

Maintaining Your Retention Basin:

A Guidebook for Private Owners in Clermont County



A well maintained retention basin



Website: Clermontswcd.org

(513) 732-7075

BASINS

INTRODUCTION

WHAT ARE RETENTION BASINS AND WHY ARE THEY IMPORTANT?



When land is altered to build homes and other developments, the natural system of trees and plants over relatively spongy soil is replaced with harder surfaces like sidewalks, streets, decks, roofs, driveways and even lawns over compacted soils. As a result, less rain water soaks into the ground and more rain water, also known as storm water, flows off the land at a faster rate. This can lead to streambank erosion and possible downstream flooding.

A retention basin is a man-made pond that holds water through the year, but also has extra storage space that fills with water after a storm. This extra water is slowly released over a period of one or two days after a storm so it minimizes downstream flooding and streambank erosion

problems. They also help remove sediments and other pollutants from storm water runoff, which helps improve the quality of local streams. Like most other things, a retention basin may not function properly or may fail prematurely if not properly maintained. Once a retention basin fails, it is often very expensive to repair.

Many retention basins are located on private property, including parcels of land owned and maintained by a homeowners association (HOA). Local governments do not have the authority to maintain components of the storm sewer system on private property, including retention basins. Rather, **these are the responsibility of the lot owner or possibly the HOA to maintain.**

Whether you are an individual property owner, a homeowners association representative, or a residential/commercial property manager, this guidebook will help answer questions and provide you with instructions for basin maintenance activities. Routine maintenance will prolong the life of your retention basin, improve its appearance, help prevent flooding and property damage, and enhance local streams and lakes.

DO YOU HAVE A RETENTION BASIN ON YOUR PROPERTY?

In Clermont County, if your development was built after 1990, it will likely have some type of basin that manages storm water runoff. Some basins are dry and have mowed turf grass in the bottom of them. These are referred to as dry detention basins, or simply detention basins, and are not the focus of this Guidebook. Other ponds may have been built for aesthetic reasons and were not designed to manage storm water.

If you live in a residential community, your homeowners association (HOA) dues may help pay for retention basin maintenance. The HOA leadership should have access to information about the locations of any retention basins. If your development does not have an HOA, or the HOA has no information, here's how to check to see if a retention basin is present:

- Look for information in the notes on your recorded plat of your subdivision, which is usually included with the paperwork you received when closing on the purchase of your home. You may also search for record plats and deeds on the Clermont County Recorder's web site.
- Look in the "Covenants, Conditions and Restrictions" for your subdivision

After checking these sources, if you are still unable to determine the location or if a pond was designed as a storm water management basin, contact the Clermont Soil & Water Conservation District for assistance.

The information in this booklet is based on the following publications:

Maintaining Stormwater Control Measures: Guidance for Private Owners & Operators, Northeast Ohio Storm Water Training Council, July 2015

Ohio Pond Management Handbook, Ohio Department of Natural Resources, Division of Wildlife

Stormwater Wet Pond and Wetland Management Guidebook, U.S. Environmental Protection Agency, EPA 833-s-09-001, February 2009.

ARE YOU RESPONSIBLE FOR RETENTION BASIN MAINTENANCE?

Responsibility for maintenance varies. Some retention basins in Clermont County have been placed into a “public watercourse” program or are part of a “storm water district,” where property owners with land that contribute flow to the basin pay an annual fee to the Clermont County Engineer’s Office, which in turn assumes responsibility for maintenance. Retention basins are generally placed into this program during the development phase; however, residents can petition the Board of County Commissioners to assume maintenance for a basin either through the public watercourse program or through the creation of a storm water district. If you are unsure if a basin is in the program, or are interested in placing your existing basin in one, contact the Engineer’s Office at (513) 732-8857.

In most other cases, if a retention basin is located on private property, the party responsible for maintenance will either be the lot owner or the homeowners association. To find out if the HOA is responsible, refer to the record plat (available through the Clermont County Recorder’s Office) and/or the HOA’s Covenants and Restrictions.

