

Native Plants & Pollinators:

Intentional gardening for water quality, wildlife habitat, & pollinators

Homeowner's Workbook

Coming Soon...

- ◆ List of area contractors (design, engineering, etc.)
- ◆ List of native plants sold at area nurseries

These resources will be posted at www.fcsvt.org
In 2019 so stay tuned!

Developed by:



FRANKLIN COUNTY
Stormwater



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Acknowledgments: Northwest Regional Planning Commission received funding for this project through the EPA Healthy Communities Grant. The EPA New England’s Healthy Communities Grant Program combines resources from several EPA programs to strategically address the environmental and public health issues burdening New England communities. The program competitively selected projects that will: assess, understand, and reduce environmental and human health risks; increase collaboration through community-based projects; build institutional and community capacity to understand and solve environmental and human health problems; advance emergency preparedness and resilience; and achieve measurable environmental and human health benefits in communities across New England.



PART 1: Key to Utilizing Workshop Resources

These Documents are in the Participant Packet You Have Received

- 1) Vermont Guide to Stormwater Management for Homeowners & Small Businesses (2018)
- 2) Vermont Rain Garden Manual
- 3) Lake Wise: Establishing No-Mow Zones
- 4) Lake Wise: Planting & Maintaining Vegetation Areas
- 5) Lake Wise: Managing Invasive Plants
- 6) Lake Wise: Planting and Re-Naturalizing Areas (Encouraging Mixed Hardwood Forests)
- 7) Lake Wise: List of Shoreland BMPs
- 8) A Guide to Healthy Lakes Using Lakeshore Landscaping: Design templates and easy-to-use planting plans by Federation of Vermont Lakes and Ponds (2017)
- 9) **Landscaping at the Water's Edge: An Ecological Approach** by University of New Hampshire Cooperative Extension
https://extension.unh.edu/resources/files/resource004159_rep5940.pdf
- 10) Lakes Like Less Lawn: Environmental Landscaping for Water Quality by Portland Water District

The table below identifies which document to review to find out more information on key topics.

TOPIC	DOCUMENT	PAGE #
A. Stormwater Management		
What is stormwater runoff and why is it a problem?	1	2-3
Small changes that improve stormwater management	1	37-40
B. Green Stormwater Infrastructure		
What is Green Stormwater Infrastructure?	1	4-5
Overview of best management practices for driveways and around the home	7	1
C. Property Site Assessment		
Identify where to apply practices on property	1	6-9
Also see Part 2 and Part 6 of this workbook		
D. Role of Soil		
Identify different soil types	Part 2A Workbook	6 - 7
Identify your property's soil type	Part 2A Workbook	8 - 11
Infiltration and percolation	Part 2A Workbook	12 - 13

TOPIC	DOCUMENT	PAGE #
E. Landscape Design Process		
Steps to Consider	9	31-39
Create your base concept plan	9	40-48
Sample Planting Plans	-	-
<ul style="list-style-type: none"> ▶ Raingardens <ul style="list-style-type: none"> <i>For Shade & Clay Soils</i> 	2 8 2	15-18 26-27 18
<ul style="list-style-type: none"> ▶ Shoreline based but overall concept is ornamental close to house and natives further from home as a way to ensure areas of fertilizer use is more focused 	10	6-11
<ul style="list-style-type: none"> ▶ Shoreline based but apply to all landscapes based on identified site considerations: <ul style="list-style-type: none"> <i>For level sites</i> <i>For gently sloping</i> <i>For steeply sloping</i> <i>For shady/sloped areas</i> <i>Option for edibles (part sun/shade)</i> <i>Option for pollinators (sun to part-shade)</i> <i>Option enhance water view/Riparian woodland</i> <i>Option stabilize banks/Beach</i> 	8 8 8 8 8 8 8 8	14 15 16 17 18-19 20-21 22-23 24-25 28-29
F. Nature Based Solutions for Water Quality		
<i>These practices can be classified as providing the following functions: Slow, Filter, Infiltrate, and Stabilize.</i>		
No-Mow Zone (Slow, Filter, Stabilize)	3	-
Buffer, Vegetated (Slow, Filter, Stabilize) <i>* focused on shoreland habitats</i>	6 8 9*	- 6, 10-13 25-30
Plant a Tree (Stabilize, Infiltrate) <p style="text-align: right;">Resource: VT Dept of Forest, Parks and Recreation</p> <u>Tree Selection:</u> VT Tree Selection Guide— https://vtcommunityforestry.org/sites/default/files/pictures/vmtree_guide.pdf Interactive Guide — https://vtcommunityforestry.org/resources/tree-selection		
<u>Tree Care:</u> https://vtcommunityforestry.org/resources/tree-care		
Rain Garden (Slow, Filter, Infiltrate)	1 2	29-30 All
Swale, Vegetated (Slow, Filter, Infiltrate)	1	27-28
G. Planting Along Shorelines or Buffers		
Re-establishing/Re-vegetating Areas	4 6 9	1 3 53-56
Importance of Planting Along Lakes and Streams	8	9

TOPIC	DOCUMENT	PAGE #
H. Planting for Wildlife & Pollinators		
List of species that provide food or habitat	6	7
<p style="text-align: center;"><i>Workshop Presentation Resources:</i></p> <ul style="list-style-type: none"> <i>Native plants are the preferred food sources for native birds and the preferred host plants for native insects and pollinators (www.bringingnaturehome.net)</i> <p style="text-align: center;"><i>Additional Resources to be added and final version posted to www.fcsvt.org</i></p>		
I. Native Plants		
Facts	6	8
Trees	2 4 6 8	14 2 5 30
Shrubs	2 4 6 8	13-14 3 5 33
Groundcover/Perennials	4 6 2 8	3 6 11-13 31-32
Alternate Plants (native and non-native)	8	34
<p><i>To be sure you are getting native species, you need to know the scientific (Latin) name. Often the same common name is used for several varieties.</i></p> <p style="text-align: center;"><i>Workshop Presentation Resources:</i></p> <ul style="list-style-type: none"> <i>Is it native? http://gobotany.newenglandwild.org/</i> <i>New England Ecoregions— Ecoregions are defined by similar geologic, climate, soils, hydrology, vegetation, and wildlife. Select plants native to your ecoregion http://www.newenglandwild.org/grow/ecoregions-of-new-england.html</i> <i>New England Wild Flower Society's "Plant Finder" tool to search for native plants that will grow well on your site http://plantfinder.newenglandwild.org/</i> <p style="text-align: center;"><i>Additional Resources to be added and final version posted to www.fcsvt.org</i></p> <p><i>NRPC is compiling a list of native plants that are available from suppliers in Franklin/Grand Isle Counties and the surrounding areas. This resource will be posted to www.fcsvt.org</i></p>		

