M'Deek Geothermal Reservoir

Preliminary Geohazard and Geotechnical Assessment

Prepared by BGC Engineering Inc. for:

Kitselas Geothermal Inc.

November 9, 2023

Project 2442001

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Attention: Megan Eyre, Ph.D., P.Geo., Geophysicist

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Please find the report attached. We appreciate the opportunity to collaborate with you on this challenging and interesting project.

Should you have any questions, please do not hesitate to contact the undersigned.

Yours sincerely,

BGC Engineering Inc.
per:

Geneviève Cauchon-Voyer

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EXECUTIVE SUMMARY

Kitselas Geothermal Inc. (KGI) is investigating the economic potential of the M'Deek Geothermal Reservoir, located in the Kitimat Valley near Lakelse Lake, British Columbia. As part of this investigation, KGI is proposing to drill temperature gradient investigation holes and geothermal production wells to further characterize and develop the geothermal resource. Stakeholders have raised concerns that these drilling activities may cause slope instabilities in the glaciomarine clay known to exist locally (e.g., the Ministry of Transportation and Infrastructure regarding Highway 37 that runs through KGI's permit area).

To address these concerns, BGC has completed a preliminary geotechnical assessment of the soils in portions of the permit area using in-situ testing methods only. This work was completed to characterize the soil conditions to assess areas of the site with higher and lower risk of geothermal production well drilling activities triggering localized slope instabilities and larger scale progressive failure and retrogressive landslides.

In 1962, two landslides, referred to as the Lakelse Lake landslides, occurred in soil conditions with both differences and similarities to the geologic setting of the project site. Based on the limited information available regarding these historical landslides, the geotechnical characteristics of the KGI project site soils are interpreted to be similar. There is less topographic relief in most of the project site than in the vicinity of the historical landslides but also relatively steeper slopes are present along sections of Highway 37 that may be similar to the pre-failure configuration of the 1962 landslides.

The geotechnical analyses demonstrated that the geotechnical conditions of the soils around the mapped hot springs area, in an approximative 400-m zone adjacent to Highway 37, are likely the least favourable on the project site and geothermal well drilling is not recommended in this area. There is either no alluvial material or a thin clay crust over very low shear strength glaciomarine clays. The absence of a thicker alluvial layer above the glaciomarine clays is unfavourable for geothermal well drilling activities. Based on the result of the analysis, localized rotational failures, larger retrogressive landslides, and translational progressive landslides are judged to be significant hazards on the project site.

There are very few slopes higher than 5 m in the project site, which is a factor that significantly reduces the likelihood of larger progressive and retrogressive landslides. These events are rare, but not absent, for slopes lower than about 10 m. Based on the current understanding of the nearby 1962 Lakelse Lake landslides, these failure events developed in slopes in the order of 7 m to 9 m high. These large landslides are most often the result of a succession of small failures retrogressing from the original slope. The best line of defense against these events is to allow significant setback distances to the geothermal well drill rig from existing slopes, such as ditches, creek channels and excavations.

Based on literature and case history review, the risk of geothermal well drilling triggering strength loss and progressive slope failure in the sensitive glaciomarine clays cannot be discounted. Recommendations to locate drill pads to minimize geotechnical risk of slope

instability and landslides from geothermal production well drilling activity at the site are as follows:

- Based on the results of the stability analyses for the area of the site near the existing hot springs with very soft sensitive marine clay, in an approximative 400-m zone adjacent to Highway 37, BGC recommends a minimum setback distance for the geothermal well drilling rig from existing slopes (creek channels, ditches and other excavations) of 250 m to 400 m. For the remaining area investigated by BGC, a minimum setback distance of 50 m from existing slopes is recommended. With these setback distances, it is unlikely that geothermal well drilling activities will result in local slope instability and large progressive failure and retrogressive landslides.
- Locate geothermal well drill holes on areas of the site with a thicker alluvial cover to reduce the likelihood of initiating localized rotational failures or landslides.
- Planning for geothermal production well drilling activities in cold and dry periods when the ground is frozen and thus the bearing capacity and differential settlement risks may be lower.

The preliminary screening level investigations and assessments presented herein will assist KGI to plan geothermal well locations in areas of the site with lower geotechnical risk. There remain several areas within the permit limits where no subsurface site investigation has been completed and where the distance between the completed SCPTUs is large. Once the geothermal well drill locations are selected, it is recommended that BGC review the proposed locations, identify geotechnical data gaps and develop a work plan for additional site investigation and geotechnical assessment for specific geothermal well drill locations.