THE SOILS REPORT AND PROCEDURES FOR EVALUATING THE WATER TABLE

Introduction

The purpose of this section is to describe procedures for evaluating the water table within the site. A consultant qualified in the area of soils and sewage disposal should evaluate the water table.

General description of the water table

The water table is that surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere. The water table can be viewed directly by drilling an observation well into this groundwater body and waiting for the water level to stabilize. Repeated measurement of the water level in this well over a year or so will likely reveal that the water level fluctuates, perhaps by a metre or more. The water table to ground surface separation may also vary considerably over small distances as revealed by simultaneous measurement of water levels in neighbouring wells. The water table level in a well is influenced by such factors as weather, season, water levels of nearby water bodies or water courses, groundwater discharge, surficial stratigraphy and topography.

High water table area and constraints to development

A high water table area is defined as any area where the water table is within 1.8 metres (6 feet) of the ground surface during the frost free period up until the end of August; and within 2.4 metres (8 feet) of the ground surface during the remainder of the year. This definition recognizes that the water table will probably be elevated in the spring due to the infiltration of snowmelt and during the summer rainy season. High water table levels can:

- adversely affect the functioning of a sewage disposal system, which could lead to shallow groundwater and/or surface water contamination;

- render the area unsuitable for residential basement construction, interfere with the construction of roads, etc.

The Suitable Development Area as defined in the glossary is well drained and does not include a high water table area.

Preliminary evaluation of the water table

The preliminary evaluation of the water table lays the groundwork for the water table test hole program. Through the interpretation of relevant report, map and air photo information, coupled with a site inspection, a great deal can be learned about the site's

water table. It is at this stage that a consultant can outline on a map suspected high water table areas.

(1) **Sources of available information**

There are many sources of information that can assist in the preliminary evaluation of the water table of the site. These include topographic maps, soils and surficial geology maps and reports, water well records, air photos, and historical information on existing disposal fields within the property. Of particular interest will be any soils testing reports prepared for previous subdivision applications within the site.

(2) **Easily observed indicators of water table levels**

Despite the water table being hidden from view, it is possible to reliably estimate whether it is high at given location without excavating. Indicators such as topography, water courses and water bodies, and vegetation provide valuable clues and can be readily observed on stereo air photos or during a site inspection.

Topography

The water table is generally a subdued reflection of the topography. Therefore, elevated areas within the site such as knolls, mounds, etc. will tend to have lower water table conditions (greater water table to ground surface separation) than those associated with depressions and valley bottoms.

Water courses and water bodies

Areas adjacent to water courses and water bodies often have high water table conditions. Search for areas which are flat, nearly level and are only slightly higher than the water surface elevation when examining topographic maps, air photos or conducting a site inspection.

Vegetation

Vegetation type, which is probably the most sensitive indicator, tends to reflect the interplay of various factors and the resultant long-term range of water table levels.

Areas forested in aspen probably have low water table conditions.

A transition from low to high water table conditions can sometimes be detected by the presence of white birch and balsam poplar.

High water table conditions are encountered in wetlands such as bogs, fens and marshes. These areas are usually flat or very gently sloping. In bogs, black spruce, tamarack, dwarf evergreen heaths and sphagnum

moss predominate. Sedges, willows, dwarf birth and tamarack are characteristic plant species of fens. Marshes are usually found in association with shoreland areas and abound in sedges, cattails, rushes and grasses.

(3) **Preliminary delineation of suspected high water table areas on the base map**

Based upon a review of the available maps and reports, examination air photos and possibly a site inspection, major vegetation types should be outlined on the base map and suspected high water table areas tentatively delineated.

Water Table Test Hole Program

One of the basics methods for determining water table levels is the water table test. The test consists of drilling a hole (shallow observation well) to a depth of 3.0 metres (10 feet), allowing the water level to stabilize, then measuring the distance from the ground surface to the water level.

Optimal time for testing

The optimal time for testing is during the spring after the frost is out of the ground. At this time the water table is generally at its peak annual level.

Location of test holes

It is suggested that water table test holes be placed both in suspected high and low water table areas, but more importantly in transitional areas between them. In addition, areas that have been difficult to interpret should have test holes.

Number of test holes

As a general rule, 1 water table test should be augured for a lot less than 3 acres and 3 water table test holes should be augured for a parcel size of 3 to 10 acres. At the opposite extreme, if a single residential parcel is proposed, a test hole at the proposed building site and another within the proposed disposal field will likely be sufficient.

Auguring the test hole and keeping a soil log

Augur (drill) by hand or otherwise a hole to a minimum depth of 3.0 metres (10 feet). In sandy soils where contamination of groundwater is of concern, deeper test holes may be needed. As the hole is being augured record the soil texture. For example:

Table 3.1 – Example Water Table Test Hole Soil Log

0 to 4 cm	sandy loam, dark brown
4 to 45 cm	sand, medium to dark brown, slightly moist, fine-grained

45 to 300 cm silty clay, dark olive brown, slightly moist to moist, slightly plastic

During the removal of the soils one should be particularly vigilant for the presence of soil mottling in the excavated material (spotty discoloration) which indicates the uppermost point reached by the water table. Less well-drained soils have larger and more distinct mottles and mottles closer to the surface.

When frost conditions exist, collect a soil sample for grain size analysis between 90 to 119 cm (35 to 47 inches) below the ground surface.

Preparing the test hole for water level measurements

Immediately after auguring the hole, insert a perforated plastic pipe such that the standpipe reaches the bottom and protrudes at least 30 cm (12 inches) above the ground surface. The standpipe should be capped to prevent the entry of airborne debris. The excavated soil should be back filled around the standpipe and lightly tamped down. At the ground surface, soil should be mounded around the standpipe to prevent entry of surface water.

The location of the test hole should be brightly marked so that it can be easily relocated. In addition, the number of the hole should be clearly indicated. The hole and its standpipe should be left intact at least until after the registration of the subdivision plan at an Alberta Land Titles Office.

Water Level Measurements

Allow the water level to stabilize in the hole and measure the distance from the ground surface to the water level. This stabilization period will be a minimum of 24 hours. Include in the report the time allowed for stabilization and the date of testing. We recommend the water level be measured and documented every 24 hours over a period of 72 hours.

Preparation of the water table site map

Based upon the preliminary evaluation supplemented by the water table test hole program, the high water table areas should be delineated on the Base Map. This map should also outline major vegetation types and show the location of all water table and percolation test holes. In addition, the stabilized water table level within each water table test hole should be included. If bedrock is encountered within 2.4 metres of the ground surface, it should be delineated on the base map and its lithology described.