

# Retention Basin



## General Maintenance

### Trash and Debris Removal

Remove trash and debris after rain greater than one inch and check that drain is free of debris.

### Vegetation Height

Maintain turfgrass at 3 to 3.5 inches and other vegetation to designed height.

### Dam Maintenance

Remove woody vegetation.

## Annual Maintenance

### Vegetation Harvesting

Harvest when aquatic vegetation is greater than 50 percent of surface area. Remove invasive species.

### Embankment Maintenance

Repair holes in embankment and side slopes.

### Inlet and Outlet Structures

Assess inlet and outlet structures for damage or debris. Clean out and repair if needed.

## Long-term Maintenance

### Every Five Years

Remove sediment from forebays or sediment storage areas when 60 percent of total volume is lost.

### Every 10 to 20 Years

Remove sediment from main cells when 50 percent of total volume is lost.

**Retention basins, or wet ponds,** retain a deep, permanent pool of water that can collect stormwater and release it slowly to maintain a desired water level, after which the excess stormwater is released slowly via an outlet (drawdown orifice). Retention basins should always have a baseline level of water present and may be vegetated. Retention basins provide a higher level of pollutant retention (up to 80 percent) and a lower chance of sediment resuspension than detention basins (dry ponds).

## Best Management Practice (BMP) Maintenance Considerations

To maintain optimum function of retention basins, continual and focused maintenance is required for the life of the BMP. It is important to consider the aesthetic appeal and use (i.e., recreation) as well as the design and function of retention basin BMPs when deciding on maintenance goals.

Key maintenance considerations for retention basins include regular visual inspections and maintenance of control structures, trash and debris removal, vegetation control, sediment level monitoring and removal, embankment stability monitoring, nuisance animal inspections, and inlet and outlet structure monitoring and repair. Of greatest importance are preventing clogging and removing debris from the outlet.

Manage vegetation as needed by type (turfgrass, wetland plants, or trees) and always maintain access to control structures.

Turf is used for vegetative bank stabilization, ease of maintenance, and aesthetics. It should be maintained at six to eight inches and requires frequent mowing during the growing season.

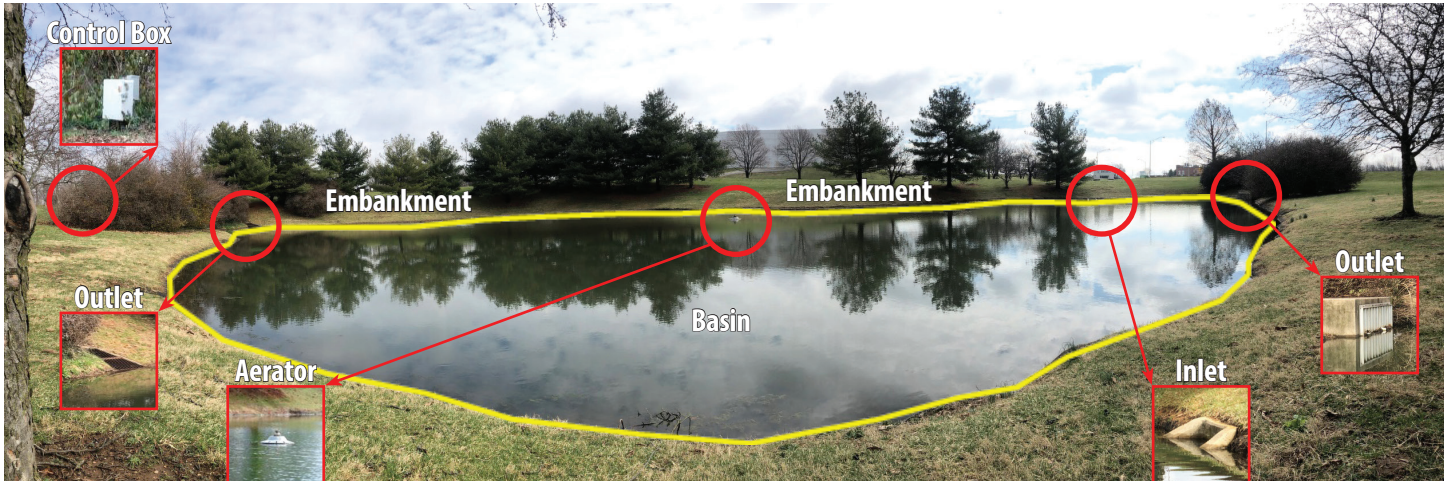
Native wetland plants biologically uptake pollutants and add aesthetic value. In some cases, vegetation harvesting and control of invasive aquatic plants (e.g., cattails) are necessary (when more than 50 percent of the surface area is covered) and should be implemented before winter die-off to prevent nutrient release into the water column.

Trees provide temperature-regulating shade and add beauty to a site. However, their root systems pose a risk for bank destabilization and produce litter and debris, which clog control structures. Remove debris and seedlings from side slopes to prevent clogging and tree establishment on slopes or the surrounding embankment.

