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# BC Hydro - John Hart Powerhouse Replacement, Campbell River, British Columbia

In May 2009, BC Hydro proceeded to undertake a study program for the "John Hart Powerhouse Replacement", which comprised investigations to replace the current powerhouse, a 62 year old facility requiring upgrading at the John Hart Generating Station (BCHJGS). The site area covers an area of approximately 5,000 m$^2$, and the proposed powerhouse has a footprint of approximately 2,660 m$^2$, which will transmit foundation loads directly to underlying bedrock strata.

The feasibility study was undertaken by GES Geotech Inc. between July 2009 and September 2009. GES' drilling program included three water well drill holes and three sonic drill holes, together with three preliminary pumping(reel) tests, two pumping tests, and slug tests, as well as analyses of the above mentioned tests, and a numerical model using ModFlow to simulate the future dewatering flow rate.

The drilling program indicated the site is underlain by overburden deposits, overlying fractured bedrock. The pumping tests indicated the presence of two aquifers at this site: 1) an unconfined shallow aquifer and 2) a deep confined aquifer adjacent to the fractured bedrock stratum. The water level observations showed the hydraulic head in the deep bedrock aquifer was approximately 2.5-4 m higher than that in the shallow aquifer, suggesting that the deep aquifer recharges the unconfined shallow aquifer.

Based on the results of the tests, GES concluded that maximum values of hydraulic conductivities were 1.1 m/day and 0.25 m/day within the shallow and confined aquifers respectively.

Using the results of the in-situ permeability tests, a numerical model was generated using Visual ModFlow software program to simulate the future dewatering flow rate. Using the model, the total flow volume requiring dewatering was estimated at approximately 36 l/sec at maximum, which, given the measured hydraulic conductivities was considered manageable by means of constructing a system of pumped sumps for dewatering purposes.

GES suggested that, as the existing powerhouse was not designed to tolerate any differential settlements at all, a cutoff wall system, extending a distance of 65 m in length and 0.6-1.0 m wide, could prove effective in mitigating the risk of differential settlement, whilst also helping minimize the amount and cost of pumping. The cutoff wall system would enable the excavation to proceed for the proposed powerhouse without impacting the adjacent Campbell River. The project was subsequently awarded to SNC Lavalin as a design-build contract. Construction is scheduled to commence in 2014.