



Technical Report 5 – Indicative Groundwater Assessment

Rangott Mineral Exploration Pty. Ltd.

INDICATIVE GROUNDWATER ASSESSMENT STATEMENT

FOR PROPOSED YOUNG-WELLINGTON GAS PIPELINE DEVELOPMENT

(ERM POWER).

Following on from a preliminary geological assessment of the proposed pipeline route conducted in 2008, Landpartners Ltd., on behalf of the client (ERM Power) has requested further information in response to sections of the Environmental Assessment for the project. Specifically further information regarding probable groundwater in the areas underlying the current proposed route was sought, to address the following:

“The EA must include a general assessment of the likely risk of encountering groundwater (taking into account the proposed depth of trenching and geology of the area) and identify indicative mitigation measures that would be implemented in the case that groundwater is encountered.”

Information in response to the statement above is provided in detail below.

Definitions

<i>Groundwater</i>	Groundwater is subsurface water located in a completely saturated environment. Water is held in soil pore spaces and in fractures in the underlying bedrock.
<i>Aquifer</i>	A lithology or permeable subsurface horizon which contains and allows flow of significant groundwater. Described as either confined (artesian) or unconfined.
<i>Water Table</i>	The layer forming the upper limit of saturated substrate, below which all pore spaces in the host rock/soil are filled with water.
<i>Aquitard</i>	A lithology or substrate with low porosity that permits limited transmission of groundwater.
<i>Aquiclude</i>	A substrate with porosity that is so low it is virtually impermeable to groundwater.

Groundwater Risk

From geological assessment of the proposed pipeline route, the overall risk of encountering groundwater is considered to be low given;

- i) The nature of the underlying lithologies along the pipeline route.
- ii) The probable depth of the water table along the route.
- iii) The depth of the trenching activities required to lay the pipeline.

As indicated by ERM Power and Landpartners Ltd., the pipeline is to be laid typically within 1.5m of surface, and with the exception of creek crossings, it is highly unlikely that the water table occurs within 2m of the surface anywhere along the proposed route.

The lithologies underlying the pipeline are a mix of permeable, low- permeability and impermeable units. Impermeable units include Tertiary Basalt, intrusive rocks, and basic to acid volcanics. Low-permeability units include limestones and fractured volcaniclastic rocks. Permeable lithologies found in the area include sandstones, siltstones, limestone, and recent colluvium and alluvium.

Any groundwater encountered in areas underlain by impermeable units is likely to be hosted by fractures in competent rock, or at the interface between weathered and fresh rock. The volume of water in these locations is thought to be minor, as no springs were observed around the planned route during geological reconnaissance. The current route has also been selected to avoid areas where hard rock may be found close to surface, preventing free digging during construction, and as such is unlikely to encounter groundwater that may occur on the horizon between weathered and fresh rock.

Low- permeability units underlie a considerable proportion of the proposed route, and minor amounts of groundwater is likely to occur in fractures in hard rock, and in saturated weathered rock below the water table. Again given the route selected, fracture hosted groundwater is unlikely to be encountered, and the rolling topography along the route suggests that the water table is likely to lie at or around the fresh rock interface.

Permeable lithologies which have the potential to host pore-water exist along the route, but are not considered to be aquifers in the near surface environment traversed by the planned pipeline. The majority of permeable units along the route, such as the Catombal Group Sediments and the Garra Formation Limestone are located on topographic highs, with considerable local relief. Any pore water near surface in these units would be derived from recent rainfall events, and is likely to quickly drain to the saturated horizon below, and as such, lies above the water table.

Unconsolidated sediments are sometimes found on floodplains adjacent to permanent watercourses around the proposed route. Effort was taken in the geological assessment to make sure such areas were avoided where possible, and traversed by the shortest practicable route where unavoidable. In these instances, typically immediately adjacent to creeks which the route crosses at a high angle, directional drilling activities are proposed by the client, to increase the depth of the pipeline below the surface, and to minimise disturbance to the substrate and prevent erosion of the creek bed and banks.

As a result of this assessment it is considered highly unlikely that the proposed activities will disrupt groundwater systems in the surrounding areas.

Mitigation Measures

In the unlikely circumstance that groundwater is encountered during the course of trenching/pipeline construction, the following mitigation measures are proposed;

- Where significant groundwater hosted by a permeable lithology is encountered, i.e. a discharging spring, the trench immediately downslope from the discharge zone should be backfilled and sealed using bentonite or equivalent to prevent change in the groundwater flow.
- Areas of unconsolidated sediment found during trenching should be directionally drilled from points outside the unconsolidated unit to avoid disturbance of groundwater systems potentially present.
- That the trench be filled with material matching the porosity/permeability of the unit found in the section of trench. Ideally this material would be the spoil from the trenching operations in the affected section. If the trenched materials are layered (topsoil, subsoil, clays, gravels) efforts should be made to replace the different materials back in the trench in their original order.

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