Calvert Soil Conservation District Small Pond Approval Guidelines

Guidelines & Checklist

(This document can be downloaded in pdf format from our web site.)
www.CalvertSoil.org

SMALL POND APPROVAL GUIDELINES

The following items must be addressed when preparing the pond design and must be clearly shown in the plans and/or computations. **Include a copy of this checklist with the plan sheet and/or computation booklet page to indicate compliance by referencing the location of the information by number noted beside each checklist item.**

_____ 1. The pond plans and computations submitted for review and approval by the Calvert Soil Conservation District (District) must adhere to the current USDA, Natural Resources Conservation Service, Maryland Conservation Practice Standard Pond, Code 378 (MD-378). District approval will be required for all hazard class "A" ponds unless otherwise excluded in MD-378, Section entitled "Conditions Where Practice Applies". Some class "A" ponds may need permits from the Maryland Department of the Environment, Dam Safety Division instead of District Small Pond Approval.

_____ 2. For District review, the dam must be a class "A" structure and not be greater than 20 feet in height measured from the top of the dam to the lowest point on the upstream toe of the dam. Justification for an exemption from the small pond permit requirement must be included as applicable. Please reference the basis for exemption and show supporting data.

_____ 3. Provide a dam breach analysis for District review, the pond must be a class "A" as determined by potential hazard from failure. This determination must be made using the existing and ultimate development of the downstream area from the pond that will be affected by a possible dam breach. The pond classification must be stated on the plans and must be clearly documented and justified in the report. A reiteration of the Class "A" is not acceptable. Prepare a Danger Reach Study (dam breach study) as per USDA, NRCS TR-66.

_____ 4. Complete and submit Pond Summary Sheet (MD-ENG-14), Small Pond Permit Application, and Operation and Maintenance Plan for each pond. (See Appendix)

_____ 5. Place a copy of the completed Pond Summary Sheet, the Design Certification, and the As-Built Certification directly on the plans. All of these items must be completed prior to District approval with the exception of the As-Built Certification which is to be completed after the as-built plans have been developed. The minimum requirements of an acceptable as-built are outlined in APPENDIX # 1 and should be followed by the engineer responsible for preparing the as-builts as required by the Small Pond Approval Letter.

_____ 6. A soils report is required. The information in the report shall address MD-378, "Soil Investigations". The soils shall be identified according to the Unified Soil Classification System. At a minimum, the soils report must include information along the centerline of the proposed embankment (especially at the lowest point), in the emergency spillway location and on-site borrow areas. The soil boring locations and the on-site borrow areas should be clearly designated. Earth fill shall be free of roots, stumps, wood, rubbish, stones greater than 6 inches, and frozen or other objectionable materials. Fill material for the center of the embankment (embankments impervious core) and cut-off trench shall conform to the Unified Soil Classification System CH or CL. GC and SC materials may be used provided that at least 30 percent of the material passes the #200 sieve. Other materials will only be considered with the specific recommendation of a registered GeoTech Engineer. The center of the embankment (embankment impervious core) must extend up to the 10 year design storm elevation. If borrow material is from off-site, place the following note on the plans: **"Fill material for the core trench and the embankment will be taken from an off site borrow area. The fill material must be certified as meeting NRCS, MD-378 Pond Specifications for Fill Material by a professional engineer prior to placement."** Acid sulfate soils can be very detrimental to riser and pipe materials. The Appendix (7) contains information on identifying sulfide materials and acid sulfate soils. They cannot be used in the embankment.

_____ 7. Any pond embankment, which is existing or created by excavation into an existing slope, must be totally reconstructed unless the engineer proves that all existing pond structure components (embankment, cut-off trench, spillway, anti-seep collars, etc.) meet the current MD-378 criteria, and designates specific recommendations for construction and sequencing.

_____ 8. Excavated ponds which include a pipe or weir outlet control system shall be designed using the MD-378 Hydrologic Criteria for Ponds, (Table 1). Refer to principal and emergency spillway columns. Compliance shall be noted either on the plan or in the design report.

_____ 9. All computations must adhere to the following: (Use of any other programs must have prior approval.)

_____ a. Use current version of USDA, Natural Resources Conservation Service (NRCS) TR-55 and the current version of USDA, NRCS TR-20, Formulation Hydrology Computer Program. Provide a Schematic and label all input and output values. Number all sheets.

_____ b. Provide a drainage area map at appropriate scale, with contours, delineating the overall pre-development and ultimate development drainage areas to the pond. The contours must justify the drainage divides shown. Spot elevations may be required on relatively flat drainage areas. Note the acreage of each drainage area.

