A guide to how residents can help improve local water quality and try small changes to help manage stormwater in Springfield

Prepared by the Southern Windsor County Regional Planning Commission, December 2010

CONTENTS

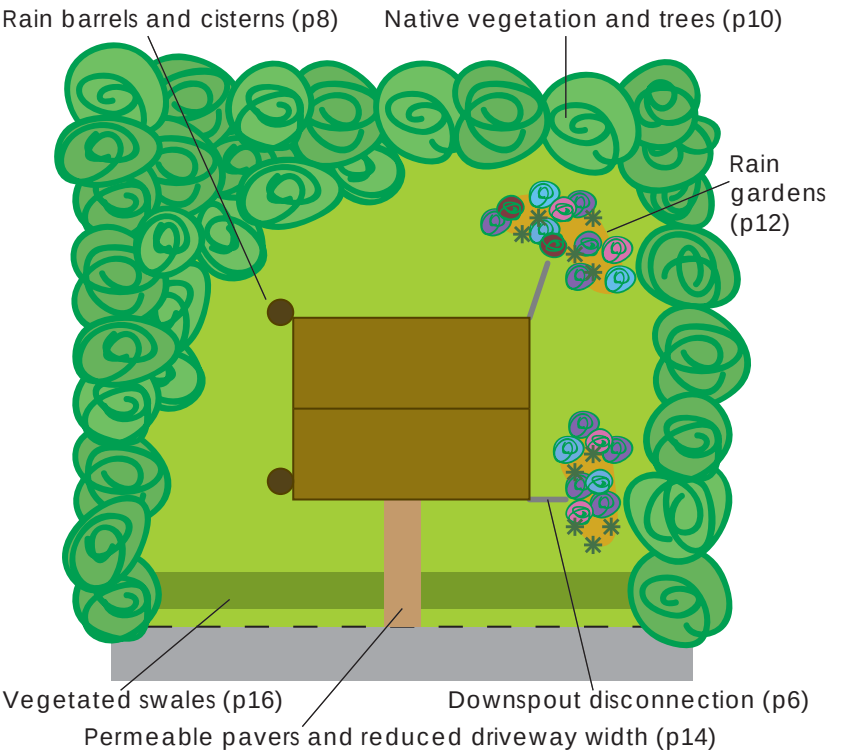
Pg 3 Why help manage stormwater and improve local water quality?

Pg 6 What can I do? Tools to intercept and use stormwater around the home (see diagram below)

Pg 17 Ways to improve local water quality
- *a. Inside the Home*
- *b. In the Yard and on the Driveway*

Pg 20 How do my efforts fit into the bigger picture?

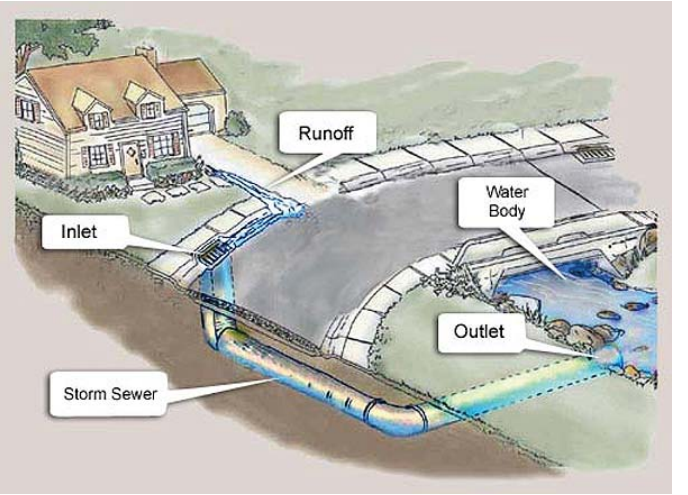
Pg 21 References and additional resources



WHY HELP?

What is stormwater?
Stormwater is the water from rain, snow or other precipitation that falls on the ground and either soaks into the ground or runs over it to a storm drain or a nearby stream, river or pond.

