



Minnesota  
Pollution  
Control  
Agency

Water Quality

Wastewater  
Technical  
Review and  
Guidance

# RAPID INFILTRATION BASINS – REVIEW CHECKLIST

Water/Wastewater/#5.65, May 2001

FACILITY NAME

DATE

CONSULTING ENGINEER

SITE INSPECTION (DATE & INSPECTOR)

PLANNING OR DESIGN PHASE

Primary or secondary treatment before  
discharge?

Number of days of storage

Will the effluent be chlorinated (if so,  
possible chlorinated organics developing)

Effluent standards before discharge to RI's

Reason for RI discharge (ammonia,  
phosphorus)

Effluent chemical characteristics:

CBOD<sub>5</sub>

Phos

TOC

Kj-N

NH<sub>4</sub>

NO<sub>3</sub>

Fecals

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Is the BOD influent loading less than 115  
lbs/acre/day

wq-wwtp5-65

Minnesota Pollution Control Agency, 520 Lafayette Road North, St. Paul, Minnesota 55155-4194

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## **SITE CHARACTERISTICS**

### **SURFACE**

Does the site show signs of disturbance compaction?

\_\_\_\_\_

Are there any pipelines, cables, tile, etc. going through the site?

\_\_\_\_\_

Location and direction of any residences

\_\_\_\_\_

Is a statement made that it is the contractor's responsibility to determine to his/her satisfaction to the location and nature of all surface and subsurface soil and water conditions which will be encountered during construction?

\_\_\_\_\_

Landscape position

\_\_\_\_\_

General description of elevations and contours of the sites and adjacent area.

\_\_\_\_\_

Average Slope

\_\_\_\_\_

Is the pond located in a drainageway that will receive significant amounts of runoff?

\_\_\_\_\_

Are there adequate provisions to divert storm water around the ponds?

\_\_\_\_\_

### **Karstification**

Is the pond site located over Karst areas?

\_\_\_\_\_

REMARKS Ponds shall not be located on sites which show evidence of karstification (ie sinkholes). If site is located in SE MN it shall be subject to seismic and resistivity studies. The MPCA must be included in the scope of this study prior to commencement. If ponds are approved in SE MN they may be required to use additional lining materials.

### **Bedrock**

Is there a separation distance of 10 feet between the top of seal and bedrock?

\_\_\_\_\_

### **WATER TABLE DETERMINATION**

Has a hydrogeologist either from the agency or consultant assessed the site from a groundwater perspective?

\_\_\_\_\_



Depth to water table from natural soil surface:

Soil survey:

soil series	W.T. depth	W.T. kind	extent %

Soil borings:

# of acres of site \_\_\_\_\_ # of borings \_\_\_\_\_

bor #	locat	obser elev/surf	mott elev/GW	elev/GW	Elev/pond	bott	net

Is the field tile drained? \_\_\_\_\_

Are there at least 3 piezometers installed in bore holes to collect data over an extended period of time, particularly in the spring? \_\_\_\_\_

# Installed \_\_\_\_\_

Readings:

Date	Site	Site	Site	Site

REMARKS Data may be collected by the owner.

Are the piezometer readings identified in the P&S \_\_\_\_\_

Is it specified that the piezometers be backfilled according to code? \_\_\_\_\_

Is there a minimum separation of 4 feet between the top of the pond seal and the maximum high water table? \_\_\_\_\_

Is tile drain proposed under the pond to permanently lower the groundwater table? \_\_\_\_\_

If tiled, is the tile lowering the readings in the piezometers? \_\_\_\_\_



Groundwater depth? (10 feet from bottom of system)

\_\_\_\_\_

**GROUNDWATER IMPACTS:**

Are there any regional long term groundwater fluctuations that may affect the system over the 20 year life?

\_\_\_\_\_

Has the hydraulic conductivity of the aquifer been determined?

\_\_\_\_\_

Are there any compacted or differing soil conditions downgradient which could change G.W. flow direction or impede flow?

\_\_\_\_\_

Has the groundwater flow direction been determined?

\_\_\_\_\_

Are there any drawdown or artificial recharge (other onsite) that could be affecting GW flow direction?

\_\_\_\_\_

Has the GW discharge area been identified?

\_\_\_\_\_

By what method?

\_\_\_\_\_

If in inland area, a GW study must be conducted to determine deleterious effects

\_\_\_\_\_

Any wells between the RI's and the discharge point?

\_\_\_\_\_

What is the expected GW mound height?

\_\_\_\_\_

How determined?

\_\_\_\_\_

Basins constructed long and narrow to minimize mounding?

\_\_\_\_\_

Can the system be managed to minimize mounding if necessary?

\_\_\_\_\_

Will mounding of one basin cause hydraulic problems in adjacent basins?

