

## D.01 Detention Ponds

This checklist reflects most, but not necessarily all of the items that will be reviewed by the Development Review. It is intended to be used as an aid by us to provide a consistent review of development work in Thurston County. All items may not be applicable in the review of each project and all items of concern to this office may not be covered on this checklist.

Y	N	
		<b>SIZING AND MODELING CRITERIA</b>
		For compliance with Minimum Requirement #7, the Western Washington Hydrologic Model (WWHM), MGSFlood, or other approved continuous runoff model is used to model the detention pond and contributing area.
		For compliance with Minimum Requirement #7, overflows from the detention pond comply with Minimum Requirement #7 (refer to <b>Checklist 1 – Minimum Requirements</b> ).
		The facility is represented in the model using the pond element.
		All control structure restrictor devices are sized using <u>at least one</u> of the following equations: <ul style="list-style-type: none"> <li>• Simple Orifice</li> <li>• V-Notch Sharp-Crested Weir</li> <li>• Proportional or Sutro Weir</li> <li>• Riser Overflow</li> <li>• Other approved equation by the county reviewer</li> </ul>
		If emergency overflow is provided by an emergency overflow structure, then the structure is designed to pass the 100-year recurrence interval developed peak flow (using broad-crested weir equation).
		<b>DESIGN CRITERIA</b>
		If infiltration is included as a second outflow, the pond meets all the requirements of DDECM Volume V, LID.01 Infiltration Basins.
		<b>Setbacks</b>
		Detention pond open water maximum surface elevations are at least 1 foot below the lowest finished floor elevation of any structures within 25 feet.
		5 feet from maximum water surface to septic tank or distribution box.
		10 feet from maximum water surface to property lines and onsite structures.
		10 feet from maximum water surface to building sewer.
		10 feet from maximum water surface to nearest tract property boundary lines.
		30 feet from maximum water surface to septic drainfields and drainfield reserve areas for single family onsite sewage disposal systems.
		100 feet from maximum water surface to septic drainfields and drainfield reserve areas for community onsite sewage disposal systems.

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		50 feet from the top of slopes steeper than 20% and greater than 10 feet high.
		100 feet from drinking water well to maximum water surface of stormwater control.
		<b>General Detention Design</b>
		If the detention pond impounds 10 acre-feet or more at the embankment crest, it meets the dam safety requirements (WAC 173-175-020(1)).
		Pond is designed as a flow-through system.
		Pond bottom is level and located at least 0.5 feet below the inlet and outlet to provide sediment storage.
		Includes a crest gauge.
		Project submittals include a table that identifies the design facility stage expected for the 2-, 5-, 10-, 25-, 50-, and 100-year recurrence interval flows.
		A geotechnical assessment and soils report is prepared for work located within 300 feet of the top of a steep slope, erosion hazard, or landslide hazard area.
		Pond is designed to be an attractive feature of the urban environment.
		<b>Side Slopes</b>
		Interior side slopes are no steeper than 3H:1V (unless a fence is provided).
		Exterior and interior side slopes steeper than 2H:1V were analyzed for stability by a geotechnical engineer.
		Vertical retaining walls are only used when <u>all</u> of the following conditions are met: <ul style="list-style-type: none"> <li>• Walls are constructed of 3,000 psi structural reinforced concrete (min.) with water stops at all construction joints.</li> <li>• A fence is provided along the top of the wall;</li> <li>• The design is stamped by a licensed civil engineer with structural expertise;</li> <li>• An access ramp to the bottom of the pond is provided.</li> </ul>
		Other retaining walls such as rockeries, concrete, masonry unit walls, and keystone type wall were designed by a geotechnical engineer or a civil engineer with structural expertise.
		<b>Embankments</b>
		Embankments greater than 6 feet in height were designed by a professional engineer with geotechnical expertise.
		Embankments less than 6 feet in height have a minimum 6-foot top width and sides less than 2H:1V.
		Anti-seepage collars are placed on outflow pipes in embankments impounding water greater than 8 feet in depth at the design water surface.
		Where maintenance access is provided along the top of the embankment, the minimum width of the top of the embankment is 15 feet.

