King County

Stormwater Pollution Prevention Manual

Best Management Practices for Commercial, Multi-Family and Residential Properties

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Water and Land Resources Division
Stormwater Services Section

FOREWORD

The King County Stormwater Pollution Prevention Manual was developed to comply with requirements of the Federal Clean Water Act-National Pollutant Discharge Elimination System Program and the State Puget Sound Water Quality Management Plan-Stormwater Program. The intent of these programs is to maintain and improve the quality and beneficial uses of our water resources. The widespread implementation of best management practices is regarded as one of the best solutions to achieving this goal. This manual provides detailed information for businesses, residents, managers, and owners of property in unincorporated King County, and describes the actions we are all required to take to reduce the contamination of stormwater, surface water, and groundwater.

Note: This manual replaces the King County Stormwater Pollution Prevention Manual, Best Management Practices for Businesses, dated February 2005.

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READER'S NOTE

Chapter I provides an overview of Best Management Practices and how to use this manual. Chapter III, "Stormwater Best Management Practices for Specific Activities" applies to commercial, industrial, agricultural, public, and multifamily residential properties. Chapter IV, "Residential Best Management Practices" applies to single family residential properties.

Chapters II, V, and VI provide supporting material with information on water quality problems, best management practices, and references and phone numbers for technical assistance.

READ CHAPTER I TO....

1. Determine which Activity Sheets apply (Chapter III – Commercial or IV – Residential).

2. Find the step-by-step instructions for working through the implementation of best management practices.

☞ If Chapter III applies, complete the Activity Worksheet (located in Chapter III) to identify which Activity Sheets you should review.

CLARIFICATION OF MANUALS

This ***Stormwater Pollution Prevention Manual*** presents pollution prevention practices for all property owners in unincorporated King County. For construction projects that require King County permits, and have stormwater quantity and quality control requirements, the ***King County Surface Water Design Manual*** (KCSWDM) must be used. If you are involved in a redevelopment or property improvements on an existing site, structural Best Management Practices will be required as part of that permit. See Special Requirement #4: Source Controls, in Chapter 1 of the King County Surface Water Design Manual. The Activity Sheets in this manual can be used when developing a Construction Stormwater Pollution Prevention Plan as required in the KCSWDM.

KING COUNTY STORMWATER POLLUTION PREVENTION MANUAL

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Describes what is required of you as a resident, property owner, or business owner or manager, and provides an introduction to the use of this manual.

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Provides information on how water becomes polluted and the effects of pollutants on water quality.

CHAPTER III "STORMWATER BEST MANAGEMENT PRACTICES FOR SPECIFIC ACTIVITIES"

Describes stormwater best management practices that are required for various commercial, industrial, public, and multifamily residential activities.

CHAPTER IV "RESIDENTIAL BEST MANAGEMENT PRACTICES"

Describes stormwater best management practices for single family residential property owners.

CHAPTER V "BMP INFO SHEETS"

Provides detailed information on how to implement many stormwater best management practices.

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I
OVERVIEW

ABOUT THIS MANUAL

King County's water resources — its streams, lakes, wetlands, groundwater, and Puget Sound — play an important role in the quality of life we enjoy. They provide us with recreation and drinking water, support tourism and salmon, and are used by industry. These waters, however, are vulnerable to pollution from a wide variety of human activities.

Many of our water pollution problems are due in large part to pollutants that are washed off from land by storms. The quality of "stormwater" from residential properties, public facilities, commercial and industrial businesses, and agricultural lands is an increasing concern nationwide. Many people believe that stormwater is "clean" and does not harm water quality. This perception is understandable since the amount of pollution from any one place is not usually significant by itself. But when all these small amounts are combined, they can cause significant water quality problems.

The federal Clean Water Act mandates that cities and counties control the quality of stormwater runoff. One way to achieve this requirement is to implement pollution prevention measures on individual properties. To meet the requirements of the Clean Water Act and to sustain our quality of life, the King County Council passed King County Code 9.12 (Water Quality) in November 1992 .The code has been updated at periodic intervals with the last update effective October 2008.

This manual applies to those residential, commercial, industrial, governmental, and agricultural activities in unincorporated King County that have the potential to contribute pollutants to stormwater runoff or directly to receiving waters. Stormwater runoff may seep into the ground, drain to a storm drain or a drainage ditch, or flow over the ground. Regardless of the way runoff leaves the site, it ends up in a stream, river, lake, wetland, groundwater, or Puget Sound.

Contaminated stormwater can negatively affect every water body it enters. Therefore, this manual provides detailed information on how to reduce the contamination of surface water, groundwater, and stormwater from activities on our properties. It shows that we are all doing our part to protect our quality of life.

Chapter I describes what is expected of you as a property owner, business/agency owner, or manager and provides a beginning point on the use of this manual.

Chapter II provides information on how water becomes polluted and the effects of pollutants on water quality.

Chapter III describes stormwater best management practices that are required for various commercial, industrial, public and multifamily residential activities. [1]

Chapter IV describes stormwater best management practices for single family residential properties.

Chapter V provides detailed information on how to implement many stormwater best management practices.

Chapter VI provides information on other programs or services that can provide assistance in implementing the stormwater best management practices.

BEST MANAGEMENT PRACTICES....WHAT ARE THEY?

The methods of improving stormwater quality, and thus surface water and groundwater, are called *best management practices* (BMPs). BMPs encompass a variety of managerial, operational, and structural measures that will reduce the amount of contaminants in stormwater and improve the quality of our water resources.

BMPs are separated into two broad categories: ***source control*** and ***treatment.*** As the name implies, source control BMPs prevent contaminants from entering water bodies or stormwater runoff. Some source control BMPs are operational, such as checking regularly for leaks and drips from equipment or vehicles, covering materials that have the potential to add pollutants to surface water if rainwater comes in contact with the materials, and educating employees about site clean-up procedures. Other source control BMPs require use of a structure to prevent rainwater from contacting materials that will contaminate stormwater runoff. Examples of these BMPs include a covered area or berm to prevent clean stormwater from entering work areas.

In contrast, ***treatment BMPs*** are structures that treat stormwater to remove contaminants. Most treatment BMPs require elaborate planning, design, and construction. No treatment BMP is capable of removing 100 percent of the contaminants in stormwater.

The goal of King County's water quality compliance program is to reduce the contamination of water resources through emphasis on source control BMPs because these are very effective and relatively inexpensive.

MANUAL COVERAGE

This manual applies to all properties in unincorporated King County. It is intended to cover every activity considered to have the potential to contaminate surface, storm, or groundwater. Anyone involved in a particular activity, whether as a property owner, resident, employee, supervisor, manager, or landlord must take part in implementing the appropriate BMPs selected from this manual.

Note: New development activities and significant redevelopment of a site are subject to

[1] This manual works in a modular format so that property owners only receive the information that is pertinent to their site. Therefore the activity sheets located in Chapter III (business activities) and Chapter IV (single family residential activities) may need to be obtained by request.

other stormwater management requirements set forth in the King County Surface Water Design Manual.

EXEMPTIONS

If you are already implementing BMPs according to another federal, state, or local program, you may not have to implement the BMPs in this manual. In addition, people who are voluntarily implementing BMPs may also be exempt. ***You are exempt if you:***

- Have obtained and are complying with a general or individual permit under the National Pollutant Discharge Elimination System (NPDES) Stormwater Permit Program.
- Are implementing and maintaining a farm management plan approved by the King Conservation District.
- Are implementing BMPs in compliance with King County Code 21A.30, which addresses animal and livestock keeping practices.
- Are a public facility implementing BMPs in compliance with the stormwater management program of the County's NPDES municipal stormwater permit.
- Are engaged in forest practices, with the exception of Class IV general forest practices.
- Are voluntarily implementing other BMPs, which are equivalent measures, methods, or practices to the BMPs in this manual. Contact the King County Water and Land Resources Division (WLRD) to determine equivalency.

Please understand that these exemptions are only from the requirements of this manual. If you are exempted for one or more of the reasons listed above, King County assumes that you are implementing the appropriate BMPs. If the County finds that you have not implemented BMPs, or that the BMPs that you have implemented are not effectively addressing the discharge of contaminants, then you may be required to comply with this manual. Everyone must implement BMPs, but how each individual goes about it, and through what program, may differ from one situation to the next. The following is a step-by-step approach to comply with the BMP requirements.

STEP BY STEP APPROACH

Step 1 - Determine Your Status

Determine if you are obligated to comply with the BMPs by checking the list of exemptions in this chapter. If you are not exempt, then you must comply with the BMPs in this manual.

Determine whether Chapter III or Chapter IV is applicable to your property. Chapter III applies to all commercial, industrial, agricultural, public, and multifamily residential properties. Use Chapter IV for single family residential properties.

Step 2 - Evaluate Existing Conditions

Determine which activities in Chapter III or Chapter IV of this manual are applicable to your property.

Review the applicable activity sheets, then evaluate whether you have any practices or measures already in place that protect water quality from pollutants generated by the activities and determine what additional measures you may need to implement. Activity sheets can be found on our Web site at http://www.kingcounty.gov/environment/waterandland/stormwater/documents/pollution-prevention-manual.aspx.

You will need to gain familiarity with the stormwater drainage patterns and drainage system on your site. To control stormwater pollution it is important to understand your drainage system. You can use the site plan graph paper (in the back of this chapter) to sketch out the location of the drainage system on your property. This will help you locate storage and activity areas in order to minimize the chance of spills or pollutant discharges to your drainage system.

Step 3 - Seek Assistance

At this point or at any time during this process, you can request a free on-site consultation from WLRD. Engineers are available to walk through your site discussing existing site conditions and necessary BMPs and providing assistance with implementation. To request an on-site consultation, call 206-296-1900.

Step 4 - Check Your Internal Floor Drains and Plumbing System Connections

A common problem that can cause significant stormwater pollution is discharges other than stormwater to the storm drainage system. Examples are discharges from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges must go to the sanitary sewer system, a holding tank, an on-site process water treatment system, or a septic system. You must correct these illicit discharges. If you have any question as to whether your discharge is allowable, contact WLRD at 206-296-1900.

For information on how to check for illicit connections see BMP Info Sheet 1 in Chapter V. You can also ask for help from your local sewer utility. If you find out that your internal drains are improperly connected to the storm drainage system, they will need to be either removed, permanently plugged, or connected to the sanitary sewer, septic system, on-site treatment system, or a holding tank.

Step 5 - Develop an Implementation Strategy

Look at your property as a whole and determine how the BMPs you implement will work together to improve overall runoff quality from your property. The activity sheets identify specific required BMPs, usually followed with the phrase "or equivalent method, measure, or practice." There may be acceptable BMPs that are not listed in the manual. Be creative in assessing your own needs and the constraints that you may face on your property. You are welcome to implement the stated BMP or an alternative BMP you believe better suits your particular situation. If you are interested in pursuing an alternative BMP, fill out and mail an Alternative BMP Request Form to WLRD. A copy of this form is provided at the

end of this chapter.

Your BMP implementation strategy should be a well thought out approach to controlling runoff pollution from your site. You do not have to develop or submit any written plan.

Step 6 - Implement the Nonstructural Source Control BMPs

First, implement the nonstructural operational BMPs that typically do not require extensive construction. Examples include having spill control and cleanup materials on site, using drip pans or drop cloths when conducting day to day activities, and sweeping instead of hosing down an area to a storm drain.

Step 7 - Implement, if Necessary, the Structural Source Control BMPs

Second, implement the structural source control BMPs that may require a building permit or require larger capital expenditures. Examples include constructing a building to enclose a work activity that is currently in the open, or berming a storage area to redirect runoff.

Step 8 - Implement, if Necessary, a Treatment BMP

If a treatment BMP is determined to be necessary for your site, you must have an acceptable design prepared and approved by WLRD before it is constructed or installed. You may be required to use the King County Surface Water Design Manual when designing and receiving approval of treatment BMPs. Once your BMP design has been approved by WLRD and a permit issued (if necessary) from the Department of Development and Environmental Services, the construction process may begin.

Step 9 - Keep Records

Keep copies of your appropriate activity sheets and other documentation on implementing BMPs. You may use records to illustrate your compliance with this manual, and as references for information on BMPs and whom to call for assistance. You can also use the manual as a training tool for new employees.

Step 10 - Maintain your BMPs

Business owners and property managers must ensure employees are carrying out operational or nonstructural source control BMPs. Employee education should be a continuous process for effective BMP implementation. The best way to make BMP maintenance routine is to schedule BMP checks and designate responsible individuals to be your BMP inspectors. As new employees join your company or agency, make sure to involve them in your pollution control efforts.

Single family residential properties are also required to maintain any needed BMPS, for example maintaining your storm drainage system.

Step 11 - Evaluate Your BMPs

After a year of implementing BMPs take some time to evaluate your BMPs and your decisions. Be aware of new technology. Is everything working as expected? Has your property use changed? Do you now know of something that can be done better?

Step 12 - Questions?

If you have questions or need assistance, please call WLRD at 206-296-1900.

MEASURING COMPLIANCE

Compliance with the manual means implementing the required Best Management Practices (or approved alternatives) and preventing the discharge of contaminants into the storm drainage system, surface waters, and groundwater. There are no requirements for monitoring your discharges or for submitting a BMP plan. Please keep in mind that the intent of the County code and the BMPs is to reduce the contamination of surface and stormwater or groundwater in the most efficient and least costly way.

In the manual, the County has identified general sets of required BMPs to reduce such discharges. The BMPs are intended to comprehensively cover all activities and give flexibility for the variety of properties in the county. There are properties, however, where implementing the minimum BMPs may not adequately reduce the discharge of pollutants. Therefore, it is important to spend time evaluating your property and your activities before simply implementing the minimum requirements. You are encouraged to contact WLRD for an on-site consultation for assistance in evaluating your site and implementing the BMPs.

You may find that an alternative BMP would work better on your site. To implement an alternative you must complete a short application (included in the back of this chapter) and submit it to King County WLRD for approval.

If you are implementing the minimum BMPs and there are still significant contaminated discharges from your site, WLRD staff will ask you to address those discharges even though you are doing the minimum BMPs. If you have implemented BMPs but have not maintained them and they are not working, you will need to take additional action. This action will be decided in consultation with you and could include additional source control BMPs, installation of treatment BMPs, or other actions to control the pollutants.

In determining the need for additional BMPs and the time frame for action, WLRD will consider whether you have made substantial progress and a good faith effort in reducing contaminated discharges and improving the quality of your stormwater. The County's intent is to work with you to implement the BMPs most appropriate for your situation to prevent contamination of our water resources.

If you have questions or need assistance in determining appropriate BMPs for your property, call WLRD at 206-296-1900.

IMPLEMENTATION SCHEDULE

By law, the County's first response to BMP implementation is to provide technical assistance to property owners. Once contact is made between WLRD and a property owner, an individualized implementation schedule will be established.

BMPs that require a building permit may take longer to implement. People will not be held liable for noncompliance for delays associated with obtaining a building permit. WLRD also recognizes that some property owners will have more requirements to meet than

others. WLRD will be looking for evidence that a property owner is actively pursuing compliance, meaning a good faith effort to implement the BMPs. This may mean implementing the nonstructural BMPs according to the schedule, showing progress in providing required information, and actively planning for completion of more costly ones. A schedule of expected implementation will inform the WLRD staff of your effort toward gaining compliance. The County will not take enforcement action if a good faith effort by the property owner is being pursued to implement BMPs.

OTHER AGENCY REQUIREMENTS

Please note that other federal, state, and local agencies enforce regulations that may relate to your implementation of Best Management Practices. For example, before discharging process wastewater to the sanitary sewer, you will need to obtain permission from your local sewer authority and the King County Wastewater Treatment Division Industrial Waste Section (if within the service area).

King County Surface Water Design Manual

- Drainage requirements, and erosion and sediment control for new development and redevelopment

King County Critical Areas and Clearing and Grading Ordinances

- Land use regulations protecting environmentally sensitive areas and public health and safety

King County Fire Code

- Storage and handling of flammable, combustible, and hazardous materials

King County Animal Regulations (Livestock)

- Raising and keeping of livestock

Seattle-King County Department of Public Health

- Solid waste
- Septic systems
- Structural pesticide applicators

King County Wastewater Treatment Division Industrial Waste Section and Local Sewer Authorities

- Acceptance of process water or stormwater to sanitary sewers

Washington State Department of Ecology

- National Pollution Discharge Elimination System (NPDES) Stormwater Permits
- Discharge of process wastewater to surface water
- Underground storage tanks
- Spill prevention and control plans
- Dangerous waste generators
- Groundwater quality protection
- Oil spill prevention and cleanup plans (with U.S. EPA)

Washington State Department of Agriculture

- Pesticide regulations

Puget Sound Clean Air Agency

- Fugitive dust
- Outside painting

U.S. Coast Guard

- Transfer of petroleum products on Puget Sound

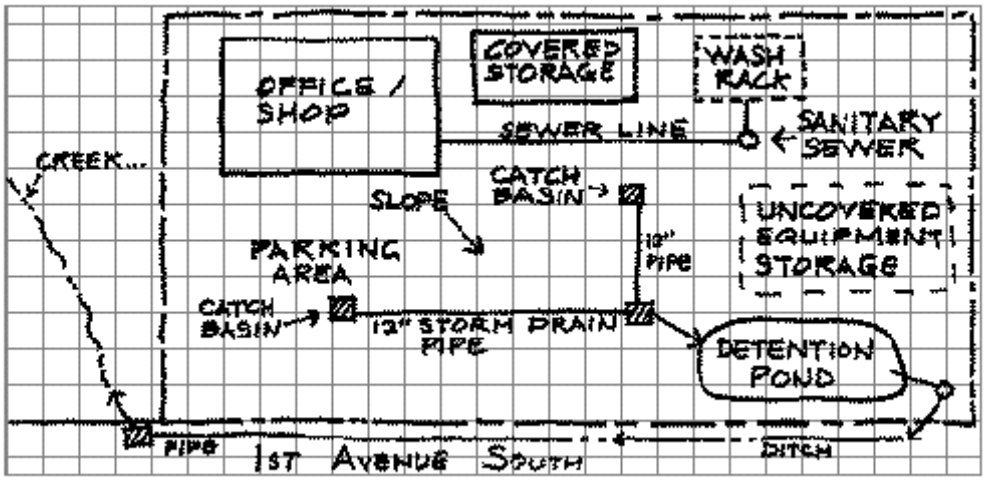
ON-SITE STORM DRAINAGE SYSTEM WORKSHEET

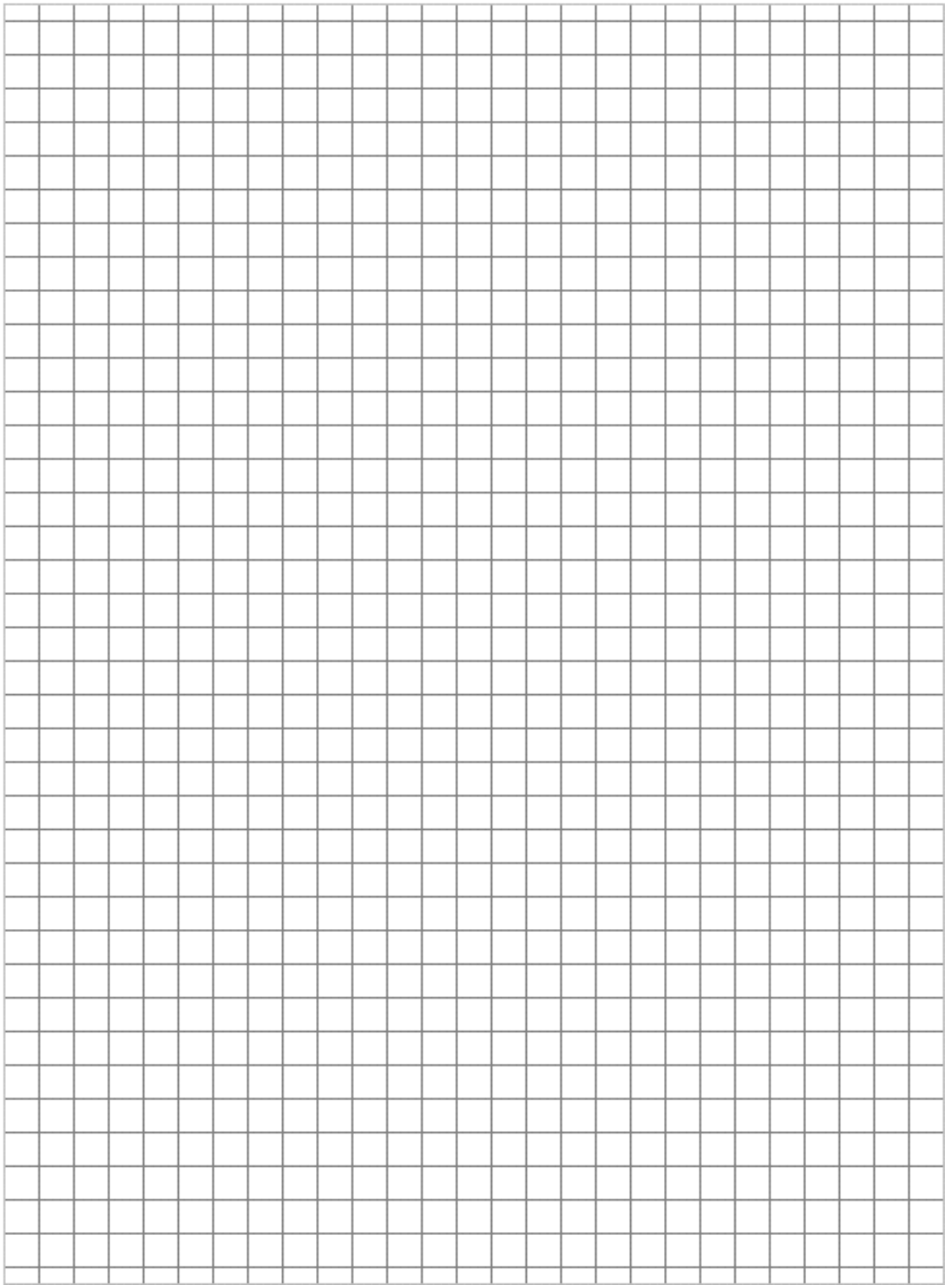
INSTRUCTIONS

If you have a set of plans/blueprints of your site and the associated storm drainage system, familiarize yourself and your employees with drainage patterns and drainage structure location.

- If you do NOT have a set of plans, prepare a rough sketch that shows the following:
  - Drainage structures, i.e., catch basins, pipes, ditches, ponds, vaults, etc.
  - Buildings
  - Storage structures/sheds
  - Storage areas
  - Places/points where stormwater leaves your site
- Use the attached graph paper for your sketch. A rough sketch will familiarize you with your on-site drainage system and aid in the implementation of best management practices. If you have any questions call 206-296-1900.

EXAMPLE





ALTERNATIVE BEST MANAGEMENT PRACTICES (BMP) REQUEST

THIS FORM is to be used to request the use of an alternative **BMP** to one or more of the minimum **BMP** requirements or for a major modification to one of the required **BMPs** as stated in the King County Stormwater Pollution Prevention Manual. It can be used by those who already have **BMPs** on their site that may differ from the requirements or in cases where implementation of one or more of the required **BMPs** is not the best or preferred solution.

AFTER RECEIVING THIS REQUEST, Stormwater Services staff will: (1) Review the request; (2) Notify the applicant the request was received and when a decision will be made; and (3) Notify the applicant in writing of approval or denial, and an explanation of the decision.

INSTRUCTIONS:

1. Answer each question on this form as briefly as possible while still conveying relevant information.
2. Additional pages can be used if necessary.
3. Return this request to:

King County DNRP, Water and Land Resources Division
201 S. Jackson Street, KSC-NR-0600
Seattle, WA 98104-3855
Attn: Stormwater Services Section (Water Quality Compliance)

TO BE COMPLETED BY THE APPLICANT:

Date: _____ Applicant's name: _____
Facility name (if applicable):_____ Owner name: _____
Facility address: _____
Phone number: _____ Type of property (brief description): _____

Specify activity under consideration for BMP:
What the manual requires:
Why this will not work on site or is not as desirable:

OVER

ALTERNATIVE BMP (Page 2)

Describe the alternative BMP:
Explain why this alternative may work:
Constraints or limitations of this alternative BMP (application or seasonal limitation, environmental constraints):
Other comments:

Please do not write below this line.

TO BE COMPLETED BY COUNTY:

☐ Approved ☐ Approved with Conditions ☐ Denied

Date: _____ Signature: _____ Title: _____

II

STORMWATER PROBLEMS: YOUR ROLE

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II
STORMWATER PROBLEMS: YOUR ROLE

STORMWATER RUNOFF

In vegetated areas such as forests, fields, and wetlands, rainwater seeps slowly into the ground. However, when rain falls on paved and other hard surfaces it runs off quickly and is conveyed by pipes and ditches directly to King County lakes, wetlands, and streams. This water that flows across the land is called stormwater runoff. Stormwater runoff, although starting as rain, collects pollutants when it hits the ground and travels. For example, runoff from parking lots picks up oil and grease dripped from cars, asbestos from worn brake linings, and zinc from tires. Pesticides, herbicides, and fertilizers are washed off from landscaped areas, and soils are washed away from construction sites. Any substance found on the ground can contaminate stormwater runoff.

STORM DRAINS LEAD TO LAKES AND STREAMS

Storm drainage systems are designed to decrease the chance of flooding in areas that have been developed with homes, businesses, and roads. The rainwater that used to seep into vegetated areas now must be collected and carried elsewhere. The storm drainage system collects this stormwater runoff and carries it to the nearest wetland, lake, stream, or to Puget Sound. In urban areas, the storm drainage system consists of drains and underground pipes. Storm drains are normally located in streets and parking lots. In rural areas, the storm drainage system may be in the form of ditches that carry the stormwater along a roadside or piece of property. These drainage systems are meant to carry only unpolluted stormwater to the nearest natural body of water. Putting oil, antifreeze, detergents, and other material into the storm drainage system is the same as dumping them directly into a lake or stream.

The sanitary sewer system is different. Sanitary sewer drains lead to the sanitary sewer system and end up at a wastewater treatment plant. This system carries household wastewater and some permitted industrial wastewater. The wastewater in this system is treated before being discharged into a natural water body.

POLLUTING IS AGAINST THE LAW

Keeping pollutants out of the water isn't just a good idea - it's the law. The Washington State Water Pollution Control Law (RCW 90.48) and the King County Water Quality Code (KCC 9.12) prohibit the discharge of pollutants to the storm drainage system, surface water, and groundwater. Polluted stormwater runoff or the direct dumping of pollutants can negatively affect every water body it enters. Pollution can cause algal blooms causing taste and odor problems and impaired recreation and aesthetics; toxins can cause lesions and tumors in fish and other animals; turbidity can cause the destruction of fish spawning areas and other habitat for plants and animals; and all of this can result in a decrease in fishing, swimming, and boating opportunities.

WAYS YOU MAY BE POLLUTING

Many people know that it is illegal to dump toxic chemicals or other material down a storm drain. But you are also polluting if you allow pollutants to be washed into a storm drain with stormwater runoff or with wash water. For instance, you may be polluting if you:

- allow water from washing tools and equipment to enter a storm drain;
- spill antifreeze or other material on your site without cleaning it up;
- allow materials or wastes stored outside to leak on the ground; or
- clear land without taking steps to prevent erosion.

Virtually anything on the ground can become a water pollutant. Therefore, it is important to keep a clean site and ensure that polluting material is properly handled and stored.

POLLUTANTS

Any substance that can render water harmful to people, fish, or wildlife or impair recreation or other beneficial uses of water is considered a pollutant. The broad categories of pollutants and their effects on fish and wildlife are described below.

Table 2.1 (located at the end of this chapter) presents a list of the activities addressed in this manual. This table indicates the types of pollutants that may be generated by those activities as well as the types of receiving water bodies that may be affected by stormwater runoff from the activity sites.

