

Go With the Flow

A Homeowner's Guide to Responsible Stormwater Solutions

Practical Ways to Protect Your Property and the Environment from the Effects of Flooding



City of
Rockville
Get Into It

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Get Into It

Go with the Flow!

A Homeowner's Guide to Responsible Stormwater Solutions

Practical and Eco-Friendly Ways to Protect Your Property and
the Environment from the Effects of Stormwater Runoff

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Management Division

Homeowner Guide Design by: Hazen and Sawyer



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www.rockvillemd.gov

Statement of Purpose

This manual has been developed for educational purposes by the City of Rockville, MD. The stormwater runoff improvement practices in this guide are general guidelines and are not to be used as professional engineered specifications. Before implementing ANY practices, seek technical assistance from a licensed professional engineer or landscape architect, and/or certified professionals in drainage, waterproofing, erosion, and sediment control for specifications for these practices. Designs that address each site's unique needs and constraints are essential.

Note: Federal, state, and local regulations in Maryland pertain to many of the subjects presented in this guide. Regulations change quickly, as do the technical methods and standards for environmental protection. Be sure to follow applicable regulations covering private land maintenance and related activities for your area.

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Section 1

UNDERSTANDING RESIDENTIAL DRAINAGE

Before it was the City of Rockville, the land around us was covered in undeveloped forests, wetlands, and streams. Rainwater soaked into the ground and slowly filtered through layers of soil. Today, much of that water is trapped on the surface and redirected by the roads, parking lots, buildings, and compacted soils. These impervious surfaces* create more rainwater runoff, which flows faster into creeks and streams and carries pollutants like sediment and fertilizer. The runoff can also flood areas of your property that lack proper drainage or have high groundwater.

*Impervious surfaces are hardened surfaces that do not allow water to pass through.



Homeowner or City Responsibility?

In most cases where there is no ongoing construction, residential drainage is a civil matter and should be resolved neighbor to neighbor. In limited instances enforcement can take place.

Benefits of Good Residential Drainage

Maintaining good property drainage does several important things:

- ✓ Protects your home and belongings from damage
- ✓ Reduces runoff from your property
- ✓ Helps filter runoff
- ✓ Can be stored and used for watering plants
- ✓ Helps safely recharge vital surface water and groundwater supplies
- ✓ Prevents soil damage and erosion
- ✓ Redirects concentrated flow to a safe location away from your home and neighboring properties

Go with the Flow

Because gravity wants to pull everything to the lowest point, water draining from a nearby property may flow onto yours. To keep water moving and prevent damage to your property, you'll need to know whether to "**sink it**" or "**send it**."

Follow this guide to learn how to do your part to go with the flow.

Common Signs and Consequences of Drainage Issues

Signs	Consequences
Water in Your Basement Visible wet spots from: water seepage, blocked or flooded window wells, leaking doors or windows, or improperly directed downspouts. 	Poor drainage around your home can cause expensive foundation issues such as cracks or shifting, mold, and damage to your belongings. 
Erosion Excess water flowing over landscaping may carry the top layer of soil or mulch with it, creating paths through mulch and piles in low areas. 	Intense storm events can wash away topsoil, create holes or gullies, and can carry sediment pollution to storm drains. 
Standing Water or Wet Spots Ground feels spongy or soggy spots in the grass that don't green evenly. 	This can lead to dead grass, plants (even water-loving ones!), and trees, as well as problems with mosquitoes. 

How to Use this Guide

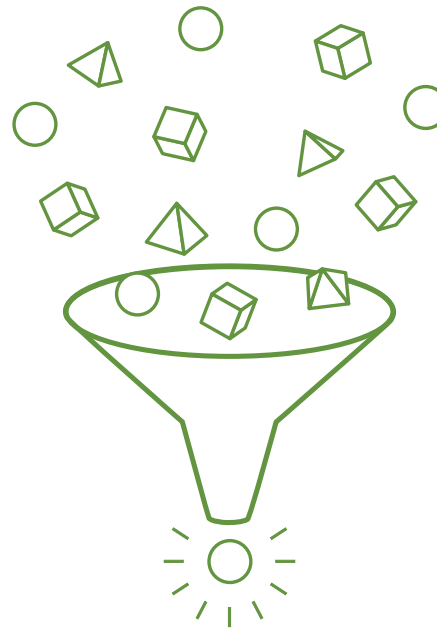
Identify Source and Severity of Issues

Drainage issues occur from a variety of circumstances and range. [Section 2](#) outlines steps you can take to identify and assess issues affecting your home.



Identify Potential Solutions

[Section 3](#) and [Section 4](#) outline a range of potential solutions to common drainage issues. Work with your contractor to identify a solution that fits your home and budget.



Identify a Contractor and Apply for a Rebate

[Page 10](#) of this section describes how to choose a contractor to confirm and execute the right solution for you. It also outlines rebates that may be available and how to apply for them.



Thinking about expanding your impervious? Go to [page 7](#)

EVALUATING YOUR DRAINAGE NEEDS: *SINK IT* OR *SEND IT*?

General Guidelines

The best option for getting water to where it needs to be will depend on your property. While letting it soak back into the ground seems ideal, it may not always make sense. You may be able to “**sink it**” and help the water go back into the ground. Or you may need to “**send it**” to the right outlet.

Note that water can't always be directed to Right-of-Way
(by you or your neighbor)

Should You Sink It?

Does your yard have modest amounts of rainwater flow and/or some short term standing water? **Slow, spread, and sink it** — but plan for overflow.

A Soggy Ground

Water pools in certain areas of your yard for less than 48 hours after at least a ½ inch of rainfall.

B Roof Runoff

Downspouts drain to impervious surfaces, compacted soils, or areas of sparse vegetation.

C Patio Runoff

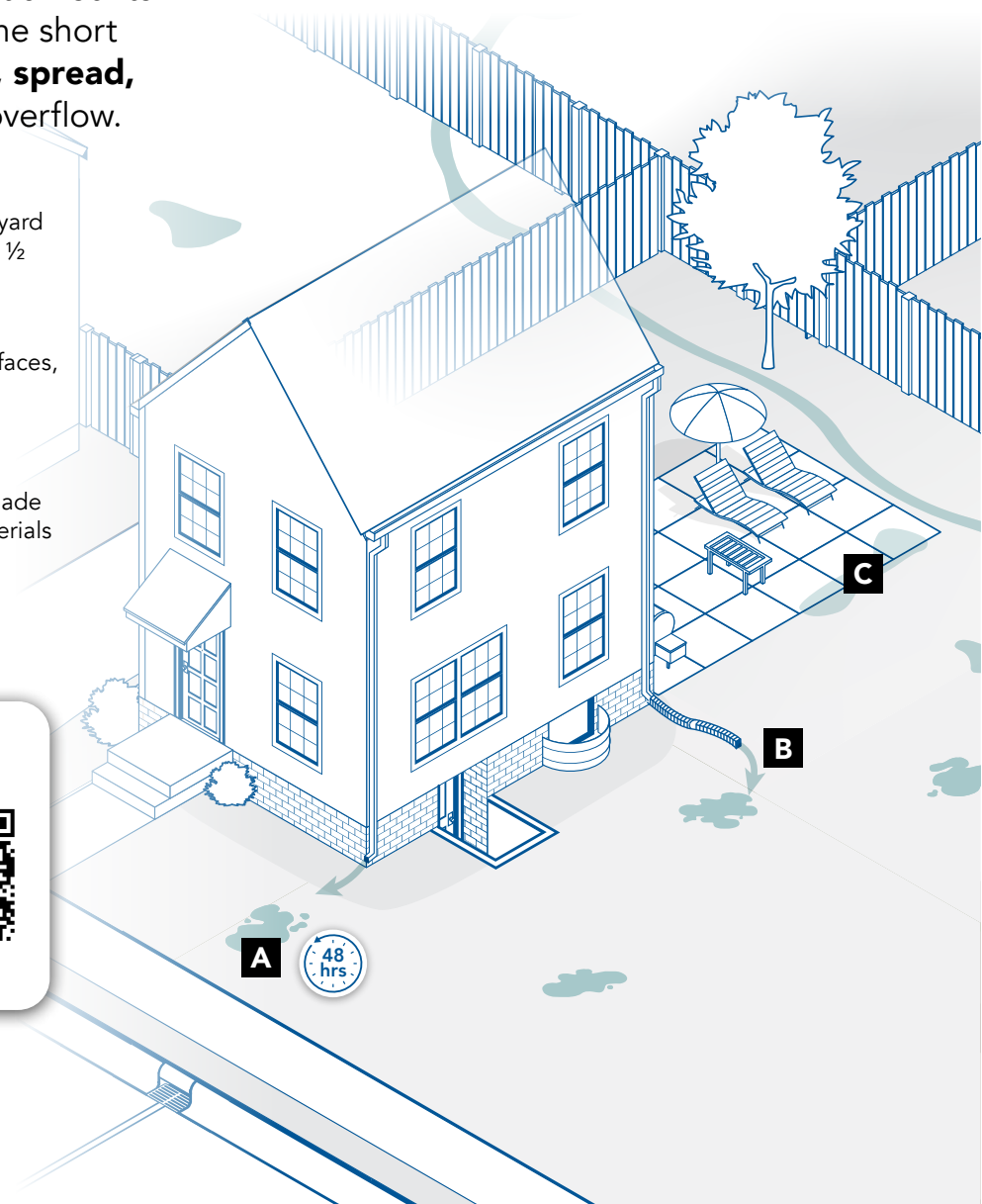
Hard surfaces like patios are often made of concrete or other impervious materials that don't allow water to soak in.

