

Hydrogeological Screening Tool

Checklist For Applicant

When a person submits an application for development that has the effect of creating one or more new lots or is proposing development on an undersized parcel, a professional confirmation of sufficient and potable water supply will be required as part of a completed application if any of the following apply:

- ☐ The development involves the creation of a new lot that is less than 1 ha in size.
 - ☐ A proposed lot is located within 150 m of seven other existing dwellings that are serviced with private well and septic.
 - ☐ A proposed lot is within one of the influence areas identified in pits and quarries, adjacent agricultural uses, waste disposal sites or sewage treatment of the Official Plan.
 - ☐ The development is taking place in an area of known hydrologic sensitivity or the local area has known or suspected water quality or quantity issues.
-

Scoped Hydrogeological Assessment

A scoped hydrogeological assessment will be required as part of a complete planning application in the circumstances referenced above. If an applicant is required to undertake a scoped hydrogeological assessment as per this screening tool, at the pre-consultation stage Municipal Staff will ensure that a formal pre-consultation with the Municipality's consultant is held.

Sections two (2) and three (3) of this document provide a summary of the reporting requirements and related policies and industry guidance, respectively.

Section four (4) provides a checklist of reporting requirements that is to be interpreted and used by qualified professionals.

Section (5) provides a checklist for an applicant to assist with determining if a hydrogeological assessment may be required prior to development approval.

Section One - Overview

The Municipality has consultants on retainer to provide technical advice to the Municipality about the suitability of hydrogeological reports that are produced in support of privately serviced development applications. The consultant's advice, which is based on provincial guidance and current industry standards, aims to reasonably protect

existing and future private groundwater supplies, thereby supporting the longevity of development at these sites and the health of existing and future residents.

Section Two - Summary of Reporting Requirements

When the Municipality has determined that a scoped hydrogeology study is required for development, the hydrogeology report is expected to demonstrate a favourable:

I. Groundwater Quantity Assessment

Whereby an on-site well, of specified construction, will be able to provide enough water to run a household on an on-going basis and not interfere with the use of well water on adjacent properties.

II. Groundwater Quality Assessment

Whereby on-site groundwater, from a well of specified construction, will meet the Ontario Drinking Water Standards, Objectives and Guidelines. This is to include dissolved heavy metals, when the province has specified a related standard, and parameters associated with local land-uses.

III. Terrain Evaluation and Water Quality Impact Risk Analysis

Whereby the terrain at the site is suitable, from a planning and groundwater protection perspective, to attenuate the effluent from on-site wastewater treatment systems such that down gradient land is not impacted in excess of provincial standards. This requirement is substantially different from the requirements of the Leeds, Grenville and Lanark District Health Unit, which is to ensure that an on-site wastewater treatment system can be built on the site as per the Ontario Building Code construction requirements. These requirements are currently addressed separately from each other.

In addition, the hydrogeology report should provide:

IV. Conclusions and Recommendations

Where these are to be detailed site-specific requirements, as determined by a qualified professional, that will be used to guide the Municipality in the implementation of the study recommendations and requirements. The qualified professional provides a substantiated opinion, based on their interpretation of study findings, that the proposed development will have no adverse impact on the reasonable use of groundwater on existing and future adjacent properties.

Section Three – Relevant Policies and Guidelines

The Municipality's consultants provide advice based on relevant policies in Mississippi Mills Official Plan; relevant provincial guidance; and current industry expectations. The relevance of the Ministry of the Environment and Climate Change's guidance to development is given below.

- I. Procedure D-5-4 Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment (1996)
<http://www.ontario.ca/document/d-5-4-individual-site-sewage-systems-water-quality-impact-risk-assessment> "Although MOEE (1) does not normally review development proposals consisting of 5 or fewer lots, municipalities are encouraged to retain, on their behalf, professionals with demonstrated expertise in hydrogeology with emphasis on development on private services, to review studies prepared in accordance with this Guideline. Municipalities are also encouraged to implement the provisions of this guideline in their consideration of developments by consent or severance." Further, Procedure D-5-4 applies "to residential, commercial and industrial proposals which use individual on-site sewage disposal systems for the treatment of domestic waste."
 - II. Procedure D-5-5 Technical Guideline for Private Wells, Water Supply Assessment (1996) <http://www.ontario.ca/document/d-5-5-private-wells-water-supply-assessment> "The guideline applies to all development proposals for residential development involving individual well water supplies. Development agreements between the proponent and the municipality ... shall be used to bind development to the recommendations of approved hydrogeology studies." "The guideline also applies to developments for which a plan of condominium is required and to industrial, commercial or institutional developments where water is used for human consumption. "Procedure D-5-5 indicates that "Although MOEE does not normally review development proposals consisting of five or fewer private residences, the Ministry recommends that supplies serving five or fewer private residences should use the ODWOs(2) to ensure the quality of drinking water. This recommendation may apply to development by consent or at the official plan amendment stage..." "Where development by severance is considered, determination of the availability of a potable water supply should be made as early as possible in the severance approval process."
 - III. Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) as explained in "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines" (MOECC 2003, Revised June 2006).
<http://www.ontario.ca/document/technical-support-document-ontario-drinking-water-standards-objectives-and-guidelines>
-

