

WATERTECH ABSTRACT

THE GEOLOGY AND HYDROGEOLOGY OF THE SPYHILL AREA (CALGARY, AB)
CLARE NORTH, WORLEYPARSONS KOMEX AND MARTIN ORTIZ, THE CITY OF CALGARY

The Spyhill area of NW Calgary is located on a regional topographic high. These highlands are capped with Tertiary gravel deposits, as evidenced by several gravel extraction operations. The area is also the location of an active landfill site, owned and operated by The City of Calgary.

Routine monitoring at the landfill detected landfill-related contaminants in groundwater beneath the site. To gain an understanding of the fate and transport of these contaminants, a study of the geology and hydrogeology of the area was required.

A review of published information yielded very little information regarding the geology and hydrogeology of the area. To gain an understanding the surficial geology, particularly the distribution of the Tertiary gravel deposits, an aerial photograph interpretation was undertaken. An extensive drilling program was carried out to ground truth the aerial photograph interpretation and to investigate the hydrogeology of the area. As part of the drilling program, three core holes were advanced into bedrock to assess fractures. Additionally, two aquifer tests were performed to evaluate aquifer properties.

The aerial photograph interpretation indicated that the area was blanketed in Quaternary till deposits with the exception of the coulees and slopes where predominantly colluvial deposits were present. The Tertiary gravel deposits were typically restricted to elevations greater than 1210 masl. Topographic elevations in the area range from 1180 to 1260 masl.

The drilling program confirmed the Tertiary gravel distribution and demonstrated that the Tertiary gravel deposits are typically water-bearing where they extend below 1225 masl. Furthermore, aquifer testing indicated that the Tertiary gravel deposits in this area would fulfil Alberta Environment's definition of a domestic use aquifer. Collation of borehole logs has indicated the presence of a relatively continuous cemented layer within the Tertiary gravel deposits at around 1225 – 1228 masl.

Drilling investigations into the underlying bedrock confirmed interbedded sequences of sandstone, siltstone and shale. Core holes advanced into the bedrock indicated that it was fractured. Aquifer testing demonstrated a fracture-dominated flow regime in the bedrock.

Three further implications of the study are the importance of hydrogeologic interactions between gravel and bedrock, the possibility for groundwater-surface water interaction and the effect of a palaeo-bedrock valley on the groundwater flow regime.

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Miss North is a hydrogeologist and risk assessor with over six years experience in the field of contaminated site characterization and remediation (soils and groundwater) and risk assessment. She holds a B.Sc. (Hons) in Geology from the University of Southampton and a M.Sc. in Hydrogeology and Groundwater Quality from the University of Reading. Following completion of her education, Clare worked in the Leeds (UK) office for three years before transferring to Calgary in 2004.