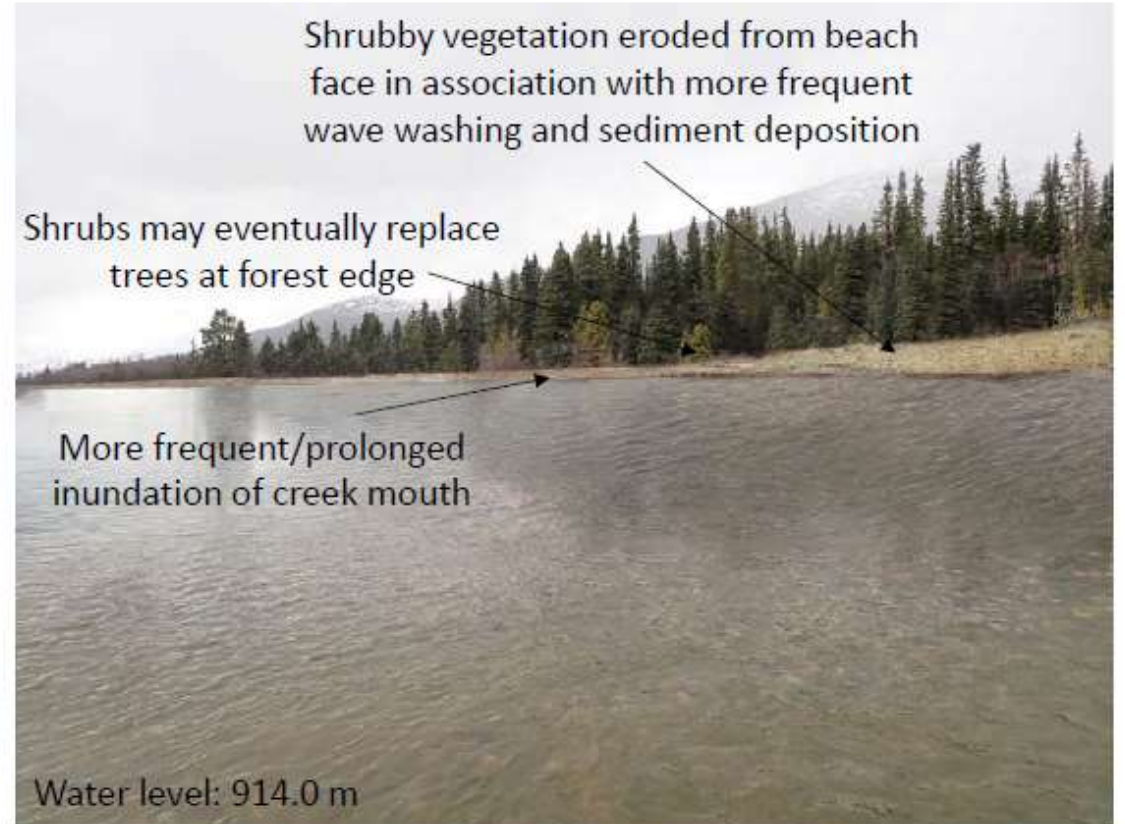


Conceptualization of Granite Creek beach early September (913.8 m)

Inundation on Surprise Lake will have seasonal impacts to the land base (i.e. will flood low-lying areas that are currently not flooded), including, but not limited to: at Class A Cultural Sites, the wetland at Boulder Creek, backwater lagoon at Hemlock Creek.

Flooding and lake draw-down will result in seasonal changes to the size of the land base of the Surprise Lake shoreline at different times of the year, as well as, in some cases, the type of shoreline habitat.

## Ruby





## Hemlock



## Pine Cup



# Impacts and Mitigation

- ▶ Inundation will alter the height and timing of water levels, which could affect recreational, cultural and subsistence activities, as well as wildlife habitat availability and migration routes.
- ▶ Effects assessment concludes that these impacts are not significant, based on an analysis of impacts to specific values, e.g., shoreline birds, sheep, etc., and the likelihood for the beach structures to re-establish.
- ▶ Not all change is inherently adverse, e.g. potential reduction in wetlands in some areas, but creation of wetlands in other areas.
- ▶ Monitoring is proposed, with a limited suite of potential adaptive management tools.
  - ▶ Primarily related to managing the water levels as closely as possible to the proposed FSL throughout the high water season.
  - ▶ Managing water releases during flood seasons, e.g., high snow pack

# What will happen on Pine Creek?

- ▶ The proposed Project involves diverting more water from Pine Creek to feed two new powerhouses.
- ▶ There would be a total of three places where water is *diverted* from Pine Creek: at the existing concrete dam (where water is diverted to Xeitl's powerhouse), and at the proposed Upper and Lower Pine Creek control structures (where water would be diverted to the two new powerhouses).
- ▶ These three diversions create FOUR distinct sections - flows of different sections, or "reaches," of the creek are affected differently.
- ▶ Diversion of the lower reach of Spruce Creek into lower headpond, and the use of settling pond on Spruce Creek.



