



May 19, 2015

# GEOTECHNICAL DESKTOP STUDY REPORT

## King Township Schomberg, Nobleton & King City Ontario

**Submitted to:**  
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The Municipal Infrastructure Group  
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Vaughan, Ontario

REPORT

**Report Number:** 1522930

**Distribution:**

1 Copy - TMIG Ltd.  
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#### APPENDIX A

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### 1.0 INTRODUCTION

This report presents the results of our desktop geotechnical study in the areas of the townships of Schomberg, Nobleton and King City, Ontario, as shown on the Key Plan, Figure 1. This desktop study was carried out in general conformance with our proposal dated February 25, 2015. Authorization to proceed was given in the form of an email by Mr. Kevin Brown on February 20, 2015.

The Municipal Infrastructure Group Ltd. (TMIG) is proceeding to undertake a Master Plan Class Environmental Assessment for King Township for water / wastewater and stormwater systems. As part of this study, a desktop study is required for planning purposes.

This report provides the results of the review of the available background information and should be read in conjunction with the *“Important Information and Limitations of This Report”* (Appendix A, attached). The reader’s attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report. The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location.

### 2.0 SITE AND PROJECT DESCRIPTION

The study areas for this project are shown on Figure 1 and encompass the three communities of Schomberg, Nobleton and King City.

The three communities generally consist of a mix of low rise residential and commercial buildings and are serviced via municipal water, wastewater and storm sewer networks. These communities are experiencing growth and the review and analysis of the existing services will allow the Township to coordinate municipal infrastructure planning with its Official Plan update. As part of this effort, a Water, Wastewater and Stormwater Master Plan Class Environmental Assessment (EA) is being carried out by TMIG.

The aim of this desktop study is to provide general information about the subsurface conditions within each community and it is one of the inputs to the EA to be used for planning purposes.

### 3.0 BACKGROUND INFORMATION AND AVAILABLE DATA

For the purpose of this desktop study, information about the subsurface conditions was obtained from the following reports provided by King Township:

#### **Schomberg**

- “Geotechnical Investigation, Residential Subdivision, Schomberg, Ontario,” Terraprobe Report No. 1-03-0441 dated December 22, 2003; and
- “Hydrogeological Investigation, Proposed Residential Subdivision, Part Lots 34 & 35, Concession 9, Schomberg, Ontario,” Terraprobe Report No. 1-07-2274 dated October 23, 2007.



### **Nobleton**

- “Preliminary Geotechnical Investigation, Proposed Residential Subdivision, Part of Lot 7, Concession 8, Nobleton Community, Township of King, Ontario,” Shaheen & Peaker Ltd., Report No. SP6379, dated December 23, 2005;
- “Supplementary Geotechnical Investigation, Proposed Residential Subdivision, Part of Lot 7, Concession 8, Nobleton Community, King, Ontario,” SPL Consultants Ltd., Report No. G-09.12.015, dated February 4, 2010;
- “A Soil Investigation for Proposed Residential Development, Noble Ridge Residential Subdivision, Part of Lots 7, 8, 9 and 10, Concession 8, Highway 27 and King Road, Nobleton, Township of King, Ontario,” Soil Engineers Ltd., Report No. 0602-S068, dated May 2006;
- “A Soil Investigation for Proposed Residential Subdivision, East of Russell Snider Drive, Between Sheardown Drive and King Road, Township of King (Nobleton), Ontario,” Soil Engineers Ltd., Report No. 1204-S005, dated June 2012; and
- “Hydrogeological Investigation for Tomlinson Gardens Residential Development, Nobleton, Ontario,” Cole Engineering Report No. EM12-0177, dated August 31, 2012.

