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Mineral Aggregate Assessment

3119 Carp Road
Ottawa, Ontario

Prepared For
Mr. Greg LeBlanc

March 7, 2014

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1.0 INTRODUCTION

1.1 Terms of Reference

Paterson Group Inc. (Paterson) was retained by Greg LeBlanc and Sallie Storey (LeBlanc) acting through the planning agent, Kathleen Willis Consulting Ltd.(Willis), to complete a Mineral Resource Impact Assessment of the existing lands having the legal identity as Part of Lot 12, Concession 3, Geographic Township of Huntley, City of Ottawa, Ontario and having the municipal identification of 3119 Carp Road.

The purpose of this report has been to ascertain the quantity and quality of the aggregate materials present beneath the site in order to address some planning issues related to the development of the subject property as a commercial subdivision. Specifically, it is Paterson's understanding that, based on the Planning Rationale prepared in support of the development application to the City of Ottawa by Willis (March 2014), the developable portion of the site is currently zoned RC9 and the proposed commercial subdivision is consistent with that zoning. Furthermore, the remaining portion of the site contains two (2) large ponds created by historical aggregate extraction operations. However, based on the Willis Planning Rationale, a portion of the proposed commercial development, Lot 10 specifically, has a Sand and Gravel Resource overlay on the Carp Road Corridor Community Design Plan. Reference should be made to the Draft Plan of Subdivision, prepared by Farley, Smith & Denis Surveying Inc, and provided for reference purposes in Appendix 2.

It was determined by Willis, that in order to be consistent with the Ontario Provincial Policy Statement, that a mineral aggregate assessment was required to determine the development fate of Lot 10 and to assess the potential for aggregate reserves within the remainder of the proposed commercial development area. As such, the following scope of work was established:

- ❏ Investigate by means of compiling all available site specific borehole and test pit data, the existing subsurface conditions under the subject site
- ❏ Determine the suitability of the aggregates (based on gradation) of the various materials recovered from the test pits.
- ❏ Provide a assessment of the viability of the suggested aggregate reserve within the MR Zone, for future extraction in the unlicensed areas.

This report has been prepared specifically and solely for the above noted project which is described herein, and has been completed in consideration of the 2005 Provincial Policy Statement. It contains all of our findings and results of the preliminary investigation at this site.

1.2 Background

Site Information

The subject property, as noted in the previous section, is located at 3119 Carp Road. The property is situated on the west side of Carp Road with existing commercial and residential development to the east and south. The property has a total area of approximately 53.2 hectares and contains two (2) large ponds created from historical aggregate extraction operations. Based on information provided by Willis in the Planning Rationale, aggregate extraction operations have not taken place in upwards of 20 years and the aggregate resources are assumed to have been fully depleted in Block 14 and virtually completed in Block 13 (refer to Draft Plan of Subdivision located in Appendix 5).

A development application has been prepared by Willis to create a total of 12 commercial lots via plan of subdivision for the 14.2 hectares located closest to Carp Road. The western portion of the site (i.e. Block 13 and Block 14) will be converted to blocks and held for future development potential.

1.3 Previous Studies

A series of investigations have been completed on the subject property in anticipation of the proposed development of the lands as a commercial subdivision. Specifically, it is Paterson's understanding at the time of preparation of this report, that a stand alone geotechnical investigation and hydrogeological study and terrain analysis have been completed on the site by Houle Chevrier Engineering Ltd. Portions of the hydrogeological study report were provided to Paterson which included existing test pit locations, Soil Profile and Data sheets, and overburden thickness interpretation mapping.

2.0 METHODOLOGY

The site was investigated through a test pitting program, for the purpose of recovering samples of the various stratigraphic units. A total of seven (7) test pits were put down on the property, which were intended to compliment and fill in gaps in the existing test pits layout that had been put down on the site by others in association with the preparation of the geotechincal and hydrogeological studies. The approximate locations of the test holes are shown on the Test Hole Location Plan - Drawing No. PH2450-1 located in Appendix 3.

The test pits were completed using a track mounted mechanical shovel. The test pit procedure consisted of excavating to the required depths at the selected locations and logging and sampling the overburden. The test pits were loosely backfilled upon completion. Reference should be made to the Soil Profile and Test Data Sheets prepared for each hole and included in Appendix 1.

Sampling and Identification

All soil samples were classified on site, placed in sealed plastic bags and transported to our laboratory. The depths at which the test pit samples were recovered from the test holes are shown as G samples on the Soil Profile and Test Data sheets in Appendix 1.

The subsurface conditions observed in the test holes were recorded in detail in the field. The soil profiles are presented on the Soil Profile and Test Data sheets in Appendix 1 of this report.

Groundwater

The groundwater levels were recorded, where encountered, for each of the test pits. The test pits remained open for several hours allowing the groundwater levels to stabilize in each pit prior to recording of the depth and associated backfilling operations taking place.

Laboratory Testing

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging. Samples identified as having the potential to meet OPSS requirements for select fill material were selected for grain size distribution analyses. The results are presented in Appendix 1.

3.0 OBSERVATIONS

3.1 Regional Geology

Surficial

In review of the available surficial soils mapping provided by the Ontario Geologic Survey (refer to Figure 2, located in Appendix 3), the site is underlain by coarse textured glaciofluvial deposits consisting of sand and silt. Paleaozoic bedrock is also picked up in the mapping for the subject lands.

The fieldwork program, carried out on the subject property, revealed that the surficial soil profile is generally consistent with the regional mapping.