Find sink it best practices in our companion guide:

Slow It. Spread it.
Sink it! A Homeowner's
Guide to Sustainable
Home Drainage



www.rockvillemd.gov/drainageguide



Should You **Send It**?

Do you have water in your basement, a stream of water through your yard, damage to the outside of your home, landscape erosion, or obvious standing water for more than two days after rain? **Send it!**

A Runoff from a Neighboring Property

A stream flows from a nearby ditch through the property.

B Poorly Sloped Yard

Land is sloped towards the house and water pools near windows, causing flooding.

C Large Amounts of Impervious Surfaces

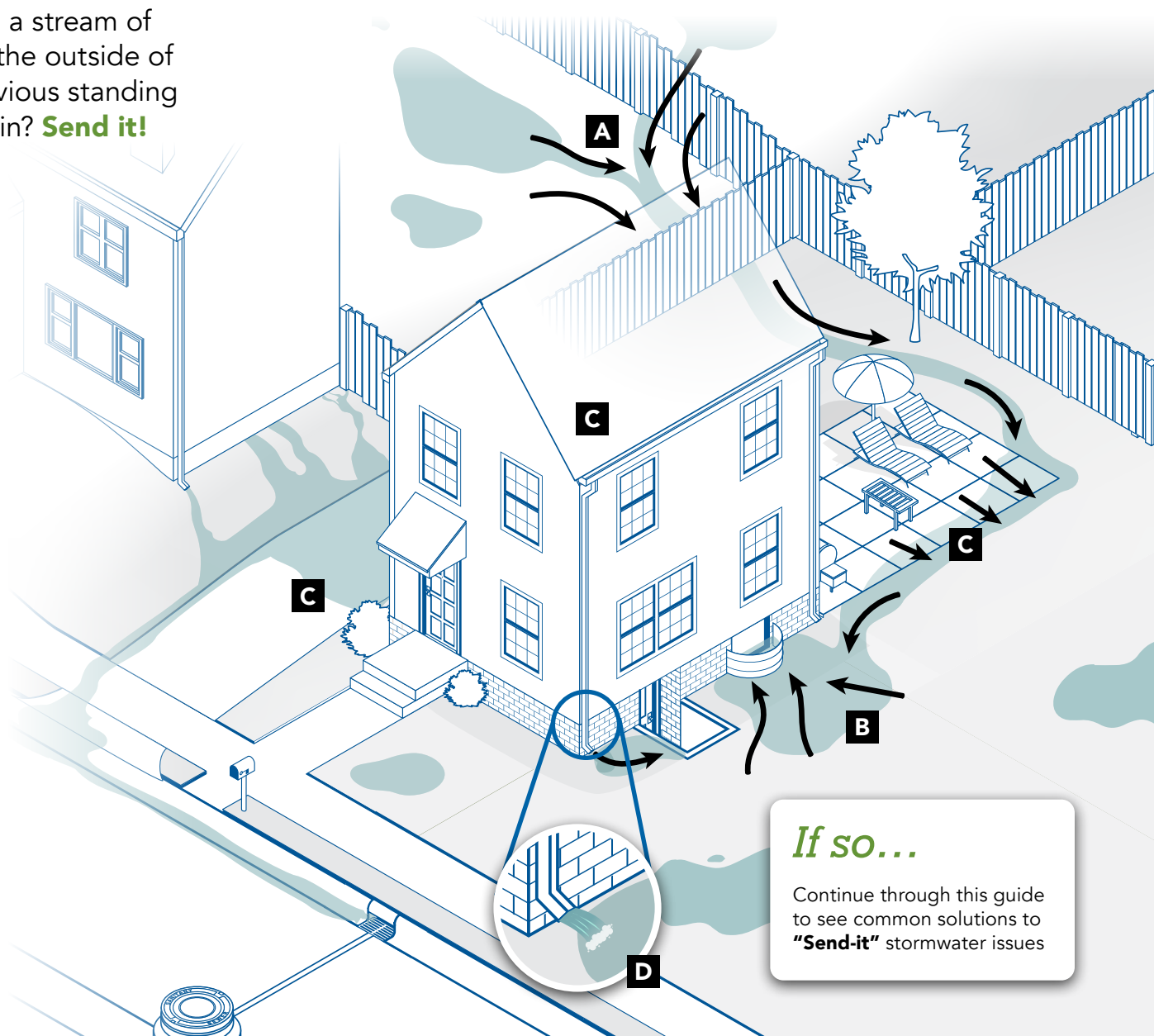
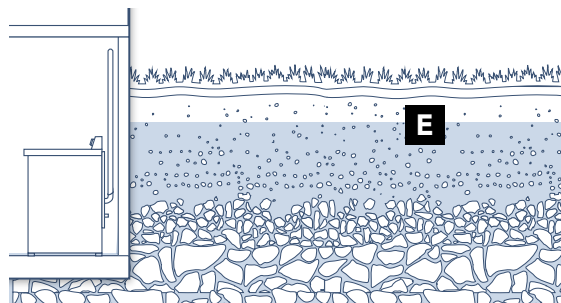
Paved, concrete, and other hard, impervious surfaces added to properties prevent water from draining into the soil. Find more details on impervious surfaces on [page 6](#).

D Gutter Direction Causes Standing Water

Water from the gutters is directed toward the house or does not drain far enough away from the foundation.

E High Groundwater

Areas with naturally high groundwater levels can cause or intensify drainage issues.



If so...

Continue through this guide to see common solutions to "Send-it" stormwater issues

Impervious Surfaces and Their Risks

An impervious surface does not allow water to soak into the ground. Some examples are:

Concrete Patios



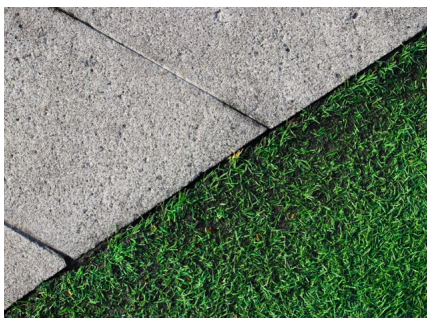
Roofs



**Paved Driveways
and Parking Areas**



Paved Walkways

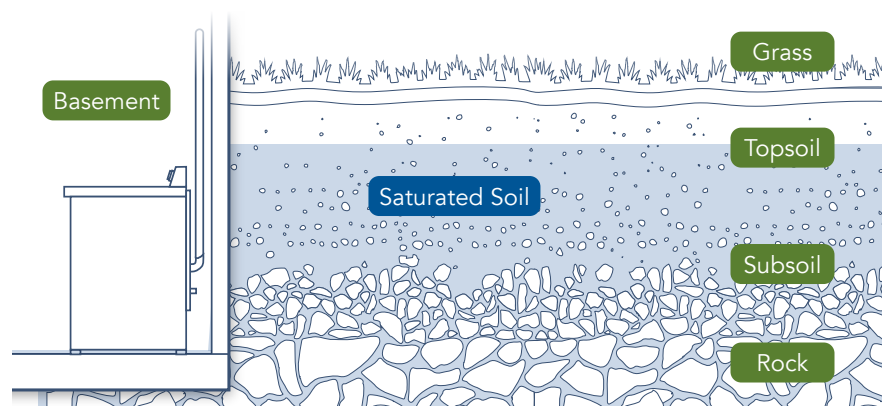


Increasing impervious surface area also increases the amount of water that needs to flow somewhere. Without proper drainage, this could increase flooding on your property or a neighbor's. Runoff from impervious surfaces can carry pollution to nearby creeks and streams.