### **King City**

- “A Soil Investigation for Proposed Residential Subdivision, Highway 27 and King Road, Township of King, Ontario,” Soil Engineers Ltd., Report No. 0502-S076, dated May 2005;
- “Geotechnical Investigation, Roads Reconstruction and Rehabilitation Program, Various Roads – Area 6A, King City, Ontario,” Peto MacCallum Ltd., Report No. 06TF011, Report 3, dated August 22, 2006;
- “Geotechnical Investigation, Roads Reconstruction and Rehabilitation Program, Various Roads – Area 5, King City, Ontario,” Peto MacCallum Ltd., Report No. 06TF011, Report 4, dated August 23, 2006;
- “A Soil Investigation for Proposed Sanitary Sewer Construction, Dennison Street Easement, Township of King, Ontario,” Soil Engineers Ltd., Report No. 0807-S044, dated September 2008;
- “Geotechnical Investigation, Design Areas 1 and 2, Sanitary Sewer, Watermain Installations and Road Reconstruction, In the Community of Nobleton, Township of King, Ontario” Peto MacCallum Ltd., Report No. 10TF002, dated June 2, 2010;
- “Geotechnical Investigation, Design Area 3, Sanitary Sewer, Watermain Installations and Road Reconstruction, In the Community of Nobleton, Township of King, Ontario” Peto MacCallum Ltd., Report No. 10TF002, dated July 22, 2010;
- “Geotechnical Investigation, Proposed Nobleton Sanitary Services, Town of Nobleton, Ontario,” Peto MacCallum Ltd., Report No. 12TF014, dated May 17, 2012;
- “Supplemental Boreholes, Tender No. 2013-T11 Part B – Contracts 6 and 7B, Ellis Avenue and Robinson Road, Nobleton, Ontario” Terraprobe Report No. 11-13-3125, dated August 12, 2013; and



- “Geotechnical Review of Clay Liner, Maidenstone Storm Water Management Pond, Proposed Residential Development, Highway 27 and King Road, Township of King, Ontario,” Soil Engineers Ltd., Report No. 1311-C133, dated December 9, 2013.

## 4.0 SUBSURFACE CONDITIONS

The description of the subsurface conditions are based on a review of existing available published surficial geology and bedrock geology maps and Golder’s previous experience in the area as well as the above referenced geotechnical investigation reports provided by King Township.

### 4.1 Regional Geology

The physiographic region and surficial geology aspects of the general site area are presented in the following publications:

- Ontario Geological Survey 2010, “Surficial Geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release – Data 128 – Revised”; and
- Chapman, L.J. and Putnam, D.F. 2007, “The Physiography of Southern Ontario”; Ontario Geological Survey, Miscellaneous Release – Data 228”.

The surficial geology and the physiographic regions in the area of the three communities of Schomberg, Nobleton and King City are presented on Figures 2 and 3, respectively.

#### Surficial Geology

Based on the surficial geology mapping, the community of Schomberg lies within an area of consisting of variable subsurface conditions, predominantly fine textured glaciolacustrine deposits (silt and clay, minor sand and gravel, massive to well laminated) along with deposits of till (clay to silt textured till derived from glaciolacustrine deposits or shale) and modern/older alluvial deposits (clay, silt, sand, gravel).

The surficial geology mapping indicates that Nobleton and King City lie within an area of till consisting of clay to silt textured till derived from glaciolacustrine deposits or shale. The surficial geology mapping also indicates modern alluvial deposits (clay, silt, sand and gravel) along surface water channels. In King City there are fine textured glaciolacustrine deposits of silt and clay, minor sand and gravel north of King Road.

#### Physiographic Regions

According to the above noted references, physiographic mapping in the area of Schomberg, indicate that the Schomberg community site lies within a physiographic region known as the Schomberg Clay Plains. The Schomberg Clay Plains in this area contain deep deposits of stratified clay and silt and the surface under the clay is that of a drumlinized till plain. The smaller drumlins are completely covered, but many of the larger ones escaped complete burial although the clay may occur well up the slopes of the hills. The average depth of the clay deposit seems to be about 4.5 m, but deep deposits are known. Chemical analysis shows the clay to contain about 50% calcium and magnesium carbonates. Mechanical analysis indicated about 50% clay and



40% silt, but its behaviour is more like that of silt than clay. It is very slippery when wet and inclined to be mealy when dry.<sup>1</sup>

Physiographic mapping in the area of Nobleton and King City communities indicates that the communities lie within a physiographic region known as the South Slope. The South Slope region slopes gradually downward towards Lake Ontario. The overburden immediately below ground surface within the South Slope generally consists of clayey silt till and silty clay till and at depth consists of alternating deposits of dense lacustrine sands and silts and overconsolidated lacustrine clays and clay tills overlying the bedrock.