Oils, Greases, and Fuels

Oils and greases are a common component of stormwater runoff pollutants, primarily because there are so many common sources: driveways, streets and highways, parking lots, food waste storage areas, heavy equipment and machinery storage areas, and areas where pesticides have been applied. The familiar sight of a rainbow-colored puddle or trickling stream of water in parking lots, driveways, and street gutters is a reminder of the presence of oils and greases in stormwater runoff. Oils and greases can be petroleum-based or food-related (such as cooking oils). No type of oil or grease belongs in surface water. Oil and grease are known to be toxic to aquatic organisms at relatively low concentrations. They can coat fish gills, prevent oxygen from entering the water, and clog drainage facilities (leading to increased maintenance costs and potential flooding problems).

Metals

Many metals, including lead, copper, zinc and cadmium, are commonly found in urban runoff. Metals can contaminate surface and groundwater, and concentrate in bottom sediments, presenting health problems for fish and animals that eat from the bottom of lakes, streams, and Puget Sound. Reproductive cycles of bottom-dwelling species can be severely reduced, and fish inhabiting such metal-contaminated locations often exhibit lesions and tumors. Metals can also contaminate drinking water supplies. Industrial areas, scrap yards, paints, pesticides, and fallout from automobile emissions are typical sources of metals in runoff.

Sediments

Sediment, often originating as topsoil, sand, and clay, is the most common pollutant in stormwater runoff by volume and weight. Sediments readily wash off paved surfaces and exposed earth during storms. Sediment may seem harmless enough, but it poses serious problems in the water. Excess sediment concentrations turn stream and lake water cloudy, making them less suitable for recreation, fish life, and plant growth. Sediment is of particular concern in fish bearing streams where it can smother trout and salmon eggs, destroy habitat for insects (a food source for fish), and cover prime spawning areas. Uncontrolled sediment can also clog storm drains, leading to increased private and public maintenance costs and flooding problems.

Sediment is also of concern because many other pollutants including oils, metals, bacteria, and nutrients tend to attach to soil particles. Therefore, when sediments enter water, they usually carry other pollutants with them.

Cleared construction sites and exposed earth are generally the greatest contributors of soil particles in surface waters. Other sources include erosion from agricultural lands, application of sand and salts to icy roads, fallout from pressure washing and sandblasting operations, dirt from equipment and vehicles, and dirt and grit from parking lots, driveways, and sidewalks.

Oxygen-Demanding Substances

Plant debris, yard waste, food waste, and some chemical wastes fall into a category of water pollutants known as oxygen-demanding substances. Such substances use dissolved oxygen in water when they decay or chemically react. If dissolved oxygen levels in water become too low, aquatic animals become stressed or die. Salmon and trout are particularly at risk because they need high dissolved oxygen levels to live.

Animal wastes, food wastes, leaves and twigs, and other miscellaneous organic matter carried by stormwater runoff into surface water can lead to reduced oxygen levels. Slow-moving waters are particularly susceptible to oxygen depletion because aeration of the water by turbulence is lacking. Therefore, oxygen that is depleted in slow-moving waters due to the presence of excess organic matter or unnatural chemical compounds is not replaced. Reduced oxygen levels in these waters are often particularly severe after a storm.

Nutrients

Nutrients such as phosphorus and nitrogen are needed by plants to grow, but high levels can be harmful to water quality. Excess nutrient levels can over-stimulate the growth of algae and other aquatic plants, resulting in unpleasant odors, unsightly surface scum, and lowered dissolved oxygen levels from plant decay. Nutrients are most likely to pose a problem in slow moving water such as lakes or sluggish streams.

Some forms of algae are toxic to fish and other aquatic organisms and may even cause death in animals that drink affected water. Algae can also cause taste and odor problems in drinking water, foul-smelling odor in ponds and lakes, and problems with clogged water intakes, drains, and pipes. Heavy loading of nutrients into slow-moving waters can adversely affect many beneficial uses of the water. Forms of nitrogen (ammonium), in combination with pH and temperature variations, can cause water quality problems and be toxic to fish. This process consumes large amounts of oxygen in the water and subsequently stresses or kills fish and other aquatic organisms when oxygen levels are reduced.

Ammonia can harm fish and other aquatic organisms.

Fertilizers, animal wastes, failing septic systems, detergents, road deicing salts, automobile emissions, eroded soils, and organic matter such as lawn clippings and leaves are all contributors to excessive nutrient levels in urban/rural and agricultural stormwater runoff.

Toxic Organic Compounds

Toxic organic compounds such as pesticides are particularly dangerous in the aquatic environment. Excessive application of insecticides, herbicides, fungicides, and rodenticides, or application of any of these shortly before a storm, can result in toxic pesticide chemicals being carried from agricultural lands, construction sites, parks, golf courses, and residential lawns and gardens to receiving waters. Many pesticide compounds are extremely toxic to aquatic organisms and can cause fish kills.

Many other toxic organic compounds can also affect receiving waters. These toxic compounds include phenols, glycol ethers, esters, nitrosamines, and other nitrogen compounds. Common sources of these compounds include wood preservatives, antifreeze, dry cleaning chemicals, cleansers, and a variety of other chemical products. Like pesticides these other toxic organic compounds can be lethal to aquatic organisms.

Fecal Coliform Bacteria

Fecal coliform bacteria in water may indicate the presence of pathogenic (disease-causing) bacteria and viruses. Pet and other animal wastes, failing septic systems, livestock waste in agricultural areas and on hobby farms, and fertilizers can all contribute fecal coliform bacteria. This can limit the recreational use of a water body. Bacterial contamination has led to closures of numerous shellfish harvesting areas and swimming beaches in the Puget Sound region.

pH

The pH value of water is an indication of its relative acidity. The pH value can range from 0 to 14, with a range of 6 to 8 being desirable for most bodies of water. A pH level outside this range will adversely affect plant and animal life. Waters with very high (basic) or very low (acidic) pH are corrosive to metal surfaces. There are several sources that can contribute to change of pH in runoff, including industrial processes that discharge acidic wastewater, solutions used in metal plating operations, acidic chemicals used in printing and graphic art businesses, cement used in concrete products and concrete pavement, and chemical cleaners used in homes and businesses.

Table 2.1 Potential Pollutants and Impacts Associated with Activities

Activities That May Affect Stormwater Runoff • Potentially present in activity area runoff, or potentially affects receiving water ◊ No presence or impact	Potential Pollutants in Runoff										Potential Receiving Waters Affected					
	TOXIC ORGANIC COMPOUNDS															
	HYDRO-CARBONS	PESTICIDES / PCBs	OTHER	OILS AND GREASES	NUTRIENTS	METALS	SUSPENDED SOLIDS	COD/ BOD	COLIFORM BACTERIA	ABNORMAL pH	LAKES	STREAMS	WETLANDS	GROUND WATER	PUGET SOUND	COMMENTS
STORAGE ACTIVITIES																
Storage of liquid materials in stationary tanks	•	•	•	•	•	•	◊	•	◊	•	•	•	•	•	•	
Storage of liquid materials in portable containers	•	•	•	•	•	•	◊	•	◊	•	•	•	•	•	•	
Storage of soil, sand, salt, and other erodible materials	◊	◊	◊	◊	•	•	•	•	•	•	•	•	•	◊	•	
Storage of pesticides and fertilizers	◊	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Storage of contaminated soils	•	•	•	•	◊	•	•	◊	◊	•	•	•	•	•	•	Ecology permit required
Storage and processing of food items	◊	◊	◊	◊	•	◊	•	•	◊	◊	•	•	•	◊	•	
Storage of solid waste and food waste (including cooking grease)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Storage of scrap and recycling materials (including auto recycling facilities)	•	•	•	•	◊	•	•	•	◊	◊	•	•	•	•	•	
Treatment, storage or disposal of dangerous wastes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	Ecology permit required
WASHING																
Cleaning or washing of tools and equipment	•	•	•	•	•	•	•	•	◊	•	•	•	•	•	•	
Cleaning or washing of cooking equipment	◊	◊	◊	•	•	◊	•	•	◊	•	•	•	•	◊	◊	
Vehicle washing and steam cleaning	•	•	•	•	•	•	•	•	◊	•	•	•	•	•	•	
Interior washing operations (including mobile contractors)	◊	◊	•	•	•	◊	•	◊	◊	•	•	•	•	•	◊	
Pressure washing of buildings, rooftops and other large objects	•	◊	•	•	•	•	•	•	◊	•	•	•	•	•	•	
TRANSFER OF LIQUID MATERIALS																
Truck or rail loading and unloading of liquid or solid material	•	•	•	•	•	•	◊	•	◊	•	•	•	•	•	•	
Fueling operations	•	◊	◊	•	◊	•	◊	•	◊	◊	•	•	•	•	•	
Vehicle and equipment repair and maintenance	•	◊	•	•	◊	•	•	•	◊	•	•	•	•	•	•	
PRODUCTION AND APPLICATION																
Concrete and asphalt production at stationary sites	•	◊	•	•	◊	•	•	◊	◊	•	•	•	•	•	•	
Concrete and asphalt application at temporary sites	•	◊	•	•	◊	•	•	◊	◊	•	•	•	•	•	•	
Manufacturing and post-processing of metal products	•	◊	•	•	◊	•	•	•	◊	•	•	•	•	•	•	
Painting, finishing and coating of vehicles, products and equipment	•	◊	•	•	◊	•	•	•	◊	•	•	•	•	•	•	
Wood treatment and preserving	•	◊	•	•	◊	•	•	•	◊	•	•	•	•	•	•	
Commercial composting	◊	•	•	◊	•	•	•	•	•	◊	•	•	•	•	•	
Chemical applications—other than for landscaping	◊	•	•	•	◊	•	◊	•	◊	•	•	•	•	•	•	
LANDSCAPING																
Landscaping activities and vegetation management	◊	•	◊	•	•	•	•	•	•	◊	•	•	•	•	•	
CONSTRUCTION																
Cleaning and grading of land for small construction projects	•	•	◊	•	•	•	•	•	◊	◊	•	•	•	•	•	King County Critical Area Ordinance applies
Demolition of buildings	◊	◊	•	◊	•	•	•	◊	◊	•	•	•	•	◊	•	
Building repair, remodeling and construction	•	◊	•	◊	•	•	•	◊	◊	•	•	•	•	•	•	
Boat building, maintenance and repair	•	◊	•	•	•	•	•	•	◊	•	•	•	•	•	•	Boatyard general permit may apply
OTHER ACTIVITIES																
Vehicle and equipment parking and storage	•	◊	•	•	◊	•	•	◊	◊	◊	•	•	•	•	•	
Sidewalk maintenance	•	•	◊	•	◊	•	•	•	•	•	•	•	•	◊	•	
Swimming pool and spa cleaning and maintenance	◊	◊	◊	◊	•	◊	•	•	•	•	•	•	•	•	•	
Keeping animals in controlled areas	◊	•	◊	◊	•	◊	•	•	•	◊	•	•	•	◊	•	
Keeping livestock in stables, pens, pastures or fields	◊	◊	◊	◊	•	◊	•	•	•	◊	•	•	•	•	•	Zoning code may apply
Logging and log yards	•	•	◊	•	•	◊	•	•	◊	◊	•	•	•	•	•	King County Critical Area Ordinance applies
Mining and quarrying of sand, gravel, and other materials	•	◊	◊	•	•	•	•	◊	◊	•	•	•	•	•	•	Ecology discharge criteria must be met
Well and geotechnical drilling	•	•	•	•	◊	•	•	•	◊	◊	•	•	•	•	•	
Roof vents and fugitive emissions	◊	◊	•	•	◊	•	•	◊	◊	•	•	•	•	•	•	
Street deicing operations	◊	◊	•	◊	◊	◊	•	•	◊	•	•	•	•	•	•	
Wheel wash and tire bath operations	•	◊	•	•	◊	•	•	◊	◊	•	•	•	•	•	•	
Potable water line flushing or tank maintenance	◊	◊	•	◊	◊	•	•	◊	•	•	•	•	•	•	•	
Use of soil amendments on construction sites	◊	◊	◊	◊	◊	•	•	•	◊	•	•	•	•	•	•	
Dust control and soil erosion and sediment control for manufacturing and other commercial operations	•	•	•	◊	◊	•	•	•	◊	•	•	•	•	◊	•	
Maintenance of public and private utility corridors and facilities	•	•	•	•	•	•	•	•	◊	•	•	•	•	•	•	

III

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III
STORMWATER BEST MANAGEMENT PRACTICES FOR SPECIFIC ACTIVITIES

BMP ACTIVITY SHEETS

This chapter consists of a series of information sheets listing the best management practices (BMPs) required for commercial, industrial, agricultural, public, and multifamily residential activities conducted in unincorporated King County.

The manual limits the requirements to a number of minimal measures that reasonably balance stormwater pollution reduction with feasibility and cost. The manual also includes recommended BMPs that should always be considered in the effort to control pollution. King County's goal is to reduce pollution through education and prevention efforts, emphasizing source control BMPs before treatment.

Every property in the county has unique characteristics and drainage systems. Some sites have a constructed storm drainage system with catch basin inlets, while others drain to a ditch or infiltrate into the ground. The pollution generating activities occurring on site; type of drainage system; as well as the slope and ground cover of a site will affect the selection of BMPs. The activity sheets offer flexibility in BMP selection and, as much as possible, recognize the wide variety of site conditions that may be encountered.

Please note that you are responsible for your own activities as well as those activities and services rendered by a contractor you hire. Before hiring a contractor, ensure that they follow best management practices and comply with all federal, state, and local laws.

OPTIONAL BMPs

The BMPs listed below are measures that should be considered at all times for improving pollution control. These BMPs are NOT REQUIRED, but should be incorporated in your plan of implementing BMPs. Implementation of some of these BMPs may reduce or eliminate the need to implement other more complicated or costly BMPs discussed later in the activity sheets.

1

Locate Activities as Far as Possible From Surface Drainage Paths

Locating activities on high ground, far from drainage paths, ditches, gutters, and storm drains allows more time to recognize spills and act to prevent water contamination.

2

Avoid the Activity or Reduce its Occurrence

Often an alternate production process or material application process can be used to substitute for another, more polluting process. Ideally, a polluting activity can be avoided altogether, or its frequency of occurrence reduced. An example is washing vehicles less often or taking vehicles to commercial car washes or detail shops rather than washing on site.

3

Use Less Material

Improper disposal of excess material or increased application of materials simply because excess is available can cause pollution. Purchase only the amount of material that will be needed for foreseeable use. In most cases you will see cost savings in both purchasing and disposal.

4

Use the Least Toxic Materials Available

All applications of solid and liquid materials should use the least toxic products and raw materials available, whether in production; cleaning; pesticide applications; or other uses. The Seattle-King County Department of Public Health's Business Waste Line should be consulted for information on using less toxic products.

5

Create and/or Maintain Vegetated Areas Near Activity Locations

Grass and other types of vegetation can filter out many pollutants in stormwater runoff. Vegetated areas should be maintained around areas where polluting activities occur, especially down slope of activity areas. Routine maintenance will keep vegetated areas healthy and capable of filtering pollutants. (If using installed irrigation systems see King County Code 21A.16).

6

Recycle as Much as Possible

Recycling is always preferable to disposal of unwanted materials. Leftover paints, finishes, cleaning materials, building materials, etc. may be used by someone else, so don't throw them away. Contact a neighbor, friend, school, church, community group, theater group, etc. to see if your leftover materials can be used. Many empty containers and other common items are recyclable. Contact the King County Solid Waste Division's Business Recycling Program and the Seattle-King County Department of Public Health's Industrial Materials Exchange for recycling at http://www.govlink.org/hazwaste/business/imex/.

7

Educate Others About Stormwater Pollution Prevention

Educate your employees, business associates, contractors, family, and friends about stormwater pollution control. Encourage others to find solutions to stormwater pollution problems, and to continue learning about pollution control techniques.

8

Implement Treatment BMPs

Treatment BMPs are used to remove pollutants from stormwater before being discharged from a site. These include oil water separators and other catch basin inserts that control pollutants in the piped system and as well as numerous biological systems such as biofiltration swales, infiltration, and constructed wetlands. These BMPs may be a preferred option in certain circumstances. A number of treatment BMPs are described in Chapter V.

Activity Worksheet	
Name:	**Business Type:**
Address:	

Activity Sheet Number	Use this worksheet to identify the activities that you conduct. Interpret the categories broadly. Numbers A-1 – A-45 correspond to sheets located in Chapter 3.	Do you conduct this activity? If so, where?	
	TYPE OF ACTIVITY	INDOORS	OUTDOORS
	STORAGE		
A-1	**Required BMPs for All Commercial Properties**		
A-2	**Storage of Liquid Materials in Stationary Tanks**		
A-3	**Storage of Any Liquid Materials in Portable Containers**		
A-4	**Storage of Soil, Sand, and Other Erodible Materials**		
A-5	**Storage of Pesticides and Fertilizers**		
A-6	**Storage and Treatment of Contaminated Soils**		
A-7	**Storage and Processing of Food Items**		
A-8	**Storage of Solid Wastes and Food Wastes (Including Cooking Grease)**		
A-9	**Storage of Scrap and Recycling Materials (Including Auto Recycling Facilities)**		
A-10	**Treatment, Storage, or Disposal of Dangerous Wastes**		
	WASHING		
A-11	**Cleaning or Washing of Tools and Equipment**		
A-12	**Cleaning or Washing of Cooking Equipment**		
A-13	**Vehicle Washing and Steam Cleaning**		
A-14	**Interior Washing Operations (Including Mobile Contractors)**		
A-15	**Pressure Washing of Buildings, Rooftops, and Other Large Objects**		
	TRANSFER OF LIQUID MATERIALS		
A-16	**Truck or Rail Loading and Unloading of Liquid Materials**		
A-17	**Fueling Operations**		
A-18	**Engine Repair and Maintenance**		
	PRODUCTION AND APPLICATION		
A-19	**Concrete and Asphalt Production at Stationary Sites**		
A-20	**Concrete and Asphalt at Temporary Sites**		
A-21	**Manufacturing and Post-Processing of Metal Products**		

Activity Sheet Number	Use this worksheet to identify the activities that you conduct. Interpret the categories broadly. Numbers A-1 – A-45 correspond to sheets located in Chapter 3.	Do you conduct this activity? If so, where?	
	TYPE OF ACTIVITY	INDOORS	OUTDOORS
A-22	**Painting, Finishing, and Coating of Vehicles, Products, and Equipment**		
A-23	**Wood Treatment and Preserving**		
A-24	**Commercial Composting**		
A-25	**Chemical Applications-Other than for Landscaping**		
	LANDSCAPING		
A-26	**Landscaping Activities**		
	CONSTRUCTION		
A-27	**Clearing, Grading, and Preparation of Land for Small Construction Projects**		
A-28	**Demolition of Buildings**		
A-29	**Building Repair, Remodeling, and Construction**		
A-30	**Boat Building, Maintenance, and Repair**		
	OTHER		
A-31	**Vehicle and Equipment Parking and Storage**		
A-32	**Sidewalk Maintenance**		
A-33	**Swimming Pool and Spa Cleaning and Maintenance**		
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A-36	**Logging and Log Yards**		
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A-45	**Maintenance of Public and Private Utility Corridors and Facilities**		

Required BMPs for All Commercial Properties

MINIMUM REQUIREMENTS

The following BMPs are required if you own or occupy commercial, industrial, agricultural, public, or multifamily residential property in unincorporated King County.

1 Clean Your Storm Drainage System

Maintain your storm drainage system by removing sediment and other debris to prevent the transport of pollutants into receiving waters. The storm drainage system includes all drains, catch basins, pipes, ditches, gutters, and flow control and water quality facilities.

☞ See BMP Info Sheet 7 in Chapter 5 for details on drainage system maintenance.

2 Eliminate Illicit Connections to the Storm Drainage System

A common situation that can cause severe stormwater pollution problems is discharge of non-stormwater to the storm drainage system. Examples are discharges from internal floor drains, appliances, industrial processes, sinks, and toilets. These are sometimes illegally or inadvertently connected or drained to the nearby storm drainage system. These discharges must go to the sanitary sewer system, a holding tank, an on-site process water treatment system, or a septic system. You must correct these illicit discharges. If you have any questions as to whether your discharge is allowable, contact the King County Water and Land Resources Division at 206-296-1900.

☞ See BMP Info Sheet 1 in Chapter 5 for information on how to check for illicit connections. You can also ask for help from your local sewer utility. If you find out that your internal drains are

improperly connected to the storm drainage system, they will need to be either removed, permanently plugged, or connected to the sanitary sewer, septic system, on-site treatment system, or a holding tank.

Stencil Your Storm Drains

Stencil or apply storm drain markers adjacent to storm drains to help prevent the improper disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste - Drains to Stream” applied next to the catch basin to warn against the intentional dumping or discharge of pollutants. If the metal catch basin grate has been cast with this message, marking the drains is still recommended, but may not be required unless evidence is found that pollutants are being dumped or washed to the storm drains.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Storage of Liquid Materials in Stationary Tanks

This activity applies to you if you store any type of liquids outside, including but not limited to chemicals, waste oils, solvents, or petroleum products in above ground stationary tanks. Leaking tanks can contribute toxic compounds, oils and greases, metals, abnormal pH, and nutrients to stormwater runoff. In addition, spills may occur during liquid transfer operations to and from the tanks.

This activity does not apply to underground storage tanks or to businesses permitted by the Washington State Department of Ecology to treat, store, or dispose of dangerous wastes. Storage of reactive, combustible, or flammable liquids must comply with the King County Fire Code Title 17.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in storage of liquid materials in above ground stationary tanks:

1 Store and contain liquid materials in such a manner that if the tank is ruptured or leaks, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater. Typically this means installing secondary containment or using a double-walled tank.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment.

2 If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as an oil/water separator or down-turned elbow) in the catch basins that collect runoff from the storage tank area.

☞ See BMP Info Sheet 9 in Chapter 5 for information on oil/water separators.

3 Required Routine Maintenance:

- Place drip pans or absorbent materials beneath all mounted taps and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused, recycled, or properly disposed of.

- Store and maintain appropriate spill cleanup materials near the tank storage area, in a location known to all. Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

- Sweep and clean the storage area as needed if it is paved. Do not hose down the area to a storm drain.

- Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating. Collect all spilled liquids and properly dispose of them.

- Inspect spill control devices regularly (daily/weekly) to remove floating oil and debris.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Storage of Liquid Materials in Portable Containers

This activity applies to you if you store any type of liquids outside including but not limited to chemicals, waste oils, solvents, or petroleum products in portable containers (such as drums). This activity covers permanent storage as well as temporary storage areas. . This activity may also apply to you if you store liquids inside a building and if spills occur, liquid could flow to a storm drainage system or surface waters. Spills and drips of these liquids, or overtopping of storage containers, can contribute toxic compounds, oils and greases, metals, abnormal pH, and nutrients to stormwater runoff.

This activity does not apply to businesses that are permitted by the Washington State Department of Ecology to treat, store, or dispose of dangerous wastes if all required BMPs are in place as outlined in the permit. Storage of reactive, combustible, or flammable liquids must comply with the King County Fire Code.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in the storage of liquid materials in portable containers:

1. Place tight-fitting lids on all containers.

2. Enclose or cover the containers where they are stored. The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.

3. Raise the containers off the ground by using a spill containment pallet or similar method that has provisions for spill control.

   OR

   Contain the material in such a manner that if the container leaks or

spills, the contents will not discharge, flow, or be washed into the storm drainage system, surface water, or groundwater.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment options.

4 Place drip pans or absorbent materials beneath all mounted container taps, and at all potential drip and spill locations during filling and unloading of containers. Any collected liquids or soiled absorbent materials must be reused, recycled, or properly disposed of.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

5 Required Routine Maintenance:

- Store and maintain appropriate spill cleanup materials near the container storage area, in a location known to all. Ensure that employees are familiar with the site's spill plan and/or proper spill cleanup procedures.
- Sweep and clean the storage area as needed if it is paved. Do not hose down the area to the storm drainage system.
- Check containers (and any containment sumps) daily for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums. New or secondary containers must be labeled with the product name and hazards.
- Collect all spilled liquids and properly dispose of them.
- Inspect spill control devices routinely (daily/weekly) and remove separated floatables.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Storage of Soil, Sand, and Other Erodible Materials

This activity applies to you if you are stockpiling erodible raw materials such as soil, sawdust, landscaping bark, gravel, sand, and road deicing salts. It covers permanent sites as well as temporary construction sites and other temporary locations. Raw material stockpiles can easily erode due to wind or precipitation and contribute suspended solids, nutrients, metals, and harmful pH to stormwater runoff.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in storage or stockpiling erodible material on a routine or temporary basis.

1 Cover and contain the stockpiles of raw materials to prevent stormwater from washing material to surface waters or a storm drainage system. The covers must be in place at all times when the stockpile is not in active use. Do not hose down the contained stockpile area to the storm drainage system.

Stockpiles located away from paved areas or where material will not be washed or tracked to the storm drainage system may not need to be covered unless windy conditions cause air borne particulate that could settle on hard surfaces and subsequently washed into adjacent surface waters or storm drainage systems.

OR

If the stockpiles are so large that they cannot feasibly be covered and contained, implement erosion control practices at the perimeter and as needed on site to prevent erosion and runoff of the stockpiled material into the storm drainage system or off site. See the King County Surface Water Design Manual, Appendix D (Erosion and Sediment Control Standards).

☞ See BMP Info Sheet 3 in Chapter 5 for information on covering options.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment options.

2

Required Routine maintenance:

- Sweep paved storage areas as needed and collect and dispose of loose solid materials. Do not hose down the area to a storm drain or ditch.
- Stock cleanup materials, such as brooms, dustpans, and vacuum sweepers near the storage area.

ADDITIONAL BMPS

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control.

1

A catch basin insert, configured for sediment removal, may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this requirement when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Storage of Pesticides and Fertilizers

This activity applies to you if you store dry pesticides or fertilizers. See Activity Sheets A-2 and A-3 for the storage of liquid materials. Runoff from pesticide storage areas can be contaminated with toxic compounds, oils, and metals. Runoff from fertilizer storage areas can be contaminated with nutrients and fecal coliform bacteria. The primary problem with most of these pollutants is that they are soluble, which means they cannot be removed from stormwater runoff, or out of contaminated water that seeps into the soil, with the technologies currently in use.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in the storage of dry pesticides and fertilizers:

1 Cover pesticides and fertilizers.

☞ See BMP Info Sheet 3 in Chapter 5 for information on covering options.

2 Raise the materials off the ground by using pallets or another similar method to prevent contact with stormwater runoff.

OR

Contain the material in such a manner that if the container leaks or spills, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment options.

3 Required Routine Maintenance:

- Store and maintain appropriate spill cleanup materials near the storage area, in a location known to all.

- Clean up any spilled fertilizer or pesticides and ensure that the materials are kept in the designated covered or contained areas.

- Sweep paved storage areas as needed. Collect and dispose of loose solid materials. Do not hose down the area to a storm drain or conveyance ditch.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Storage of Contaminated Soils

This activity applies if you store and treat soils contaminated with toxic organic compounds, oils and greases, and metals. Typically this situation arises when other site work is being conducted, such as removing a leaking underground tank. Contaminated soils are usually excavated and left on the premises for treatment via aeration and perhaps chemical stabilization. Stormwater runoff that comes in contact with contaminated soil can carry some of those same contaminants along with suspended solids into receiving waters. The Washington State Department of Ecology regulates businesses engaged in this activity. In addition, a permit from the Puget Sound Clean Air Agency is required if the treatment method for removing soil contaminants involves forcing air through the soil. The BMPs below supplement other required regulations.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in storage and treatment of contaminated soils:

1 Cover or contain contaminated soils to prevent stormwater from carrying pollutants away to surface or ground waters.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment and run-on prevention.