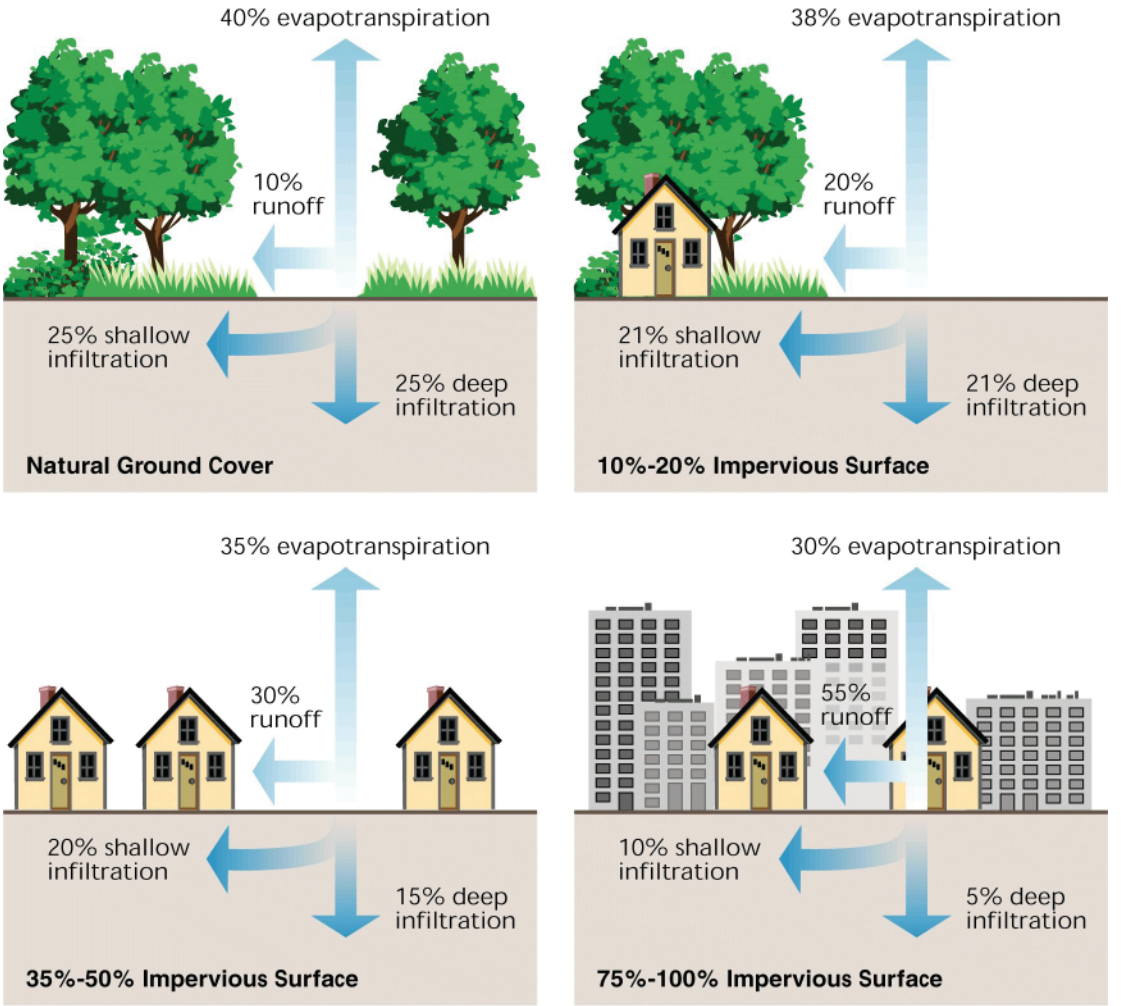
Why should we consider stormwater management and water quality when we have drains, sewers and water treatment plants?



Flow of water from homes to streams and rivers.
Source: see page 23

In fall 2010 Springfield completed the disconnection of storm drains from the local sewer system. This will help to prevent overloading of the sewer system in events with lots of rain or snow melt. This also means we need to be careful of what is picked up by rain water or snow melt as it flows towards the storm drains. With the storm drains and the local sewer system disconnected, any water that flows down the storm drain would flow directly into local streams and rivers and the chemicals and pollutants it may have picked up along the way would not have been treated.

Why do we need to improve water quality and stormwater management in Springfield?
As water flows from place to place, above and below ground, it picks up pollutants like fertilizers, gasoline, oil, tree branches and trash. The water and everything it's picked up all eventually ends up in our streams, rivers, reservoirs and groundwater. Individually the contribution of a single property or roadway to local water quality is often small, but together the impact can be great. Pollutants can be harmful to people, as well as other vegetation and wildlife which use the water. Some pollutants can encourage the growth of vegetation that harms local water quality as has occurred in Lake Champlain with algae.



