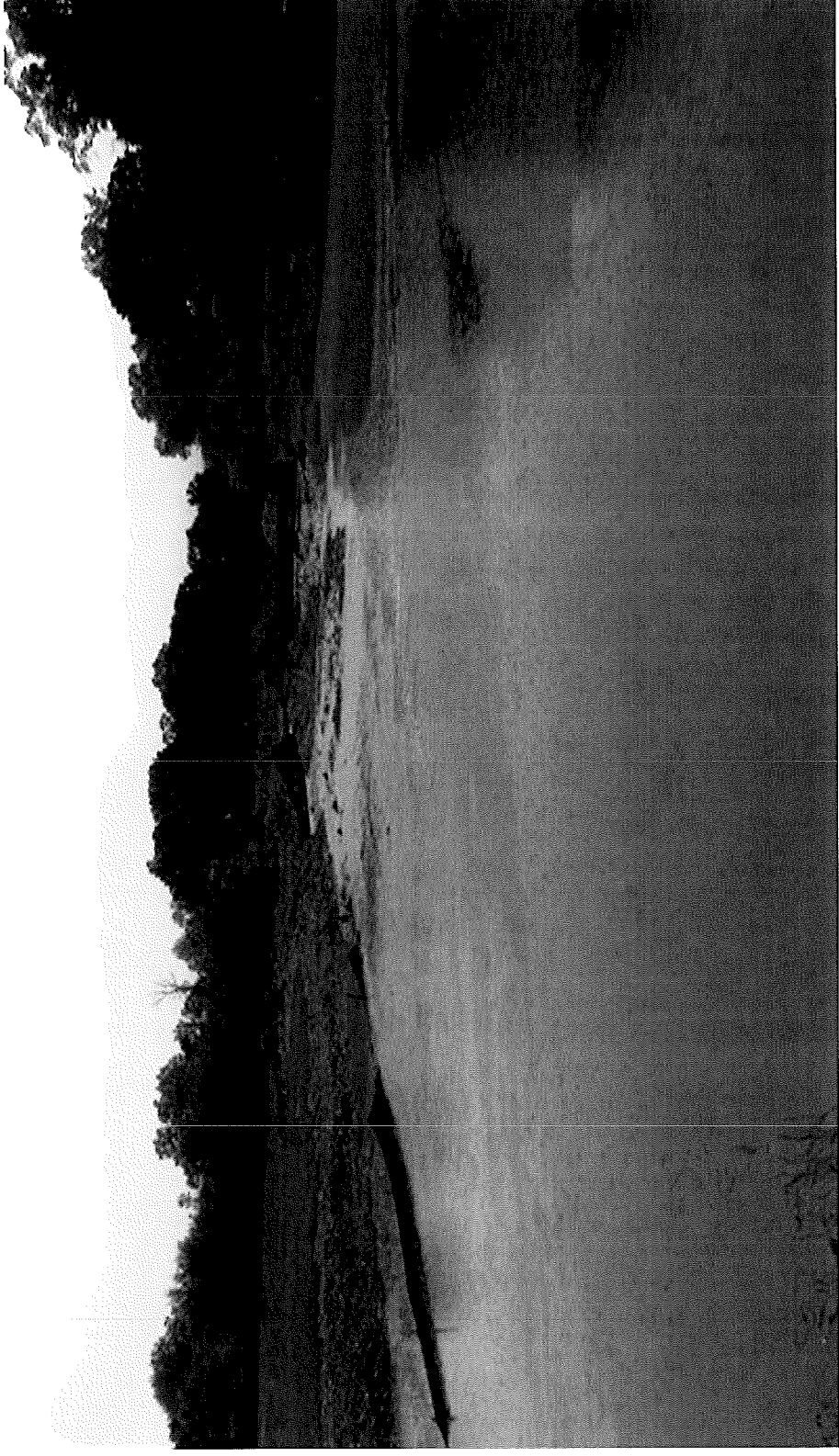


AFTER THE STORM

City of Nixa

01/31/12

FLOODING!*



FLOODING!



FLOODING!*



STORMWATER*

- ▣ As important as flooding issues are, it's only a portion of the Stormwater story.
- ▣ “Rest of the story”, I/I and Stormwater pollution.