As a side note, based on information obtained from the Ministry of Natural Resources, Ontario Base Map 1983, Scale 1:10,000, Peterborough, Ontario, the community of King City lies within the Oak Ridges Moraine Conservation Plan Area while Schomberg lies to the north and Nobleton to the south of the Oak Ridges Moraine Conservation Plan Area as defined by Ontario Regulation 140/02.

### **Bedrock**

The Ministry of Northern Development and Mines, "Map 2276, Bedrock Topography, Bolton, Southern Ontario", published in 1973, indicates the bedrock surface in the area varies from between Elevations of 100 m and 150 m. A possible location of a tributary to the Laurentian River is mapped north of Nobleton. The existence of a deep bedrock valley would indicate greater depth to the bedrock and potential for existence of deep aquifers.

Base on "Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1," the bedrock consists of shale, limestone, dolostone and siltstone of the Georgian Bay Formation, Blue Mountain Formation, Billings Formation, Collingwood Member and Eastview Member.

## **4.2 Subsurface Conditions Based on Existing Boreholes**

### **4.2.1 Schomberg**

The review of existing boreholes indicated topsoil or surficial fill materials generally overlying deposits of firm to very stiff clayey silt which was found to extend to depths greater than 8 m.

### **4.2.2 Nobleton**

The review of existing boreholes indicated that the subsurface conditions generally consist of stiff to hard silty clay till overlying deposits of dense to very dense silt to very stiff to hard silty clay with localized deposits of compact to very denser silty sand, sand to gravelly sand and sandy silt till to silty sand till, at variable depths.

The glacially derived soils should be expected to contain cobbles and boulders, which could affect excavations. It is expected that the overburden soils can be excavated using conventional hydraulic excavating equipment. Contractors working in this area should be made aware of the potential presence of cobbles and/or boulders

<sup>1</sup> Chapman, L.J., & Putnam, D.F., (1984), "The Physiography of Southern Ontario," 3 Ed., Ontario Geological Survey Special Volume 2



within the overburden soils as it may affect their excavation progress rates and it may require cobble/boulder removal.

### 4.2.3 King City

The existing boreholes indicated that the subsurface conditions generally consist of interstratified layers stiff to hard silty clay till, compact to very dense silt and very stiff to hard silty clay with localized deposits of compact to very dense sand to sandy silt and sandy silt till.

The glacially derived soils should be expected to contain cobbles and boulders, which could affect excavations. It is expected that the overburden soils can be excavated using conventional hydraulic excavating equipment. Contractors working in this area should be made aware of the potential presence of cobbles and/or boulders within the overburden soils as it may affect their excavation progress rates and it may require cobble/boulder removal.

## 4.3 Groundwater Conditions

The following section provides a very general description of the overall groundwater levels encountered in the previous geotechnical investigations referenced in Section 3.0. More detailed information related to the groundwater levels are presented in Golder's 2015 Hydrogeological Desktop Study for King Township.

As the prevailing soils generally consist of glacial tills, conventional groundwater control measures are anticipated to be needed as a part of construction activities. Where more permeable (sandy) soils are encountered, more positive (active or proactive) groundwater control measures may locally be required. Any groundwater extraction in excess of 50,000 l/d will require site specific hydrogeological assessment and application for a Permit to Take Water from the Ministry of Environment.

### 4.3.1 Schomberg

The groundwater levels ranged from approximately 1 m to 2 m below the ground surface.

### 4.3.2 Nobleton

The groundwater levels ranged from approximately 1 m to 6 m below the ground surface. Perched groundwater tables are expected in the localized sand to sandy silt soils. Soil Engineers report dated May 2006 indicated that "minor artesian" condition was encountered.

