Kidston Pumped Storage Hydro

UPG

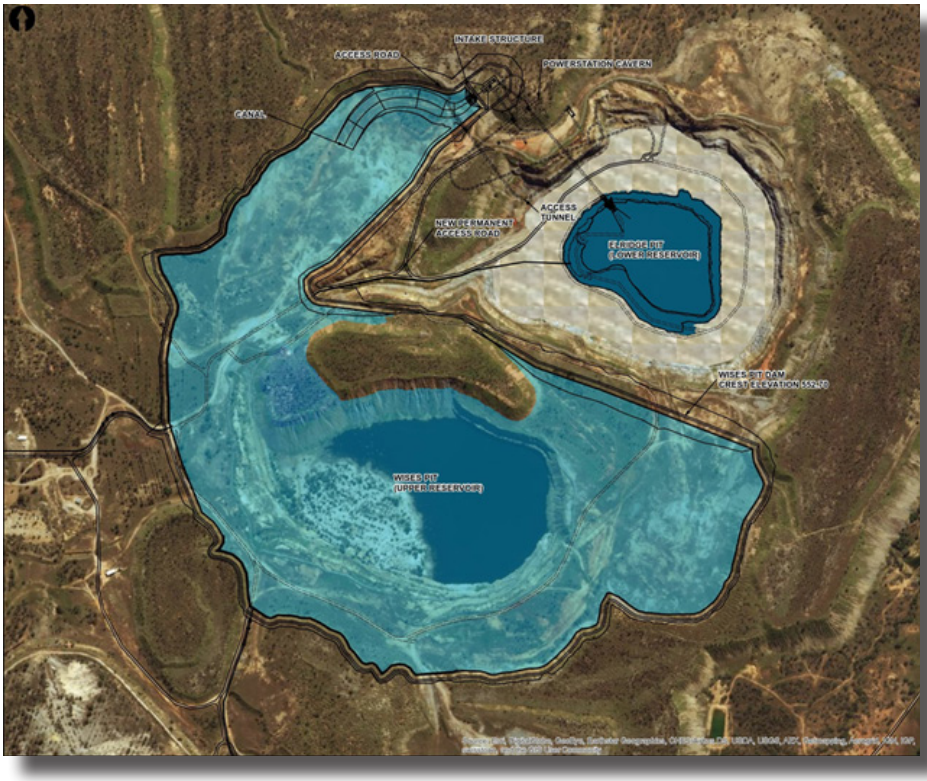
An innovative project that involves the world-first conversion of a disused gold mine into a pumped storage hydroelectric power generation facility.

Trimble
Authorised Distribution Partner

Customer: Minstaff Survey

Location: Kidston, Queensland

Trimble: SX12, TSC7, Business Center



Project Background:

The Kidston Pumped Hydro Project is the flagship project for Genex Power, located in Kidston, Far-North Queensland.

The Kidston Pumped Storage Hydro Project is the first pumped hydro project in Australia for over 40 years, the first to be developed by the private sector, and the third largest electricity storage device in the country.

This project has a unique mix of bulk earthworks, underground tunnelling, and structural/ mechanical components all needing accurate survey control and construction techniques.

EPC (Engineering, Procurement and Construction) Contractor JV (Joint Venture) of McConnell Dowell and John Holland worked with project owner, Genex for a number of years to develop the project using the ECI (Early Contractor Involvement) model. The ECI model ensured maximum innovation was brought to the project from both highly experienced Contractors, and the design team of GHD-Mott McDonald. An acceptable design, time and cost outcome was achieved and the project then moved to construction in 2021, now 50% complete (Q2-2023).

The MDJH-JV bring decades of combined experience in the delivery of significant Civil, Tunnelling, and Energy Infrastructure projects.

Minstaff Survey

Minstaff Survey began in 1995 and now has over fifty qualified surveyors that service construction, underground mining, infrastructure projects, and bulk earthworks. Contractor JV of McConnell Dowell and John Holland chose them for their proven track record on major projects and experience in underground surveying.