_____ c. Delineate the ultimate development drainage area on a copy of the soil survey sheet. Identify the Hydrologic Soil Groups of each soil type by clearly coloring each group (differentiating each group by color) on a separate copy of the soil survey sheet.

_____ d. The runoff curve number (RCN) must be justified. Submit a copy of an appropriately scaled drainage area map delineating the Hydrologic Soil Groups, clearly identifying the land uses in each Hydrologic Soil Group. Note the acreage in each drainage area for each Hydrologic Soil Group. The consultant should prove that the cut and fill for the proposed development will not alter any Hydrologic Soil Group. Downgrade the Hydrologic Soil Groups A and B to B and C, respectively, for the 100 year storm routings.

_____ e. When time of concentration is computed, clearly show the travel time reaches on the scaled drainage area map. Provide computations to justify the velocities used for channel and pipe flow reaches.

_____ f. An adequate state discharge table must be provided which takes into account all flow conditions. An example format is provided. Provide equations with references, and show all variables.

- _____ Flow capacities must be computed at a minimum of 0.2 foot increments.
- _____ The table must be legible.
- _____ Each riser discharge component (i.e., low flow openings, low flow orifices, openings on top of riser, etc.) must have two columns. One column must show the discharge value and the other must show the hydraulic head (H) which was used to compute it.
- _____ Each riser component must be analyzed for weir and orifice flow to prove which flow condition governs.
- _____ Inlet control and outlet control columns must be provided for the spillway barrel.
- _____ The barrel discharge must be analyzed by using the total discharge from the riser components and computing the controlling head.
- _____ The controlling head (inlet or outlet) for the barrel will correspond to an elevation inside the riser. Therefore, include a column for the water surface inside the riser. If this water surface elevation has an affect on the riser discharge components, the values must be adjusted.
- _____ The outlet control calculations for the barrel must account for tailwater during the 100 year frequency, 24 hour duration, NRCS Type II distribution rainfall.
- _____ Measure the "H" value from the tailwater elevation or the centerline of the outlet pipe (whichever is greater).

_____ If the outlet is connected to an existing storm drain system (or is to be connected in the future) at a particular junction, measure the "H" value from the 100 year hydraulic gradient at that junction.

_____ g. Analyze the riser for flotation assuming all orifices and pipes are plugged. The factor of safety against flotation shall be 1.2 or greater. The flotation analysis must assume the entire riser and riser base submerged.

_____ 10. Provide a stage storage table.

_____ 11. Perform a "worst case" ultimate 100 year storm routing under the following assumptions:

- Assume ultimate zoning land use;
- Include any and all drainage area on site or off site which could flow into the pond;
- Ignore the presence of any riser opening with smallest dimension less than or equal to six inches;
- Ignore the presence of any opening that does not have a trash rack or a trash rack that does not meet the MD-378 Specifications.
- 100 year worst case routing must not overtop the embankment.
- Begin discharge and storage values at the crest of the lowest opening. The lowest opening cannot be an opening that is being ignored as mentioned above.

_____ 12. Provide seepage control (see MD-378 for design methodology): Anti-seep collar design computations (if applicable) or Filter-Drainage Diaphragm (see APPENDIX POND #8 for design example).

_____ 13. The current MD-378 Construction Specifications must be shown on the plans. Any additional construction specifications must be shown adjacent to, but separate from, the MD-378 Construction Specifications.

_____ 14. Topographic data is to be sufficiently adequate to show conditions of the site and adjacent properties. The topographic data must be provided at a minimum of 100 feet downstream of the barrel outlet to a stable outfall. Show the outlet peak velocities and peak discharges at outfalls for the 10 year and the 100 year frequency, 24 hour duration, NRCS Type II distribution rainfall. The outfall pad must be sized for maximum flow occurring at the outfall during the 100 year storm event. Show the downstream 100-year storm event elevation. Contours are to be adequately labeled and easily identified (spot elevations are to be shown). Existing and/or proposed improvements (i.e., buildings, walls, parking lots, roads, etc.) in the immediate vicinity and downstream of the proposed pond are to be shown.

_____ 15. The pond construction is to be included in the overall sequence of construction; and if applicable, shall depict the best methods to divert the existing watercourse with the least disturbance, during installation of the principal spillway structure and embankment. The diversion method chosen must be designed for the 2 year frequency storm.

Specifically, note the installation of the following items in the sequence of construction. 1) clearing, stripping, and stockpiling of topsoil; 2) construction of the cut-off trench; 3) spillway installation; 4) embankment construction; and 5) borrow area excavation.

