Stormwater

Best Management Practices Guide for Homeowners Associations and Commercial Facilities



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Stormwater Best Management Practices Guide for Homeowners Associations and Commercial Facilities

Stormwater runoff in residential and commercial areas is often managed on site or within the area of a residential subdivision or commercial complex using stormwater facilities or Best Management Practices (BMPs).

Stormwater BMPs clean stormwater runoff before it enters our local creeks, the Boise River, or groundwater. Some BMPs also decrease the volume of runoff discharged to creeks and the river during storm events by slowing the runoff down and allowing it to seep into the ground or evaporate. Responsibility for maintaining stormwater BMPs and the stormwater drainage system varies. Within and alongside public roadways, maintenance is generally performed by the Ada County Highway District. BMP maintenance for commercial properties is typically the responsibility of the property owner. In residential subdivisions, maintenance responsibility may be shared between private parties and one of the local public entities that make up the Partners for Clean Water.

This manual provides guidance for individual homeowners and homeowners associations, as well as, business and commercial property owners/managers on how to identify which type of stormwater BMPs have been installed for your neighborhood or facility. The guide also discusses how several stormwater BMPs work, making it easier to identify common issues. The guide also describes routine maintenance needs and general good housekeeping practices to keep BMPs and the stormwater drainage system functioning properly. This guide includes information about the function and general maintenance requirements of the stormwater drainage system and common stormwater BMPs. Individual fact sheets address:

- ✓ Stormwater Drainage System
- ✓ Dry Ponds (Basins)
- ✓ Wet Ponds (Basins)
- ✓ Swales

In residential subdivisions and commercial facilities light maintenance is typically the responsibility of private parties such as the individual homeowners and homeowners associations or business and commercial property owners/managers. Light maintenance generally consists of clearing litter and other small debris, mowing, and maintaining important signage where needed. Heavy maintenance is typically the responsibility of one of the Partners for Clean Water agencies. This may include repair to structures that are part of the stormwater BMPs, sediment removal from the bottom of wet and dry ponds, or repairs to curbs, gutters, and roadways. Contact the Partners for Clean Water agency that approved your maintenance and operation plan before making any changes that may impact the function of a BMP (such as changing vegetation planted, regrading, or changing the BMP shape or depth). Additional review, approvals, and/or agreements may be required.

Refer to the stormwater facilities maintenance and operation manual for your subdivision or facility for more specific information on caring for your stormwater BMPs. You may also visit the Partners for Clean Water Website at www.partnersforcleanwater.org for additional resources and Partners contact information.

Partners for Clean Water: Ada County Highway District, Boise State University, City of Boise, City of Garden City, Ada County Drainage District #3, Idaho Transportation Department District #3



Stormwater Drainage System

The Stormwater drainage system is more than just pipes. It consists of the whole network of structures, BMPs, and surfaces that move stormwater runoff away from homes and businesses to a receiving water such as a creek or river, or to groundwater. These systems are designed to move stormwater quickly and efficiently without creating unsafe conditions for drivers, pedestrians, residents, customers, or workers.

HOW THEY WORK

Roadways, parking lots, and gutters are designed with a gentle slope so that when it rains the stormwater naturally moves off of driving or walking surfaces toward storm drains and BMPs. In some areas stormwater may be conveyed away from a property or subdivision and mix with stormwater from other areas in the municipal separate storm sewer system prior to entering a larger, regional stormwater BMP or being discharged to a surface water at a larger outfall.



Stormwater drainage systems can vary significantly. Understanding the pathway of stormwater runoff from pavement to outfall in your neighborhood or commercial property is important to keep the system functioning properly.



Maintaining design grade in parking lots is important to keep stormwater flowing in the right direction.



from the road or parking lot to the outfall.



Grates over storm drain inlets should be kept clear of sediment and debris to avoid clogging and subsequent flooding.

MAINTENANCE AND GENERAL HOUSEKEEPING

Roadway, gutter, catch basin, and storm drain pipe maintenance are the responsibility of the Ada County Highway District in the majority of urban areas and subdivisions. However, maintenance of parking areas is typically the responsibility of individual businesses, commercial complex managers, or homeowners associations.