TOPIC	DOCUMENT	PAGE #
J. Other		
Planting and Caring for Vegetation	4 9	4 56-60
Invasive Species Management	5	-
Selecting Species to Plant Together	6 9	4 49-51
Stormwater Friendly Lawn Care	9	61-71
K. Hiring A Contractor		
List of contractors in Northwest region	Under development will be posted at www.fcsvt.org	
Quick reference list to discuss with contractors		
<u>Erosion Control Certified Contractors</u> Consider hiring a "certified contractor" (landscapers, engineers, and site workers). The Vermont Department of Environmental Conservation has developed a certification on Best Management Practices for contractors who want to make an ongoing effort to learn about erosion control, stormwater management, bioengineering, and wildlife habitat protection. This program, called the Natural Shoreland Erosion Control Certification Course, teaches contractors both the science for using BMPs and the science of how they work to protect the lake while remaining attractive and appealing to homeowners. A certified contractor is not necessarily more qualified to work, but does have more training in Best Management Practices and understands the relationship between eroded soil and lake water quality. See VT DEC's NSECC trained professionals and more information on their website at http://dec.vermont.gov/watershed/lakes-ponds/lakeshores-lake-wise/nsecc .		



PART 2: Site Analysis - Evaluate Your Landscape

Understanding the conditions on your property will aid you in identifying where to locate plantings and the types of stormwater practices that will be a good fit for your site.

Learning Objective

⇒ Identify features of your landscape and how you utilize your property

Criteria

Check Property Boundary

Ensure you are working within the boundary of your property.

Identify Utility Locations

Check if there are above and/or below ground utilities in the work area.

Call 811 for utility marking



**Know what's below.
Call before you dig.**

Evaluate Existing Vegetation

Identify if there are existing invasive species that should be removed

Check out www.vtinvasives.org for a list of species considered invasive in VT.

See *Gallery of Terrestrial Plants*.

Monitor for Microclimates

Monitor your landscape and note the sun patterns and wind exposure over time.

- Full Sun = >6 hours direct sunlight daily
- Part Sun/Part Shade = 3-6 hours
- Shade = <3 hours of direct sunlight daily



Source: Annie White

Explore the Soils on Site

Check your soil type in several areas around your yard. Knowing the amount of sand, silt and clay in your soils will guide you in making modifications for the types of planting you should consider and potential modifications for success.

See Part 2.A of this workbook for more detail on soil type and how to identify soils on your property.

Monitor Stormwater Pathways

Walk your property to identify the various pathways stormwater can take on your property. For example, high points, low points, drainage pathways, wet areas.

See Part 6 of this workbook for a questionnaire to help you with this process.

Consider Placement of Snow Storage

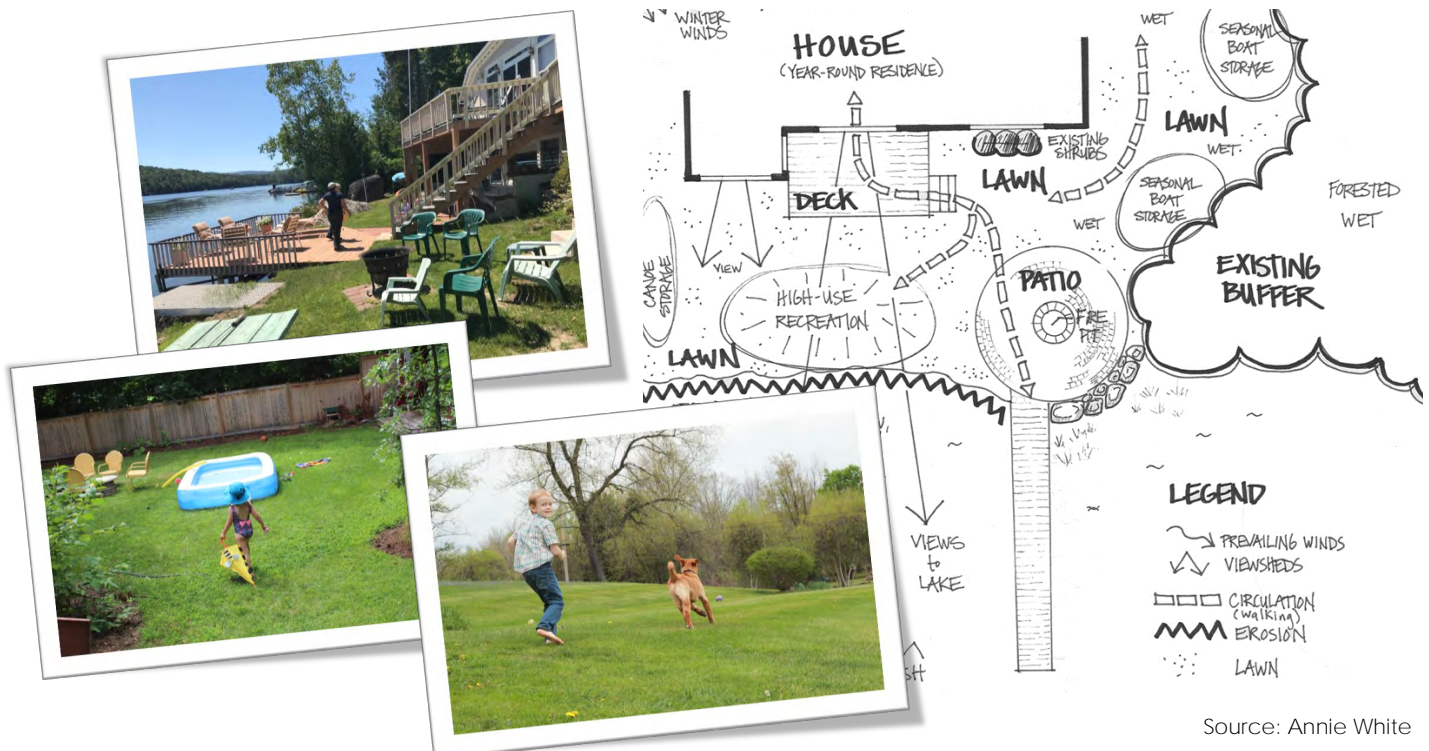
Identify if there are areas currently used to store snow and consider if there will be sand or salt applied that will make its way into your planting.



