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1. Existing Conditions Hydrogeology

Groundwater within the Western Vaughan Transportation Improvements Study Area supports vegetation, animals, and humans. People living in the rural areas obtain their drinking water from wells, and numerous industries rely on groundwater for commercial and industrial use. Aquifers supply farmers with water for irrigation and to develop their products for commercial distribution. Aquatic habitat, in both streams and wetlands, is dependent on specific groundwater conditions. Certain fish species require a specific thermal regime, which may be influenced by groundwater upwelling, and wetland vegetation can be highly sensitive to changes in groundwater quality. Groundwater in turn is replenished by recharge of precipitation through surficial soils.

Paved construction and operation has the potential to locally adjust groundwater recharge and flow patterns and groundwater quality. Such effects are typically in the shallow subsurface. Therefore, an understanding of the groundwater system is important when planning infrastructure such as for the Western Vaughan Transportation Improvements.

A regionally significant groundwater recharge area (Oak Ridges Moraine ï ORM) is located just north/northeast of the Study Area. The Study Area also includes discharge areas commonly associated with wetlands and rivers and streams. Hydrogeologically sensitive areas are identified on the basis of surficial geology, groundwater recharge and discharge areas, and the locations of water wells.

1.1 Data Source and Methodology

Assessment of Study Area hydrogeological existing conditions was conducted by way of a desktop study. The desktop study included review of published information including:

- Ontario Geological Survey mapping (Karrow, 1987);
- Ministry of Environment water well records (MOE, 2006);
- Ontario Base Mapping (MNR, 2006); and
- The City of Vaughan Subwatershed Study (GLL, 1993).

Figure 1 shows the regional surficial geology at a scale of 1:30,000. Water well locations within the Study Area were mapped (**Figure 1**), and selected water well records were consulted in order to characterize the subsurface distribution of sediments and compare to the regional-scale surficial geology mapping of the Ontario Geological Survey. Aerial photograph was used to verify surficial geology.

Two geological/hydrogeological cross-sections were prepared across the Study Area based on information from the MOE water well records (**Figures 2** and **3**). Locations of the cross-sections are shown on **Figure 1**. These cross-sections were used to illustrate the conceptual understanding of the area in terms of geological and hydrogeological conditions.

1.2 Physiography and Topography

The landforms (physiography) within the area of investigation have been shaped by a cover of glacial deposits, which overlay Devonian and Silurian age limestone and shale bedrock. The ORM, a regional geologic feature, occurs within the north/northeastern portion of the City of Vaughan and is a major landform of particular importance. Its hummocky, knob-and-kettle surface topography reflects the variety of glacial and melt water processes that led to its formation. Most of the rest of the City of Vaughan including the Study Area is covered by a gently rolling plain of glacial soils such as till with a veneer of glaciolacustrine deposits.