Regular maintenance and good housekeeping are critical to keeping stormwater runoff flowing in the right direction. These activities may include:

- Clearing gutters and catch basin inlet grates: Trash, sediment, and debris in the street and gutters can get washed down to surface waters or clog catch basin grates and storm drain pipes.
- **Regular inspections:** Inspecting gutters, catch basins, and other visible stormwater structures on a regular basis is an effective way of identifying issues early. Conducting inspections when stormwater runoff is present can identify issues that may not be apparent during dry weather inspections.
- Irrigation maintenance: Overspray or overwatering can result in excess flow in gutters and storm drain pipes, potentially transporting pollutants downstream while also reducing storage capacity. Adjust sprinklers and irrigation structures as necessary to keep excess irrigation water out of the stormwater drainage system.

COMMON ISSUES

Some common issues that arise with stormwater drainage systems include:

- Standing water and irrigation runoff in stormwater drainage system
- Localized subsidence of gutters, creating low spots that retain water
- Vegetation growing through cracks in gutters or pavement
- Blocked or broken pipes, catch basins, or other flow structures

Issues are often identified by visible degradation of the parts of the system (i.e., cracked or crumbling curbs and gutters and broken pipes or grates). Stormwater drainage systems are designed to move water out of traffic areas guickly, therefore flooding or standing water outside of a stormwater BMP is an indication of a problem at some point in the system.

For recommendations on how to resolve these issues, refer to your subdivision's or facility's manual for light maintenance of stormwater facilities or the City of Boise's Resource Guide for Operation and Maintenance of Stormwater Systems.



Dry Ponds/Basins

Dry ponds, or basins, may be designed to slow stormwater down (detention pond) and provide some treatment before allowing it to flow to an outfall, or they may be designed to capture and hold the stormwater (retention pond) until it infiltrates into the ground or evaporates. Dry ponds should not have standing water in them for more than a couple days after a storm.



Structures in the pond should be kept clear to ensure proper function.

HOW THEY WORK

Stormwater usually enters dry ponds through an inlet pipe. The inlet pipe directs water into a preliminary treatment area called a forebay. The forebay slows the flow of incoming water and settles out sediment, debris, and any attached contaminants. Sedimentation in the forebay is removed as needed to maintain proper storage capacity.

Detention ponds have an outlet that is smaller than the inlet in order to extend the time it takes for the stormwater runoff to leave the system. In some cases the outlet may be an underdrain – a series of perforated pipes in a layer of sand on the bottom of the pond.

Retention ponds are designed to capture the stormwater runoff inside the basin area, from which the water infiltrates into the ground or evaporates within a few days.

Both types of ponds may have an overflow outlet or spillway that allows unusually large amounts of water to exit the pond at a controlled point, preventing damage to the pond.

Regular inspections of dry ponds, particularly inlets and outlet structures, are encouraged on a monthly basis to ensure proper functioning and to identify and address issues promptly.



The forebay may be a part of the basin, or a precast structure designed to settle out sediment and remove oil and grease.



Dry retention ponds rely on rapid infiltration and evaporation of stormwater runoff.

RECOMMENDED MAINTENANCE AND GENERAL HOUSEKEEPING

Dry ponds require regular maintenance to ensure proper function. These activities may include:

- Vegetation removal/maintenance: Depending on the design of the pond, it may be intended to be vegetated or free of vegetation (in the case of ponds with underdrains). Removing weeds and/ or keeping vegetation at appropriate heights is necessary for the pond to perform as designed.
- **Trash/debris removal:** Trash and debris often get washed into dry ponds. Removing it in a timely manner prevents it from clogging the outlet pipe or being washed into creeks or the river.
- Sediment removal: Sediment accumulated in ponds reduces the volume available for holding stormwater runoff and slows down infiltration rates. Sediment removal is typically considered "heavy maintenance" for a dry pond.

COMMON ISSUES

Some common issues that arise with dry ponds include:

- Undesirable vegetation invading the pond
- Bare spots or sparse vegetation in the pond (when design calls for vegetation)
- Reduced infiltration rates over time due to soil compaction or excessive sediment
- Water flowing through holes in dam or berm cause by rodents
- Growth of large trees around the pond that interfere with maintenance activities
- Blocked or broken inlet/outlet pipes
- Designed berms/structures begin to settle excessively lower than designed elevations
- Erosion on banks and forebay structures

Issues are often identified by visible degradation to the pond (i.e., rilling or excessive vegetation growth), standing water that stays for more than 48 hours, debris, sediment, or vegetation accumulated around the outlet, or overtopping of the basin area during rain events.