Source: Consumer Reports

Explain How Site Functions

How your property is used for passive/active recreation by children, pets, adults, etc.



Source: Annie White

PART 2A: Identify Soil Suitability

Understanding the type of soil on your property will aid you in identifying the types of stormwater practices that will be a good fit for your site.

Learning Objectives

- ⇒ Gain awareness of soil texture types
- ⇒ Identify the type of soil on your property
- ⇒ Measure how well your land infiltrates water

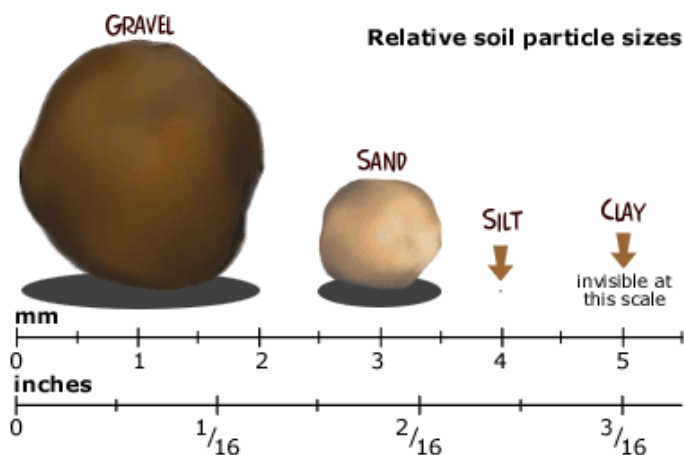
When considering how an area can manage stormwater, a focus is on the capacity of the soil to retain and infiltrate stormwater runoff and to support naturalized or ornamental vegetation. The following are all factors that determine the soil's health and its ability to support plant life:

- Particle size distribution
- Infiltration capacity (drainage)
- Nutrient content
- Soil chemistry

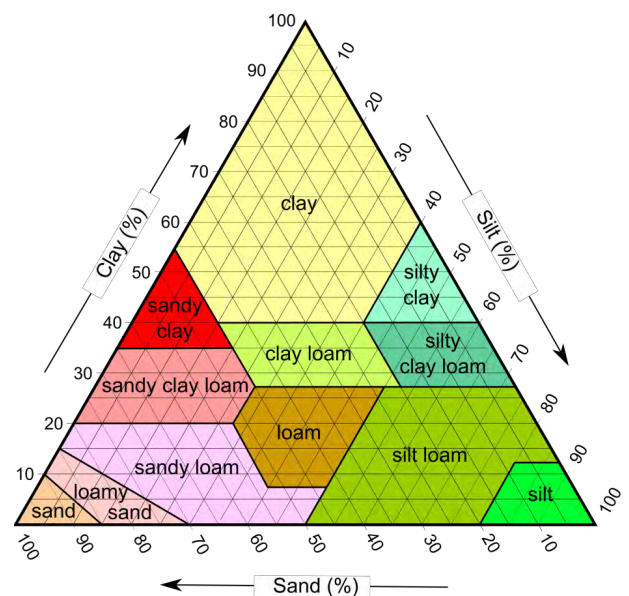
A. Soil Texture (particle size distribution)

A first step to evaluating soil suitability is to have a general understanding of the 3 basic soil texture types:

- Sand
- Silt
- Clay



Source: Discovery Channel



The **Soil Texture Triangle** above illustrates soil textures and provides the relative sand, silt, and clay content for each soil class.

Sandy Soil

Sandy soils can typically retain their structure and are less likely to have severe compaction and drainage-related problems. However, they typically have the lowest nutrient levels, and may need amendments to support dense vegetation. Stormwater infiltration practices work particularly well on sandy soils as the water drains quickly. Pretreatment practices should be included to ensure the stormwater is free of trash and high sediment loads prior to infiltrating.

Loamy Soil

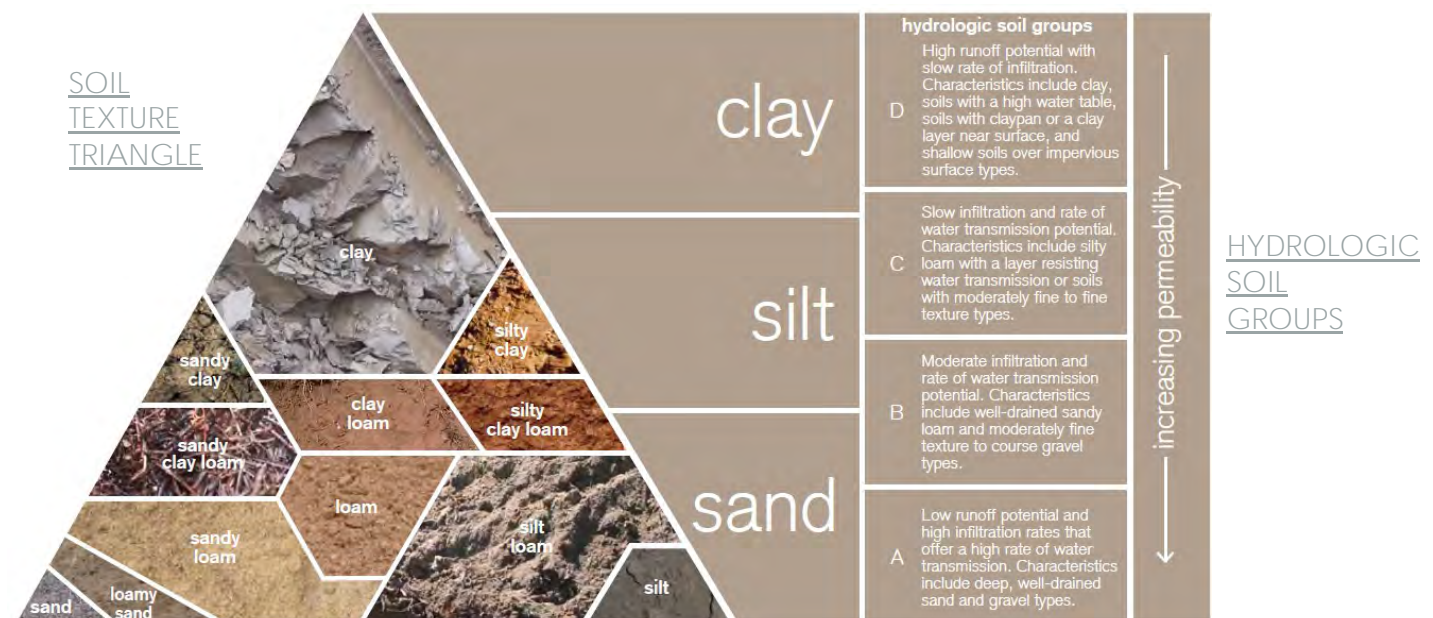
Loamy soils can be described as a mixture of sand, silt, and clay that exhibits properties of each in equal proportion. Loamy soils have historically been the most productive soil type for food crops. These soils are typically friable, soft, and rich in organic material. The same features that make this soil so conducive to plant growth make it prone to compaction, and wind and water erosion. Drainage and infiltration rates in loamy soils vary based on silt and clay content; loamy soils tend to be well-drained. In uncompacted loamy soils, drainage is typically sufficient to ensure soil moisture conditions that are ideal for plant growth.