Differences in water flow through the environment before and after development.

How can we improve stormwater management in Springfield?

Many of the tools mentioned in this booklet are part of a group of tools known as Low Impact Development (LID) strategies. Low Impact Development is a stormwater management technique that concentrates on adapting natural water processes to manage rainwater. LID strategies focus on maximizing the amount of water that soaks into the ground where it falls, thereby minimizing the amount of water that flows and collects in storm drains and local water sources.

LID can be used in all development settings – commercial, residential and industrial. LID techniques range from smaller projects like installing rain barrels at the end of downspouts and creating rain gardens, to larger scale projects such as installing bioswales and reducing road widths. The first section of this booklet focuses on LID projects that can be done around the home to help with stormwater management, although page 21 details some other projects which can be done on a larger scale or for new construction.

How can we improve local water quality in Springfield?

Improving how we manage stormwater is a significant component of improving local water quality. There are however some additional small changes that can help reduce the number of pollutants that reach local streams and rivers from around our homes and gardens. These are highlighted in the second section of this booklet and include reducing use of fertilizers and pesticides, washing cars on the grass rather than the driveway and using low phosphorus cleaners around the home.

What are the common benefits of the tools in this booklet?

- By letting rainwater filter directly into the ground on site, the water has less chance to pick up pollutants from roadways and other surfaces it passes before it enters the local water supply.
- The soil and plants which the water travels through can help filter off some of the pollutants.
- With rainwater soaking into the plants and ground on site, less water reaches local streams and river. The rate at which water reaches local streams and rivers is also slowed down, reducing the risk of flooding.

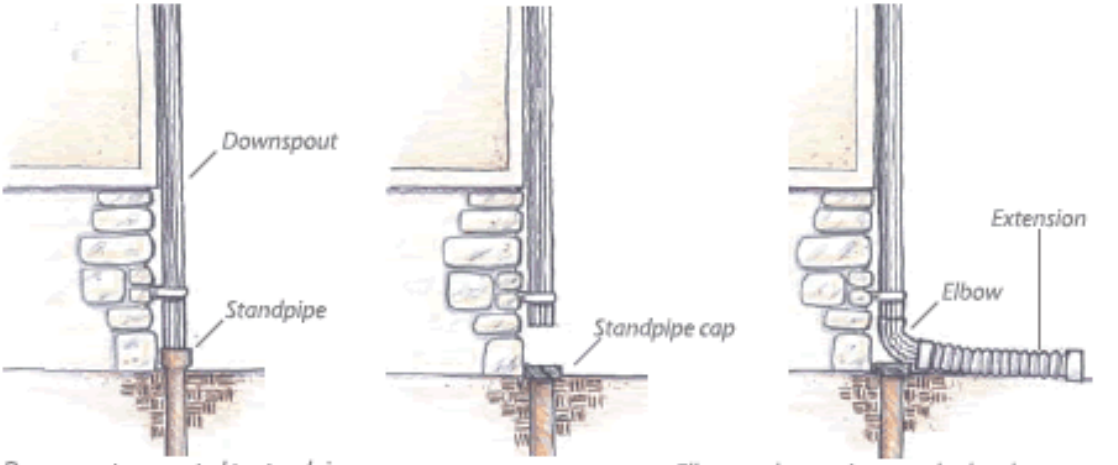
How can these small changes on my residential property make changes on a larger scale?

Every little thing helps. The tools referenced in this booklet focus on using lots of small, on-site projects to manage stormwater, which collectively, with other small projects, make a bigger impact.

WHAT CAN I DO TO MANAGE STORMWATER?

Downspout Disconnection

By disconnecting the downspout which runs from the gutters around your home directly into the sewer system, into the ground and onto driveways and roads, water can instead be directed into lawns and gardens. Sump pumps and foundation drains can also be disconnected and re-directed to lawns and gardens.



Downspout connected to standpipe.

Elbow and extension attached to downspout.

What are the benefits?

In addition to the benefits that all the tools in this brochure share (see page 5), downspout disconnection also allows water from the roof can be used directly to water the lawn and garden.

Where can I do this?

- Areas with good soils for infiltration
- Areas which are not directly over a septic system or underground oil tank.
- Do not disconnect within ten feet of a retaining wall.
- At least six feet away from buildings to prevent seepage into the basement and 5 feet from property lines.
- On slopes of less than 10%

What does it involve?