The Kidston Pumped Hydro Project presented unique surveying challenges for Minstaff and the JV team. The projects components are covering a vast area with over 5O pieces of plant for excavation, haulage, and tunnelling, working both day and night shifts.

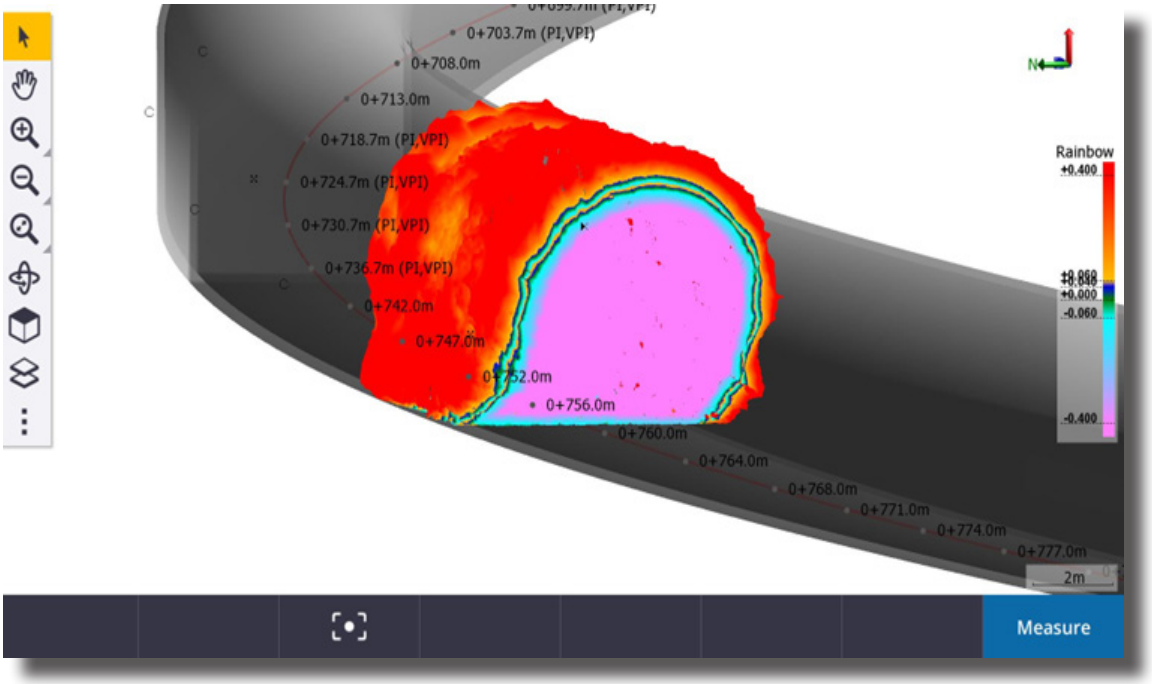
At the helm of the project is Minstaff's Survey Manager for Major Projects, Andrew Fenwick. Andrew was well suited to the position due to his key role on a multi-billion-dollar tunnelling project in Victoria and other major infrastructure projects in his 16 years of experience in the industry.

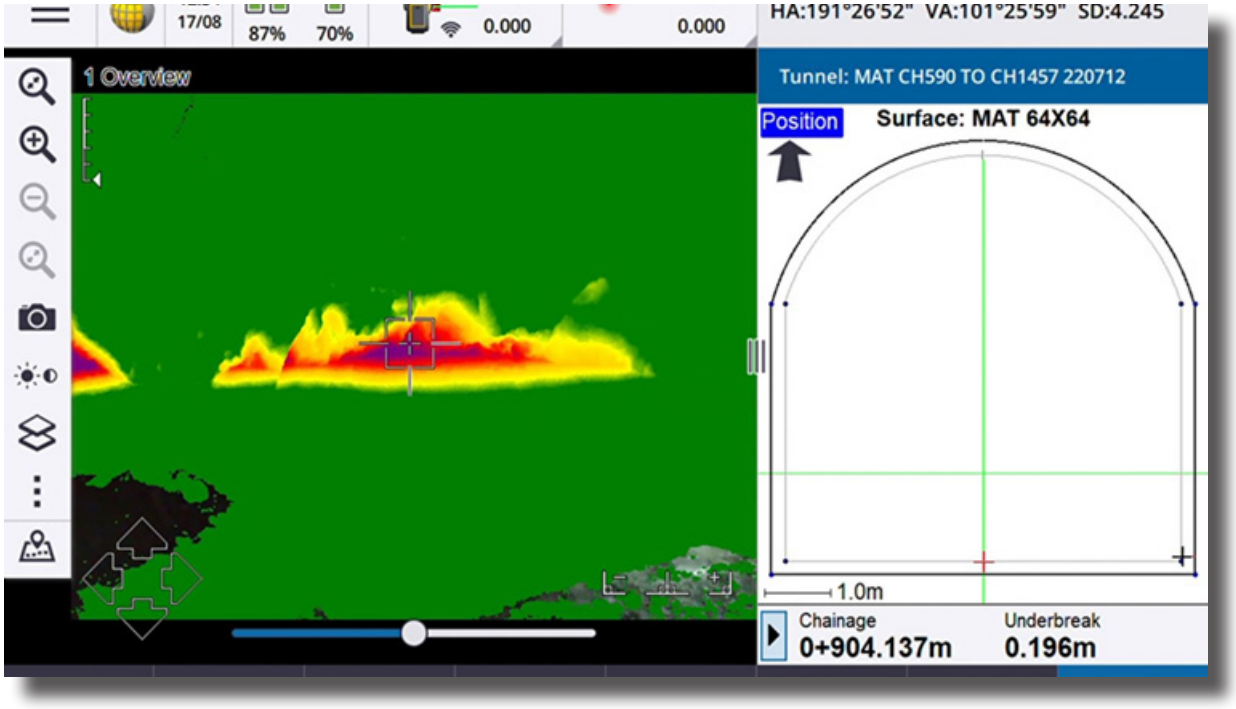
"This project is no different to any other major project in the country now, with the struggles of skilled workers. The ability to upskill our surveyors was aided with simple workflows presented in Trimble access and Trimble Business Center. The SX12 is an instrument like no other for ease of use and speed of operation, allowing tasks that would normally require a survey team of two to be now completed by a single person in less than half the time. The JV team are well pleased with the reduced time survey are required in the underground cycle, speeding up production. While maintaining high accuracy set out and detailed reports," said Andrew.

Survey Techniques taking it to the next level

Trimble SX12

The Trimble SX12 and TSC7 are used by the survey team for daily tasks. The cycle times are very tight between excavation, Shotcrete, drilling for blasting, and blasting. The survey team must quickly set up near the face to measure the newly excavated surface or recently completed shotcrete to confirm conformance to design. This is all done onboard the TSC7 controller with the use of surface inspection function. The inspection map allows for the identified areas to be painted up showing required rework if applicable, saving a return trip down the tunnel. Before the survey team has left the face, they can deliver guidance to operators and supervisors.

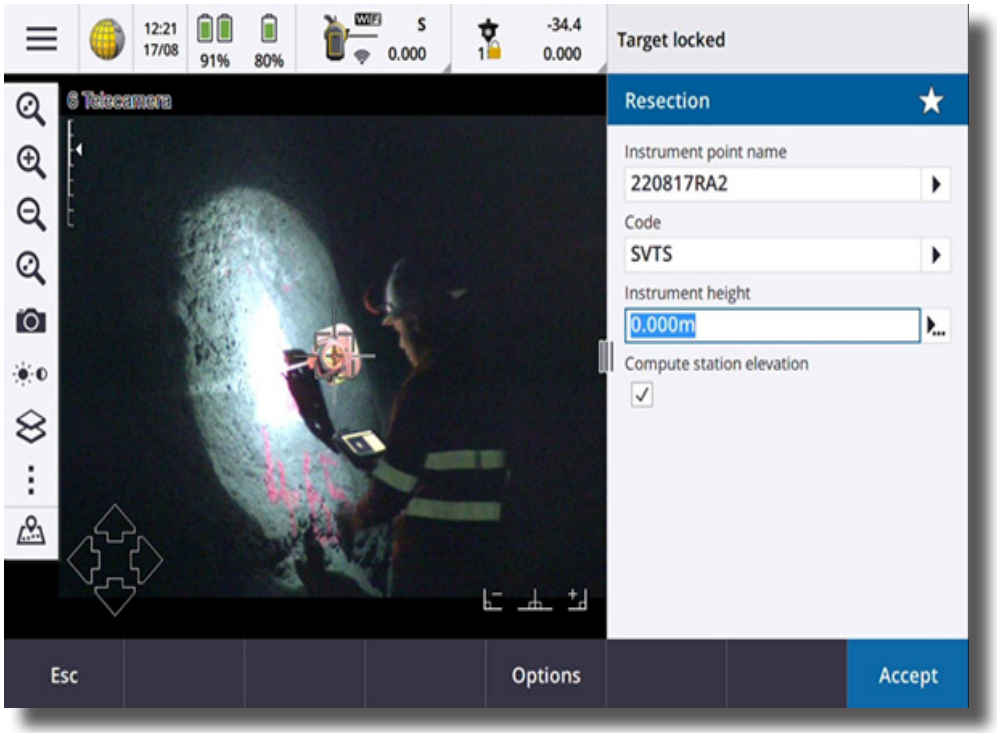




Trimble Access Tunnelling Applications

The green laser is extremely easy to identify on the face even with poor lighting. Using the TSC7 with purpose-built tunnelling and mining apps., the software allows for the surveyor to mark out the face quickly. The application has been created in conjunction with industry for simple workflows. The surveyor can automatically operate the instrument remotely and turn to point of interest with a predefined pause for mark up.

The integration of the digital cameras and removal of the telescope is a game changer for a one-man operation and allows for the highest level of efficiency for survey tasks.



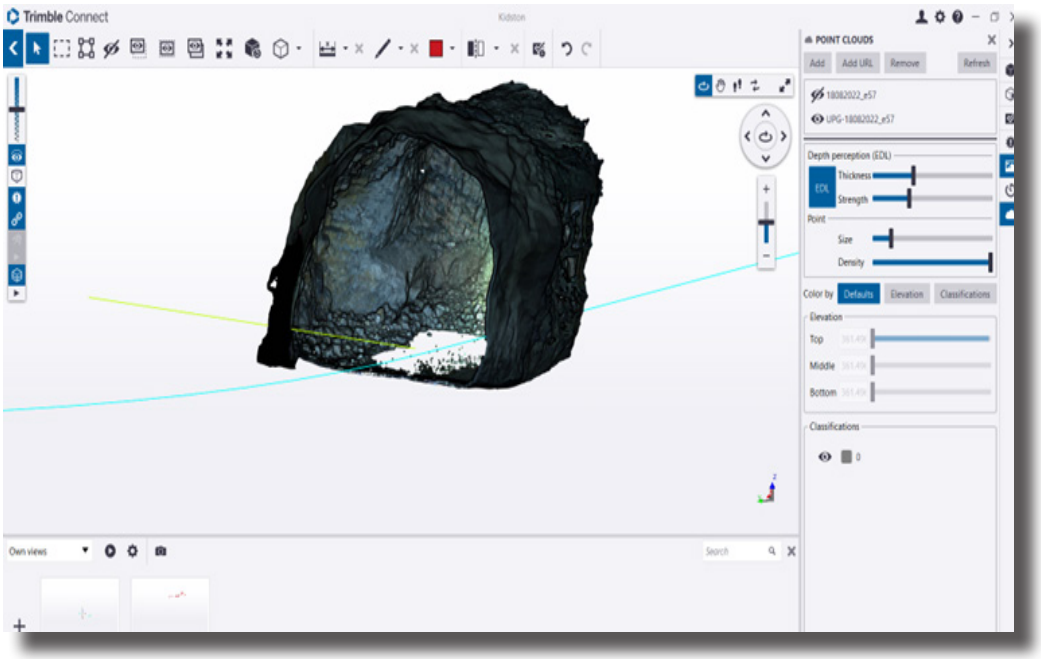
Grade lines (shown in white below) are marked out automatically at 1m intervals along the walls to assist the production team to remain on target. Trimble access makes this procedure seamless by pointing to the desired grade line at nominal offset and then automatically progressing down the wall, pausing for mark ups at surveyors desired intervals.

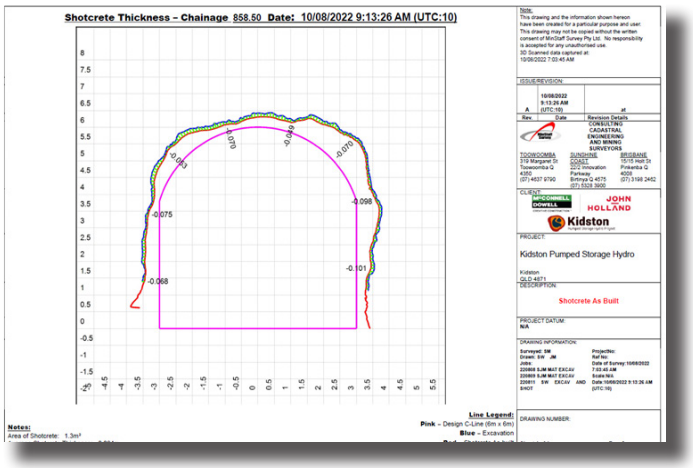
Trimble Business Center

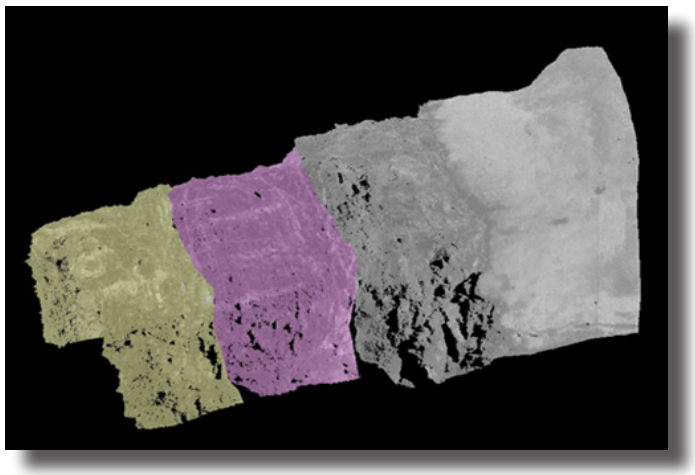
Trimble Business Center is the control centre of the project from design phase through to as-constructed reporting of the tunnelling. Once the work has been completed underground including set-out, survey of as-constructed tunnel, and bolt and scanning, photogrammetry captures, import into the office is very simple. A drag and drop of the job file allow all linked photographs and scans to be imported already on survey datum. The SX12 is a scanning total station so all work is completed in the field on datum which significantly reduces office time that in the past has been associated with scan registration and georeferencing. A single file import allows for the user to have all imported data including survey data, 3D point cloud, and Photogrammetry all registered and ready for analysis.

The 3D photogrammetry can be quickly shared to the cloud for browser viewing by other professions like engineers, Geotech engineers and supervisors. Trimble Connect allows them to view, take measurements, and overlay designs in 3D, minutes after the survey data is uploaded.

Trimble Business Center allows for automatic conformance reporting at both excavation and shotcrete stages. Below is an example of the report that users can customise using their logos and project details at desired intervals down the chainage. Although all data and heatmaps are deliverable in 3D format the chainage cross sections are still a useful tool for communicating overbreak and underbreak on the tunnel profile.







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