Clayey Soil

Clay is the smallest soil particle size. The small particles give clay cohesiveness and a unique ability to resist wind erosion; however, water erosion can be severe. Clayey soil is typically poorly drained; as a result, soil remains wet for long periods of time. Clay is also the easiest to compact by both human activity and natural phenomena. Establishing vegetation in clayey soils can often require aeration or soil amendments. Soils with extensive clay content slow the infiltration process, and facilities to be constructed on such soils must be appropriately evaluated and designed.

B. Soil Hydrologic Groups

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

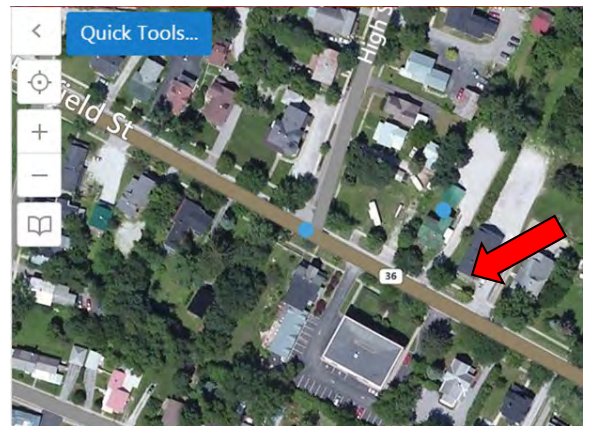


Take-Home Activities

Activity 1 - Identify your soil type and hydrologic group from online maps



- 1) To identify your soil type, go to <http://websoilsurvey.nrcs.usda.gov>.
- 2) Using the interface in the application you can select the area of interest and see a full list of the soil types and applicable land uses or limitations for the selected area based on soil properties.
- 3) To identify your soil hydrologic group, go to <http://anmaps.vermont.gov/websites/anra5/>.
- 4) A map of the state of Vermont should show up. Go to "Quick Tools" in the top left corner of the map, click on it. Then click on "Find an Address" and type in your address (i.e. 75 Fairfield Street) and then town (i.e. St. Albans). Click Submit.
- 5) It will then give you an aerial view of your property (see the image to the right).
- 6) From here, click on "Quick Tools" again and scroll down to "Show Map Layers" and click on it.
- 7) The map layers will show up on the left hand side of the screen and then you will scroll down to "**Geology**", click on it. Scroll down to "**Soils - Hydrologic Groups**" and click on it. Zoom out a bit and your screen should then look like this:



- 8) Click on the icon where the red arrow is above. This will allow you to see the **“Legend”** and what each color represents, for example red is “Soil Group A”, yellow/orange is “Soil Group B”, green is “Soil Group C”, and blue is “Soil Group D.”



NOTE: Dual Hydro Groups (“A/D”, “B/D”, “C/D”) is a relatively new addition to Vermont’s NRCS Soil Survey dataset. This “/D” can denote soils in HSG D because of a shallow water table limitation, but when the soils are drained (for instance with a curtain drain or with agricultural tile drainage) the soil texture itself is favorable for faster water transmission. The dual classification is assigned based on the post-drainage-enhancement condition to the left of the “/”, and the pre-drainage-enhancement condition to the right “always “D”).

- 9) The table below describes the minimum Soil Infiltration Rate expected for each hydrologic group.

HYDROLOGICAL SOIL GROUP	INFILTRATION RATE*
Group A is sand, loamy sand or sandy loam	>0.30 in/hr
Group B is silt loam or loam	0.15 - 0.30 in/hr
Group C soils are sandy clay loam	0.05 - 0.15 in/hr
Group D soils are clay loam, silty clay loam, sandy clay, silty clay or clay	<0.05 in/hr
*Urban Hydrology for Small Watershed TR-55 (USDA Soil Conservation Service, 1986)	

See Activity 3 for more information on Infiltration Rates.

These online resources will give you a sense of what your soil type is. However, when your property was developed, soil (or fill) may have been brought onto your property in order improve its conditions. Therefore, it is a good idea to do to ribbon test (Activity 2) and percolation test (Activity 3) to test your soil.

