



PHASE II STORMWATER
MANAGEMENT PERMIT APPLICATION FORM

Permit Number _____

Project Number _____

(No.'s to be provided by C.O.K.)

WET DETENTION BASIN SUPPLEMENT

This form must be filled out, printed and submitted.

Do not use this form for Low Impact Development projects with Wet Ponds designed using Discrete SCS Method for volume calculations. The Required Items Checklist (Part III) must be printed, filled out and submitted along with all of the required information.

I. PROJECT INFORMATION

Project name	
Drainage structure ID	
Design Engineer	
Date	

II. DESIGN INFORMATION

Site Characteristics

Receiving stream / tributary name			
Is structure located in watershed overlay district?		Name:	
Drainage area		acre	
Impervious area		acre	
% impervious		%	
Design rainfall depth		in	

Storage Volume: Non-SR Waters

Runoff coefficient, R_v		(unitless)
Minimum volume required		ft ³
Temporary Volume provided		ft ³

Peak Flow Calculations

If this BMP is used for stormwater detention, complete table below

	1-yr, 24-hr storm	10-yr, 24-hr storm	50-yr, 24-hr storm	100-yr, 24-hr storm
Rainfall depth (in)				
Runoff coefficient, pre-development (unitless)				
Runoff coefficient, post-development (unitless)				
Rainfall intensity (in/hr)				
Pre-development peak flow (ft ³ /sec)				
Post-development peak flow (ft ³ /sec)				
Routed post-development peak flow (ft ³ /sec)				
Maximum pool elevation (ft)				

II. DESIGN INFORMATION

Basin Elevations and Data

Sediment clean-out bottom elevation		ft		
Bottom of pond elevation (sediment cleanout top elev)		ft		
Sediment storage depth	0.00	ft	Increase depth to provide at least	
Bottom of shelf elevation		ft		
Seasonable High Water Table (SHWT) elevation		ft	Source:	
Permanent pool elevation (PPE)		ft		
Water quality orifice / weir size				
Top of shelf elevation		ft		
Temporary water quality storage elevation		ft		
Stormwater detention outlet size				
Stormwater detention outlet elevation (ft)				
Stormwater detention outlet size				
Stormwater detention outlet elevation (ft)				
Emergency spillway elevation (if provided)				
Freeboard provided		ft		
Top of embankment elevation		ft		
Height of embankment		ft		
Top width of embankment		ft		

Volume and Surface Area Calculations

Permanent pool design depth (design tables)		ft
SA/DA ratio (design tables)		
Permanent pool, surface area required	0.00	ft ²
Permanent pool, surface area provided		ft ²
Permanent pool volume		ft ³
Surface area at the bottom of pond		ft ²
Surface area at the bottom of shelf		ft ²
Volume at the bottom of shelf		ft ³
Distance between bottom of shelf to bottom of pond	0.00	ft
Surface area at the top of shelf		ft ²
Volume at the top of shelf		ft ³
Average depth provided (Option 1 calculation)		ft
Average depth provided (Option 2 calculation)		ft
SA/DA ratio (provided)		
Forebay volume		ft ³
Forebay % of permanent pool volume		%
Temporary pool, surface area provided		ft ²

Drawdown Calculations

Treatment volume drawdown time		days
Treatment volume average discharge rate		ft ³ /s

II. DESIGN INFORMATION

Additional Information

Design TSS removal		%
Vegetated basin side slopes		:1
Vegetated shelf slope		:1
Vegetated shelf width		ft
Storage basin side slope		:1
Length of flowpath to width ratio		:1
Length to width ratio		:1
Trash rack for overflow & orifice?		(Y or N)
Vegetated filter provided?		(Y or N)
If "Y", is 10-year storm flow non-erosive?		(Y or N)
Recorded drainage easement provided?		(Y or N)
Captures all runoff at ultimate build-out?		(Y or N)
Drain mechanism for maintenance or emergencies		
Is the Permanent Pool Elevation within 6" of the SHWT?		(Y or N)
If no and PPE > (SHWT + 6"), is a basin liner used?		(Y or N)
If no and PPE < (SHWT - 6"), are wetlands impacted?		(Y or N)

III. REQUIRED ITEMS CHECKLIST

Please indicate the page or plan sheet numbers where the supporting documentation can be found. **An incomplete submittal package will result in a request for additional information. This will delay final review and approval of the project.** The Engineer shall initial in the space provided to indicate the following design requirements have been met. **If a requirement has not been met, attach justification.**