- Installation
    - You can do it yourself
    - Tools – hacksaw, drill, pliers, tape measure, screwdriver or nut driver
    - Materials – downspout elbow and extension, standpipe cap with wingnut or hose clamp, splashblock and some gravel (optional but will help prevent soil erosion), sheet metal screws (to attach all the pieces together).
    - Will take about an hour
    - May need to re-grade around the foundation
- Maintenance
    - Low – Check the gutters are clean and the downspout are clear, securely fastened and not leaking.

How do I do it?

There are instructions online in many places. The City of Portland, Oregon, has produced a good brochure which details how and where to disconnect your downspouts (www.portlandonline.com/bes/index.cfm?c=43445).

Rain Barrels and Cisterns

Rain barrels are designed to collect rain water that comes down the downspout connected to gutters. The water that is collected can be used to water lawns and gardens. Cisterns are larger scale versions of rain barrels and can be located above or below the ground. Rain barrels can store between 50-150 gallons of water, while cisterns can hold between 500 and 7,000 gallons.

What are the benefits?
In addition to the benefits that all the tools in this brochure share, rain barrels and cisterns also allow water from the roof to be stored and used later to water your lawn and garden.

You can increase the amount of water you collect by adding additional rain barrels or using bigger barrels or a cistern.

This tool can also be done where there are no gutters by placing the rain barrel under a roof valley.

What does it involve?
Rain Barrels

- Installation
  - You can do it yourself
  - Tools – same as disconnecting your downspout. A few more are needed if you are building your own rain barrel.
  - Materials – Can either buy a pre-made rain barrel, or make one yourself from a food grade plastic barrel (and a few other items). You will also need materials to disconnect the downspout, create an overflow and outlet, and something to stand the rain barrel above the ground (see instructions for details).
- Maintenance
  - Low – Check the gutters are clean, the rain barrel is securely fastened and the mosquito screen is intact.

Cisterns
Cisterns typically need to be installed by a professional and may require a permit from the Town depending on the size.

How do I do it?
There are instructions online in many places. The City of Portland, Oregon, has produced a good brochure which details how and where to install a single rain barrel and build your own barrel (www.portlandonline.com/bes/index.cfm?c=43445).

Design guidance for double rain barrels can be found in the Vermont Department of Environmental Conservation's Vermont Low Impact Development Guide (www.anr.state.vt.us/dec/waterq/planning/docs/pl_LID%20Guide.pdf). Also look out for rain barrel resources from the Black River Action Team (http://blackriveractionteam.org/wp/).

Note: Depending on the quality of rain barrel used, many should be disconnected and emptied before the first major freeze in the winter. An overflow will be needed for large rain events.

Native Vegetation and Trees

One of the best ways to intercept stormwater is to retain and plant native vegetation. Native plants are well suited to our particular climate and soil conditions, and require less watering, pesticides and fertilizers than non-native plants.

Trees are one of the best interceptors of water. Research has shown that when an inch of rain has fallen, trees can intercept 98% of the water that has fallen while impervious surfaces can only stop 3% of water run off (Pennsylvania Department of Environmental Protect, 2006: Ch2-Pg9). Even for the bigger rainstorms, such as a 4.09 inch rainstorm (which Springfield had twice in September/October 2010), trees would still only about 40% of the rain to run off.

Vermont native plants come in a wide variety of shapes, sizes and colors. Examples shown (L-R): Red baneberry, purple false foxglove, nodding onion, wild ginger, milkweed/ butterfly plant, lady fern, false aster, wild/ American senna, coreopsis, rosebud azalea, painted trillium and false hellebore.

What are the benefits?

In addition to the benefits that all the tools in this brochure share, having native vegetation instead of grass on a lawn will also reduce the amount of fertilizers and pesticides needed, as well as reducing the amount of time spent mowing.

During new construction, retaining existing trees and vegetation keeps the soil undisturbed, so it is better at storing and infiltrating water, even when saturated.

This tool can also be used in conjunction with other tools described in this booklet – such as downspout disconnection, rain barrels and rain gardens.

What does it involve?

- Installation
  - You can do it yourself
  - Tools – gardening tools
  - Materials – plants, compost, mulch
- Maintenance
  - Low – Water plants regularly until their roots are established, weed regularly (need should decrease over the years), add mulch after a few years.

How do I do it?