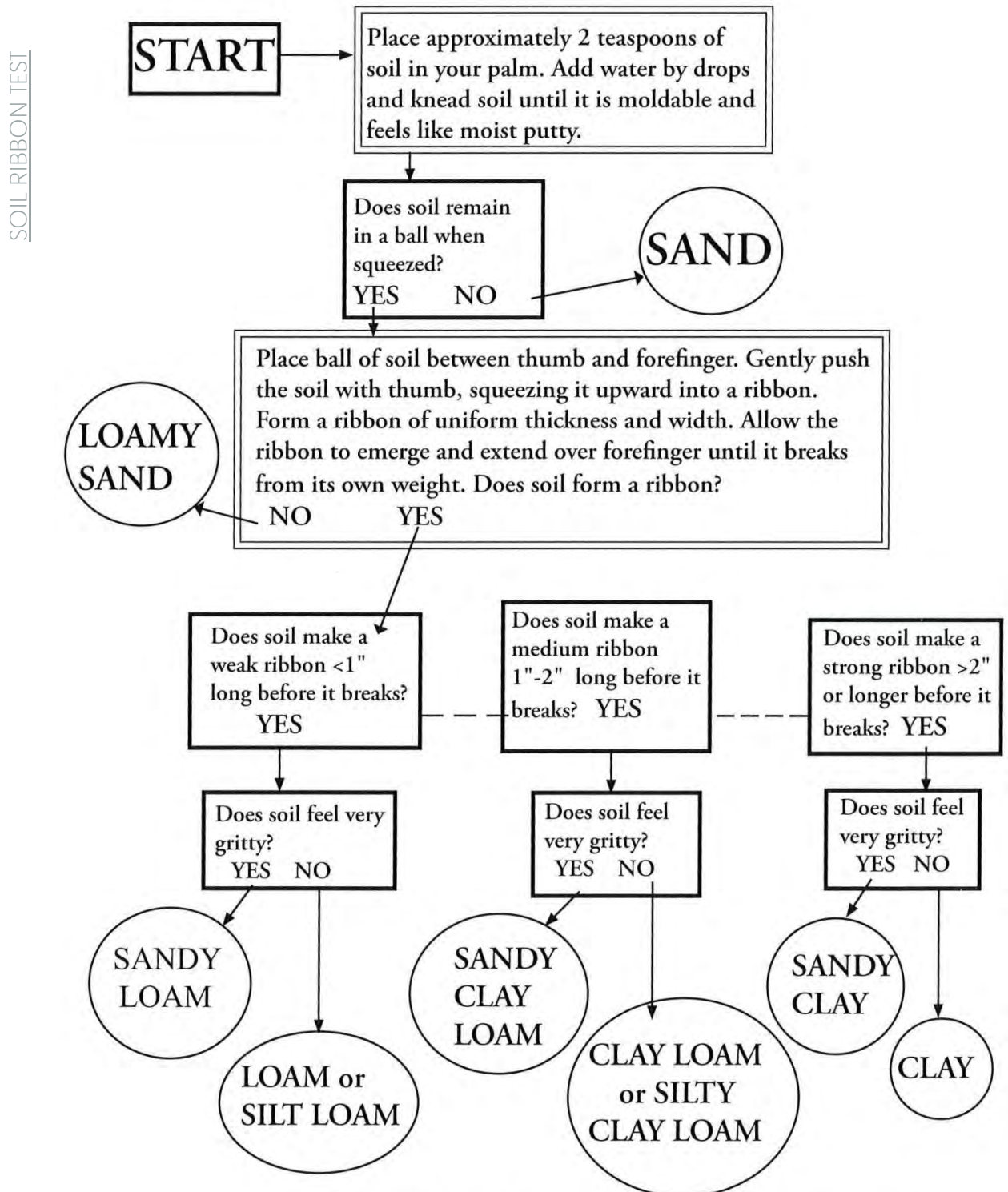
SOIL TEXTURE AND DRAINAGE



Activity 2 - Soil Texture by Feel

To test the soil texture on your property perform a soil ribbon test and compressing some soils into a ball and making a "soil ribbon" to determine if it is sand, silt loam, or clay.

Begin at the place marked "start" and follow the flow chart by answering the questions until you identify the soil sample. Please note that soils having a high organic matter content may feel smoother (siltier) than they actually are. Follow the chart below to perform the Soil Ribbon Test.



Source: Adapted from WOW!: The Wonders of Wetlands, Environmental Concern Inc.

Activity 3 - Soil Percolation Test (looking at infiltration)

Setting up a Percolation Test - A soil percolation test is conducted to determine how quickly water will infiltrate at a site. Areas with soils of good drainage type are candidates for installing practices that direct water to that area. See links to videos under Additional Resources on how to conduct a simple percolation test.

Instruction: Best time to perform a percolation test is in the spring when the soil is more moist.

- 1) Using a shovel, dig a hole that is as deep as it is wide. It is recommended to dig a hole either 8in deep by 8in wide.
- 2) Use a watering can or bucket to fill the

NOTE: If the hole fills with water on its own or if water is still in the hole after 24 hours, choose a new location.

hole with water to pre-moisten the soil and allow it to drain completely.

- 3) Fill the hole with water a second time and place a ruler or yard stick in the hole. Record the water level and the time.
- 4) Measure the water height every 30-60 minutes. Note your results in the Timing Results Table.
- 5) Continue to note your results until the rate of infiltration stabilizes (the water is no longer draining and the water depth has stayed steady for 2-3 hours) or at a minimum 4 hours.
- 6) Use results to calculate the infiltration or drainage rate (inches/hour) of the soil.



The table below provides a guide to aid in determining what type of soil you have your property and how well it infiltrates water back into the ground.

TIMING RESULTS TABLE				
Date of Test	Elapsed Time (Hours)	Water Depth Measurement (Inches)	Infiltration Rate (Depth of Drop-inches/Time-hours)	Comments

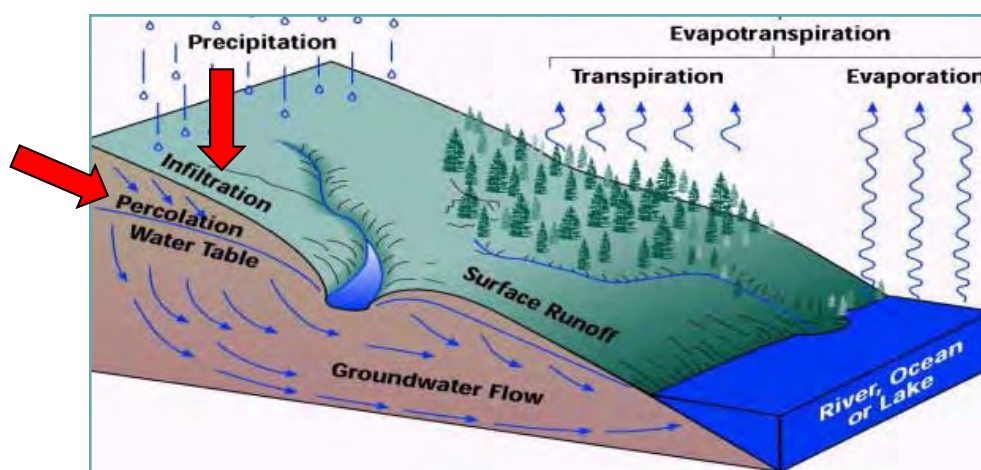
Soil Type	Ribbon Length (inches)	Min. Absorption Rate (inches/hour)
Sand	Soil does not form a ribbon at all	8 in/hr
Silt	A weak ribbon <1.5 inches is formed before breaking	1in/hr
clay	A ribbon >1.5 inches is formed	0.04 in/hr

NOTE: A quarter inch an hour is a minimum rate for raingardens.

Infiltration vs Percolation

Infiltration is defined as the downward movement of water into the soil surface.

Percolation is defined as the flow of water within the soil matrix.



How water flows through soil plays a significant role in the decision to build and size a rain garden or other type of stormwater practice with the ultimate goal of infiltrating water into the soil and groundwater.

Soil Infiltration

Infiltration is a surface characteristic and hence primarily influenced by the condition of the surface soil. Many factors affect the amount of water infiltrated on a site.