Groundwater vs. Surface Water

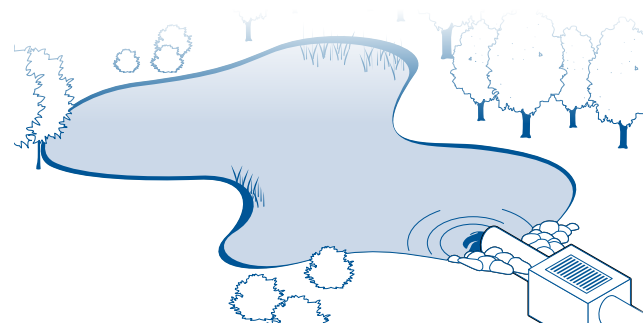
Groundwater

Groundwater is rain or melted ice and snow that soaks through the layers of soil and is stored in the tiny gaps between rocks and other soil particles. The water is filtered as it soaks through these layers.



Surface Water

When precipitation or snowmelt does not soak into the ground, it flows over the surface as runoff. It can combine with groundwater to form bodies of water like streams, rivers, lakes, and wetlands. This runoff water often carries pollution with it as it flows.



THINGS TO THINK ABOUT WHEN EXPANDING IMPERVIOUS SURFACE AREA ON YOUR PROPERTY

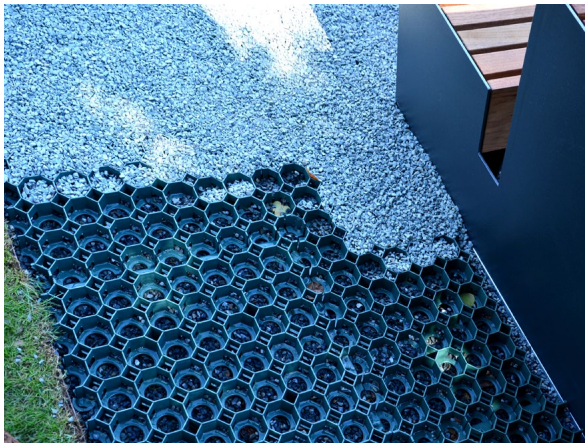
Reduce impervious surface whenever possible!

Adding impervious surface area to your property, such as expanded driveways, patios, and additions, will increase stormwater runoff on your own property and potentially your neighbors. Decrease impermeable surfaces, incorporate permeable surfaces and direct water safely away from your foundation as well as neighboring properties.

Could it be permeable?

Choose permeable surfaces:

Use permeable pavers whenever possible. While gravel is not permitted as a driveway material, it can be used for private walkways and patios. Avoid dense materials that compact and become impervious.



Allow gaps between stones and bricks:

Set patios, walls, and steps on sand and gravel instead of cement, grout, or mortar. This lets water flow through and sink back into the ground.



Choose decks with plantings or gravel underneath over impervious patios:

Surfaces like decks let water flow between the boards and filter into the ground instead of running off.





Obtain Proper Permits

The permitting issues outlined below apply to new impervious surfaces.

SWM

Stormwater Management Permits

Any proposed activity that involves 5,000 square feet or more of disturbed area, creates or replaces 2,000 square feet or more of impervious area on a single unit detached dwelling, townhouse or semi-detached dwelling lot (250 square feet for other properties) or requires Federal or State authorization for alteration of any floodplain, City waterway, stream buffer, or wetlands buffer required a Stormwater Management Permit issued by DPW: rockvillemd.gov/stormwaterpermits

 **240-314-8500**

DPW

Department of Public Works

Any proposed activity that involves the grading or land disturbance of more than 5,000 square feet (or 100 cubic yards) requires a Sediment Control Permit (SCP) issued by DPW: rockvillemd.gov/2372/Sediment-Control-Permit

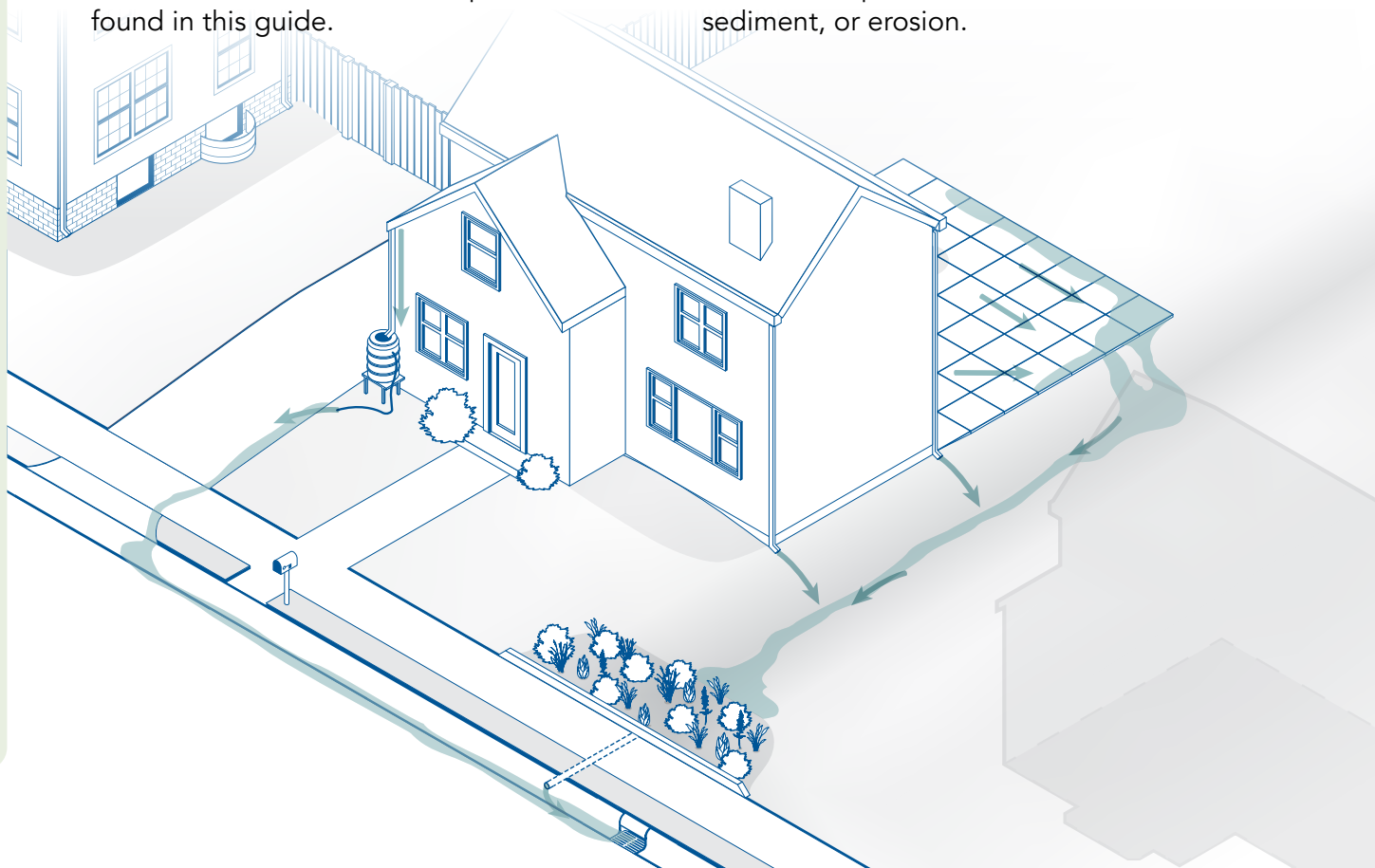
Any disturbance within the public right-of-way requires a PWK permit issued by DPW: rockvillemd.gov/publicworkspermits

 **240-314-8500**

Reducing the Impact of New Impervious Surface

When you increase impervious area, you also increase runoff and potential flooding issues.