2 Required Routine Maintenance:

- Sweep paved storage areas as needed. Collect and dispose of soil particles. Do not hose down the area to a storm drain or ditch.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

- Stock cleanup materials such as brooms, dustpans, and vacuum sweepers near the storage area.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

A catch basin insert, configured for sediment removal, may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Storage or Processing of Food Items

This activity applies if you temporarily store fruits and vegetables outdoors prior to processing or other use; crush, cut, or shred fruits or vegetables for wines, frozen juices, and other food and beverage products; or process meats, seafood and other foods.. Stormwater runoff from areas where these activities occur may be contaminated with nutrients from crushed or decaying fruits and vegetables and suspended solids from unwashed produce.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in the STORAGE of fruits, vegetables , meats and fish or other food

1 Minimize use of water to clean fruits and vegetables to avoid excessive runoff. Animal and fish wastes must be must be sealed or contained in some manner to ensure they do not leak from dumpsters or other waste containers. Do not drain water or ice used for storing fish and meat products to the storm drainage system.

2 Required Routine Maintenance:

- Clean the storage area as needed to collect dirt and fragments of fruits or vegetables or other foods. Properly dispose of collected waste. Do not hose down the area to the storm drainage system.
- Stock cleanup materials such as brooms and dustpans near the storage area.
- Minimize outdoor storage time for fruits and vegetables whenever possible.
- Collect rotting produce frequently and dispose of it properly.

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in the PROCESSING of fruits, vegetables, meats, fish or other foods:

1 Enclose the processing area. Any discharges must drain to the sanitary sewer or a treatment facility.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Storage of Solid Waste and Food Wastes (Including Cooking Grease)

This activity applies to you if you store solid wastes including both food and non-food wastes outdoors. This typically refers to garbage dumpsters, other outdoor waste containers such as cooking grease barrels or containers, and any stockpiled garbage. Improper storage of non-food solid wastes can allow toxic compounds, oils and greases, metals, nutrients, and suspended solids to enter stormwater runoff. Stormwater runoff from food waste storage areas may be contaminated with oils and greases, nutrients, and suspended solids if waste containers are leaking, are not covered, or are too small to contain the amount of waste generated. If you store dangerous wastes you must follow specific regulations outlined by the Washington State Department of Ecology.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in storage of solid wastes or food wastes:

1

Dumpsters and other waste storage containers must be leak-proof with solid lids. Keep dumpsters closed except when adding waste. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and run-off with a berm or similar method. Keep all waste piles covered except when in use.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment and run-on prevention and BMP Info Sheet 3 for information on covering options.

2

When transferring cooking oil/grease to outside containers from kitchens, cover the container with a tight lid during transport and clean up any spills immediately. Keep the area around the grease container clean, free of grease, and debris free.

3

Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the

ground. Clean up spills immediately. Collected grease must be properly disposed of as garbage.

Required Routine Maintenance:

- Check storage containers as needed for leaks and to ensure that lids are on tightly. Replace containers that are leaking, corroded, or otherwise deteriorating.

- Sweep and clean the storage area as needed if it is paved. Do not hose down the area to a storm drain.

- Dispose of rinse and wash water from cleaning your containers into a sanitary sewer according to health department requirements, or if no sewer is available, store in a holding tank, dead end sump or truck off site to an approved disposal location.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Storage of Scrap and Recycling Materials (Including Auto Recycling Facilities)

This activity applies to you if you salvage and store scrap metal, scrap equipment, junked appliances and vehicles, empty metal drums, and recyclable items such as cans, bottles, plastic and paper products for longer than two weeks (unless material is rotated and storage is essentially continuous). Stormwater runoff from these sites may contain toxic hydrocarbons, polychlorinated biphenyls (PCBs), other toxic compounds, metals, oils and greases, and suspended solids.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in storage of scrap and recycling materials:

1

Designate an area to drain gasoline, engine fluids, and other contaminated liquids from scrapped items. Dispose and store waste properly, or preferably recycle it, before the items are placed in the scrap storage area. Drain and transfer fluids from vehicles and other equipment to storage containers only in designated areas located on impervious surfaces (preferably Portland cement concrete) or over drip pans. All containers used to store fluids must comply with Activity Sheets A-2 and A-3 regarding secondary containment. Storage of gasoline must comply with the appropriate Fire Codes.

Contain the designated draining and dismantling area to prevent stormwater from entering the area and carrying pollutants to surface or ground water or drainage systems. Dismantling areas must be covered with roofs and/or tarps to prevent rainwater contact.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment and runon prevention and BMP Info Sheet 3 for information on covering options.

2

Check incoming scrap materials, vehicles and equipment for potential fluid contents and batteries. Always use the designated fluid draining/dismantling area.

3

Remove batteries and store batteries in enclosed containers with neutralizing agents such as baking soda in case of battery breaks and/or acid leaks.

4 All scrap metal and materials that may contaminate stormwater runoff must be covered and raised off the ground to prevent stormwater from contacting the material. A tarp and a pallet are acceptable. Keep dumpsters used for scrap closed to keep out rainwater.

5 Cover or enclose stockpiles of crushed containers, crushed glass, recycled plastic, and any other material that has the potential to contaminate stormwater runoff. Stockpiled materials or leachate must not enter the storm drainage system.

6 Required Routine Maintenance:

- Inspect the storage area regularly to check for contamination from stockpiles or containers. Promptly clean up any leaks, spills, or contamination in the storage area.
- Sweep paved open areas of the scrap storage area as needed. Collect and properly dispose of loose scrap and other particulates. Do not hose down the area to a storm drain.
- Store and maintain appropriate spill cleanup materials in a location known to all. Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

7 If you are involved in transporting any of these materials you must (1) carry spill cleanup material in the vehicle to capture any spilled liquids, or (2) place an impermeable liner in the bed of your truck to capture any spilled or leaked materials. Properly dispose of or reuse any collected fluids.

ADDITIONAL BMPS

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

1 A catch basin insert, configured for debris and oil/grease removal, may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. The absorbent materials for oil and grease removal must be monitored and replaced regularly to ensure they perform as intended. Carefully consider this when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Treatment, Storage, or Disposal of Dangerous Wastes

This activity applies to businesses that are permitted by the Washington State Department of Ecology (WSDOE) to treat, store, or dispose of dangerous wastes. Dangerous waste handling activities at these businesses can contribute toxic compounds, oils and greases, metals, nutrients, suspended solids, abnormal pH, and coliform bacteria to stormwater runoff. Detailed BMPs are not included here because treatment, storage, and disposal (TSD) site requirements are beyond the level of typical BMP application. WSDOE regulates these facilities with specific requirements, which include the need for a National Pollutant Discharge Elimination System (NPDES) permit.

☞ Contact the Washington State Department of Ecology at 425-649-7000 or 360-407-6000.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Cleaning or Washing of Tools and Equipment

This activity applies if you clean all types of tools and equipment. This includes landscaping equipment such as lawn mowers and weed whackers; tools used at auto and other equipment repair shops; and, manufacturing equipment such as saws, grinders and screens. Uncontrolled outdoor washing can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, metals, harmful pH, and suspended solids to stormwater runoff.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in cleaning or washing of tools and small power and manufacturing equipment:

1

Tool and equipment wash water is considered process water, and must discharge to the sanitary sewer, a holding tank, or a process treatment system, regardless of the washing method used.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

You are encouraged to recycle your wash water with an enclosed loop system or use self-contained parts washers. Numerous products are commercially available that recycle and contain wash water and cleaning solvents.

If you cannot connect discharges to a sanitary sewer, process treatment system, or holding tank you must contact the Washington State Department of Ecology and go through the Individual Wastewater Discharge permit process.

2

Lawnmowers may be rinsed with water only on a lawn or similar area as long as the rinsed-off grass clippings will not be washed to the storm drain system or surface waters when it rains. Washwater from oily or similarly contaminated lawn maintenance equipment is not allowed to flow to or discharge to any stormwater system or surface water.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Cleaning or Washing of Cooking Equipment

This activity applies to you if you clean cooking equipment such as vent filters and grills outside of buildings. Uncontrolled outdoor washing can contribute oils and greases, nutrients, and suspended solids to stormwater runoff. Ideally, this type of cleaning activity should take place indoors.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in cleaning or washing of cooking equipment:

1

Cooking equipment wash water is considered process water, and must discharge to the sanitary sewer, a holding tank, or a process treatment system, regardless of the washing method used.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

Washing must be done in an inside sink or wash basin. If washing is done outside, it must be done in a designated area and the wash water must discharge to one of the above systems. Provisions must be made to prevent stormwater from becoming contaminated from contact with the washing area.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment and run-on prevention.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Vehicle Washing and Steam Cleaning

This activity applies to you if you wash or steam clean vehicles. It also applies to mobile operations and commercial car washes. The types of vehicles may include highway maintenance trucks, taxicabs, buses, rental cars, new and used autos on lots, government and company cars, construction equipment, fork lifts, golf carts, riding lawn mowers, and similar large vehicles. Wash water from cleaning activities can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, metals, and suspended solids to stormwater runoff. The soap used for washing is often a greater pollution threat than the substances washed off the vehicles. All soaps are harmful to aquatic organisms, including those labeled as "biodegradable", "non toxic", or "environmentally friendly".

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in vehicle washing and steam cleaning:

1

It is allowable to rinse down the body of a vehicle, including the bed of a truck, with just water without doing any wash water control BMPs. The washwater must be screened prior to discharge to the stormwater drainage system to trap particulates found in washwater. Turbid water may not be discharged directly into the stormwater drainage system.

If you wash with a mild (pH neutral) soap or detergent on an area that infiltrates water, such as gravel, grass, or loose soil, it is acceptable to let the wash water infiltrate as long as you only wash the body of vehicles. However, if your business is located in an area designated as a Critical Aquifer Recharge Area (CARA), infiltration may sometimes not be allowed. Check with the Water and Land Resources Division at 206-296-1900 or your local jurisdiction before infiltrating wash water.

If you wash on a paved area and use detergents or other cleansers, or if you wash/rinse the engine compartment or the underside of vehicles, you must choose ONE of the following options:

(a) Designate and pave a wash area to wash all vehicles. Discharge

wash water from vehicle cleaning operations to a sanitary sewer, holding tank, or process treatment system, or process it through an enclosed recycling system.

See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

The local sewer authority and the King County Wastewater Treatment Division Industrial Waste Section may have limits on the types and amounts of pollutants, such as oil and metals that can be discharged to a sanitary sewer. Absolutely no untreated wash water can enter storm drains.

OR

(b) Designate and pave a wash area to use when washing all vehicles. Use a storm drain cover or other effective method to prevent all wash and rinse water from entering a storm drain or other storm drainage system component. All runoff from the activity must be collected for proper disposal to a sanitary sewer. A wet vacuum or pump can be used for this. There are several products commercially available that enable collection of runoff. This requirement also applies to mobile vehicle washing services.

OR

(c) Take the vehicles to a commercial car wash or use a mobile washer who complies with (a) or (b) above.

Designated wash areas must be well marked with signs indicating where and how washing must be done.

Oil changes and other engine maintenance cannot be conducted in the designated washing area.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Interior Washing Operations (Including Mobile Contractors)

This activity applies to you if you are engaged in washing carpets, floors, upholstery, and other interior items. This activity is performed by both mobile contractors and on-site staff. The typical washing process includes the use of machines that scrub and suck dirt and other particles with a wash water solution into a portable containment device with limited capacity. Stormwater and surface waters or groundwater may become contaminated if collected wash water is disposed outdoors. Wastewater from washing operations that is dumped into storm drains, on streets, in drainage ditches, and in other outdoor locations can contaminate water bodies with nutrients, suspended solids, and chemicals used in the cleaning process.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you engage in interior washing activities:

1 Do not dispose of any wastewater from this activity outdoors or to the storm drainage system. This point must be made clear to employees. Wastewater from mobile fleet washing operations may be permitted for sanitary sewer disposal if it does not contain high concentrations of toxic materials. Contact the local sewer authority and the King County Wastewater Treatment Division Industrial Waste Section for more information at 206-263-3000. Wash water can also be recycled.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

2 Do not dispose of sludges that are left in tanks, containers, or trucks outdoors or to a ditch or drain connected to the storm drainage system. Sludges must be disposed of properly.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

Additional BMPs

The following BMPs are optional, unless the above minimum required BMPs do not provide adequate source control.

1 Limit the amount of water used in interior washing operations. This limits the amount of wastewater you need to worry about properly disposing of.

2 Recycle wash water.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Pressure Washing of Buildings, Rooftops, and Other Large Objects

This activity applies if you are engaged in pressure washing large, immobile objects such as building facades, rooftops, and awnings on a site-to-site basis. Pressure washing can degrade water quality as the runoff and loosened solids typically travel directly into the storm drainage system. Wash water from pressure washing operations can be contaminated with suspended solids, metals, and possibly other pollutants present on the objects being washed. Pressure washing of boats in boat yards, marinas, and dry dock areas is covered by a National Pollutant Discharge Elimination System (NPDES) permit, administered by the Washington State Department of Ecology, so the BMPs listed below may not apply to pressure washing in these locations.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in pressure washing of large objects:

1 In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

2 If soaps or detergents are NOT used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use filter fabric catch basin inserts or some other type of screening device on the ground and/or in the catch basin to trap the particles in wash water runoff.

3 If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash water runoff must infiltrate into the grass and not drain to the pavement or storm drainage system.

4 Another option is to hire a mobile washer who collects and recycles water or complies with the above.

If the painted surface being pressure washed is painted with lead or other heavy metal-bearing paint (such as chromium or cadmium), consider using a commercial pressure washing service that can collect, test, and properly dispose of the wastewater.

Additional BMPs

The following BMPs are optional, unless the above minimum required BMPs do not provide adequate source control:

A catch basin insert, configured for debris removal, may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Truck or Rail Loading and Unloading of Liquid or Solid Material

This activity applies to the loading and unloading of liquid and solid materials by truck or rail and the transfer of those materials into tanks, containers or other storage areas. Leaks and spills while transferring liquid or solid materials can potentially contribute toxic organic compounds, particulates, oil and grease, nutrients, metals, and harmful pH to stormwater runoff.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in loading and unloading of liquid or solid materials:

1. Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip-collected materials must be disposed of properly.

   ☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

2. Sweep loading/unloading areas as needed to remove debris. Clean up any material that is spilled during transfer operations immediately. Never wash spilled material or debris to the storm drains or the street.

3. To minimize the risk of spills or leaks , ensure employees are trained in and follow proper loading and unloading procedures.

4. Store and maintain appropriate spill cleanup materials in a location known to all. Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

5. Check equipment for leaks on a regular basis and repair if needed

6 Conduct loading and unloading operations under cover if possible.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

1 Pave areas where liquids are transferred to and from tanker trucks. Use Portland cement concrete for fuels such as gasoline that react with asphalt.

2 Install a curb or dike, or slope the area to prevent stormwater from running on to the loading/unloading area and washing away spilled material.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Fueling Operations

This activity applies if you refuel vehicles on the premises, whether a large sized gas station or a single pump maintenance yard installation. It also covers mobile fueling operations. Stormwater runoff from fueling areas may be contaminated with toxic hydrocarbons, oils and greases, and metals.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in dedicated permanent fueling operations:

1. Cover the fueling area with an overhanging roof structure or canopy so that precipitation cannot come in contact with the fueling area.

   ☞ See BMP Info Sheet 3 in Chapter 5 for information on covering options. An exception to this requirement is granted for mobile fueling equipment, floating fuel islands on water, and oversized vehicles that can not maneuver under a roof.

2. Pave the fueling area with Portland cement concrete and contain the area to prevent uncontaminated stormwater from running into the fueling area and carrying pollutants to the onsite storm drainage system or adjacent surface water or conveyance systems.

   ☞ See BMP Info Sheet 5 in Chapter 5 for information on containment.

3. Install and maintain an oil or spill control device in the appropriate catch basin(s) to treat runoff from the fueling area.

   ☞ See the King County Surface Water Design Manual for various designs and the BMP Info Sheet 9 in Chapter 5 for further information on oil/water separators.

4. Never hose down the fueling area to the storm drains. Contaminated runoff must be collected for proper disposal.

5. Required Routine Maintenance:

   - Post signs to remind employees and customers not to top off the fuel tank when filling. Post signs that ban customers and employees from changing engine oil or other fluids at that location.
   - Store and maintain appropriate spill cleanup materials in a location known to all. Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

If you cannot implement the above requirements on your site, consider ceasing your on-site fueling activities and take your vehicles to a fueling station that meets these requirements.

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in mobile fueling operations:

1. Locate the fueling operation to ensure leaks or spills will not discharge, flow, or be washed into the storm drainage system, surface water, or groundwater.
2. Use drip pans or absorbent pads to capture drips or spills during fueling operations.
3. If fueling is done during evening hours, lighting must be provided.
4. Required Routine Maintenance:
   - Store and maintain appropriate spill cleanup materials in the mobile fueling vehicle. Ensure that employees are familiar with proper spill control and cleanup procedures.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control.

1. Use absorbent pillows or similar absorbent materials in or around storm drain inlets on the property to filter oily runoff. These require frequent maintenance and close attention, but can be useful in short-term situations. Used absorbent materials containing oil must be picked up by a qualified disposal contractor.
2. A catch basin insert configured for oil removal may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this when evaluating your options. The oil absorbent filter media must retain absorbed oil during future storm events. See Chapter 6.6.1 of the King County Surface Water Design Manual for more information regarding which filter media provide acceptable oil retention.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Vehicle and Equipment Repair and Maintenance

This activity applies if you repair and maintain vehicles and other equipment. It also applies to mobile vehicle maintenance operations, such as at construction sites. This common activity can lead to immediate stormwater contamination if repairs and maintenance are not done in a controlled manner. This activity can contaminate stormwater runoff with toxic hydrocarbons, other toxic organic compounds, oil and grease, harmful pH, and metals.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in engine and vehicle repair and maintenance:

1. Inspect vehicles and equipment for leaks. Use drip pans or absorbent material to capture leaking fluids. Clean up any spilled fluids immediately.

2. Keep waste oil, antifreeze, and other fluids properly covered and contained. See Activity Sheet A-3, "Storage of Liquid Materials in Portable Containers."

3. Store batteries upright in a secure, contained, covered place. Don't store batteries outside on the ground. Check to ensure batteries are not damaged or leaking. Keep battery acid neutralizing materials, such as baking soda, available near the storage area.

4. Call the Business Waste Line at 206-296-3976 or see http://www.govlink.org/hazwaste/business/index.cfm for information on the proper disposal and recycling of vehicle fluids, filters, and batteries.

5. Sweep paved work areas as needed to clean up debris. Clean up vehicle fluids with rags or other absorbent material immediately. Never wash paved areas to a storm drain or the street.

6. Regular work at a stationary business location should be done indoors. If temporary work is being conducted outside, use a tarp, ground cloth, or drip pans beneath the vehicle or equipment to capture all spills and drips. The collected material must be disposed of, reused, or recycled properly.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

7 Ensure employees are trained in the proper handling, storage, and disposal of vehicle and equipment fluids.

8 Store and maintain appropriate spill cleanup materials in a location known to all. Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures. Call the Business Waste Line at 206-296-3976 for information on the proper disposal of used absorbent materials.

9 Industrial laundry services are available that provide reusable cloth shop rags to clean up small drips and spills. A list of industrial laundry services that manage shops rags is available online at http://www.govlink.org/hazwaste/business/wastedirectory/wasteindex.cfm#S. Do not wash cloth rags at home or at a regular commercial laundry.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum requirements do not provide adequate source control.

1 Absorbent material such as pillows or booms can be used around storm drains or in catch basins to absorb oil and other substances. Used absorbent materials containing oil or other engine fluids must be disposed of in the appropriate manner. Oil recycling vendors or other vendors that pick up used vehicle fluids can assist in the appropriate disposal of these materials.

2 A catch basin insert, configured for oil removal, may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this requirement when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

Concrete and Asphalt Production at Stationary Sites

This activity applies if you mix raw materials on-site to produce concrete or asphalt. It also applies to subsequent activities such as pouring concrete structures, and making other concrete and asphalt products. Mishandling during concrete production can introduce suspended solids and metals to stormwater runoff and cause pH alterations in receiving waters. Asphalt production can introduce toxic hydrocarbons, other toxic organic compounds, oils and greases, and metals to stormwater runoff. Improper equipment washing may cause concrete and asphalt waste materials and liquids to be washed to storm drainage systems. Mobile concrete pouring and asphalt applications are covered under Activity Sheet A-20. This activity sheet does not cover concrete production at mining or sand and gravel sites covered by a King County Clearing and Grading Permit or National Pollution Discharge Elimination System (NPDES) Sand and Gravel Permit issued by the Washington State Department of Ecology. However, if the BMPs conditioned in these permits do not adequately protect stormwater, surface, or ground water quality, more stringent BMPs may be required under King County Code 9.12.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in concrete and asphalt mixing and production:

1

Discharge all process water from production, pouring, and equipment cleaning activities to a sump, process water treatment or recycling system, or sanitary sewer system. Never wash contaminated water to the storm drainage system. Discharge to the sanitary sewer system will require approval from the local sewer district/agency.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

2

Contain the production and pouring area to prevent stormwater runon so pollutants are not washed to stormwater or natural drainage systems.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment

and run-on prevention.

3. Prevent cement dust from settling onto surfaces where it will contaminate stormwater runoff. Sweep up any settled dust. Never hose down cement dust to the storm drainage system.

4. Required Routine Maintenance:

   Sweep the production and pouring area as needed if it is paved. Collect loose chunks of aggregate and raw material particles for recycling or proper disposal. Do not hose down the area to a storm drain.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

1. Use an oil control device in the catch basins to treat stormwater runoff. See the King County Surface Water Design Manual and BMP Info Sheets 9 and 10 in Chapter 5 for further information.

2. Pave the mixing, production, and/or pouring area(s) with a slope that drains to a central collection area. For concrete production and pouring activities, a sump drain should not be provided because it would be quickly clogged with hardened concrete. It would be effective to segregate the mixing and pouring area from the curing area because wastewater from curing applications could be collected by a drain. By sloping the pavement to a central location, loose chunks of concrete or asphalt aggregate can be collected more easily and recycled or disposed of properly.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Concrete and Asphalt Application at Temporary Sites

This activity applies if you apply asphalt and/or pour concrete for building construction, road construction, sidewalk, curb and gutter repairs and construction, sealing of driveways and roofs, and other applications. These activities are typically done on a temporary site-to-site basis where permanent BMP measures do not apply. Asphalt application can contribute high concentrations of toxic hydrocarbons, other toxic organic compounds, oils and greases, and metals to stormwater runoff. Concrete pouring can contribute suspended solids and metals to stormwater runoff and cause detrimental pH changes in receiving waters.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in concrete pouring and asphalt application at temporary sites:

1. Use drip pans, ground cloths, heavy cardboard or plywood wherever concrete, asphalt, and asphalt emulsion chunks and drips are likely to fall unintentionally, such as beneath extraction points from mixing equipment.

2. Provide storm drain covers, inlet protection or similarly effective containment devices over all nearby drains at the beginning of the workday. All accumulations of runoff, aggregate chunks, and other solids must be collected for proper disposal at the end of the workday (or more frequently) prior to removing the containment or cover device(s). Drain covers and other containment devices are commercially available to keep runoff out of the storm drainage system.

3. Contain and collect the slurry from exposed aggregate washing, where the top layer of unhardened concrete is hosed or scraped off to leave an exposed aggregate or rough finish. Never wash or allow the discharge of concrete slurry to a storm drain, ditch, roadway shoulder or gutter. Use a storm drain cover, inlet protection or other containment device, such as a hand-dug sump where slurry can be directed to and contained. (See item 4 below). All collected runoff must be properly disposed of.

4

Concrete and concrete pumping vehicles shall not discharge any concrete, slurry, or rinse water into street gutters, storm drains, or drainage ditches or onto the paved surface of a roadway or driveway.

Designate a wash-out area onsite where application and mixing equipment cleaning will be conducted. This washout area can also be used as an area for rinse water control. It is also acceptable to dispose of rinse water and slurry in a hole in the ground large enough to contain the slurry and rinse material. Commercial products and services are also available for concrete, slurry, and rinse water containment and disposal.

5

Routine Maintenance:

Sweep the pouring area at the end of each day or more frequently if needed. Collect loose aggregate chunks and dust. Do not hose down the area to a storm drain.

Additional BMPs

The following BMPs are optional, unless the above minimum required BMPs do not provide adequate source control:

1

If possible, portable asphalt mixing equipment should be covered by an awning or other simple structure while raining to avoid contact with rainfall.

2

A catch basin insert configured for sediment removal may remove some of the pollutants in runoff from this activity. This is especially useful if the activity must proceed on rainy days. Catch basin inserts require frequent maintenance to be effective, so consider this when evaluating your options. Concrete work of all types tends to cause elevated pH in runoff, and it must be monitored and neutralized before off site discharge of the runoff occurs.

☞ See BMP Info Sheet 10 in Chapter 4 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Stormwater Services Section at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Manufacturing and Post-Processing of Metal Products

This broad activity group applies to mills, foundries, and fabricators that manufacture and/or post-process metal products at stationary sites. It does not apply to temporary activities such as welding or pipe cutting that are conducted in the field. A variety of activities such as machining, grinding, soldering, cutting, welding, quenching, cooling, and rinsing that may take place are covered under these BMPs. Wastewater from these operations may be contaminated with toxic organic compounds, metals, oils and greases, abnormal pH, and suspended solids. Stormwater runoff from areas where these activities occur can be contaminated with these same pollutants. Businesses may be required to apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit from the Washington State Department of Ecology. Painting, finishing, and coating of metal products is covered under Activity Sheet A-22.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in manufacturing or processing metal products:

1 Discharge process wastewater from this activity to a sanitary sewer, holding tank, or process treatment system.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

2 Required Routine Maintenance:

- Sweep the work and pouring area at least daily to collect metal fragments and debris and prevent stormwater contamination. Do not hose down the area to the storm drainage system.

Additional BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control.

1

Cover the activity area(s) to prevent precipitation from contacting the area, and to reduce the amount of runoff that has to be detained or treated.

☞ See BMP Info Sheet 3 in Chapter 5 for information on covering options.

2

Use a catch basin insert configured to remove sediment to capture stray metal particles in runoff. Catch basin inserts require frequent maintenance to be effective. Carefully consider this when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for information on inserts.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Painting, Finishing, and Coating of Vehicles, Products, and Equipment

This activity applies if you apply primers, paints, finishes, and coatings to vehicles, furniture, manufactured products, and other objects. This includes car detailing work. It also includes preparation work such as sanding and blasting. BMPs for painting of buildings are given in this manual under "Building Repair, Remodeling, and Construction." BMPs for painting and finishing of boats and other marine objects are described under "Boat Building, Maintenance and Repair." Stormwater runoff from work areas where this activity occurs may be contaminated with toxic hydrocarbons and other organic compounds, oils and greases, metals, and suspended solids.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are involved in painting, finishing, or coating of vehicles, products, and equipment:

1. Enclose all work while using a spray gun or conducting sand blasting (unless the work is too large) according to the Puget Sound Clean Air Agency requirements. Approved paint booths must be in place prior to any vehicle painting. All filters from paint booths must be handled as required under Dangerous and Hazardous Waste Regulations.

2. Use ground cloths or other methods to collect dust and debris from sanding operations. Do not hose down the area to the storm drainage system.

3. For outside work, use ground cloths and/or drip pans in locations where paints, finishes, and other liquid materials are mixed, carried, and applied.

4. Required Routine Maintenance:

   - Store and maintain appropriate spill cleanup materials in a location known to all. Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

- Train employees in careful and appropriate application of paints, finishes, and coatings to reduce misuse and over spray.
- Sweep the area at the end of each day at a minimum. Do not hose down the area to a storm drain.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system you will be asked to take additional measures to correct the continued pollution discharges.