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		Embankments adjacent to a stream or other body of water are sufficiently protected with riprap or bioengineering methods to prevent erosion of the embankment.
		Constructed on native consolidated soil (or adequately compacted and stable fill soils analyzed by a geotechnical assessment), which is free of loose surface soil materials, roots and other organic debris.
		Designed with a “key” equal to 50% of the embankment cross-sectional height and width. In till soils the “key” minimum depth is 1 foot of excavation into the till.
		Cores consist of soil compacted to a minimum of 95% of the maximum dry density, standard proctor method per American Society for Testing and Materials [ASTM] D1557).
		Soil is placed in 6-inch lifts.
		Soil has the following soil characteristics per the USDA’s textural triangle: a minimum of 30% clay, a maximum of 60% sand, a maximum of 60% silt, with nominal gravel and cobble content or as recommended by a geotechnical engineer.
		Core is adequate to make the embankment impervious.
		Exposed earth on the pond side slopes are sodded or seeded with appropriate seed mixture (BMP C120: Temporary and Permanent Seeding).
		Vegetative cover is protected and reseeded as necessary.
		<b>Overflow</b>
		A primary overflow is provided to bypass the 100-year recurrence interval developed peak flow over or around the outlet restrictor system.
		A secondary inlet to the control structure is also provided (as additional protection against overtopping from a clogged control structure).
		Emergency overflow structures are designed with at least 6 inches of freeboard.
		<b>Emergency Overflow Spillway</b>
		For ponds with embankments less than 2 feet in height and located at grades less than 5%, an emergency overflow structure, such as a Type II manhole fitted with a birdcage, or emergency overflow spillway is provided.
		For ponds with constructed embankments over 2 feet in height, or for ponds located on grades in excess of 5%, an emergency overflow spillway is provided.
		For impoundments of 10 acre-feet or greater, the emergency overflow spillway meets the state’s dam safety requirements.
		For impoundments less than 10 acre-feet, the emergency overflow spillways are sized to pass the 100-year recurrence interval developed peak flow in the event of total control structure failure (e.g., blockage of the control structure outlet pipe) or extreme inflows.
		The entire width of the spillway is armored with riprap in conformance with BMP C209: Outlet Protection in Volume II.
		Designs are analyzed as broad-crested trapezoidal weirs.
		The spillway is designed with at least 1 foot of freeboard.

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		<b>Control Structures</b>
		<b>Multiple Orifice Restrictor</b>
		Minimum orifice diameter is 0.5 inches (unless a smaller diameter is permitted, and a screen, per Attachments Section A, Details 12.0, is utilized to protect the orifice from fouling).
		<b>Riser and Weir Restrictor</b>
		Designed to convey the developed 100-year recurrence interval peak flow assuming all orifices are plugged. (Note: Figure 3.18 can be used to calculate the head in feet above a riser of given diameter and flow.)
		<b>Access Roads</b>
		Access roads are provided to the control structure(s) and around the complete perimeter of the pond (unless otherwise approved by the county).
		Pond access roads are located in the same tracts when the ponds themselves are in tracts, or in the open space when the pond is also located in open space and the access roads are constructed so as to be aesthetically compatible with the open space use.
		Access roads to structures and pond are a minimum of 15 feet in width.
		Perimeter roads are a minimum of 12 feet in width.
		Access roads to pond are asphalt, gravel surface, or modular pavers.
		Access roads to control structures, catch basins, and other pond related drainage structures are asphalt.
		Access roads to structures and pond have an inside radius of at least 40 feet.
		Perimeter roads have an inside radius of at least 25 feet.
		Access road slope is less than or equal to 12%.
		Paved aprons are provided where access roads connect to paved public roadways.
		Manhole and catch basin lids are located in or at the edge of the access road and at least 3 feet from a property line.
		For pond access roads that are longer than 75 feet, either a vehicle turn-around, or paved perimeter access road around the perimeter of the pond is provided.
		Turnaround length is 31 feet or less.
		Turnaround inside wheel path radius is at least 40 feet.
		<b>Access Ramps</b>
		Access ramp surface is either: <ul style="list-style-type: none"> <li>Asphalt (required if providing the only access to a control structure, catch basin, or other drainage structure).</li> <li>Quarry spalls (2- to 4-inch) 6 inches thick (top layer) with 2-inch thick crushed rock surface and geotextile fabric (lowest layer) over the native soil.</li> </ul>
		Width of access ramp is at least 15 feet.
		Slope of the paved access ramp is 15% or less, and of gravel access ramp is 12% or less.
		If the pond bottom area is greater than 1,500 square feet (measured without the ramp), then the ramp extends to the pond bottom.