Surprise Lake

Upper Pine Creek

Upper Control Structure

Upper Bypass Reach

Existing Control Structure

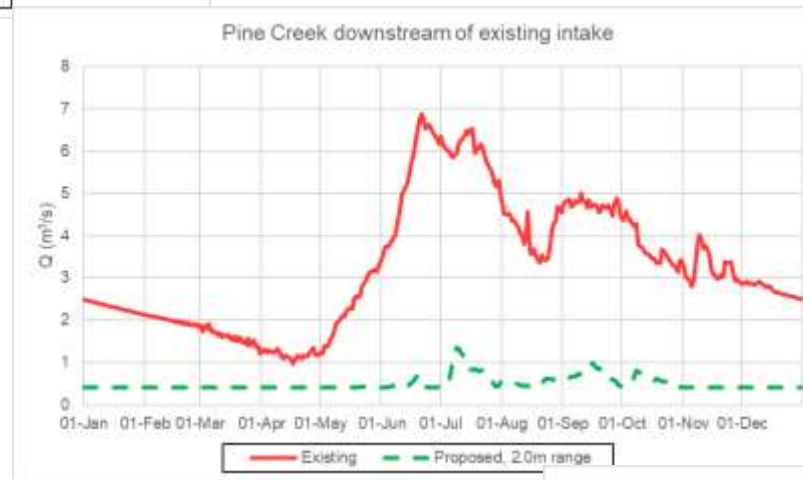
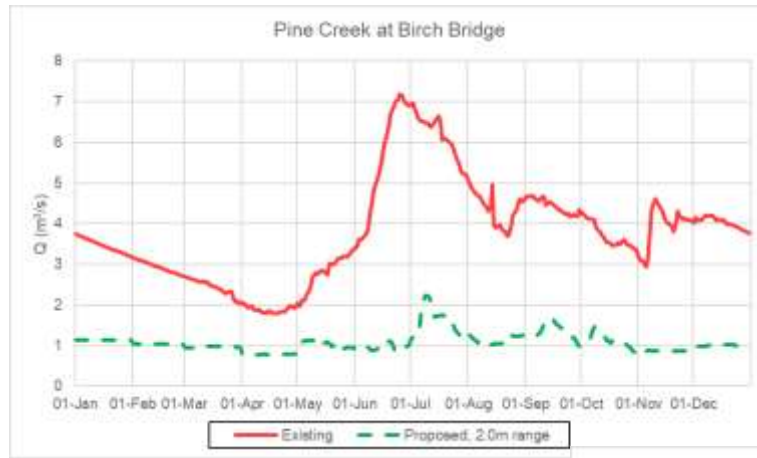
Middle Bypass Reach

Pine Creek Falls

Lower Control Structure

Lower Bypass Reach

ATLIN LAKE







Fish Biologist assessing flows in Pine Creek below Surprise Lake bridge. Flows shown are approximately  $0.8 \text{ m}^3/\text{sec}$ , which is HALF of what the lowest flows would be at this location.



Low flows on Pine Creek will reduce the wetted width by ~ 20%

# Pine Creek Impacts and Mitigation

- ▶ Lower flows (~10% Mean Annual Discharge) in various reaches means:
  - ▶ Loss of fish habitat, but not expected to affect fish productivity, since productive habitat is in Upper Pine Creek
  - ▶ Upper Pine Creek reach significant to spawning grayling - other areas are likely incidental, swept-downstream use
  - ▶ Aesthetic impacts, particularly Pine Creek Falls
- ▶ Improvement in water quality in Pine Creek and its outflow to Atlin Lake
- ▶ More stable, meandering creek, particularly in middle and lower bypass reaches
- ▶ Increase in riparian vegetation, creating new terrestrial habitat
- ▶ Details of fish habitat mitigation and compensation included in the Fisheries Authorization :
  - ▶ In-stream habitat features for Pine Creek and Spruce Creek, as necessary
  - ▶ Fishway at Surprise Lake
  - ▶ Compensation at tailrace and Otter Creek





Pine Creek Falls in May and July, with a difference in flow between photos of almost 4 m<sup>3</sup>/sec.

