



PO Box 28057  
Havelock North  
New Zealand  
Tel: +64 6 877 1652

Our Ref: L-140303151-01

30 October 2014

Department of Conservation  
West Coast – Tai Poutini Conservancy  
Private Bag 701  
Hokitika

Attn: Ms Diana Clendon

## **PEER REVIEW GEOTECHNICAL ASPECTS OF PROPOSED WAITAHA HYDROELECTRIC SCHEME**

The Department of Conservation (DoC), West Coast – Tai Poutini Conservancy is processing a request by Westpower Ltd (Westpower) for the construction of a hydroelectric scheme on the Waitaha River, Westland. The scheme includes a tunnel with intake and stilling basin, power station at river level 1.5km downstream of the intake, and access roads.

### **SCOPE OF WORK**

Resource Development Consultants Ltd (RDCL) has been asked to peer review the Geological Feasibility Report as it relates to geotechnical risk and suitability of the method of assessment.

### **UNDERSTANDING OF PROPOSAL**

We understand that Westpower wish to construct a run-of-river hydroelectric scheme based on an underground intake and stilling basin, with water conveyed by tunnel to a powerhouse situated 1.5km downstream at river level. A main access road is required as are additional minor roads to the intake structure and powerhouse.

### **STAGE OF DEVELOPMENT**

The design has been developed to Feasibility level with detailed design of all project components now required.



## **PROJECT GEOLOGY**

The project geology comprises schist and mylonitised schist with potentially large scale faults including the Alpine Fault in close proximity. The geology report is based on walkover during at least 2 field trips and provides good general description of:

- geological structure and potential risk of intersecting additional structures,
- earthquakes,
- landslides, and
- rockfall.

## **GENERAL CONSTRUCTION**

From the Concession Application report, we understand that, for the:

### **TUNNEL AND UNDERGROUND WORKS**

- Tunnel location has been situated to avoid weakest material and has been developed considering dominant joint sets and alignment and location of known faults,
- Tunnel excavation will be upstream starting from powerhouse,
- Tunnel waste (spoil) will be trucked off site for storage (Macgregor Creek),
- Portals will be protected against rockfall,
- Excavation will be by drill and blast with ground support,
- Excavation size is:
  - 5m x 5m in tunnel,
  - 10m wide in stilling basins, with
  - some three way intersections.
- Sediment control will be by stilling basin likely in the tailrace.

### **INTAKE STRUCTURE**

- Intake works will be at risk in flood until the diversion works and coffer are in place,
- Blasting will be required for the intake channel.

## POWERHOUSE AND ACCESS ROADS

- Clearing is required for the:
  - Powerhouse (30m x 15m), and
  - Switchyard (20m x 20m).
- Main Access Road will undergo detailed alignment to reduce impacts on vegetation and water.
  - Road corridor 10m for road including “water tables”, plus
  - 10m for transmission line
  - Through “rolling country”.
- Access road water crossings are protected or avoided and vegetation disturbance reduced.

## PRE-CONSTRUCTION WORKS

- Pre-construction works are sensible and well thought out, designed to address key risks.
- Disturbance during pre-construction works likely to be only for drill rig access and survey.

## BACKGROUND

Westpower has recent experience in tunnel construction under similar conditions at the Amethyst River near Harihari.

## HEALTH AND SAFETY

Health and Safety aspects of the proposed development are not covered in the proposal. Tunnelling and excavation operations will at the least and may not necessarily limited to meet the requirements of the:

- Health and Safety in Employment (Mining Operations and Quarrying Operations) Regulations 2013,
- Health and Safety in Employment (Tunnelling Operations – Excluded Operations) Order 2013,
- relevant Approved Codes of Practice, and
- any New Zealand based Guidelines as may be applicable.

## CONCLUSIONS AND RECOMMENDATIONS

We consider that the proposed project presents a low risk to DoC as it relates to geotechnical aspects of the scheme, and that the method of evaluation is normal and in line with good practice. The:

- application is well written, clear and precise in nature,
- scheme proponent (Westpower) has recent successful experience with a similar project on the Amythest River, near Harihari, and
- geotechnical and scheme engineers (Geotech Ltd) are experienced in the region, have a successful track record with Westpower and appear well integrated into the project team.

The geotechnical aspects of the project are currently at Feasibility level, being based on walkover and experience, with detailed design to be based on additional investigation.

For the tunnel, the main risk at this stage is in the unknown ground conditions, particularly for the intake area including stilling basin with relatively wide spans. There may also be unknowns due to poor ground associated with faults. The risk is in potential instability and requirement for ground support above estimate.

Mitigation as proposed is for specific geotechnical drilling for detailed design. Once that is complete, we expect sufficient engineering work will be enabled to reduce the risk during construction, and to improve cost estimation for ground support.

For the access roads, we see little risk of instability as the land is described as “rolling”, and because of the high quality of the geomorphological assessment. Further, the detailed layout of the road will be developed based on improved survey, with a view to avoiding or reducing any potential issues associated with it.

We see low to very low risk in the development of the power station, switchyard and transmission lines.

## RECOMMENDATIONS

The geotechnical investigation work detailed to take the project into pre-construction is required, appropriate and should address the main risk items of tunnel instability.

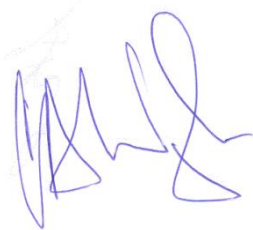
As part of construction, compliance with the relevant new Health and Safety Acts (2013) and Approved Codes of Practice, which although perhaps not a direct responsibility of DoC, should be an overt condition of operation as a responsible land administrator.

## LIMITATIONS

- This letter has been prepared for the particular purpose outlined in the project brief and no responsibility is accepted for the use of any part in other contexts or for any other purpose.
- Ground conditions assessed in this letter are inferred from published sources, site inspection and the investigations described. Variations from the interpreted conditions may occur, and special conditions relating to the site may not have been revealed by this investigation, and which are therefore not taken into account. No warranty is included either expressed or implied that the actual conditions will conform to the interpretation contained in this letter.
- No responsibility is accepted by Resource Development Consultants Ltd for inaccuracies in data supplied by others. Where data has been supplied by others, it has been assumed that this information is correct.
- Groundwater conditions can vary with season or due to other events. Any comments on groundwater conditions are based on observations at the time.
- This letter is provided for sole use by the client and is confidential to the client and their professional advisors. No responsibility whatsoever for the contents of this letter shall be accepted for any person other than the client.

We trust this meets your current needs. Should you wish to discuss any aspect of the contents of this document please contact me the undersigned on 06 877 1652.

Sincerely,



CA Wylie

Principal  
MIPENZ, CPEng, MAusIMM, CP (Mine Geotechnical)