A Vermont native plant list has been compiled by The Winooski Natural Resources Conservation District compiled a list of 150 plants and trees as part of their Rain Garden manual (www.vacd.org/~winooski/RGManualPlantList7.1.09FINAL.pdf). The list includes information about the plants and trees such as salt tolerance, sun/shade requirements, hardiness, and tolerance to drought and poor drainage.

Extract from the Vermont native plant list.

Latin Name	Common Name	VT Native	Tolerant to Salt	Mature Height	Exposure	Seasonal Interest	Pollinators
FERN							
Athyrium filix-femina	Lady Fern	x		1-3'	PSH/SH		
Deparia acrostichoides	Silver False Springwort	x		1-3'	PSH/SH		
Dryoptera filix-mas x marginalis	Vermont Wood Fern			1-3'	PSH/SH		
Matteuccia struthiopteris	Ostrich Fern	x		3-5'	PSH/SH		
Onoclea sensibilis	Sensitive Fern	x		1-3'	PSH/SH		
Osmunda cinnamomea	Cinnamon Fern	x		2-3'	PSH/SH	F	
Osmunda claytoniana	Interrupted Fern	x		1-4'	PSH/SH		
Osmunda regalis	Royal Fern	x		2-3'	PSH/SH	F	
Polystichum acrostichoides	Christmas Fern	x		1-3'	PSH/SH	W	
Thelypteris noveboracensis	New York Fern	x		1-2'	PSH/SH	F	
GRASS							
Agrostis stolonifera	Creeping Bentgrass			3-5'	FS	S	
Andropogon gerardii	Big Bluestem	x		3-7'	FS	F/W	BM
Andropogon virginicus	Bushy Broomsedge			3-4'	FS	S/F	
Bouteloua curtipendula	Side-oats Grama Grass			1.5-2.5'	FS	S/F	
Calamagrostis acutiflora	Feather Reed Grass		x	3-5'	FS		
Carex flacca	Blue Sedge			6-8"	FS/PSH	Sp	
Carex flaccosperma	Blue Wood Sedge		x	1-1.5'	FS/PSH	Sp	
Carex grayi	Gray Sedge	x	x	2-3'	PSH	S	

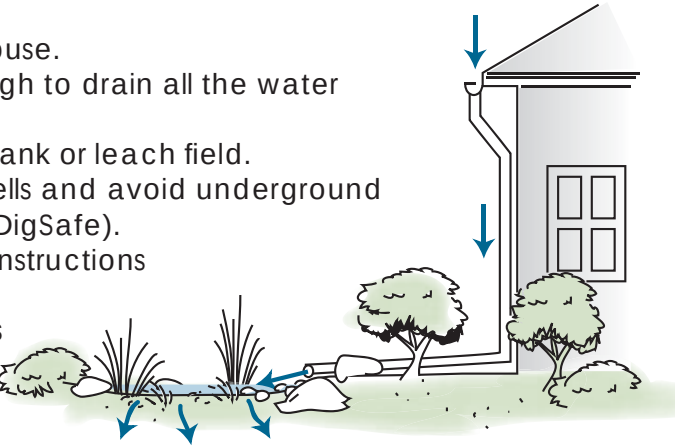
Rain Gardens

Rain gardens are small areas of native plants that are designed to collect, clean and infiltrate water.

What are the benefits?
In addition to the benefits that all the tools in this brochure share, rain gardens are also an attractive and relatively low maintenance garden.

Where can I do it?

- At least 10 feet from the house.
- In a garden area big enough to drain all the water directed to it in 36 hours.
- Areas not above a septic tank or leach field.
- Should be 100 feet from wells and avoid underground pipes and utility lines (Call DigSafe).
- Well draining ground (see instructions for how to test).
- Works best on slopes of less than 5%.



What does it involve?

- Installation
    - You can do it yourself
    - Tools – gardening tools
    - Materials – plants, compost, mulch
    - Some rain gardens include a layer of stone or sand at the bottom and a perforated pipe. These more engineered rain gardens may require professional assistance.
- Maintenance
    - Low – Water plants regularly until their roots are established, weed regularly (need should decrease over the years), add mulch after a few years.

How do I do it?
There are instructions available online in many places. In 2008 the Winooski Natural Resources Conservation District produced a Vermont specific rain garden manual which includes information on choosing a location, designing, installing and maintaining a rain garden. Manual available online

at www.vacd.org/~winooski/RGManual7.1.09FINAL.pdf

A Vermont rain garden plant list is also included in the manual contains 150 plants suitable for a rain garden and information about the plants such as salt tolerance, sun/shade requirements, hardiness, and tolerance to drought and poor drainage. Plant list available online at www.vacd.org/~winooski/RGManualPlantList7.1.09FINAL.pdf

Notes

Raingardens that capture stormwater runoff from over one acre of impervious surface may require an Underground Injection Control (UIC) permit from the Vermont Agency of Natural Resources. For more information see www.anr.state.vt.us/dec/ww/uic.htm

Permeable Pavers and Reducing Driveway Widths

Development often requires large areas of impervious surfaces whether roads, rooftops, parking lots or driveways. Impervious surfaces stop water from entering the ground on site and instead channelize stormwater to nearby storm drains and waterways. Reducing driveway and walkway widths on individual properties can help reduce overall impervious coverage while minimizing initial construction costs. Using permeable pavement options can also make significant differences to local stormwater management and water quality. Permeable pavement can come in a variety of shapes and sizes. There are pervious concrete and asphalt options designed specifically to allow water to travel through them into the ground beneath. Alternatively, you could use permeable paver options such as wood decking, bricks or interlocking stones as a lower cost option which still allows water to sink into the ground between the planks of wood, bricks or stones through the sand, gravel or vegetation.

What are the benefits?
In addition to the benefits that all the tools in this brochure share, porous concrete and asphalt reduce ice development so less salt is needed over the winter. There is also less cracking and buckling of the surface with freezing and thawing so the life span of the surface is longer (15-25 years is typical). Porous concrete and asphalt have greater traction when wet.

Where can I do it?

- Best suited for slopes of less than 2%.
- Area with a minimum of 2 feet from the gravel base to the underlying bedrock and/or seasonal high for the groundwater table.
- At least 10 feet from buildings and 100 feet from drinking water wells.

What does it involve?

- Installation
  - Tools and Materials - Depends on type of material and size of driveway. Usually higher than other paving options, but usually last longer.
  - Professional assistance may be required.
- Maintenance
  - Medium - Check it is infiltrating well. Vacuum sweep a few times a year to retain good filtration. Replacement of the sand, gravel and vegetation between the blocks as needed to retain good filtration.

Vegetated Swales

Vegetated swales, also known as bioretention systems, are channels designed to collect stormwater and to some extent allow the water to travel as well. Depending how long the trench is, check dams or filter berms may be installed to control water flow better. Vegetated swales differ from infiltration trenches which are shallower trenches that are filled with gravel with a perforated pipe underneath, although there is some similarity between the two techniques.

What are the benefits?
In addition to the benefits that all the tools in this brochure share, vegetated swales also provide a location for snow storage.

Where can I do this?

- Flat areas or areas with shallow slopes.
- Places with soils that are not highly susceptible to erosion
- Need to be careful about proximity to underground utilities.

What does it involve?

- Installation
  - Tools and Materials - Depends on the scale and complexity of the swale.
  - Professional assistance may be required.
- Maintenance
  - Medium - Maintain the vegetation including mowing any grass; inspect the inlets, outlets, check dams and berms periodically; remove accumulated sediment; and check the water is draining from the trench according to design during and after rain storms.

WHAT CAN I DO IMPROVE LOCAL WATER QUALITY?

Inside the Home

Household cleaners and products
Look for biodegradable or organic cleaners and chemicals to use around the home if possible, to reduce their effect on local water. Low phosporus cleaners and chemicals help to prevent algae blooms in local water bodies. If you are painting, be sure to wash brushes in the sink and not outside where the paint can run straight into storm drains.

Household waste
There are a number of items around the home which should not be disposed of in the regular trash. Check out the Springfield Recycling Center website (www.springfieldvt.com/recycling-center-information.htm) for details on which items can be recycled, which items should go in the trash and which are considered hazardous materials (such as motor oil, some old paints, pesticides, solvents, batteries, and electronics). Make sure that any items that are considered hazardous materials are stored in a safe place and brought to the twice annual collection at the Springfield Recycling Center.

Also visit the Southern Windsor/ Windham Counties Solid Waste Management District website (www.vtsolidwastedistrict.org) which has additional information on all kinds of household and commercial waste, what to do with it and when.

In the Yard and on the Driveway

Retain and plant native vegetation
As already described, plants are an important part of the natural water system, not only to intercept, use and store water, but also to filter pollutants. Existing trees and vegetation keep the soil undisturbed, so it is better at infiltrating water. Native plants and trees are best for new plantings because they are more suited to the local area so require less water, fertilizer and pesticides.

If you live along a stream, retain and plant native trees and plants along the edge of the stream as a buffer. This buffer with help to slow erosion of the stream bank as the roots hold the soil together, trap pollutants before they enter local surface waters and also provide a stream habitat.

Reduce use of fertilizers and pesticides
Fertilizers and pesticides are contaminants when they collect in ground and surface waters reducing water quality. Reducing the use of both can reduce the contamination of local water sources. One easy way to reduce usage is to plant native plants, as they tend to require less fertilizer than alternative plants and grass. Also be careful not to use fertilizer on your garden within a day or two of rain being expected– rain does not help the fertilizers sink in, but instead just washes them straight to the storm drains and local water supplies where they build up over time. With pesticides, use chemical controls for pests as a last option (after physical controls, biological control and bacterial insecticides) and if you still have to, try to use the ones that are designed specifically to control your pest. Also, be careful of how you dispose of empty fertilizer and pesticide containers.

Yard and driveway clean up
Yard waste can help clog up local stormwater drains, and also add pesticides and fertilizers into the local waters. Collect yard waste, compost it and use it for fertilizer on your property, thereby reducing fertilizer costs as well as helping with local stormwater issues. Adding compost also

helps the soil to retain water. Yard and garden wastes are also collected by the Springfield Recycling Center.

Clean your driveway by sweeping and disposing of the waste properly rather than hosing. Hosing driveways and pavements just washes the pollutants straight into the storm drains and local streams and rivers.

Washing the car
When washing your car, wash it on the grass or in the local car wash. If you wash your car on the driveway, the detergent, dirt and oils from your car wash straight down the driveway into local storm drains. Instead, if you wash your car on the grass, the soil can help filter out some of the chemicals and pollutants that come off the car. If possible, use low phosphate detergents for cleaning. Commercial car washes recycle or treat the water they use.

Vehicle and machinery products
Vehicles have a number of polluting substances. Make sure to check for leaks and spills regularly, and if there is one, use absorbent material like sand or kitty litter to clear it up and then dispose of it appropriately. Oil and engine fluids should not be disposed of down storm drains, on the ground or into a ditch. Oil can be re-refined into re-usable lubricating oil (talk to local service station about collection, and it might be accepted at the biannual household hazardous waste collections).

Pet waste
Unfortunately pet waste contains many harmful parasites, bacteria, nutrients and viruses that wash into local waters through stormwater. Be sure to collect all pet waste, even from your yard and dispose of it in the trash.

HOW DO MY EFFORTS FIT INTO THE BIGGER PICTURE?

There are many other ways in which to improve the management of stormwater and improve local water quality. The efforts made on residential properties fit into a wider set of stormwater management strategies that include the following structural practices:

- Pervious pavement or pervious pavers
- Infiltration/ soakage beds, basins and trenches
- Dry wells
- Rain gardens and bioretention
- Vegetated swales along roadways and near parking lots
- Vegetated/ green roofs
- Tree box filter
- Constructed stormwater wetlands

The efforts made on residential properties fit into a wider set of stormwater management strategies that include the following non-structural practices:

- Protecting sensitive and special value features
- Protecting, conserving and enhancing stream and river areas through creation of buffers
- Protecting and using natural site drainage patterns when planning and designing changes to a site
- Clustering uses on a site to reduce impervious coverage
- Minimizing area disturbed when building through compaction and grading, and maximizing soil restoration
- Re-vegetating and re-foresting disturbed areas with native species.
- Reducing impervious cover
- Disconnecting, distributing and decentralizing stormwater management

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Vermont Department of Environmental Conservation. *Vermont Low Impact Development Guide for Residential and Small Sites.* December 2010. www.anr.state.vt.us/dec/waterq/planning/docs/pl_LID%20Guide.pdf

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Page 10: All plant images from Winooski Natural Resources Conservation District. "Vermont Rain Garden Manual 2009". www.vacd.org/~winooski/RGManual7.1.09FINAL.pdf

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Page 14: Vegetated Swale in Carleton, Prince Edward Island. August 2009. Photograph by K. Otto.

Page 16: Permeable Pavement in West Cape May, New Jersey. September 2009. Photograph by K. Otto.

Pages 18 through 20: All images from Delaware Department of Transportation "Where stormwater pollution comes from." www.deldot.gov/stormwater/wherestorm.shtml

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