

Sampling and Determining Soil pH at Soil Relocation Receiving Sites

Introduction

A key section in the *Environmental Management Act* enables a Director of Waste Management to enter into Contaminated Soil Relocation Agreements.

This technical guidance document provides a process for ministry staff and site owners to characterize a receiving site to ensure that soil relocation does not result in unacceptable impacts. The process relies on the principle that the mass load deposited at a receiving site can be attenuated by near surface soil (depending on the area), soil pH, depth of deposition, and other factors.

Two sampling method approaches

The following procedures are to be used for site identification, location of sampling points, and soil sampling.

- Method 1 is to be used if the total volume of soil being relocated is less than the receiving site area \times 0.1 m.
- Method 2 is to be used if the total volume of soil being relocated is greater than the receiving site area \times 0.1 m.

Method 1

If the total volume (m^3) of soil being relocated is less than the receiving site area \times 0.1 m, then:

- a minimum of one sampling site is required for small sites and two sampling sites for large sites, where a small site has an area

less than or equal to 12,000 m^2 and a large site has an area greater than 12,000 m^2 ;

- one additional sampling site is required per terrain¹ unit present at the site; and
- standard sampling depths should be adopted:
 - 0 m–0.1 m, and
 - 0.9 m–1.0 m.

One duplicate is recommended for each site. This should be created by splitting one of the samples.

As shown in Figure 1, for each sampling site, this procedure will result in:

- 4 surface samples,
- 4 subsurface samples, and
- 1 duplicate sample.

Method 2

If the total volume (m^3) of soil being relocated is greater than the receiving site area \times 0.1 m, then:

- a minimum of one sampling site is required for small sites and two sampling sites for large sites;
- one additional sampling site is required per terrain unit;
- standard sampling depths should be adopted:
 - 0 m–0.1 m
 - 0.5 m–0.6 m

¹ B.C. Ministry of Environment and Ministry of Crown Lands. 1997. *Terrain Classification System for British Columbia* (Version 2). Manual 10, Victoria, B.C.

- 0.9 m–1.0 m
- 1.9 m–2.0 m
- 2.9 m–3.0 m

One duplicate is recommended for each site. This should be created by splitting one of the samples.

As shown in Figure 2, for each sampling site, this procedure will result in:

- 4 surface samples,
- 16 subsurface samples, and
- 1 duplicate sample.

Guidance for characterizing a site

For guidance on classifying, identifying, and sampling sites, see Attachment 1. Guideline A is for small sites and Guideline B is for large sites.

Sample packaging and handling

- Place the sample in new polyethylene bag or other sample container specified by the laboratory.
- Write an identifying number on the bag with a waterproof marker.
- Close the sample bag with a tie and attach a tag that has the site number, sample location, depth, date, and sampler's initials written on it.
- Take or send the bag to a laboratory.
- Have the soil pH determined using the Canadian Society of Soil Science soil:water method².
- Calculate the median pH value from the laboratory results.

For more information, contact the Environmental Management Branch at site@gov.bc.ca

² British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Air Samples, 2005 edition.

ATTACHMENT 1

Guideline A

For small ($\leq 12,000 \text{ m}^2$) sites

Step 1. Site Classification

- Check soil, terrain, or surficial geology maps to determine the type of surficial (genetic) material at the receiving site.
- A site centre will be required for *each* terrain type (i.e., fluvial, lacustrine, moraine, organic, etc.) present at the receiving site.

Step 2. Site Identification

Identify and record:

- the name and address of the property owner;
- the current and surrounding land uses;
- the soil/terrain type(s) present at the site; and
- the latitude and longitude.

Step 3. Locating Sampling Points

As a minimum, one sampling site is required for small-sized sites. Additionally, one sampling site is required for each terrain type to which soil will be relocated. Establish quadrants for each sampling site:

- Divide the site or terrain units into quadrants.
- Select a random sampling point in each quadrant.

Step 4. Soil Sampling

Once sampling points have been located within each quadrant, soil samples may be taken.

- Use a clean trowel or coring tools for collecting samples.
- Take standard depth samples as prescribed in the relevant method used.
- Clean sampling equipment between uses.

Guideline B

For large ($> 12,000 \text{ m}^2$) sites

Step 1. Site Classification

- Check available soil, terrain, or surficial geology maps to determine the type of surficial (genetic) material at the receiving site.
- A site centre will be required for *each* terrain type (i.e., fluvial, lacustrine, moraine, organic, etc.) present at the receiving site.
- If information on soils/terrain type is not available for the site, consider collecting this information by conducting a survey of the site.

Step 2. Site Identification

Identify and record:

- the name and address of the property owner;
- the current and surrounding land uses;
- the soil/terrain type(s) present at the site; and
- the latitude and longitude.

Step 3. Locating Sampling Points

As a minimum, two sampling sites are required for large sites, regardless of terrain type.

Additionally, one sampling site is required for each terrain type to which soil will be relocated.

