

Maintaining Your Detention Basin:

A Guidebook for Private Owners in Clermont County



A well maintained detention basin



BASINS

INTRODUCTION

Your detention basin is a storm water best management practice (BMP) designed to temporarily capture and hold storm water runoff during periods of heavy rain, and slowly release this flow over a period of one or two days so it minimizes flooding and streambank erosion problems downstream. They also help remove sediments from storm water runoff, which helps improve the quality of local streams. Like most other things, a detention basin may not function properly or it may fail prematurely if not properly maintained. Once a detention basin fails, it is often very expensive to correct.



Many detention 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 detention basins. Rather, these are the responsibility of the lot owner to maintain.

Whether you are an individual property owner, a homeowner's 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 detention basin, improve its appearance, help prevent flooding and property damage, and enhance local streams and lakes.

WHAT ARE DETENTION 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 possibly cause downstream flooding.

A detention basin is a man-made depression that collects and temporarily holds storm water runoff. Your detention basin (along with others in the area) helps to slow the rate of storm water runoff from the neighborhood and improve the quality of the storm water leaving the detention basin. Your detention basin is important because:

- it collects and detains storm water
- it helps settle out and hold sediment
- it protects local creeks and private property
- it reduces downstream flooding

There are different types of storm water management basins. 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 the focus of this Guidebook. Others are designed to have a permanent pool of water and are commonly called wet ponds or retention basins. These wet ponds hold water throughout the year, but also have extra storage space that fills with water after a storm. This Guidebook only deals with the care and maintenance of dry detention basins.



Photo courtesy of EPA

DO YOU HAVE A DETENTION BASIN NEAR YOUR PROPERTY?



In Clermont County, if your development was built after 1990, it will likely have a detention basin that manages storm water runoff. If you live in a residential community, your homeowners' association (HOA) dues may help pay for detention basin maintenance. The HOA leadership should have access to information about the locations of any detention basins. If your development does not have an HOA, or the HOA has no information, here's how to check to see if a detention 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 of a basin, contact the Clermont Soil & Water Conservation District for assistance.

ARE YOU RESPONSIBLE FOR DETENTION BASIN MAINTENANCE?

Responsibility for maintenance varies. Some detention basins in Clermont County have been placed into a "public watercourse" program, where property owners with land that contribute flow to the detention basin pay an annual fee to the Clermont County Engineer's Office, which in turn assumes responsibility for maintenance. Detention 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 (both of which would involve residents paying a fee for maintenance). If you are unsure if a detention basin is in the program, contact the Engineer's Office at (513) 732-8857.

In most other cases, if a detention 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 for assistance.

BASIN COMPONENTS



A detention basin contains different components, including inlet pipes (there may be one or multiple inlets), the side slopes and bottom, a low flow channel, the outlet structure, the outlet pipe, an embankment and emergency spillway, and rip rap that is usually placed around pipes where they enter and exit to prevent erosion.

Outlet structures vary from basin to basin, but all will 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 detention 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. Some detention basins may also include a *micropool*, which is a small, shallow, permanent pool of water near the outlet designed to prevent re-suspension of sediment and clogging of the outlet.



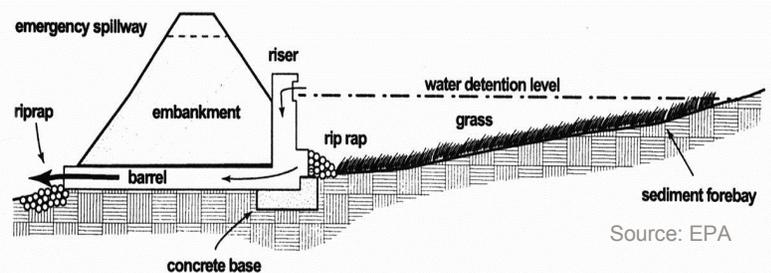
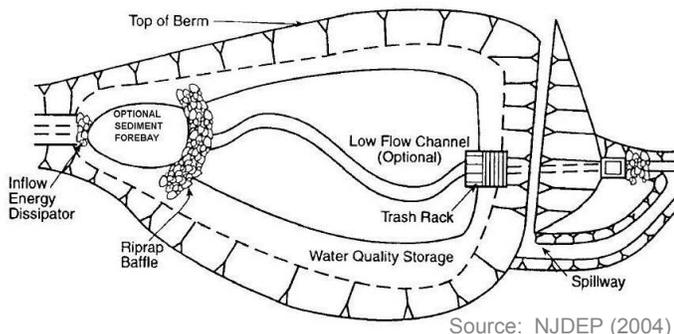
Basin Outlet Structure