- 1 If permeable options are not feasible, minimize new impervious surface as much as possible. Reduce the size or number of new parking spaces, patios, or additions.
- 2 Work with your contractor before construction begins to plan for and capture runoff from impervious surfaces. This can be done with swales, drains, and other practices found in this guide.
- 3 Ensure that water is sent to a safe outlet, such as the street or storm drain. Ensure that concentrated flow from drains or downspouts is not directed onto neighboring properties.
- 4 Inspect and maintain your swale and other drainage systems regularly. Remove debris and look for pools of water, accumulated sediment, or erosion.



Check Your Eligibility for a Rebate through Rockville's Flood Mitigation Assistance Program

The Flood Mitigation Assistance Program (FMAP) helps City of Rockville residents who own homes and properties take steps to prevent damage from future flooding events. The program can reimburse residents up to 50% of the money paid for these improvements, up to a total of \$5,000. Only approved measures will be reimbursed. Funds will be distributed on a first-come, first-served basis. **Itemized receipts or invoices are required.**

For more information on the FMAP, including eligibility criteria and a list of approved flood-proofing measures, scan the QR code or click below.



rockvillemd.gov/floodassistance

More Information



Flooding Can Be Hard To Predict

Be prepared to take steps like putting out sandless sandbags, flood socks, permanent flood doors, etc., to prevent flooding ahead of large rain events. These measures and many more are approved practices that may be reimbursable through the Flood Mitigation Assistance program.



Quick Dam™

Cost-Effective Methods to Try First

- 1 Routinely clean and maintain gutters, downspouts, and splash-pads. Redirect downspouts so they drain into permeable areas away from building foundations.



- 2 Make sure any nearby drainage ditches or storm drains are clear of debris and blockages that would keep water from flowing.

If you see a blocked storm drain, call 240-314-8567



- 3 Build up any sunken areas around the foundation. Dig channels or drains or improve the slope of your yard to direct flowing water away from your home.



- 4 Move important documents and valuable items to a location above the potential flood level and/or inside waterproof containers



- 5 Investigate plumbing leaks. If water is pooling in your basement, determine whether it's coming from outside. If you can't find an outside source, you may have an indoor plumbing leak.



ENLISTING A PROFESSIONAL

Tips for Identifying Potential Contractors

It's important to ensure you hire a reliable and qualified professional contractor for your drainage projects. Use this checklist to help you find the right one for your needs:

- ✓ **License and Insurance:**
 - They should be licensed to work in your area.
 - They should have liability insurance and worker's compensation coverage to protect you and their workers.
- ✓ **Experience:**
 - Check their experience, especially with projects similar to your needs.
- ✓ **References:**
 - Ask for references from past clients and contact those customers.
 - Look for online reviews and ratings from reputable sources.
- ✓ **Portfolio:**
 - Request to see photos or examples of their previous work.
- ✓ **Written Estimate:**
 - Get a detailed, written estimate that includes all costs, materials, and labor.
- ✓ **Timetable:**
 - Discuss the expected timeline for the project to make sure it aligns with your schedule.
- ✓ **Permits and Regulations:**
 - Verify that the contractor is familiar with local building codes and drainage regulations.
 - Confirm that they can obtain the necessary permits for your project.
- ✓ **Communication:**
 - Assess their communication skills and responsiveness.
- ✓ **Contract:**
 - Have a clear, written contract that outlines the scope of work, costs, and payment schedule.
- ✓ **Warranty:**
 - Inquire about any warranties or guarantees on the work performed.
- ✓ **Cost and Payment:**
 - Ensure you understand the payment schedule and terms.
 - Be cautious of contractors who request full payment up-front.
 - Keep all receipts and invoices. Ask for itemized receipts that show the breakdown of costs.
- ✓ **Clean-Up:**
 - Discuss how the contractor will handle site clean-up after the project is completed.
- ✓ **Subcontractors:**
 - If they use subcontractors, ensure they are also licensed and insured.
- ✓ **Local Knowledge:**
 - A contractor with local experience may better understand the challenges specific to your area.
- ✓ **Environmentally Friendly Practices:**
 - Inquire about their commitment to environmentally friendly solutions.

ENLISTING A PROFESSIONAL

Setting a Project Budget

Creating a budget for a yard drainage project helps the project stay on track financially. If you are using a professional, get detailed quotes from multiple contractors and keep all project invoices and receipts to submit with FMAP reimbursement.

Going to DIY? Here's what you should consider to help set your budget:



Assess the Yard:

Prioritize problems and address those most impactful to your home.



Research Drainage Solutions:

Explore what solutions will work best for your yard's specific needs, then research the costs associated with each option.



Account for Contingencies:

Set aside a part of your budget for unexpected expenses. Sometimes projects uncover hidden issues that need to be addressed.



Permits and Regulations:

Check local building codes and regulations to determine if permits are required for your drainage project. Include the cost of permits in your budget and consider permit approval timelines.



Gauge Materials Costs:

Consider the materials needed for the project, such as pipes, gravel, landscaping fabric, and drainage basins. Obtain price estimates for these materials.



Equipment Rental:

If special equipment or machinery is needed, find out about rental costs and include them in your budget.



Include Post-Project Landscaping:

Plan for the cost of landscaping and restoring the yard after the drainage work is completed. This may involve reseeding, sodding, or replanting.



Include Maintenance:

Consider ongoing maintenance expenses, such as cleaning and inspecting drains, to ensure the drainage system remains effective.

**CALL
BEFORE
YOU DIG!**



Miss Utility is a FREE service available to anyone planning a project that entails digging. It is simple and easy to use.

At least, two working days **BEFORE** you start your project, **call 811 or 1-800-257-7777.**

Miss Utility will contact the appropriate agencies to come and mark any publicly maintained utilities that interfere with your project location. For more detailed information, visit Miss Utility at missutility.net.

Note: Privately maintained lines will not be marked.

FLOOD RISK MITIGATION BEST PRACTICES

For Everyone

- **Purchase Flood Insurance.** Most homeowners and renters insurance does not include flood insurance. The City of Rockville participates in the National Flood Insurance Program (NFIP), which allows resident to purchase federally-backed flood insurance. Learn more at floodsmart.gov.
- **Recognize that your property is unique.** There is no one-size-fits-all solution to flood risk mitigation.
- **Be a good neighbor.** Make reasonable efforts to try and direct runoff to right-of-way.
- **Consult professionals** such as architects, engineers, contractors, landscapers, or other experts to plan for future flood risk mitigation.

If You've Had Basement Flooding:

- Protect your valuables by securing them in watertight containers.
- Consider installing a flood alarm.
- Raise basement outlets above the flood level elevation line.
- Raise your HVAC equipment and appliances above the flood level elevation line.
- Have a professional install a sump pump to drain excess water.
- Install a battery back up and sump pump alarm so you are alerted when replacement is required.

See Section 4 for Best Practices



Watertight storage, raised



Flood alarm



Raised outlet



Raised appliance



Sump pump



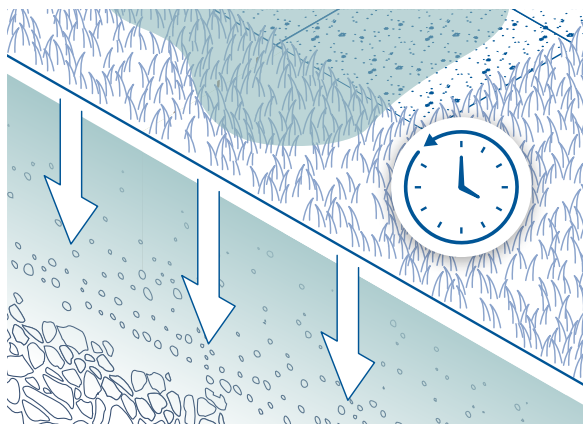
Battery backup for sump pump

Section 2 UNDERSTANDING YOUR DRAINAGE PROBLEM AND NEEDS

Determine the Cause of Flooding

Answering a few simple questions can help you find and assess your drainage issues, and decide if and how to fix them:

How severe is the problem?



Just like water from a faucet flowing down a drain, the stormwater in your yard will need time to sink in. Whatever your yard can't absorb immediately will either run off or create an area of standing water (a process called ponding).

Normally, the water will drain within a day or two after the storm is over. But if something is keeping the water from soaking in or flowing away, ponding will continue. Remember: the amount and duration of rainfall will affect the amount and duration of ponding in your yard!