# What will happen at Warm Bay Road and Pine Creek Trail?

- ▶ The location of the penstock creates a right of way near town in the vicinity of Pine Creek trail, the Pine Creek Campground operated by the Atlin Board of Trade, and the Pine Creek flats area. Some of the impacts to residents and users of the area may include:
  - Short traffic delays and noise during construction where the penstock crosses Warm Bay Road.
  - Widening of the Warm Bay Road right of way where it parallels the road and overlaps with the campground.
  - Disruption during construction of access to the Pine Creek trail.
  - Development of additional trail potential along the penstock route and powerline.
  - Improved recreational access across Spruce Creek due to the creek being diverted through a culvert.
  - Visual impacts to some residents use and enjoyment of their properties.





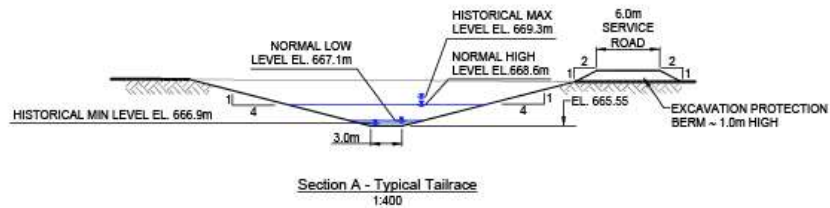
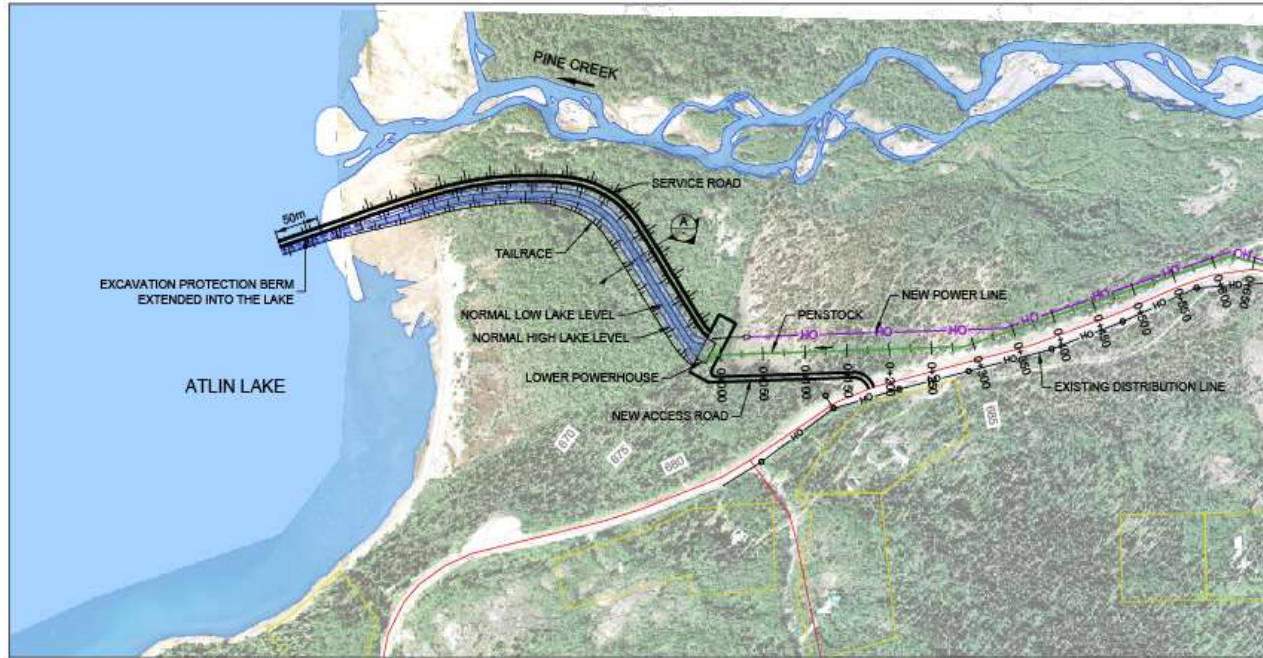


# What will happen at Pine Creek Flats?

- ▶ The lower powerhouse is proposed to be located at Pine Creek flats, below Warm Bay Road. The powerhouse will not be visible when standing on the public use beach, but the 500 m long tailrace will be.
- ▶ The tailrace will have a service road dike to protect it from flooding, which will also be an accessible trail with sitting benches and interpretive signage.
- ▶ The powerhouse will not be operational\* during the period of peak recreational use from June - August.
- ▶ THEL is committed to working with the community to develop and maintain trails that connect with other areas, including Pine Creek trail and the campground.
- ▶ Due to its location, the powerhouse will also be designed with aesthetic appeal in mind and acoustic engineering.



