

Aggregate Resources of Ontario: Policy

Maximum Predicted Water Table Report

1.0 Purpose

The Maximum Predicted Water Table Report (the Report) is a requirement of the [*Aggregate Resources of Ontario: Technical Report and Information Standards*](#) (the Standards), and must be completed as part of an application for an aggregate licence, permit, or wayside permit, regardless of whether extraction is proposed above or below the water table.

Surface water and ground water features and resources must be protected during aggregate excavation, and potential negative impacts must be prevented or mitigated. This requires an understanding of surface water and ground water present at the proposed pit/quarry site, including the elevation of the maximum predicted water table (i.e., the water table at its highest elevation).

The Report must describe how the maximum predicted water table was determined within the proposed licensed/permitted area. This policy defines key hydrogeological terms and lists requirements and best practices for determining and reporting the maximum predicted water table under the [*Aggregate Resources Act \(ARA\)*](#).

2.0 Key Terms

2.1. Aquifer

An aquifer is a water-saturated geologic unit (e.g., formation, stratum) that yields water to wells or springs at a sufficient rate, so that the wells or springs can serve as sources of water supply ([Figure 1](#)). In unconsolidated materials (e. g., sand, gravel), aquifers are considered to be unconfined if the ground water table is open to atmospheric pressure and are considered to be confined if the ground water table is positioned above or within the low-permeability confining unit.

2.2 Ground Water Table

See the [Standards](#) for definition of ground water table, under the ARA framework.

2.3 Ground Water Recharge

Ground water recharge is the movement of water downward, from the ground surface to the ground water table, through an unsaturated zone (Figure 1). Recharge is the primary mechanism by which water enters the ground water table. Recharge rate varies significantly depending on climate, season, and geographic location. As a result, the ground water table also varies seasonally, and from year to year.

2.4 Perched Ground Water

Perched ground water, which usually forms on top of a clay lens or other impermeable material, is unconfined ground water which is separated from the main saturated zone (Figure 1). Potential impacts to perched ground water will be considered, when it may support functions in nearby natural heritage features such as significant wetlands, fish and wildlife habitat, springs, and water sources.

A water table that is associated with perched ground water and is separate from the main ground water table is called a perched water table.

2.5 Qualified Person

Per the Standards, a qualified person (QP) means a registered Professional Geoscientist or exempted Professional Engineer with appropriate training and experience in accordance with the [Professional Geoscientists Act, 2000](#).

3.0 Determining Maximum Predicted Water Table

3.1 Data Collection

Maximum predicted water table elevation must be determined based on water level measurements taken from onsite ground water monitoring wells or test pits, over a period of at least one year, unless [alternative information](#) is available for the site. One-

year measurements account for seasonal variations in elevation, including during seasonal highs (e.g., spring freshet, from late March to May, and fall, from September to November), when ground water recharge is typically greater than at other times of year, leading to higher ground water table elevation(s). In particularly dry or wet years, applicants may be required to consider multi-year data and/or additional monitoring.

To measure ground water level(s) that represent ground water conditions likely to be encountered during aggregate excavation, it is best to construct monitoring well(s) according to the anticipated depth of extraction, and not significantly deeper. The hydrogeological conditions should dictate the necessary information (and target depth) to support the impact assessment. The number of monitoring wells and/or test pits and seasonal monitoring frequency must be determined by the QP, based on the conditions at the site.

It may not be necessary to determine the exact position of the ground water table if it is substantially below the anticipated final depth of the proposed excavation. By drilling a well to a depth of at least 2.5 m below the proposed maximum depth of extraction (typically a site sump or pond), a QP may determine that the proposed excavation will remain above the ground water table. In areas of considerable uncertainty and variability in intersecting fractures, it is advisable to drill the well deeper than 2.5 m below the deepest anticipated excavation point, to account for any additional blast-induced fractures.

Note: (1) All monitoring wells must be constructed in accordance with current [provincial regulations](#) under the [Ontario Water Resources Act](#). (2) On Crown land, a permit under the [Public Lands Act](#) may be required, to construct monitoring wells or create test pits.

For additional information, contact the local MNR office.

3.2 Review of Information

In addition to monitoring wells or test pits in the proposed licensed/permitted area, the following information sources may assist in determining maximum predicted water table:

- existing well data,
- previous hydrogeological studies relevant to the site,

- surface water elevations of nearby water bodies,
- historical precipitation records,
- other relevant site-specific information.

All consulted information sources must pertain to the proposed licensed/permitted area or immediately adjacent lands.

3.3 Maximum Predicted Water Table in Non-Sedimentary Rocks

Non-sedimentary rocks, such as Precambrian rocks (i.e., the Canadian Shield), are typically massive, dense formations with low permeability. Water movement in these rocks occurs mainly along fractures and faults, resulting in depth-related changes in water pressure along fractures and faults. As a result, wells drilled close to each other but to different depths may show different water levels. The number of monitoring wells and seasonal measurement frequency are to be determined by the QP, based on site conditions.

Applicants proposing to determine maximum predicted water table in non-sedimentary rocks using alternative methods to those described above should **contact MNR (ARAapprovals@ontario.ca) in advance**, to discuss the proposed methodology.

4.0 Report Requirements & Best Practices

The Maximum Predicted Water Table Report must clearly state the determined maximum predicted water table elevation(s), along with the anticipated depth of extraction, expressed in metres above sea level (masl). The determined elevation(s) should represent the entire site, including any variation in water table elevation across the site. The elevation(s) must also be illustrated in site plan cross-sections, to satisfy the [Aggregate Resources of Ontario: Site Plan Standards](#).

The Table Report must

- describe the methodology undertaken to determine maximum predicted water table elevation(s), including when measurements were taken, and locations of ground

water monitoring sites (in Universal Transverse Mercator or latitude-longitude coordinates),

- include data, mapping, and other information that support the QP's determination of the maximum predicted water table elevation(s), and
- state the qualifications and experience of the QP(s) who have prepared the Report, along with their signature and stamp.

Unless an applicant plans to submit [alternative information](#), the QP should visit the proposed pit/quarry site, to verify site information provided in the Report.

The QP should follow the [Professional Geoscientists of Ontario \(APGO\) Professional Practices Guidelines for Ground Water Resources Evaluation, Development, Management and Protection Programs in Ontario](#), 2004 or as updated, when determining maximum predicted water table elevation(s).

5.0 Alternative Information

Certain information may be sufficient to meet the requirements of a maximum predicted water table report. For example, recent relevant water studies or direct measurements of the ground water table completed at or near the proposed pit/quarry site (e.g., on adjacent lands) may be submitted to MNR for consideration. The age and relevance of the alternative information, and whether it includes a record of ground water table elevation(s) from times of expected water table highs, will be considered by MNR when determining whether the information is acceptable in lieu of a Maximum Predicted Water Table Report.

Applicants who propose to submit alternative information instead of the Maximum Predicted Water Table Report should contact MNR

(ARAapprovals@ontario.ca), in advance. MNR may also request further information and clarification from applicants, as appropriate, as part of any discussions pertaining to the submission of alternative information.

Figure 1. Types of Ground Water and Aquifers