It is important to check your maintenance agreement to identify your specific legal obligations. If you cannot determine who is responsible for maintenance, contact the Clermont Soil & Water Conservation District at (513) 732-7075 ext: 3 for assistance.

Safety and liability are often big concerns for those who have a basin on their property, giving rise to many questions. Does a basin create additional liability concerns? Should a landowner take precautions to prevent access to a basin? What if a child trespasses and becomes injured? Are all homeowners in an HOA or subdivision liable or only those homeowners who own lots that adjoin the basin?

In Ohio, the answers to these questions depend generally upon whether the landowner met his legal “duty of care” to the person harmed by the basin. The Ohio State University Extension Office has created a fact sheet titled “Ponds and Legal Liability in Ohio,” which explains the factors affecting a landowner’s legal duty of care to pond visitors. An online link to this publication can be found at: <https://www.clermontswcd.org/pond-management/> It also discusses how a landowner can fulfill this legal duty and how to manage a pond to prevent or limit liability for harm to visitors. While this fact sheet specifically deals with ponds, much of this information may also be transferrable to retention basins.

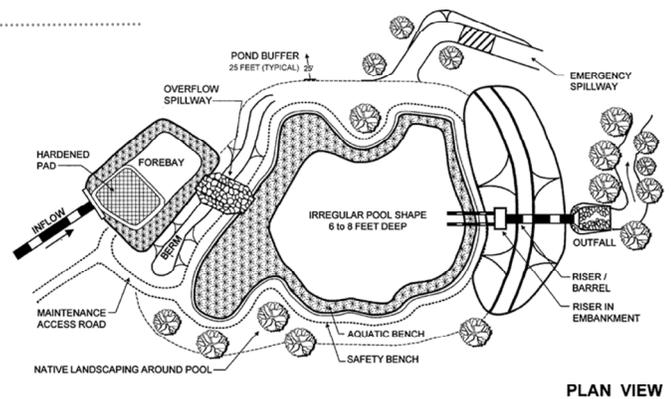
Please note that the information provided above is not intended to offer legal or other professional services. The reader should seek the services of a competent attorney if legal advice is necessary.

BASIN COMPONENTS

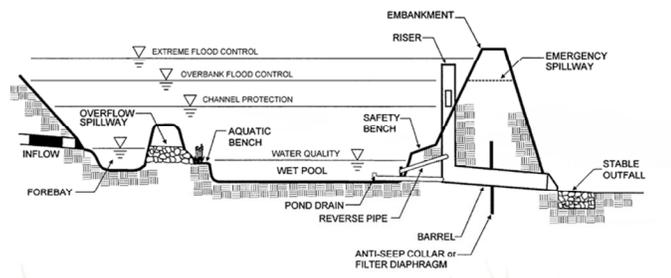
A retention basin contains different components, including inlet pipes (there may be one or multiple inlets), the side slopes and bottom, the permanent pool of water, an outlet structure or riser, the outlet pipe, an embankment and emergency spillway, and riprap that is usually placed around pipes where they enter and exit to prevent erosion.

Outlet structures vary from basin to basin, but will typically include a minimum of two outlets - a small diameter outlet and a larger diameter overflow. Outlets may be covered by a trash rack or metal grate.

Newer, more advanced retention basins may include a forebay, which is a settling pool located at the inlet to a basin, and is separated from the rest of the basin by a level dike. The purpose of the forebay is to collect sediment before it enters the main basin. By concentrating sediment in the forebay, it becomes much easier (and less expensive) to clean the sediment out.



PLAN VIEW



PROFILE

Source: *Stormwater Wet Pond and Wetland Management Guidebook*, U.S. Environmental Protection Agency, EPA 833-s-09- 001, February 2009.

BASIN

MAINTENANCE



A consistent maintenance program is the best way to ensure that a retention basin will continue to perform its water quality functions. In general, a maintenance program should contain the following components:

- Maintain access for inspection and maintenance
- Regular inspections
- Debris and litter removal
- Vegetation management
- Embankment and outlet stabilization
- Sediment removal.