**Conceptual image of Lower Powerhouse and Tailrace.**



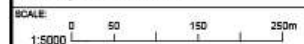
○

LEGEND

-  Existing Land Parcels
-  Existing Roads
-  New Overhead Powerline
-  Existing Overhead Powerline
-  Lower Penstock
-  Flow Direction



Coordinate System: NAD 1983 UTM Zone 8N



TLINGIT HOMELAND ENERGY LIMITED PARTNERSHIP

PROJECT:  
ATLIN HYDRO EXPANSION PROJECT

TITLE:  
Lower Power Plant Tailrace Plan & Section

PROJECT NO.:  
2001073  
DATE:  
Aug. 2020

MAP 2-9

© 2020 Morrison Hershfield. All rights reserved. This document is the property of Morrison Hershfield. It is not to be distributed, copied, or used for any purpose other than the project for which it was prepared.



# What will happen on the Atlin Road from the transmission line?

- ▶ Generally speaking in BC the cleared width of the right of way will increase by ~7.5 m, and ~5 m on the Yukon side.
- ▶ Aesthetic impact/change due to the presence of a pole-line, but poles are not “towers,” and reducing the ecological impact of new linear developments was more important than the aesthetic concerns.
- ▶ Line was located on the east side of the highway to avoid main viewscales, and road crossings are reduced to the greatest extent possible.
- ▶ Impacts to wildlife may include avoidance of the line, but it is possible that wildlife mortality will also be reduced due to improved line of sight.

# Regulatory Review Phase



# CEDP Review Process

- ▶ CEDP is now in the Technical Review Process
- ▶ Province and TRTFN are part of the Regional Clean Energy Project Team that will review the Project and will make recommendations to the decision-makers on whether to permit/authorize the project, and/or any required changes or additional mitigation needed.
- ▶ The CEDP is available for review and public comment.

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the left and right sides of the page, framing a central white area. The shapes are composed of triangles and polygons, creating a modern, layered effect.

# FAQs

# What happened to the Use, Recreation and Enjoyment of the Public land use designation at Pine Creek Flats?

- ▶ THEL was not aware that the designation was removed prior to submitting our Clean Energy Development Plan. We did not view the lower powerhouse as being in conflict with the designation, and our submission focused on how we could enhance recreation and use of the area.
- ▶ THEL was advised by the Province AFTER our submission that the UREP designation had been removed. Since the UREP designation was also consistent with the Atlin Land Use Plan designation of Pine Creek Flats as High Value Community Use area, we did not change our assessment, but considered the values here.
- ▶ The Province advised THEL that the designation had been removed one-year prior, in addition to over a thousand other UREPs in the Skeena region.
- ▶ Both THEL and ACID have asked the Province to explain when/how/why these designations were removed. We are still waiting for a response.

# How will low flows affect the Pine Creek delta/flats?

- ▶ The greatest potential effect to Pine Creek is anticipated in the lower bypass reach, however it is not expected to result in major changes to wildlife and habitat.
- ▶ The delta was formed due to a combination of historic placer mining impacts (significant amounts of sediment in streams) as well as high peak flows at times of the year. The reduction in flow will result in the stream being more stable and allowing regeneration of vegetation more typical of a stream in the absence of placer mining impacts. Currently there is significant avulsion, erosion and sedimentation, including in winter.
- ▶ The reduced peak and average flows, in combination with the recovery from historic placer mining, will result in the creek shifting over time to a smaller and more meandering creek in the lower reach.
- ▶ The combination of these changes will have long-term stabilizing effects on the geomorphology and recovery of the creek for riparian and aquatic species. These changes will also result in wildlife habitat characteristics.

# How will low flows affect the ecology of Pine Creek flats?

- ▶ The meadow vegetation of sedges and grasses is mainly an artifact due to the early successional stage of vegetation due to historic placer mining impacts and is not a rare or threatened ecosystem, but relatively common throughout the regional study area.
- ▶ The sand/gravel bars and riparian areas will be colonized with vegetation and the wetted width will be reduced, but habitat value for moose, amphibians and grizzly bear will likely increase overall.
- ▶ The meadow vegetation is expected to change to a more natural riparian vegetation with stable water levels that will support amphibians, moose, bears and a wide range of migratory birds.
- ▶ Stable water levels and lack of sediment and erosion from the peak flows and historic sediment loads from placer mining will provide good habitat for a range of aquatic species.



# How will flows affect the ecology of Pine Creek flats cont'd

The changes that will come with restoration to a pre-placer mine environment will benefit a wide range of species.

The grass and sedge communities currently there are not rare or threatened in the regional area and relatively common.

