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KAPUNI GREEN HYDROGEN PROJECT

CONSTRUCTION ACTIVITIES SUMMARY

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MAY 2021

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## GREEN HYDROGEN PROJECT

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The project involves building new wind energy generation facilities on the PKW Farm at 331 Kokiri Road south of the Ballance Agri-Nutrients (BAN) industrial plant at Kapuni in South Taranaki. The renewable electricity will be used to power the industrial plant and to produce green hydrogen gas from water electrolysis. The hydrogen will be used for production of ammonia/urea and as a hydrogen fuel supply for fuel cell powered heavy transport. The intent is to create a 'hydrogen hub' in Taranaki, where hydrogen is both produced and consumed for several applications.

The following activities will take place during the preliminary design phase and construction phase of the wind turbine component of the project. Construction hours will typically be between 7 am and 6 pm Monday to Friday and 7 am to 1 pm Saturdays. Commissioning activities may involve 24 hours per day however these activities generally don't produce any construction noise.

### 1.1 GEOTECHNICAL INVESTIGATIONS

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A geotechnical investigation will be completed on site at the proposed turbine locations to determine the geology of the underlying land. This involves test pits, Cone Penetrometer Test (CPT) and deep bore holes. The geotechnical investigation is expected to take approximately 2 weeks onsite to complete and expected to start in early October 2020. CPT rigs and drilling rigs are used to complete the onsite testing.