How frequently does water pond?



Every time it rains?



Periodically?



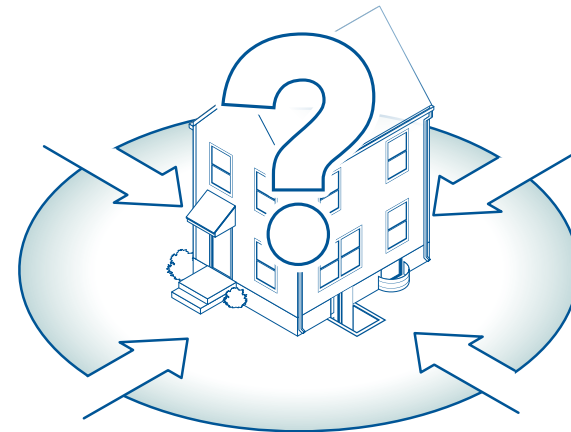
A few times a year?

Or only during abnormally heavy rains?

If you answered "every time" or "periodically," you likely have drainage problems that may need to be addressed if it becomes a nuisance.

Some Water is Normal: Small wet spots in your yard after a heavy rain that dry out within a day or two are common and not usually cause for concern. You can save money by living with small amounts of water or learn about eco-friendly ways of absorbing the water, such as native plants, in a Homeowners Guide to Sustainable Home Drainage.

Where is the problem coming from?



Spend some time outside during and after a rain event and note where water comes from.

Is water flowing onto your property from adjacent properties? Is it a concentrated flow or is it coming from multiple directions?

Where is water from your downspouts flowing? Is a garage or shed missing gutters and downspouts?

Is water flowing off your patio, walkway or driveway? Where is it going?

Have you maintained the drainage system on your property? Check if pipes or ditches are clogged and clear them to keep water flowing.

Visual Assessment Guide – Finding Your Home’s Flooding Risks

1 Is a large volume of stormwater flowing onto your property?

3 Is your yard directing water toward your house?

Check:

...your property’s slope and drainage.

Flat yards may look nice, but some slope is needed for water to run off. If you have a flat yard, water may pond too close to your foundation and cause damage.

A yard that slopes toward your house without proper drainage in place can cause water to flow into your foundation or basement.

...for low points adjacent to your house where water pools.

This low point may have gotten worse over time and could be a sign of a higher water table or sinking ground.

...that existing drainage features are not damaged and are working correctly.

Examples include a French drain or a City-owned inlet. Damaged or non-functioning private drainage systems should be repaired by the property owner. Problems with City-owned drainage structures should be reported immediately to the City for repair.

2 Where do neighboring properties drain?

If you are downhill of neighboring properties, it’s possible that stormwater from other lots will drain to yours. Look to see if any pipes, downspouts, or drains point toward your property.

4 Do aspects of your house increase flooding risk?

Check:

...where roof drainage goes.

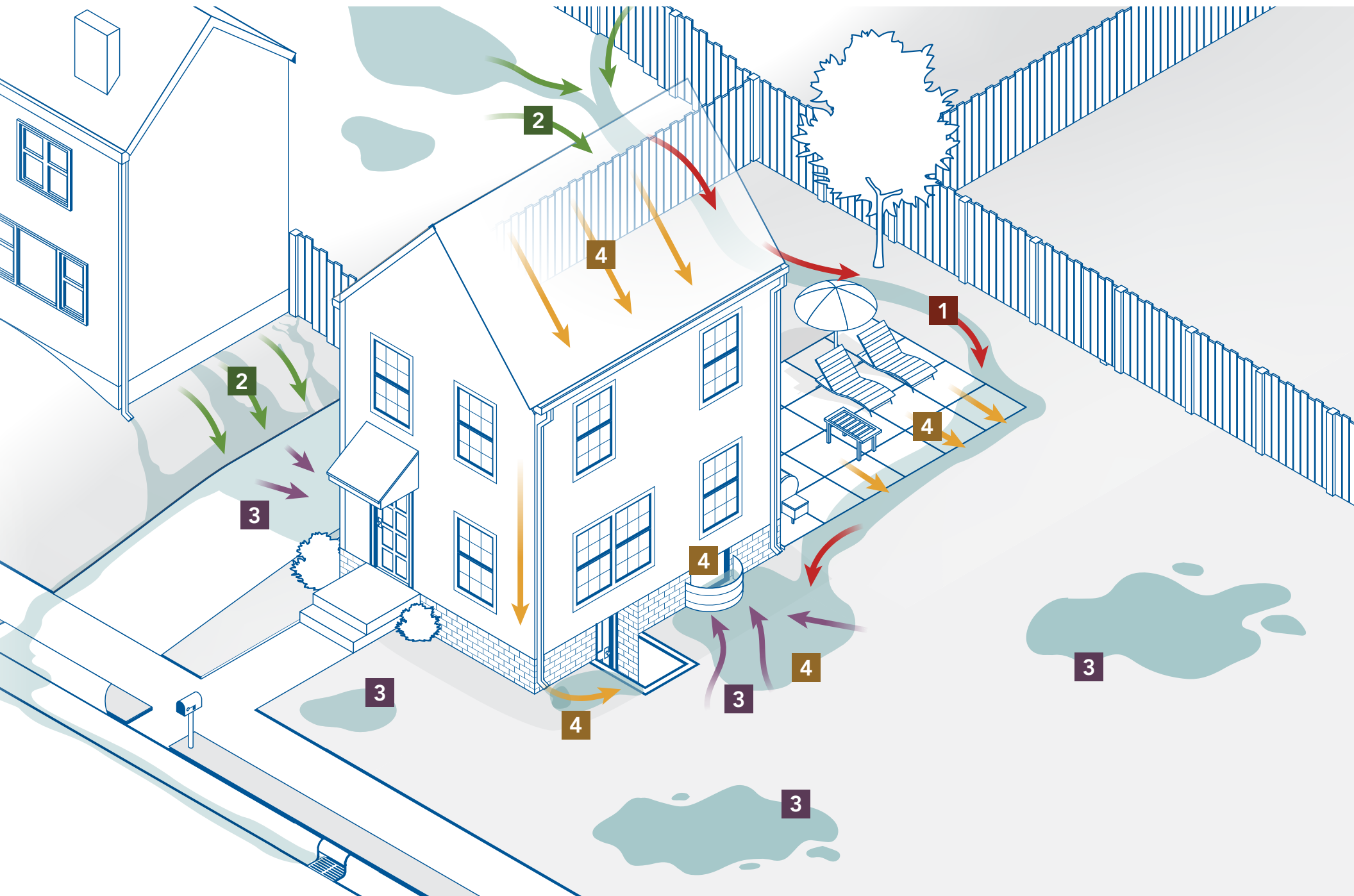
Downspouts should direct water away from the house or directly onto neighboring properties. If downspouts are not properly installed or directed, water can pond near the foundation and cause damage. Downspouts should direct water to an area at least 6 feet away from the house.

...for impervious areas next to the house that may be a source of runoff OR where water could pool.

Check that impervious areas do not drain toward your house. Also check for pooling in areas like basement stairwells where drains may not be working correctly.

...for evidence of rainwater collecting in window or vent wells and coming through windows and/or vents.

Window and vent wells should remain clear and above grade to prevent water leaking into the foundation.



Frequently Asked Questions

Answers

How can I protect my belongings and property if water gets into my basement?



Make sure your belongings are stored in watertight containers and consider installing a sump pump if needed.

If I'm out of town, how would I know if there is standing water?



There are sensors that can be installed to notify you of standing water.

Do my utilities (tank, furnace, laundry), outlets, and circuit breakers need to be elevated or protected?



If your basement is at risk of flooding, consider taking precautions to protect your utilities, outlets, and circuit breakers.

If I have a sump pump and the power turns off, how does it operate?



Storms with heavy rainfall may also cause power outages. Always have a backup source of power for a sump pump if it requires one.

If my basement does flood, how will I remove the standing water?



It's important to have a plan in case your basement does flood. Push brooms, shop vacs, and fans can be used to dry out a flooded basement. Professional services are also available.

Are there ways to protect my home from flooding?

Yes

While no method will work 100% of the time, there are many ways to protect your property from damage from flooding.