Section 4 - Consultant's Checklist

The following checklist is provided to assist qualified professionals in their scoping of a suitable hydrogeological investigation that would address the general reporting objectives given in the preceding overview. This checklist provides more explanation than is available in the equivalent subdivision checklist in order to more clearly define the level of effort required for applications for development.

Technical pre-consultation to refine the scope of study was undertaken with the Municipality's Consultant.

Groundwater Supply Assessment (Procedure D-5-5)

Groundwater Quantity Assessment

- ☐ Water well records for the area around the site are provided and mapped in the report. MOECC's interactive mapping and well record downloads available here: <http://www.ontario.ca/environment-and-energy/map-well-records>; <http://www.ontario.ca/data/water-wells>
- ☐ The report contains a simple discussion of regional and site hydrogeology (incl. aquifer characteristics, groundwater flow regime etc.) and provides all related mapping if conditions vary within 500 m of the site. The groundwater flow regime is explained, at the regional scale, in Mississippi-Rideau Source Protection documents, which are available here: <http://www.mrsourcewater.ca/en/library/reports>. Information about groundwater flow could potentially also be interpreted from information in the MOECC's water well records.
- ☐ Information about well construction and well / aquifer yield (including recovery) from all available technically appropriate (representative) domestic wells up to one kilometer and at least 500 m from the site is evaluated in the report. At least one of the wells (test well) used in this evaluation is shown to represent site specific conditions, exhibit future well construction specifications and meet Ontario Regulation 903 requirements. This well is preferably located on-site. However, a nearby accessible well of known and representative construction may be located on an adjacent property and shown to be suitable for this assessment. Specific capacity is considered the most appropriate well yield parameter to evaluate in this analysis.
- ☐ The report demonstrates that future water wells can be pumped at or above the minimum test rate specified in the provincial guidelines. Where local well yields

are found to be poorer as per the above analysis, a full pumping and recovery test and interference analysis may be required from an on-site or representative off-site well. Further consultation is highly recommended.

- ❑ The report demonstrates that the test well fully recovers during a 24-hour pumping cycle.
 - ❑ Information from the owners of representative private wells in the vicinity of the site about their experience with well yield vs demand, groundwater levels, well replacement/repair etc. are evaluated in the report. The report describes and evaluates those land uses that could affect well yield within a minimum of 500 m from the site; and accounts for this in the groundwater quantity assessment.
-

Groundwater Quality Assessment

- ❑ Field data is provided for raw groundwater samples from the test well. At minimum, field parameter measurements are to include: residual chlorine, pH, temperature, conductivity, dissolved oxygen, turbidity, colour, alkalinity and a hydrogen sulphide odour test. Where detected, hydrogen sulphide is also measured in the field. Methodologies for the measurement of field parameters are described in the report in reference to specific industry standards including field equipment make / model and calibration outcomes.
- ❑ Original laboratory reports are provided for raw groundwater samples from the test well. Lab analyses / calculations are provided for the common 'subdivision suite' of parameters including those listed in Table 1 of Procedure D-5-5; and fluoride, phenols, tannin & lignin, total kjeldahl nitrogen (TKN), organic nitrogen, phosphate and all naturally occurring dissolved heavy metals with provincial standards, objectives or guidelines (i.e. Aluminum, Antimony, Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Uranium and Zinc).
- ❑ Methodologies for the collection and preservation of samples are described in the report in reference to specific industry standards including bottle types, filtration, preservation / treatment, holding times and temperature. Where TDS values are high, the report includes written rationale, with supporting analyses, that corrosion, encrustation or taste problems will not occur.
- ❑ Field data and professional opinion indicates that chlorine residuals were zero at the time of sampling; and that raw water turbidity is acceptable. The report explains how raw groundwater quality meets the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) and/or is within the provincial treatability limits for aesthetic/operational parameters.