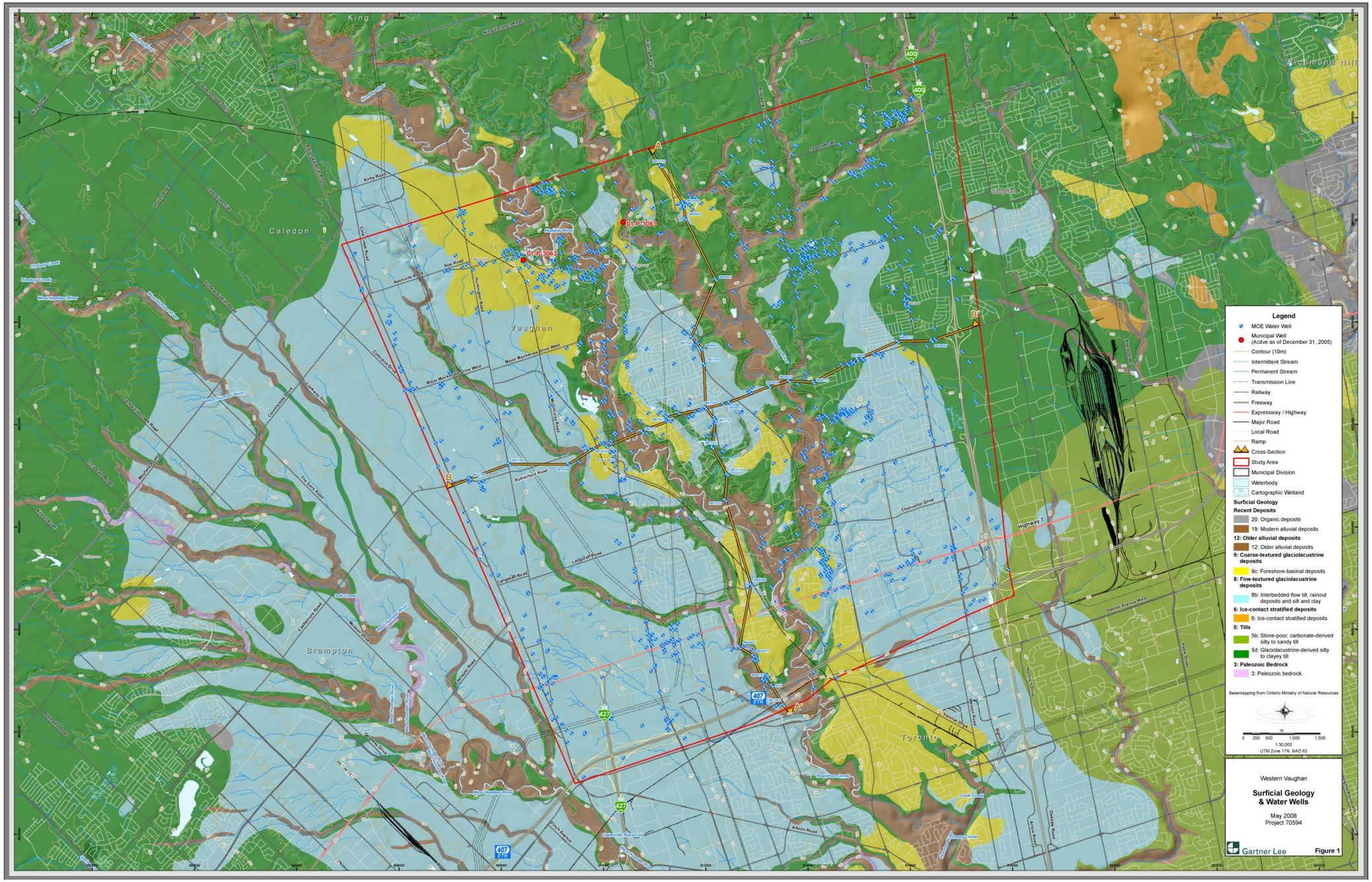

Figure 1. Surficial Geology, Location of Cross-Sections, Ministry of the Environment Water Wells

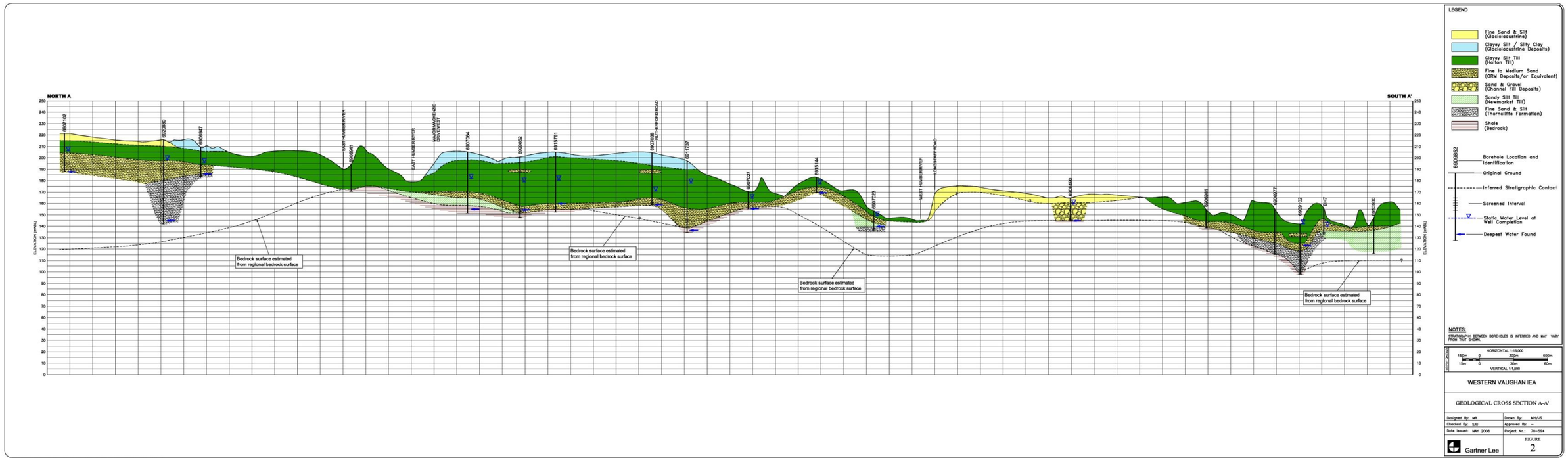

Figure 2. Hydrogeological Cross-section (N-S)

Figure 3. Hydrogeological Cross-section (E-W)