Wood Treatment and Preserving

This activity applies if you are involved in wood treatment operations that are performed outdoors or include storage of freshly treated wood materials outdoors. It includes permanent sites as well as temporary (or mobile) sites. Some of these operations are unique to large-scale commercial wood preserving and therefore require a specific set of BMPs. Because materials used in wood treatment and preserving are extremely toxic, this activity is segregated from similar activities discussed elsewhere in this manual. Stormwater runoff from wood treatment and preserving activities may be contaminated with toxic hydrocarbons and other organic compounds, metals, oils and greases, and suspended solids. Large scale commercial operations are required to have a stormwater National Pollutant Discharge Elimination System (NPDES) permit from the Washington State Department of Ecology.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in wood treatment and preserving:

1. Use ground cloths or drip pans to collect drips and spills.

2. Store portable containers of wood preservative compounds indoors or in a covered location with appropriate secondary containment when not in use.

   ☞ See Activity Sheet A-3 “Storage of Liquid Materials in Portable Containers.”

3. Hold dipped lumber over dip tanks until dripping ceases (if applicable).

4. Store treated lumber in a covered and paved area for at least 24 hours following treatment (longer during cold periods) so that precipitation does not come into contact with the treated products until they are fully dry. Contain the storage area to restrict stormwater from running into the covered area.

Contain or berm the wood treatment equipment and work areas to prevent stormwater from entering the area and carrying pollutants away.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment and runon prevention.

Required Routine Maintenance:

- Cover outdoor dip tanks when not in use.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Commercial Composting

This activity applies to you if you are engaged in receiving and composting wastes as a commercial service. This typically refers to businesses that have numerous compost piles that require large open areas to break down wastes. Composting can contribute nutrients, coliform bacteria, and suspended solids to stormwater runoff. When stormwater is allowed to contact any active composting area, it becomes leachate. Leachate must be separated from stormwater runoff. All commercial-composting operations must satisfy Seattle-King County Health Department requirements. In addition, the Department of Ecology requires a National Pollution Discharge Elimination System (NPDES) permit for commercial composting operations. The BMPs listed below are intended to complement other regulatory requirements.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in composting wastes:

1. Ensure that wastes do not contain dangerous materials that belong in a hazardous waste facility, or solid wastes that do not break down by composting. Employees must be trained to screen these materials in incoming wastes.

2. Locate composting areas on impervious surfaces.

3. Drain all leachate from composting operations to a sanitary sewer, holding tank, or on-site treatment system.

   ☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options. Because biochemical oxygen demand (BOD) or fecal coliform bacteria are significant pollutants in compost runoff, drainage must be routed to a sanitary sewer or holding tank, regardless of whether a process treatment system is used.

4. Contain the compost pile leachate. Containment of leachate will be best

accomplished with a dike or berm, or with intercepting drains placed on the down slope side of the compost area.

☞ See BMP Info Sheet 5 in Chapter 5 for information on containment. See the King County Health Code for full compliance.

Required Routine Maintenance:

- Clean up debris from yard areas as needed to prevent stormwater contamination.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

A catch basin insert, configured for debris and sediment removal, may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this when considering your options.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Chemical Applications – Other Than Landscaping

This activity applies if you use pesticides, herbicides or other chemicals for such purposes as removing moss from rooftops, killing nuisance rodents, and using fungicides to preserve patio decks. The over application of pesticides in these situations can result in stormwater contamination in much the same way as in landscaping activities. The pollutants of concern for stormwater management are toxic organic pesticide compounds, oils, and metals. Businesses/agencies engaged in this activity must comply with Seattle-King County Department of Public Health structural pesticide applicator regulations. The BMPs listed below are intended to complement other regulations. Application of pesticides for landscaping purposes must follow the BMPs discussed under Activity Sheet A-26, "Landscaping Activities."

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you apply chemicals for non-landscaping purposes:

1. Avoid excessive application. Follow manufacturers' application guidelines and label directions. Chemicals must never be applied outside if it is raining.

2. Use the smallest amount of chemicals necessary to accomplish the job.

3. When applying chemicals on rooftops for moss control or other chemical treatment, downspouts must either be blocked or disconnected if the downspouts are directly connected to the storm drainage conveyance system in the roadway or to a flow control or water quality facility. The wash/waste water must be directed to pervious areas such as landscaping or gravel for infiltration or collected and disposed of to the sanitary sewer, or taken off site for appropriate disposal. To check if roof downspouts are connected to street drains, verify if downspouts go directly into the ground, rather than splash blocks. If the downspouts are tied directly into the ground, look in the closest catch basin on the roadway to see if a small (usually a 4 inch PVC) is connected or discharging into the catch basin which indicates the downspouts directly discharge to the roadway drainage system.

4. Clean up any spilled chemicals immediately. Do not hose down to a storm drain or conveyance ditch.

5. Do not spray pesticides within 100 feet of open waters, including wetlands, ponds, and streams, unless approved by local jurisdiction.

6. Unblock the roof drains or reconnect downspouts when the chemical application is finished.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

1. Manual pest control strategies such as physically scraping moss from rooftops, using high-pressure sprayers to remove moss, and using rodent traps should be attempted.

2. Integrated pest management (IPM), a comprehensive approach to the use of pesticides which minimizes pesticide application and stresses selection of proper products and tailored application rates, is the most effective BMP measure that can be taken. IPM is applicable to businesses that frequently apply pesticides.

☞ See BMP Info Sheet 6 in Chapter 5 for information on IPM.

3. Educate employees about the pollution they can cause if they do not follow simple rules of application.

4. Select the least toxic chemical application that can accomplish the job.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Landscaping Activities and Vegetation Management

This broad activity encompasses all aspects of landscaping and vegetation management, from small-scale yard maintenance to large-scale commercial landscaping businesses and vegetation management programs. It includes vegetation removal, herbicide and insecticide application, fertilizer application, watering, and other gardening and lawn care practices. Stormwater runoff from areas that have been subject to pesticide or fertilizer application or extensive clearing, grading or cutting may be contaminated with pesticides and other toxic organic compounds, metals, oils, suspended solids, nutrients from fertilizer, and coliform bacteria, and may cause biochemical oxygen demand.

While not required, consider using the Integrated Pest Management (IPM) approach for pest control. IPM is an approach that uses an array of methods to manage pest damage with the least possible hazard to people and the environment. IPM uses a combination of biological, cultural, and physical practices that can significantly reduce or eliminate the use of pesticides.

See Activity Sheets A-5, "Storage of Pesticides and Fertilizers" and A-3, "Storage of Liquid Materials in Portable Containers." Landscaping activities related to golf courses should refer to King County's Golf Course BMP Manual (see Chapter 6 of this manual for more information).
Note: The term pesticide includes insecticides, herbicides, fungicides, rodenticides, etc.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in landscaping activities:

1. Do not apply any pesticides directly to surface waters, unless the application is approved and permitted by the Washington State Department of Ecology.

2. Mix pesticides so that spilled material will not be washed to surface waters, the storm drainage system, or onto the ground. Clean up any spills immediately. Ensure employees are trained on the proper use of pesticides and in pesticide application techniques to prevent pollution. Washington pesticide law requires most businesses that commercially apply pesticides to the property of another to be licensed as a Commercial Applicator.

3. Follow manufacturers' recommendations and label directions. Pesticides and fertilizers must never be applied if it is raining or about to rain. Do not apply pesticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams. This also can include stormwater conveyance ditches. Remove weeds/vegetation in stormwater ditches by hand or other

mechanical means. Chemicals should be used as a last resort.

4 Dispose of grass clippings, leaves, branches, sticks, or other collected vegetation, by recycling, composting, or burning (if allowed). Do not dispose of collected vegetation into storm drainage systems, conveyance ditches, stormwater ponds, or surface water.

5 Use mulch or other erosion control measures when soils are exposed for more than one week during the dry season or two days during the rainy season.

6 Implement water conservation practices to assure sprinkler systems do not "overspray" vegetated areas and discharge to hard surfaces such as sidewalks, driveways, and parking lots. Adjust sprinkler heads accordingly. Minimize water use so runoff does not occur or enter storm drainage systems. Use approaches to reduce water use such as those described in the Natural Yardcare program.
http://your.kingcounty.gov/solidwaste/naturalyardcare/watering.asp

The King County Noxious Weed Control Program provides best management practices for the removal of typical noxious weeds such as blackberry and purple loosestrife. Call 206-296-0290 or see http://www.kingcounty.gov/environment/animalsandplants/noxious-weeds/weed-control-practices.aspx for more information.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

1 Integrated pest management (IPM), a comprehensive approach to the use of pesticides is the most effective BMP measure that can be taken for herbicide, insecticide, and fungicide use.

☞ See BMP Info Sheet 6 in Chapter 5 for information on IPM.

2 Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface. Determine the proper fertilizer application for the types of soil and vegetation involved. Soil should be tested for the correct fertilizer usage.

3 Use mechanical methods of vegetation removal rather than applying herbicides.

An effective measure that can be taken to reduce pesticide use, excessive watering, and removal of dead vegetation involves careful soil mixing and layering prior to planting. A topsoil mix or composted organic material should be rototilled into the soil to create a transition layer that encourages deeper root systems and drought-resistant plants. This practice can improve the health of planted vegetation, resulting in better disease resistance and reduced watering requirements.

Use native plants in landscaping. Native plants do not require extensive fertilizer or pesticide applications.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Clearing and Grading of Land for Small Construction Projects

This activity applies if you clear, grade or prepare land for projects. Stormwater runoff from cleared and graded sites can be loaded with suspended sediments and attached pollutants such as oils and greases, toxic hydrocarbon and herbicide compounds, metals, and nutrients. Control of this runoff at the source can prevent large pollutant loadings from entering and degrading receiving waters. Prior to clearing, grading, and preparation activities for construction sites greater than 2,000 square feet, the King County Department of Development and Environmental Services (DDES) must be contacted. You may need to follow the procedures for construction site erosion and sediment control outlined in the King County Surface Water Design Manual, Appendix D.

King County DDES coordinates the clearing, grading, and erosion control requirements on individual sites. The King County Surface Water Design Manual has requirements for erosion and sediment control measures. Appendix D (Erosion and Sediment Control Standards) outlines requirements that all sites must implement. The King County Surface Water Design Manual Appendix C (Small Project Drainage Requirements) addresses small project developments. Even if your site does not require a permit, erosion control measures are still required to prevent turbid water from entering drainage systems or surface waters. King County uses the authority of K.C.C. 9.12 and this manual to develop erosion control requirements for those activities not covered by the King County Surface Water Design Manual.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Stormwater Services Section at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system you will be asked to take additional measures to correct the continued pollution discharges.

Demolition of Buildings

This activity applies to the removal of existing buildings by controlled explosions, wrecking balls, or manual methods, and subsequent clearing of the rubble. Demolition of buildings can introduce a variety of pollutants into stormwater runoff, primarily suspended solids, but also toxic organic compounds and metals. Broken concrete can elevate the pH of stormwater. This activity can also produce air borne pollutants that must be controlled to avoid surface water contamination.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in building demolition:

1. Spray water throughout the site to help control fine materials and dust. The amount of water must be actively controlled and monitored to eliminate contaminated runoff from leaving the site. Other approved dust suppressants are available. Avoid excessive and repeated applications of dust suppressant chemicals.

2. Place filter fabric, inlet control measures or a similarly effective device in or around all nearby drains to prevent particles and solids from entering the storm drainage system. Filtering devices shall be placed at the beginning of the workday and the accumulated materials collected and disposed of properly before removing the devices at the end of the workday. Filter fabric and other filter devices are commercially available.

3. Sweep surrounding street gutters, sidewalks, driveways, and other paved surfaces as needed to collect loose debris and garbage. Properly dispose of collected debris and garbage. Do not hose down the area to a storm drain.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

A catch basin insert configured for sediment and debris removal may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Building Repair, Remodeling, and Construction

This activity applies if you are engaged in common on-site labor activities associated with construction of buildings and other structures, remodeling of existing buildings and houses, painting of building exteriors, and general exterior building repair work. Stormwater runoff from building repair, remodeling, and construction work can be contaminated with toxic hydrocarbons in solvents, other toxic organic compounds, suspended solids, metals, abnormal pH, and oils and greases. Concrete pouring is covered under Activity Sheet A-20,"Concrete and Asphalt Application at Temporary Sites."

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in building repair, remodeling, and construction:

1. Do not dump any substance, wash water or liquid waste on the pavement, the ground, or toward a storm drain or drainage ditch.

2. Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work and properly dispose of collected material daily.

3. Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning. Dispose of all wash water from tool cleaning to the sanitary sewer system. Never dispose of wash water to on-site yard drains or street drains.

4. Never dispose of any wash water to a storm drain. Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

☞ See BMP Info sheet 2 in Chapter 5 for information on disposal options.

5

Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the workday, and accumulated dirty runoff and solids must be collected and disposed of in an appropriate manner before removing the containment device(s) at the end of the workday. For example, a combination of a wet vacuum and brooms and dustpans could be used to collect accumulations of dirty runoff. Drain covers, filter fabric, and other containment devices are commercially available if effective runoff control cannot otherwise be provided.

If you need to dewater an excavation site, you must filter the water before discharging to a catch basin or discharging off-site. You should direct the water through sediment filters or traps or use an equivalent method. The pH of water from dewatering activities must be monitored. If the pH is not neutral (7), discharge must not occur to a drainage system until the water is neutralized through an approved method. Dewatering must also be assessed for other pollutants that may not be removed by simple filtering of stormwater. If other pollutants are present, discharging the water to surface or stormwater systems may not be allowed. See Appendix D of the King County Surface Water Design Manual, "Erosion and Sediment Control Standards."

6

Routine Maintenance:

- Store and maintain appropriate spill cleanup materials in a location known to all. Ensure that employees are familiar with proper spill cleanup procedures.
- Sweep paved areas as needed and collect loose particles for proper disposal. Wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.
- Store toxic material under cover during precipitation events and when not in use (such as overnight). A cover would include tarps or other temporary cover materials.

☞ See Activity Sheet 3, "Storage of Liquid Materials Portable Containers."

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

Recycle or reuse left over materials.

A catch basin insert configured for debris and sediment removal may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Boat Building, Maintenance, and Repair

This activity group applies to mobile operations, onshore repair facilities, and on-water fueling and repair operations that are not covered in other activity categories. The variety of practices grouped into this activity can collectively contaminate stormwater and surface water with toxic organic compounds, oils and greases, metals, nutrients, suspended solids, and abnormal pH. All boatyards are required to be covered under a National Pollutant Discharge Elimination System (NPDES) general or individual permit from the Washington State Department of Ecology. The BMPs discussed below are similar to those listed in the NPDES Permit and apply to areas not covered by a NPDES permit.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in boat building, mooring, maintenance, and repair; and you are not covered by a NPDES Permit for Boat Building and Repair Facilities:

1. Move maintenance and repair activities onshore if possible. This action reduces some of the potential for direct pollution of water bodies.

2. Shelter any blasting and spray painting activities by hanging wind blocking tarps to prevent dust and overspray from escaping.

3. Use ground cloths or drip pans for collection of drips and spills in painting, maintenance, repair, and finishing activities.

4. Collect bilge and ballast water that has an oily sheen on the surface. Properly dispose of it rather than dumping it in surface waters or on land.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options. Several companies are available for bilge pump-out services. The problem can possibly be avoided if oil-absorbent pads are used to capture the oil in the bilge water before pumping. If pads are used, they must be recycled or properly disposed of.

5. To avoid spilling directly in surface water bodies, perform paint and solvent mixing, fuel mixing, and similar handling of liquids on-shore. Clean up spills immediately. Do not wash spills to a storm drain or surface waters.

6. Collect and properly dispose of wash water from washing painted boat hulls. Consider taking the boat to a local boat yard that is equipped to collect and treat the wash water. Never dispose of wash water containing soap or other chemicals to storm drains or surface waters. It is acceptable to wash a boat using only water.

7. Required Routine Maintenance:

- Store and maintain appropriate spill cleanup materials in a location known to all. Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
- Sweep maintenance yard areas, docks and boat ramps as needed to collect sandblasting material, paint chips, oils, and other loose debris. Properly dispose of these collected materials. Do not hose down the area to the water or to a storm drain.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

1. Boat construction and structural repair activities should be covered.

2. A tarp should be placed above the water surface underneath the work area on boats or docks to collect drips, spills, paint chips, and loose solids when work is performed over water.

3. All used oil and oil filters should be recycled. Most marinas now offer used oil recycling services.

4. No soaps or detergents of any kind should be used to wash the topsides or hulls of boats where the wash water will enter surface waters.

5. Use sanders that have dust containment bags.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Vehicle and Equipment Parking and Storage

This activity applies to all types of parking lots (commercial, public, and private), retail store parking lots, fleet vehicle lots and yards (including rent-a-car lots and car dealerships), industrial areas, equipment sale and rental lots, and parking lot driveways. Stormwater runoff from these sites can be contaminated with toxic hydrocarbons and other organic compounds, oils and greases, metals, nutrients, and suspended solids.

MINIMUM REQUIRED ROUTINE MAINTENANCE

The following BMPs, or equivalent measures, methods, or practices are required if you have parking lots and driveways:

1. Sweep parking lots, storage areas, and driveways as needed to collect dirt, waste, and debris. Do not hose down the area to the storm drainage system.

2. If washing/pressure washing of the parking lot occurs, the wash water must be collected and discharged to a sanitary sewer or other treatment system. There are services that will clean parking lots and collect water for off-site disposal. Never drain washwater to the storm drainage system.

☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

3. Gravel and dirt lots may require additional BMPs to prevent sediment laden water from leaving your site. Vehicles can track dirt out of parking and storage areas onto public roadways. Basic sediment controls as outlined in Appendix D (“Erosion and Sediment Control Standards”) of the King County Surface Water Design Manual must be installed if other BMPs do not adequately control sediment laden water from entering off site storm water conveyance systems or surface water. Wheel wash facilities may need to be considered if track out of mud becomes a problem. See Activity Sheet A-41, “Wheel Wash and Tire Bath Operations.”

ADDITIONAL BMPs

The following BMPs are optional, unless the above minimum required BMPs do not provide adequate source control.

1. Encourage employees to carpool or use public transit through incentives.

2. Encourage customers to use public transit by rewarding valid transit pass holders with discounts.

3. A catch basin insert configured for sediment and also oil removal may remove some of the pollutants in runoff from this activity. Catch basin inserts may require frequent maintenance to be effective. Carefully consider this when evaluating your options.

4. Clean up oil and antifreeze spills with absorbent materials.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Sidewalk Maintenance

This activity applies if you have sidewalks. Litter accumulation on sidewalks can contribute suspended solids to stormwater runoff; runoff from sidewalks crossing driveways may also have hydrocarbon, oil and grease, and metal contaminants. If herbicides are used on sidewalks, toxic pesticide compounds, oils, and metals may also be introduced into stormwater. If crack sealants or surface coatings are applied, toxic hydrocarbons, oils and greases, and metals may be contributed to stormwater runoff. Sidewalks and driveways are important areas to target for stormwater pollution control because they typically drain directly to stormwater conveyance facilities. Note that BMPs for driveways associated with parking lots are described under Activity Sheet 31, "Vehicle and Equipment Parking and Storage."

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you are engaged in sidewalk maintenance:

1. Sweep sidewalks as needed to collect loose dirt and debris rather than pushing it into the street or gutter or hosing it down. Collected materials must be disposed of as solid waste.

2. Conduct spot stain removal instead of washing the entire sidewalk. Do not use soaps and detergents to wash down sidewalks.

3. If pressure washing of sidewalks is needed, and soaps or other cleaners are used, the wash water must be collected and disposed of to the sanitary sewer or taken off site for appropriate disposal. If only water is used, filtering devices at catch basins must be used to collect all solids and debris.

ADDITIONAL BMPs

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

1 Use deicing salts and sands only when snow or ice is present (not as a preventive measure) and apply sparingly. Shoveling of snow is always preferred to dumping excessive amounts of deicing materials in an effort to avoid shoveling. If deicing salts are used, the residue and remaining granules must be swept up when the snow and ice have melted, and reused or disposed of in your garbage.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Swimming Pool and Spa Cleaning and Maintenance

This activity applies to all municipal swimming pools, commercially owned swimming pools, and commercially owned spas, including Health Department-regulated facilities (general and limited use). Pools and spas at hotels, motels, apartment and condominium complexes, and other private locations, other than single family residences, are also covered here. Older pools and spas must comply with these provisions as well. Improper drainage of these pools can lead to nutrients, suspended solids, chlorine, metals, and abnormal pH entering the surface water environment. Chemicals used in pool and spa maintenance can also contaminate stormwater if they are not stored properly.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required of all businesses, municipalities, and multi-family residential complexes engaged in swimming pool and spa cleaning and maintenance:

1 Dechlorinate pool and spa water to 0.10 ppm or less and adjust to pH neutral if it is to be discharged to the ground. Neutralizing chemicals are available for this. Letting the pool or spa "sit" with no neutralizing chemicals may reduce chlorine levels; the facility should not be used during this period. Test kits should be used to determine disinfectant concentrations. The water must not cross property lines, and a satisfactory means for distributing the water to the ground must be used so there is no runoff or erosive flows from the water discharge. Pool water that has been treated with copper based algaecides may not be discharged to the ground.

2 Regardless of the sanitizing agent used (chlorine, bromine, or ozone), all pool and spa drainage must go to a sanitary sewer or water treatment system if it cannot be dechlorinated sufficiently. If a sanitary sewer is available, all Health Department-regulated facilities must be connected to the sanitary sewer for draining and backwash. Prior to draining, the local sewer authority and the King County Wastewater Treatment Division Industrial Waste Program may need to be notified, as there are concerns with the volume of discharge and disinfectant levels. If the

pool or spa does not have a drain to accommodate this, water will have to be pumped or drained to a sanitary sewer or water treatment system inflow pipe connection. If a sanitary sewer is not available, do not discharge pool or spa water to a septic system, as it may cause the system to fail. Alternative draining and backwash procedures must be approved by the Seattle-King County Department of Public Health in this situation.

3

Diatomaceous earth (commonly used as a filtering agent in pools) cannot be discharged to surface waters, storm drainage systems, septic systems, or on the ground. This material must be disposed of as solid waste.

4

Never discharge backwash from filter systems to surface waters or storm drainage systems.

ADDITIONAL BMPs

The following BMPs are optional, unless the above minimum required BMPs do not provide adequate source control:

1

Managers of pools and spas located in sensitive areas or adjacent to shorelines should check with the King County Department of Development and Environmental Services or the appropriate local building department to determine if other code requirements apply.

2

Provide drip pans or buckets beneath drain pipe connections to catch leaks. This is especially important if the pool or spa water has not been dechlorinated and is being pumped through piping to an appropriate discharge location.

3

Hire a professional pool-draining service to collect all pool water for off-site disposal.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Stormwater Services Section at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Keeping Animals in Controlled Areas

This activity applies to outside kennels, fenced pens, and other animal management areas that do not involve livestock. It includes all types of animal maintenance practices other than keeping livestock in stables, fields, and pastures. This activity does not cover sheep, pigs, horses, cows, goats, and other hoofed animals. Stormwater runoff from cage areas, pens, and yards can contain coliform bacteria, nutrients, and suspended solids. See Activity Sheet A-35 for keeping livestock in stables, pens, pastures, or fields.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in management of animals other than livestock:

1. If animals are kept in unpaved and uncovered areas, the ground must either have vegetative cover or some other type of ground cover such as mulch.

2. If animals are not leashed or in cages, the area where animals are kept must be surrounded by a fence or other means that prevents animals from moving away from the controlled area where BMPs are used.

3. Do not allow wash water to be discharged to storm drains or surface waters.

4. Required Routine Maintenance:

   - Sweep and clean animal keeping areas as needed to collect and dispose of droppings, uneaten food, and other stray particles. Do not hose down the area to the storm drainage system.

ADDITIONAL BMPs

The following BMPs are optional, unless the above minimum required BMPs do not provide adequate source control:

1 Septic systems designed for kennels are commercially available and are recommended if the above BMPs are not adequate.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Keeping Livestock in Stables, Pens, Pastures, or Fields

This activity applies to management of all types of livestock, including cows, horses, and other hoofed animals. Stormwater runoff from areas where livestock are kept may contain coliform bacteria and nutrients from manure. Suspended solids may be present in runoff from areas that are eroding due to overgrazing and stream bank trampling. The King County Code 21A.30 has specific requirements for livestock management. If livestock management BMPs are implemented in accordance with the livestock management code, additional BMPs will not be necessary unless the BMPs are not adequate to protect King County surface waters.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Logging and Log Yards

This activity covers logging activities that fall under the classification of Class IV general forest practices. These are situations where timber harvesting is done in the process of converting forest lands into other land uses, such as forest cutting for construction of homes. The primary concern with this logging activity in the context of stormwater pollution is the effect of timber cutting and understory clearing on erosion processes. Logging activities can introduce large concentrations of suspended solids and nutrients into stormwater runoff from bare soil and vegetation debris, as well as toxic organic compounds, oils and greases, and metals from vehicles and pesticides.

The King County Critical Areas Ordinance has requirements for logging near streams, wetlands, and other sensitive areas, and the King County Surface Water Design Manual has requirements for the clearing and grading of sites. Additionally, log yard operations are required to apply for coverage under the State Department of Ecology's National Pollution Discharge Elimination System (NPDES) baseline general permit. However, if BMPs required in the permit do not adequately prevent contaminated water discharges, additional BMPs will be required under the authority of KC Code 9.12 Water Quality.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Mining and Quarrying of Sand, Gravel, and Other Materials

This activity applies to surface excavation and on-site storage of sand, gravel, minerals, peat, clay, rock, and other materials that are mined in unincorporated King County. Mining operations have the potential to introduce a variety of pollutants into runoff, including nutrients, suspended solids, abnormal pH, and metals. Precipitation can easily erode cut slope faces and stockpiled materials, causing stormwater contamination problems.

The Washington State Department of Ecology and the State Department of Natural Resources regulates all mining activities in the state for the protection of water quality, and is the authority for enforcement of stormwater requirements related to water quality protection. Ecology has developed the National Pollutant Discharge Elimination System (NPDES) Sand and Gravel General Permit for Sand and Gravel Operations, Rock Quarries, and Similar Mining Facilities, Including Stockpiles of Mined Materials, Concrete Batch Operations, and Hot Mix Asphalt Operations.

The King County Department of Development and Environmental Services (DDES) also has the authority to regulate mining activities under the Stormwater Ordinance (KC Code 9.04 and 9.12) and the Clearing and Grading Ordinance (KC Code 16.82). However, if the DDES permit conditions do not adequately protect surface and groundwater, additional BMPs will be required under KC Code 9.12, Water Quality.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Well, Utility, Directional and Geotechnical Drilling

This activity applies to you if you drill water wells and utilities, environmental protection and monitoring wells, and geotechnical borings that use machinery in the drilling. It does not apply to the use of devices such as hand augers. Drilling activities have the potential to impact nearby surface water resources and underlying groundwater resources due to erosion, sedimentation, and leaching of contaminants. Stormwater runoff that comes in contact with cuttings and/or spoil piles can carry suspended solids to receiving waters. If cuttings or spoil piles contain material removed from a well or boring that was drilled into contaminated subsoils, stormwater can carry those same contaminants into receiving waters. Similarly, decontamination water and water used in the drilling operation can readily carry pollutants away from the drilling site if controls are not used. Ensure that proper permits are obtained for drilling activities, and for clearing and grading the access routes and the work site. Contact the King County Department of Development and Environmental Services for information.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods or practices are required if you are engaged in mechanical drilling of wells and geotechnical drilling and directional drilling for utilities:

1. Determine if environmentally sensitive areas (streams, wetlands, erosion hazards, and landslide hazards) exist at or within the area of influence of the work site. For horizontal directional drilling, take measures to ensure drilling fluids are not inadvertently entering nearby waterbodies or storm drainage systems.

