

RAINDROPS KEEP FALLING ON..... OUR HOMES !



**A Homeowner's Guide to managing the precipitation
that falls on your property.**

Our rivers, lakes, ponds, estuaries, bays and ocean.

- ❖ Here in Mashpee we love our water resources. We expect them to be clean so that we can fish, shellfish, raft, boat and swim in them knowing we are not putting ourselves or our loved ones in harm's way.
- ❖ Under Section 303-D of the Federal Clean Water Act, states are required to identify those waterbodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and to prioritize and schedule them for the development of a total maximum daily load (TMDL). A TMDL establishes the maximum amount of a pollutant that may be introduced into a waterbody and still ensure attainment and maintenance of water quality standards. Furthermore, a TMDL must also allocate that acceptable pollutant load among all potential sources. The final version of the list must be approved by the EPA.
- ❖ According to the Massachusetts Year 2006 Integrated List of Waters the following Mashpee water bodies are listed under Category 5 (which means they are impaired or threatened for one or more uses and require a TMDL). Reasons for inclusion on this list include problems of nutrient overload, pathogens, metals, organic enrichment, low dissolved oxygen, and noxious aquatic plants.
- ❖ **Mashpee River, Quashnet River, Santuit Pond, Johns Pond, Ashumet Pond, Santuit Pond, Great River, Mashpee-Wakeby Pond, Popponesset Creek, Popponesset Bay, Waquoit Bay, Shoestring Bay, Hamblin Pond, Jehu Pond, Little River.**

Purpose of this document

- ❖ The Environmental Protection Agency (EPA) reports that stormwater runoff pollution is the most common cause of the poor quality of our water resources. It is caused by the many different daily activities of people everywhere.

The inclusion of many of Mashpee's water bodies on the impaired list requires that we do all possible to address the problem of stormwater runoff. For this reason, the Town of Mashpee Environmental Oversight Committee has prepared this homeowner's guide. Its purpose is to:

- (1) Educate homeowners on the importance of managing the precipitation that falls on their property, and
 - (2) Provide action guidelines that homeowners can implement.
- ❖ If all of us accept the goal of not allowing the precipitation that falls on our property to leave our property, but rather to retain and manage it, we can all be part of the solution to stormwater pollution.

After all, what is the cost to society, in terms of public health, recreation, economics and other factors, of NOT doing all we can to achieve sound water quality conditions.

SO LET'S GET STARTED !

NATURE'S WAY

- **When land is left in its natural state, the majority of rain and snowfall falls into forests and meadows; as it soaks slowly into the earth it is filtered by bacteria associated with tree, shrubs and plant roots and the settling out of pollutants. This naturally filtered precipitation eventually feeds our streams, lakes, and underground aquifers.**
- **This natural process of water is destroyed when development covers the land with buildings, roads, and parking lots, interrupting the natural filtering process and thus begins the problem of stormwater runoff.**
- **Existing meadows and forests have been replaced with roofs, concrete, compacted earth areas, sloped lawns, driveways and walkways; all of which do not allow rain/snowfall melt to penetrate into the earth. Instead, the falling precipitation runs off roofs, over paved roads, driveways and parking lots and into storm drains, all without the benefit of the natural process treatment mentioned above.**
- **The EPA website (www.epa.gov) and the Center for Watershed Protection (www.cwp.org) are excellent sources for additional information on stormwater runoff and the important part that homeowners can play in reducing the impacts on our water resources.**

WHY IS STORMWATER RUNOFF A PROBLEM?

- ❖ **As stormwater runoff flows, it becomes an efficient transporter of contaminated water. It picks up soil, pet manure, salt, pesticides, fertilizers, oil and grease, antifreeze, leaves, soil sediment, grass clippings, pine needles, cigarette butts and other types of litter as it travels down roadways into our storm drains and eventually into our water bodies and groundwater. Each can affect your watershed in a different way. Sediment (dirt, soil, sand) can increase the turbidity (a measure of water cloudiness) of a water body. Turbidity can block sunlight from reaching aquatic plants, making it impossible for them to grow.**
- ❖ **Pathogenic (capable of causing disease, especially in humans) bacteria can be carried by storm water into a water body. This creates health hazards that result in lakes, rivers and beach closures.**
- ❖ **Debris such as plastic bags, bottles and cigarette butts can wash into a water body and interfere with aquatic life. Other hazardous wastes can be carried into a water body.**

- ❖ **Excess nutrients carried in stormwater runoff to our storm drains can also negatively affect our water supply. These nutrients, primarily nitrogen and phosphorus, can come from lawn fertilizers or natural sources such as manure and can cause algal and bacterial blooms which reproduce rapidly and crowd out other aquatic life.**
- ❖ **Respiring and decaying algae consumes oxygen, increases turbidity in the water body and eventually damages fish and other aquatic life that need oxygen to survive. Soil clouds water and degrades habitat for fish and water plants. Toxic chemicals such as antifreeze and oil from leaking cars, carelessly applied insecticides and pesticides (chemicals used to control or kill insects), herbicides (chemicals used to kill unwanted plants), and zinc from galvanized metal gutters and downspouts threaten the health of fish and other aquatic life. Bacteria and parasites from pet manure can make nearby lakes and bays unsafe for wading and swimming after storms and cause the closing of shellfish beds.**

EACH OF US CAN CONTRIBUTE TO IMPROVING OUR WATER QUALITY BY PROPERLY MANAGING OUR STORMWATER RUNOFF!

- ❖ Actions can be taken by all homeowners to reduce the impacts of stormwater runoff by:
 - (1) KEEPING HARMFUL POLLUTANTS OUT OF STORMWATER.
 - (2) UTILIZING THE STORMWATER RUNOFF ON YOUR PROPERTY.
- ❖ **Here's the first step:** You will need to learn what happens to the precipitation on your property. Head outdoors with your boots and umbrella and watch where the rainwater goes.
- ❖ Make a sketch of your property, drawing arrows showing the direction that storm water flows off driveways, rooftops, sidewalks, lawn and yards. A sample map is provided in Figure 1, page 19. Does water soak into the ground quickly, or does it puddle in places and flow off lawns and driveways? Your soil type affects water soaking into the ground. As you might expect, water infiltrates sandy soil very quickly but has a hard time seeping into fine-grained silt or clay soils.
- ❖ During your walk, note how far it is to the nearest storm drain, ditch, wetland, stream or body of open water. Note whether runoff flows onto your land from adjacent streets, lands or storm water systems. If you live at or near the bottom of a hill, you may have special problems. Be sure to go out during more than one rain shower to get a good understanding of runoff flow during small and large storms.

ACTION GUIDE, PART I

REDUCING POLLUTANTS IN STORMWATER RUNOFF

- ❖ **ASK YOURSELF: ARE ANY CAR, TRUCK OR BOAT WASTES BEING CARRIED AWAY BY STORMWATER ?**
- ❖ **Oil stains on your driveway and outdoor spills of antifreeze, brake fluid, and other automotive fluids are easily carried away by a rainstorm. An oily sheen on runoff from your driveway is a sure sign that you need to be more careful.**
- ❖ **Use pans, carpet scraps or matting to catch drips. Routine maintenance can prevent your car from leaking and help identify potential leaks. If you change your own oil, be careful to avoid spills. Collect waste oil for recycling.**
- ❖ **Oily car parts and fluid containers should be stored where rain and runoff cannot reach them. Never dump used oil, antifreeze, or gasoline down a storm drain, in a ditch, or on the ground. These wastes will end up in a nearby lake or stream, or they may pollute your drinking water.**
- ❖ **Washing your car in the driveway creates runoff without the help of a rainstorm -- your hose provides the water. The dirty, soapy runoff drains directly into storm drains, picking up oil and other pollutants as it goes. Try washing your car on the lawn or, better yet, take it to a commercial car wash or spray booth that sends its dirty water to a wastewater treatment plant.**

Ask yourself: Are household products stored outside the reach of storm water?

- ❖ **Most households store lawn and garden products like weed killers, insect killers and fertilizers. If storm water or floodwater reaches these products, it can transport them into surface water and possibly your well.**
- ❖ **Pool chemicals, salt for water softeners, and a wide variety of other chemical products can also cause trouble if they are washed away.**
- ❖ **Keeping such products in waterproof containers and storing them up high and out of the potential path of runoff or floods is important. You can avoid storage problems by buying only what you need for a particular task and then using up the product.**
- ❖ **Prevent freezing of liquid products. Most pesticides, and some fertilizers, are liquid and may be subject to freezing. This may burst containers or render the product unusable**

Ask yourself: Do I use and handle chemicals safely?

- ❖ **Safe storage is only the first step in preventing contaminated runoff. When mixing chemicals, try to do it within a washtub so spills will be contained. If you spill chemicals, act quickly to contain and clean up the spill. This is particularly important on paved surfaces.**
- ❖ **Using more pesticides or fertilizers than you need invites problems. Choose organic fertilizer for your yard and garden needs. Timing of applications is also important. Do not apply pesticides and chemicals if rain is expected within twenty-four hours.**
- ❖ **Read all pesticide labels carefully for application instructions and restrictions.**

Ask Yourself: Do I use road salt or other de-icing products?

- ❖ **Road salt and de-icers eventually wash off paved surfaces and end up in the soil or water. From your driveway or sidewalk, salt can readily flow to storm drains and into streams and lakes.**
- ❖ **Salt in high concentrations is harmful to wildlife and plants. Use less to keep these chemicals out of natural systems.**
- ❖ **If you use too much, clean up the excess. Consider sand or regular kitty litter as less toxic alternatives. Chipping ice off pavements is an even better choice, although care must be taken not to damage the pavement surface.**

Ask yourself: How do I handle the disposal of pet droppings?

- ❖ **Droppings from dogs and cats and from other commonly kept animals like exotic birds, rabbits, goats and chickens can be troublesome in two ways.**
 - ***First, manures contain nutrients that can promote the growth of algae if they enter streams and lakes.**
 - ***Second, animal droppings are a source of disease.**
- ❖ **The risk of storm water contamination increases if pet manures are allowed to accumulate in animal pen areas or if they are left on sidewalks, streets or driveways where runoff can carry them to storm drains.**
- ❖ **Animal droppings should be picked up, double wrapped, and disposed of with your household trash.**

Ask yourself: Are yard and garden wastes kept out of storm water?

- ❖ **If left on sidewalks, driveways, or roads, grass clippings, pine needles and other yard wastes will wash away with the next storm.**
- ❖ **Although leaves and other plant debris accumulate naturally in streams and lakes, homeowners can contribute excess amounts of plant matter, especially in areas with many homes. This can lead to water that is unattractive or green with algae and unsuitable for recreation.**
- ❖ **Burning yard waste is not an environmentally friendly alternative. Hydrocarbons and nutrients released by burning leaves contribute to water pollution as well as air pollution.**
- ❖ **Rain washes smoke particles out of the air, and runoff picks up dust and ashes left on pavement or in ditches.**
- ❖ **Avoiding the problem is easy -- sweep clippings back onto the grass, and compost leaves and garden wastes on your property to recycle nutrients.**

ACTION GUIDE: PART TWO

LANDSCAPING AND SITE MANAGEMENT TO CONTROL STORMWATER RUNOFF

Part Two provides action guidelines that address some of the specific areas of stormwater runoff as well as major landscape alterations you might want to consider. Some stormwater runoff risks can be reduced or eliminated by making changes to buildings, paved and soil surfaces, and your landscaping choices.

Ask yourself: Are there areas of bare soil without plant or tree roots around my home ?

- ❖ **Areas of bare soil often exist in vegetable and flower gardens, on newly seeded lawns, and around construction projects.**
- ❖ **Even on gentle slopes, water from rain and snow can remove soil and carry it to storm drains.**
- ❖ **Planting grass or other ground covers is the best way to stop erosion. Putting a straw or chip mulch over gardens or newly seeded areas will slow erosion. Straw bales, diversion ditches and commercially available silt fences around construction sites can help slow runoff and trap sediment on-site.**
- ❖ **If you are working with a contractor, insist that precautions are taken to control runoff and erosion during construction.**

Ask yourself: Is it feasible for me to eliminate paved surfaces or install alternatives?

- ❖ **Concrete and asphalt roads, driveways and walkways prevent rainwater from soaking into the ground.**
- ❖ **When you have the choice, consider alternative materials such as gravel or wood chips for walkways.**
- ❖ **Avoid paving areas such as patios. Where you need a more solid surface, consider using a "porous pavement" made from interlocking cement blocks or rubber mats that allow spaces for rainwater to seep into the ground.**
- ❖ **If you must pour concrete, keep the paved area as short and narrow as possible and design it so that precipitation runs off it into a vegetated area.**

Ask yourself: Does roof runoff flow onto pavement, or vegetated areas?

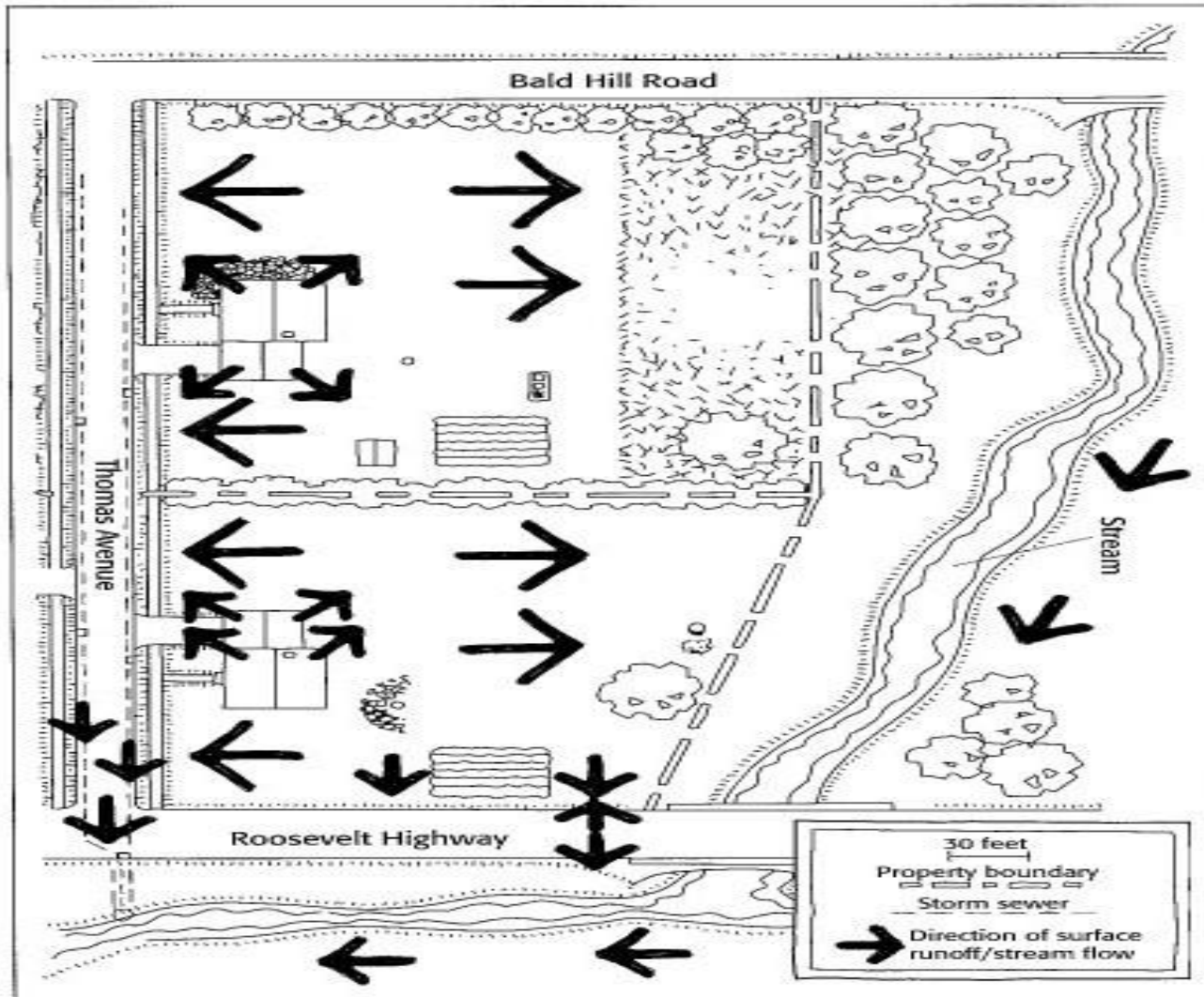
- ❖ **Your buildings' roof(s), like pavement, sheds water.**
- ❖ **For roofs without gutters, plant grass, spread mulch, or use gravel under the drip line to prevent soil erosion and increase the ground's capacity to absorb water.**
- ❖ **Several choices for directing roof drainage from gutters are available. At the very least, choose to direct it away from the foundation of your building onto your lawn. However, there are more effective choices such as areas of shrubbery or a rain garden.**
- ❖ **The stronger the root systems of the area you are directing the roof runoff to, the more effective the filtering treatment will be.**
- ❖ **Another excellent choice is to consider using rain barrels to capture the downspout runoff and use it for watering lawns and gardens.**

Ask yourself: Can I change my landscape's layout to reduce runoff?

- ❖ **Remember that the goal of stormwater management is to keep all the precipitation that falls on your property from leaving your property as much as is feasibly possible.**
- ❖ **Many home lawns are sloped to encourage water to run off onto neighboring property or streets. Instead, you could provide low areas landscaped with shrubs and flowers to encourage water to soak into the ground. Remember that the stronger the plantings' root system is, the more effective the filtering process will be.**
- ❖ **If your yard is hilly, you can terrace slopes to slow the flow of runoff and make mowing and gardening easier.**
- ❖ **If you have a large lot, consider "naturalizing" areas with prairie, woodland or wetland plants.**
- ❖ **If your property adjoins a lake or stream, one of the best ways to slow and filter runoff is to leave a buffer strip of thick vegetation along the waterfront.**

FIGURE 1

The arrows on this map illustrate the direction of precipitation flow on this property. You will need to prepare a similar map for your property.



Interesting bits of information.....

- ❖ Remember that the most effective cleansing of stormwater runoff is accomplished by directing the runoff into areas of trees, shrubs and plantings that have deep root structures.
- ❖ **Trees** provide the greatest stormwater and environmental benefit. Their canopy covers impervious areas and intercepts water before it falls to the ground. Trees capture and hold rainfall in leaves and branches and take up nitrogen. Trees improve water quality by filtering rainwater and holding soils in place. Their shade reduces pavement heat, which in turn lowers runoff temperature. Tree wells can provide additional benefits by accepting runoff from sidewalks or other paved areas. An excellent source of information is the City of Portland, Oregon at www.cleanriverspdx.org
- ❖ A **rain barrel** is a simple rainwater collector that captures and stores a portion of the runoff from a roof downspout for non-potable, exterior uses such as irrigation. They must have an overflow using an appropriate disposal location. The average residential roof generates about 30,000 gallons of rainfall runoff per year, and an average 55 gallon rain barrel captures only a fraction of that. By providing a water source for your garden and lawn, you can conserve drinking water.
- ❖ **Porous Pavement** is a general term for numerous products and design approaches that allow stormwater to infiltrate a hard surface. Many types are available. It may be used for walkways, patios and driveways. It accepts only the rainfall that falls on it and should not be used to manage drainage from other areas.
- ❖ **Rain gardens** are gaining in popularity as a stormwater management tool. In its simplest form, a rain garden is a shallow depression in the earth, landscaped with permeable soil and hardy grasses, shrubs or trees and covered by a thin layer of mulch. Rain gardens collect the stormwater runoff from impervious surfaces such as roofs and driveways, and allow it to percolate into the ground and be cleansed by bacteria associated with the plantings' roots, rather than draining into storm drains.

POLLUTANTS IN STORMWATER RUNOFF

POLLUTANT

Increased Runoff

Land alterations increases the rate and amount of runoff from the watershed entering the stream.

Sediment

Dirt and sand on roads, driveways, and parking lots or eroded sediment from disturbed surfaces (e.g. construction sites) enters stream with stormwater runoff; increased flow causes stream bank erosion.

Nutrients

Excess fertilizers on lawns and fields, failing septic systems, and animal waste.

Temperature

Warmer water caused by runoff from impervious surfaces, removal of streamside vegetation, and reduction in groundwater flows.

Bacteria

Potentially pathogenic microscopic organisms in failing septic systems, sewer overflows, and animal (including pet) wastes.

Toxic Contaminants/Heavy Metals

Heavy metals such as Mercury, cleaning compounds, pesticides and herbicides, industrial by-products such as dioxin, and vehicle leakage of oil, gas, etc.

WHAT DOES IT DO?

Carries pollutants, erodes stream channel and destroys instream habitat.

Smothers aquatic habitat, depletes oxygen, reduces water clarity, and carries nutrients and toxic contaminants.

Stimulates excessive plant growth, lowers dissolved oxygen levels, degrades aesthetics and destroys native aquatic life.

Harmful to trout and other cold water species, promotes spread of invasive species and excessive plant growth, reduces dissolve oxygen levels in water.

Harmful to humans, untreated waste can cause numerous diseases.

Harmful to humans and aquatic life at fairly low levels; many resist breakdown and some accumulate in fish and other animal tissues, (including human), and can lead to mutations, disease or cancer.

SOURCES

- Thanks to Mr. George Laur for permission to use and adapt the University of Missouri Extension Publication EQM102.
- www.epa.gov
- www.cwp.org
- www.cleanriverspdx.org
- Massachusetts Year 2006 Integrated List of Waters

OTHER

- To learn more about Mashpee's environment, please visit the Mashpee Environmental Coalition website at www.mashpee.mec.us
- There is a wealth of information on the internet on the subject covered in this publication. Google topics such as stormwater runoff, stormwater management for homeowners, rain barrels, rain gardens, vegetated swales, and porous pavement materials.