\_\_\_\_\_

What is the travel time of the pollutants?

\_\_\_\_\_

What is the configuration of contaminant plume?

\_\_\_\_\_

Has a survey been done to determine the characteristics of the nearby drinking water wells?

\_\_\_\_\_



What is the capacity of the aquifer to dilute the effluent?

\_\_\_\_\_

Have nearby wells been tested to determine if GW drinking standards have already been exceeded?

\_\_\_\_\_

Can GW drinking standards be met at the property boundary?

\_\_\_\_\_

What affects will there be on receiving surface waters (NH<sub>4</sub> and P)?

\_\_\_\_\_

Has a monitoring scheme been developed to determine GW flow direction and its fluctuations throughout the seasons?

\_\_\_\_\_

Is this determination influenced by the GW mound?

\_\_\_\_\_

Location, proximity and direction of water supplies

\_\_\_\_\_

Are any wells within ¼ mile of the proposed site?

\_\_\_\_\_

Ground water flow/relation to possible contamination

\_\_\_\_\_

Soils –

Soil series at site

\_\_\_\_\_

Landscape position

\_\_\_\_\_

Number of borings

\_\_\_\_\_

Type of borings

\_\_\_\_\_

Number of pits

\_\_\_\_\_

Quality of descriptions

\_\_\_\_\_

Estimated seasonal watertable height

\_\_\_\_\_

Any observed standing water in hole

\_\_\_\_\_

Bedrock:

Depth:

\_\_\_\_\_

Type:

Geophysical data needed?

\_\_\_\_\_

Flooding Potential

\_\_\_\_\_



Estimated hydraulic conductivity

\_\_\_\_\_

Conducted on the most limiting soil layer above the limiting layer  
(WT/BR)

\_\_\_\_\_

Test used

\_\_\_\_\_

In site

\_\_\_\_\_

Correct Procedure

\_\_\_\_\_

Do the test results compare well to the soil texture estimation of

\_\_\_\_\_

Water movement?

\_\_\_\_\_

Depth to restricting layers

\_\_\_\_\_

Any lithological discontinuities/abrupt textural changes?

\_\_\_\_\_

Suitable soil textures?

\_\_\_\_\_

Chemical analysis conducted on the soils for effectiveness of  
treatment? (ie phosphorus removal)

\_\_\_\_\_

Loading rate calculated taking into account the test method?  
(EPA Design Manual)

\_\_\_\_\_

Are soil borings located in relation to the pond location on the plan  
sheet?

\_\_\_\_\_

Are soil borings located in the Plans & Specs?

\_\_\_\_\_

Are the cross sections shown on the plans sheet?

\_\_\_\_\_

## **BASIN DESIGN**

Is the total square feet of basin bottom adequate?

\_\_\_\_\_

Is the number of basins adequate for dosing and resting?  
(2"/day, load 1 to 2 days, rest 5 to 7 days) (minimum of three  
ponds)

\_\_\_\_\_

Are there enough basins so one is always available for loading?

\_\_\_\_\_



Is the height of the basins such that there will be 1 foot of freeboard?

\_\_\_\_\_

Is the size of the basins such that the basins will completely fill?  
(typical size ½ to 5 acres)

\_\_\_\_\_

Are spillways designed in the dikes to allow for emergencies?

\_\_\_\_\_

Will the dikes be rip rapped?

\_\_\_\_\_

Can the basins be accessed for maintenance?

\_\_\_\_\_

Is the configuration such to allow for easy maintenance with equipment? (ie corners)

\_\_\_\_\_

Are the dike slopes 1:1 or 2:1?

\_\_\_\_\_

Are the bottoms of the basins to be covered with gravel?  
(not acceptable)

\_\_\_\_\_

Is loading less than 400 gallons/acre/year

\_\_\_\_\_

Is loading less than 2.5 to 3 inches per day?

\_\_\_\_\_

If flooding around the basins is expected, is the outside of the dike going to be rip rapped?

\_\_\_\_\_

## CONSTRUCTION

General description of work?

\_\_\_\_\_

Is it specified that erosion control be practiced so that no fines enter the basins during construction?

\_\_\_\_\_

Is it specified that topsoil will be removed from the entire pond site?

\_\_\_\_\_

Is it specified where the topsoil will be disposed of?

\_\_\_\_\_

Has an earthwork balance been done?

\_\_\_\_\_

borrow needed?

\_\_\_\_\_

Has a borrow/disposal area been identified on the plan sheet?

\_\_\_\_\_



**BASIN BOTTOM:**

Do the plans and specifications indicate that the basin bottom not be compacted during construction?

\_\_\_\_\_

If filling is needed to reach subgrade elevation how will the fill material be placed/compacted to provide stability but not lower the permeability?