2. Develop and implement methods of mitigating potential impacts to surrounding areas and/or the storm drainage system. The driller must be equipped to quickly respond to unusual conditions that may arise.

3. Locate and prepare access roadways such that the amount of excavation and the potential for erosion is minimized. See the King County Surface Water Design Manual for information on vehicle access preparation and maintenance and erosion control measures.

4. Contain accumulated water and sediment on-site and direct through a geotextile filtration system (or equivalent system) before discharging to the surrounding ground surface. Keep all sediment-laden water out of storm drains and surface waters. If sediment-laden water does escape from the immediate drilling location, block any nearby catch basins using fabric, inlet protections, sand bags, erosion fences, or other similar methods. Similarly, block flow into any nearby stream or wetland, and renew efforts to retain all sediment at the drilling location.

5. During wet weather divert any concentrated flows of water into the site using sandbags or check dams up-slope from the site.

6. Dispose of soil cuttings and accumulated sediment by appropriate methods. None of this material can be dumped in or near a wetland, stream, lake, or Puget Sound. If cuttings or other soils disturbed in the drilling process are to be temporarily stockpiled on-site, they must be covered and surrounded by a berm or filter device.

☞ See the Activity Sheet A-4, “Storage of Soil, Sand, Salt, and Other Erodible Materials”.

7. Stabilize exposed soils at the end of the job, using mulch or other erosion control measures.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Roof Vents and Fugitive Emissions

This activity applies if you have a process that vents emissions to the roof and/or if pollutants accumulate on your roof. Stormwater runoff from roofs of manufacturing and commercial buildings can be sources of pollutants if building vents and other air emission sources are not properly treated. Roof surfaces may accumulate hydrocarbons, solvents and other organic compounds, oils and greases, metals, and other toxins and suspended solids. Operations that are of special concern include spray-paint booths, paint-stripping operations, electroplating shops, galvanizing operations, cement kiln dust, and grease from food preparation. BMPs for paint processes are given in this manual under "Painting, Finishing, and Coating of Vehicles, Products, and Equipment."

The Puget Sound Clean Air Agency and/or the Washington State Department of Ecology (DOE) may regulate air pollution control measures. If your activities are regulated by either of these agencies, these requirements are supplemental. Additionally, if you are covered under a DOE National Pollution Discharge Elimination System (NPDES) Industrial Permit, and sampling for specific parameters is required, these BMPs may assist you in attaining your permit conditions. The DOE has final approval on meeting your NPDES permit requirements.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required if you have vents and/or air emissions:

1. Identify processes that are vented and may contribute pollutants to the roof. Testing runoff from roof drains may be helpful. Install appropriate source control measures such as air pollution control equipment (filters, scrubbers, and other treatment) and operational or process changes. Maintain air filters and pollution control equipment on a regular basis to prevent pollutant fallout on your roof. (If you smell odors from outside the building, the pollution control equipment may need maintenance or evaluation.)

2. If proper installation and maintenance of air pollution control equipment does not prevent pollutant fallout on your roof, additional treatment of the roof runoff may be necessary. Install/provide appropriate devices for roof runoff before it is discharged off site. This may include water quality treatment BMPs such as catch basin filters or structural stormwater treatment systems.

☞ See BMP Info Sheet 8 in Chapter 5 for information on water quality treatment BMPs.

3 Required Routine Maintenance:

- If maintenance of the roof requires application of chemicals, detergents, or other pollutant sources to remove accumulated emissions, a water collection devise that enables collection of wash water and associated solids must be used to prevent pollutants entering the natural and constructed storm drainage system and waterways. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff must be discharged to the sanitary sewer or be removed by a waste disposal company.

  ☞ See BMP Info Sheet 2 in Chapter 5 for information on disposal options.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Street Deicing Operations

This activity applies to you if you perform deicing and/or anti-icing operations on streets and highways to control ice and snow. Deicers commonly used on highways and streets include sand, calcium magnesium acetate (CMA), calcium chloride, magnesium chloride, sodium chloride, urea, and potassium acetate. These deicing and anti-icing compounds become pollutants when they are conveyed to storm drains or to surface water after application. Leaks and spills of these chemicals can also occur during handling and storage.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are perform deicing and/or anti-icing operations on streets and highways:

1. Select deicers and anti-icing materials that cause the least adverse environmental impact. Apply only as needed using minimum quantities. Always adhere to manufacturers and industry standards of use and application.

2. Where feasible and practicable use roadway deicers, such as sand, calcium chloride, magnesium acetate, potassium acetate, or similar materials, that cause less adverse environmental impact than urea, and sodium chloride.

3. Store and transfer de/anti-icing materials on an impervious containment area in a manner that ensures the material does not enter storm or natural drainage systems.

4. Sweep/clean up accumulated de/anti-icing materials and grit from roads as soon as possible after the road surface clears.

5. Minimize use in areas where runoff or spray from the roadway immediately enters sensitive areas such as fish-bearing streams.

ADDITIONAL BMPS

The following BMPs are optional unless the above minimum required BMPs do not provide adequate source control:

1. Intensify roadway cleaning in early spring to help remove particulates from road surfaces.

2. Include limits on toxic metals in the specifications for de/anti-icers.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Wheel Wash and Tire Bath Operations

If a site is not paved (e.g. gravel or compacted dirt), sediment and mud on vehicle tires can be transported onto the adjacent paved roads. If track out cannot be controlled by constructing a typical rocked construction entrance, a wheel wash system may need to be installed. See Appendix D, Chapter D.3.4.3 of the King County Surface Water Design Manual for a more detailed description of wheel wash operation requirements.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if are install a wheel wash or tire bath system to control sediment tracking onto adjacent roads:

1. The wheel wash area must be paved.
2. The water level in the wheel wash must be a minimum of 12 inches deep.
3. Spray nozzles may be needed in muddy conditions.
4. Wheel wash systems should be designed with a small grade change, e.g. 6 to 12 inches for a 10 foot wide ponding area, to allow sediment to collect in the low side of the ponding area to prevent re-suspension of solids.
5. Required Routine Maintenance:
   - A drain pipe with a 2 to 3 foot riser should be installed on the low side of the ponding area to allow for cleaning and refilling.

- The wheel wash should start out with fresh water each day.

ALTERNATIVE DESIGNS

1. Closed loop wheel wash systems are preferred with the wastewater discharged to a sanitary sewer.

2. Polymers for flocculation may be used in closed loop systems that discharge to the sanitary sewer. Contact your local sewer district and/or the King County Industrial Waste Program for authorization.

Note: See Appendix D of the Surface Water Design Manual for additional information or wheel wash systems.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Potable Water Line Flushing or Tank Maintenance

Line flushing and tank maintenance typically uses chemicals such as chlorine to disinfect drinking water systems. These chemicals are highly toxic to aquatic organisms. Line flushing and tank maintenance also creates suspended solids and metals that can degrade receiving waters.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you perform potable water line flushing or tank maintenance operations:

1. When flushing water lines or maintaining water tanks, filter water through sediment traps. If super chlorination or chemical treatment is used as part of flushing, the water must be discharged to the sanitary sewer (with applicable permits) or if a sanitary sewer is not available, the water must be collected and disposed of appropriately. Water cannot be discharged directly to stormwater systems unless treated and water quality standards are met. Discharging treated water to stormwater systems requires approval from the Washington State Department of Ecology and King County Water and Land Resources (KCWLRD). In some cases, water from line flushing and tank maintenance can be infiltrated in well-vegetated areas. In order to discharge to the MS4, water must be dechlorinated to 0.1 ppm and pH adjusted. Water must be volumetrically and velocity controlled. Contact KCWLRD for approval.

2. Tank cleaning water must go to the sanitary sewer or be infiltrated into the ground. No erosive flows can occur and water must not cross property lines. If tanks are simply drained, infiltration is an acceptable BMP.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Use of Soil Amendments on Construction Sites

The use of soil amendments (including cement treated base (CTB) and cement kiln dust (CKD)) on development sites must be approved by King County. The approval process is described in BMP Info Sheet #11, "Processing Requirements for Use of Soil Amendments on Construction Sites".

Note: Additional BMPs may be required to prevent adverse impacts to the public and/or the environment. It is the responsibility of the permit holder to remain in compliance with all other applicable local, state, and federal regulations.

Category of Action	Specific Action	CTB/CKD Best Management Practices
1. Materials Source Analysis	Solubility Testing & Specifications	A. If CKD is proposed, a chemical analysis of soluble pollutants of the product to be used will be provided to the Washington State Department of Ecology (DOE) and the King County Department of Development and Environmental Services (DDES) in advance of any product is applied. B. CTB/CKD mixing percentage is anticipated to be approximately 3 percent to 5 percent. C. A Geotechnical Engineer will establish the mixing percentage for the on-site soils. D. All treatment procedures shall be directed, monitored, and verified by a Geotechnical Engineer. E. Soil amendments will never occur in excess of the ability of the on-site equipment and resources to meet all BMP requirements specified herein.
2. Site Preparation	Runoff Collection System	A. Areas that are to be treated as shown on the plan are flagged off to prevent equipment from leaving treated area and going onto untreated areas, and to prevent unauthorized equipment from entering the treated area. B. Assessment of surface runoff collection points are noted. C. Cutoff trenches, collection sumps, and pumps are installed. D. Sealed storage tanks will be properly sized to contain all runoff from treated areas. E. Sealed storage tanks shall be set up and ready for use to treat contact water. F. An approved wheel wash will be constructed at the construction exit, typically a paved ramp sump that utilizes high-pressure washers. G. Copies of Treatment Plan, Approval, and Contingency Plan area are required to be located on site.
3. Lay-down Mixing Equipment		A. Exposure of CTB/CKD materials to air to be minimized. Delivery tankers shall be set up to place CTB/CKD directly into spreading trucks or equipment. B. CTB/CKD operations are only allowed during daylight hours. C. Tarps or dust bags will be used over the discharge truck hose at

Category of Action	Specific Action	CTB/CKD Best Management Practices
		unloading to prevent dust particles for becoming airborne. D. Unloading will occur at the lowest possible pump pressure. E. Unloading and mixing will be avoided on high wind days. PSAPCA Section 9.15 prohibits visible emissions of fugitive dust. F. CTB/CKD to be placed on ground by large wheeled spreaders designed for this purpose capable of measuring application. G. When spreading CTB/CKD it shall be kept 2-3 feet away from untreated areas boundaries to prevent the material from migration and contaminating outside the treatment zone. H. Treatment area will be kept damp/wet at all times CTB/CKD is being spread and mixed. Skirting around applicator/spreader and mixer is required to minimize CTB/CKD dust. I. CTB/CKD is to be roto-tilled into soil immediately after being spread onto soils and shall be done with a skirted tiller. J. Direct auguring machine that measures, spreads, and mixes CTB/CKD in one operation is preferred. K. Compaction will be complete within 2 hours after CTB/CKD application.
4. Site Management	Work Progress and Weather Conditions	A. Dust suppression by use of water trucks shall be used on areas where work on dry soil is performed and potential airborne contamination may occur. B. The volume of CTB/CKD allowed on site will be limited to the amount that can be used within a normal workday. Every effort will be made to forecast the daily delivery rate to match the daily on-site use rate. C. CTB/CKD will not be added to soils at a rate that exceeds the ability of on-site resources to immediately commence mixing and compacting. D. No work will occur in rain heavier than drizzle, or under drizzle that exceeds 6 hours duration, or under any rainfall which generates runoff from the areas being worked. E. Should the weather change to stop the application, remaining CTB/CKD will be covered and contained to prevent stormwater from entering storage containment, and causing runoff . F. All vehicles and equipment leaving the treatment area/site must be cleaned/washed to prevent CTB/CKD from leaving site. Wash water will be contained and treated as needed. G. CTB/CKD contact water in the wheel wash will be removed from the site via a vactor truck for transport to an approved off-site treatment or disposal facility in accordance with all federal, state, and local laws and regulations; or, if permitted, to the sanitary sewer system.
5. Surface Water Collection		A. Surface runoff from the treated areas is to be collected and stored in onsite sealed treatment tanks. B. A rigid schedule of TESC inspection, maintenance, and drainage controls will be maintained. C. Temporarily plugging and using detention facilities is not allowed as a storage practice. D. Runoff from compacted areas amended with CTB/CKD will be directed to previously sealed tank(s) until pH levels of water are verified to be within acceptable background water limits. No uncontrolled discharge or infiltration from the sealed tank(s) will be allowed. E. Drainage from areas amended with CTB/CKD within the past 72 hours will be prevented from co-mingling with any other project drainage.
6. Discharge	Applicable	A. Any and all discharges from this site will be in compliance with all

Category of Action	Specific Action	CTB/CKD Best Management Practices
Compliance	Regulations	applicable federal, state, and local laws and regulations pertaining to health and safety, water, air, waste, and wildlife, including the Federal Clean Water Act, Clean Air Act, and Endangered Species Act. Laboratory analysis of water is required prior to discharge to verify compliance. B. No infiltration is allowed to occur if pH readings are above 8.5 standard pH units, or below 6.5 standard pH units. C. A pH meter must be used to determine levels. pH meter is to be calibrated following proper QA/QC procedures. Fresh buffers are to be available to re-calibrate as needed. D. A log of turbidity and pH readings will be kept on site for inspection. E. All treatment of water must be directed, bench tested, monitored and verified by a qualified water quality specialist. F. Treated area water runoff shall not enter the permanent stormwater system. G. Stormwater drainage system within treatment area is to be cleaned out prior to use for regular water runoff conveyance from untreated areas. Water from cleanout is to be tested and treated following the approved treatment criteria.
7. Natural Treatment and Discharge		A. The preferred method of disposal of the treatment water will be discharge to the sanitary sewer, provided a permit is obtained to do so. B. If infiltration is proposed, the area of infiltration is to be identified, capacity confirmed, and a contingency discharge plan in place in the event facilities fail to infiltrate. C. For infiltration, pH limits shall be strictly adhered to. D. If a permit to discharge to the sanitary sewer is not obtained, a National Pollutant Discharge Elimination System (NPDES) discharge permit is required from DOE. The retention volume of the lined pond(s) will also be increased to ensure complete control of the retained volume. Monitoring, bench testing, and controlled discharge rates, with prior approval by DOE, would be needed prior to discharge to an approved off-site surface drainage system. Sites that currently have NPDES permits will need to amend permit prior to discharge to cover this action. County approval is still required. E. Per KCC 9.12, discharges into receiving drainage systems shall not have acid or basic pH levels. F. Sealed storage tanks shall be used to reduce turbidity and pH before discharge.
8. Chemical Treatment		A. Carbon dioxide sparging (dry ice pellets) may be used as the chemical treatment agent to reduce the water pH. B. Any means of water treatment to reduce pH will require an NPDES discharge permit from DOE. Permit would only be granted after bench testing performed by an independent qualified party. C. Active mixing will cease if the residual retention water volume falls below the ability to treat and properly dispose of contact storm water. D. Discharge would only occur after the approval of DOE, following bench testing and consultation with DOE. E. All materials for chemical treatment will be on site and property stored, during all phases of CTB/CKD treatment.
9. Water Quality	Monitoring	A. Turbidity and pH will be monitored on a twice-daily basis, prior to operations and immediately upon ceasing operations, and these measurements will be recorded. Monitoring will also occur immediately after any storm event of ½ inch in 24 hours, or water

Category of Action	Specific Action	CTB/CKD Best Management Practices
		migration to the retention pond(s), and the measurements recorded. If the pH approaches 8.0, monitoring frequency will increase. B. Turbidity and pH monitoring will occur in all treatment facilities, stormwater detention facilities, infiltration areas (if infiltration is used), and in all surface water areas adjacent to site where stormwater potentially discharges. Additional upstream surface water sites will be established to determine background levels of turbidity and pH. C. All water quality monitoring data will be conducted and evaluated by an independent, qualified party and conducted using professionally supportable test protocols and QA/QC procedures.
10. Reporting	Ecology and DDES	A. All water quality monitoring data will be included in weekly DDES TESC reports to DDES, and in weekly NPDES reports to DOE. B. All work, testing, and monitoring associated with the application of CTB/CKD shall be observed by engineer. The engineer shall prepare and submit a report to the assigned DDES project inspector indicating BMPs were/were not being met. C. Copies of all reports and logs will be available on site during the soil and surface runoff treatment activities.
Other elements to consider:		
11. Water Quality – Soils	Source Controls	A. There may be very small amounts of concrete washout produced on-site as a result of construction of erosion control measures during reclamation. Concrete washout, if any, would be retained in a lined enclosure of at least 6-ml visqueen or plastic sheeting, with no outlet. The washout retention enclosure would be isolated and separate from any CTB/CKD area runoff. Contents of the lined concrete washout enclosure will be removed from the site via a vactor truck for disposal in an approved off-site treatment or disposal facility in accordance with all federal, state, and local laws and regulations. Signed trip tickets, as proof of proper disposal, will be provided to DOE and DDES.
B. Water Quality – pH	Cover Measures	A. Areas amended with CTB/CKD for compaction after CTB/CKD addition will be covered with plastic or visqueen sheeting, or other impervious material by the end of each working day. B. Temporary cover will be maintained over all compacted areas amended with CTB/CKD until testing confirms that pH levels are stabilized to background measurements. [Note: Curing to avoid pH effects has no relationship to the rate at which material can be compacted in multiple lifts. Compaction will commence immediately after application and mixing, and multiple lifts will occur as quickly as each lift is compacted and ready to accept the next.] C. Should weather conditions prevent mixing, any unmixed CTB/CKD remaining on site will be enclosed in a sealed containment, such as portable silo, or removed from site.

Dust Control and Soil Erosion and Sediment Control for Manufacturing and Other Commercial Operations

This activity applies to manufacturing and other commercial operations that generate dust, sediment, and other particulate matter that may contaminate stormwater runoff if not properly controlled. Best management practices to control dust and other particulates are intended to stop dust and other particulates from being tracked or washed to the storm drainage system. If not controlled, stormwater runoff may be contaminated with suspended solids, toxic organic compounds, harmful pH, and metals.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in manufacturing or other commercial operations:

1. Sweep paved areas as needed where dust accumulates from commercial, manufacturing, and industrial operations. Use power vacuum cleaners and sweepers as appropriate to minimize generating airborne dust and for more efficient dust removal.

2. Regularly clean equipment and vehicles subject to dust accumulation from operations. Never wash down equipment or vehicles to the storm drainage system.

3. Stabilize or cover areas of exposed or disturbed soil where necessary to prevent soil erosion. See the King County Surface Water Design Manual, Appendix D, Erosion and Sediment Control Standards, for recommended erosion and sediment control practices and standards.

4. Ensure employees are trained in the proper operating procedures to minimize dust from accumulating on the ground.

ADDITIONAL BMPs

The following BMPs are optional, unless the above minimum required BMPs do not provide adequate source control.

1 A catch basin insert, may remove some of the pollutants in runoff from this activity. Catch basin inserts require frequent maintenance to be effective. Carefully consider this requirement when evaluating your options.

☞ See BMP Info Sheet 10 in Chapter 5 for more information.

2 If appropriate, consider using dust filtration and collection systems such as bag house filters.

3 Contact your local sewer authority and the King County Wastewater Treatment Division Industrial Waste Section to determine if it is acceptable to wash accumulated dust to the sanitary sewer.

4 Consider using approved dust suppressants such as those listed in the King County Surface Water Design Manual, Appendix D, Erosion and Sediment Control Standards. See also the Department of Ecology Publication "Techniques for Dust Prevention and Suppression," #96-433. Please note that not all dust suppressants are appropriate for use near storm drainage systems or surface waters.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Maintenance of Public and Private Utility Corridors and Facilities

This activity applies to maintenance activities associated with the transmission and distribution of public and private utilities such as petroleum products, natural gas, water, sewage, and electrical power. This includes the maintenance of underground utility vaults, pump stations, and similar facilities. Access roads and equipment maintenance can be sources of pollutants to stormwater runoff, including suspended solids, oil and grease, petroleum hydrocarbons, harmful pH, pesticides, and metals.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in maintaining public and private utility corridors and facilities:

1. Minimize the amount of herbicides and other pesticides used to maintain access roads and facilities. See Activity Sheet A-26, "Landscaping Activities and Vegetation Management," for BMPs associated with managing vegetation for access roads and maintenance areas.

2. Stabilize access roads or areas of bare ground with gravel, crushed rock, or another method to prevent erosion. Use and manage vegetation to minimize bare ground/soils that may be susceptible to erosion. See the King County Surface Water Design Manual, Appendix D, Erosion and Sediment Control Standards for recommended erosion and sediment control practices and standards.

3. Provide stormwater drainage for roads and maintenance areas. Grade roads with a crown or slope to minimize the potential for erosion from runoff. Provide ditches, swales, and culverts to convey stormwater runoff.

4. Monitor and maintain ditches and culverts as needed to reduce the possibility of the drainage becoming plugged or blocked, which may lead to overflows and erosion.

5 Check utility vaults or other underground structures for pollutants prior to pumping out any collected water. If the water is contaminated, it must be collected for proper disposal. Small amounts of oil may be captured with absorbent material. Never discharge contaminated water, including high or low pH, to storm drainage facilities or surface waters.

6 Clean up any debris or spilled material immediately after completing maintenance and repair activities.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

IV

STORMWATER BEST MANAGEMENT PRACTICES FOR SINGLE FAMILY RESIDENTIAL ACTIVITIES

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IV
RESIDENTIAL BEST MANAGEMENT PRACTICES

RESIDENTIAL BMP ACTIVITY SHEETS

This chapter consists of a series of information sheets listing the best management practices (BMPs) that are required for single family residential activities in unincorporated King County. The activity sheets in this chapter target typical household activities that have the potential to pollute stormwater, surface waters, and groundwater.

Stormwater pollution occurs when water runs over the ground, picks up pollutants, and washes the pollutants into surface and ground waters. Street storm drainage systems are designed to prevent local flooding by carrying stormwater runoff to nearby streams and rivers. These drainage systems do not remove pollutants such as motor oil or soap.

Even small amounts of commonly used household products such as motor oil, pesticides, paint waste, and soaps are harmful to aquatic life. Although individual activities may appear insignificant, runoff from urban areas is now a leading cause of water pollution in rivers, lakes, and coastal areas.

King County's goal is to reduce pollution by educating homeowners and residents to prevent the contamination of stormwater runoff and our streams, rivers, lakes, and groundwater.

Residential Automobile and Boat Washing

Automobile washing is one of the most common residential activities that pollutes surface water, streams, creeks, lakes, and Puget Sound. In addition to soap and dirt, vehicle wash water carries oil, grease, solvents, nutrients, and metals and to our local water bodies. The soaps and detergents that we use to wash automobiles can be more of a pollution threat than the grime washed off the automobiles. Even soaps that are labeled "biodegradable," "environmentally friendly" or "nontoxic" are harmful to aquatic life and water quality. The “nontoxic” label simply means the soap is less toxic to the user.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods or practices are required if you engage in automobile or boat washing at your home.

1. It is acceptable to rinse down the body of a vehicle/boat with just water without doing any washwater BMPs. The wash water is diverted from the storm drain, i.e. wash water will infiltrate.

2. If you wash your automobile or boat using mild detergents (pH neutral) on an area that allows for infiltration of the wash water, such as gravel, grass, or loose soil, it is acceptable to let the wash water infiltrate as long as you only wash the body of the vehicle (i.e. not the undercarriage or engine).

3. If you wash on a paved area such as your driveway and use soaps or other cleansers, you should do ONE of the following:

   - Redirect the wash water to vegetated areas such as landscaping or your lawn. This can be accomplished by using temporary measures such as a berm, boom/socks, or other solid materials like a piece of lumber placed at the low point of where your vehicle is parked. This will direct the flow of water to your lawn or landscaping.
   - Use a wet vacuum to collect the wash water and then dispose of the wash water to your sink or toilet for treatment at your local sewage treatment plant.

OTHER OPTIONS AND TIPS

1. Take your vehicle to a commercial car wash where wash water is recycled and discharged to the sanitary sewer. This also reduces the amount of water used for vehicle washing.

2. Use a hose nozzle with a trigger and shut it off when you're not using it to conserve water.

3. Never clean or pressure wash the engine or undercarriage of your automobile at home. The oil, grease, and other pollutants from this activity can contaminate your property, as well as groundwater such as shallow aquifers. This is especially important in areas where wells provide potable water. For this type of cleaning, take the vehicle to a commercial car wash where wash water will be treated appropriately.

4. There are several waterless car wash products on the market. These products are designed to clean and protect your vehicle without using water. Cloths, rags, etc. used with these products should be disposed of as solid waste.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Residential Storage of Solid and Food Wastes

Improper storage of household garbage and other wastes can lead to a variety of pollutants in storm water runoff. Waste such as leaking garbage cans, yard waste containers without lids, scrap piles, and junk vehicles and equipment can cause polluted runoff from your property to drain to surface and groundwater. Contaminants such as oils, greases, nutrients, bacteria, pathogens, and suspended solids are carried to our creeks, streams, lakes, rivers, and Puget Sound.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices are required in storage of solid and food wastes at your home.

1. Dispose of unwanted garbage or scrap in your regular garbage service pickup containers, or dispose of garbage and scrap at a landfill or transfer station. Do not let garbage accumulate at your residence. The accumulation of garbage is a surface water concern and a health issue. Accumulated garbage can attract rodents, rats, mosquitoes, and other pests that are also health hazards.

2. Waste stored outside should be kept in covered containers or be covered with a tarp. All waste containers that are outdoors should have lids.

OTHER OPTIONS AND TIPS

1. Recycle as much as possible. Someone else may be able to use leftover paints, finishes, cleaning materials, building materials, etc. Contact a neighbor, friend, school, church, or community group to see if your left over materials can be used. The King County Industrial Materials Exchange (IMEX) is a good resource for finding uses for your left over materials. Call IMEX at 206-296-4899 or send an e-mail to imex@kingcounty.gov. Consult the IMEX Web site for more information, at http://www.govlink.org/hazwaste/business/imex. Another recycling resource is the King County Online Materials Exchange at http://your.kingcounty.gov/solidwaste/exchange/.

The King County Solid Waste Division provides waste disposal and recycling information at http://your.kingcounty.gov/solidwaste/index.asp. Information regarding proper household hazardous waste disposal is available at http://www.govlink.org/hazwaste/house, or contact the Hazards Line at 206-296-4692. See Activity Sheet R-4, "Residential Hazardous Waste Use, Storage, and Disposal."

Compost biodegradable wastes rather than disposing of them as garbage. Contact the King County Solid Waste Division at http://your.kingcounty.gov/solidwaste/composting/index.asp for more information on composting yard and kitchen waste.

Information on yard waste collection services is available at http://your.kingcounty.gov/solidwaste/garbage-recycling/yardwaste.asp.

Dispose of pet waste in your garbage; bury it in your yard (not in vegetable gardens); or, dispose of in sanitary sewer systems such as your toilet. See http://your.kingcounty.gov/solidwaste/composting/petwaste.asp.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Residential Automobile Repair and Maintenance

Many people prefer to repair and maintain their vehicles at home. Those that do need to ensure that these activities do not pollute our streams, rivers, and lakes. Automobile maintenance and repair activities can introduce chemicals such as oil, grease, antifreeze, hydraulic and brake fluids, and metals to our surface and groundwater. A recent study estimated that the amount of oil running off our streets and driveways and ultimately flowing into the oceans is equal to an Exxon Valdez oil spill – 10.9 million gallons – every eight months (NRC, 2002).

MINIMUM REQUIREMENTS

The following best management practices (BMPs) or equivalent measures, methods, or practices are required if you engage in automobile repair and maintenance at your home.

1. Collect all used oil, antifreeze, or other vehicle fluids in containers with tight fitting lids. Do not mix these fluids in the same container as this limits your ability to recycle the oil at your local auto parts store or service station.

