

Kemano T2 Project

Project update – Spring 2022



The Kemano T2 Project – Finishing Strong

Dear readers,

Mother nature has been kind to us this year, with less snow than average and fewer avalanches than last year.

But it sure has been a busy winter. Since the tunnel boring machine (TBM) broke through in October, it has now completely been dismantled and removed from the tunnel. The refurbishing of the portion of the tunnel mined in the 1990s is continuing as planned and we have started demobilizing equipment and temporary infrastructure that are no longer needed. The project is on schedule and water up is still on target.

The whole team is getting ready for spring. Usually, spring is a season prone to avalanches due to the warmer

temperature, but the low amount of snow this year makes us believe the avalanches won't be as challenging as last spring. One of the challenges to consider in spring is the wash out of portions of the main road when the snow melts and a lot of water flows from the mountains. Our surface team is working on getting our drainage system as good as it can possibly be to try to avoid wash outs and keep the road safe for all of us.

As the project is gradually getting to an end, it is time for me to hand over the reins of the project to Alf Garnett, who successfully led the Kemano T2 Underground team since his arrival in 2020. Since taking the lead of the Kemano T2 Project in April 2020, and

involvement for several months prior, I am immensely proud of what the entire T2 Project team has achieved during this period with the challenges that both nature and COVID-19 have placed upon us. I am humbled by the support and the conviction of the Kemano T2 family and the drive to safely get the job done, whatever the challenge that is put in front of us.



Alex Jones
Project Director Resolution,
Integrated Skarns
Project (ISP), and Kemano



Alf Garnett
Project Manager
Kemano T2 Project

The tunnel boring machine is dismantled and removed.

Now what?

It took about three months to disassemble and remove the tunnel boring machine (TBM) from the tunnel. While a TBM can usually be removed at the end of the tunnel, the Kemano T2 Project's TBM had to be dismantled inside the tunnel and transported via the tunnel's rail system all the way back to the beginning of the tunnel since the intake structure built in the 1950s is not large enough to remove the TBM and is 30m below the surface of the water.

Tunnel rails and power cables removed. Water pipe and lights will be removed with final cleaning.

The TBM cutterhead and shield are larger than the concrete tunnel lining installed by the TBM so they would not fit back out of the tunnel in one piece. The shield of the TBM, which extends 10m behind the cutter head is the only part of the TBM that will remain underground and will be incorporated into the tunnel lining. The shield will be encased in shotcrete to create a smooth transition from the 1950's intake structure to the new bored tunnel. Special rail trolleys were used to remove the components from the inside of the shield. The cutterhead was cut into small pieces and removed through the gate slot at the intake.

Now that the TBM is removed, the Kemano T2 workers are removing the services that supplied the TBM including the rails, water pipes and power cables.

When all the services are removed, workers will finish cleaning the tunnel and perform a final inspection before filling the tunnel with water in the summer of 2022.



Removal of the cutter head of the TBM, TBM Shield will be incorporated into tunnel lining.

What is a tunnel plug?

The T2 tunnel requires two plugs to physically close the construction access openings to the underground work areas. One plug is being installed at what we call the **2600 Landing** where the TBM exited the tunnel in the 1990s. This plug is 10m long and circular, 5.73m in diameter. The second plug will close the opening by which the TBMs entered the T2 tunnel in 1990 and 2018 at **Horetzky**

Landing. This plug will be 12m long and horseshoe shaped 7m wide and 7m tall. Both plugs are made of concrete and will have a 3m by 3m steel door that will allow equipment access for future maintenance. The plugs include drainpipes that can be opened by valves to empty the tunnel when and if access is required at a later date. It takes six to eight weeks to construct a plug!



2600 Plug and the commencement of construction of the Horetzky Plug.

What is happening Downstream?

There has been a lot of work going on in the portion of the tunnel that was built in the 1990s. This tunnel is being rehabilitated, which means that they are upgrading the ground support, removing the old infrastructure and cleaning the portion of tunnel that had been started in the 1990s.