INFLOW & INFILTRATION

$(I/I)^*$

▣ *Inflow:*

▣ *Infiltration:*

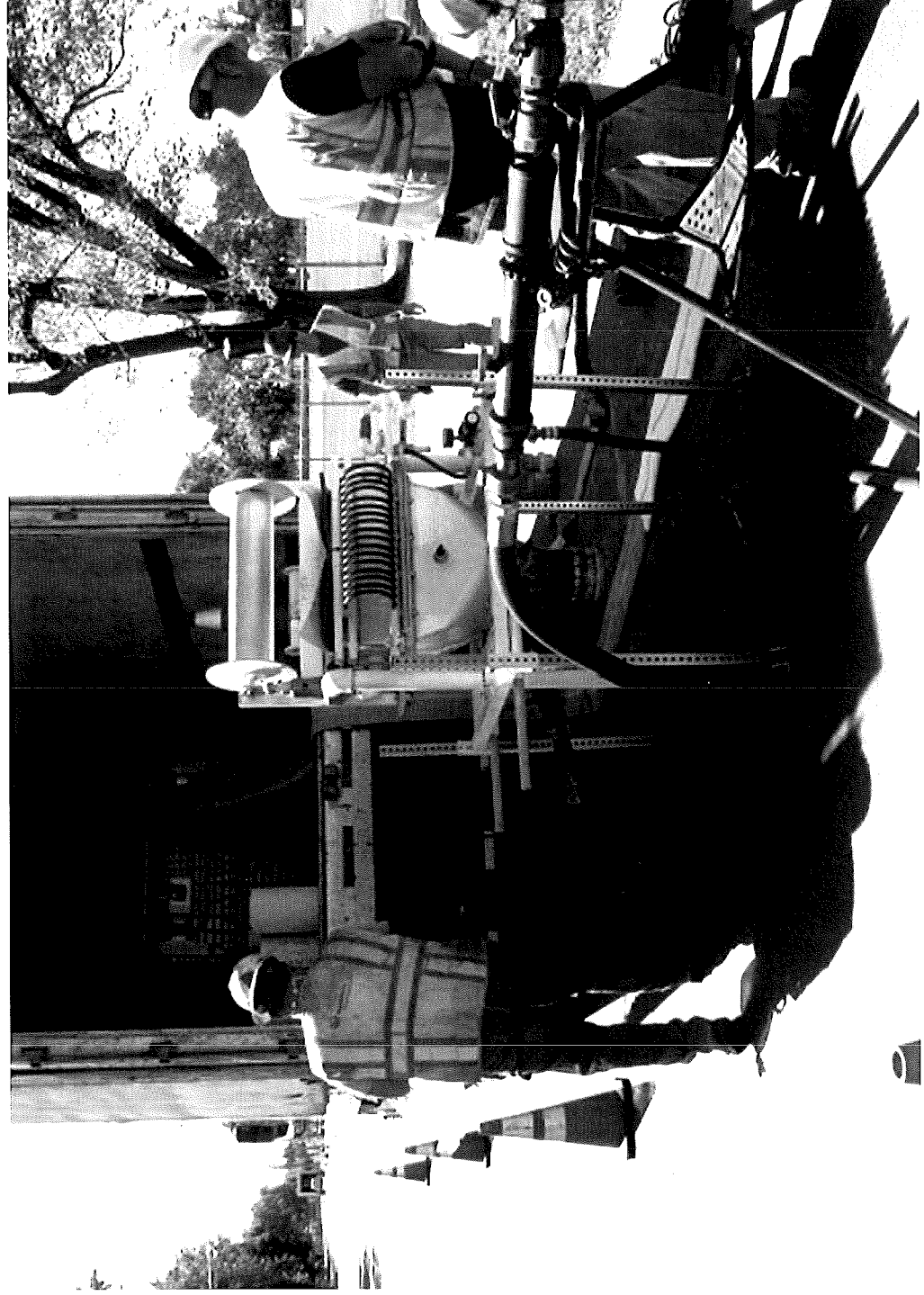
INFLOW & INFILTRATION

- ▣ The average daily flow through the WWTP for the last 5 years is 1,334,000 gpd (24 hrs).
- ▣ On occasion we have received between 4 & 8,000,000 gallons due to I/I.
- ▣ 13" rainfall event in September 2010, we received 11,000,000 gallons due to I/I.
- ▣ The maximum capacity of our sewer treatment facility is 11,000,000 gpd.

Recent Improvements*

- ▣ ARRA “American Recovery and Reinvestment Act”
- ▣ Missouri Street and New Street.
- ▣ CIPP (Cure In Place Pipe)
- ▣ Ongoing routine maintenance and repair.

Cure In Place Pipe*





Cure In Place Pipe*



Cure In Place Pipe*



Projected Improvements 2012*

- ▣ CIPP
- ▣ New sewer video equipment to help indentify these areas of INI.
- ▣ On going routine maintenance and repair.

THE CLEAN WATER ACT*

- ▣ 1948 The Federal Water Pollution Control Act (FWPCA)
- ▣ 1972 The Clean Water Act (CWA)
- ▣ The National Pollution Discharge Elimination System, (NPDES)

MS4*

- ▣ Municipal Separate Storm Sewer System (MS4).
- ▣ This MS4 permit program was implemented in 2 phases.
- ▣ Phase I (medium and large)
- ▣ Phase II (small)

MS4

- ▣ Is a conveyance or system of conveyances, that:
- ▣ ARE: Used to collect and/or convey stormwater;
- ▣ ARE: Owned by an incorporated public entity that discharges stormwater to waters of the U.S.;
- ▣ ARE Not: a combined sewer; and not part of a publicly owned treatment facility (sewage treatment plant).

MS4 Permit Requirements:

“The permittee shall develop, implement, and enforce a stormwater management program (SWMP) designed to reduce the discharge of pollutants from the permittee’s regulated small MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Missouri Clean Water Law.”

MS4 Permit Requirements:*

“The SWMP should include best management practices; control techniques and systems, design and engineering methods; and such other provisions as the permitting authority determines appropriate for the control of such pollutants.”

Stormwater System Mapping*

- ▣ Mapping of our entire stormwater system
- ▣ OUTFALLS: The City of Nixa currently has 51 discharge outfalls

SAMPLES*

OEWRI “Ozarks Environmental and Water
Resources Institute”

6 Minimum Control Measures*

- 1: Public education and outreach on stormwater impacts;
- 2: Public involvement/participation;
- 3: Illicit discharge detection and elimination;
- 4: Construction site stormwater runoff control;
- 5: Post construction stormwater management in new development and redevelopment;
- 6: Pollution prevention/good housekeeping for municipal operations.

Monitoring, Recording, and Reporting

MONITORING: “The permittee shall evaluate program compliance, the appropriateness of identified best management practices, and progress toward achieving measurable goals.”

Monitoring, Recording, and Reporting*

RECORDKEEPING: “The permittee shall retain records of all activities requiring recordkeeping by the SWMP including monitoring instrumentation, copies of all reports required by the permit, discharge monitoring reports, NPDES permit, ordinances,” etc., etc., etc.

Monitoring, Recording, and Reporting*

REPORTING: “The permittee shall submit annual reports, using the annual report form provided by the department (DNR), to the director by July 28 of each year of the permit term.”

Inspections

- ▣ Commercial/Industrial Illicit Discharge Detection and Elimination, 731.

Inspections

- ▣ Commercial/Industrial Illicit Discharge Detection and Elimination, 731.
- ▣ Construction site stormwater runoff control, 35.

Inspections

- ▣ Commercial/Industrial Illicit Discharge Detection and Elimination, 731.
- ▣ Construction site stormwater runoff control, 35.
- ▣ Pollution prevention/good housekeeping for municipal operations, 52.

After the Storm: Co-produced by EPA and The Weather Channel

All across America people live, work and play in watersheds, without knowing it. As this DVD shows, protecting the nation's water resources will take the awareness and effort of individual citizens. Three case studies focus on the interconnections between water supply, water quality and the economic vitality and quality of life in our communities.



Santa Monica Bay, California



New York City



Gulf of Mexico



Watershed protection approaches

This DVD is intended for educational and communication purposes in classrooms, at conferences, etc. It may be aired on cable or other TV stations. Stations may air all or a portion of the program. If a portion of the program is aired, please ensure that you include in your broadcast that the program was co-produced by EPA and The Weather Channel. For additional copies of this DVD call the National Service Center for Environmental Publications at (800) 490-9198, or e-mail nscep@bbs-lm.com.

United States Environmental Protection Agency
Office of Water (4503T)
1200 Pennsylvania Ave., NW
Washington, DC 20460
EPA 841-C-06-001
December 2006
Run Time: 22 minutes
Includes closed captions



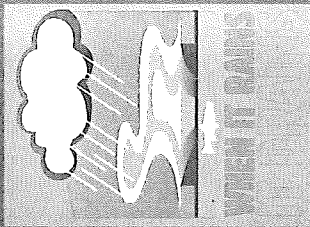
The program was co-produced by the United States Environmental Protection Agency and The Weather Channel, and was broadcast on The Weather Channel in 2004. For more information, please visit www.epa.gov/weatherchannel or send questions to EPA at: weatherchannel@epa.gov.

The material in this program has been subject to Agency technical and policy review, and has been approved by the Agency. The views expressed by individuals in the program, however, are their own, and do not necessarily reflect those of the U.S. Environmental Protection Agency. Mention of trade names, products, or services does not convey official EPA approval, endorsement, or recommendation.

After the Storm

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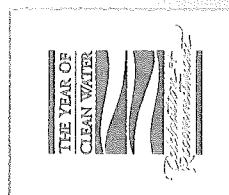




After the Storm

For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

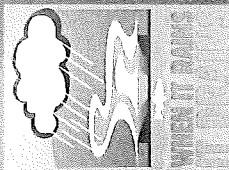


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Environmental Protection
Agency

EPA 833-B-03-002

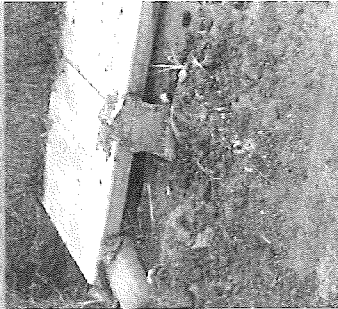
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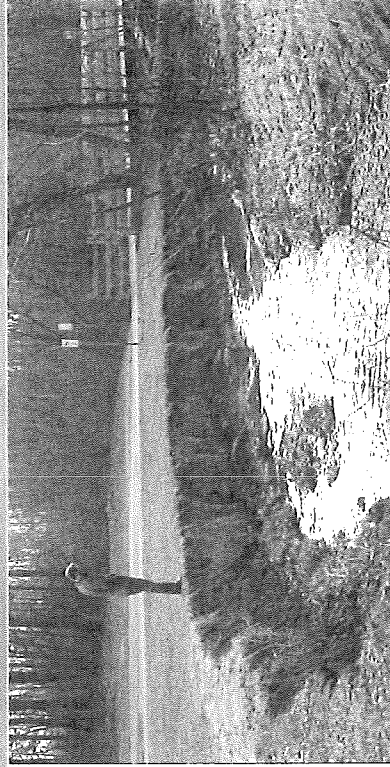
*A Citizen's Guide to
Understanding Stormwater*

What is stormwater runoff?



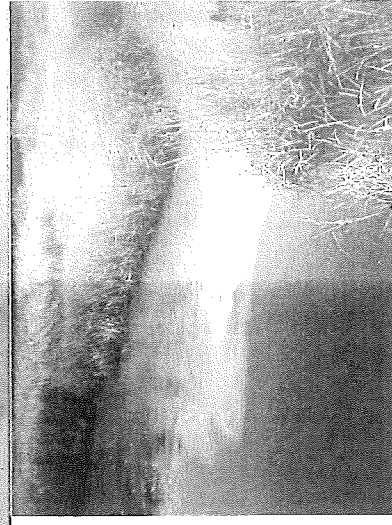
Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?



Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

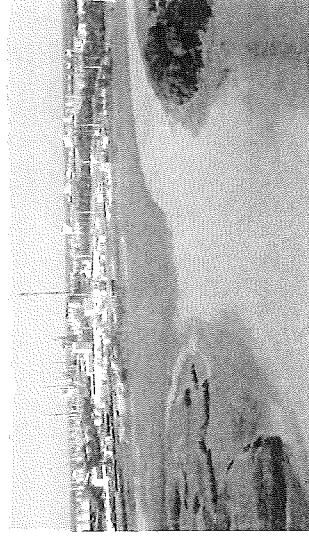
The effects of pollution



Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- ◆ Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- ◆ Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- ◆ Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- ◆ Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- ◆ Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.

- ◆ Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.



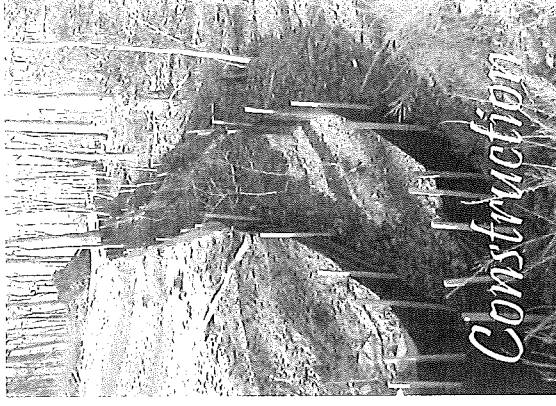


Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- ◆ Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- ◆ Cover grease storage and dumpsters and keep them clean to avoid leaks.
- ◆ Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

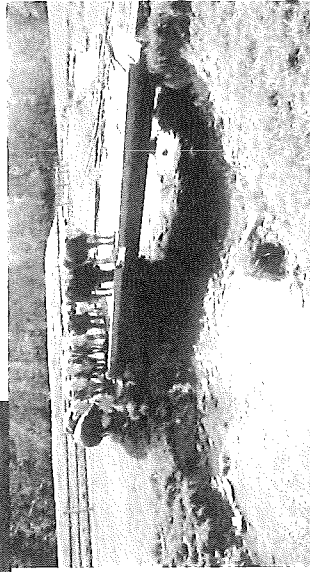
Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- ◆ Divert stormwater away from disturbed or exposed areas of the construction site.
- ◆ Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- ◆ Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.



Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

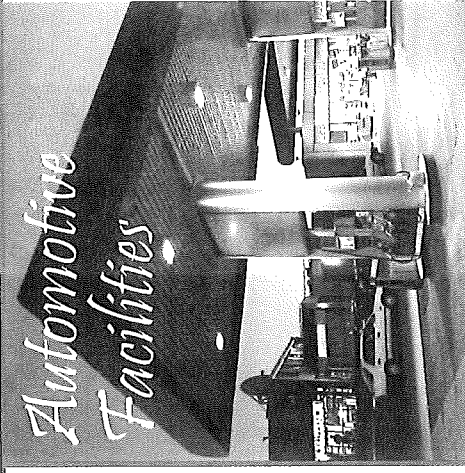
- ◆ Keep livestock away from streambanks and provide them a water source away from waterbodies.
- ◆ Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- ◆ Vegetate riparian areas along waterways.
- ◆ Rotate animal grazing to prevent soil erosion in fields.
- ◆ Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.



Improperly managed logging operations can result in erosion and sedimentation.

- ◆ Conduct preharvest planning to prevent erosion and lower costs.
- ◆ Use logging methods and equipment that minimize soil disturbance.
- ◆ Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- ◆ Construct stream crossings so that they minimize erosion and physical changes to streams.
- ◆ Expedite revegetation of cleared areas.

Automotive Facilities



Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- ◆ Clean up spills immediately and properly dispose of cleanup materials.
- ◆ Provide cover over fueling stations and design or retrofit facilities for spill containment.
- ◆ Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- ◆ Install and maintain oil/water separators.

Stormwater Pollution Solutions

Residential



Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Auto care

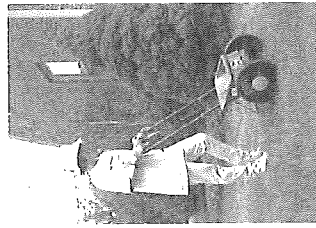
Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.



- ◆ Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- ◆ Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.



- ◆ Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- ◆ Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- ◆ Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- ◆ Cover piles of dirt or mulch being used in landscaping projects.

Septic systems

Leaking and poorly maintained septic

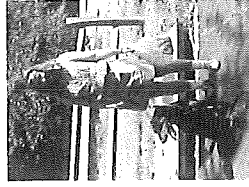


systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- ◆ Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- ◆ Don't dispose of household hazardous waste in sinks or toilets.

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.



- ◆ When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Residential landscaping

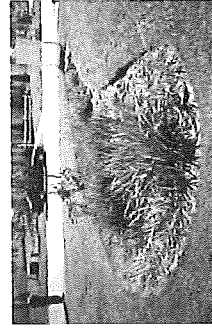
Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.



Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for

rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.



Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

WORLD WIDE WEB

- ▣ <http://www.dnr.mo.gov/env/wpp/stormwater/sw-local-gov-programs.htm>
- ▣ <http://cfpub.epa.gov/npdes/>
- ▣ *Google: NPDES, MS4.*