2. Never dispose of used oil, antifreeze, or other fluids into a storm drain, into a ditch, or onto the ground. Oil should be recycled at an auto parts store or service station. Other fluids can be disposed of at a household hazardous waste collection site. Call the household hazardous waste line at 206-296-4692 or see http://www.govlink.org/hazwaste/house/products/list.cfm for recycling and disposal information and locations.

3. Never clean the engine or undercarriage of your vehicle at home. For this type of cleaning, take the vehicle to a commercial car wash facility.

4. Use drip pans, tarps, or even cardboard and newspaper under the vehicle to capture leaks or spills that may occur during maintenance and repair activities. This ensures spilled fluids won't be washed to the storm drainage system the next time it rains.

5

Clean up spills with rags or absorbent material, such as sand, dirt, or cat litter. Do not wash down or hose down these spills to the curbs, roadway, or storm drains. Sweep up absorbents and dispose of them in your garbage can.

6

Store automotive parts, such as batteries, engines, transmissions, and other parts that may have oily or greasy residue on them, under cover and off the ground to minimize rainwater contact. Rainwater can wash pollutants off these parts and send pollutants to storm drainage systems and groundwater. Tarps are an inexpensive and easy solution to covering parts.

OTHER OPTIONS AND TIPS

1

Take your vehicle to a commercial car repair facility where fluids are handled, recycled and disposed of correctly to avoid pollutants being introduced to our local water bodies. The EnviroStars Program certifies businesses for reducing, recycling, and properly managing hazardous waste. See http://www.envirostars.com/ to search for businesses that have earned the EnviroStars rating.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Residential Hazardous Waste Use, Storage, and Disposal

There are a variety of hazardous materials routinely used in and around our homes including chemical cleaners, pesticides, paints, solvents, lighter fluid, gasoline, antifreeze, brake fluid and other automotive products, wood preservatives and even batteries from our electronic equipment.

Improper disposal and failure to keep hazardous products from rainwater contact may cause surface and groundwater pollution. With so many hazardous compounds present in thousands of households in King County, the cumulative adverse effects of poor usage, storage and disposal practices are potentially severe to our environmental health.

MINIMUM REQUIREMENTS

The following best management practices (BMPs) or equivalent measures, methods, or practices are required when using or storing hazardous wastes at your home.

1. Store all hazardous materials inside a building or shed or under cover. Do not expose hazardous materials to rainwater that can transport hazardous pollutants to surface and groundwater.

2. Use products only as specified on labeling directions.

3. Dispose of and recycle hazardous wastes through the Household Hazardous Waste Program or other recycling programs or businesses, or carefully follow disposal directions on containers of chemicals. There are three fixed hazardous waste collection sites for household hazardous waste in Seattle and King County. In addition, the Wastemobile travels to different areas of King County throughout the year. See http://www.govlink.org/hazwaste/house or call the Household Hazards Line at 206-296-4692 for more information.

4. Never allow hazardous chemicals to be discharged or dumped into storm drainage systems or on to the ground.

OTHER OPTIONS AND TIPS

1. Reuse and recycle as much as possible. Someone else may be able to use leftover paints, finishes, cleaning materials, building materials, etc. Contact a neighbor, friend, school, church, or community group to see if your left over materials can be used. The King County Industrial Materials Exchange (IMEX) is a good resource for finding uses for your left over materials. Call IMEX at 206-296-4899 or send an e-mail to imex@kingcounty.gov. Consult the IMEX Web site for more information, at http://www.govlink.org/hazwaste/business/imex.

2. Use the least toxic product available. See http://www.govlink.org/hazwaste/house/alternatives for information on finding alternatives to hazardous household products.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Residential Gardening and Lawn Care

Many pollutants can enter stormwater systems, groundwater, and water bodies as a result of typical lawn and gardening work. Runoff that is contaminated by pesticides and fertilizers can severely degrade receiving waters and result in adverse effects on fish and other aquatic life. Recent studies in the Puget Sound region detected pesticides in urban streams at levels that exceed limits set to protect aquatic life. Some gardening chemicals are also harmful to children and pets. Fertilizers add nutrients to water bodies causing unwanted algal blooms and other aquatic plant growth. Disposal of grass clippings and other vegetation into storm drains, stormwater ponds, roadside ditches and other water bodies can lead to decreased oxygen levels in stormwater as the vegetation decomposes. Decreased oxygen levels can be lethal to fish and other aquatic life. Several simple practices can be used to prevent these problems, and may result in improved lawn and garden quality. These practices should also be shared with private landscapers that conduct gardening and lawn care on your property.

Note: The term pesticide includes insecticides, herbicides, fungicides, rodenticides, etc.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods, or practices, are required if you are engaged in gardening and lawn care at your home:

1. Never apply herbicides, insecticides, rodenticides, or fungicides along the banks of stream and drainage channels with flowing water, or along the shores of lakes and wetlands. Never apply these chemicals when it is raining.
2. Manually or mechanically remove weeds and other pests rather than using pesticides in areas of running or standing water.
3. Store all bags or piles of fertilizers and containers of pesticides in a covered location such as a garden shed.
4. Do not sweep or dump grass clippings, leaves, or twigs into any street, drainage ditch, or stormwater facility or pond.

5 Store piles of beauty bark and other erodible materials on lawns or other pervious areas. If these materials are stored on impervious areas such as driveways, cover them with a tarp so that rainwater does not wash the materials into storm drains or ditches.

OTHER OPTIONS AND TIPS

1 Purchase and use the least amount of pesticides necessary and always follow the label directions for application. Try pest control measures that do not require chemicals first. See http://www.govlink.org/hazwaste/house/yard/problems for information on how to reduce or avoid the use of pesticides.

2 Compost your yard wastes, or use yard waste as mulch in your yard or garden. Contact your local solid waste utility to see if yard waste pickup service is available. See http://your.kingcounty.gov/solidwaste/garbage-recycling/yardwaste.asp for more information on yard waste collection and recycling services.

3 Educate yourself about alternatives to chemical pesticides and fertilizers such as integrated pest management techniques. Contact the Local Hazardous Waste Management Program at 206-296-4692, or visit http://www.govlink.org/hazwaste/house/yard.

4 Limit the amount of lawn and garden watering so that surface runoff does not leave your property. Check automatic sprinkler systems to ensure water is dispersed to landscaped areas and not to hard surfaces such as driveways and sidewalks that drain to storm drainage systems.

Avoid planting species on the Noxious Weeds list. For assistance or questions contact the Noxious Weed Section of WLRD at 206-296-1900.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

Reader Note: The above requirements are the minimum required BMPs. If these BMPs fail to prevent discharges to the storm drainage system, you will be asked to take additional measures to correct the continued pollution discharges.

Residential Maintenance and Repairs

There are a variety of home maintenance and repair activities routinely carried out by homeowners in King County that have the potential to adversely affect our streams, rivers, and lakes. Pollutants generated from these activities can affect whether a lake or water body is swimmable or fishable. Painting, pressure washing, carpet cleaning, moss control, and concrete repair and maintenance are a few examples of activities homeowners conduct that can result in pollutants being discharged to drainage systems, surface water, and ground water. Wash water from these activities contain chemicals, suspended solids, organic compounds, detergents, solvents, abnormal pH, and other toxins that have a detrimental and toxic effect on fish and other aquatic life.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods or practices are required when conducting residential maintenance and repairs at your home.

1. Do not dispose of any wastewater into the street, gutter, storm drain, or drainage ditch, or into a stream, creek, or other body of water.

2. PAINTING: Do not dispose of wash water from cleaning brushes, paint rollers, paint buckets, or containers to surface water, storm drains, or ditches. Wash water from latex paints can be disposed of to the sanitary sewer. Empty containers of latex paint can be left open to dry out any residual paint, and then disposed of in your normal garbage or taken to a transfer station for disposal. Residual oil based paint, paint thinners, and solvents must be disposed of as hazardous waste.

   See http://www.govlink.org/hazwaste/house/products/list.cfm and http://www.govlink.org/hazwaste/publications/Paint_CommonWastes.pdf for information on the proper disposal of paint and solvent waste.

3. PRESSURE WASHING: Water from pressure washing decks, driveways, roofs, or other hard surfaces may contain suspended solids and other pollutants that should not be directly discharged to drainage systems. Redirect pressure washing wastewater to vegetated areas or areas such as gravel, lawns, landscaping, or bare soil where the water will infiltrate slowly into the ground. If this cannot be accomplished, filter the wash water through filter fabric, or other filtering media to collect the suspended solids before discharging the water to a drainage system. If any

chemicals are used during the pressure washing process, the wastewater must be collected and disposed of in a sanitary sewer system or infiltrated on site. If moss control or another chemical treatment is used during pressure washing of roofs, disconnect the downspouts so the chemicals do not discharge to the storm drainage system, and disperse the wash water onto adjacent lawns and landscaping.

4

CARPET CLEANING: Most commercial carpet cleaners have onboard wastewater recycling systems. If you do your own carpet cleaning, the wash water must be discharged to the sanitary sewer or your septic system. Filter the water if it contains lint or other particles to avoid clogging the drains. If you prefer not to discharge the water to your septic system, you may also discharge the water to your lawn or a landscaped area to allow the washwater to infiltrate slowly into the ground. Be aware that detergents and other cleaning chemicals such as solvents can be harmful to vegetation and septic systems. Discharging wash water to the ground may not be allowed if you live in a Critical Aquifer Recharge Area (CARA). Never dispose of carpet cleaning wash water to a storm drain, drainage ditch, or surface water. Carpet cleaning wastewater contains chemicals, detergents, and suspended solids that adversely impact the quality of surface and ground waters.

5

CEMENT/CONCRETE WORK: Concrete/cement wash water has a pH level that is toxic to aquatic life. Do not allow wash water from concrete work to discharge into storm drainage systems, including small yard drains or adjacent roadways. This is especially important when installing washed aggregate driveways or patios. Direct the wash water to vegetated areas or dig a hole where the wash water can settle and infiltrate slowly into the ground. The cement residue can be mixed into the soil where the wash water is infiltrated with no detrimental effects, and the pH will be neutralized.

OTHER OPTIONS AND TIPS

1

Hire a professional home maintenance and repair company that follows the approved BMPs for home repair and maintenance, as adopted by King County. If you have questions about which Best Management Practices a business must comply with contact King County Water and Land Resources at 206-296-1900 or see http://www.kingcounty.gov/environment/waterandland/stormwater.aspx.

Remember, as a homeowner, you have a responsibility to ensure your contractors follow the required Best Management Practices. As part of your agreement with contractors, require them to follow all King County Codes and regulations.

Residential Swimming Pool and Hot Tub Maintenance

Many residents in King County have swimming pools, spas, or hot tubs. Improper drainage or discharge of pool water to storm drains or ditches during maintenance activities can lead to nutrients, suspended solids, chlorine, abnormal pH, and other chemicals entering our streams, rivers, and lakes. Chemicals used in pool, spa, and hot tub maintenance can contaminate stormwater and surface water if they are not stored, used, and disposed of correctly.

MINIMUM REQUIREMENTS

The following BMPs, or equivalent measures, methods or practices are required when draining or maintaining your pool, spa, or hot tub.

1. Dechlorinate pool, hot tub, and spa water if it is to be discharged to the ground. Neutralizing chemicals are available. Letting the pool, hot tub, or spa "sit" with no chemicals may reduce chlorine levels. State law allows discharges of pool water to the ground if the chlorine level is below 3 ppm (parts per million). The pool water must be drained to the ground in a manner so that it does not cross property lines or cause erosion problems. Never discharge pool water directly to storm drains or ditches.

2. If pool or spa water cannot be dechlorinated, the water must be drained to the sanitary sewer or collected by a pool maintenance company for off-site disposal.

3. Diatomaceous earth (commonly used as a filtering agent) and water from backflushing filter systems cannot be discharged to surface waters, storm drainage systems, septic systems, or the ground.

4. Pool water that has been treated with copper based algaecides may not be discharged to the ground.

OTHER OPTIONS AND TIPS

1. Hire a professional pool maintenance company to service your pool, hot tub or spa.

For more information or assistance in implementing these best management practices, contact the King County Department of Natural Resources and Parks Water and Land Resources Division at 206-296-1900.

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BMP INFO SHEETS

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V
BMP INFO SHEETS

Best Management Practices Information Sheets

This chapter provides information on how to implement several best management practices discussed in Chapter III and Chapter IV. It also provides information on some of the currently available water quality treatment facilities. Stormwater treatment facilities are covered in the King County Surface Water Design Manual. Existing sites may be able to incorporate treatment facilities, depending on the site constraints and conditions, without review or approval by the King County Department of Development and Environmental Services (DDES). Some treatment BMPs can be installed after review and approval by King County Water and Land Resources Division Water Quality Compliance Program staff. To obtain approval it may be necessary to complete the Alternative BMP form located in this manual.

Table 5.1 below lists the BMPs that are discussed in this chapter.

TABLE 5.1

BMP INFO SHEETS

No.	TITLE
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Source Control BMPs

The following BMP Info Sheets discuss a variety of source control BMPs and other methods used to prevent, control, and dispose of pollutants. Source control BMPs prevent pollutants from contaminating stormwater runoff or entering water bodies. Some source control BMPs are operational, such as reducing the frequency of engaging in a pollution-generating activity, checking regularly for leaks and drips from equipment and vehicles, and educating employees about site maintenance and cleanup and spill prevention procedures. Other source control BMPs use structural methods to prevent rainwater from coming in contact with materials or stored items that will contaminate stormwater runoff. Examples of these BMPs include a berm or containment structure to prevent clean stormwater from entering work or storage areas, or a roof over a storage area. A source control BMP can also include altering or revising your industrial process to use less potentially contaminating substances.

The goal of King County's Water Quality Compliance program is to reduce the contamination of water resources by emphasizing source control BMPs. The following BMP Information Sheets provide more detailed information on how to implement some of these source control BMPs.

Illicit Connections

An illicit connection is a connection that could convey anything not composed entirely of surface and stormwater directly to the storm drainage system or a water body. Many buildings throughout King County could have illicit connections to the storm drainage system. These typically include, but are not limited to, sanitary sewer pipes, process wastewater discharges, sump overflows, and internal building drains connected to the storm drainage system. As a result of illicit connections, wastewater containing a variety of pollutants is discharged directly to storm drains and drainage ditches, and ultimately to receiving waters rather than to the sanitary sewer system or a septic system. In many instances these connections are unknown to the business or property owner, and may not show up on building drawings. Elimination of illicit storm drainage connections is an important facet of stormwater pollution reduction and must be addressed as a top priority. King County is currently making a committed effort to determine where illicit connections are present and to require their removal.

FINDING AN ILLICIT CONNECTION

All businesses, residents and public agencies in unincorporated King County must investigate their plumbing/drainage systems to determine if there are any illicit connections to the storm drainage system, such as internal floor drains plumbed to the storm drainage system. If building and property drawings are available with plumbing details, they should be reviewed to understand pipe connections.

If you are unsure whether a particular drain (such as a floor drain) discharges to the storm drainage system, you should identify where the potential illicit connection drains to by consulting plans, side sewer cards, and possibly conducting a dye test. Running water from a hose into the drain and observing where the water discharges is often a very simple and effective method of identifying illicit connections.

Any pipes or other conveyances connected to storm drainage facilities that drain anything but stormwater must be permanently plugged or rerouted to a sanitary sewer, holding tank, on-site process treatment system, or septic system (with approval from the appropriate agencies or jurisdiction).

If building plans and side sewer cards do not show your plumbing, the most basic methods for determining a connection is either dye tracing or running water through the system. A nontoxic dye can be put in water and flushed or drained into the suspect piping. Observations should then be made in catch basins, manholes, drainage ditches, or other storm drainage conveyances that

are present on site (or adjacent to the property) to search for the dye. Enough water must be poured or flushed through the indoor drain to force the flow to reach the point(s) of observation. If possible, all other drains in the building should be out of use while the dye test is conducted to ensure the results can pinpoint the problem drain. This test should be conducted for each suspect drain on the property. Any observations of dye in the storm drainage system must be noted and the corresponding indoor drains tagged for followup plugging or rerouting.

If you are uncertain as to the locations of catch basins or manholes that can be used for observation, or if you can not determine how the storm drainage system is constructed on your property, contact the King County Water and Land Resources Division (WLRD) at 206-296-1900 for assistance. Notify WLRD at least one day in advance if you are performing a dye test.

ELIMINATING AN ILLICIT CONNECTION

Drains and pipes that are found to connect to the storm drainage system and have the potential of discharging pollutants or wastewater must either be permanently plugged or disconnected and rerouted as soon as possible. Drains that are no longer needed can be plugged with concrete or another similarly effective material. Whenever process water, stormwater, or other wastewater is redirected to the sanitary sewer, the local sewer authority and the King County Industrial Waste Program must be contacted to obtain approval for discharging to the sanitary sewer. The local sewer authority and King County must also be contacted prior to the installation of any permanent connection to the sanitary sewer. The name of your local sewer authority is identified on your water and sewer bill. The local sewer authority and King County Industrial Waste will regulate the connection both for discharge quantity and quality, but the responsible party will have to arrange for the necessary plumbing supplies and pipe disconnection/rerouting work.

If a sanitary sewer does not service the property, and one is not available for hookup, alternative measures are necessary. If the discharge is domestic wastewater from a toilet, sink, appliance, or shower/bathtub, a septic system can be used to receive the rerouted discharge. The connection of plumbing fixtures to an on-site sewage disposal system usually requires an on-site sewage disposal system repair permit. Therefore, before any pipes are rerouted, the Seattle-King County Department of Public Health must be contacted for further information. If a septic system is not present on the property then one should be installed. The Seattle-King County Department of Public Health should be contacted for advice and information on septic system requirements. If the discharge is industrial process water or other nondomestic wastewater, a holding tank or on-site treatment system will be needed. If an illicit connection needs to be rerouted to a holding tank, King County Water and Land Resources Division staff should be contacted for assistance and information on tank content disposal requirements. As with septic system and sanitary sewer hookups, the property owner or responsible business operator is responsible for rerouting the illicit pipe connections.

Disposal Options

Every business, property owner, and public agency in King County must dispose of solid and liquid wastes and contaminated stormwater properly. There are generally five options for disposal depending on the types and quantity of materials. These options are: (1) sanitary sewer system, (2) septic system, (3) recycling, (4) municipal solid waste disposal facilities, and (5) waste transportation and disposal services. Ordinary stormwater runoff is not considered to be contaminated to the point of requiring special disposal. Stormwater that is mixed with concentrated wastes requires special disposal, as discussed below.

DISCHARGE TO SANITARY SEWER SYSTEM

Process wastewater (depending on the pollutants and associated concentrations present) can be put into the sanitary sewer, subject to approval by the local sewer authority and the King County Industrial Waste Program. Animal waste can be disposed of in a sanitary sewer, subject to loading capacity constraints. The King County Industrial Waste Program may require that all stormwater discharged to a sanitary sewer be metered. Sewer fees may be collected on such discharges.

The first priority is to discharge process water to a sanitary sewer using an existing plumbing connection or a new pipe connection. Whenever the diversion of any process water or other wastewater to the sanitary sewer is needed, the local sewer authority and King County must be contacted to obtain approval prior to discharging to the sanitary sewer. Pretreatment of discharges to remove some of the process water pollutants may be required to obtain approval. The local sewer authority and King County must also be contacted prior to the installation of any permanent connection to the sanitary sewer. The name of your local sewer authority is identified on your water and sewer bill. Sumps or other temporary storage devices may be useful for storing liquid wastes on a temporary basis if you cannot discharge to a sanitary sewer system. Consideration should be given to using a holding tank for process water if the volume of process water generated by the activity is not excessive. See BMP Info Sheet 4 for more information on holding tanks. The contents of the holding tank must be pumped out or drained before the tank is full. Several commercial services are available for pumping out sumps and holding tanks. These can be found in your telephone directory's yellow pages under the headings "Sewer Contractors and Cleaners" and "Tank Cleaning," or on the King County Stormwater Services website at http://www.kingcounty.gov/environment/waterandland/stormwater/problem-investigation-line/drainage_maint_vendors.aspx. Septic system pumpout and hauling contractors must not be used for disposing wastes other than domestic sewage. They are not allowed to haul industrial wastes.

DISCHARGE TO SEPTIC SYSTEM

If your site is not serviced by a sanitary sewer system, you probably have a septic system. Only liquid waste that is comparable to residential sewage in strength and constituency may be disposed of in septic systems. Hazardous chemicals cannot be disposed of in septic systems. Further, the septic system must be designed to accommodate the volume of suitable wastewater generated. Any changes in waste volume and constituency from those present when the system was permitted must be approved by the Seattle-King County Department of Public Health. Stormwater, whether contaminated or not, may not be disposed of in septic systems. Animal waste may not be disposed of in a septic system designed for single family, multifamily or commercial properties.

RECYCLING

Recycling facilities are a recommended option for many commercial items, including used oils, used batteries, a variety of used auto parts, metal scrap materials, solvents, paints, and other solid wastes. There are a number of private businesses that accept materials for recycling. In addition there is an Industrial Material Exchange clearinghouse which facilitates the transfer of unwanted materials from the generator to another business that can use them. The Industrial Material Exchange or IMEX website is http://www.govlink.org/hazwaste/business/imex.

Process wastewater such as wash water can be recycled on-site as an alternative to discharge to the sanitary sewer. There are numerous products on the market that are designed to recycle wash water. Contact the King County Water and Land Resources Division at 206-296-1900 for more information.

MUNICIPAL SOLID WASTE DISPOSAL FACILITIES

Municipal solid waste disposal facilities are designed to handle solid wastes. Hazardous and dangerous wastes and many liquid wastes must be properly disposed of at an appropriate facility. Contact your local solid waste disposal facility or see http://your.kingcounty.gov/solidwaste/garbage-recycling/index.asp for information on which materials are accepted at these facilities. Call the Business Waste Line at 206-296-3976 or see http://www.govlink.org/hazwaste/business for information on the proper disposal of oil, antifreeze, and other hazardous wastes.

WASTE TRANSPORTATION AND DISPOSAL SERVICES

There are numerous services that can help you identify, quantify, transport, and dispose of any waste that you may generate. Many people have their wastes picked up by a disposal contractor.

Costs of disposal vary considerably depending on the types of materials, quantities, methods of collection and transport, and whether the wastes are mixed. The rate the contractor charges will generally reflect the costs of testing and/or treating waste materials (if necessary) and the subsequent disposal. It is important to keep different types of wastes separated, so that the disposal contractor(s) can take them to the appropriate place(s) without causing inadvertent contamination problems elsewhere, and so that you are not paying too much for disposal of

materials that are not contaminated (e.g. regular garbage). If you are properly implementing your BMPs and collect contaminated waste materials for proper disposal, your efforts are compromised if a disposal contractor subsequently disposes the contaminated materials as regular garbage. Therefore, it is essential to be familiar with disposal alternatives and the different types of contractors for each disposal option.

The Seattle-King County Department of Public Health's Waste Characterization Program serves hazardous waste generators in Seattle and King County that have questionable wastes. Information supplied by the generator on questionable wastes such as sludges, sandblast waste, treated wood, and contaminated soils is reviewed by the Health Department. Permits are issued for those wastes that will be allowed in the garbage. The dangerous waste regulations as well as other criteria are used in the decision process.

The disposal of wastes is the responsibility of the generator. Before agreeing to let a company handle your waste, it is recommended that you ask for (and check) the company's references. All waste collected by the company should be delivered to an authorized site. Make sure you keep copies of all your transactions. Transfer of waste to a vender does not release you from legal obligation for disposal to a licensed disposal facility.

Covering Options: Tarp, Roof, or Awning

One of the most effective actions a person can take to prevent stormwater contamination is keeping potential pollutant generating materials out of the rain. There are numerous options for covering an activity or stored materials. This BMP, combined with the prevention of stormwater runon into the covered area, can be as effective as storing materials or conducting activities indoors.

The simplest cover is a tarp or other nonstructural device. Building a permanent structure may require a building permit and must comply with all applicable building and fire codes. These building requirements may make some structures too expensive to be practical. Contact the King County Department of Development and Environmental Services for information on building permits and requirements for a roof structure.

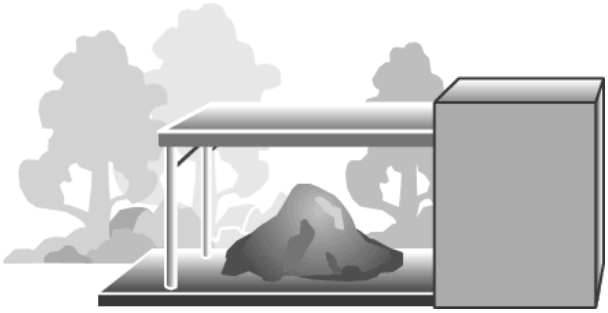
Tarp Covering

Many activities, such as stockpiling of raw or erodible materials or storage of drums, can be effectively covered with a heavy plastic tarp made of impermeable material. Weights such as bricks, tires, or sandbags must be used to anchor the cover in place. Care should be taken to ensure that the tarp covers the stored materials completely and that stormwater runon does not penetrate significantly under the cover. If several tarps are used to form a cover, they should be tethered together or overlapped. If necessary, pins or stakes should be used to anchor the tarps to the ground. The tarp/cover will be easier to keep in place and will last longer if some form of wind protection is possible. Attempts should be made to locate stockpiles in areas where winds are minimal.

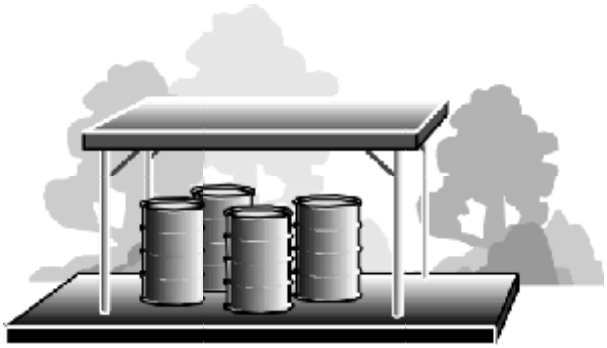
The tarps must be in place when the material is not being used. The tarps must be inspected weekly to ensure that no holes or gaps are present. Tarps are inexpensive, and therefore are a cost effective BMP for many activities. This BMP can be combined with containment for better effectiveness. See BMP Info Sheet 5 for more information.

The other option for covering is the use of a roof. The particular roof cover option used at a given site is subject to the site layout, available space, affordability, and limitations imposed by other regulations. The area of the roof should be sufficient to prevent any precipitation from reaching the contents underneath. This BMP should be implemented in conjunction with

prevention of stormwater run-on into the covered area. BMP Info Sheet 5 presents information on containment/run-on prevention. Examples of various structures are shown below.



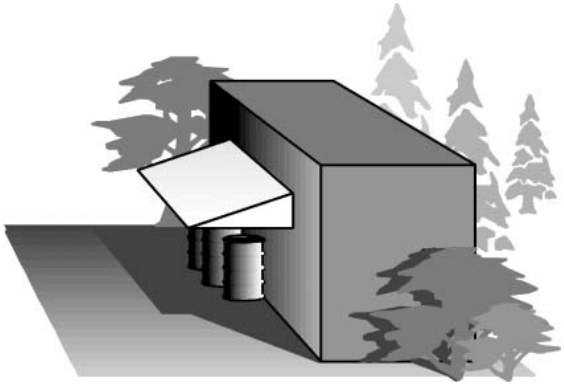
Lean-To Structure



Stand-alone Canopy

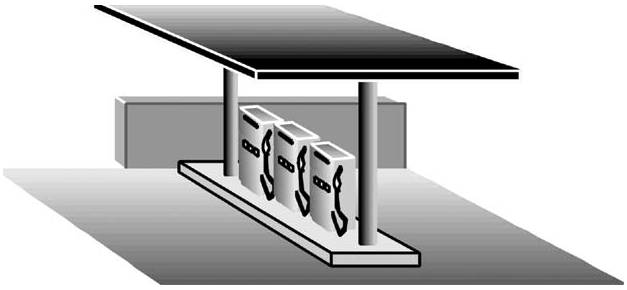
There are also numerous prefabricated storage sheds that can be purchased to enclose and cover materials. This may be a preferred alternative on some sites. Before purchasing these structures ensure they meet applicable building and fire codes.