- ☐ Where raw water quality parameters exceed the Ontario Drinking Water Objectives and Guidelines but are within the D-5-5 reasonable treatment limits, water treatment recommendations are discussed.
 - ☐ Where raw water quality parameters exceed the Ontario Drinking Water Objectives and Guidelines and the D-5- 5 reasonable treatment limits, water treatment recommendations are discussed; and a favorable feasibility assessment is provided to explain the financial and maintenance efforts that would be required by future home owners if development proceeds via treatment.
 - ☐ Where any health-related parameters are found to exceed the Ontario Drinking Water Standards, development would not proceed based on test well construction specifications. *
 - ☐ Other well construction specifications and /or re-sampling efforts could be explored. For all exceedances, consultation with the consultant and the Municipality is required.
 - ☐ Information from the owners of representative domestic wells in the vicinity of the site about their experience with well water quality are evaluated in the report.
 - ☐ The report describes and evaluates those land uses that could affect groundwater quality within a minimum of 500 m from the site; and accounts for this in the groundwater sampling program.
-

Individual On-site Sewage Systems: Water Quality Impact Risk Assessment (Procedure D-5-4)

General Evaluation

- ☐ Representative background nitrate (as nitrogen) levels from the receiving groundwater and a description and justification of the sampling rationale and methodologies are presented. Background nitrate addresses D-5-4 guidance. If existing domestic wells are considered representative of the receiving groundwater, a suitable rationale is provided.
- ☐ The report demonstrates that the location of future septic systems is not obviously hydrogeologically sensitive (i.e. no karst, fractured bedrock exposed at surface, areas of thin soil cover, or areas with highly permeable soils). Simple justification is given based on appropriate technical information and analyses (e.g. airphotos, regional geological mapping, water well records etc.) Current Geological information, including karst and bedrock outcrop mapping, is available here: <http://www.mndm.gov.on.ca/en/mines-and->

minerals/applications/ogsearch. Overburden isopach data is available from the Ontario Geological Survey's GIS data-release associated with Aggregate Resources Inventory Paper, ARIP 189:

http://www.geologyontario.mndmf.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=ARIP189

- ☐ Where soil depths are likely less than two (2) metres, simple on-site soil depth testing information, including photographs are provided and evaluated in the report.
 - ☐ Where karst is likely present, such as along the eastern boarder of Lanark County, evidence of complete on-site terrain characterization, including photographs, is provided and evaluated in the report. The consultant was consulted when determining the field program for this work.
 - ☐ Where highly permeable soils are likely present, soil profiles and grain size analyses are provided and evaluated in the report.
 - ☐ Where obviously hydro-geologically sensitive terrain is found on-site, best management practices that would be prescribed in the development agreement or site plan agreement to reduce the risk of impacts to on-site and off-site water wells, including but not limited to the following, are prescribed in the report recommendations: locating wells up-gradient from septic systems; increased casing lengths; increased separation distances between all down-gradient water wells and septic systems; tertiary septic systems with nutrient reduction technologies; separation of septic systems from constraints; etc. *
 - ☐ If constraints that affect the location of septic systems and water wells exist on-site, then a lot layout plan that includes these constraints (hydro-geologically sensitive terrain, hazard set-backs, MDS set-backs etc.), the proposed septic system locations and the proposed water wells locations is provided.
 - ☐ All field methods are described in the report and meet standard industry practice.
-

Water Quality Impact Risk Analysis: Three-Step Assessment Process

- ☐ If lots are one hectare or greater and the site does not exhibit elevated nitrate levels or hydro-geologically sensitive terrain, then no additional work is required.
- ☐ If lots are less than one hectare but are underlain by ten metres or more of massive clay (or sediment of similar low hydraulic conductivity), then no additional work is required.

- ❑ If lots are less than one hectare and do not exhibit elevated nitrate levels or hydro-geologically sensitive terrain, then a predictive contaminant attenuation assessment is provided as per Procedure D-5-4. The available water surplus, to be used in the assessment, can be obtained for site specific soils and local climate data from Environment Canada.
-

Conclusions and Recommendations

- ❑ Substantiated professional conclusions, which reference key study findings, are provided in the report and stipulate that the proposed development will have no adverse impact on the reasonable use of groundwater on existing and future adjacent properties.
- ❑ A list of informative findings and recommendations, which can be reproduced in the development agreement or site plan agreement, is provided in the report. Recommendations include: OWTS location constraints; well and OWTS location, design and construction requirements; drilling supervision requirements; well water treatment recommendations; best management practices for water wells and OWTS; requirements for earth energy systems; warnings about hydraulic fracturing; reference to a constraint map etc.

* Please note that the consultant will indicate that the on-site conditions do not address provincial guidance where the report recommends locating future on-site wastewater treatment systems on or adjacent to obviously hydro-geologically sensitive terrain; and / or where the report recommends treatment of aesthetic or operational parameters which were measured above the provincial treatability limits.