## Retention Basin Potential Issues

Issue	What Causes It?	Remediation
Invasive plant species (e.g., cattail and <i>Phragmites</i> sp.) are present.	Suitable habitat/excess nutrients	Harvest and apply herbicide via painting stems. Invasive removal may require limited use of aquatic herbicides. Remove plant material off-site.
Gullies or bare ground appears around perimeter of basin.	Erosion/stormwater runoff	Regrade soil and replant ground cover. Adjust soil pH if needed. Apply one-time fertilizer and water until vegetation is established.
Shrubs or trees grow in embankment.	Seedling establishment	Remove entire tree or shrub.
Holes appear in embankment and/or tree debris with chewed ends is present.	Muskrat, groundhog, or beaver	Consult a nuisance animal removal specialist.
Harmful algal blooms appear.	Excess nutrients/ permanent pool too low	Install aeration equipment. Harvest excessive vegetation growth. Fix leaks in pond embankment, principal spillway, or pond bottom.
Trash or debris accumulates along perimeter, in basin, or near outlet.	Stormwater runoff	Remove trash and debris.
Insect pests/strong odor detected.	Stagnant water	Install aeration equipment. Introduce predatory fish (i.e., mosquito fish).
Signs indicate seepage on downstream face.	Embankment or emergency outlet failure	Consult a professional.
Waterfowl are present.	Suitable habitat	Consult a nuisance animal removal specialist.
Permanent pool is too high or overtopping embankment.	Clogged outlets (drainage orifice)	Remove debris or sediment from outlet structures.

## Parts of a Retention Basin



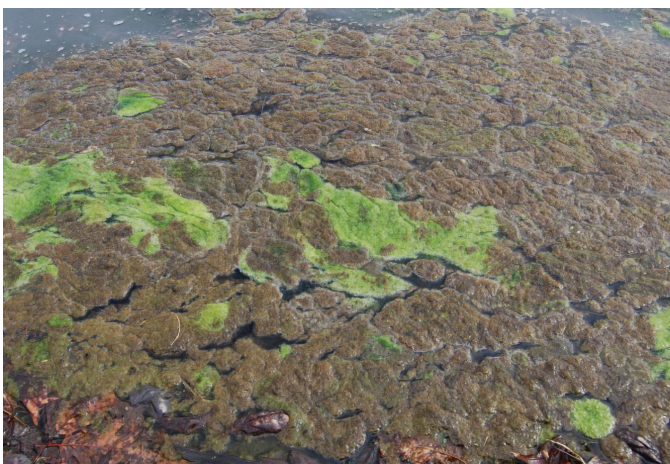
## Common Issues



A muskrat has created a hole in the turf reinforcement mat and a tunnel into the bank, destabilizing the embankment.



Japanese bush honeysuckle, an invasive plant species, is invading this embankment.



Algal growth is caused by excess nutrients.



Cattail, an invasive plant species, is covering the entire surface area of this retention basin.

# Retention Basin Inspection and Maintenance Checklist

Site name:			
Location:			
Inspector name(s):		Inspection date:	
Rain in previous 48 hours? <input type="checkbox"/> Y <input type="checkbox"/> N If yes, record amount and timing:			
Current weather conditions:			
Flow or water observed? <input type="checkbox"/> Y <input type="checkbox"/> N If yes, record appearance:			
<b>Inspection item</b>	<b>Yes</b>	<b>No</b>	<b>If no, explain location, extent of issue, and/or maintenance performed.</b>
<b>General Inspection</b>			
Site is accessible.			
Area is clean of trash, debris, grass clippings, etc.			
Vegetation is maintained as designed in the correct areas (i.e., six to eight inches in height, covering less than 50 percent of surface area, etc.).			
Woody seedlings (trees or shrubs) or invasive plants are absent.			
Erosion protection measures (i.e., turf reinforcement mats) are in place and functioning.			
Erosion is not evident.			
Water flows into the basin and there is no erosion on the outside of the embankment.			
Banks are stable, and no sinkholes or animal burrows are present.			
Water in basin is at correct level.			
No evidence of harmful algal blooms or excessive mosquitos.			
<b>Sediment</b>			
Sediment accumulation is less than 60 percent of forebay volume.			
Sediment accumulation in main cell(s) of detention basin is less than 50 percent of total volume.			
All control structures are free of sediment.			
<b>Inlet, Outlet, Overflow Condition</b>			
Inlet is in good condition, and there is no erosion around the inlet structure.			
Outlet and overflow structures are in good condition, with an absence of erosion surrounding structure.			
All pipe joints are watertight, and no leaks are visible.			

## Glossary

**Aerator:** A floating water circulation device that functions by siphoning water and releasing it through a small nozzle, creating bubbles or a fountain of water.

**Basin:** Concave part of the BMP. It is surrounded by the embankment and captures and holds water for a predetermined amount of time.

**BMP:** Best management practice.

**Drawdown device:** Pipe or subsurface drain that controls the rate of water released from the basin.

**Embankment:** A wall or bank of material, usually soil, that functions to contain water within a certain area of the BMP.

**Emergency overflow:** A spillway that safely conveys water away from the basin of the BMP once the basin capacity is reached. A retention basin may or may not have an emergency overflow.

**Erosion:** Process by which soil and material are washed away by high volumes of stormwater.

**Forebay:** A canal or small water basin that receives water prior to water entering a larger basin. A retention basin may or may not have a forebay.

**Inlet:** Area where water enters the basin of the BMP. This can be a pipe entering the basin or simply an opening.

**Invasive plants:** Plant species that tend to spread out of control (e.g., Japanese honeysuckle).

**Outlet:** Area where water leaves the BMP structure and enters the stormwater system. This can be located inside the basin of the BMP or on the outer edge beyond the emergency overflow.

**Sediment:** Fine material that is carried by stormwater and deposited as the water settles.

**Turf reinforcement mats:** Woven synthetic mats that provide temporary cover for bare soil, protection against stormwater erosion, and long-term vegetation support.

## References

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