[Read on to find out more!](#)

Section 3

MAKE YOUR YARD MORE FLOOD RESISTANT

Disclaimer: The Best Management Practices (BMPs) described in this guide are provided exclusively for general educational and information purposes. The guide is intended to help landowners consider their current runoff practices and to identify concerns and potential solutions. Any BMP should be installed with the consultation of an experienced professional who can address site specific conditions. This chapter outlines a number of well-established practices along with recently introduced options for managing stormwater runoff.

The Problem and What a Homeowner Can Do

If your yard stays wet for several days after rain or snow, it may have improper grading or poor water infiltration. Lows spots or depressions can keep water from flowing away from your property and can lead to flooding.

Use FMAP reimbursable practices covered in this section to direct water away from structures and to areas that can receive runoff without causing erosion or other harm.

One of the easiest and most cost-effective methods to do this is a swale, or shallow depression that conveys water to a safe outlet, such as the street, a storm drain or a rain garden. Mitigate other wetness or flooding issues with the other practices such as those covered below.

Reimbursable Practices Covered in this Section:

- ✓ Construct an earthen berm.
- ✓ Perform surface grading.
- ✓ Build a protective flood wall.
- ✓ Install impermeable (water resistant) material around foundations.
- ✓ Install a French drain system.

Project Cost Range Key

Throughout this guide we will use the following scale for a quick visual reference of how the cost of projects might compare to each other.

\$ Low < \$1,000	\$\$ Moderate \$1,001–\$9,999	\$\$\$ High > \$10,000
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Obtain Proper Permits

The permitting issues outlined below apply to every FMAP practice discussed in this chapter.

DPW

Department of Public Works

Any proposed activity that involves the grading or land disturbance of more than 5,000 square feet (or 100 cubic yards) requires a Sediment Control Permit (SCP) issued by DPW:

rockvillemd.gov/2372/Sediment-Control-Permit

Any disturbance within the public right-of-way requires a PWK permit issued by DPW:

rockvillemd.gov/publicworkspermits

📞 240-314-8500

CPDS

Community Planning & Development Services

Single-family homes, contact CPDS (forestry inspector) if you have Forest Conservation Easements on the property. [View the Forest Conservation Easements Map.](#)

Commercial, mixed use, and HOA properties, contact CPDS (forestry inspector) if the limits of disturbance for your project is within a critical root zone of any significant tree (6" diameter or greater at 4.5' off the ground). If you are unsure, please contact CPDS (forestry inspector) for clarification.

Homes in Historical Preservation Districts contact CPDS (forestry inspector).

📞 240-314-8233

Perform Surface Grading

Permits **DPW** **CPDS** Cost **\$–\$\$**

Surface grading, such as creating swales, helps safeguard homes from flooding by diverting stormwater away from structures. This is done by adjusting the slope around a structure to a gradient of at least 0.5 inch per foot for a distance of at least 10 feet. The graded soil should then be compacted to keep it from settling.



DO

- Ensure runoff is directed away from structures.
- Apply grass seed, stone, or erosion control fabric to prevent erosion.
- Monitor after rainfall events.
- Check regularly for wet spot or erosion and clear any debris of sediment.

DO NOT

- Direct concentrated flows of water towards another property.
- Disturb over 5,000 sq. feet without a permit.
- Disturb any area within a stream or wetland buffer.

Construct an Earthen Berm

Permits **DPW** **CPDS** Cost **\$\$**

An earthen berm is a small hill covered with grass or other plants that is built to divert runoff so that it will not flow to a certain area. As opposed surface grading, this involves building “up” instead of grading “down,” and can be used to create swales when digging down is not feasible.



DO

- Apply a layer of mulch to prevent soil erosion on top of topsoil.
- Use gravel or rocks to fill the berm.
- Tamp down the berm to prevent slumping.

DO NOT

- Exceed a berm height of 24-inches.
- Cut off drainage patterns or allow water to pond behind the berm.

Construct a Protective Flood Wall

Permits **DPW CPDS** Cost **\$\$-\$\$\$** Call Before You Dig 

While not common in urban residential areas, floodwalls made of cinder blocks or similar materials can prevent the intrusion of floodwaters. They can be especially helpful for buildings with below-ground, walk-down basements.



DO

- Find out where gas, water, electrical, or other utilities are located.
- Ensure a permit will not be needed.
- Hire a professional to determine structural requirements.

DO NOT

- Place flood wall on neighboring property or on property line.
- Construct floodwall with brick or cinder blocks.

Install Impermeable (Water-Resistant) Material Around Foundations

Permits **DPW CPDS** Cost **\$\$** Call Before You Dig 

Standing water can indicate a ground water issue. In areas where standing water is a constant problem, homeowners can reduce intrusion of groundwater and surface flood waters to the underground structure by installing impermeable materials around the home's foundation.

Materials can include waterproof boards and rubber seals. Installing the materials will likely require excavation around the foundation.



DO

- Dig down to the foundation drains and install a cleanout.
- Check for cracks.
- Apply a sealant and a membrane.

DO NOT

- Don't forget interior drainage solutions.
- Don't apply sealer over painted walls.

Install a French Drain System

Permits

DPW

CPDS

Cost

\$\$

Call Before You Dig



The purpose of a French drain is to direct surface water and groundwater away from the home's foundation. These types of drains are ideal because they reduce water pressure and remove excess moisture from the soil.

French drains are normally installed below areas prone to flooding. French drains can be installed to alleviate water from pooling in low-lying areas such as a ditch or basement. If water has collected at the surface, a shallow French drain can be installed to prevent further trouble.



DO

- Provide sufficient drain slope to move water.
- Line the trench with drainage fabric.
- Call Miss Utility to dig safely.
- Properly maintain your french drain.

DO NOT

- Do not cover the drain pipe with soft stones or rock like marble or pea gravel.
- Install a gravel only drain without a drain pipe.
- Connect downspout directly into drain.

Section 4

MAKE YOUR HOUSE MORE FLOOD RESISTANT

Disclaimer: The Best Management Practices (BMPs) described in this guide are provided exclusively for general educational and information purposes. The guide is intended to help landowners consider their current runoff practices and to identify concerns and potential solutions. Any BMP should be installed with the consultation of an experienced professional who can address site-specific conditions. This chapter outlines a number of well-established practices along with recently introduced options for managing stormwater runoff.

What a Homeowner Can Do

For most homeowners, their home is their biggest investment. Proactively safeguarding your home and belongings from flooding can save you significant time and money. Use this section to choose the best FMAP-approved practices for your property. Don't forget to apply for reimbursement if you install any of these practices (refer to [page 9](#) ).

FMAP-Approved Practices Covered in this Section:

- ✓ Install basement window protection, permanent glass protection materials or floodproof windows.
- ✓ Install custom ground floor or basement window wells.
- ✓ Install a permanent or temporary doorway floodgate or flood panel.
- ✓ Purchase flood socks, Quick Dams™, and/or sandless sandbags.
- ✓ Apply interior concrete sealers and waterproof paints.
- ✓ Install a flood alert system.
- ✓ Incorporate flood-resistant building materials.
- ✓ Purchase portable submersible water pumps and hoses.
- ✓ Install drain tiles below basement floor and install a sump pump.
- ✓ Disconnect or plug internal floor drains.
- ✓ Install flood vents.
- ✓ Purchase and connect battery backup for sump pump.
- ✓ Install flanged "Quick Connect" system.
- ✓ Install interior concrete or masonry walls.
- ✓ Purchase utility flood covers.
- ✓ Elevate electrical, utilities, and service equipment.



Obtain Proper Permits

The acronyms below are used throughout this chapter to indicate permits that a FMAP practice may require.

HDC

Historic District Commission

HDC approval is required for a project that will make a permanent alteration to a property located within a locally designated historic district.

 rockvillemd.gov/historicdistricts

 240-314-8236

ISD

Inspection Services Division

Approved Practices may require a building, mechanical, electrical or plumbing permit.

 rockvillemd.gov/165/Permits-Inspections

 240-314-8240

NR

No Reviews or Permits Needed

Windows

Install basement window protection.

Permits **HDC** **ISD** **NR** Cost **\$\$**

Watertight covers made of translucent material can be installed on basement windows to help protect against surface flooding. Studies have shown that window covers should be custom-fitted and professionally installed for the best protection.



DO

- Check local building codes and regulations before starting.
- Perform regular maintenance. Keep covers clear of debris and check seal integrity.

DO NOT

- Use materials that aren't designed for harsh weather conditions.
- Forget to add ventilation.