More stable streamflow and hydrology are expected to benefit threatened species such as Western Toad.

Changes due to the reduced peak and average flow are predicted to be neutral to beneficial as they will restore a more natural ecological community that is stable habitat for moose, bear, amphibians and riparian birds.

# Will the lower powerhouse be noisy?

- ▶ The short answer is “No.”
- ▶ The lower powerhouse will be designed to be quiet, such that under a range of normal weather conditions, it will be largely unnoticeable to the nearest and/or most sensitive receptors.
- ▶ This is achieved through the use of sound dampening in the building, as well as the use of a Francis turbine that is submerged.
- ▶ Sensitive sites include the nearest residences, as well as the Pine Creek beach and Monarch Mountain trail
- ▶ The actual decibel level required to achieve this has not been determined yet, but acoustic engineers/vibration experts will be collecting baseline sounds conditions next week to help determine the sound level that should be achieved at a given distance or receptor.
- ▶ Vibration from the penstock will not be perceptible to overlapping uses and is not an effect pathway.
- ▶ More information will be provided to the public and nearby residences on expected noise levels as well as an explanation on how to understand them in the coming weeks, with the help of the acoustic engineering team.

# How will Pine Creek trail be affected?

- ▶ The lower penstock right of way does not overlap with the Pine Creek Trail, with the exception of 150 m and a couple of pinch points, e.g. potentially where it meets Warm Bay Road and at its egress where it would cross the power canal. Alternative routing will be developed for these areas, if desired.
- ▶ Overall, the Project will increase accessibility on this trail and over Spruce Creek, as Spruce Creek will be passable year-round.

# How will recreation at Pine Creek beach and in the flats be affected?

- ▶ The main impact to Pine Creek beach is the aesthetic impact of the development of the tailrace. This will affect beach users during construction and operations, as permanent infrastructure.
- ▶ The tailrace will have a dike that will be an accessible gravel path ~500 m long, allowing accessible recreation and enjoyment of the beach area.
- ▶ Access along the beach will not be impeded.
- ▶ THEL is excited to work with the public to develop a trail network, making use of some existing informal trails, to connect the beach with the campground and areas on the north side of Pine Creek.
- ▶ There is potential for a 5-6 km long loop trail in this area, which could also be used by skiers in winter.
- ▶ THEL is of the view that the lower powerhouse is an opportunity to enhance recreational use in this area for a broader user group.

# Will my well be affected by lower flows in Pine Creek?

- ▶ No, groundwater wells will not be affected by reduced flows in Pine Creek.
- ▶ Pine Creek is a regional discharge creek, meaning that groundwater reports to the creek, and flow is not the other way around, as confirmed by geologists and geomorphologists.



# Will placer miner's water use be affected/constrained by the project?

- ▶ In general, the answer is “no.”
- ▶ Placer mining water use is generally considered to be neutral in terms of flow reduction, because water is returned directly back to the creek.
- ▶ As well, placer mining water use is comparatively minor.
- ▶ Consideration could be required for future operations, depending on their size and geographic extent, to ensure that the points of diversion and water returns do not affect flow availability at hydropower diversion structures.

# What will happen to the beaches on Surprise Lake?

- ▶ As shown previously, beaches on Surprise Lake will persist over time. The processes that formed the spectacular beach formations at Pine Cup Creek and Hemlock Creek, for example, will remain, and beaches will continue to grow through erosion and deposition.
- ▶ After a couple of high water- high wind events, beaches will become more prominent, being raised up and pushed inland slightly.
- ▶ While the first couple of seasons may see greater inundation, beaches will recover their recognizable features in both the short and long-term timeframes.
- ▶ Access and main existing camping areas will be unaffected, with the exception of some areas along the Pine Cup Creek spit, which will shrink in the near-term under highwater conditions.

# What will happen to nesting shorebirds?

- ▶ In terms of inundation, the impact to shorebirds is expected to be neutral, since high water will occur later in the season, and shorebirds are adapted to annual fluctuations in water levels.
- ▶ Habitat loss for wetland nesters may occur at Boulder Creek; however, new wetland habitat may also be created. Although these changes may be locally important on Surprise Lake, these potential impacts are not considered significant from a population or regional perspective.
- ▶ Monitoring of habitat changes will occur.

# Why can't you eliminate the lower powerhouse from the Project?

- ▶ The 2.8 MW plant is 1/3 of the proposed energy - that is significant!
- ▶ We're in a climate crisis - every little bit helps!
- ▶ The cost of the transmission line and substations are the same no matter what the total energy generated for the Yukon is, and warrants maximizing the energy produced.



Q&A