The remaining sections of this Guidebook will describe the maintenance tasks required for proper basin function as well as frequency of various tasks. It will also review property management activities that benefit your basin.

INSPECTING & MAINTAINING YOUR RETENTION BASIN

The first step in a maintenance program is to obtain and review a copy of the retention basin design, either through the homeowners association or the Clermont County Building Inspection Department.

Basin Access

It's important to insure proper access to the basin for regular inspection and maintenance activities. Access should be wide enough for heavy equipment that may be needed for dredging or major repairs. Be aware of any HOA prohibition against homeowners placing fences, outbuildings, landscaping or anything which might interfere with proper access.

Record Keeping



It is important to keep records of all inspections, maintenance activities, repairs and costs. An annual Retention Basin Inspection and Maintenance Checklist has been provided at the back of this guidebook for your use to assist in documentation.

Management Costs



An effective basin management program does come with costs, and retention basin owners should plan accordingly. **The Center for Watershed Protection has estimated that the annual cost of routine maintenance is typically about 3 to 5% of the construction cost.** With good record keeping, the owner can determine annual costs more accurately. Owners should set aside money for routine maintenance as well as the occasions when outside expertise or equipment is needed to maintain, upgrade or repair a basin.



Retention pond outlet structure partially blocked by debris



Goose droppings-Yuck

REGULAR INSPECTIONS / MAINTENANCE: THE KEY TO KEEPING A WELL MAINTAINED BASIN

The following maintenance and inspection tasks should be conducted for basin structures. Please also refer to the inspection schedule at the back of this guidebook.

Monthly and after major storms:

- Inspect inlet pipes and outlet structure for clogging. Any sediment or debris found to be blocking the inlets or outlet structure, even partially, should be removed. Small amounts of removed sediment can be spread evenly on upland areas and seeded. All trash and debris throughout the basin should also be removed.

Early spring, fall and after major storms:

- Inspect the entire basin for debris in early spring, fall, and after major storms. If necessary, clear large limbs and other debris that may ultimately block the outlet structure. If the spillway structure is frequently found to be clogged or partially clogged, debris within the basin area should be cleared on a more frequent basis.
- Inspect riprap at the inlet and outlet pipes. Check for erosion around the pipe. Replace riprap when missing or clogged with sediment and debris.



Blocked inlet to retention pond - Regular cleaning will prolong the life of the structure.

Annually:

- Inspect the inlet pipes and outlet structure for structural integrity - ensure they aren't crumbling or broken. Do not enter any pipes to complete inspection (such as the outlet pipe under the embankment). Many local contractors have camera equipment that can be used to inspect these pipes.
- Inspect for excess sediment accumulation. Remove every 5-10 years or when 12 or more inches of sediment has accumulated. If the basin has a forebay, remove sediment when the forebay capacity has been decreased by 50%.
- Inspect any safety-related structures, including fences and gates, for problems or defects. Correct as necessary.

Every 5-25 years

- Remote camera inspection of hard to access piping. Repair or replace pipe as necessary.

POSSIBLE MAINTENANCE ISSUES

Basin Leaks

Retention basins differ from dry detention basins in that they maintain a permanent pool of water year round. One problem basin owners may face is a pool level that is too high or too low. The water level should not drop substantially below the normal (dry weather) pool level unless under drought conditions. Likewise, levels should not remain high for more than three days after a storm.

When pool levels drop too low, algal blooms can occur, as can low dissolved oxygen conditions, which may lead to fish kills and mosquito problems. Low water levels that are not drought-induced are usually caused by leaks in the pond embankment / perimeter, the spillway, or in the pond bottom.