Note in the sequence that all materials for the pond (i.e., riser, barrel, anti-seep collars, etc.) must be on site prior to commencement of work.

If applicable, the sequence must describe the method of plugging and unplugging the low flow orifice.

The construction sequence must state how the pond will be dewatered during the grading of the pond bottom. Provide an adequate dewatering detail (i.e., sump pit).

If the pond is to be used temporarily as a sediment basin for a separate sediment control plan, then the construction sequence of the pond must be properly coordinated with the other sediment control plan construction sequence. Include the material removal and restoration of the basin area.

_____ 16. Specific details and notes must be provided for all structures (i.e., riser, riser base, trash racks, etc.) Provide a specific detail of the trash rack fasteners. The wall thickness for all concrete pipe must be factored in the component design.

_____ 17. All concrete spillway structures are to be poured in place. All steel reinforcement must be specified. Computations demonstrating that structure will not overturn or float must be provided. An analysis of a riser for flotation assuming all orifices and pipes are plugged must be provided. The factor of safety against overturning and flotation shall be 1.2 or greater. The flotation analysis must assume the **entire** riser and riser base as submerged. The total calculated volume multiplied by 62.4 lbs/cf equals the uplift force.

_____ 18. The plan view of pond must show:

_____ a. Plan view at a scale of 1' = 40' or less (i.e., 1" = 30', 1" = 20' are acceptable).

_____ b. Existing and final contours must be clearly labeled utilizing 2 foot intervals.

_____ c. Locations of soil borings with borings clearly labeled. Minimum soil boring locations will be at the centerline of the embankment, principal spillway and borrow area.
_____ d. Outfall protection at points of concentrated flows into pond and low flow channels (detail required).
_____ e. Areas to be sodded or stabilized with matting.
_____ f. Emergency spillway and outlet channel (designed according to current USDA, NRCS, Engineering Field Manual)
_____ g. Pond bottom dimensions.
_____ h. Fence.
_____ i. Stations.

_____ 19. Provide a profile of dam along centerline that includes:
_____ a. Top of dam elevations (settled and constructed).
_____ b. Location of emergency and principal spillways.
_____ c. Existing ground (show original ground if area contains fill).
_____ d. Top of impervious core (center of embankment).
_____ e. Bottom of cutoff trench.
_____ f. Storm peak elevations (2 year, 10 year, 100 year and 100 year worst case.
_____ g. Show log and location of soil boring.

_____ 20. Provide a cross-section of dam through principal spillway that includes:
_____ a. Existing ground (show original ground if area contains fill).
_____ b. Proposed ground surface (settled and constructed top of dam).
_____ c. The combined upstream and downstream side slopes of the settled embankment shall not be less than five horizontal to one vertical (5:1) with neither slope steeper than 2:1.
_____ d. Top width of dam, meeting or exceeding the MD-378 criteria.
_____ e. Cut-off trench with designed bottom width (4 foot minimum) with a minimum of 4 feet below the bottom of the pipe and impervious core (center of embankment), both with side slopes of 1:1. In excavated areas, the four foot minimum depth is generally measured from bottom of pond.
_____ f. Trash racks (details must meet MD-378 criteria). Project 8 inches minimum outward, extend 8 inches minimum below weir crest; and must be attached to riser with galvanized or stainless steel bolts. Minimum spacing on trash rack bars must be 6 inches clear space (not on center). **The plans should clearly state that "the trash rack must be hot dipped galvanized after fabrication".**
_____ g. Anti-vortex device if necessary.
_____ h. Riser base length, width, thickness, and gauge (if metal). Concrete risers are to be poured in place. Remove references to any standard details that are not shown on plans.
_____ i. Orifice or similar structure (indicate size).

_____ j. Pipe must be round. Indicate inside diameter, lengths, slope, type of material, gauge, joint locations, corrugation, etc. Note that pipe, if concrete, be ASTM C-361 and designate class. Show spigot section of principal spillway pipe from riser structure. First joint is to be within 4 feet of riser.

_____ k. Watertight connection detail.

_____ l. Phreatic line (4:1 slope) is measured from normal pool or the 10 year storm elevation (indicate saturated length).

_____ m. Anti-seep collars (detail required). Indicate size, spacing and location of pipe and provide detail (if applicable).

_____ n. Bedding (detail must meet MD-378).

_____ o. Emergency spillway crest.

_____ p. Outlet protection sized according to the 100 year storm discharge rate. Outlet protection must meet the current Maryland Standards and Specifications for Soil Erosion and Sediment Control.

