Gamsby and Mannerow
E N G I N E E R S

Revised June 17, 2009
April 21, 2009
Our File: S-1382

City of Owen Sound
Engineering Division
1900-20th Street East
Owen Sound, Ontario
N4K 5N3

Attn: Mr. Dana Goetz

Re: Slope Stability Assessment
Mannerow Estates
Thom Construction Limited
300 Block - 4th Avenue "A" West

Dear Dana,

Thom Construction Ltd. is proposing to develop a 60 lot subdivision plus four additional lots by consent on the 9.46 ha parcel of land located in the 300 block, west of 4th Avenue West and east of the Niagara Escarpment. In order to comment on the stability of the slopes in regards to the proposed development, the writer visited the site on April 18, 2009 to conduct a site inspection. Except for pockets of snow in sheltered sections of the escarpment, the existing slopes surfaces and features were all visible.

Approximately 2.5 ha of the westerly portion of the site consists of the Niagara Escarpment and the associated talus slopes. A small watercourse and tributaries are located more or less at the base of the slope and flow northerly. The escarpment slope and the area along the watercourse is well treed.

The area east of the watercourse and part of the central portion of the site consists of flat to very gently sloping terrain. The first 100 m or so is well treed while the easterly portion is mostly open with grassed areas and scrub bush. Residential development exists to the north and south of these lands.

Although very gently sloping and partially treed lands of approximately 0.5 ha in size are present in the south east corner of the subject property, a small to medium sized ravine is the predominant feature in the easterly portion of the subject property. As shown on the attached plan, the ravine originates on the south side of the site at the end of the 4th Avenue 'A' road allowance and cuts across the south easterly portion of the site towards the northeast corner of the site. The open ravine temporarily terminates at 4th Avenue West where a 900mmØ storm sewer crosses the street and empties into the larger downgradient ravine system.

A smaller secondary branch of the ravine of approximately 60 m in length originates in the southeast corner of the site to create a small peninsula of flat land between the two ravines. The southerly

branches of the ravine are shallow and vary in depth from approximately 2 m to 4 m, while the larger ravine reaches a depth of approximately 6 m at the northeast end. The side slopes of the ravine are generally steep and appeared to be generally in the range of 39° (1.25 to 1) to 26° (2 to 1) (horizontal to vertical). Although, ground vegetation was still dormant during the site inspection, the slopes appear to be reasonably well vegetated, with only some bare topsoil exposed in the steeper sections. The ravine supports the growth of mostly deciduous trees and consists of a significant number of trees with trunk diameter of 300 mm and greater. The trees are also located along the side slopes that are less steep and even at the bottom of the sideslopes in certain areas.

The overall slope of the ravine channel towards the 4th Avenue storm sewer varies from 2 to 4%. The upper reaches of the ravine channel exhibited a wet bottom with minor ponding in the flatter sections . Visible flow of water was not apparent until approximately halfway down the ravine channel. Even where flow was evident, the channel bottom was generally filled with leaves and organic debris, and channel erosion is not occurring. While the bottom of the ravine is wet, no evidence of significant seepage zones were noted along the sideslopes during the site inspection. The ground surface of the ravine was probed at various locations with a 6 mmØ steel rod, and the soil is interpreted to be in a loose to compact state along the upper portion of the side slopes and in a loose to very loose state in the bottom of the ravine channel.

Discussion

The proposed lot matrix has been established based on requirements of the Environmental Impact Study as well as maintaining the lot boundaries outside the theoretical 3 to 1 slope (horizontal to vertical) from the bottom of the ravine. The area that is theoretically covered by the 3 to 1 slope would be considered the Hazard Area by the Grey Sauble Conservation Authority (GSCA) and no development is permitted within that zone without supporting geotechnical studies. Furthermore, the GSCA has established a 7.5m development setback from the interpreted Hazard Line for the construction of residential dwellings.

As previously indicated, the ravine originates on the subject property and is only part of the larger ravine system which consists of the larger south/north trending valley eroded into the Niagara Escarpment, which was partially infilled during the retreat of the glaciers with till and glacial-acustrine deposits. The down gradient ravine east of 4th Avenue East increases in depth to 20m along the former Lake Nippissing Shore above the Sydenham River Valley.

A slope study of the slopes in Owen Sound was conducted for the GSCA by Trow Geotechnical Ltd. in 1988. In the report, the slope on the subject property was identified as a Type 5 slope, which is considered stable. Subsequent individual slope stability investigations for the downgradient Sheldon Place Subdivision and the Westview Heights Phase 2 Subdivision also confirmed that the development could proceed on the tablelands within approved setbacks which were less than the theoretical 3 to 1 slope from the bottom of the ravine.

From the geotechnical investigations for those developments, the upper soils generally consisted of 7 to 10 m of sand and silty sand in a loose to compact state. Based on the depth of the ravine varying from 2

to 6 m on the subject property and the lack of seepage zones along the sideslopes, it is interpreted that the upper soils along the ravine are also sandy and similar in nature. The steep sections of the existing ravine sideslopes show no signs of sloughing and have remained stable even near the steep sections. This is likely due to the presence of upper sandy soils with a generally low water table along the ravine. The presence of sandy soils and a lower water table improves the stability of slope and increases the long term factor of safety against rotational slip failures. Minor creep due to seasonal frost action will occur as part of a natural evolving slope.

Considering the above information and the fact that the ravine is shallow, the rear of the proposed property boundaries located at the required theoretical 3 to 1 slope line from the bottom of the ravine as per the GSCA requirements is in my opinion, acceptable for the safe construction of the residence in the proposed building envelopes.

I trust that this information is satisfactory for your review of the Draft Plan submission.

Yours truly,

GAMSBY AND MANNEROW LIMITED
Per:

Wm. E. Dubeau, P.Eng.
WED/ah
cc: Thom Construction Ltd.
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