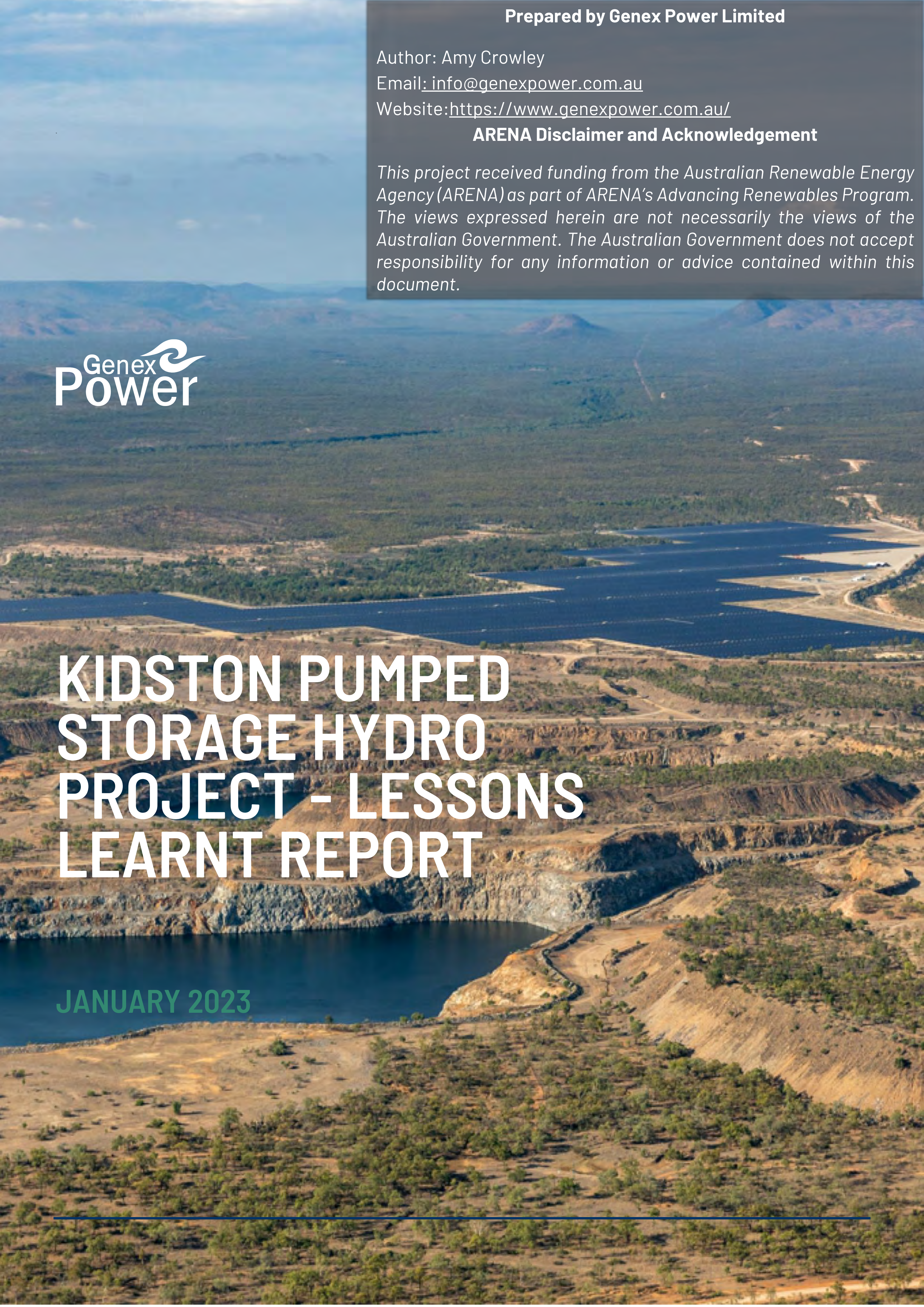

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ARENA Disclaimer and Acknowledgement

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Genex Power

KIDSTON PUMPED STORAGE HYDRO PROJECT - LESSONS LEARNT REPORT

JANUARY 2023

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1. EXECUTIVE SUMMARY

Genex Power Limited (**Genex**, **Company** or **Owner**) is the 100% owner of the Kidston Clean Energy Hub, located in North Queensland (the **Kidston Hub**). Stage 1 of the Kidston Hub was completed in the form of the 50MW Stage 1 Kidston Solar Project, which was energised in November 2017. Stage 2 of the Kidston Hub is the 250MW Pumped Storage Hydro Project (**K2-Hydro** or **Project**) which is currently under construction, having reached financial close in May 2021. A further Stage 3 of the Kidston Hub, being a wind project of approximately 200MW which Genex is developing in a 50:50 partnership with Electric Power Development Co. Ltd (trading as **J-POWER**), is currently in feasibility stages along with a potential co-located solar farm of up to 270MW.

