

 <b>Ontario</b> Ministry of Natural Resources / Ministère des Richesses naturelles	<i>Subject:</i> <b>Aggregate Permit Applications: Hydrogeological Report Standards (Categories 10 &amp; 12)</b>	<i>Policy No.:</i> <b>A.R. 4.01.05</b>	<i>New:</i> <b>Yes</b>
<i>Compiled by – Branch:</i> <b>Lands &amp; Waters</b>	<i>Section:</i> <b>Aggregate &amp; Petroleum Resources</b>	<i>Date Issued:</i> <b>March 15, 2006</b>	

### **Guiding Principle**

***To determine if an aggregate operation will not adversely affect the water table or ground water regime (e.g. wetlands, areas of natural and scientific interest or nearby wells), it is necessary to establish where the water table is, in relation to the depth of extraction. The report must also carefully consider mitigative measures by a qualified individual.***

### **Policy**

For aggregate permit applications proposing to extract aggregate material from within or near the water table (i.e. pit within 1.5 metres or quarry within 2 metres), a Hydrogeological report must be prepared by a qualified individual.

If the proposed site is remote or isolated and the following criteria has been satisfied, then a Hydrogeological Level 1 and Level 2 is not required:

If the excavation limit of the site is not within:

- a) 500 metres of a coldwater stream;
- b) 1000 metres of a waterwell, whether dug or drilled; and
- c) 5000 metres of a sensitive receptor.

*Sensitive receptor* is defined in the Aggregate Resources of Ontario Provincial Standards as meaning: *residences, or facilities where people sleep (nursing homes, hospitals, trailer parks, camping grounds, etc); schools; day care centres.*

With respect to the preparation of the Hydrogeological reports, a "qualified" individual must be a registered "Professional Geoscientist" as defined under the *Professional Geoscientists Act* who is qualified to prepare hydrogeological reports or an individual who is licensed as a "Professional Engineer" under the *Professional Engineers Act* and who is competent by virtue of training and experience, to engage in practices that would also constitute the practice of professional geosciences (i.e. hydrogeology).

A hydrogeological level 1 report is a preliminary evaluation to determine the final extraction depth relative to the established groundwater table(s), and the potential for adverse effects to groundwater and surface water resources and their uses. If the preliminary evaluation identifies a potential adverse effect resulting from the operation, then a more intensive impact assessment (level 2) is required to determine the significance of the effect and the feasibility for mitigation (see the Provincial Standards for information requirements). The hydrogeological report should implicitly state whether it is a Level 1 or Level 2 report and include the supporting rationale.

An “*aquifer*” or “*water-bearing formation*” is a water-saturated geologic unit (i.e. formation or strata) that will yield water to wells or springs at a sufficient rate so that the wells or springs can serve as viable sources of water supply. The unit must contain pores or spaces filled with water and these spaces must allow the movement of water at a perceptible rate.

“*Water table aquifers*” most commonly found in unconsolidated materials (e.g. sand, gravel) are usually referred to as an “unconfined aquifer” or “*unconfined ground water*” and the upper surface of the water is at atmospheric pressure. The terms “*artesian aquifer*”, “*confined aquifer*” or “*confined ground water*” refers to an aquifer found below a low permeability layer where the water is not open to atmospheric pressure. Often water within the aquifer is at greater than atmospheric pressure. When a well is drilled or an excavation digs through the upper confining layer into the underlying aquifer, the water in the well/excavation rises to a level above the top of the aquifer (i.e. *water found level*). Most wells drilled into bedrock (i.e. consolidated materials) are of this nature. For the purpose of this report, the static level or surface that the water rises to is considered the water table elevation within the confined aquifer and not the elevation where the water was found. The elevation that the water rises to within the well is also referred to as the “*potentiometric level*”, and the upper surface as the “*potentiometric surface*”.

The water table is partially controlled by the topography of the land and generally, tends to follow the surface of the land. However, other factors may also influence the behaviour and location of the water table. Precambrian rocks of the Canadian Shield are usually massive, dense formations, which are not conducive to the movement of water (i.e. low porosity and low permeability). Water movement mainly occurs along fractures or faults in the rocks, which are not necessarily interconnected and localized in nature. For this reason, determining the elevation is often very difficult and may be unreliable even when the site is drilled. The overlying, younger Paleozoic rocks of southern Ontario are usually better suited to the movement of water, but vary depending on the rock type (e.g. shale, limestone, sandstone) and extent of rock openings (e.g. bedding and jointing planes, solution channels, porosity and permeability of formation).

A local zone of saturation may exist above the water table where a relatively impervious stratum within the zone of aeration interrupts/intercepts percolation and causes ground water to accumulate in a limited area. The upper surface of the ground water is referred to as a “*perched water table*”. A perched water table is not usually considered the water table for the purpose of establishing the on-site water table, unless it is significant in size and function such as an adjacent wetland.

Information sources to determine the elevation of the water table on the site may include existing well data, surface water elevations of nearby water bodies or features, and testing (e.g. wells/holes) by the applicant. More than one source may be necessary to make this determination. Where there is a lack of available information, it will be necessary for the applicant to establish the water table by digging or drilling test holes. The report must indicate the time of year when the testing was performed and how the elevation was established. A time of seasonal high (i.e. April/May or September/October) is the preferred time for establishing the elevation of the water table. In addition, longer-term seasonal trends (e.g. seasonal rainfall patterns) may also need to be considered by the applicant or their consultant.