### 4.3.3 King City

The groundwater levels ranged from approximately 3 m to 11 m below the ground surface. Perched groundwater tables are expected in the localized sand to sandy silt soils.



## **5.0 LIMITATIONS**

This report has been prepared for the exclusive use of TMIG and their agents for specific application to the Master Plan Class Environmental Assessment for King Township, Ontario. The findings presented in this report were prepared in accordance with generally accepted geotechnical engineering practice at the time of this study. It is stressed that the information in this report is provided for planning purposes of the Master Plan Class Environmental Assessment for King Township for water / wastewater and stormwater systems and is intended for this project only. This report is not intended for preliminary or detailed design or construction.

The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at this site. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

## **6.0 CLOSURE**

This report is intended to summarise available data on subsurface soil and groundwater conditions for the potential water / wastewater and stormwater systems in King Township, Ontario. The data contained in this report was obtained from previous subsurface investigations carried out by others in the study areas and was provided to Golder by King Township as well as from Golder's previous experience in the areas.

We trust this report provides sufficient information for your immediate requirements. If you have any questions regarding the contents of this report or require additional information, please do not hesitate to contact this office.



## Report Signature Page

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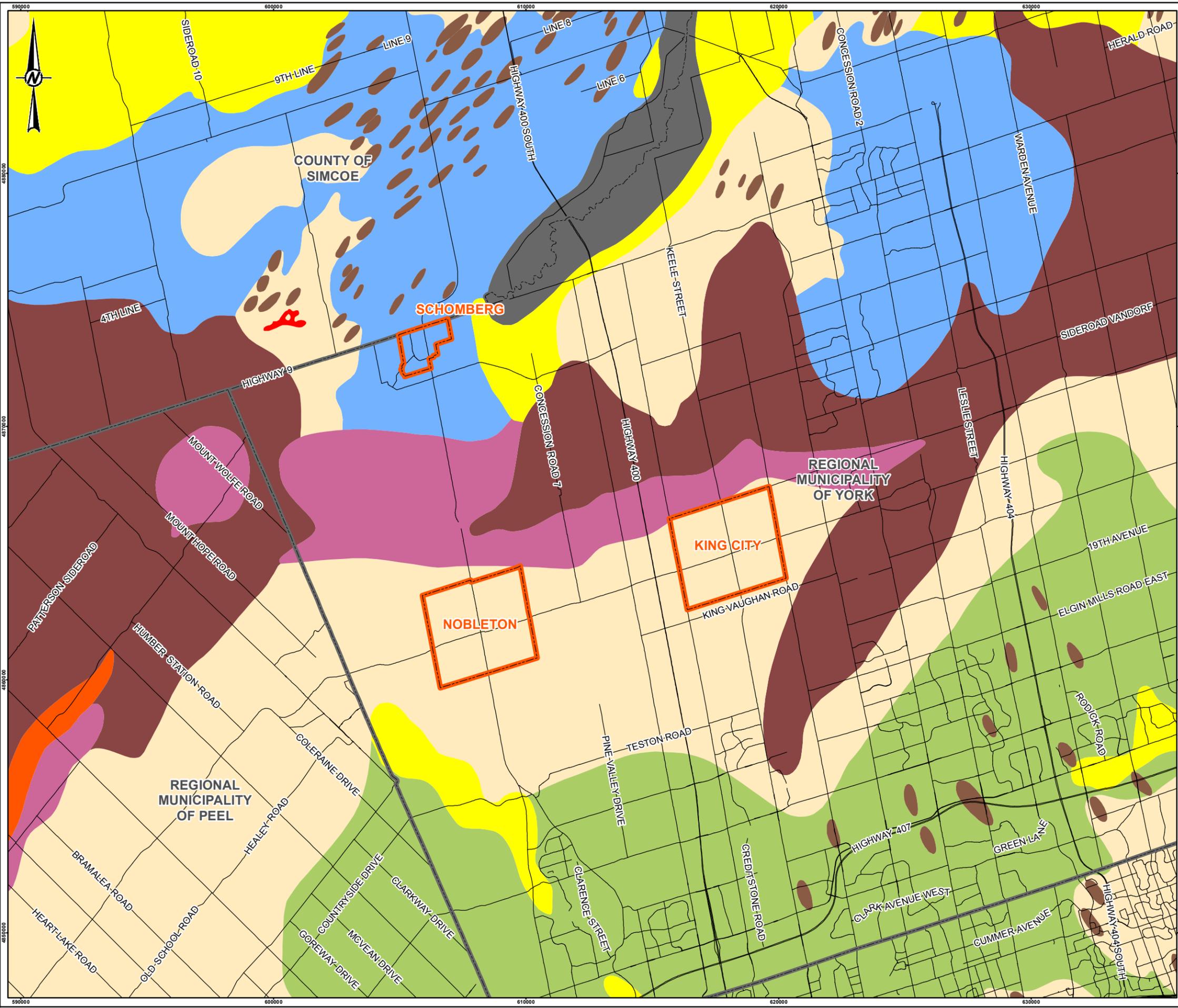
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# FIGURES