This report will serve as a Lessons Learnt Report, discussing issues around transporting the major Project equipment to site, focusing on methods of transport, storage as well as overall improvements in this space.

Key lessons learnt include:

- To engage heavy logistics specialists early in the planning phase to ensure route geometry and local available specialist equipment;
- To commence planning as early as possible and involve local stakeholders and Councils in this process to ensure that no unexpected situations occur when construction commences;
- To complete material transportation outside of the wet season and identify and make available alternate offsite storage; and
- To implement a logistics management system for tracking components from factory to site and then storage onsite.

2. DESCRIPTION OF MAJOR EQUIPMENT

The major components of the hydro generator are being fabricated overseas, mainly in China and India, by the supplier – Andritz Hydro. The two 125MW turbines (the **Turbine** or **Turbines**) are manufactured in parts and shipped to Australia via the Townsville Port. To date, three shipments of equipment have been received (mainly steel components that will be embedded into concrete). All shipments to date have been transported by semi-trailer using existing road routes without special conditions or escorts. However, for specific items which are either large or heavy or both, special transportation measures are required. A summary of the largest components is provided in Table 1 below.

HEAVY LIFTS | ODC	TONS	L (CM)	W (CM)	H (CM)
Draft Tube Section (various)	11	660	400	350
Draft Tube Main Gate	91	550	450	330
Bottom Ring	32	430	430	110

Head Cover	56	510	510	150
Main Inlet Valve	91	550	450	330
Shafts	28	660	150	150
Main Transformer	135	900	320	400
Stator Stacked, wound	94	762	405	423

Table 1: Preliminary Heavy Lift Details

Of the above, components of the turbine and the transformer are the critical logistical challenges for the Project, and are described further in the sections below.

2.1 Turbines

Turbines are a key component of the Project and are used to generate electricity. When electricity demand is high, water will flow from the upper reservoir of the Project into the lower reservoir, passing through turbines that rotate generators to produce electricity.

The Turbine is made up of several components that are placed and fitted together at the Project site. The key components for the purposes of transportation and logistics are as follows:

- The runner
- Bottom ring
- Headcover
- Draft tube cone
- Draft tube liner
- Pit liner
- Stay ring; and
- Spiral plates.

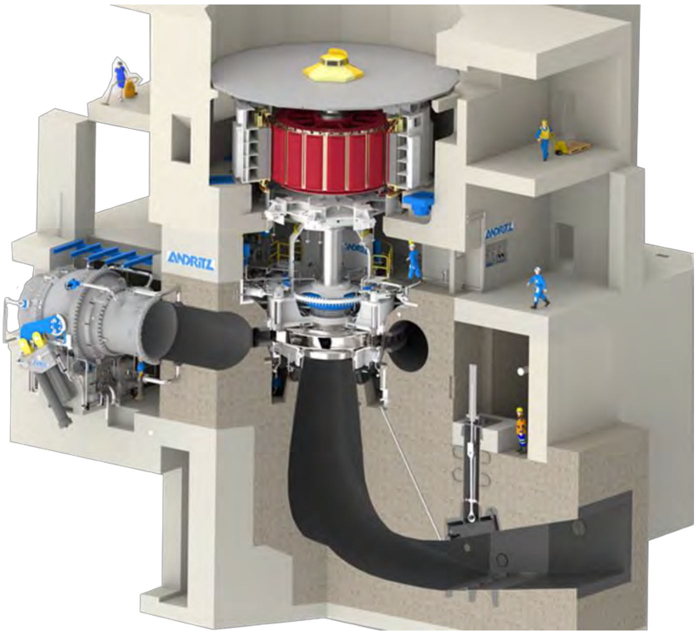


Figure 1: Illustration of a reversible pump turbine

Of these parts, the stay ring is the largest single piece that is required to be transported. Refer to Figure 2 for illustration of stay ring on a semi-trailer.