_____(1). D50 and D max riprap size.

_____(2). Length, width and thickness. Show on plan view and cross sections.

_____(3). Filter cloth.

_____(4). Extend profile of outlet to stable outfall.

_____(5). All metal pipes shall be aluminum or luminized CMP.

_____ q. Elevations shown must include:

_____ (1). Top of dam (provide freeboard according to the current MD-378 and measure it from the 100 year storm routing).

_____ (2). Crest of emergency spillway.

_____ (3). Crest of riser and other openings.

_____ (4). Storm peak elevations (2 year, 10 year, 100 year and 100 year worst case).

_____(5). Top of impervious core (center of embankment).

_____(6). Top and bottom of riser.

_____(7). Bottom of cut-off trench.

_____(8). Inlet and outlet inverts of pipe.

_____(9). Show the constructed and settled elevations on the top of embankment (if applicable).

_____r. Filter Diaphragm. [SEE APPENDIX].

_____ 21. Emergency Spillway - Computations and Design Requirements:

_____ a. Capacity of principal spillway sized according to MD-378 requirements.

_____ b. Design by USDA, NRCS procedures (i.e., Current Engineering Field Manual).

_____ c. Excavated earth spillways must be located in undisturbed earth. (Spillways are not permitted in fill)

_____ d. Profile must show:

_____(1). Existing ground (extend to a minimum of 100 feet below end of the exit channel).

_____(2). Inlet control and outlet sections.

_____(3). Slopes.

_____(4). Design discharges and velocities.
_____(5). Method of spillway stabilization, note leveling sections of emergency spillways are not generally rock lined.

_____ e. Cross-section of spillway must be provided.

_____ 22. If applicable, provide details for the following:

_____ a. Concrete bedding/cradle.

_____ b. Anti-seep collar. The required anti-seep collar projection must be measured from the outside edge of the concrete cradle.

_____ c. Coupling bands.

_____ d. Trench cross-section for installing barrel spillway for excavated ponds. Trench must have 2:1 slopes and a bottom width equal to diameter of pipe plus 4 feet.

_____ e. Riser steel reinforcement requirements (concrete). The riser detail must show the required steel reinforcement and exactly how it is to be joined to the barrel. The connections are to be watertight. All details for the barrel and riser must be shown directly on the plans in lieu of reference.

_____ 23. Outfall Study:

_____ a. Cross-sections at critical points (in improved and existing channel or waterway).

_____ b. Post flow rates and velocities, for 10 and 100 year storms, must be shown up to 100 feet downstream of outfall or as required by the District.

_____ c. Soil profiles at cross-section.

_____ d. Existing vegetation and condition.

_____ e. Danger reach study (dam breach study) using USDA, NRCS TR-66.

_____ f. Supplementary photographs can be provided.

_____ g. All downstream information must be identified such as future zoning, possible structures and roads, etc.

_____ 24. Landscaped Plan.

_____ a. Provide a copy of landscaped plan.

- No trees or shrubs allowed on embankment. Also, a 15 foot wide grass strip from the toe of the embankment slope should be provided. Revise landscape plans accordingly.
- Minimum 50' radius around the inlet structure shall be kept free of woody vegetation.

_____ 25. Topsoiling specifications must be placed on the plans.

_____ 26. Pond reconstruction, repairs and modifications:

_____ a. An assessment of the condition of the embankment and principal spillway structure must be made. Items included in this assessment must include pipe corrosion, water tightness of pipe joints, settlement, pipe alignment, etc. Specify the shell material for the embankment. Include the topsoil specifications (from the 1994 Standards and Specifications or most current edition) on the plan. Compile the stage discharge information on one table.

_____ b. Place a note on the plans that no field welding of the trash rack will be permitted.

_____ 27. Stage Discharge Table [SEE APPENDIX].

_____ 28. If seeking an exemption to Small Pond Approval provide the justification directly on the design plans.

SMALL POND APPROVAL APPENDIX

APPENDIX #1

SMALL POND AS-BUILT CHECKLIST

A. Method:

_____ 1. The minimum information shall be shown in red on a copy of the approved plans.

_____ 2. A check mark must be made beside planned values if they were the constructed values. For changed values, line out the planned value and enter the actual value. Elevations to the nearest 0.1 foot are sufficient.

_____ 3. A check mark must be made next to each constructed pond component (i.e., core trench, trash racks, anti-seep collar, etc.).

_____ 4. Revised computations are required to address deviations from approved design.

B. Minimum Information Required:

_____ 1. A profile of the top of dam. Show constructed core trench and spillways.

_____ 2. A cross-section of the emergency spillway at the control section.

_____ 3. A profile along the center line of the emergency spillway.

_____ 4. A profile along the center line of the principal spillway extending at least 100 feet downstream of the fill. Show constructed core trench.