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		If the pond bottom area is less than 1,500 square feet (measured without the ramp), the ramp extends to at least 4 feet above the cell bottom.
		If an internal embankment is used as maintenance access, then: <ul style="list-style-type: none"> <li>• The embankment is no more than 4 feet above either cell bottom</li> <li>• The embankment is designed to support the weight of a trackhoe (considering the embankment is normally submerged and saturated)</li> <li>• The embankment side slopes are no steeper than 3H:1V.</li> </ul>
		If a cell does not have an access ramp, then <u>at least one</u> of the following is satisfied: <ul style="list-style-type: none"> <li>• Cell bottoms are accessible (side slopes of the cell is no steeper than 3H:1V), <u>or</u></li> <li>• Cell bottoms are reachable<sup>1</sup> by trackhoes from the perimeter access road.</li> </ul>
		<b>Pond Access Gates or Bollards</b>
		Vehicle access is limited by a double gate if a pond is fenced, or by bollards if the pond is not fenced.
		Access gates and bollards are set 20 feet back from property line where the road it is connecting from is posted 35 mph or greater (arterials).
		A minimum of one locking access road gate is provided that meets WSDOT State Standard Plan L30.10.
		Pedestrian access gates (if needed) are a minimum of 4 feet in width and meet WSDOT State Standard Plan L-3.
		Gates are 14, 16, 18, or 20 feet in width.
		Bollards consist of two fixed bollards on the outside of the access road, and two removable bollards equally spaced between the fixed bollards (or all four removable if placed in the traveled way).
		<b>Fencing Extents</b>
		A fence is provided around the entire site if the site is a public stormwater facility tract, or if the pond impoundment wall is greater than 24 inches high.
		A fence is provided for portions of the pond perimeter where pond slopes at steeper than 3H:1V at the emergency overflow water surface elevation, or higher.
		Within the clear zone of roads with design speeds of 35 mph or higher, fencing is placed at the tract or easement boundary, and a minimum of 5 feet from the top slope catch point.
		Detention ponds on school sites comply with safety standards developed by the Washington State Department of Health (DOH) and the superintendent for public instruction.
		<b>Fence Material</b>
		Fences around public detention ponds are a minimum 6-foot-high chain link fence.
		Fences around tracts within the clear zone of roads with design speeds of 35 mph or higher are chain link fence Type 3.

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		Fences around any pipe stem access to a basin are WSDOT Type 4 chain link fence with a 14-foot gate.
		Fence material is No. 9 gauge galvanized steel fabric with bonded vinyl coating.
		Fence vinyl coating is green or black.
		All posts, cross bars, fasteners, and gates are painted or coated the same color as the vinyl clad fence.
		For metal baluster fences, IBC standards are met.
		If wood fences are used, the homeowners' association or adjacent lot owners assume responsibility for fence maintenance.
		Wood fences have pressure treated posts (ground contact rated) either set in 24-inch deep concrete footings or attached to footings by galvanized brackets.
		Rails and fence boards are cedar, pressure-treated fir, or hemlock.
		<b>Signage</b>
		A sign is placed with maximum visibility from adjacent streets, sidewalks, and paths.
		For private facilities, the sign shows the owner's name and contact information.
		<b>Planting Requirements</b>
		Sod or seed is planted on exposed earth on the pond bottom and interior sides with an appropriate seed mixture.
		All remaining areas of the tract are planted with grass or landscape and are covered with a 3-inch cover of hog fuel or shredded wood mulch. (If soil preservation and amendment is implemented in replanted areas per SWM Volume III, Section 3.1 Soil Preservation and Amendment, 2-4 inches of hog fuel/woodchip mulch is used).
		Shredded wood mulch is made from shredded tree trimmings.
		The mulch is free of garbage and weeds and does not contain excessive resin, tannin, or other material detrimental to plant growth.
		Wood debris or wood treated with preservatives are not used for producing shredded wood mulch.
		<b>Landscaping</b>
		<b>Planting on Embankments</b>
		Trees or shrubs are not planted on embankments meeting the criteria of dams regulated for safety.
		Trees or shrubs are not planted within 10 feet of inlet or outlet pipes or manmade drainage structures, such as spillways or flow spreaders.
		Tree or shrub species with roots that seek water, such as willow or poplar, are not planted within 50 feet of pipes or manmade structures.
		Landscaping is not located on embankments that impound water permanently or temporarily during storms. (This restriction does not apply to cut slopes that form pond banks, only to embankments.)
		Only grasses are planted on portions of water-impounding embankments taller than 4 feet (trees and shrubs are not allowed).

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		Grasses allow unobstructed visibility of embankment slopes for detecting potential dam safety problems such as animal burrows, slumping, or fractures in the embankment.
		Trees planted on portions of water-impounding embankments less than 4 feet high are not higher than 20 feet mature height, and have a fibrous root system.
		All landscape material, including grass, is planted in good topsoil.
		<b>Soil Amendment</b>
		If native underlying soils are used for planting, native soils are amended with 4 inches of compost tilled into the subgrade in accordance with SWM Volume III, Section 3.1 Soil Preservation and Amendment.
		Additional enrichment or compost top-dressing is provided for shrubs and trees as recommended by a landscape professional or arborist.
		Seed mixes meet the following requirements: <ul style="list-style-type: none"> <li>• Dwarf tall rescue: 40%</li> <li>• Dwarf perennial rye "Barclay:" 30%</li> <li>• Red fescue: 25%</li> <li>• Colonial bentgrass: 5%</li> </ul>
		<b>INSPECTION CRITERIA</b>
		The detention pond meets applicable design and construction criteria (see * in Design and Construction Criteria above and Verification below).