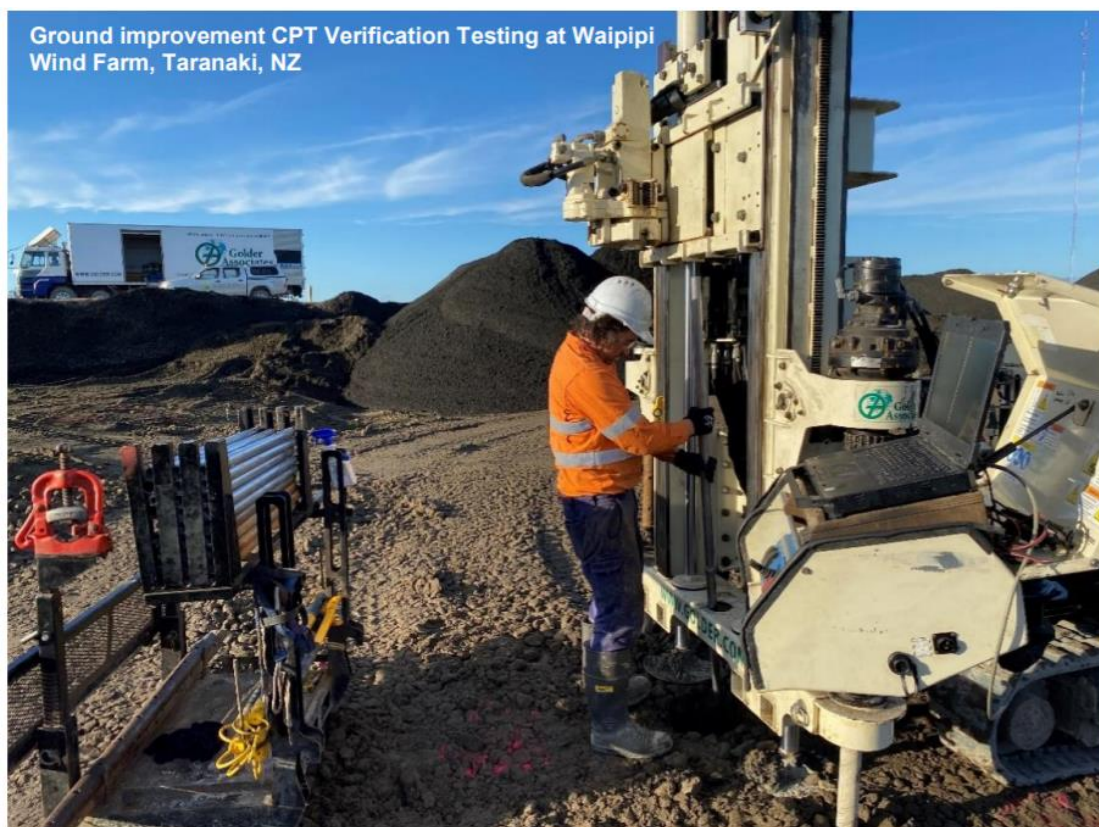


FIGURE 1 EXAMPLE OF CPT TESTING AT WAIPIPI WIND FARM (COURTESY OF GOLDERS)



FIGURE 2 BOREHOLE DRILLING

## 1.2 FARM ENTRY AND RACE UPGRADES

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A new entry to the farm will be constructed off Kokiri Road to allow construction vehicles and turbine components to access the farm site. This will include appropriate turning space to allow the long turbine components to access the farm. The existing farm races will be used to allow the construction vehicles to access the turbine locations. Due to the number of heavy loads required, these races will be overlaid or upgraded using compacted gravel. Approximately 420 trucks of gravel will be imported to site and placed using diggers and rollers.

## 1.3 TURBINE FOUNDATIONS

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The foundations sit on a large mass gravity foundation constructed from steel and concrete to prevent the turbine from tipping or leaning from forces applied to the turbine from wind or seismic events. Depending on the ground conditions identified during the geotechnical investigation, ground improvements may be required to prevent the foundations from settling into the ground. These ground improvements are likely to require removal of a certain amount of soft ground material under the foundations to be replaced with engineered fill, typically compacted gravel.

After the ground improvement work is completed, a foundation cage is prepared from steel reinforcing bars. The hold down bolts for the turbine are tied into the steel. Once completed, the cage is filled with concrete to form the foundation of the turbine which is largely backfilled so just the hold down bolts are protruding from the ground. Approximately 50 trucks of gravel and 125 concrete trucks per turbine foundation are required to pour the foundations over a period of 15-20 hours. Trucks will be transporting concrete and gravel from local batching plants and quarries. A traffic management plan will be put in place that will dictate the routes to be used for trucks which will be focused on state highways and major arterials.



FIGURE 3 EXAMPLE OF FOUNDATION CAGE PRIOR TO POURING



FIGURE 4 EXAMPLE OF FOUNDATION AFTER POURING



FIGURE 5 EXAMPLE OF A FOUNDATION AFTER BACK FILLING

#### 1.4 TURBINE TRANSPORTATION

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The turbine components (tower, blades, nacelle and hub) will be shipped to Port Taranaki and delivered to site as individual pieces. The blades will be 79 meters long which may require some vegetation to be trimmed/removed along the transport route to allow the bladed length to manoeuvre around corners. Hiringa are still in the process of determining the proposed route from Port Taranaki to the site.



#### 1.5 TURBINE ERECTION

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Large mobile cranes are required to lift the turbine towers, hubs, nacelle and blades into position. A compacted gravel pad is required to support the crane weight during turbine erection. Approximately

360 trucks of gravel are required to construct the crane pads which will be removed after construction. The cranes are mobilised to the site in pieces and assembled on site.



FIGURE 6 EXAMPLE OF TURBINE ERECTION CRANE

## 1.6 ELECTRICAL INFRASTRUCTURE

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Transmissions cables will be installed between each turbine and from the wind farm location to the Ballance site. The cables will be buried underground through the cable route. Where the terrain allows, cables will be installed in open cut trenches which will then be back filled. Cables are generally buried at a depth of one meter. Road and water way crossings will be traversed using Horizontal Directional Drilling (HDD) to prevent disruption to traffic or waterways.



FIGURE 7 EXAMPLE OF HV CABLES IN CABLE TRENCH BEFORE BACKFILLING



FIGURE 8 EXAMPLE OF HORIZONTAL DIRECTIONAL DRILL RIG