For recommendations on how to resolve these issues, refer to your subdivision's or facility's manual for light maintenance of stormwater facilities or the City of Boise's Resource Guide for Operation and Maintenance of Stormwater Systems



Wet Ponds/Basins

Wet ponds, or basins, are designed to act as an extended detention pond. The wet pond often provides longer detention times than dry ponds before the stormwater runoff continues on its way through the storm drain system. Wet ponds may be situated in an area with soils that inhibit infiltration, or are below the seasonally high water table, creating a pool of water that remains for some or all of the year.

HOW THEY WORK

Stormwater usually enters wet ponds through an inlet pipe. The inlet pipe directs water into a preliminary treatment area called a forebay. The forebay slows the flow of incoming water and settles out sediment, debris, and any attached contaminants. Sedimentation in the forebay is removed as needed to maintain proper storage capacity.

As new runoff mixes with the water in the wet pond it drops out the remaining sediment and other contaminants. Sometimes wetland vegetation is planted in and around wet ponds to allow further treatment as the plants pull settled nutrients from the soil and trap additional sediment and debris. The outlet of the pond may be a pipe or a channel. Outlet pipes often have a rack over the top or at the inlet to prevent large pieces of trash and debris from moving on to the outfall and into creeks or the river.



Water levels in wet ponds fluctuate throughout the year, and the ponds may be dry at times.

Regular inspections of wet ponds, particularly inlets and outlet structures, are encouraged on a monthly basis to ensure proper functioning and to identify and address issues promptly.





which should be cleaned and inspected regularly.

RECOMMENDED MAINTENANCE AND GENERAL HOUSEKEEPING

Wet ponds require regular maintenance to ensure proper function. These activities may include:

- Vegetation removal/maintenance: Removing noxious weeds or overgrown vegetation may be necessary.
- **Trash/debris removal:** Trash and debris often get washed into wet ponds. Removing it in a timely manner prevents it from clogging the outlet pipe or being washed into creeks or the river.
- Sediment removal: Sediment accumulated in ponds reduces the volume available for holding stormwater runoff and slows down infiltration rates. Sediment removal is typically considered "heavy maintenance" for a wet pond.
- **Providing/maintaining water circulation:** To prevent water in wet ponds from becoming stagnant and breeding grounds for insects, bacteria, and algae, a source of water circulation during wet periods is often necessary (e.g. fountains or aerators).
- **Preventing unapproved activities:** Wet ponds may appear attractive to people as a venue for recreation. Wet ponds are not intended or designed for swimming or wading for humans or pets. Entering stormwater wet ponds is not safe and may also damage the pond.

COMMON ISSUES

Some common issues that arise with wet ponds include:

- Undesirable vegetation or algae invading the pond
- Water remaining stagnant and breeding insects, bacteria, and/or algae
- Water flowing through rodent holes in berms or side slopes
- Growth of large trees around the pond that interfere with maintenance activities
- Blocked or broken inlet/ outlet pipes
- Designed berms/structures begin to settle excessively lower than designed elevations
- Erosion on banks and forebay structures

Issues are often identified by visible degradation to the pond (i.e., rilling or excessive vegetation growth), stagnant water with excessive algae or insect growth, odors, debris, sediment, or vegetation accumulated around the outlet, or overtopping of the basin area during rain events.

For recommendations on how to resolve these issues, refer to your subdivision's or facility's manual for light maintenance of stormwater facilities or the City of Boise's Resource Guide for Operation and Maintenance of Stormwater Systems.



Swales

Swales are stormwater conveyance and treatment structures that may look like a grassy ditch. Swales spread runoff out over a long area and use vegetation and soil to filter out pollutants as stormwater runoff flows through the shallow channel and infiltrates water down into the soil.

HOW THEY WORK

Water may fow into a swale directly off of a roadway, parking area, or sidewalk, or it may enter through an engineered structure such as a curb cut, catch basin, or rock apron. The water then enters the vegetated portion of the swale, which has specifcally chosen plants (often grass) that prevent erosion of the underlying formulated soil mix and can tolerate periods of being submerged. Swales are designed to store water from most storms so that it may infltrate down through the soil. As the stormwater percolates down towards groundwater the vegetation and soil filter out sediment, nutrients, bacteria, and other pollutants.



Stormwater runoff should flow freely from the street into the swale.

Regular inspections of swales and associated stormwater structures are encouraged on a regular basis to ensure proper function and to identify and address issues promptly.



The bottom of the swale channel may use rocks to help slow stormwater flows.



Curb cuts can become blocked with sediment or vegetation.



Swales are sloped to allow stormwater runoff to flow along the length of the swale towards the outlet.

RECOMMENDED MAINTENANCE AND GENERAL HOUSEKEEPING

Swales can add an aesthetic benefit to the landscape. Regular maintenance is required to keep them looking nice and functioning properly. Routine maintenance includes: irrigating during dry months, trimming/mowing vegetation to proper height, and removing litter and other debris.

- Irrigation: Vegetated swales often require irrigation during the summer months. It is important to not over-water the swale though. Overwatering leads to reduced capacity, and can result in stagnant water, algae growth, decreased infiltration rates, and ultimately failure of the swale.
- **Trimming/Mowing:** Maintaining the proper height of vegetation is important for both the plant health and to provide adequate filtration. Grasses should be kept to a height of 4-9 inches. Remove all grass clippings from the swale.
- **Cleaning:** Swales are designed to filter out materials from stormwater runoff. Debris and sediment must be removed from the swale periodically to ensure proper function.

COMMON ISSUES

Some common issues that arise with swales include:

- Excessive sediment
 accumulation
- Soil compaction, which can reduce infiltration rates and impede plant growth
- Improper vegetation maintenance such as trimming grass too short or too long, replanting with unapproved species, or allowing noxious weeds to take root
- Clogged inlet/outlets that prevent water from flowing as designed

Issues are often identifed by ponded water at the inlet of the swale, standing water in the vegetated area that stays for more than 48 hours, or signs of erosion, such as rills or isolated sediment deposits.

For recommendations on how to resolve these issues, refer to your subdivision's or facility's manual for light maintenance of stormwater facilities or the City of Boise's Resource Guide for Operation and Maintenance of Stormwater Systems.



Agency Contacts

208-387-6250	ACHD ENVIRONMENTAL
achdidaho.org/departments/engineering/stormwater/stormwater.aspx	DEPARTMENT
208-602-1713; 208-343-5454	ADA COUNTY DRAINAGE
www.adacountydrainagedistrict3.org	DISTRICT #3
208-384-7150	BOISE CITY PUBLIC WORKS
www.cityofboise.org/departments/public-works	DEPARTMENT
208-472-2949 ext. 2116	GARDEN CITY PUBLIC WORKS ENVIRONMENTAL DIVISION
www.partnersforcleanwater.org	PARTNERS FOR CLEAN WATER



Definitions

Best Management Practices (BMPs): A structure (sometimes including specific soils and vegetation) that is used to remove pollutants from stormwater.

Contaminants/Pollutants: Materials that are picked up and transported by stormwater runoff, which can cause harm to streams, creeks, and the Boise River. Nutrients, sediment, and bacteria are of highest concern in stormwater runoff.

Conveyance: Moving stormwater from one part of the drainage system to another.

Degradation: Breaking down of a structure, which could cause failure or safety concerns.

Erosion: Removal of sand or soil from the banks of a pond or the sides or bottom of a swale or drainage channel by water or human activity (i.e., digging or walking).

Forebay: The area at the inlet to a pond that slows oncoming runoff and settles out some of the sediment and debris. Stormwater then flows in a more controlled way into the larger treatment area of the pond.

Infiltration: Movement of water down into the ground. Stormwater BMPs are often designed for a specific infiltration rate to get rid of stormwater runoff quickly, but not too quickly, so the soil has time to remove pollutants from the water as it passes through. **Irrigation Runoff:** Excess irrigation water from overwatering, overspray, broken or mismanaged irrigation equipment, which flows into the stormwater drainage system.

Noxious Weeds: Invasive plants that are bad for humans, agriculture, or natural habitats or ecosystems.

Outfall: Discharge point from the stormwater drainage system into a creek, stream, or river.

Underdrain: A series of slotted pipes installed in the bottom of a pond that collect water as it seeps into the ground to convey it out of the pond area.

Rilling: Small channels formed by water as it erodes banks or sides of swales and drainage channels. Rills concentrate the energy of the water's flow and may grow wider and deeper if they are not repaired.

Rock Apron: Rocks placed at an outlet to slow water down as it flows past them.

Sediment Deposits: Mounds or blankets of dirt or sand, often found near inlets to or outlets from stormwater BMPs.