- Soil surface with vegetative cover has a greater infiltration rate than bare soil
- Warm soils absorb more water than colder ones
- Coarse surface texture, granular structure and high organic matter content in surface soil all help to increase infiltration
- Infiltration rate is comparatively lower in wet soils than dry soils

Factors Affecting Infiltration:

- Compaction of soils (surface crust)
- Clay minerals
- Soil texture
- Soil structure (air spaces)
- Moisture content
- Vegetative cover
- Topography

The characteristics of subsoil (the layer under topsoil) play a role in water movement (percolation). Subsoil that is made up of glacial till or clay prevents infiltration. If there is enough rain with this type of subsoil, the topsoil becomes saturated, leaving no place for the water to go regardless of the characteristics of the topsoil.

Additional Resources

⇒ Identify where stormwater could flow and collect on your property

Soil Texture - The Ribbon Test - <https://www.youtube.com/watch?v=GWZwbVJCNec>

A video example of how to conduct a soil texture test, in order to determine type of soil and how well it infiltrates on your property, based off the texture.

How To Do a Percolation Test

Below are a few videos that provide examples of how to conduct a simple percolation test, in order to determine how quickly water will infiltrate on at site.

UNL extension - <https://www.youtube.com/watch?v=nZqYZWjNfD8>

The Horticulture Guy - <https://www.youtube.com/watch?v=e6VV6OU3ssA>

San Antonino River Authority - <https://www.youtube.com/watch?v=kYWh6MuOBJM>

PART 3: Differentiating Property Surfaces: Impervious vs Pervious

Learning Objectives

- ⇒ Learn the differences between features on your property such as rooflines, driveway, lawn, flower beds, unmanaged areas
- ⇒ Understand the impacts of different property feature types

Take-Home Activity

Identify features on your property as either an [impervious surface](#) or [pervious surface](#).

Impervious Surfaces

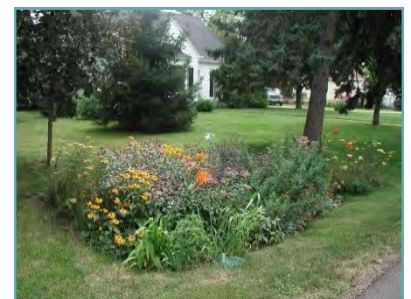
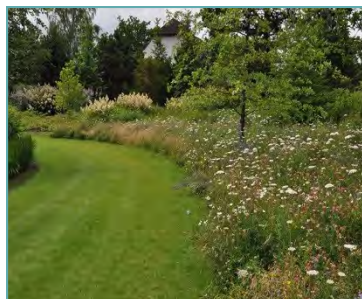
What are they? Hard surfaces that cover the ground and prevent stormwater, like rain and snow melt, from soaking into the soil. These can include roofs, roads, driveways, parking areas, walkways, decks, patios and other hard surfaces (including packed gravel paths).



What do they do? Impervious surfaces increase the amount of stormwater that runs off your property.

Pervious Surfaces

What are they? Landscaped or natural ground cover that allows rain and snow melt to soak into the soil. These can include grass areas, gardens and natural areas (i.e. forest or meadow).



What do they do? Pervious surfaces decrease the amount of stormwater that runs off your property by allowing water to naturally soak into the ground due to its permeable material.

PART 4: Calculate the Amount of Impervious Area on a Property

Learning Objectives

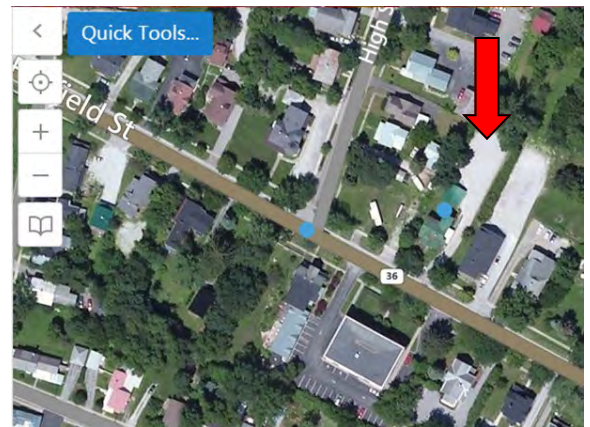
- ⇒ Learn how to calculate the percentage of your property that creates runoff (impervious) and the percent that can soak it in (pervious)

Take-Home Activities

Activity 1 - Use the VT ANR Natural Resources Atlas to Identify Features on Your Property


- 1) Go to <https://anrmaps.vermont.gov/websites/anra5/>

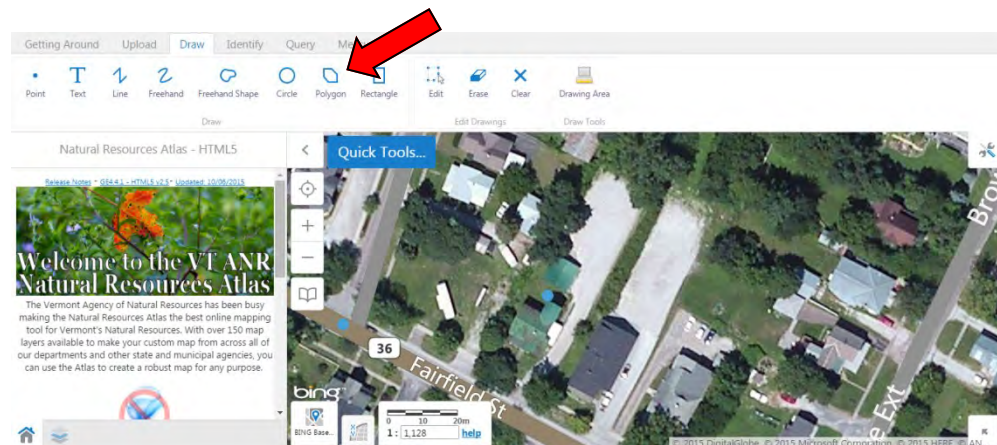
- 2) A map of the state of Vermont should show up. Click Quick Tools in the top left corner of the map. Then click on Find an Address and type in your address (Example: 75 Fairfield Street) and then town (Example: St. Albans City). Click Submit.




- 3) It will take you to an aerial view of your property, see image to right of Example: 75 Fairfield Street, St. Albans City.