_____ 5. The elevation of the principal spillway crest.

_____ 6. The elevation of the principal spillway conduit invert (inlet and outlet).

_____ 7. The diameter, length and type of material for the riser.

_____ 8. The diameter, length and type of material for the conduit.

_____ 9. The size and type of anti-vortex and trash rack device and its elevations in relation to the principal spillway crest.

_____10. The number, size and location of the anti-seep collars.

_____11. The diameter and size of any low stage orifices or drain pipes.

_____12. Show the length, width and depth or contours of the pool area so that design volume can be verified.

_____13. Notes, measurements and elevations to show that any special design features were met.

_____14. Statement on seeding and fencing.

_____15. Notes on site clean-up and disposal.

_____16. A certification statement and seal by a professional engineer that the as-built is accurate and complete and that the pond, as constructed, meets the requirements of the Standards and Specifications for Ponds (APPENDIX POND #3).

_____17. No trees allowed on the embankment.

_____18. The emergency spillway exit slope may be 1 - 2% steeper, but not flatter nor less narrow than the design.

_____ 19. The top of fill elevation must be no less than the design elevation plus the allowance for settlement.

_____ 20. The top width and side slopes must be equal to or flatter than the design.
_____ 21. There must be a proper relation between the elevations of the principal spillway crest, the emergency spillway crest and the top of dam. All of these elevations should be greater than or equal to the design elevations.
_____ 22. The structure must have an acceptable outlet as provided in the plans.
_____ 23. All as-built elevations must be noted next to the design elevations.

APPENDIX #2

POND DESIGN CERTIFICATION

I CERTIFY THAT THIS DESIGN PLAN FOR THE CONSTRUCTION OF THE EMBANKMENT AND/OR EXCAVATED POND(S) REPRESENTS A HAZARD CLASS "A" POND(S) AND WAS DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE USDA, NATURAL RESOURCES CONSERVATION SERVICE - MARYLAND STANDARDS AND SPECIFICATIONS FOR PONDS, (MD-378). I HAVE REVIEWED THIS PLAN WITH THE OWNER/DEVELOPER.

SIGNATURE _____ PHONE # _____
NAME (PRINTED) _____
ADDRESS _____
_____
MD LICENSE # _____

SEAL

_____
Signature

_____
Date

APPENDIX #3

AS-BUILT CERTIFICATION FOR POND NUMBER (S) _____

(Note, the following as-built certification is not to be executed until the pond has been completed.)

I CERTIFY THAT THIS AS-BUILT IS ACCURATE AND COMPLETE AND THE POND(S) AS CONSTRUCTED MEETS THE REQUIREMENTS OF THE USDA, NATURAL RESOURCES CONSERVATION SERVICE MARYLAND STANDARDS AND SPECIFICATIONS FOR PONDS (MD-378). ANY POND DESIGN COMPONENTS NOT IDENTIFIED WITH AS-BUILT NOTATIONS WERE CONSTRUCTED AS PER THE APPROVED POND DESIGN.

SIGNATURE _____ PHONE # _____
NAME (PRINTED) _____
ADDRESS _____
_____
MD LICENSE # _____

SEAL

_____
Signature

_____
Date

The Calvert County certification (shown below) is acceptable for ponds which the District approved providing that it is sealed by a Maryland Registered Professional Engineer

Stormwater Management & Stormwater Conveyance Systems As-Built Plan Certification Statement

I hereby certify that to the best of my knowledge that this "As-built" is in compliance with the design and the grading (line & grade). The stormwater management facilities and stormwater conveyance systems as constructed meets all requirement of the SWM & Storm Drainage Ordinance, the 2000 Maryland Stormwater Design Manual, the Grading Ordinance, the Standards and Specification for Construction Manual, the Charles County Detail Manual and/or the pond/basin as constructed, meets the requirements of the Maryland Natural Resource Conservation Service, Standards and Specification for ponds (MD-378) and the appropriate standards and specification on the approved plan.

_____(SEAL) Date:_____
Maryland Registered Professional Engineer

Maryland Registered Professional Land Surveyor

APPENDIX #4

FILTER – DRAINAGE DIAPHRAGMS

Filter-drainage diaphragms consist of sand or a sand/gravel mixture that is installed around the principal spillway barrel. The design gradation of the diaphragm is based on the gradations of the backfill material around the pipe and the foundation material at the diaphragm location. Fine aggregate concrete sand (ASTM C-33) is generally suitable for filter-drainage diaphragms.