**LEGEND**

- ROAD
- APPROXIMATE SITE BOUNDARY

**SURFICIAL GEOLOGY**

- PEAT AND MUCK
- BEACHES
- CLAY PLAINS
- SAND PLAINS
- BEVELLED TILL PLAINS
- DRUMLINS
- TILL PLAINS (DRUMLINIZED)
- KAME MORAINES
- SPILLWAYS
- TILL MORAINES



**REFERENCE(S)**  
 BASE DATA - MNR LIO, OBTAINED 2013  
 SURFICIAL DATA - MRD228-PHYSIOGRAPHY OF SOUTHERN ONTARIO, 2007, PROVIDED BY MINISTRY OF NORTHERN DEVELOPMENT MINES  
 PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2015  
 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

**CLIENT**  
 THE MUNICIPAL INFRASTRUCTURE GROUP LTD.

**PROJECT**  
 DESKTOP STUDY FOR KING CITY TOWNSHIP  
 SCHOMBERG, NOBLETON AND KING CITY, ONTARIO

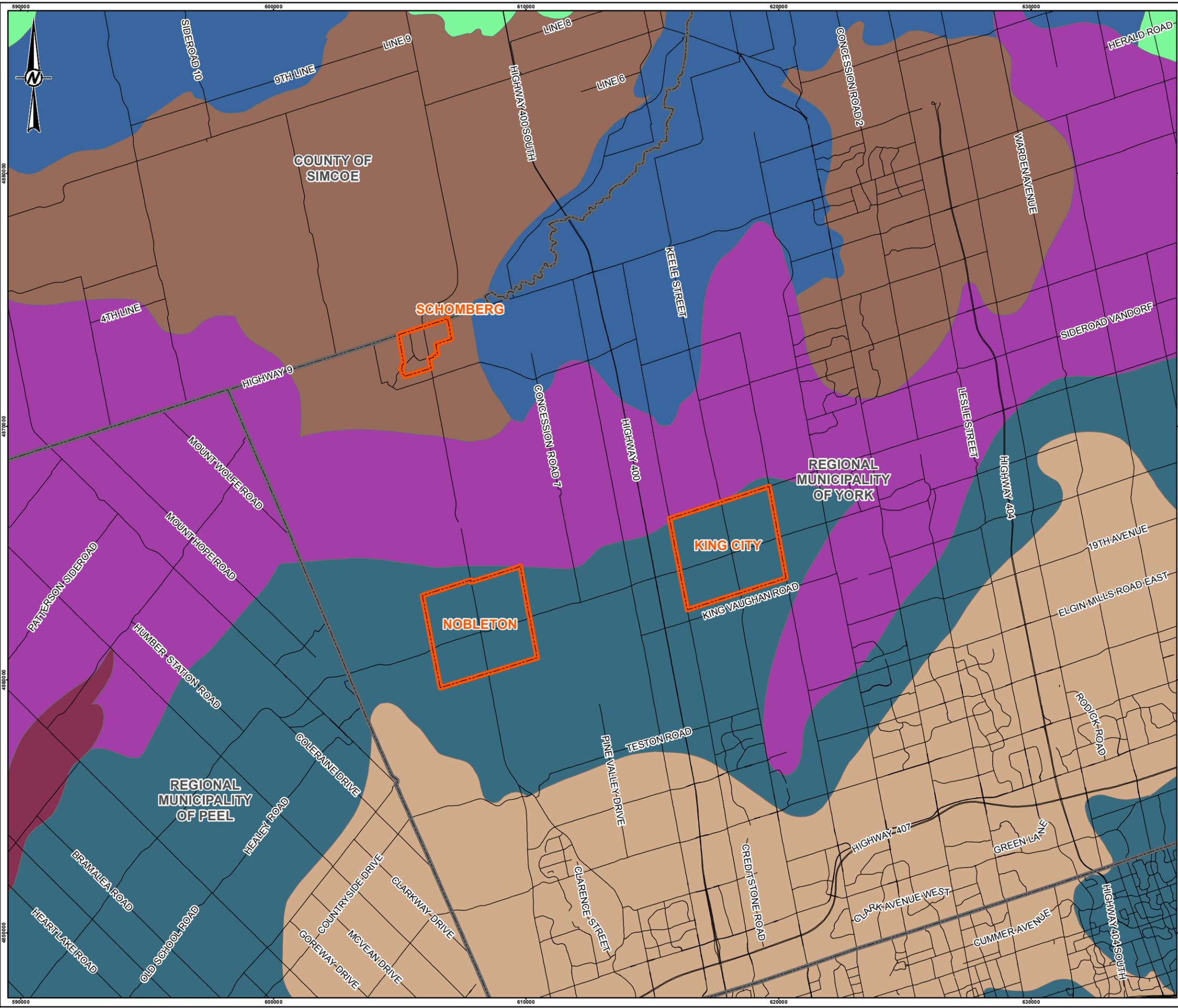
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 SURFICIAL GEOLOGY

CONSULTANT	YYYY-MM-DD	2015-03-25
DESIGNED	JT	
PREPARED	JT	
REVIEWED	RA	
APPROVED	AJH	



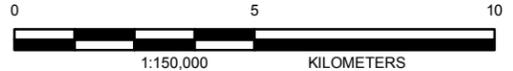
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**LEGEND**

- ROAD
- APPROXIMATE SITE BOUNDARY
- PHYSIOGRAPHIC REGIONS**
- NIAGARA ESCARPMENT
- OAK RIDGES MORAINE
- PETERBOROUGH DRUMLIN FIELD
- SOUTH SLOPE
- PEEL PLAIN
- SCHOMBERG CLAY PLAINS
- SIMCOE LOWLANDS



**REFERENCE(S)**  
 BASE DATA - MNR LIO, OBTAINED 2013  
 PHYSIOGRAPHY DATA - THE PHYSIOGRAPHY OF SOUTHERN ONTARIO, THIRD EDITION BY CHAPMAN AND PUTMAN, 1984  
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 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

**CLIENT**  
 THE MUNICIPAL INFRASTRUCTURE GROUP LTD.

**PROJECT**  
 DESKTOP STUDY FOR KING CITY TOWNSHIP  
 SCHOMBERG, NOBLETON AND KING CITY, ONTARIO

**TITLE**  
 PHYSIOGRAPHIC REGIONS

CONSULTANT	YYYY-MM-DD	2015-03-25
DESIGNED	JT	
PREPARED	JT	
REVIEWED	RA	
APPROVED	AJH	

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# APPENDIX A

## Important Information and Limitations of This Report



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## IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

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**Standard of Care:** Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

**Basis and Use of the Report:** This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder can not be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

**Soil, Rock and Groundwater Conditions:** Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.



## IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

**Sample Disposal:** Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

**Follow-Up and Construction Services:** All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

**Changed Conditions and Drainage:** Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

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