SAFETY & LIABILITY

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 that 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. 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 detention 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 MAINTENANCE



A consistent maintenance program is the best way to ensure that a detention 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 control;
- Vegetation management;
- Embankment and outlet stabilization; and
- 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. The Guidebook will also review property management activities that benefit your basin.

MAINTAINING YOUR DETENTION BASIN



The first step in a maintenance program is to obtain a copy of the detention basin design, either through the homeowners' association or the Clermont County Building Inspection Department. Review the engineering design!

Basin Access

Insure that you have 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. Consider 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 associated costs. An annual Detention 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 detention basin management program does come with costs, and detention 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.



Detention basin overflow weir



Basin inlet in background and outlet structure with trash rack in center, which has been helpful in preventing debris from being discharged.



Detention basin outlet structure; mowing here would be helpful

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 for sediment, trash or other debris that may be blocking the inlet or outlet pipes, as well as the spillway.* Debris and sediment commonly clog detention basins and reduce the basin's overall effectiveness. Additionally, improperly maintained basins can harbor breeding areas for mosquitoes. Any sediment or debris found to be blocking the inlets or outlet structure, even partially, should be removed. Remove accumulated sediment with a shovel and wheelbarrow if it is blocking water flow. 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.



Outlet structure blocked with sediment and debris

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. Dead vegetation should be raked out in early spring. 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.
- *Check for standing pools of water, especially in the low flow channel.* Eliminate these as they are found, either by filling in low spots and seeding, or by re-grading the problem area.

Twice a year and after major storms:

- Inspect riprap at the inlet and outlet pipes. Check for erosion around the pipe. Replace riprap when missing or clogged with sediment and debris.

Annually:

- *Inspect the inlet pipes and outlet pipe for structural integrity* - check inlet/outlet pipes to 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 in the basin* - Remove every 5-10 years or when 6-12 inches of sediment has accumulated.
- Inspect any safety-related structures, including fences and gates, for problems or defects. Correct as necessary.

SEDIMENT REMOVAL

Excess silt and sediment can collect over time and reduce the storage capacity of the detention basin. In addition, sediment tends to collect around the outlet structure and may block the outlet. To prevent too much sediment from building up:

- Inspect the basin for sediment accumulation annually
- Remove excess sediment when six inches of sediment has accumulated in the basin, or approximately every 5-10 years.
- If the basin has a forebay, remove sediment when the forebay capacity has been decreased by 50%.

Sediment removal is fairly simple if access is available for the equipment. Front-end loaders or backhoes can be used to remove the accumulated sediment. Sediment removal should be done under the dry weather/dry soil conditions, otherwise, de-watering of the sediments might be necessary. Waste sediments are typically treated as uncontaminated soils and can be used as fill material; however, if soil is contaminated and deemed to be hazardous, it must be disposed of in a hazardous waste landfill.

MANAGING FOR MOSQUITOES



Mosquito problems may occur in detention basins that are not functioning properly and are not maintained. The best control technique is to ensure that stagnant pools of water do not develop. There are a variety of other things you can do to reduce the number of mosquitoes in your environment:

- Install bird houses or bat boxes near the basin.
- Cattails and bulrushes attract dragonflies and other mosquito-eating insects.
- Dense shrubs and brush often provide a habitat for birds and mosquito-eating insects.

VEGETATION MANAGEMENT



Vegetation should be maintained throughout the basin to prevent erosion, including the basin bottom, side slopes, and both sides of the dam. Turf grass is the most common groundcover, although other vegetation, such as deep-rooted native plants, can be used to improve basin performance by allowing more water to infiltrate (to soak into the soil). If something other than turf grass is used in the basin bottom, care should be taken to use plants that can withstand temporary inundation and wet soils as well as periods of extended dryness.

If vegetation in a basin is not managed, problems can result. To stay ahead of problems:

- In the spring and fall, inspect the vegetation along the side slopes and basin bottom.
- Re-seed any barren or eroded areas which have developed.
- Any small erosion gullies which have appeared should be completely filled with well-compacted soil, re-seeded, and monitored for recurrence. If the erosion problems are severe, do not simply fill in the eroded area with soil or other material—contact the Clermont Soil & Water Conservation District at (513) 732-7075 for guidance.
- In the spring, remove decomposing vegetation if it is clogging pipe openings.
- Mow at least twice a year if turf grass is used as the groundcover in the basin to prevent trees and woody plants from becoming established. The basin may be mowed more frequently for aesthetic purposes. It is recommended that a grass height of 2 inches be maintained.



No trees or shrubs should be planted or allowed to grow within 15 feet of inlet or outlet pipes or manmade drainage structures such as spillways or earthen embankments. Plants with roots that seek water, such as willow or poplar, should not be used within 50 feet of pipes or manmade structures.

Once a year, the detention basin should be inspected for the appearance of invasive species, including honeysuckle, Callery pear, autumn olive, buckthorn (common & glossy), purple loosestrife and phragmites. Vines can also be a nuisance around the inlet and outlet structures. There are different strategies for effectively removing different invasive species. The Ohio State University Extension Office in Clermont County (513-732-7070) can provide guidance on invasive species treatment and removal. If herbicides are to be used, only approved, aquatic-use herbicides should be used in detention basins. It is highly recommended that a qualified licensed professional be used for herbicide applications.

Cattails



There are good and bad points about the common cattail. On the plus side, the common cattail (*Typha latifolia*) is a native species and is effective in removing excess nutrients from storm water runoff. On the down side, cattails have a tendency to invade and grow quickly, crowding out other desirable species. Many people also feel they are aesthetically unpleasing. If you choose to allow cattails to grow in the basin, there are some important things to keep in mind. Cattails should be kept clear of the outlet structure, as they can cause blockages. Cattails should also be kept away from the dam area. Cattails can encourage muskrats, and their burrows can affect the integrity of the dam. If you wish to eliminate the cattails in the future, it is important to note that cattails can be very difficult to remove, and special equipment may be needed.

EMBANKMENT AND OUTLET STABILIZATION

A structural failure can occur in the basin embankment or outlet structure. Indications of a failure include:

- landslides on the embankment,
- cracks in the embankment or spillway,
- discharge of water through the downstream face of the embankment, or
- continuous ponding days after the end of a rainfall.

If these conditions are observed, immediately seek advice from a professional engineer. To minimize the chances of such problems occurring, remove any trees or large shrubs growing on downstream side of the basin berm to eliminate habitat for burrowing rodents.

BASIN MANAGEMENT

WHAT CAN THE HOMEOWNER DO:

INDIVIDUAL PROPERTY MANAGEMENT WITHIN THE DRAINAGE AREA



There are many steps that property owners can take to ensure that the detention basin functions properly and to minimize long-term maintenance. A number of these activities are described below:

- Do not place yard waste such as leaves, grass clippings or brush in the detention pond, drainage ways, or in the storm drains located in the streets. Yard waste can block basin inlet and outlet pipes. This material also releases excess nutrients as it decomposes. Nutrients, such as nitrogen and phosphorus, are among the most significant pollutants of concern in local lakes and streams.
- Do not dump any materials, such as motor oil, into the storm sewer system. Improperly disposed of materials will pollute the basin. It is also illegal.
- Do not use unapproved or unnecessary amounts of pesticides, herbicides, or fertilizers. These products will wash from the basin into local streams and rivers. In addition, these chemicals can be harmful to the wildlife, such as bees, frogs, toads, fish, and dragonflies.
- 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 Clermont County offers soil testing for local residents. 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. To find out where you can purchase a rain barrel, contact the Clermont Soil & Water Conservation District.
- 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.

RETROFITS AND ENHANCEMENTS: IMPROVING YOUR BASIN



Detention basins are primarily designed to reduce the rate of storm water runoff to downstream areas. While they do remove some sediments, there are numerous opportunities for improving the ability of a detention basin to remove pollutants and improve water quality. Some common retrofits include:

- **Removal of concrete low flow channels:** Concrete channels increase both the volume and rate of flow of storm water runoff, as they do not provide any chance for water to soak into the ground.
- **Installation of a sediment forebay:** Installing forebays at all pipe inlets will trap coarse sediment, thus improving water quality and improving ease (and cost!) of maintenance.
- **Modifying the existing outlet structure:** Newer detention basin outlet structures provide extended detention of smaller storm events, thus promoting improved water quality in nearby streams or rivers.
- **Dredging:** Dredging accumulated sediment provides more capacity and often improves the infiltration capacity of dry basins.
- **Convert the basin into a bioretention basin:** A “bioretention basin” is essentially a large rain garden with a bed that is graded flat (so water spreads evenly across it) and planted with native vegetation that filters and removes pollutants and also improves the permeability of the soil. In some instances, grants may be available to convert a detention basin into a bioretention area. If this is something that interests you, contact the Clermont Soil and Water Conservation District for more information.
- Before any changes to a detention basin are made, it is necessary that you contact the Clermont County Building Inspection Department at (513) 732-7213 to determine what plans and permits are required.

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
Check for standing pools of water, eliminate when found	Early spring, fall, and after major storms
Mowing	At least twice annually
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 6-12 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.

Dry Pond or Dry Extended Detention Basin Inspection and Maintenance Checklist

Facility:			
Location/Address:			
Date:	Time:	Weather Conditions:	Date of Last Inspection:
Inspector:		Title:	
Rain in Last 48 Hours <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, list amount and timing:			
Pretreatment: <input type="checkbox"/> vegetated filter strip <input type="checkbox"/> swale <input type="checkbox"/> forebay <input type="checkbox"/> other, specify:			
Site Plan or As-Built Plan Available: <input type="checkbox"/> Yes <input type="checkbox"/> No			
Inspection Item		Comment	Action Needed
1. 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 and debris have accumulated.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
2. DEWATERING			
The water quality orifice is visible.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
3. INLETS			
Inlets are in 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 has accumulated and/or is blocking the inlets.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Erosion is occurring around the inlets.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
3. EMBANKMENT			
Sinkholes or cracks are visible in the embankment.	<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 present on the 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 OR BOWL AREA			
Trash and debris have accumulated.	<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 is evident on the basin floor or low flow channel.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
The micro-pool has sediment accumulation.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Sinkholes or animal borrows are 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 AND EMBANKMENT			
Erosion is evident.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Sinkholes, animal borrows or instability are present.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
6. OUTLETS AND OVERFLOW STRUCTURE			
Outlets or overflow structures in 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, trash or debris is blocking the outlets or overflow structure.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Erosion is occurring around the outlets or overflow structure.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Joints are not water tight and/or leaks are visible.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		<input type="checkbox"/> Yes <input type="checkbox"/> No
Additional Notes			

**Urban
Tech Team**



This publication was initiated by the Area IV Urban Tech Team.

Urban Tech Team, Area IV: Soil and Water Conservation Districts of Ohio