Install permanent glass protection materials or flood-proof windows.

Permits **HDC** **ISD** **NR** Cost **\$\$**

Heavy flooding can cause pressure from water and debris to damage basement windows. Using permanent glass protection or flood-proof windows can protect against water pressure and the impact of debris. These windows can withstand hurricane-strength flooding and debris impact.



DO

- Install watertight seals.
- Choose materials that are impact-resistant to withstand debris.

DO NOT

- Neglect to properly anchor window frames to the building structure.

Install custom ground-floor or basement window wells.

Permits **HDC** **ISD** **NR** Cost **\$\$**

Custom window wells should be made of steel or polycarbonate plastic and custom-fitted. They should also be connected to a central drainage system that leads to an internal or external drain, the exterior of the structure away from the foundation, or the storm drain.



DO

- Choose durable and weather-resistant materials
- Include a drainage system.
- Securely attach to the foundation.

DO NOT

- Block an egress window.
- Forget to backfill around the window well with permeable materials.

Doorways

Install a permanent doorway floodgate or panel.

Permits **HDC** **ISD** **NR** Cost **\$**

Permanent floodgates or panels for doorways are physical barriers to floodwater. They attach to an external door frame and can be closed quickly to block water. Because open doorways are the fastest way for water to enter a structure, these permanent barriers are a better option than sandbags for fast, convenient protection. They should be custom fitted and installed to be most effective.



DO

- Check the gate panel, pan, and sidewalls for visible damage or misuse.
- Raise the gate and check the gasket, gasket flange bolts, and hinges periodically
- Lubricate the gaskets.

DO NOT

- Forget to check and clear the gate of debris after flood waters have receded.

Install a temporary doorway floodgate or flood panel.

Permits **HDC** **ISD** **NR** Cost **\$**

The key difference between temporary and permanent doorway floodgates and panels is how they are deployed. Temporary floodgates are only set up before flooding occurs, while permanent systems are always in place and ready to be used. Temporary systems usually aren't custom-made but they usually have expandable steel tube frames that can adapt to different doorway sizes. They may not be watertight like permanent options but can still provide great protection against flooding.



DO

- Check the condition of the door frame and fix any gaps before installation.
- Measure the doorway carefully before choosing a floodgate or flood panel.

DO NOT

- Install the floodgate or flood panel on a non-level surface.

Flood Stoppage Equipment

Purchase flood socks.

Permits **HDC** **ISD** **NR** Cost **\$**

Flood socks are designed for residential use and can stop leaks and water seepage into structures. They are lightweight and can be deployed quickly. The socks should be placed at basement or garage entrances where they will soak up water and then stick together to form a protective barrier against flooding.



DO

- Check that the bottom makes full contact with the ground.
- Regularly inspect and replaced damaged or saturated socks.
- Store socks in a cool, dry place.

DO NOT

- Ignore saturation: Fully saturated socks will be ineffective.
- Reuse one-time use socks.

Purchase Quick Dams™.

Permits **HDC** **ISD** **NR** Cost **\$**

Quick Dams™ are a brand-named device for diverting flowing water away from an area. They have a special cover that lets water into the dam where it is absorbed. The dam expands within minutes, can be used more than once, and can be used instead of sandbags.



DO

- Put a plastic layer down on unsealed cement.
- Soak them in water to activate.
- Refer to the Quick Dams website for information on proper stacking.

DO NOT

- Cut them.
- Stack one flood bag on top of another.
- Machine wash them.

Purchase sandless sandbags.

Permits **HDC** **ISD** **NR** Cost **\$**

Sandless sandbags are small, lightweight bags that serve as an effective floodwall barrier when they fill with water. They can be emptied after use, stored, and filled again as needed.



DO

- Wear gloves and protective clothing when handling.
- Clear the area where you'll place sandbags.
- Submerge the sandbags in water to activate.

DO NOT

- Let them dry out while in place.

Protective Materials and Equipment

Apply interior concrete sealers and waterproof paints.

Permits HDC ISD **NR** Cost \$

Oil- or water-based concrete sealers and paints—for example, polyurethane and thick, rubberized liquids—can keep water from seeping through concrete foundations and walls.



DO

- Clean the concrete thoroughly.
- Repair any cracks or damage.
- Etch the concrete to help the sealer or paint stick to the surface.

DO NOT

- Apply the sealer or paint in direct sunlight.
- Work in an area without proper ventilation.

Install a flood alert system.

Permits HDC ISD **NR** Cost \$

Flood alert systems use home Wi-Fi networks and water-sensing flood cables to detect flood waters. They can alert property owners by text, phone, or e-mail when water enters an area so further flood damage can be prevented.



DO

- Use a reliable power source with backup.
- Replace batteries as needed.
- Periodically check sensors and components.

DO NOT

- Mount sensors on surfaces they were not designed to be mounted on.

Protective Equipment (Continued)

Incorporate flood-resistant building materials.

Permits HDC ISD NR Cost \$\$

FEMA defines flood-resistant building materials as those capable of enduring direct and extended contact with floodwaters for at least 72 hours without sustaining damage beyond cosmetic repair. Replacing damaged building materials with flood-resistant alternatives like cement board, vinyl and rubber flooring, concrete, lime plaster, and decay-resistant wood can protect property from future damage.



DO

- Install water-resistant insulation.
- Use waterproof sealants.
- Choose corrosion-resistant fasteners and connectors.
- Consider water resistant alternatives for new flooring, internal walls and ceilings, and doors and window frames.

DO NOT

- Use materials that are not certified or tested for flood resistance.

Purchase portable submersible water pumps and hoses.

Permits HDC ISD NR Cost \$

These can help prevent floodwater from entering a building or quickly remove it. This can speed up the recovery process.



DO

- Determine the amount of water you need to move.
- Measure the vertical distance the pump needs to move water (head height).
- Match the pump to your power source.

DO NOT

- Neglect to check that the temperature resistance of the hose material and the temperature range for pump operation match your climate.

Basement

Install drain tiles below basement floor and a sump pump.

Permits

HDC

ISD

NR

Cost

\$\$-\$\$\$

A drain tile is a drainage system installed under a basement floor to relieve the pressure from groundwater that is trying to seep in. It's made from a perforated flexible plastic pipe installed under a layer of washed gravel. This system redirects water from the basement floor to a sump pump, which then moves the water to a drain.



DO

- Sit piping on at least two inches of gravel or crushed stone.
- Cover the gravel/crushed stone or pipe with a filter.
- Test the pump immediately.
- Hire a licensed and experienced plumber.

DO NOT

- Install the drain tiles above the area that needs protection.

Disconnect or plug internal floor drains.

Permits

HDC

ISD

NR

Cost

\$

Internal floor drains are often connected to storm sewer pipes outside the home. When these lines become blocked, water can reverse its flow. This can cause water to come back up through the floor drain. Minimize the risk of backups by disconnecting or plugging floor drains.



DO

- Consider using temporary plugs if you're expecting a specific event that might lead to flooding.
- Hire a licensed and experienced plumber.

DO NOT

- Make any modifications to your plumbing system without obtaining the proper permits.

Basement (Continued)

Install flood vents.

Permits HDC ISD NR Cost \$\$

Floodwater pushes against the structures it surrounds with a huge amount of pressure. Flood vents are small openings that let flood water flow into and out of enclosed areas like garages or crawl spaces. Letting water inside actually helps prevent structural damage by equalizing the water pressure as the water flows in and out of the vents.



DO

- Install in the correct part of the wall (typically the lower part).
- Determine the required net vent area (see building codes).
- Select flood vents appropriate for your specific application.