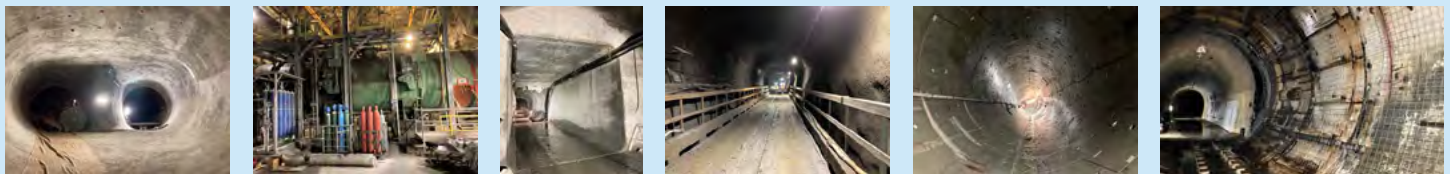
Geological mapping has been performed before starting any work in this half of the tunnel. By identifying the types of rocks and minerals present in the tunnel, the geological engineers of the Kemano T2 Project could locate portions of the tunnel that had to be reinforced with shotcrete (sprayed concrete). There are two reasons to use shotcrete on the rock in a tunnel: to increase the durability of the tunnel by protecting the rocks that can be more easily eroded and by covering blocks of rocks that could fall due to minerals swell or shrink when in contact with water, and to ensure the stability of the rock that could move or fall.

A 'rock trap' 40m long, 5m wide, and 5m deep has been built near the discharge end of the tunnel. Any rocks or debris that

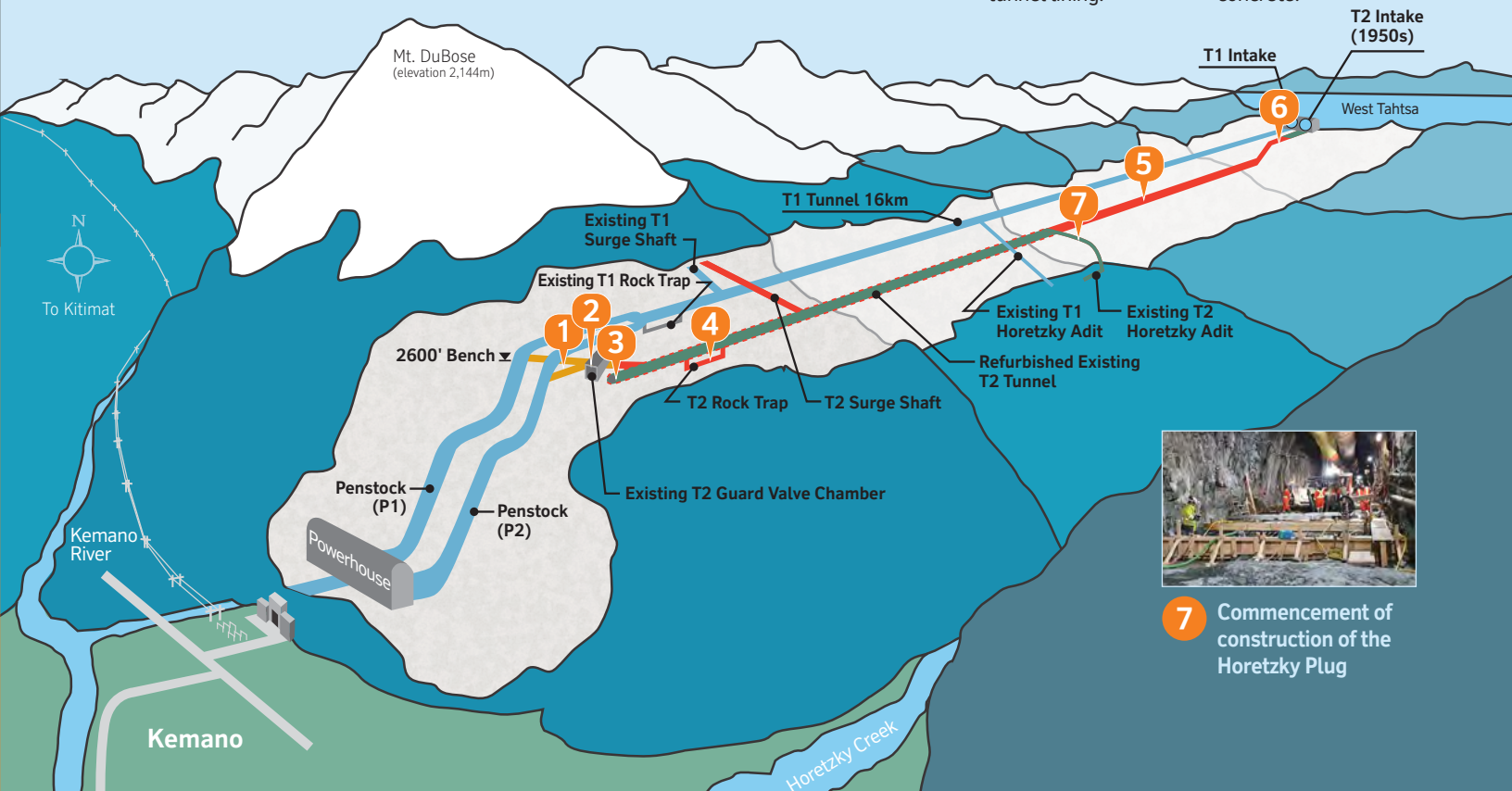
become loose in the tunnel while water is flowing, no matter their size, will tumble and end up in the rock trap instead of continuing their way to the power station turbines. The T2 team covered identified portions of the tunnel with shotcrete to ensure durability and stability, so the rock trap is just another layer of protection to increase the lifespan of the tunnel.