Leaks within the embankment or the bottom of the pond can be hard to find unless they are large. Active leaks could produce a vortex which would indicate the location of the leak. Water may leak through sinkholes formed in pond bottoms or infiltrate through porous underlying soils (not a common problem in Clermont County). Basin leaks through the embankment or bottom can often be sealed with clay material such as bentonite. Bentonite clay is typically available at farm and drilling equipment stores and is sold as a dry powder that expands when wet. Bentonite works best when incorporated into the basin's soil after it has been drained. If the basin cannot be drained, a slurry can be added uniformly across the surface, although this is usually less effective. Geomembranes and other plastic liners can also be used to seal leaky ponds, although they are more expensive solutions.

Clogging

Clogged inlet pipes and outlet structures are among the most common problems in retention basins. Material such as dead plants, branches and leaves as well as litter and trash typically cause the clogging. Clogging can occur quickly when large amounts of material are washed in during heavy storms, or problems may grow over time as larger items catch smaller materials, eventually creating a blockage.

Clogged inlet pipes can cause flooding further up in the system, possibly impacting roads and homes. Clogged outlet structures can prevent the basin from draining. High water levels for more than three days after a storm are typically a sign of a clogged low flow outlet. This can cause several problems - little to no storage volume is left for the next storm, plants around the edge of the basin may die if their roots are flooded for too long, and wet areas created outside the permanent pool can become mosquito breeding habitat.

Routine inspections and clearing of material, especially after major storms, greatly minimizes the risk of clogging. Trash racks installed at the outlet structure can help prevent clogging; however, it's essential that these are cleaned of debris on a regular basis or as needed.

Keep in mind that clearing clogged openings can be dangerous, as strong flow can be generated instantaneously when the clog is removed. If removing an obstruction seems like it might be unsafe, leave it to a qualified contractor.



Pond trash rack (Photo: EPA)

Pipe / Outlet Structure Failures

Pipes entering and leaving the basin are designed to be watertight. Over time, problems including cracking, corrosion, separated joints and other long-term wear and tear issues may occur that allow ground water (and the surrounding soil) to enter the pipe which could lead to a sinkhole forming. Water leaking from the pipe could also move along the outside of the pipe (**known as "piping"**) resulting in erosion and possible failure of the embankment.

Most pipes can be visually inspected from the open end or from the grate; however, some cannot be inspected without entering them or conducting a remote video inspection. In these cases, inspection work should be left to qualified professionals who are versed in confined space entry as regulated by state and federal OSHA standards. Some pipes are impossible to inspect manually (such as a 6-inch underdrain), and remote video inspection or complete unearthing are the only options. A professional contractor should be hired if pipe repair or replacement is necessary.



Badly corroded outlet pipe

Embankment (Dam) Failures

Indications of a structural failure in the basin embankment include:

- Landslides or erosion on the embankment
- Cracks in the embankment or spillway
- Discharge of water through the downstream face of the embankment

Causes:

- Piping of water along the pipe leaving the outlet structure can lead to erosion and eventual failure.
- Rodents such as muskrats can pose serious problems as their burrows allow water to travel through the embankment. Cattails and other tuberous water plants attract muskrats & should be removed from the dam area and limited in other areas of the retention pond.
- Trees or large shrubs should not be allowed to grow on the embankment, as their root systems can provide pathways for water to flow through the embankment.



Shoreline slumping / erosion
(Photo: Clemson University)

****If indications of embankment failure are observed, immediately seek advice from a professional engineer.**

Sedimentation

Retention basins are designed to capture sediment, and eventually need to be cleaned out (dredged) to maintain their effectiveness. The best way to determine if a basin needs dredging is to monitor the depth to bottom when the pond is at its normal pool level.

When removing sediment from smaller basins, the water may be drawn down to a point where the sediment can dry. After the material is dried, heavy equipment such as a backhoe can remove the sediment from the bottom of the pond.

Hydraulic suction or mechanical dredging from barges can be used to remove sediments from larger ponds that cannot be drained. Once collected, sediments are usually dewatered and either disposed of onsite, transported and used elsewhere, or landfilled. If the basin takes flow from an area that can contribute hazardous pollutants (such as a gas station), the sediments should be tested for these pollutants and disposed of as hazardous waste if they are found.