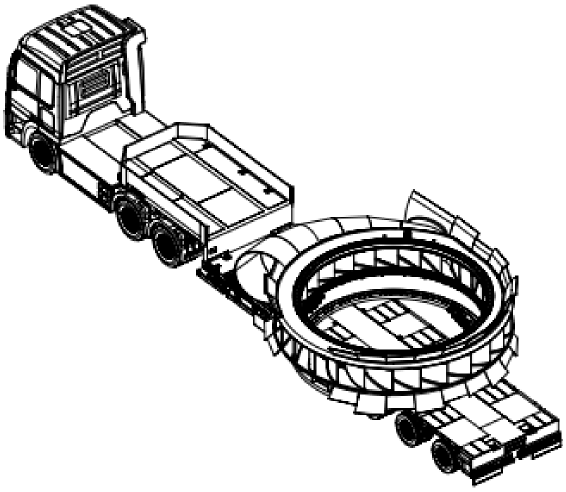
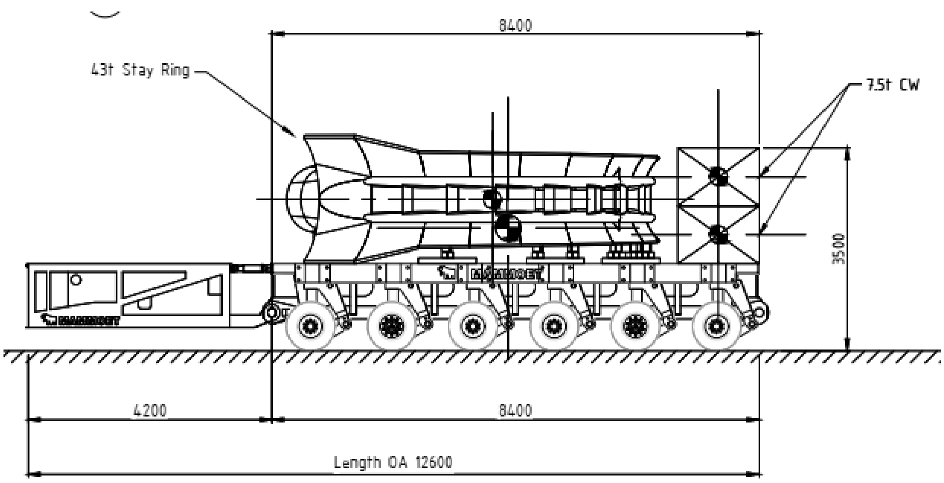


Figure 2: Transportation Configuration of Stay Ring on Semi Trailer – Above ground

For the journey below ground, the stay ring is required to fit through a 6m high, 6m wide tunnel, having a 7% grade (1 in 14) with curves having a 60m radius. The size and route geometry require the utilisation of specialised transportation equipment for this journey. The stay rings will be transported underground in one piece utilising Self-Propelled Modular Trailers (**SPMT**). A preliminary transportation configuration is provided below:



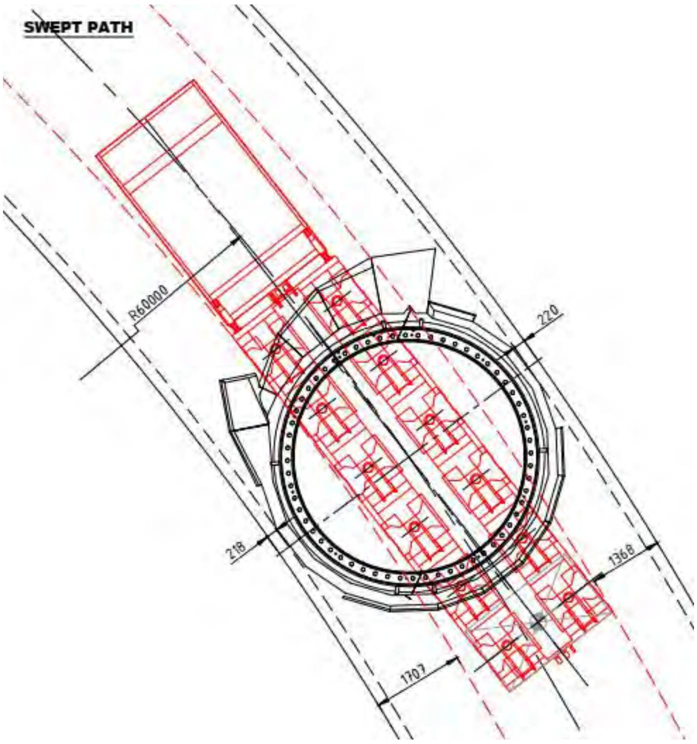


Figure 3: Transportation Configuration of Stay Ring on SPMT – Underground

A key consideration for any underground project is to ensure that heavy logistics specialists are engaged early in the planning phase to ensure route geometry and local available specialist equipment. This approach was undertaken and has resulted in the solution currently being constructed.