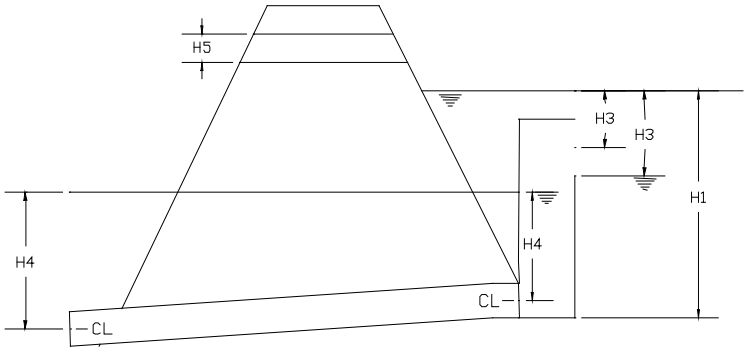
The drain material must be coarse enough to drain off seepage, but it also must be fine enough so that any soil particles being carried by the seepage are trapped at the upstream edge of the diaphragm. Use acceptable USDA, NRCS design methodology.

APPENDIX # 5

WATER ELEV IN POND	WATER ELEV IN RISER	LOWER OPENING WEIR FLOW		LOWER OPENING ORIFICE FLOW		RISER CREST WEIR FLOW		RISER CREST ORIFICE FLOW		BARREL Q4	HEAD REQUIRED FOR Q4 H4o FOR OUTLET CTRL H4i FOR INLET CTRL		EMERGENCY SPILLWAY		TOTAL Q
	Corre-sponds to greater of H4o or H4i	**H1w**	**Q1w**	**H1o**	**Q1o**	**H3w**	**Q3w**	**H3o**	**Q3o**	**Q1+Q3 = Q4**	**H4o due to Q4**	**H4i due to Q4**	**H5**	**Q5**	**Q4 + Q5 = Q**

NOTE:

- **LIST ALL EQUATIONS , VARIABLES, ETC.**
- **ONCE THE WATER ELEVATION WITHIN THE RISER RISES ABOVE ANY ORIFICE OR WEIR, THE EFFECTS OF THE SUBMERGENCE MUST BE ANALYZED AND THE REDUCTION IN THE DISCHARGE MUST BE ACCOUNTED FOR.**
- **HEAD MUST BE MEASURED TO CENTERLINE OF PIPE OUTLET OR ACTUAL TAILWATER, WHICHEVER IS GREATER. THE "100 YEAR" HYDRAULIC GRADIENT CALCULATIONS ARE NEEDED IF OUTLET IS CONNECTED TO STORM DRAIN SYSTEM.**



APPENDIX # 6

SMALL POND APPROVAL LETTER

TO:

PROJECT NAME and POND #:

This letter advises you that the Calvert Soil Conservation District has approved the plans and specifications for a SWM pond located at Maryland Coordinates 000,000 feet East and 000,000 feet North.

This approval is issued with the understanding that you will construct the pond in strict accordance with plans and specifications furnished by you. Variation from these plans and specifications without prior written approval by the Calvert Soil Conservation District or failure to submit an "As-Built" plan package as required, will be cause for the District to withdraw this letter of approval and notify the Water Management Administration, Dam Safety Division, of the Maryland Department of the Environment of the withdrawal of this letter of approval. This approval is issued under the following conditions:

- The approval is valid only for use by the owner/developer and may not be transferred to another unless written permission for such transfer is obtained from the District.
- The approval shall become null and void if the construction under the approval has not been initialized within three (3) years of the approval date.
- Construction shall be in strict accordance with Natural Resources Conservation Service criteria for pond construction and the terms of this approval. The location, dimensions and type of all structures, as well as an excavation or filling shall be in accordance with the aforementioned plans submitted by the owner/developer, unless written approval for any change is granted by the District.
- The pond shall be constructed under the supervision of a registered professional engineer. Within 30 days of the completion of construction, the owner/developer shall provide the District with an "As-Built" plan that meets the requirements of the Calvert Soil Conservation District "Small Pond Approval Guidelines". The "As-Built" plan shall be sealed by a registered professional engineer. The registered professional engineer shall certify that the pond was constructed in accordance with the approved plans and specifications. The pond construction shall at all times be in full conformance with the Calvert County Stormwater Management, Grading and Erosion and Sediment Control Ordinance. Any major change or deviation from the approved plans must be redesigned and the revised plans must be approved by the Calvert Soil Conservation District prior to the performance of work.
- The owner shall be responsible for operating and maintaining the pond in the approved completed condition so as to ensure proper functioning of the structure and protection of adjoining properties. (O&M plan is to be attached to this approval letter)
- If the dam is not constructed, operated, or maintained in full compliance with this approval the owner shall remove or repair all or any part of the structure at its sole cost and expense as may be directed by the Dam Safety Division or the District.

Approved:_____Date: _____

cc: Engineer
MDE (Dam Safety Division) w/enclosures DPW&T w/enclosures

APPENDIX #7

ACID SULFATE SOILS Fact Sheet

Introduction. Acid sulfate soils include all soils in which sulfuric acid may be produced, is being produced, or has been produced in quantities that impact soil characteristics. Generally these soils include tidal marsh soils of the Atlantic Coast and Chesapeake Bay areas. In addition, these soils may also include soils that form in sulfide-bearing dredged materials (DM). Not all DM are sulfidic, but many are in coastal areas.[1] Acid sulfate materials have been unearthed at some depth in most of the Coastal Plain deposits that comprise Southern Maryland.

What are Sulfidic Materials? "Sulfidic materials contain oxidizable sulfur compounds. They may be mineral or organic soil materials that have a pH of 3.5 or more and that, if incubated as a layer 1 cm thick under moist aerobic conditions (field capacity), show a drop in pH of 0.5 or more units to a pH value of 4.0 or less (1:1 by weight in water to permit measurement) within in 8 weeks"[2] Sulfidic materials are most common in tidal marsh environments where permanent saturation results in the reduction of sulfates to sulfides. Sulfidic materials can also occur in freshwater marshes if sulfur is present in the water column. Coastal Plain deposits also commonly contain sulfidic materials, especially in deep layers. A key to recognizing potential and active acid sulfate soils is the identification of sulfidic materials.

What do sulfidic soil materials look like? Sulfidic soil materials are usually black or dark gray in color and typically have a soil Munsell chroma of 1 or less with hues (when present) of 10YR or yellower, greener, or bluer whereas organic materials may have higher chroma (2 or more) and browner hues. Soils with black (N/2) colors usually contain iron monosulfides and upon exposure to hydrochloric acid evolve hydrogen sulfide gas. The different colors of acid sulfate soils reflect the various stages in the process of sulfuricization.[3]

What are the consequences of draining or exposing sulfidic materials? Typically, if sulfidic materials are drained or excavated, sulfides (if present) are oxidized and form sulfuric acid. The pH value that may be at or near neutral before exposure to air can drop to a value near 3. In such situations, vegetation may be difficult if not impossible to establish due to aluminum and iron toxicities. Acidic runoff and groundwater from oxidizing exposed sulfidic materials can damage streams, ponds, their aquatic organisms, and any infrastructure in contact with the acidic water.

What can be done to reduce the adverse impacts of acid sulfate soils? If possible, soil materials that might be dredged or tidally influenced soils that might be disturbed, or deep excavations in Coastal Plain deposits should be examined prior to disturbance for the presence of sulfidic materials. The best advice is not to expose sulfidic materials to air. Remediation of acid sulfate materials is difficult and expensive. Reclamation strategies for acid mine drainage may be employed and have included the use of lime for the neutralization of acidity.

For more information contact the Soil Survey Division of the USDA Natural Resources Conservation Service.

References:

[1] Fanning, D.S. and Burch, S. Coastal Acid Sulfate Soils. pp 921-935. Reclamation of Drastically Disturbed Lands, American Society of Agronomy, Monograph no. 41. 2000.

[2] Soil Survey Staff. 2010. Keys to Soil Taxonomy, 11th Ed. USDA-Natural Resources Conservationb Service, Washington, D.C.

[3] Fanning, D.S., Rabenhorst, M.C., and Bigham, J.M. Colors of Acid Sulfate Soils. Soil Science Society of America, Special publication no. 31. 1993.

IDENTIFYING SULFIDIC MATERIALS AND ACID SULFATE SOILS

Soil color is usually a good indicator of the presence of sulfidic materials. Expect a potential acid-sulfate problem if the soil materials have a Munsell chroma of 1 or less, and a Munsell color value of 4 or less when moist. If the soil is mottled and the matrix has these color properties, then sulfides may be present.

To determine if sulfidic materials are present:

1. Take freshly excavated soil material with a pH of 3.5 or higher.
2. Incubate a layer of material 1 cm thick under moist aerobic conditions (field capacity), at room temperature for 8 weeks. Drying and rewetting is acceptable during the incubation, but it should not remain dry for long periods.
3. Check pH after 8 weeks of incubation. Take pH measurements 1: 1 in water or the minimum amount of water to permit pH measurement.
4. Sulfidic materials are present if there is a drop in pH of 0.5 units or more to a pH of 4.0 or less in this time period.

"Sulfidic materials accumulate as a soil or sediment which is permanently saturated, generally with brackish water. The sulfates in the water are biologically reduced to sulfides as the materials accumulate. Sulfidic materials most commonly accumulate in coastal marshes near the mouths of rivers that carry noncalcareous sediments, but they may occur in freshwater marshes if there is sulfur in the water. Upland sulfidic material may have accumulated in a similar manner in the geologic past."

If a soil containing sulfidic materials is drained, or if sulfidic materials are otherwise exposed to aerobic conditions, the sulfides oxidize and form sulfuric acid. The pH value, which normally is near neutrality before drainage or exposure, may drop below 3. The acid may induce formation of iron and aluminum sulfates. The iron sulfate, jarosite, may segregate to form the yellow mottles that commonly characterize a sulfuric horizon. The transition from sulfidic materials to a sulfuric horizon normally requires very few years and may occur within a few weeks. A sample of sulfidic materials, if air-dried slowly in shade for about 2 months with occasional remoistening, becomes extremely acid." (Source: Keys to Soil Taxonomy. 2010. USDA-Natural Resources Conservation Service, 11th edition.)

Conventional soil tests indicating high levels of sulfate salts (> = 0. 05 % water soluble sulfate) or high total sulfur (more than about 0. 3 % S) in conjunction with low chroma soil colors, should warrant concern and further analysis (i.e. 8 week incubation). One problem with relying entirely upon total sulfur in the soil is that this test cannot account for the soil's ability to buffer the acid produced. This would overestimate the potential acidity of sulfur bearing materials in some cases. **Some commercial soil testing labs offer an Acid-Base Accounting test that can help estimate the amount of liming material needed to prevent environmental and structural damage when sulfidic materials are exposed to air.**

Color is also used to identify jarosite. Jarosite has hue of 2.5Y or yellower, and normally has chroma of 6 or more. Jarosite is an indicator of past or current, highly acidic conditions in soils since it does not form above a pH of 3.5 or 4. Jarosite forms only at low pH, but it remains stable in oxidized conditions even after the acid sulfate weathering has ceased, and the soil pH stabilized at about 4.5 or higher. Therefore, jarosite is not necessarily an indicator of current, severely acidic conditions.

S.L. Davis
USDA – NRCS
6/4/2013

APPENDIX #8

PONDS EXEMPT FROM SOIL CONSERVATION DISTRICT SMALL POND APPROVAL

Pages 1 and 2 of the NRCS-MD 378 Pond Code Standards and Specifications for Small Pond Design (MD-378) describe the conditions for exemption from formal review by the local SCD. **While not required to meet all conditions of MD-378, facilities that are exempt shall be approved by the appropriate authority and conform to the following minimum design and construction criteria:**

1. Design for a stable outfall using the ten-year design storm (or two year design storm if the pond is an off-line structure providing water quality storage only).
2. Dams shall meet class "a" dam safety hazard classification,
3. Principal spillway/riser shall provide anti-floatation, anti-vortex, and trash-rack designs.
4. One (1) foot of freeboard shall be provided above the design high water for the 10 year storm.
5. Material and construction specifications for the principal spillway shall be in accordance with MD-378 code.
6. Material and construction specifications for the embankment shall be in accordance with MD-378 code, except that fill material for the embankment shall conform to Unified Soil Classification GC, SC, SM, MH, ML, CH, or CL, and no cutoff trench is required.
7. Woody vegetation is prohibited on the embankment.

PONDS REQUIRING REVIEW AND APPROVAL BY THE MDE DAM SAFETY DIVISION

1. The proposed embankment is twenty feet or greater in height from the upstream toe to the top of dam; or
2. The contributing drainage area is a square mile (640 acres) or greater; or
3. The structure is classified as "high" or "intermediate" class "b", or class "c" hazard pond.

FOR ACCESSING THE USDA NRCS MARYLAND
CONSERVATION PRACTICE
STANDARD POND CODE 378
"MD378 STANDARDS AND SPECIFICATIONS"

VISIT USDA, NRCS WEBSITE

AT

http://www.nrcs.usda.gov/technical/efotg/

- Scroll down to US map and click on the State of Maryland location.
- Then click on the County location.
- Go to the eFOTG search menu on left hand side of web page and enter "MD378"

OR

www.CalvertSoil.org