For each sampling site:

a) Establish Quadrants

- Choose a sampling site of a minimum $80 \text{ m} \times 80 \text{ m}$ and approximate the centre.
- Bisect the site through the centre point into two halves. The orientation of the division line is arbitrary.
- Draw a line perpendicular to the division line through the centre to cut the site into four quadrants.

b) **Select a random sampling point in each of the 40 m x 40 m quadrants.**

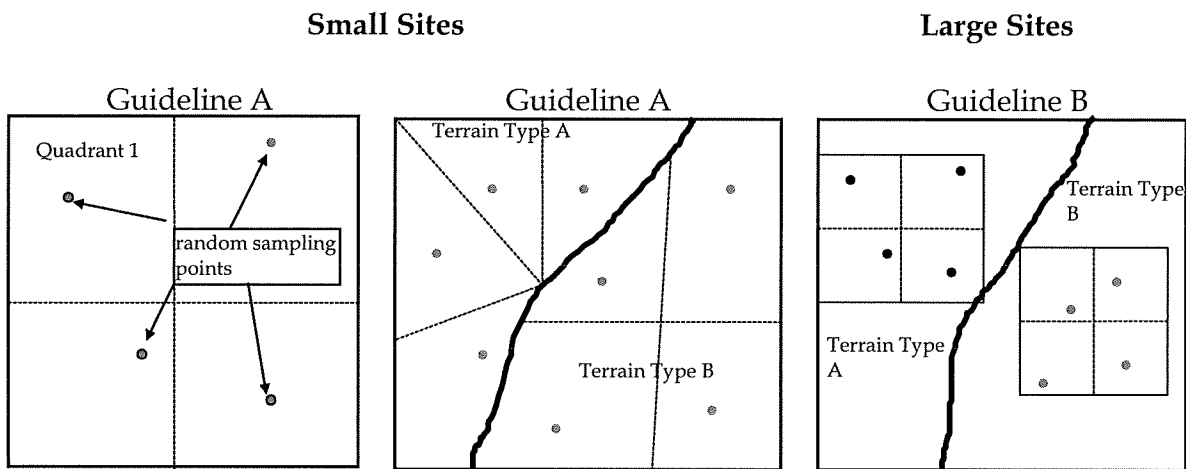
- Using a 1-40 random number table, randomly select the first number. Read the second number off the table in the approximate direction of the second hand on a watch. The first number is the number of metres perpendicular to the division line. The second number is the number of metres the sampling site is located to the right or left of the perpendicular, depending on the quadrant you are working in. In this manner, locate one random sampling location in each of the four 40 m x 40 m quadrants.
- Other randomization methods may also be used.

Step 4. Soil Sampling

Once sampling points have been located within each quadrant, soil samples may be taken.

- Use a clean trowel or coring tools for collecting samples.
- Take standard depth samples as prescribed in the relevant method used.
- Clean sampling equipment between uses.
- If groundwater is encountered before 3 m, sample the nearest depth category above the groundwater table

Figure 1. Method 1 for locating sampling points.



Method 1 sampling depths for Guideline A and B

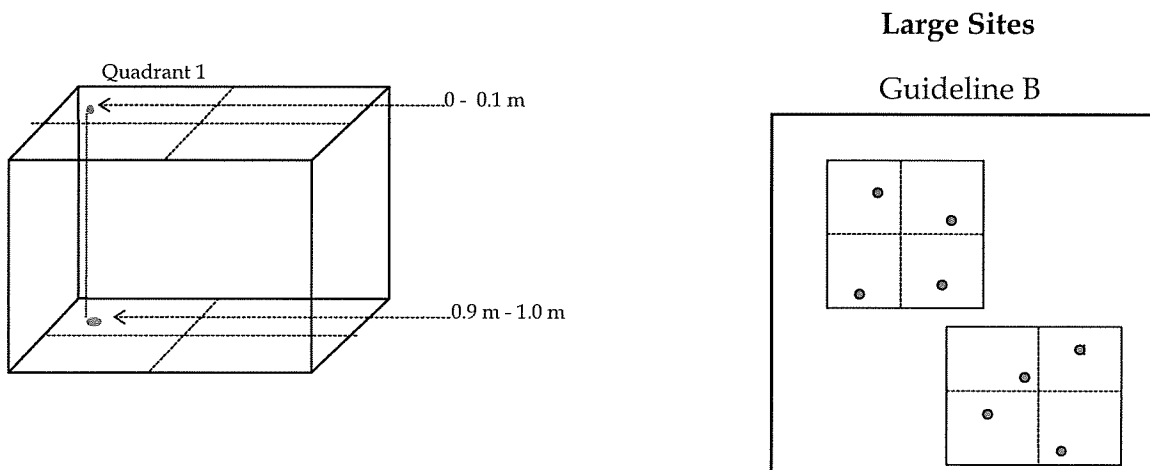
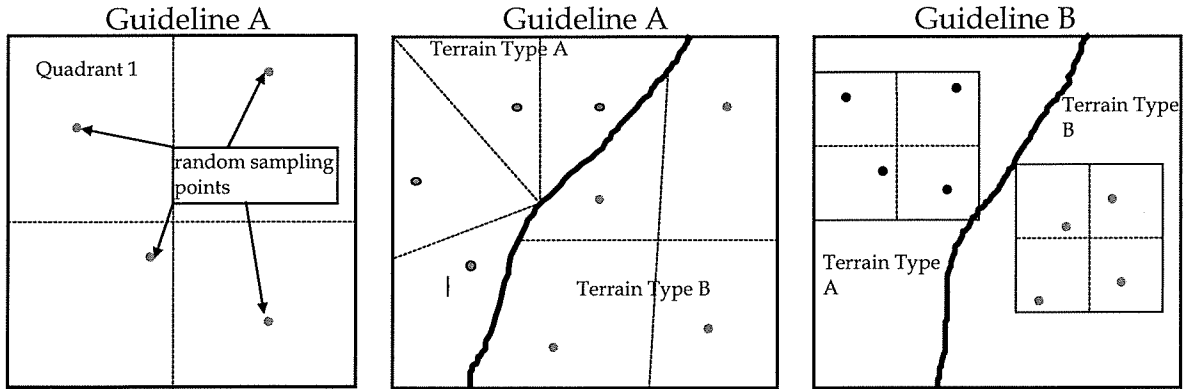


Figure 2. Method 2 for locating sampling points.

Small Sites

Large Sites



Method 2 sampling depths for Guideline A and B

Large Sites

Guideline B