Bedrock

The Ontario Geologic Survey mapping, reproduced with specific reference to the subject lands and provided as Figure 3 in Appendix 3, indicates that the subject lands overlay the Verulam Formation of the Ottawa Group, a Middle Ordovician bedrock. The Verulam Formation is one of the youngest of the Ottawa Group of limestones and overlays the Bobcaygeon Formation. The Verulam Formation consists of interbedded bioclastic to very fine grained limestone and grey-green calcareous shale.

3.2 Subsurface Profile

The soil profile underlying the site consists primarily of a topsoil layer overlying fine to coarse grained sands with some finer sand and silts present directly beneath the topsoil layer. Towards the western quadrant of the subject property, however, the overburden material thins out significantly as a bedrock is present at extremely shallow depth in that area. Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for the details of the soil profiles encountered at each test hole location. In addition, the grain size distribution curves for the dominant terrain units are provided in Appendix 1 and detailed in section below.

Any information pertaining to soils and all test hole logs are furnished as a matter of general information only, and test pit descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those described by the test pits themselves. Rather they lend themselves to establishing trends in the surficial soil characteristics and thickness throughout the site.

Topsoil

Topsoil was encountered at ground surface at all test hole locations. Generally, the apparent thickness of the topsoil layer varies between 50 and 300 mm.

Fine Sand/Silty Sand

A transitional layer consisting of sand with varying amounts of silt is present beneath the topsoil layer across most of the subject property. This silt sand to sandy silty layer is either underlain directly by shallow bedrock, or by a fine to medium grained sand. The thickness of the fine sand/silty sand layer ranges from approximately 600 mm to 1300 mm across the subject property. Based on the grain size distribution analyses carried out on this stratum, the sand does not meet the OPSS Granular 'B' Type 1 aggregate gradation envelope.

Sand

Below the transition layer of silty sand, resides a fine sand to medium grained sand. The stratum has a thickness of between 1.0 m and 2.7 m. Based on the grain size distribution analyses completed on representative samples from this stratum, the sand does meet the OPSS Granular 'B' Type 1 aggregate gradation envelope. However, as detailed in the groundwater section of this assessment, much of the layer is completed saturated present below the overburden groundwater table.

Groundwater

The groundwater levels within the test pits were recorded on the corresponding Soil Profile and Test Data sheet for each test pit. An overburden groundwater table was only encountered in TP1 to TP4, inclusive. It is prudent to note that TP5 to TP7, inclusive, intercepted shallow bedrock within 1.5 m of the ground surface.

Bedrock

TP5 to TP7, inclusive, encountered shallow bedrock exhibiting the visual characteristics consistent with the Verulam Formation. This is consistent with the published bedrock mapping. Where encountered, the bedrock was noted to be smooth and competent with no obvious signs of weathering.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Current and Previous Aggregate Extraction

Based on the results of this study, in conjunction with the investigations completed on the site by others, the portion of the existing study area in which the aggregate extraction licensing apparently overlaps from the extraction operations located to the west (i.e Lot 10), the bedrock in this location is extremely shallow. Moreover, the surficial soil coverage is minimal with no aggregate meeting the OPSS Granuar 'B' Type 1 gradation requirements. As such, there is no usable aggregate remaining in this subject quadrant.

4.2 Remaining Aggregate Outside Existing Licensed Area

In conducting an assessment of the quantity of suitable material for mineral extraction outside the licensed area extending east and south enveloping the entire property, consideration should be given, in accordance with the Ontario PPS, to the quality of the existing unprocessed material, the position of the groundwater table, and the horizontal extent of the deposit.

Based on the results of the test holes and of the Grain Size Distribution tests , it appears that generally speaking, aggregates meeting the gradation requirements of OPSS Granular B Type I exist in an extremely limited quantity within the remainder of the site area. Notwithstanding this revelation, the overburden groundwater table is elevated throughout the central quadrant of the site resulting in most of the usable aggregate being present beneath the water table.

The results of this study confirm that the available resource outside of the existing licensed area is extremely limited, and from an economic perspective, is in our opinion, not viable. Other issues such as extraction setbacks from existing residences and roadways would further reduce the viability of a mining operation if suitable material did exist in sufficient quantity.

5.0 SUMMARY

A geological assessment was conducted on the lands currently owned by Greg LeBlanc and Sallie Storey, to determine the suitability of these lands for aggregate extraction operations. Based on the results of this assessment, the primary resource, which consists of OPSS Granular 'B' Type I aggregate is not present in any appreciable quantity on the subject lands to make it economically viable to extract. As such, it is our opinion that the de-designation of the portion of the site which is presently mapped with extraction zoning, complies with the intent of the Ontario PPS based on economic viability and potential environmental impacts. Moreover, the remaining portion of the site, based on the same economic rationale, has no future reserve of usable select aggregate in any appreciable quantity in which to extract and draw profit.

Paterson Group Inc.

Robert A. Passmore, P. Eng.

Report Distribution:

- ❏ Greg Leblanc. (8 copies)
- ❏ Paterson Group (1 copy)

APPENDIX 1

- ❑ **SOIL PROFILE & TEST DATA SHEETS**
- ❑ **SYMBOLS AND TERMS**
- ❑ **GRAIN SIZE DISTRIBUTION TEST RESULT SHEETS**

APPENDIX 2

- ❑ **FIGURE 1 - SITE LOCATION PLAN**
- ❑ **FIGURE 2 - SURFICIAL SOILS DELINEATION PLAN**
- ❑ **FIGURE 3 - BEDROCK DELINEATION PLAN**
- ❑ **DRAFT PLAN OF SUBDIVISION (BY OTHERS)**
- ❑ **DRAWING NO. PH2450-1: TEST HOLE LOCATION PLAN**