Is it specified that any proposed borrow material areas have been identified on the plan sheet?

\_\_\_\_\_

**UNIFORMITY OF COMPLETED POND BOTTOM**

Is it specified that finished elevations of the pond bottom and 6 inch seal lifts shall not be more than 0.2 foot from the average elevation of the bottom?

\_\_\_\_\_

Is it specified that pond bottom uniformity will be verified by a minimum of one spot elevation per 5,000 square feet?

\_\_\_\_\_

Is it specified that deviation from stated tolerance shall be corrected prior to prefilling?

\_\_\_\_\_

**EMBANKMENTS**

**SUBGRADE**

Will vegetation, topsoil and other unsuitable materials be removed from the area upon which the embankment is to be placed?

\_\_\_\_\_

Is it specified that the subgrade will be scarified and compacted to a depth of 6 inches?

\_\_\_\_\_

compacted by what method?

\_\_\_\_\_

If dikes will be built into natural slopes, is it specified that the slope be benched or flattened to less than 4:1?

\_\_\_\_\_





DIKE CORE MATERIALS:

PLANNING:

Has relatively incompressible material free of organic matter, debris, and rocks been located?

\_\_\_\_\_

Is excessive volume shrinkage anticipated due to a high percentage of rocks which will diminish the usable material for construction?

\_\_\_\_\_

Is adequate material available on site or is borrow needed?

\_\_\_\_\_

Has it been tested for opt. moisture and density?

\_\_\_\_\_

Contractor responsible for tests?

\_\_\_\_\_

SPECIFICATIONS:

Is it specified that the soil to be used be relatively incompressible and tight?

\_\_\_\_\_

Is it specified that the material be free of organic matter, vegetation debris, and rocks?

\_\_\_\_\_

Is it specified that topsoil will not be used for more than the outside of the 1:1 slope down and outward from the shoulder lines?

\_\_\_\_\_

Has a maximum rock size been specified?

\_\_\_\_\_

Is a cross section drawn on the plans, showing what materials will be placed in what parts of the dike?

\_\_\_\_\_

CONSTRUCTION SPECIFICATIONS:

Is a density specified?

\_\_\_\_\_

Is a moisture specified?

\_\_\_\_\_

Do the specifications generally agree with MN DOT 2105.3?

\_\_\_\_\_

Is a maximum lift thickness specified?

\_\_\_\_\_

Is there any settlement time specified before structure placement?

\_\_\_\_\_



Is it specified that the outside of the dike will be covered by topsoil for seeding purposes?

\_\_\_\_\_

INSPECTION/TESTING:

What is the required testing while the material is being placed?

\_\_\_\_\_

What is specified for inspection while the material is being placed?

\_\_\_\_\_

SEEDING:

Is it specified that 4 inches of fertile topsoil will cover all disturbed areas?

\_\_\_\_\_

Is topsoil defined?

\_\_\_\_\_

Specs included for: Vegetative type?

\_\_\_\_\_

Seeding rate

\_\_\_\_\_

Seeding date

\_\_\_\_\_

Fertilization

N

\_\_\_\_\_

P

\_\_\_\_\_

K

\_\_\_\_\_

Mulch?

\_\_\_\_\_

Weed control?

\_\_\_\_\_

Is the watering schedule specified?

\_\_\_\_\_ by whom?

with what water?

\_\_\_\_\_

Is it specified that vegetation will be established from the outside toe to the minimum pond operating depth?

\_\_\_\_\_

Is the area to be reseeded shown on the plans?

\_\_\_\_\_

Explained in the specifications?

\_\_\_\_\_

Is erosion control specified during construction?

\_\_\_\_\_

Will additional erosion control be necessary on the exterior dike slopes to protect from sever flooding?

\_\_\_\_\_

Is it planned for?

\_\_\_\_\_



## TESTING REQUIREMENTS

Is it specified that all soil test results: density, permeability, moisture on all the dikes be submitted for approval?

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Is it specified that the results of a survey of the pond bottom indicating that the level is within the proper tolerances be submitted for approval?

---

Is a seepage test specified to determine seepage performance?

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Is an acceptable seepage rate given?

---

Does the plan sheet agree with the specifications?

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Facility Plan?

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Soil Firm Recommendations?

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## OPERATION & MAINTENANCE, MONITORING, AND PERMIT REQUIREMENTS

Is the GW monitoring adequate?

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Are piezometers located in the basins to check for GW mounding?

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Does the permit indicate monitoring frequency for wells and piezometers?

---

Does the permit indicate maximum GW mounding and max. contaminant concentrations at the property boundary?

---

Does the permit specify effluent quality into the ponds?

---

Is equipment available to maintain the basin bottom?

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Does the O & M Manual state that the basin bottom be scarified every 6 months to a year?

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