Impressive civil engineering work has been made in the connection tunnel and bifurcation, where the T2 tunnel splits in two to connect with each of the T1 penstocks that bring the water to the Kemano Powerhouse. Finally, the T2 team is almost finished the installation of the first tunnel plug, which will block the access to this portion of the tunnel.

Where is what?



- 1 Bifurcation**
- 2 Guard valve chamber.** Water will go through this penstock.
- 3 Tunnel plug**
- 4 10m long rock trap** covered with a wooden bridge.
- 5 The portion of the tunnel bored by the TBM, with tunnel lining.**
- 6 The shield, the portion behind the cutter head, that stays underground and will be covered with concrete.**



7 Commencement of construction of the Horetzky Plug

Protecting the Coastal Tailed Frogs

We always take precautions when performing work that may affect wildlife. There is one specific location along the Horetzky road where the coastal tailed frogs like to hang out: in the swift water streams coming from the mountains and flowing into two culverts that go under the road.

The streams carry forest debris and rocks which can block the culverts. Before cleaning the area, once or twice a year, we install a little barrier upstream that works as exclusion fence to prevent more frogs from going close to the culvert. Afterwards, we survey the area where we'll work to make sure we remove all the Coastal Tailed Frogs we can find. We either move them up the exclusion fence or on the other side of the culvert.

Donald Harron, one of the environment leads at the Kemano T2 Project, says that "we can find between a couple and a hundred frogs. The more debris and rocks there are, the more coastal tailed frogs we expect to find.



That's what they like! The frogs use the rocks to hide from the current."

Once the project is complete, the Horetzky access road will be decommissioned, and the culvert will be removed. The water flow will wash out the road and the nature will take back its course.

In British Columbia, the Coastal Tailed Frog is moderately widespread and locally common. It is not an endangered species, but it is designated as a species of special concern in Canada. They are the only frog species in North America that breed in cold mountain streams.

You ask, we answer!

Q. What are you doing with the waste rock?

The rock excavated from the tunnel stays on-site. The project has an approved rehabilitation and revegetation plan for the area where the rock is stored to regenerate grass, flora and fauna. The rehabilitation and revegetation will take place at the beginning of the summer.

Q. How deep is the tunnel under land?

Because of the mountains above the tunnel, the depth of the tunnel varies from 40 meters to 620 meters below ground surface with an average depth of 400 meters.

Q. How long is the new tunnel?

The complete length of the tunnel will be 16 kilometers. About half of the tunnel was bored in the 1990s (8.4 km). The TBM finished mining the remaining 7.6 km October 2021.

Send us yours!



Hi! My name is Sophie. I am the communities and Social Performance Advisor for the Kemano T2 Project and I want to hear from you.

Part of my role is to be the connection between the project and the community. This project update aims at giving you interesting and informative insights on what is happening on the project, underground and on the ground. I would love to hear from you so please do not hesitate to contact me if you have any questions on the project or feedback about this project update.

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About the Kemano T2 Project

The BC Work's smelter in Kitimat is powered by the Kemano Powerhouse, which receives water from the Nechako Reservoir via a single tunnel that is over 60 years old. The Completion of a second tunnel will ensure the long-term reliability of the power supply that energizes Rio Tinto's BC Works smelter in Kitimat. The smelter produces aluminium with one of the lowest carbon footprints in the world.

Rio Tinto will continue to operate the existing tunnel and monitor its condition until the T2 Project is completed, and on an ongoing basis.

Rio Tinto and all the contractors working on the Kemano T2 Project are working to maximize the involvement of local businesses and First Nations in the project.