Another option for covering an activity or stored materials is to use an overhanging awning of sufficient size to prevent precipitation from reaching the contents underneath. This cannot be an awning already in place over a public right-of-way such as a sidewalk in front of a store. Many of the building permit, fire code, and zoning code requirements mentioned above apply to these structures.



Overhanging Awning

Activities such as fueling operations may be covered by an island-type overhanging roof. This roof arrangement is supported by columns along the center of the structure rather than at the corners, enabling vehicular traffic underneath while still providing sufficient protection from precipitation.



Island-Type Overhanging Roof

Pave Area and Slope to Holding Tank

This BMP applies to several activities that cannot be covered effectively, and therefore require a method of controlling runoff from leaving your site that may be contaminated. It is particularly suited to activities with the potential for spills and leaks, but that otherwise do not generate excessive amounts of polluted runoff. In addition, this BMP is well suited to activities that intermittently produce wastewater such as washing or steam cleaning operations. A sump or holding tank serves to provide containment until the liquids can be pumped from the holding tank and disposed of properly. If the activity produces large amounts of runoff or wastewater, this BMP will not be very effective because contaminated water will overflow the sump or pass through the sump before collection and disposal are possible. The following information is intended for situations where this BMP can be effective.

A designated area must be paved and sloped to a drain connected to a central collection point. A sump, vault, or holding tank must be installed to capture the wastewater. Some materials, such as gasoline, can react with and cause deterioration of asphalt pavement. It is preferable for the area to be paved with Portland cement concrete. If the area is already paved with asphalt, an asphalt sealant should be applied to the pavement surface. Whichever paving material is used, the paved surface must be free of gaps and cracks.

The sump or holding tank should have a large enough capacity to contain the entire volume of wastewater generated by the activity, or the entire volume of a potential spill (whichever is applicable, or the greater of the two). Depending on the circumstances, the sump or tank can be equipped with an outflow pipe to allow discharge of normal, uncontaminated runoff to the storm drainage system. The local sewer authority may, in some instances, allow a connection to the sanitary sewer system.

The paved activity area must also be contained to prevent stormwater runon and runoff. This can be achieved by constructing a curb, dike, or berm that directs uncontaminated surface water flows away from the area. See BMP Info Sheet 5 in this chapter for more information. This way, only the precipitation that falls within the activity area is discharged and/or treated along with the process water.

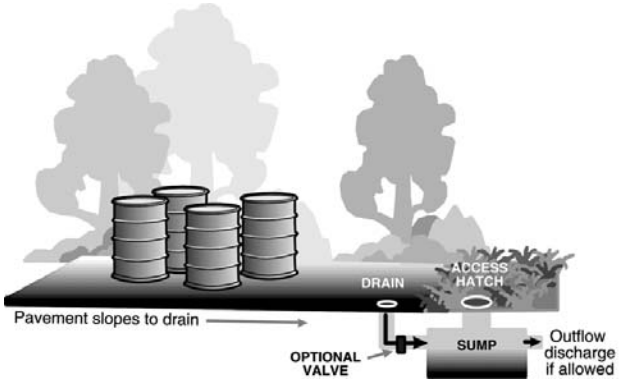
The catch basin/tank/sump must have a two-way valve installed at the outflow pipe so that uncontaminated runoff from the activity area can discharge to the storm drainage system at times when the pollutant generating activity is not occurring. The two-way valve must easily switch between discharges to the sanitary sewer, holding tank, or treatment facility, and discharges to the storm drainage system. Each time the activity is occurring, the two-way valve must be switched so that the polluted runoff discharges to the sanitary sewer, holding tank, or treatment

facility. After the pollutant generating activity operation is finished and no more process water is generated, the area must be sprayed, hosed, or otherwise washed down with the wash water discharging to the sanitary sewer, holding tank, or treatment facility. The two-way valve must be switched after clean up is completed so that subsequent runoff is discharged to the storm drainage system until the next time the activity that produces wastewater occurs. It is critical that careful attention be given to this valve so that it is always switched to the correct position. Approval for discharges with a two-way valve should be obtained from the King County Industrial Waste Program, the local sewer authority and King County Water and Land Resources Division, Water Quality Compliance Program.

If discharges to the storm drainage system or sanitary sewer are not allowed, the sump or holding tank contents will need to be pumped out periodically and disposed of properly. This requirement can make this BMP costly, especially during the wet season. See BMP Info Sheet 2 for disposal options.

An example of a paved activity area with a sump drain is shown to the right.

Drainage into the sump or holding tank should only occur at times when the activity that generates wastewater is occurring. To keep disposal costs down, a drain cover, plug, or shutoff valve in the pipe leading to the sump should be used at times when the activity is not occurring. Before starting the activity (if the activity is intermittent), the cover, plug, or valve must be opened.



Paved Area with Sump Drain

The cost of constructing a sump and disposing of accumulated contents can be high, so businesses should consider whether other allowable BMP alternatives could be used. Individual cities, sewer agencies and King County may charge additional fees if a sanitary sewer hookup is made. The fees depend on location, quantity of discharge, and whether the hookup is for a business or residence. A King County industrial waste discharge permit may also be required in some situations.

Several commercial services are available for pumping out sumps and holding tanks. These can be found in your telephone directory's yellow pages under the headings "Sewer Contractors and Cleaners" ,and "Tank Cleaning." You can also find information on Drainage Maintenance Contractors on the King County Stormwater Services website at http://www.kingcounty.gov/environment/waterandland/stormwater/problem-investigation-line/drainage_maint_vendors.aspx or by calling 206-296-1900. Septic system pump-out and hauling contractors must not be used for disposing wastes other than domestic sewage. They are not allowed to haul industrial wastes.

BMP INFO SHEET #5

Secondary Containment and Elevation: Surround with Dike or Berm, or Elevate

These BMP options can be an effective means for prevention of uncontaminated stormwater from flowing into or onto a contaminated activity area. These BMPs also explain containment of spills in activity areas where pollutants may be present. These BMPs may be less expensive to implement than paving the area and providing storm drainage collection, but can also be more difficult to maintain if stormwater ponding occurs inside a secondary containment dike.

If a curb, berm, or dike is used to prevent stormwater run on to a covered area, and the area is paved or otherwise impermeable, it should be covered so that precipitation will not pond inside the secondary containment area. In some instances, run on prevention can be accomplished by placing a curb or berm on the upslope sides of the area. Elevating the activity or stored materials with a platform or other type of pedestal can also prevent stormwater run-on.

Secondary containment may be achieved with concrete curbing, an earthen berm, a tub such as a plastic wading pool, or some other dike structure, depending on the activity, its size, and resources available. If a curb, berm, or dike is used to contain possible spills, and other containment regulations (such as fire codes or Washington State Department of Ecology requirements) do not apply, the containment area must be sized to hold a volume of 110 percent of the volume contained in the tank/containers.

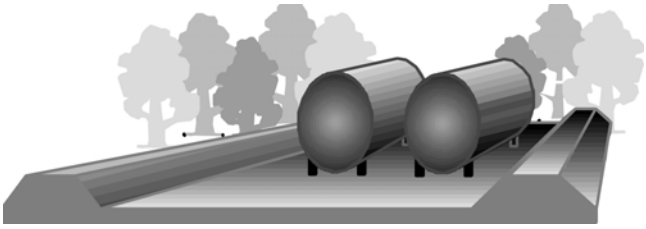
Secondary containment without a cover generally will allow rainwater to accumulate in the containment area. Contaminated water cannot be drained from the containment area to surface water or the ground. The water must be collected and disposed of either into a sanitary sewer, a stormwater treatment system, or at a licensed decant facility. During the wet season, secondary containment without any cover provisions can lead to frequent disposal of relatively clean water that can be costly. In addition, monitoring may be needed to determine if the water is contaminated. If the stormwater is typically clean, or if a stormwater treatment system is present on-site, a valve must be installed in the secondary containment area so that excess stormwater can be drained out of the containment area and directed either to storm drainage facilities (if clean) or into the stormwater treatment system (if contaminated), whichever applies. If a discharge valve is installed in the containment area, the valve should always be kept closed unless excess stormwater is being discharged, so that any spills that occur within the area can be contained. Local sewer authorities and the King County Industrial Waste Program may not allow discharges from a large containment area into the sewer system. Discharge authorizations from the local sewer district must be obtained prior to releasing water from containment areas into the sanitary sewer system.

If containment is used for stockpiles of erodible material, a dike, berm, or filtering device such as basic erosion control must be placed on at least three sides of every stockpile to act as a barrier or filter to treat runoff and to remove suspended solids. If the containment device is three-sided, the open side should not be on the upslope or the downslope side of the stockpile, if feasible. The dike or filter can be made of hay bales, silt fencing (filter fabric), concrete curbing, ecology blocks, compacted earth with grass planted on it, or similarly effective materials. Timbers treated with creosote or other preservatives should not be used because they can leach contaminants into runoff. If ponding occurs due to a sturdy dike, filter materials should be used instead. All filter materials used around stockpiles must be maintained to work effectively and must be replaced when necessary (see Appendix D of the *Surface Water Design Manual* for other options.

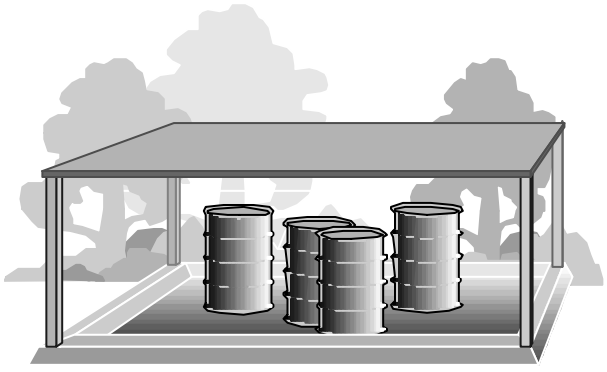
Simple Containment Devices

For storage of small items, a simple containment device is a tub or wading pool. A rubber or plastic wading pool may be sufficient for containment of some stored materials that do not require a lot space, such as storing remodeling and painting materials, and temporary storage of wastes in drums. These small storage devices should also be covered with a tarp or other cover. An example of this is shown to the left. You must also take into consideration the type of materials stored to ensure adverse chemical reactions do not occur with the containment material.

It should also be noted that neglect and poor maintenance can render the secondary containment useless. Maintenance of containment devices must be stressed, as maintenance is essential for containment to work as intended. Commercial products are available that are a combination of containment boxes/elevated pedestals. These commercially available products prevent stormwater run-on by elevating containers of liquids (such as drums) off the ground and collecting spills and drips inside the pedestal box.



Containment Dike



Containment Curb

BMP INFO SHEET #6

Integrated Pest Management

The use of herbicides, insecticides, fungicides, and rodenticides can be extremely harmful to the environment due to the highly toxic nature of many chemicals in pesticide products. In light of this, special attention should be given to pesticide use in all applications. The discussion below applies more to large scale pesticide users, but should be considered for backyard applications as well.

Commercial, agricultural, and other large scale pesticide users such as golf courses and parks should adhere to the principles of integrated pest management (IPM), a decision-making process for pest management that strives for intelligent, environmentally sound control of pests. It is a systems approach to pest management that combines agronomic, biological, chemical, and genetic information for educated decisions on the type of control(s) to use, the timing and extent of chemical application, and whether nonchemical means can attain an acceptable level of pest control.

IPM is a preventive measure designed for the exact pest(s) being targeted for control, the locations and times when pests will pose problems, the level of pest-induced damage that can be tolerated without taking action, the most vulnerable life stage, and control actions that are least damaging to the environment. The major components of IPM are as follows: monitoring and inventory of pest populations, determination of pest-induced injury and action levels, identification of priority pest problems, selection and timing of least toxic management tools, site-specific treatment with minimized chemical use, and evaluation and adjustment of pesticide applications. Monitoring of pest populations is a key to successful IPM implementation. Pest problems are universally easier to control if the problem can be discovered early. With IPM pesticides are used only as a last resort; maximization of natural controls, including biological controls and removal of pests by hand, is a guiding rule.

A list of IPM resources is available on the web at http://www.govlink.org/hazwaste/interagency/ipm/index.cfm or http://www.govlink.org/hazwaste/publications/IPMKCGuidelines.pdf.

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BMP INFO SHEET #7

Maintenance of Drainage Systems

Many commercial, industrial, residential and public agency properties have storm drainage flow control and water quality systems to capture and treat stormwater flows. Most of these systems have catch basins as key components. Catch basins are typically located along curbs, at low spots in parking lots, and where stormwater conveyance pipes combine flows. Storm drains collect runoff that directs flows into basins and pipes that are located underneath parking lots and storm drain grates. Most catch basins have a few feet of storage in the bottom or sump. This storage area is intended to trap sediment, debris, and other particulates that settle out of stormwater, to prevent clogging of downstream pipes and to keep solids from being flushed into receiving waters.

Anyone who has ever looked into a catch basin can attest to its ability to capture dirt, leaves, twigs, litter, and a variety of other materials that make for a mucky buildup in the bottom. However, if the sump (the bottom of the catch basin) is full of solid material, everything in the incoming runoff passes straight through to an outflow pipe. The bottom (or sump) in catch basins must be cleaned out periodically so they can continue to trap solids from stormwater runoff. Routine maintenance practices at all sites with storm drains and catch basins must include cleaning/removal of sediment or solids from these important drainage system features. If catch basins are not cleaned, they can actually contribute to receiving water pollution problems as trapped solids, and stagnant, polluted water in sumps can be flushed out in large quantities with turbulent storm flow conditions.

Check your catch basins annually for needed maintenance timed to occur before the rainy season. For organizations with large numbers of catch basins (greater than 50 per site), inspections may be conducted on a "circuit basis" whereby sampling of representative catch basins, including the lowest one in the circuit, within each circuit is inspected to identify clean-out needs for the circuit. The annual catch basin inspection schedule may be changed as appropriate to meet the maintenance standards based on maintenance records of double the length of time of the proposed inspection frequency. Catch basins must be cleaned out when the solids, trash, and debris in the sump reaches one-half of the depth between the bottom of the sump and the bottom (invert) of the lowest inflow or outflow pipe connected to the catch basin or at least 6 inches below this invert. The rate at which a sump fills with solid material is quite variable, and depends on the characteristics of the drainage basin feeding into it. If activities that generate a lot of sediment are taking place in the drainage area that contributes stormwater flows to a catch basin, such as exposing soils due to construction or landscaping, stockpiling erodible materials, or if your site is not paved and has heavy traffic use on dirt or gravel surfaces, the sump will fill up relatively quickly. Therefore, sites with activities generating a lot of sediments and other debris will have to inspect and clean out their catch basins more often.

Other components of drainage systems include ponds, tanks, and bioswales. These components must also be maintained to ensure your drainage systems functions as designed. Vegetation in ponds and bioswales must be mowed or thinned, and sediment accumulations must be removed. Maintenance of ponds, tanks, and bioswales is generally beyond the ability of the typical property owner. Drainage system maintenance contractors are available to complete this work.

If you clean out/maintain the catch basins yourself, you may dispose of up to one cubic yard of solid material as solid waste in your regular garbage. If you exceed this threshold you are encouraged to contact a company offering catch basin cleaning services. You can locate a cleaning service by calling the King County Water and Land Resources Division at 206-296-1900 for a list of firms performing drainage system maintenance services or in your telephone directory's yellow pages under headings like "Sewer Cleaning Equipment and Supplies," "Sewer Contractors," and "Tank Cleaning." All of the solids and stagnant water collected from catch basin sumps must be disposed of properly. None of the sump contents can be flushed into the catch basin outflow pipe. Depending on the nature of the pollutants in the sump, and the associated types of activities taking place on the site, the sump contents may need to be handled as contaminated waste. Contractors who perform catch basin clean-out services are required to follow appropriate disposal requirements.

Frequent sweeping of paved parking and storage areas, covering pollutant generating activity areas, and containing runoff from activity areas will help reduce catch basin and drainage system cleaning frequency, and may save time and money spent on required maintenance. All businesses and public agencies should set up maintenance schedules for all of their BMPs so that coordinated BMP efforts result in reduced catch basin and drainage system maintenance and cleaning.

BMP INFO SHEET #8

Water Quality Treatment BMPs

Water quality treatment BMP options may be required if operational or basic structural source controls do not adequately address pollutant discharges from your site. Source control BMPs, as presented in Chapter Three, must always be implemented before treatment BMPs are considered.

The following information describe some basics of water quality treatment systems/facilities. Design and construction details can be found in the King County Surface Water Design Manual (which contains relevant information for the treatment BMPs discussed). A private vendor specializing in the treatment system or an engineering consultant can provide information on treatment systems.

Businesses and agencies are allowed to select a treatment BMP other than those presented in this manual if they follow the adjustment process as outlined in the King County Surface Water Design Manual or if they complete the Alternative BMP request in this manual.

Table 5.2 (next page) presents a brief description of some typical water quality treatment BMPs. Table 5.3 presents water quality treatment BMPs for removing specified pollutants. One treatment BMP usually cannot treat all pollutant problems. Each BMP is designed for a specific purpose and is capable of removing only specified pollutants. If you decide to install a water quality treatment BMP, always ensure that it is removing the pollutant of concern from your site runoff.

TABLE 5.2
WATER QUALITY TREATMENT BMPs

TREATMENT BMP	BRIEF DESCRIPTION
Oil/Water Separator	An underground vault specifically designed to remove oil and grease. Also will remove floatable and some settleable solids.
Catch Basin Insert	A filtering device that is installed within an existing catch basin and uses various sorbent materials and settling space to collect pollutants.
Catch Basin Sump and Vault Filter	A device similar to catch basin inserts, only larger and placed underground.
Leaf Compost Filters	A filtering device that is installed above or below ground and uses leaf compost to remove pollutants from stormwater.
Wet Pond, Constructed Wetland, Wet Vault	A wet pond is a stormwater pond that retains a permanent pool of water. A constructed wetland is similar to a wet pond, but shallower and supporting wetland vegetation in large areas. A wet vault is an underground, covered, engineered structure that retains a permanent pool of water.
Vegetated Biofilter - Biofiltration Swale and Filter Strip	A biofiltration swale is a long, gently sloped ditch or depression designed to treat water as it passes through the vegetation. Grass is the most common vegetation. A filter strip is a grass area, wider than biofilters, also with gentle slopes. Water usually enters as sheet flow from the adjacent pavement.
Sand Filter	A structure placed in the landscape, with grass grown on top, or in vaults. Stormwater passes through the sand allowing particulate pollutants to be filtered out.
Infiltration	A normally dry basin which temporarily stores stormwater until it soaks through the bottom and sides of the basin, and infiltrates into surrounding soil.
Chemical Treatment	See the King County Design Manual for allowable chemical treatment including chitosan and alum and CO2 sparging.

TABLE 5.3
APPROPRIATE USES FOR WATER QUALITY TREATMENT BMPs

POLLUTANTS TO REMOVE	APPROPRIATE TREATMENT BMPs
Oil/Grease Sources: vehicle and equipment areas, industrial areas, food preparation	Oil/water separators; catch basin inserts; catch basin sump/vault filters, leaf compost filters.
Sediments/Solids Sources: sand/gravel storage, construction sites, unpaved areas, agriculture/livestock uses	For coarse sediments -Wet pond/vault; constructed wetland (with forebay); vegetated biofilter; sand filter; catch basin insert; catch basin sump/vault filters; leaf compost filters. For fine sediments -Wet pond/vault; constructed wetland (with forebay); vegetated biofilter; sand filter. Also see catch basin sump/vault filters. Chemical treatment
Phosphorus Compounds Sources: detergents/cleaners, fertilizers, organic matter, animal wastes	For particulate phosphorus -Wet pond/vault; constructed wetland (with forebay); vegetated biofilter; sand filter. If dissolved phosphorus must also be removed - a large "oversized" wet pond or sand filter.
Nitrogen Compounds Sources: fertilizers, animal wastes, organic matter	For particulate nitrate -Wet pond/vault; constructed wetland (with forebay); vegetated biofilter; sand filter. For dissolved nitrate - constructed wetland.
Metals Sources: industrial areas, vehicle and equipment areas, paints, pesticides	For particulate metals -Wet pond/vault; constructed wetland (with forebay); vegetated biofilter; sand filter. For dissolved metals - leaf compost filter or constructed wetland.
Fecal Coliform Bacteria Sources: animal wastes; fertilizers	There is no treatment BMP that can reliably reduce fecal coliform bacteria to acceptable levels. Some studies have shown constructed wetlands provide some benefit.
pH Sources: metal plating, printing/graphic industries, cement/concrete production, cleaners	A constructed wetland can neutralize some ranges of pH.
BOD and Trace Organics Sources: organic debris, food wastes, some chemical wastes	For particulate BOD - see "particulate nitrate" above. For dissolved BOD -A constructed wetland will remove some dissolved BOD and trace organics; more reliable performance requires activated carbon.

BMP INFO SHEET #9

Oil/Water Separator

APPLICATION AND DESCRIPTION

An oil/water separator is a device designed to remove oil, grease, and similar floatable pollutants from stormwater runoff. The name commonly refers to an underground structure. If a site requires spill control due to fueling activities, more simple designs exist.

Oil/water separators are appropriate at locations where petroleum products may be difficult to control with source-control BMPs. An oil/water separator can be a tee section in a catch basin that contains spills on an emergency basis, or a complex unit that is designed to treat runoff from sites with high vehicle use, equipment storage and parking or fueling areas. Tee sections or down turned elbows are only effective in controlling and temporarily capturing and containing spills. Spills must be cleaned up immediately to avoid downstream contamination of surface waters and other natural resources.

For many sites, such as small parking lots, a simple tee section in a catch basin will temporarily retard pollutants, making it possible to clean up a spill before pollutants leave the site. On sites with greater potential for oil spills and high concentrations of oil and grease in runoff, such as a fleet vehicle lots, auto repair shops, or fueling stations, a more complex oil/water separator is needed.

Tee sections or down turned elbows or “snouts” can be placed in catch basins along with oil pads and booms in the primary conveyance system. Because of their simplicity, there are few restrictions on their application and locations of use. If tee sections are used or installed in catch basins, other measures must be used such as oil absorbent pads or booms.

There are two types of complex oil/water separators commonly used in situations where oily runoff is a significant concern: the American Petroleum Institute (API) and the coalescing plate interceptor (CPI). The API separator has the appearance of a long septic tank. An API separator must be large relative to the area it is treating to be effective. By placing coalescing plates in the separator, its size can be significantly reduced while retaining the efficiency needed. Consequently, the CPI separator is more commonly used. The savings from reducing the cost of vault construction offset the relatively high cost of the plates.

These oil/water separators should be used for targeted pollutant removal in high traffic areas where oil or petroleum products are a significant problem rather than as an all-purpose stormwater treatment facility. The separator will function more efficiently and require less

maintenance if the amount of stormwater passing through is limited. Only runoff that has been exposed to high oil activity areas should be directed through the oil/water separator. Avoid directing stormwater (from other areas on your site) through the separator.

For information on oil/water separators that will be used as pretreatment prior to discharge to the sanitary sewer, contact your local sewer agency or King County's Industrial Waste Program within the Wastewater Treatment Division.

DESIGN AND MAINTENANCE

API and CPI oil/water separators must be designed and sized in accordance with the King County Surface Water Design Manual.

Oil/water separators must be checked frequently during the wet season. These inspections must occur often enough to prevent BMP failure that allows waste products to exit the oil/water separators, or risk violating King County Code 9.12 and be cited. How often material should be removed depends on the amount of petroleum in the influent, but the separator should be cleaned at least quarterly, and particularly in the fall before the first storm of the wet season. All residuals removed from the surface and vault bottom must be disposed of properly. In addition, the following maintenance requirements apply:

- Oil absorbent pads should be replaced as needed, but should always be replaced in the fall prior to the wet season, and in the spring.

- The outlet pipe of the separator must be blocked during cleaning operations.

- Waste oil and residuals shall be disposed of in accordance with current Seattle-King County Department of Public Health requirements. Several vendors handle waste oil hauling and disposal.

- Any standing water removed during the maintenance operation must be disposed to a sanitary sewer at a discharge location approved by the local jurisdiction.

BMP INFO SHEET #10

Catch Basin Insert

APPLICATION AND DESCRIPTION

A catch basin insert is a device installed in a storm drain to provide water quality treatment through filtration, settling, or absorption. Catch basin inserts are not a requirement for properties in King County unless other source control measures are not effective.

Catch basin inserts are products which fit into existing catch basins and are generally configured to remove one or more of the following contaminants: coarse sediment, oil and grease, and litter and debris. It has been suggested that some units may be able to remove dissolved pollutants and pollutants associated with fine sediments. When selecting an insert, ensure that your specific pollutant-removal needs are met. ***As with any treatment BMP, catch basin inserts should never be used in place of sound source control practices.***

Oil and Grease Removal: Inserts designed for the removal of oil and grease contain, and depend on, oil-absorbing media. The King County Surface Water Design Manual (SWDM) requires specific materials/media to be used in catch basin inserts to ensure oils are not re-released during storm flows. These materials are described in Section 6.1.2 of the SWDM. These inserts are appropriate for use in any area in which vehicles are used, maintained or stored. Because of the small storage capacity of these inserts, they are not acceptable as the sole line of defense against actual oil spills in areas where large amounts of oil could be released. Large amounts of sediment entering the catch basin significantly reduce the effectiveness and longevity of the oil absorbing media. Under these conditions, an oil/water separator with a pre-settling chamber may be more appropriate.

Sediment Removal: Inserts designed for sediment removal may be used at construction sites, and in situations where stockpiles or unpaved areas are likely to contribute high sediment loads. They may also be appropriate for small (low traffic) businesses. They are not considered a substitute for other pollutant-removal BMPs.

Debris Removal: Inserts can also be used for the removal of litter and debris. Some evidence suggests that the removal of large debris such as cigarette butts, candy wrappers, and beauty bark reduces the amount of bacteria and solids in receiving waters.

DESIGN AND MAINTENANCE

Unlike most other treatment BMPs, which must be designed and constructed specifically for your site, catch basin inserts may be purchased directly from a vendor and installed by the user. While standardized insert units are available, most vendors are able to customize their systems for your site. This service may improve the performance of your drainage system while adding relatively little to the cost of the product. Before purchasing a catch basin insert, the following factors must be considered.

Conveyance Capacity: The conveyance capacity refers to the amount of water that the insert can pass without causing flooding. This capacity is equal to the amount of water that is able to pass through the insert's treatment area, plus the amount that can pass through the built-in overflow. As the unit treats the stormwater, the treatment area begins to clog and the total conveyance capacity is reduced. If maintenance is neglected, or an unusually high amount of sediment or debris enters the system, the treatment capacity may drop to zero, and all of the water will have to exit through the overflow. In order to minimize the chance of flooding, the insert should be able to pass the maximum expected flow from the area draining to the catch basin. The vendor should be able to tell you what the overflow capacity is.

Treatment Capacity and Bypass: The treatment capacity refers to the amount of stormwater that the insert unit will pass through its treatment area. The insert unit should be sized to ensure that most of the water entering the drain inlet is treated even as the treatment area starts to clog. The ability of the insert to remove pollutants will be reduced if water is able to seep between the storm drain grate and the edge of the pavement. Ensure that this gap is sealed. The vendor should provide you with information on how to prevent this situation and information on the treatment capacity of the system.