Initials	Page/ Plan Sheet No.	
_____	_____	1. Plans of the entire site showing: - Design at ultimate build-out, - Off-site drainage (if applicable), - Delineated drainage basins (include runoff coefficient per basin), - Basin dimensions, - Pretreatment system, - Maintenance access, - Proposed drainage easement and public right of way (ROW), - Overflow device, and - Boundaries of drainage easement.
_____	_____	2. Partial plan and details for the wet detention basin and forebay(s) showing: - Outlet structure with trash rack or similar, - Maintenance access, - Permanent pool dimensions, including top of embankment width, - Forebay(s) dimensions, including top of berm width and spillway length & material, - Forebay and main pond with hardened emergency spillway, - Basin cross-section, - Vegetation specification for planting shelf, and - Filter strip.
_____	_____	3. Section view of the wet detention basin and forebay(s) showing: - Side slopes, 3:1 or lower, - Pretreatment and treatment areas, - 10-foot vegetated shelf, - elevations for the SHWT, basin bottom, permanent pool, temporary pool, & weir between the main pond and forebay(s), and - Inlet and outlet structures.
_____	_____	4. Details and specifications of the outlet structure showing: - Type of riser and construction material, - Interior & exterior dimensions of riser diameter, widths & height; wall thickness, bottom slab thickness and top slab thickness, - Elevations of riser invert, top of riser, & temporary pool, - Sizes and invert elevations of all orifices and weirs, - Type of riser outlet barrel and construction material, - Length, diameter, invert in & out elevations and slope of riser outlet barrel, - Dimensions for widths and depth of antil flotation block (if applicable), - Method of providing watertight joints and connections of riser and outlet barrel, and - Type of trash rack and other debris-control structures
_____	_____	5. If the basin is used for sediment and erosion control during construction, clean out of the basin is specified on the plans prior to use as a wet detention basin.
_____	_____	6. A stage-storage table of elevations, areas, incremental volumes & accumulated volumes for overall pond and for forebay, to verify volume provided. Maximum elevation increment to be 1 foot.
_____	_____	7. A stage-discharge table of elevations and flow rates for the pond outlet structure(s). Maximum elevation increment to be 0.1 foot.
_____	_____	8. A construction sequence that shows how the wet detention basin will be protected from sediment until the entire drainage area is stabilized.
_____	_____	9. The supporting calculations, including drainage area, runoff coefficients, time of concentration, peak flows, storage volumes, drawdown, bypass flows, stormwater routing, structure uplift, and antil flotation (if applicable).
_____	_____	10. A copy of the operation and maintenance (O&M) agreement.
_____	_____	11. A copy of the deed restrictions (if required).
_____	_____	12. A soils report that is based upon an actual field investigation, soil borings, and infiltration tests. County soil maps are not an acceptable source of soils information.

IV. DESIGN GUIDELINES

- _____ 13. The permanent pool elevation should be above the SHWT and above the lowest elevation of adjacent wetlands. If not, evaluate the need for a liner and/or berm/slurry wall to prevent dewatering the wetland.
- _____ 14. If the permanent pool elevation is more than 6" above SHWT, evaluate the need for a liner to ensure that the pond will maintain the proposed permanent pool elevation
- _____ 15. Wetlands delineated, or a note on the plans that none exist. Get a copy of the wetlands delineation map signed by the Corps of Engineers, or have the applicant include a copy of the unsigned delineation map submitted to the Corps. Wet ponds may not be located in wetlands unless a permit to fill those wetlands has been obtained.
- _____ 16. The drainage area for each wet pond is clearly delineated and numbered to match up to the calculations and supplement. Drainage area delineation is best done as a separate plan sheet.
- _____ 17. Where the 85% TSS chart was used, a 30 ft. vegetated filter strip is required to be shown on the plans & detailed (elevations, inverts, slopes, and flow spreader mechanism). Please note that the filter strip is not a ditch.
- _____ 18. The pond must have a minimum 1.5:1 length to width ratio and a minimum 3:1 flow path length. Artificial "baffles" of timber, vinyl, or earth can be used to create a longer flow path. The top elevation of the baffle should be set at the temporary pool elevation or higher.

V. ADDITIONAL DESIGN REQUIREMENTS

- _____ 19. If the permanent pool elevation is more than 6" above the SHWT. Provide the following documentation to ensure that the permanent pool will be maintained:
 - a. A soils report documenting that the maximum infiltration rate is no more than 0.01 in/hr for the existing soils and the soils to be used to construct the embankment, or
 - b. Design specifications and a construction detail for a clay liner with a the maximum infiltration rate is no more than 0.01 (include provisions for topsoil placement in areas that require a plant growth), or
 - c. Design specifications and a construction detail for an alternate liner system.
- _____ 20. If the permanent pool elevation is more than 6" below the SHWT. Provide the following documentation to ensure that the permanent pool will be maintained:
 - a. A calculation based hydrogeological analysis of the proposed wet pond and surrounding subsurface conditions must demonstrate the BMP will not adversely affect wetlands, surface waters, and buffers.
 - b. The analysis must demonstrate that the permanent pool will remain at the proposed permanent pool elevation to insure the survival of the plants on the vegetated shelf.
 - c. Demonstrate that the downstream conveyances, including ditches and pipes for the pond to the receiving waters, will be able to function adequately and maintain a free flow conditions such that the treatment volume is released in 2-5 days under
 - d. Evaluate the orifice size to effectively deal with the incoming groundwater such that the water level is maintained at the design permanent pool elevation and such that the design storm volume is allowed to exit the pond in 2-5 days.
 - e. A soils report with multiple samples identifying the soil types, field K value results, and the SHWT at the proposed pond location.
 - f. A clear statement of the conservative aspects of the design case subjected to the hydrogeological analysis and design equations or analytical method applied.
 - g. A listing of the limiting assumptions and a citation from the literature attesting the applicability of the design equations or analytical method applied in the analysis of the groundwater flow.

Revision History:

R1	07/29/2008	Average pond depth revisions per BMP Manual Errata, updated July 24, 2008
R2	11/07/2008	Added non-erosive 10-year flow requirement if a vegetated filter is used, and Design Guidelines
R3	04/17/2009	Added items and notes to confirm compliance with new SHWT and pond side slopes Design Guidelines; adjusted O&E text