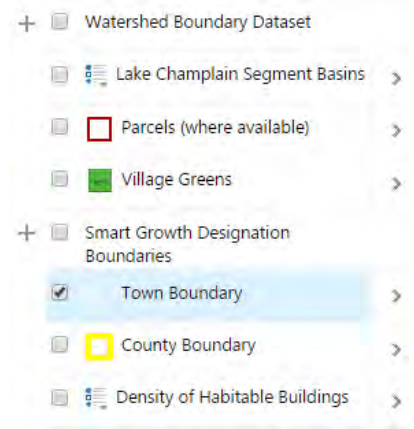
- 4) Next, "zoom in" with the + - buttons in the upper left to get a closer view of your property.

- 5) Open the main toolbar by clicking the open Tools button  in the top right corner of the map and then from there go to the tab Draw and use the Polygon tool, like the image below.



6) Identify your property boundary. You can “turn on” the parcel boundary data layer to see your property perimeter and make it easier to map out features. To show the map layers in the left

side bar, click on the Layers tab . You can find the Parcel layer by scrolling down the list; it is located below the *Watershed Boundary Dataset*.



7) Draw property features



i) Using the Polygon tool, you can draw an outline of the different features on your property (i.e. roof, garage, garden beds, landscape areas, lawn, and naturally vegetated areas).

ii) You can assign different colors to each polygon (by clicking Styles), similar to the image.

iii) The program will calculate area, BUT only provides a cumulative number based on all polygons drawn. If you want to know the total amount of impervious surface on your property, you would only draw those surfaces then select the Drawing Area button to calculate the areas outlined. Record area in table attached on page 8.

Red Polygons = Impervious Surfaces

Green Polygons = Landscaped Areas

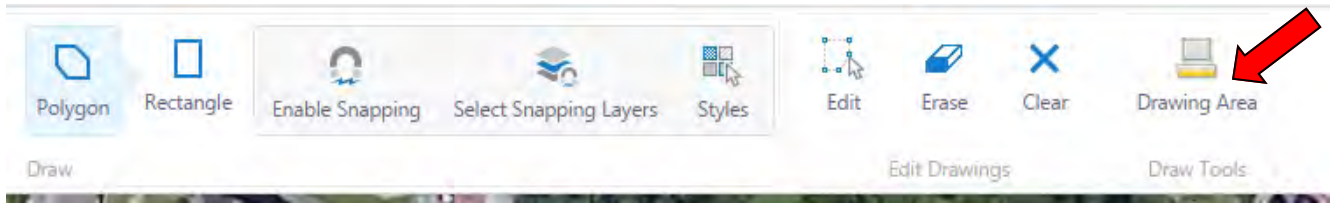
Blue Polygons = Natural Vegetation

Important Consideration - Verify where impervious surfaces are by walking around outside. Trees may overhand your driveway or other hard surface features. When this occurs, since the surface the rain would hit would be impervious, then you will want to draw your shapes to reflect what is on the ground.

In the example below, the image on the left mapped to the tree canopy edge and the image on the right mapped the extent of the driveway and parking lot that is under the tree canopy. Make sure you are fully aware of the layout of your property in order to have a good understanding of your property's features when completing this exercise.



Activity 2 - Calculate the Amount of Impervious vs Pervious Surface on Your Property Using ANR Atlas



- Using the Drawing Area tab on the right corner of the Toolbox, you can determine the acreage of each feature (1 acre = 43,560 ft²). For example, in this image above the main roof is approximately 0.03 acres, which is equivalent to 1,306.8 ft².

FEATURE TYPE	FEATURE	AREA (ac)	AREA(ft ²)
<i>Impervious Area</i>	Office Roof - 3	0.04	1,742.4
<i>Impervious Area</i>	Garage Roof - 2	0.02	871.2
<i>Impervious Area</i>	Front Walkway - 6	0.01	435.6
<i>Impervious Area</i>	Driveway - 1	0.18	7,840.8
<i>Landscaped Area</i>	Front/Side/Back Yard - 4,5	0.11	4,791.6
<i>Natural Vegetated Area</i>	None	0	0

Total Impervious Area (ft²) = 10,890

Total Landscaped Area (ft²) = 4,791.6

Total Natural Landscaped Area (ft²) = 0

For this example above, each element was drawn individually and the area was calculated per item/polygon as drawn in the image on page 16.

Activity 3 - Map Your Own Property Using the Table Below (1 acre = 43,560ft²)

Acreage of your property? _____ Convert to square feet _____

FEATURE TYPE	FEATURE	AREA (ac)	AREA(ft ²)

Total Impervious Area (ft²) = _____

Total Landscaped Area (ft²) = _____

Total Natural Landscaped Area (ft²) = _____

Percent Impervious _____

Percent Pervious _____



PART 5: Estimate the Amount of Stormwater Generated

Learning Objectives

- ⇒ Learn to calculate the amount of stormwater that is generated on your property during a 1" rainstorm
- ⇒ Increase knowledge about the average annual and monthly rainfall & snowfall in the County

The amount of stormwater runoff generated from your property depends on how long and how hard it rains, the slope of your property, the type and quality of the soils, the amount of impervious surface on your property, and other factors. You can estimate the volume of stormwater generated from a typical rainstorm (about 1") on your property by using the following formula.

$$\text{Stormwater Volume (gallons)} = (\text{Total Impervious Area, ft}^2) \times 0.0833 \times 7.488$$

0.0833 feet is one inch and 7.48 gallons are in a cubic foot

The following is the amount of stormwater generated at 75 Fairfield Street using data from the ANR online mapping program as described previously in the workbook.

$$75 \text{ Fairfield Street Stormwater Volume} = (10,890 \text{ ft}^2) \times 0.0833 \times 7.488 = 6,792.64 \text{ gallons}$$

The Northwest Regional Planning Commission property could generate around 6,792.64 gallons of runoff during a 1" rainstorm.



To put this number in perspective:
6,792.64 gallons is enough water to fill 17 Hot Tubs!

How much stormwater does your property generate?

$$\text{Stormwater Volume (gallons)} = \frac{\text{Impervious Area on Your Property}}{\text{Impervious Area on Your Property}} (\text{ft}^2) \times 0.0833 \times 7.488$$

You can put this in further perspective when you look at the average rainfall in St. Albans.

The average annual rainfall in St. Albans, VT is 37.68" and the average annual snowfall is 80.6". These amounts of rainfall and snow have the ability to generate a significant amount of storm-water on residential properties and throughout our community.