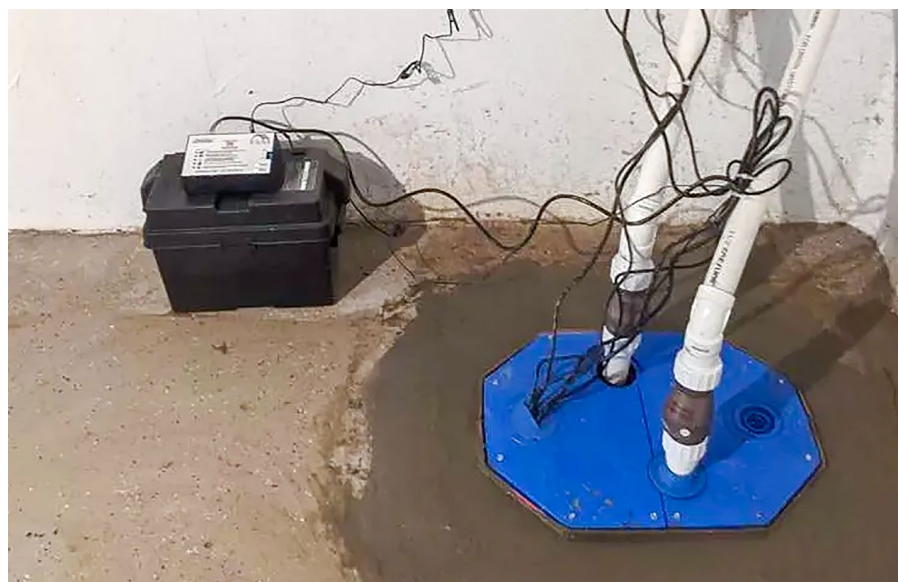
DO NOT

- Skip proper anchoring and installation procedures. Securely anchor flood vents to the building structure.

Purchase sump pumps and battery back ups

Permits HDC ISD NR Cost \$

Sump pumps redirect water from basements and are typically powered by electricity. But if there is a power outage during severe weather, sump pumps will not work to protect against floodwater. A battery backup system guarantees the sump pump can operate even if there is a power outage.



DO

- Check the specifications for the sump pump and battery.
- Choose the right type of battery.
- Choose a system with monitoring and alarms.

DO NOT

- Opt for a system that requires manual switching.
- Choose a system that is not built to withstand various environmental conditions.

Utility Protection

Elevate electrical outlets, switches, sockets, and circuit breakers.

Permits ☐ HDC ☒ ISD ☐ NR Cost ☐ \$ ☒ \$

To prevent electrical damage during floods, hire a licensed electrician to raise outlets, switches, sockets, and circuit breakers at least one foot above anticipated flood levels.



DO

- Do hire a licensed electrician.
- Do raise components at least 12 inches above the base flood elevation for your area.

DO NOT

- Neglect proper grounding.
- Overlook safety clearances to prevent overheating and ensure proper ventilation.

Purchase utility flood covers.

Permits ☐ HDC ☐ ISD ☒ NR Cost ☐ \$ ☒ \$

Plastic utility flood covers are made to protect utilities from flood damage. These protective "sleeves" can be quickly and easily pulled up and secured before a flood event. Additionally, if a water heater leaks, these covers can protect the surrounding area. Placing a waterproof flood cover beneath a furnace, boiler, or hot water heater can provide up to six feet of flood protection.



DO

- Look for covers that are made of UV-resistant and corrosion-resistant materials.
- Use covers with simple and secure installation mechanisms and deploy quickly.

DO NOT

- Use covers that are not the size and shape of your utility openings.

Elevate utilities and service equipment.

Permits ☐ HDC ☐ ISD ☒ NR Cost ☐ \$ ☒ \$

Raise critical components of a residence's heating, ventilation, and air conditioning (HVAC) system, along with major appliances like washers, dryers, and water heaters, to a higher floor or the attic. If these cannot be relocated, elevate them instead. Elevate external utilities like heat pumps using supports such as riders and cement blocks.



DO

- Plan for elevating equipment as high as possible.
- Use water- and corrosion-resistant materials.
- Securely anchor the elevated equipment.

DO NOT

- Block access to elevated utilities and equipment.

Utility Protection (Continued)

Install flanged "Quick Connect" system.

Permits HDC ISD NR Cost \$\$

Flanged connections, or "Quick Connect" systems, connect a temporary generator to the main electrical panel of a structure. They should always be positioned above anticipated flood levels. This allows for fast and safe connection and refueling of a generator.



DO

- Align the quick connect system flanges with the flanges of the equipment or pipeline.
- Check the flange alignment as you tighten the bolts.
- Perform a pressure test if needed.
- Hire a licensed electrician.

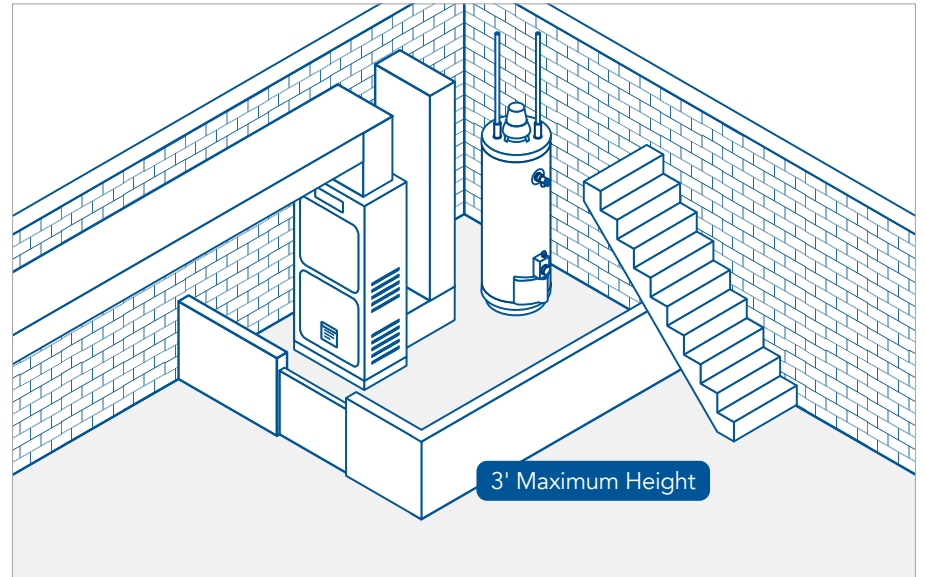
DO NOT

- Over- or under-tighten the bolts on the system. This can damage components or result in leaks.

Install interior concrete or masonry walls.

Permits HDC ISD NR Cost \$\$

Raise or enclose major appliances located in flood-prone spaces using materials such as concrete blocks or masonry walls. These internal flood barriers can offer up to four feet of flood protection.



DO

- Make sure that the foundation or substrate is properly prepared.
- Verify that the foundation has the required structural integrity to support the weight of the walls.

DO NOT

- Use weak or poorly constructed formwork or inadequate reinforcing materials.
- Rush the curing process.



Flood Mitigation Practices

-  **City of Rockville Flood Mitigation Assistance Program**
rockvillemd.gov/floodassistance
-  **Homeowners Guide to Retrofitting:
Six Ways to Protect Your Home From Flooding**
fema.gov/sites/default/files/2020-08/FEMA_P-312.pdf
-  **Protecting Your Home From Flooding:
Low-cost Project You Can Do Yourself**
fema.gov/sites/default/files/documents/fema_protect-your-home-from-flooding-brochure_2020.pdf
-  **Protecting Building Utilities From Flood Damage**
fema.gov/sites/default/files/2020-07/fema_p-348_protecting_building_utility_systems_from_flood_damage_2017.pdf



Flood Insurance

-  **Why Buy Flood Insurance**
floodsmart.gov/why-buy-flood-insurance
-  **Am I Required to Buy Flood Insurance?**
floodsmart.gov/am-i-required-have-flood-insurance
-  **National Flood Insurance Program**
fema.gov/flood-insurance
-  **Find a Flood Insurance Provider**
floodsmart.gov/flood-insurance-provider



Permitting and Utility Resources

-  **Sediment Control Permit**
rockvillemd.gov/2372/Sediment-Control-Permit
-  **Public Works Permits**
rockvillemd.gov/publicworkspermits
-  **Stormwater Permits**
rockvillemd.gov/stormwaterpermits
-  **Forest Conservation Easements Maps**
<https://rockvillemd.maps.arcgis.com/apps/webappviewer/index.html?id=cce586a954ed4fba8a8df8af7c7182d5>
-  **Rockville Historic Districts**
rockvillemd.gov/historicdistricts
-  **Inspection Services**
rockvillemd.gov/165/Permits-Inspections
-  **Call Before You Dig**
Contact Miss Utility 48 hours in advance to mark underground utilities: missutility.net/maryland, **1-800-257-7777 or 811**



Additional Resources

-  **Homeowners Guide to Sustainable Home Drainage**
rockvillemd.gov/drainageguide
-  **Public Works Stormwater Permits and ISD Permits**
rockvillemd.gov/Permits-Inspections



City of
Rockville
Get Into It

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