2.2 Transformers

Two transformers are required to convert the 16.6kV supply from the turbine generators to 275kV for purposes of connecting into the National Electricity Market. These are ultimately located underground, adjacent to the Turbines. They each weigh 135 tonnes and are approximately 9m long, 3.2m wide and 4m high. Multiple transportation configurations are required to bring the transformers to the Project site, at which they are then transported underground. A preliminary trailer configuration for above ground transportation is shown below in Figure 4:

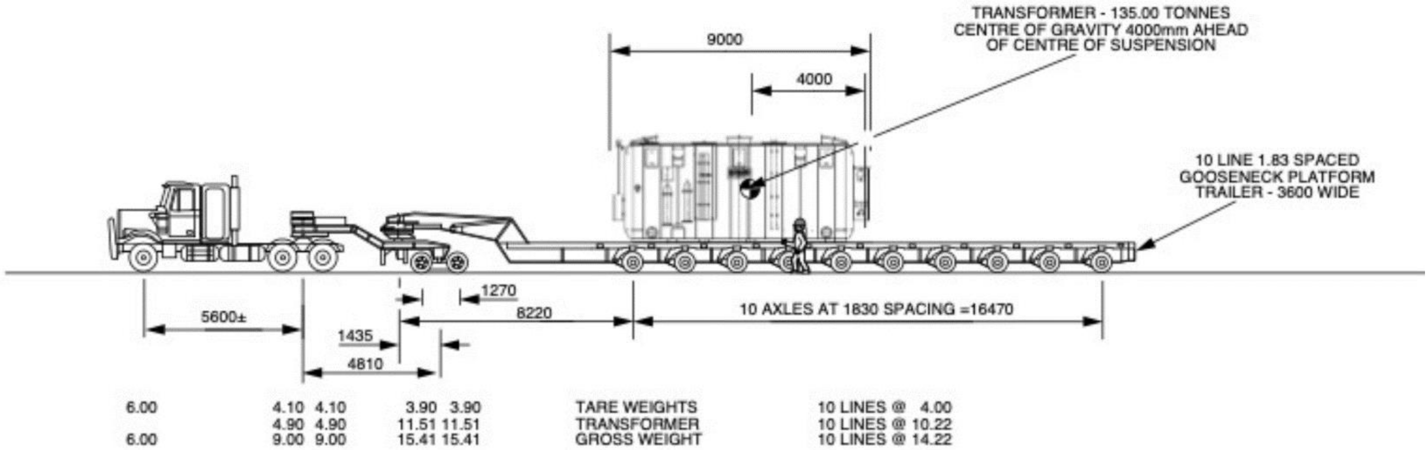


Figure 4: Transportation Configuration of Transformer on Gooseneck

Similar to the Turbines, the transformer is required to fit through a 6m high, 6m wide tunnel, having a 7% grade (1 in 14) with curves having a 60m radius. The combination of size, weight and route geometry require the utilisation of specialised transportation equipment. The transformers will be transported underground utilising SPMT. A preliminary transportation configuration is shown below in Figure 5:

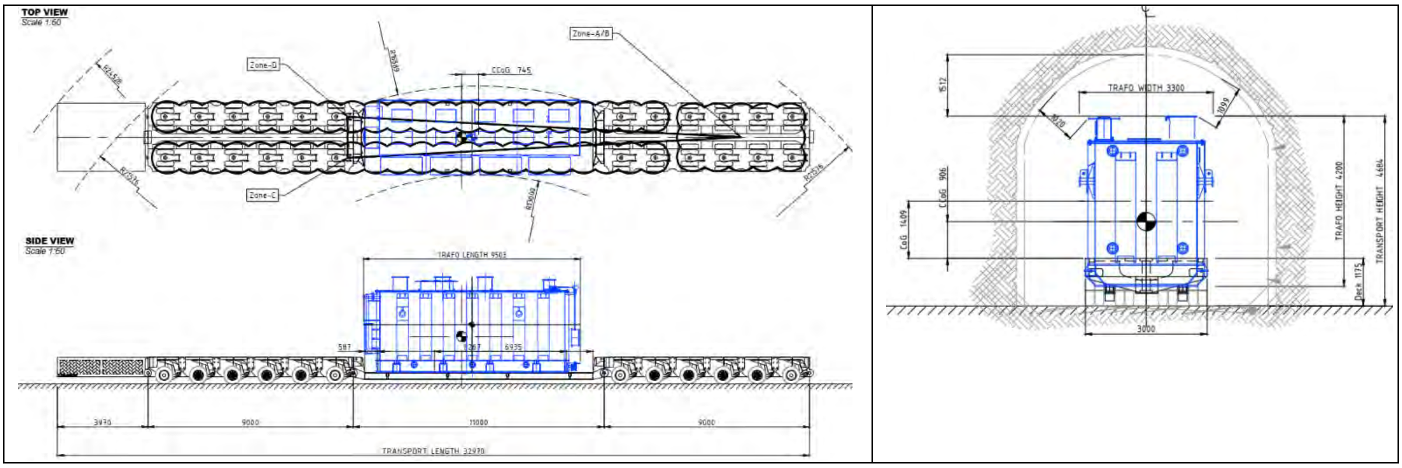


Figure 5: Transportation Configuration of Transformer on SPMT - Underground

3. JOURNEY TO SITE

3.1 Planning

The planning phase for transportation is the most critical phase of the works. During the planning phase, it is crucial to ensure that all routes available are understood and visually proofed, and that all road infrastructure is assessed for load limits, width, road geometry constraints, surface type (sealed or unsealed) and surrounding infrastructure (below ground and above ground).

For the Turbine equipment being provided by Andritz Hydro, a full route survey study was undertaken by professional internal logistics consultants (Hansa Meyer Global and J.H. Bachmann).

The route survey was broken down into:

i) Route from Townsville Port to Conjuboy Intersection; and

ii) Route from Conjuboy Intersection to Kidston site.

The various routes are illustrated in the Figures below.

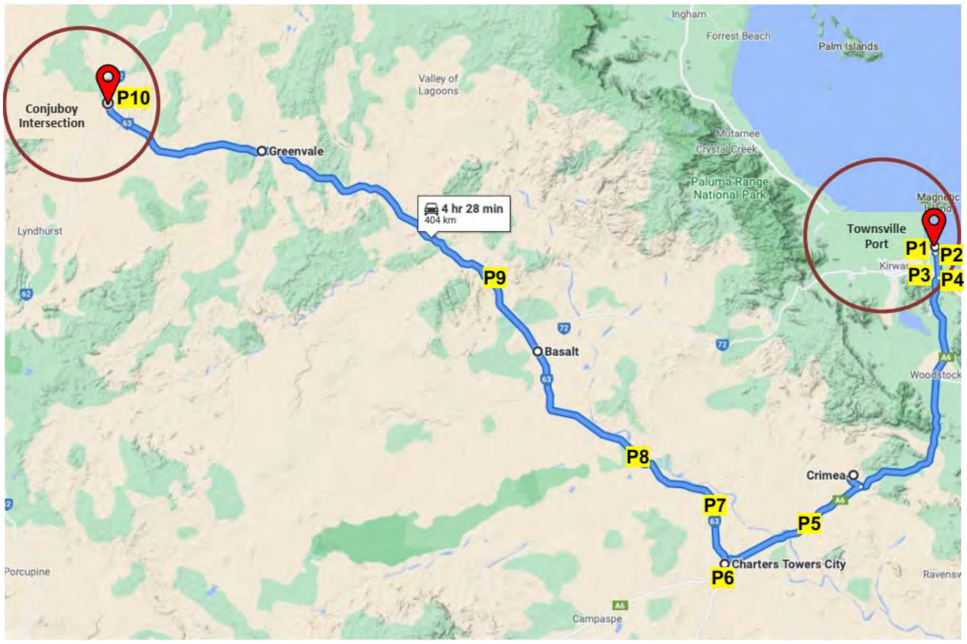


Figure 6: General Route Plan from Townsville Port to Conjuboy Intersection

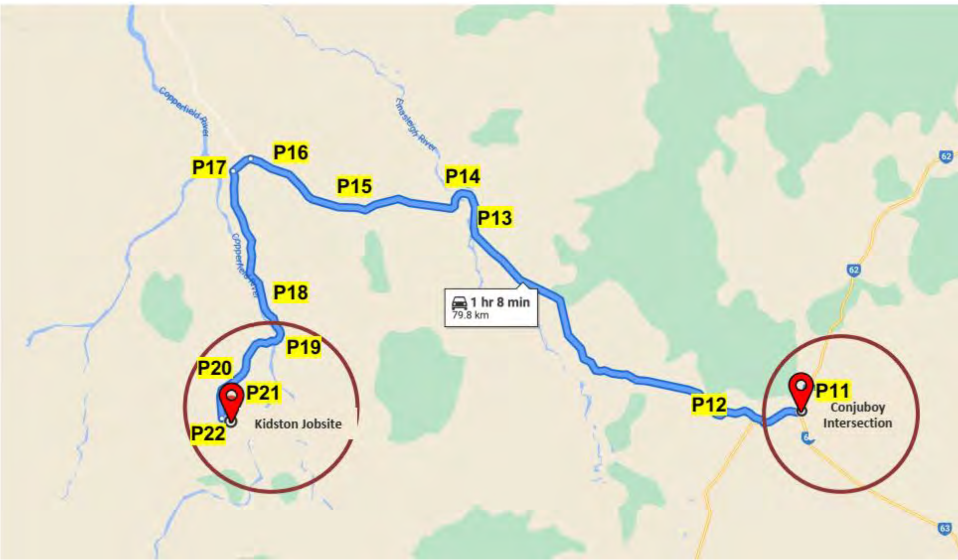


Figure 7: General Route Plan from Conjuboy Intersection to Kidston Site (Option 1 – Short Route)

Figure 8: General Route Plan from Conjuboy Intersection to Kidston Site (Option 2 – Long Route)

The main constraint unique to Option 1 for the journey from the Conjuboy Intersection to the Project Site is the crossing of the Einasleigh River Bridge (refer to P14 in Figure 7) along the Gregory Development Road. This bridge is narrow, having a trafficable width of only 3.24m, as seen below in Figure 9:

Figure 9: Einasleigh River Bridge on the Gregory Development Road

Options to overcome this issue include:

- Avoid the crossing by utilising Option 2 (as per Figure 8);
- Reinstating the bypass road (a temporary track across Einasleigh River located immediately downstream to the bridge in Figure 9) which has not been in use for over ten years, which will require substantial works; or

- Modifying the trailer configuration to bring the width from 4m to 3m for this crossing, however this requires modification works at location.

For the loads which are oversized and overweight, utilisation of the Option 2 route is currently being investigated further and is the preferred approach. Option 2 adds an additional ~200km to the journey the Project site.

A key lesson here is to commence the planning phase as early as possible and involve local stakeholders and Councils in this process to ensure that no unexpected situations occur when construction commences. Furthermore, opportunities for local upgrades to road infrastructure should be explored at that time to understand whether there is opportunity to bring forward such infrastructure upgrades and possible cost apportionment between private and public.

3.2 Approvals

A table of expected approvals and approving authorities is provided below:

APPROVING AUTHORITIES	EXPECTED APPROVALS
Townsville Port	Wharf loading approvals
Queensland Department of Transport and Main Roads	Oversize and overweight approvals
Queensland Police Service – Oversize Vehicles	Police escort services may be required
Ergon	Overhead Electrical Lines (clearance exemptions may apply)
Optus	Telephone and cable TV services
Foxtel	Cable TV services
Queensland Rail	Railways crossing and electrified overhead line (where appropriate)
Local Councils	Road conditions and approval for minor temporary river/creek crossings (as required)
Department of Environmental Services	Construction of temporary river/creek crossings (as required)

Table 2: Expected Approvals and Approving Authorities

3.3 Transportation

Transportation will generally be via semi-trailer that complies with all legal requirements, without special permits and approvals.

Where special transport configurations are required, assessment of the road constraints is required to ensure geometry compatibility between trailer and road is fit for use and to identify where minor modifications to road geometry are required to ensure safety of the transportation and that road infrastructure is not overloaded (or temporary strengthening undertaken).

An example of such engineering assessment is shown below in Figure 10.

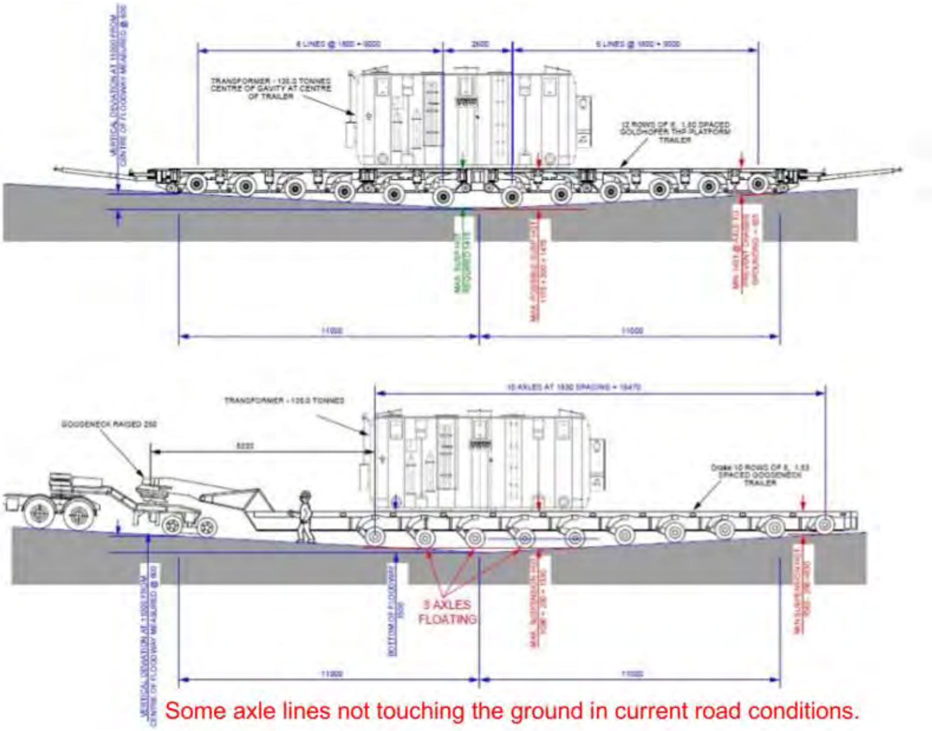


Figure 10: Example of Transportation Assessment for gully crossing (for Transformer)

Once the equipment reaches the Project site, it will be unloaded onto a bespoke laydown pad which is fitted with equipment protection in accordance with preservation requirements. Upon the time the equipment is required to be transported underground, the equipment will be loaded onto a semi-trailer or SPMT (as described above) and transported into the Main Access Tunnel (**MAT**).

The underground transportation route will be via the MAT into the powerhouse cavern. The powerhouse cavern has a uniquely designed floor for the receipt of equipment which will be picked up by an overhead gantry crane and positioned into its final place. Due to spatial constraints in the powerhouse, the overhead crane will also be used to pick up the trailer from the semi-trailer and turn it around such that the semi-trailer drives forward in both incoming and outgoing movements in the MAT.

3.4 Weather

Timing of transport is critical with respect to weather conditions. There are several unsealed roads which need to be traversed and low-level bridge crossings and gullies to be crossed. Hence, it is important that transportation of the key items is undertaken during the dry season (generally April to October in Far-North Queensland). Access to the Project site via road is required over the Copperfield River bridge and causeway located approximately 5km from the Kidston Site.

The Copperfield River is linked directly with the Kidston Dam, which is a raw water storage facility that comprises of an ungated spillway. Telemetry is available for the Kidston Dam which provides water height above the spillway, and this provides a direct correlation as to whether the Copperfield Bridge is passable or not.

Recent weather in January 2023 shows this correlation where the spillway has had up to 2.5m flowing over it. The spillway level is Reduced Level (RL) 586m.

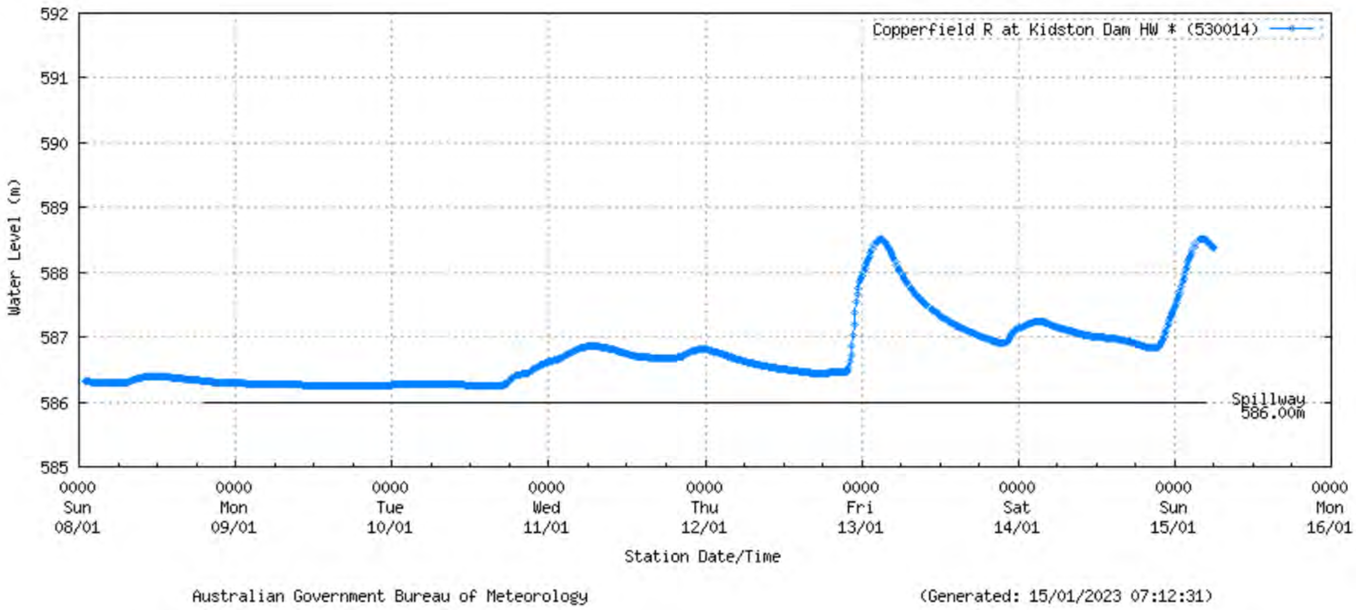


Figure 1: January 2023 Kidston Dam Spillway Levels

A key lesson is that material transportation should take place outside of the wet season and alternate offsite storage should be identified and available if required. The Project has benefited from the first three shipments being delivered to site during the dry season, with remaining shipments planned to also arrive during the dry season.

4. STORAGE OF MAJOR EQUIPMENT

4.1 General

Preservation requirements for equipment is a key consideration for the storage and transportation of the turbine generators. As such, a management plan has been drafted to define the minimum requirements and procedures for the Project in receiving, issuing, and accepting equipment and materials, as well as details around storage and any long-term preservation.

In general, the procedure requirements for storage of major equipment are defined as follows:

i) Delivery and Receipt – a storeperson sights the materials being delivered and checks the receipt details to ensure that the components on the delivery docket match the goods received.

ii) Initial Inspection – engineers / quality manager undertakes an initial visual inspection to ensure components received are in good order and no damage has occurred during transport.

iii) Recording of Data – all details from the inspection are recorded in the site management system, including any rectification works.

iv) Quarantine/Preservation requirements – specific items require special site requirements such as climate control measures to ensure that humidity is kept at certain limits. These requirements are known in advance and specific controls / infrastructure is required onsite to ensure such requirements are met. This may include temperature and humidity being controlled via enclosed temporary buildings for housing electronic sensitive equipment.

4.2 Storage of equipment at the Port

Storage of equipment at ports will be minimised by using a just-in-time delivery process. A bill of laden will be provided to confirm shipping receipt. Critical equipment will be overseen at the Port by specialist logistics personnel.

Equipment will be wrapped prior to leaving the fabrication warehouse to ensure it complies with the Andritz Hydro preservation requirements. Equipment/materials being shipped will either be containerised or stored in break bulk facilities on the ship deck (subject to size and weight requirements).

The Figures below illustrate typical transportation of Andritz Hydro equipment (from the third Andritz shipment (Shipment 3) relating to steel embedded parts).

Figure 12: Embedded Parts Transportation from Factory in China

Figure 2: Embedded Parts at Townsville Port

Figure 3: Embedded Parts – Unloading on Site

4.3 Storage of equipment at site

Each packing unit is assigned to a storage class in accordance with the packing list. All delivered packing units must be stored in accordance with their storage class at the place of destination after their acceptance.

Packing and corrosion protection of stored parts must be checked on a regular basis and the packing must be completed, repaired, or replaced, if necessary. Unless otherwise stipulated, parts in an open-air storage area must be checked monthly and parts in covered storage areas on a quarterly basis. During inspections, if damages are detected, suitable measures must be initiated in agreement with Andritz Hydro and all other Manufacturers and Suppliers.

The site laydown will be arranged to ensure preservation requirements are met and tracked using the Insite Logistics Management System (**LMS**), a proprietary based software for logistics management.

A key lesson learnt has been the implementation of the LMS for tracking components from factory to site and then storage onsite. Ensuring components are positioned in logical order for subsequent installation in the powerhouse will greatly assist with managing components during installation. This approach also applies to when components are loaded from the site laydown area and then transported underground to be positioned within the powerhouse operating floor prior to final installation. A dedicated engineering team has been tasked with the planning of such logistics from site laydown to underground to ensure that fitout efficiency is maximised. The use of the LMS together with detailed staging plans assists this exercise and is being successfully utilised by the Project team.