St. Albans, Vermont Climatology Report on National Oceanic & Atmospheric Administration

St. Albans Vermont Climatology													
St. Albans, VT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average High Temperature	25.1	28.6	37.8	53.0	65.7	74.5	78.7	77.1	68.8	55.4	43.7	31.6	53.5
Average Low Temperature	6.4	9.1	19.1	33.2	45.2	55.0	59.9	57.5	49.2	38.1	28.5	15.2	24.8
Average Mean Temperature	15.8	18.9	28.4	43.1	55.4	64.7	69.3	67.3	59.0	46.8	36.1	23.4	44.1
Record High Temperature	64	63	80	88	92	96	98	99	95	86	74	66	99
Record Low Temperature	-32	-30	-37	6	25	31	38	36	23	18	-6	-36	-37
Average Days Above 90°	0	0	0	0	0	1	1	0	0	0	0	0	2
Average Days Below 32°	30	27	28	14	1	0	0	0	1	8	20	29	157
Average Days Below 0°	11	7	2	0	0	0	0	0	0	0	0	5	25
Average Rainfall	2.10	1.96	2.65	3.06	3.23	3.73	3.82	3.92	3.58	3.62	3.33	2.68	37.68
Record Rainfall	6.04	4.43	6.60	6.59	8.30	6.69	6.83	8.61	8.30	7.28	7.25	5.22	48.41
Average Number of Rain Days	13	10	12	12	13	12	12	11	10	12	12	13	143
Average Snowfall	17.3	17.6	14.8	5.8	0.1	0	0	0	0	0.7	6.2	18.1	80.6
Record Snowfall	52.8	38.5	40.0	24.8	2.0	0	0	0	0	4.0	28.0	47.5	121.0
Average Number of Snow Days	11	9	7	3	0	0	0	0	0	1	4	10	44
Average Heating Degree Days	1527	1292	1133	658	313	90	23	46	211	567	867	1290	8017
Average Cooling Degree Days	0	0	0	1	17	82	156	118	31	2	0	0	406
Station Information	Elevation: 460 ft/Latitude: 44.8592/Longitude: -73.0911												
<p style="text-align: center;">Temperatures are reported in Fahrenheit and rainfall/snowfall totals are reported in inches. Average are for the period 1981-2010 (Annual totals may be slightly different than monthly totals due to rounding)</p>													



PART 6: Map the Flow of Water On and Around Your Property

This section will walk you through a series of questions to aid you in identifying where stormwater collects and flows on your property and the source of the water. This information will help you identify where on your property you could locate a stormwater best practice and how much water you need to treat. *Note: This is an abbreviated questionnaire; a full property questionnaire is available upon request.*

The ideal time to assess stormwater flow would be during or immediately after a rain storm any-time of year, however an assessment in spring can also indicate areas with a higher water table or ponding from snow melt.

Tip: Print an aerial map of your property from Google Maps or another online software to mark some of the issues below to inform discussions with contractors.

Learning Objectives

- ⇒ Identify where stormwater could flow and collect on your property

Take-Home Activity

Activity - Homeowner Property Assessment Questionnaire

- ◆ Indicate materials of impervious surface on property (i.e. asphalt, slate, brick, stones, dirt, and etc.).
Roof _____ Driveway _____
Walkway _____ Deck/Porch _____
Other _____

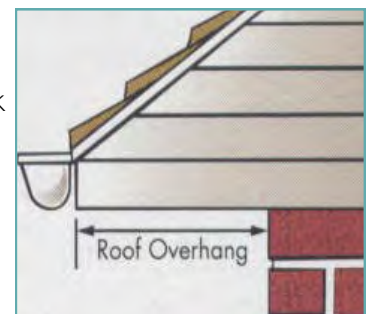
- ◆ Does the home have gutters?
Fully Guttered Partially Guttered Not Guttered

How many gutter downspouts are there and where are they directed (indicate on aerial map)?



Where does the water ultimately flow (i.e. area in yard, driveway, into the street)?

- ◆ Does your home have a roof overhang? Yes No
If yes, what does the water drain into (i.e. gutters, rain barrel, rock trench, or just the grass) and indicate where on aerial map.



- ◆ Is there evidence of driveway erosion? Yes No
If yes, explain (indicate on aerial map):

- ◆ How is water shed from walkways and other impervious surfaces?



- ◆ Where does it ultimately flow? _____

- ◆ Do you have ponding or standing water on areas of your property? Yes No
If so, where (indicate on aerial map):

- ◆ Are there seasonally saturated areas on the property?



- ◆ What type of topographic features do you have on your property? Steep slopes, low spots, hills, bedrock, and vulnerable areas? Explain.

- ◆ Are there swales or other conveyance structures on site? Yes No

If yes, describe condition and surface (vegetated, paved, perforated PVC pipe, etc.).

- ◆ Are there storm drains in close proximity where site water is flowing to? Yes No

If yes, indicate location on aerial map and inspect catch basin for inflow pipes coming from the property. Explain direct connections here: _____

- ◆ Do you have a waterbody on or along your property (i.e. stream, pond, lake, etc.)? Yes No

If yes, indicate where on your aerial map.

Is the waterbody buffered by vegetation? Yes No

Does stormwater flow to the waterbody(s)? Yes No

If yes, is there visible erosion on the banks? Explain.

- ◆ Any evidence of stormwater "run-on" from adjacent properties? Yes No

If yes, explain: _____



EPA's Soak Up the Rain Resource Program

Soak Up the Rain is a stormwater public outreach campaign to raise awareness about the problem of polluted stormwater runoff and to encourage citizens, municipalities and others to take action to help reduce runoff and its costly impacts. We can all be part of the solution. Check out the website for outreach tools, how-to guides, and many other resources to learn more and get started.

Soak Up the Rain with Green Infrastructure
www.epa.gov/soakuptherain

EPA United States Environmental Protection Agency

soak up the rain
created by U.S. EPA

Tree Canopy
Rain Barrel
Rain Garden
Green Roof
Tree Planter Box
Pervious Concrete

Learn more. Take Action.

Poster created by U.S. EPA Office of Wetlands, Oceans and Watersheds.

What can you do to soak up the rain?

soak up the rain
created by U.S. EPA

plant a rain garden

Learn more at:
www.epa.gov/soakuptherain

EPA United States Environmental Protection Agency

Next time it rains, grab your umbrella and take a walk. Watch where the rain goes. Does it soak into the ground? Does it flow across a lawn? Does a downspout send it down a driveway or parking lot to the street and down the storm drain? Where does the rain go?

What can you do to reduce runoff on your property? Disconnect/Redirect Downspouts. Use a rain barrel to catch rain from your roof. Plant a rain garden. Plant trees. Reduce impervious pavement or install permeable pavement. Plant a green roof.

Learn more at www.epa.gov/soakuptherain.

MY NOTES: