Sand Treatment Mound Design – Worksheet

Treatment Mound: Area Sizing

This form is to be completed and submitted with the OWMS application to register.

**This worksheet is for use in Manitoba to:** size the sand layer, mound base area, and berm dimensions as required in the construction of a treatment mound. **It can be used for:** design of a treatment mound.

Use only Imperial units of measurement throughout (feet, inches, Imperial gallons, etc.)

Use the following Worksheet to determine the minimum required dimensions for a treatment mound and fill in the blanks on the appropriate diagram below for a level site or a sloping site of over 1%.

### Treatment Mound Dimensions

#### Level Site

- Sand Layer Length (ft.)
- Overall Length of Mound (ft.)

#### Sloping Site

- Slope =
- F

Manitoba Sand Treatment Mound Design Worksheet
January 2009 rev April 2010
# Sand Treatment Mound Design – Worksheet (page 2 of 7)

## Treatment Mound: Area Sizing

The completed installation is to comply with MR 83/2003

### STEP 1: Determine the expected volume of sewage per day:

<table>
<thead>
<tr>
<th>Expected Volume of Sewage per Day</th>
<th>M1</th>
</tr>
</thead>
</table>

Note: Use Manitoba Minimum Expected Volume of Sewage Per Day as a guide to determine expected volume of sewage per day. Provide allowance for additional load factors.

Assure that the sewage strength does not exceed the requirements of Residential Strength Sewage.

### STEP 2: Calculate the treatment area of the sand layer:

<table>
<thead>
<tr>
<th>Expected Volume of Sewage per Day</th>
<th>Sand Layer Effluent Loading Rate</th>
<th>Treatment Area Required for Sand Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>gal/day.</td>
<td>1 gal/sq. ft. per day</td>
<td>sq. ft.</td>
</tr>
</tbody>
</table>

From M1 this worksheet

### STEP 3: Determine the minimum allowable sand layer area:

<table>
<thead>
<tr>
<th>Minimum Sand Layer Area</th>
<th>Area of Sand Layer for Treatment</th>
<th>Area of Sand Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 sq. ft.</td>
<td>sq. ft.</td>
<td>sq. ft.</td>
</tr>
</tbody>
</table>

The minimum area of the sand layer is 400 sq. ft.

From M1 this worksheet

The greater of 400 or M2

### STEP 4: Calculate the length of the sand layer:

<table>
<thead>
<tr>
<th>Area of Sand Layer</th>
<th>Width of Sand Layer</th>
<th>Length of Sand Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>sq. ft.</td>
<td>ft.</td>
<td>ft.</td>
</tr>
</tbody>
</table>

M4a From M3 this worksheet

M4b Select a width to a maximum of 10 ft.

Note: The width of the sand layer will influence the total width of the treatment mound and the amount of fill material required. The lowest cost configuration is often to make the sand layer as wide as allowed, however, on sloping sites, a narrower and longer sand layer design can reduce the amount of fill required.
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**STEP 5: Determine the (design) soil effluent loading rate:**
Note: Effluent loading rate can be determined from soil texture classification or from percolation test results.
Attachment 1 provides the effluent loading rates for various soil classifications between 5 and 120 minute per inch perc rates.

Soil Effluent Loading Rate

\[
\text{gal/sq. ft. per day.}
\]

**STEP 6: Calculate the preliminary infiltration area of the soil BEFORE area reduction factors:**

Expected Volume of Sewage per Day \( \div \) Soil Effluent Loading Rate = Primary Infiltration Area

From M1 this worksheet \( \div \) From M5 this worksheet (Required for Soil. Before Reduction Factors.)

**STEP 7: Calculate the required infiltration area INCLUDING allowed area reduction factors:**

Infiltration Area Required for Soil \( \times \) Reduced Area Factor = Required Infiltration Area

\( \times 0.75 \) (Before Reduction Factors.) \( \times 0.75 \) (Including Reduction Factors.)

A reduction of up to 25% (1-0.75) can be applied to treatment Mounds.
**SDS Design – Worksheet “M” v1.3**

**Treatment Mound: Area Sizing**

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**STEP 8: Calculate the required width of the infiltration area:**

<table>
<thead>
<tr>
<th>Required Infiltration Area</th>
<th>Length of Sand Layer</th>
<th>Width of Required Infiltration Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>sq. ft.</td>
<td>ft.</td>
<td>ft.</td>
</tr>
</tbody>
</table>

(INCLUDING Reduction Factors.)

From **M7** this worksheet

From **M4** this worksheet

**STEP 9: Determine the slope criteria of the installation:**

If the slope of the installation site exceeds 1%, proceed to Step 12.
If the slope is 1% or less, proceed to Step 10.

**Slope of Installation Site**

% **M9**

Note: The following calculations apply ONLY to the minimum height configuration of a mound unless a value is entered above. If it is necessary to raise the sand layer, (for example to provide clearance to the water table) the following calculations are NOT adequate for the design.

For slopes of 1% or less, use **STEPS 10 - 11**

**STEP 10: Calculate the required infiltration area INCLUDING allowed area reduction factors:**

<table>
<thead>
<tr>
<th>Toe to Toe Width Based on 4:1 Slope Requirement</th>
<th>Width of Required Infiltration Area within Berms</th>
<th>Required Infiltration Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>ft.</td>
<td>ft.</td>
<td>ft.</td>
</tr>
</tbody>
</table>

4:1 Slope Requirement Refer to Berm Dimensions
Diagram this worksheet, or determine by calculation

**STEP 11: Proceed to STEP 16:**

**STEPS 12-15** are used only for installations where the slope exceeds 1%
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For slopes exceeding 1%, use STEPS 12 - 15

**STEP 12:** Calculate the required width of the infiltration area:

The width of the mound is based on the greater of:
- the width as determined by the 4:1 slope requirement, or
- the width required to provide adequate infiltration area.

<table>
<thead>
<tr>
<th>Downslope Berm Width Based On 4:1 Slope Requirement</th>
<th>Width of Required Infiltration Area Under Sand Layer and Downslope Berm</th>
<th>Width of Sand Layer and Downslope Berm</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12a Refer to Berm Dimensions Diagram this worksheet</td>
<td>+ Sand Width Layer ft.</td>
<td>M12c 4:1 Slope Requirement from M8 this worksheet</td>
</tr>
<tr>
<td>M12b From M4b this worksheet</td>
<td>M12d The greater of M12c or M12d From M8 this worksheet</td>
<td></td>
</tr>
</tbody>
</table>

**STEP 13:** Determine the width of the upslope berm:

Width based on 4:1 Slope Requirement

Refer to Berm Dimensions Diagram this worksheet, or determine by calculation.

**STEP 14:** Calculate the required infiltration area INCLUDING allowed area reduction factors:

Width of Sand Layer and Downslope Berm

Width of Upslope Berm

Toe to Toe Width of Mound

From M12 this worksheet

From M13 this worksheet

From M14 this worksheet
**STEP 15:** Proceed to STEP 16:

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<table>
<thead>
<tr>
<th><strong>STEP 16:</strong> Summarize the information:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Width of Sand Layer</strong> (from M4b this worksheet)</td>
</tr>
<tr>
<td><strong>Length of Sand Layer</strong> (from M4 this worksheet)</td>
</tr>
<tr>
<td><strong>Slope of Installation Site</strong> (from M9 this worksheet)</td>
</tr>
<tr>
<td><strong>Toe to Toe Width of Mound</strong> (from M10 or M14 this worksheet)</td>
</tr>
</tbody>
</table>

**STEP 17:** Proceed to STEP 16:

Fill in the appropriate diagram on the first page with the numbers calculated in this worksheet.

**STEP 18:** Proceed to STEP 16:

This worksheet does NOT consider all the requirements of the Mandatory Standard. Please work safely and follow safe practices near trenches and open excavations.
The completed installation is to comply with MR 83/2003.