Excessive sedimentation in a drained basin

Nuisance Vegetation

Aquatic vegetation can provide many benefits, including filtering and removal of pollutants, but can also cause problems if it becomes too abundant, especially around basin inlets and outlets where it can cause blockages. Problems with excessive growth tend to occur in small shallow basins, or larger basins that have accumulated sediment over the years. To prevent nuisance vegetation from becoming established, basins should be cleaned of sediment when necessary, particularly around inlets and outlets where sedimentation tends to accumulate.

Nuisance plants can be physically removed or treated chemically. Certain plants, such as cattails, can be very difficult to remove, and special equipment may be needed. Chemical treatment can involve the use of shading products or aquatic herbicides. Shading products usually contain safe dyes that color the water blue or black. The dye pigments absorb sunlight and prevent light penetration, thus helping to control algal/aquatic plant growth. Dyes are most effective in basins with small watersheds. If herbicides are used, it's important to first identify the plant in order to select the appropriate herbicide. Once the correct product has been selected, read the product label, carefully follow application instructions, or contract a licensed applicator to select and apply the chemicals.



Excessive vegetation in retention basin

Pond management companies can help identify and control nuisance aquatic vegetation. Three companies near Clermont County include:

Aqua Doc
3828 Round Bottom Rd,
Newtown, OH 45244
(800) 689-5253
<https://aquadocinc.com>

Jones Fish Hatcheries
3433 Church St,
Cincinnati, OH 45244
(800) 662-3474
<https://jonesfish.com>

ATAC
4229 Wilmington Rd.
Oregonia, OH 45054
(888) 998-7663
www.atac.cc

Waterfowl Problems

Waterfowl problems typically involve year-round duck and geese populations (usually Canada Geese). Water quality often becomes degraded due to increased bacteria counts and nutrients from goose and duck droppings. Droppings on parking lots, paths, pond side slopes and other areas are easy problems to spot.

It is important to note that Canada Geese, their nests, and their eggs are legally protected and cannot be harmed; however, non-lethal scare and hazing tactics which do not harm the geese are allowed. Some of the following actions can help discourage their presence:

- Adding shoreline vegetation and no-mow zones to make their approach more difficult.
- Harassing them using noise makers or lights.
- Introducing predators such as snapping turtles.
- Using proprietary products for managing/discouraging waterfowl/goose populations.

If non-lethal tactics have been used in the past, without success, the ODNR Division of Wildlife may issue a permit to allow the landowner to destroy nests or the geese.

Water Quality Issues

Without proper maintenance, nutrients such as nitrogen and phosphorus that are typically found in fertilizers and yard waste can accumulate in retention basins leading to such problems as low dissolved oxygen, algal blooms, unsightly conditions and odors. Excess sediment can also accumulate and smother vegetation or clog outlets. All of these pollutants can also be “flushed” into streams during large storms.

There are steps you can take in the basin and the area draining to the basin that can help improve water quality:

- A 10-foot unmowed vegetated buffer around the perimeter of the basin (excluding the dam embankment) can filter pollutants and help prevent shoreline erosion. This also discourages geese from accessing the pond easily.
- Dissolved oxygen levels can be boosted with a diffuser or aerator.

Additional steps that individual property owners can take:

- Don't place yard waste (leaves, grass clippings or brush) in the retention basin, drainage ways, or storm drains. Yard waste can block basin inlet and outlet pipes, and it releases excess nutrients as it decomposes.
- Don't dump any materials, such as motor oil, paint or anything else into the storm sewer system. **This is illegal** and will pollute the basin.
- Don't use unapproved or unnecessary amounts of pesticides or herbicides. These will wash from the basin into local streams and rivers. They are also harmful to wildlife such as bees, frogs, toads, fish, and dragonflies. We suggest you spot treat problem areas rather than treat the entire lawn.
- If you use fertilizers, test your soil first to find out what nutrients are lacking, and **apply only what is needed**. The OSU Extension Office in Owensville offers soil testing for a low fee. Use low-phosphorus, slow-release varieties. Keep fertilizers on the lawn and not on paved areas. Fertilize after and not before a rain storm. Never fertilize when heavy rain is predicted.
- Pick up and properly dispose of pet waste.
- Mow high, and avoid mowing directly to the edge of lakes and streams. Sweep grass clippings from sidewalks and curbs and either compost or bag. Do not hose off clippings from driveways and sidewalks into the storm sewer system. Grass clippings can get into the water and add excess nutrients as they break down.
- Collect roof runoff in a rain barrel to use for watering plants and gardens. Locally, you can purchase rain barrels from Clermont SWCD, Lowes, Home Depot or online.
- Educate your neighbors. Share information and management tips with them. If your community has a web site or social media page, post helpful tips on these.



Heavy algae present

SAMPLE INSPECTION SCHEDULE

Activity	Frequency
Inspect inlet/outlet pipes and spillway for debris, sediment accumulation or other blockages	Monthly and after major storms
Inspect side slopes for barren or eroded areas	Early spring and fall
Inspect/clear pond of debris, tree limbs, dead vegetation, etc.	Early spring, fall, and after major storms
Rip rap inspection, replace as needed	Early spring, fall, and after major storms
Inspect inlet/outlet pipes for structural integrity	Annually*
Inspect safety-related structures (e.g., fences, gates) for defects	Annually
Inspect integrity of dam	Annually*
Inspect for invasive plant species	Annually
Inspect for sediment accumulation	Annually
Clean excess sediment from pond	When more than 12 inches has accumulated, roughly every 5-10 years.

** If indications of failure are observed, immediately seek advice from a professional engineer.*

Local Contact Information:

Clermont Soil & Water Conservation District

1000 Locust Street, PO Box 549
Owensville, OH 45160
(513) 732-7075

Clermont County Engineer's Office

2381 Clermont Center Drive
Batavia, OH 45103
(513) 732-8857

Clermont County Building Inspection Department

2275 Bauer Road
Batavia, OH 45103
(513) 732-7213

Ohio State University Extension Office

1000 Locust Street, PO Box 670
Owensville, OH 45160
(513) 732-7070

SAMPLE OPERATION AND MAINTENANCE AGREEMENT



All detention basins eventually need maintenance. Setting up an operation and maintenance agreement at the inception of the detention basin assures continued success as owners have a clear understanding of the operation and maintenance of the basin. For a sample of a typical operation and maintenance agreement, please contact the Clermont Soil and Water Conservation District.

Retention Basin Inspection Maintenance Checklist

Pond Owner:	Date:	Time:
Location/Address:		
Date Last Inspection:	Weather:	
Inspected By:	Title:	
Pretreatment: <input type="checkbox"/> vegetated filter strip <input type="checkbox"/> forebay <input type="checkbox"/> None <input type="checkbox"/> Other:		
Site Plan Available? <input type="checkbox"/> Yes <input type="checkbox"/> No		

Inspected Structure	Comment	Action Needed
1. FOREBAY / OTHER PRETREATMENT		
Sediment has accumulated	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Trash & debris accumulation	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. INLETS		
Poor structural condition	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Sediment blocking inlet	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Erosion around inlet	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
3. EMBANKMENT		
Cracks, sinkholes or seeps visible	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Trees or woody vegetation on dam or embankment	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
4. BASIN PERMANENT POOL		
Trash & debris accumulation	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Sediment accumulation has reduced pool volume	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Invasive plants are present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Erosion present at shoreline	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Excessive algae present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
5. SIDE SLOPES		
Erosion Evident	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Animal burrows, sinkholes, instability present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
6. OUTLETS & OVERFLOW STRUCTURES		
Poor structural condition	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Erosion around outlets / outlet structure	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Sediment, trash, debris accumulation or blockage	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No
Joints water tight / no leaks	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No

