Hydrogeological Report
Terms of Reference

PREAMBLE

A Hydrogeological Report is a review of the subsurface hydrogeological conditions to identify development suitability, constraints and mitigation measures to be implemented.

REQUIRED BY LEGISLATION

- Ontario Water Resources Act, R.S.O., 1990, c. O.40
- LSRCA Lake Simcoe Protection Plan
- MECP D-5-5
- Other legislation as applicable

For Environmental Activity and Sector Registry

- Environmental Protection Act (Part II.2)
- Ontario Regulation 245/11 (Part II.2 — General)
- Ontario Regulation 63/16

For Permits to Take Water

- Ontario Regulation 387/04
- OWRA (Sections 34 and 98)

For Source Water Protection

- Clean Water Act
- O.Reg. 284/07

WHO SHOULD PREPARE THIS REPORT?

A Hydrogeological Report must be completed by a licensed, Professional Geoscientist or Exempted Engineer as set out in the Professional Geoscientist Act of Ontario and Professional Engineers of Ontario. All reports and drawings must be stamped, signed, and dated by a qualified professional, licensed in the Province of Ontario.

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WHEN DO WE NEED THIS REPORT?

- Draft Plan of subdivision.
- Detailed subdivision engineering.
- Site plan control.
- Other processes that may be required or identified by the Town.

WHY DO WE NEED THIS REPORT?

A hydrogeological report is required to assess matters such as:

- Groundwater occurrence (unconfined and confined aquifers, aquitards, water table depth) and associated subsurface geology.
- Surface water – groundwater interactions.
- Groundwater infiltration or recharge, when water balances are required.
- Groundwater baseflow and discharge.
- Seasonal groundwater elevations (capturing spring freshet).
- Groundwater mapping showing flow paths.
- Groundwater quality and temperature.
- Cumulative watershed impacts on groundwater.
- Temporary and/or permanent dewatering intake, discharge, and zone of influence.
- Identify dewatering impacts, including contaminant migration and impacts to existing and proposed private water wells (quality and quantity), and natural heritage features.
- Identify mitigation measures and monitoring requirements of dewatering impacts.
- Dewatering impacts to building foundations and road structural stability (potential settlement) associated with dewatering.
- Evaluate dewatering, and development impacts on the municipal drinking water sources.
- Groundwater discharge which supports cold-water fisheries, if required.
- Compliance with applicable requirements from the Ministry of the Environment, Conservation and Parks (MECP), for Permits to Take Water or Environmental Activity and Sector Registry.

HOW SHOULD THIS REPORT BE PREPARED?

The review area shall encompass the land area covering the largest possible zone of influence that could result from the proposed groundwater taking and/or source of contamination.

A Hydrogeological Report should, at a minimum, contain the headings and respective information as follows:

Introduction

- Address of the subject property.
- General site location of the subject property.
- Project Name (if applicable).
- Applicant and owner's contact information.
- Author name, title, qualifications, company name and appropriate stamp.
- Brief description of the proposed development.
- Overview of the study area.
- Purpose of the study.
- Location and context map.

Proposal Description and Context

- A description of the proposal, development statistics (such as number of units, site area), type of development proposed, height, parking areas, access points, location of amenity areas, proposed phasing.
- A description of the existing hydrogeological conditions on the site and within a 500-m study area as well as surrounding areas, roads, natural areas, buildings, parking areas.
- Concept Plan for the development including building location, parking, access, amenity areas, grading and natural features and any natural hazards.

Minimum Investigation/Evaluation

- Existing Regional and Local Geology and Hydrogeology including surficial and bedrock geology, lithology, and hydrostratigraphic units.
- Description of Topography and Drainage (surface water features and functions), physiography, existing land use, and soils.

- Overlap of the site and/or the study area with regulated area(s) from the applicable Conservation Authority.
- Test pits/boreholes logs that include water table elevations and lithology.
- Monitoring Wells.
- Single well response tests or pump test(s) for formations to be impacted by dewatering activities.
- Private Well Surveys (as required).
- Hydrogeology: Aquifer properties, groundwater levels including areas of flowing artesian conditions, groundwater flow direction(s) hydraulic conductivity, vertical and/or horizontal gradients.
- Pre-development groundwater quality.
- Water Taking Details: Water quantity and quality test results, in compliance with municipal and/or regional Sewer Use By-law (as required), D-5-5 (Water Supply).
- Source Water Protection Plan (SPP) policies and vulnerable areas pertaining to the development. Ecologically Significant Groundwater Recharge Areas.
- Water balance for sites as required by source water protection plans (i.e. sites located within WHPA-Q).
- Infiltration testing for locations where Low Impact Developments are being considered and rely on design guidance for LIDs.

Impacts and Potential Short/Long Term Impact Assessment

- Potential impacts to groundwater levels/groundwater flow.
- Seasonally/Historically high groundwater levels.
- Four-season monitoring.
- Surface water system, other groundwater users, and land stability.
- Potential impacts to groundwater recharge, baseflow, and discharge to natural heritage features.
- Potential impacts to water supply wells.
- Potential impacts to settlement of existing structures.
- Pre- and post-development water balance with and without mitigation.
- D-5-4 (Onsite Sewage Systems).

- Source Water Protection: Wellhead Protection Area (WHPA), Highly Vulnerable Aquifer (HVA), Significant Groundwater Recharge Areas, Creation of a Transport Pathway, Significant Drinking Water Threats, Existing Conditions/Issues.
- Quantity and quality of an aquifer used for drinking water supply.
- Temporary and permanent dewatering, if required.
- Phosphorus loading, if required.
- Contaminant migration flowing conditions, if required.

Mitigation Measures and Monitoring Plan

- Mitigate impacts to infiltration/recharge
- Mitigate impacts associated with groundwater quality
- Conduct Groundwater Quantity Monitoring Program, for discharge evaluation
- Assess temporary dewatering needs
- Eliminate or reduce permanent dewatering needs
- Design and implement Contingency Plans for dewatering, quantity, and quality concerns
- Install contamination monitoring wells within municipal boundaries to assess and monitor impacts associated with dewatering to private/public wells, as applicable.
- Carry out a ground settlement monitoring program during dewatering.
- Conduct surface water quality monitoring (as required).
- Monitor groundwater and/or surface water level fluctuations associated with dewatering activities.
- Monitor groundwater dewatering volumes (for compliance with EASR/PTTW or requirements from Conservation Authority and MECP).
- Use engineering measures to reduce/eliminate dewatering volumes (e.g., waterproofing, soldier piles and lagging, caisson walls, sinking shafts, etc.).
- Plan for pre-treating water before discharge in the storm sewer system (as required).
- Phosphorus loading mitigation (as required).

If it has been determined that there will be a negative impact to the natural environment, municipality's sewage works, or the land stability because of groundwater taking and discharging, the Review shall identify the following:

- The extent of the negative impact

- Details of the existing of pre-construction state of all the infrastructure, municipal sewage works, and natural environment within the affected zone.
- The proposed mitigation and monitoring plan

If any potential settlement due to dewatering activities is identified, the applicant will be required to submit a pre-construction survey (including photos) and CCTV of any municipal infrastructure identified in the hydrogeology report as potentially susceptible to settlement due to the dewatering activities.

If a proposed mitigation plan is recommended, subsequently, a follow-up report is required confirming that the affected zone has been returned to its pre-development/existing conditions prior to the groundwater taking and discharge.

Recommendations

Proposal of actions to support the development and any special considerations or conditions that should be imposed.

Any recommendations or conditions that should form part of the development approval.

Drawings and Supporting Information

- Figures supporting the narrative in a report.
- Results of MECP water well records' search.
- Results of water well surveys.
- Borehole logs and location mapping.
- Hydrogeological cross-sections.
- Groundwater and/or surface water monitoring results and location mapping.
- Datalogger plots.
- Groundwater elevation contour mapping.
- Results of pumping test analysis and/or single-well response test analysis.
- Laboratory certificates of analysis.
- Dewatering spreadsheets.
- Drawings supporting the application.
- Infiltration test analysis.
- Settlement analysis reports.
- Water balance calculations (as required).

- Dewatering calculations as required.
- Phosphorus balance, loading, and offsetting calculations.
- Correspondence with Conservation Authorities or MECP (as required).

WHAT ELSE SHOULD WE KNOW?

The scope of the study should be discussed with the Growth Services Department and other staff or agencies as part of the pre-consultation process.

The study area should include the land surface area covering the largest possible area of influence that could result from the proposed taking. This may include potential influences to water level, flow direction and water quality.

The level of detail required in the hydrogeological study is normally expected to be commensurate with the level of risk posed by the taking, and level of uncertainty of the available information.

ADDITIONAL TERMS

If the proposed development is revised, the study/report shall reflect the revisions by an updated report or letter from the author indicating the changes and whether the recommendations and conclusions are the same (Note: this is subject to the extent of the revisions).

A peer review may be required, and all costs associated with the peer review may be the responsibility of the applicant.

If the submitted study is incomplete, is authored by an unqualified individual or does not contain adequate analysis, the applications will be considered incomplete and may be returned to the applicant.

SUBMISSION INSTRUCTIONS

- Follows the Digital File Naming Convention.
- All submission materials shall be submitted through an FTP site.

WHAT OTHER RESOURCES ARE THERE?

- Clean Water Act, 2006, c. 22
- Drinking Water Source Protection: South Georgian Bay Lake Simcoe Source Protection Plan (January 2015, amended May 2024), as applicable to Bradford West Gwillimbury

- Hydrogeological Assessment Submissions: Conservation Authority Guidelines for Development Applications (June 2013) Hydrogeological Technical Information Requirements for Land Development Applications
- Source Protection Information Atlas, n.d.
- Stormwater Management Planning and Design Manual (March 2003)
- Technical Guidance Document for Hydrogeological Studies in Support of Category 3 Applications, n.d. Water management: policies, guidelines, provincial water quality objectives, n.d.
- Ontario Ministry of Environment and Energy, Ontario Ministry of Natural Resources (April 1995): MOECC Hydrogeological Technical Information Requirements for Land Development Applications
- Ontario Regulation 63/16: Registration under Part II.2 of the Act – Water Taking Ontario Regulation 245/11
- Ontario Regulation 284/07, Source Protection Areas and Regions
- Ontario Regulation 387/04: Water Taking and Transfer Ontario Water Resources Act, R.S.O., 1990, c. O.40 Professional Engineers of Ontario.
- Professional Geoscientists Ontario

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About these Terms of Reference:

These Terms of Reference were developed by the Town of Bradford West Gwillimbury based on the Terms of Reference prepared by York Region.

Notes:

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