Maximum Weight: The maximum weight of the insert/filter will be equal to the weight of the insert/unit when new, plus the weight of the sediment and water trapped in the unit. Under the most extreme cases, the treatment area of the insert/unit may become completely clogged, and the unit may be full of water when it comes time to service it. It is essential the maximum weight of the insert be less than what can be lifted by the people or equipment to be used during maintenance. Before ordering a system, or having a system customized to your site, be sure the vendor knows how you will be removing the insert/unit for maintenance.

Simplicity and Durability: Since the installation of one or more catch basin inserts represents a long-term commitment to maintenance, it is important that the unit selected be easy to use and maintain, and that it is built to last. Be sure to have the vendor provide a complete demonstration of the product at your site, and if possible, ask to try an insert for an extended period of time before committing to its purchase and use.

Catch basin inserts will generally require more frequent, but less costly maintenance than other treatment BMPs. Frequent inspection of the insert is necessary to ensure that it is not clogged by large debris. Actual maintenance will generally consist of removing the insert from the catch basin, cleaning or replacing the filter media (if applicable), and re-installing the catch basin insert.

In addition to the weight considerations mentioned above, you must ensure that the drain inlet will not be obstructed when it is time to clean the filter, that you have the time and personnel to do the job (or can arrange for this service through a private contractor), and that you have a legal means of disposing of the trapped material and spent media. In most cases these materials may be disposed of as regular solid waste, however, media used for oil and grease removal may require special treatment. See BMP Info Sheet 2 in this chapter for more information on disposal.

Maintenance frequency will vary depending on the amount and type of pollutant targeted. Tests conducted by King County suggest that initially, all units should be inspected every one to two weeks (except during periods of dry weather), and that complete maintenance will be required approximately monthly. Units configured simply to catch litter and debris may work for several months without maintenance. The simplest way to determine whether the units need maintenance is to inspect them during a rainstorm and see whether water is exiting out the overflow. If this is the case, the unit is probably in need of service. Alternatively, the depth of sediment accumulation or appearance of the filter media may provide insight as to whether the unit is in need of maintenance. Again, be sure the vendor provides you with this information.

BMP INFO SHEET #11

Processing Requirements for Use of Soil Amendments on Construction Sites

Purpose: This Info Sheet establishes procedures for implementing BMPs when using soil amendments on construction sites. See Activity Sheet 43, "Use of Soil Amendments on Construction Sites" for a description of the BMPs. This document outlines an expedited review process and typical approval conditions that will allow contractors and builders to use soil amendments without impacting water quality. Additional BMPs may be required based upon site specific conditions that may warrant more protection. This policy is limited to those amendments, defined below, commonly known to add stability to sloppy soil conditions but can alter water runoff quality.

Use of Soil Amendments: It is sometimes a construction practice to add soil amendments to the surfaces of some construction areas in order to stabilize the ground for building. This practice includes placing an additive on the ground then mixing with the soil to a specified depth and finally compacting the mix. When mixed with the soil, the moisture in the ground may allow these additives to create a chemical reaction that cures similar to concrete and may absorb excessive moisture to allow soils to be compacted. The end result is a stable site for constructing a road or building pad.

Because soil amendments may be rich in lime content and other material, water runoff from these areas can be affected. If not controlled and treated, this could result in a degradation of water quality and natural drainage systems. Because these additives come in a fine powder form, the actual application can create fugitive dust. When mixed with water, some additives can become corrosive.

Authority: KCC 9.12.025 prohibits discharges of polluted or contaminated water into surface or storm water drainage systems. The purpose of this statute is to protect surface and ground water by regulating the discharge of potentially contaminated surface water. If soil amendments are proposed with an initial application, an environmental review is required, under SEPA, which assesses impacts, provides public input and mitigated conditions for its use.

King County Road Standards, Section 4.02 also requires an engineered design for use of a soil amendment on road surfaces or around drainage systems. The design may incorporate a thorough assessment of soil composition and laboratory analysis. The Surface Water Design Manual authorizes DDES to adopt BMPs for the control and protection of surface water. Currently, for all sites, the BMPs established in this policy are the minimum standards that shall be applied.

Definitions:
The following are definitions of soil amendment products that are allowed for use under these procedures:

1. Cement Kiln Dust (CKD) is a by-product in the manufacturing of cement[1].
2. Cement Treated Base (CTB) utilizes Portland Cement Type II as the soil additive.

Procedure: An applicant may apply for use of soil amendments allowed under this policy anytime during the permit application review or after the permit has been issued and site construction is underway. After making a submittal to DDES, the applicant may receive approval conditions. Conditions may vary from site to site, but typically will include many of the BMPs included in this policy.

Applicants should identify any use of soil amendments as early in the process as possible to avoid delays in obtaining approval for use during the construction phase. If a site has known soil and water conditions that might make work during rainy periods difficult, they may want to plan to use soil amendments on their site. Obviously, if this issue is addressed at the permit review phase, implementation in the field can occur without delay. However, because of the potential risks of surface water pollution discharge and required treatment, an environmental assessment will be necessary before conditions for use can be established.

Limitations: This policy applies to intended the use of soil amendments in areas that will be covered impervious surfaces. For areas not covered by impervious surfaces, additional reviews, study, and BMPs may be required. In addition, alterations to original approved use plans will require a resubmittal for approval. Approval for the use of the soil amendments in unincorporated King County can only occur by strictly following the procedures contained herein and not by any other approval obtained from DDES.

Submittal Requirements: To obtain approval for the use of soil amendments allowed under this policy, the applicant shall prepare a submittal package to DDES that includes the following:

- Letter to DDES requesting use of soil amendments at a construction site allowed under this policy.
- Document or letter attachment that identifies source of materials and description of mixing and laydown process, plan for disposal of treated contact water, sanitary sewer permits and/or BMPs, and special precautions proposed to prevent the contamination of surface or stormwater drainage systems, other than 'sealed' drainage systems..
- Site Plan: Show a site plan map which:
  1) Shows overall grading plan showing existing and proposed contours.

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[1] CKD is collected by air pollution control devices used to clean kiln exhaust during the manufacturing of Portland Cement. EPA has classified CKD a non-hazardous waste product provided management standards are followed for groundwater protection and control of fugitive dust releases.

CKD should not to be confused with Fly Ash, which is a by product of burning coal or wood and incineration of other material. Fly ash can contain major oxides and trace metals, depending upon the fuel source, and is considered too hazardous for use as a soil amendment. Using this product is not authorized or endorsed by DOE or King County.

2) Identifies sensitive areas and permanent or temporary drainage facilities.
3) Identifies areas that soil amendment is planned.
4) Shows depths of application and percent of amendment to be used.
5) Shows location of special wheel wash facility.
6) Shows location of collection and conveyance swales or pipes for contact water.
7) Shows location of sealed storage/treatment tanks or temporary ponds (fully lined).
8) Identifies any discharge point from the site into natural drainage systems.
9) Includes soil log locations that identify seasonal high groundwater areas.

- Report and analysis of engineering mix design which includes depths of application and percent of amendment usage.
- For proposals that use CKD and CKD additive, provide analysis of source material for soluble contaminants. Include a description of fuel source.
- Monitoring criteria, including locations for pH and turbidity testing.
- Provide contingency plan should use of soil amendment and site and weather conditions result in polluted or contact water entering natural drainage systems.
- Provide contact information or water quality specialist assigned to monitor application of soil amendments and BMPs.

If the project is under construction, the applicant shall contact the DDES inspector assigned to the project to initiate a review for compliance with the BMPs and requirements herein. Otherwise contact the planner or engineer assigned to review the permit or land use application.

Review and Approval: Once the review has been completed, the applicant shall be notified by letter which stipulates the conditions of approval. Prior to authorizing the use of soil amendments at the site, the applicant shall provide a special restoration financial guarantee cash deposit in the amount as determined by the existing, established processes. Note: It remains the applicant/contractor's responsibility to comply with any other applicable state or federal regulations such as use of NIOSH respiratory protection, safety goggles, gloves and protective clothing whenever using hazardous materials.

Applicable Standards:

Typically, all proposals using soil amendments in unincorporated King County shall have these conditions as standard requirements:

1. Prior to any application of CKD/CTB, the general contract shall hold a preconstruction meeting with the assigned DDES inspector at least 3 working days in advance.
2. CKD will not be permitted for use in areas adjacent to or in proximity to wetlands and streams areas. CTB may or may not be permitted in these areas.
3. Areas not covered by impervious surfaces:
    - CKD will not be permitted in areas that will not be covered by impervious surfaces.
    - If CTB is proposed in these areas, an analysis of whether or not the soil amendment will change the post-development runoff characteristics and the permanent stormwater facilities were sized appropriately shall be submitted for review. Use of CTB in areas not permanently covered by impervious surface may require re-sizing of the permanent stormwater facilities.

4. If CKD is proposed, the contractor shall provide mill certificates verifying the product composition. The contractor/developer must be prepared to follow BMPs during and after soil treatment and be prepared to treat runoff from the treatment area(s) immediately. All stormwater collection systems must be in place and all equipment (pH meters, dry ice, etc.) must be onsite.
5. Collection of stormwater (see BMP # 5):
   - Stormwater from the application area shall be kept separate from and prevented from co-mingling with uncontaminated stormwater.
   - During the application of CKD/CTB, stormwater runoff shall be collected in temporary collection systems and shall not be allowed to enter the permanent facilities. Permanent drainage systems shall be capped to prevent contact stormwater from entering the inlets of the catch basins. Stormwater from the application area shall not be collected in the temporary/permanent detention ponds, even if the underlying soils are 'impermeable'.
6. Treatment: If necessary, pH adjustment shall be done in the collection tanks or temporary ponds and not in the permanent detention ponds.
7. Disposal options: The proposal to use CKD/CTB must contain a disposal plan that may include one or a combination of sanitary sewer or approved offsite disposal. Treated contact water may be discharged to the sanitary sewer if authorizations are obtained from the King County Industrial Waste Program (206-263-3000) and the local sewer district. All discharge conditions (e.g. pH, settleable solids) must be followed. If a sanitary sewer is not available at the site, contact water may be transported offsite to an approved site for disposal and proof of proper disposal must be submitted to King County. All authorizations for disposal shall be obtained prior to CKD/CTB application.
   - Infiltration: Depending on the site conditions, pH-adjusted stormwater may be infiltrated. Prior to infiltration, pH must be between 6.5 and 8.5.
   - Surface Water: Contact water from the application area shall not be discharged to surface waters, even if treatment has adjusted the pH.
8. Emergency backup plan: An emergency backup plan must be prepared and ready to implement to handle large quantities of stormwater.
9. Monitoring shall be conducted to determine that contact stormwater is not leaving the site. Offsite monitoring shall also be conducted to identify impacts to adjacent water bodies. Bonding may be required to cover mitigation of impacts and restoration.
10. A soils specialist will establish the mixing percentage for onsite soils. Soil amendments will never occur in excess of the ability of the onsite equipment and resources to meet all BMP requirements.
11. For sites one acre or larger, a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater permit must be obtained from DOE. NPDES permits and 'Stormwater Pollution Prevention Plans' (SWPPPs) must be amended and the use of CKD/CTB must be approved by DOE prior to application.

The contractor/developer shall comply will all federal, state, and local regulations. A health and safety plan may be required for the protection of King County inspectors.

Additional BMPs may be applicable depending on mix design, proximity of wetlands or streams (e.g. within 300 feet of class/type I and 100 feet or less for other types) and site conditions.

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VI
TECHNICAL ASSISTANCE

INTRODUCTION

The quality of stormwater runoff from commercial and industrial developments, residential areas, and agricultural lands is of increasing concern with respect to protection of water resources in King County. Much of our water pollution is due to pollutants that are washed off the land during and following storms, eventually degrading surface and ground waters. Runoff from urban areas is one of the leading causes of water pollution in the United States. The Best Management Practices (BMPs) in Chapter 3 (for business and multifamily activities) and Chapter 4 (for single family residential activities) serve to reduce the amount of pollutants entering our water.

This chapter provides information on where you may obtain technical assistance for understanding, choosing, and designing appropriate BMPs for your property. The information is identified according to subject matter and function (such as selecting appropriate BMPs, hazardous waste management, landscaping, and automotive industry). This is not an inclusive list of sources of assistance but should provide a jump start on locating information.

In addition, a quick-reference phone list is included at the end of the chapter.

TECHNICAL ASSISTANCE

There are a variety of organizations and programs that can offer technical assistance in selecting and implementing BMPs. These sources of information and assistance range from local and regional programs to state and federal agencies. Governmental entities as well as private sector associations are available to provide suggestions and guidance regarding the most effective and appropriate measures to take in order to protect King County's valuable water resources. For best results, local organizations or programs should be contacted before federal or state agencies are consulted. This section provides names, contact information, and brief descriptions of several sources of information and assistance available to the businesses and residents of unincorporated King County.

In addition to the personal assistance offered by many organizations and programs, there is also a broad range of written materials available to help businesses and residents select, design, and understand applicable BMPs for water quality protection. Many of these can be obtained free of charge from local associations or governmental agencies. This section also provides information regarding several publications, manuals, books, and newsletters that can help in the formation of

pollution prevention strategies to protect King County's water quality.

GENERAL BMP SELECTION

King County Water and Land Resources Division

The Water and Land Resources Division has water quality engineers available to provide free on-site consultations to businesses and residents for assistance in implementing the water quality BMPs in this manual.

For information, or to request an on-site consultation, contact:
King County Water and Land Resources Division
201 South Jackson, Suite 600
Seattle, WA 98104
Telephone: (206) 296-1900
Web site: http://www.kingcounty.gov/environment/waterandland/stormwater

King Conservation District

The King Conservation District can provide technical assistance for a variety of stormwater pollution control efforts related to residences, small businesses, commercial farms, and hobby farms. Advice is available on effective erosion control practices and methods for specific site conditions, including stream bank stabilization and slope stabilization techniques. The Conservation District also has experience in controlling water quality problems on commercial and hobby farms. Personnel are available for site visits and can assist in effective stormwater pollution prevention planning for individual sites. The Conservation District can prepare farm management plans to assist in compliance with King County Code 9.12, Water Quality. The Conservation District does not assist with BMP implementation on large business sites (such as malls) or industrial sites.

For information, contact:
King Conservation District
935 Powell Avenue SW
Renton, WA 98055
Telephone: (206) 764-3410

Trade/Business Associations

Local trade or business associations can be valuable sources of information for specific BMP applications on a business property. Many trade and business associations have developed pollution prevention information for the benefit of their members that is unique to their specific types of operations. Contact the appropriate trade or business association to obtain information, BMP assistance, and help in locating other businesses that are working out similar problems.

SANITARY SEWER AGENCIES

King County Wastewater Division—Industrial Waste Program

The Industrial Waste Program provides information on what can be discharged to the sanitary sewer and works with businesses to meet individual discharge requirements. Industrial Waste can also assist with information for rerouting illicit storm sewer connections to the sanitary sewer.

For information, contact:
King County Industrial Waste Program
130 Nickerson Street, Suite 200
Seattle, WA 98109
Telephone: (206)263-3000
Web site: http://www.kingcounty.gov/industrialwaste

Local Sewer Agency

If you are not served by King County, contact your local sewer agency for information on allowable discharges. The name of your local sewer agency is identified on your water and sewer bill.

HAZARDOUS WASTE MANAGEMENT

The Business Waste Line – (206) 296-3976

The Business Waste Line has staff to answer questions from small businesses about hazardous waste. The Waste Line staff make referrals to other agencies and vendors and send out printed materials. The Waste Line may also be used to report complaints and hazardous waste violations. Calls are anonymous if requested.

For information, contact:
The Business Waste Line Telephone: (206) 296-3976
Web site: http://www.govlink.org/hazwaste/

Hazardous Waste Library

The Hazardous Waste Library offers small businesses, citizens, agency staff, and local officials one place to go for hazardous waste information. The library has a wealth of onsite resources and is linked by computer to environmental information throughout the world. Anyone in King County can request help in person or by phone. The library can track down information, drawing on contacts in the community, government, trade associations, various industries, and other libraries.

For information, contact:
Seattle/King County Hazardous Waste Library
130 Nickerson Street, Suite 100

Seattle, WA 98109
Telephone: (206) 263-3050
Web site: http://www.govlink.org/hazwaste/

Hazardous Waste: A Management Guide for Local Businesses

This booklet contains information to help businesses that generate small quantities of hazardous waste understand and apply the laws that affect them. The guide includes information on hazardous waste regulations, a service directory, and sources to contact for more information.

To obtain a copy of this guide, contact:
The Business Waste Line Telephone: (206) 296-3976

Hazardous Waste Onsite Consultation Program

The Onsite Consultation Program provides free onsite visits to businesses that request assistance. Only small quantity waste generators or businesses that are potential small quantity waste generators qualify for this service. Staff work with the business owner to help develop a practical hazardous waste handling program, find alternatives, reduce waste, and comply with regulations.

For information on the program or to request an onsite consultation, contact:
Seattle/King County Hazardous Waste Management Program
130 Nickerson Street, Suite 100
Seattle, WA 98109
206-263-3050
Web site: http://www.govlink.org/hazwaste/

The Household Hazards Line (Household Hazardous Waste) –

(206) 296-4692

This telephone hot line provides hazardous waste information and referrals to the general public. (Businesses should call the Business Waste Line, also listed in this Reference Guide.) The Hazards Line tells citizens where to dispose of their hazardous waste and suggests less hazardous alternatives. It also provides operations times and locations for household disposal sites for King County and the City of Seattle.

For information, contact:
The Hazards Line Telephone: (206) 296-4692
Web site: http://www.govlink.org/hazwaste/house

Seattle-King County Department of Public Health Waste Characterization

This program serves businesses in Seattle and King County that have questionable wastes. Information supplied by the generator on questionable wastes such as sludges, sandblast waste, treated wood, and contaminated soils is reviewed by the Health Department. Written authorizations are issued for those wastes that will be allowed in

the garbage.

For information, contact:
Telephone: 206-296-4633

Washington Toxics Coalition

The Washington Toxics Coalition is a nonprofit organization dedicated to providing information on reducing the use and production of toxic materials. The Coalition offers fact sheets, research materials, and personal assistance to individuals interested in reducing toxics (such as pesticides, solvents, cleaning chemicals, and a variety of other chemicals) and finding safer alternatives to toxic materials.

For written information or personal assistance, contact:
Washington Toxics Coalition
4516 University Way NE
Seattle, WA 98105
Telephone: (206) 632-1545

Washington State Department of Ecology Dangerous Waste TSD Information

The Department of Ecology is the source of information on businesses that provide services in regard to dangerous waste treatment, storage, and disposal (TSD), and information on applicable regulations for TSD businesses.

Contact:
Washington State Department of Ecology
Telephone: (360) 407-6000 (Olympia), (425) 649-7000 (Bellevue)
Web site: http://www.ecy.wa.gov/programs/hwtr/

COMMERCIAL AND HOBBY FARMS

Washington State University Cooperative Extension–King County

The Extension Service offers a variety of educational services designed to promote sensitivity to water quality concerns in land development planning. Extension staff have expertise in several types of land uses, including agricultural production, livestock management, small farms, forestry, gardening, lawn care, and others. Several programs targeted at specific land use practices offer educational materials, workshops, conferences, and individual consultation for landowners and land managers. Although the Extension Service cannot make individual site visits, staff can advise on effective BMPs, supply supporting information, and contact information for other groups with further information.

For information, contact:
WSU Cooperative Extension–King County

919 SW Grady Way Ste 120
Renton , WA 98055
Telephone: (206) 205-3100 or (206) 296-DIAL for prerecorded information on hundreds of topics related to gardening, horticulture, and agriculture
Web site: http://king.wsu.edu/

King Conservation District

See earlier description.

LANDSCAPING, NURSERY, AND GOLF COURSE PRACTICES

University of Washington Center for Urban Horticulture Elisabeth C. Miller Library

The Center for Urban Horticulture is a valuable resource for information on environmentally sensitive gardening, landscaping, and nursery practices. The Center has the only horticultural library in the Northwest, the Elisabeth C. Miller Library. Although personnel are not available for answering individual questions on vegetation-related BMPs, the library is open to the public for information that can assist in determining effective BMP strategies.

Elisabeth C. Miller Library
3501 NE 41st Street
Seattle, WA 98195
For library hours, call: (206) 543-0415
Web site: http://www.millerlibrary.org

Golf Course Best Management Practice Manual

The King County Department of Development and Environmental Services has a BMP manual specifically applicable to golf courses and their stormwater pollution concerns. The Golf Course BMP Manual provides details on environmentally sound site planning provisions, construction practices, vegetation planting and maintenance practices, pesticide use, and general golf course maintenance practices. This manual should be consulted for effective BMPs applicable to existing and proposed courses.

To obtain a copy of the manual, contact:
King County Department of Development and Environmental Services–Resource Planning Section at 206-296-6640 or King County Water and Land Resources Division
Telephone: (206) 296-6519

The Water Quality Action Manual for Greenhouse and Nursery Operators

This is a water quality protection guide for greenhouse and nursery growers that merges pollution control and prevention, economics, worker safety, and public relations into one easy-to-read manual. The American Association of Nurserymen, the Society of

American Florists, the Professional Plant Growers Association, and Roses, Inc developed it.

To obtain a copy of this manual, contact:
AAN Publications
1250 I Street NW, Suite 500
Washington, D.C. 20005
Telephone: (202) 789-2900
Web site: http://www.anla.org

Washington State University Cooperative Extension - King County

See earlier description.

LAND USE REQUIREMENTS

King County Department of Development and Environmental Services

The Department of Development and Environmental Services (DDES) should be consulted to determine whether any permits may be required in constructing BMPs, modifying property layout, or otherwise altering a site to control runoff contamination. If permit requirements are overlooked or ignored, business or property owners may be subject to fines. DDES should be contacted while plans are being formed for BMPs, and before any action is taken, to determine permit applicability and potential fees.

For information, contact:
King County DDES
900 Oaksdale Ave SW Renton, WA 98055-1219
Telephone: (206) 296-6640
Web site: http://www.kingcounty.gov/property/permits

King County Fire Marshal

Questions on specific fire code requirements for individual site conditions and potential BMP scenarios can be directed to the King County Fire Marshal's office.

For information, contact:
King County Fire Marshal
900 Oaksdale Ave Renton, WA 98055-1219
Telephone: (206) 296-6675

King County Critical Area Ordinance User's Manual

King County has enacted a Critical Areas Ordinance (CAO) to define and protect certain land and water features throughout the county. The Environmental Education Section of King County's Department of Development and Environmental Services (DDES) has prepared a CAO User's Manual that serves as a reference for the CAO in

an easy-to-understand format. The CAO User's Manual can help determine special considerations that may be necessary for implementation of BMPs within or near a designated sensitive area. The King County Environmental Education Section also offers training at the community level on sound development practices (including BMPs) related to erosion control, clearing and grading, wildlife, and sensitive areas.

To obtain a copy of the CAO User's Manual, contact:
King County DDES
Environmental Education Section
900 Oaksdale Ave Renton, WA 98055-1219
Telephone: (206) 296-6640

EROSION CONTROL PRACTICES

Master Builders Association of King and Snohomish Counties

This is a business association primarily for residential construction companies. Members have experience in applying erosion and sediment control BMPs on both small and large sites. The association can provide references on erosion and sediment control products for use on construction sites as well as material suppliers who carry erosion and sediment control products.

For information, contact:
Master Builders Association
335 116th Ave SE
Bellevue, WA 98004
Telephone: (425) 451-7920

Associated General Contractors

This association provides information and training on erosion and sediment control for contractors and field staff. The Association also provides resources in the areas of waste disposal and erosion/sediment control. It provides information on recommended water quality protection methods for contractors who maintain equipment yards or are involved in building construction or site preparation activities, such as clearing and grading.

For information:
Associated General Contractors
1200 Westlake Avenue North, Suite 310
Seattle, WA 98109
Telephone: (206) 284-0061
Web site: http://www.constructionfoundation.org

King County Surface Water Design Manual

This manual contains the requirements and standards for designing surface and

stormwater management systems in King County. It also includes a chapter on erosion and sediment control requirements for permitted sites.

To obtain a copy of the manual, contact:
King County Water and Land Resources Division
201 South Jackson, Suite 600
Seattle, WA 98104
Telephone: (206) 296-6519
Web site: http://www.kingcounty.gov/environment/waterandland/stormwater

Stormwater Management Manual for Western Washington

The Department of Ecology developed this manual as a model for local governments. It contains requirements for stormwater management system design, erosion control, and urban best management practices. Volume II discusses erosion and sediment control.

To obtain the manual, contact:
Publications Distribution Office
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600
Telephone: (360) 407-7472
Order by title and publication number 91-75

King Conservation District

See earlier description.

RECYCLING AND REUSE PRACTICES

King County Solid Waste Division - Business Recycling Program

This program assists businesses with recycling by: 1) providing information on waste reduction and recycling services for your particular needs; 2) helping you work with your employees to promote participation; 3) offering information on buying recycled products; and 4) providing you with ongoing support to ensure your program is successful. The program also runs "GreenWorks" a special program that recognizes individual business recycling efforts.

For more information, contact:
GreenWorks Waste Reduction and Recycling Program
King County Solid Waste Division
400 Yesler Way, Room 600
Seattle, WA 98104
Telephone: (206) 296-8800

The Guidebook for Implementing Curbside and Dropoff Used Oil Collection Programs

Washington Citizens for Recycling, a nonprofit organization, has prepared this guidebook for general public use to enhance used oil recycling efforts. Businesses interested in recycling used oil can use this guidebook to determine how they can recycle oil efficiently as well as how they can team with other businesses to form joint oil recycling programs.

For information on obtaining the guidebook, contact:
Washington Citizens for Recycling
157 Yesler Way, Suite 309
Seattle, WA 98104

Industrial Materials Exchange (IMEX)

IMEX provides a free service helping businesses that have surplus materials find businesses that need them. As an alternative to disposal, exchanges reduce disposal costs for generators, enable secondary users to obtain useful materials at low cost (or no cost), and reduce the amount of material that is permanently disposed. Surplus or waste materials, such as solvents, paint, plastics, and wood, are exchanged. IMEX provides this service through a bimonthly catalog, which is mailed to businesses in the region. The catalog lists materials available and materials wanted. Materials are also listed on the National Materials Exchange Network computer bulletin board (accessible by computer modem). IMEX is a component of the Local Hazardous Waste Management Program in King County, which is a multi-agency effort.

For information on the catalog or computer service, contact:
IMEX
Wells Fargo Center
999 3rd Ave Suite 700
Seattle, WA 98104
Telephone: (206) 296-4899

Washington State Department of Ecology Waste Reduction, Recycling, and Litter Control Program

The Department of Ecology has extensive information on recycling, including details on types of wastes that can be recycled, lists of commercial vendors that recycle certain types of wastes, and locations of drop-off stations for recyclable materials.

SOLID WASTE DISPOSAL

King County Solid Waste Division

The Solid Waste Division can provide information on solid waste disposal issues.

For questions on where to dispose of questionable solid waste, contact:
King County Solid Waste Division
General Information Telephone: (206) 296-6542

For information on the disposal of construction, demolition, and land clearing debris, contact:
Regional Disposal Telephone: (206) 646-2400

Seattle-King County Department of Public Health Waste Characterization

See earlier description.

BOAT AND MARINA PRACTICES

Northwest Marine Trade Association

The Northwest Marine Trade Association is a business organization with experience in water pollution issues related to a variety of boat facilities. The association can offer advice on BMPs as well as provide further contacts in the King County area for more detailed information applicable to individual site conditions.

For information, contact:
Northwest Marine Trade Association
1900 North Northlake Way, Suite 233
Seattle, WA 98103-9087
Telephone: (206) 634-0911

AUTOMOTIVE INDUSTRY

Auto Industry Guides to Managing Hazardous Wastes

The Washington State Department of Ecology has published eight guides for the automotive industry describing ways to manage hazardous wastes. These are small individual guide books for the following auto service areas: radiator shops, transmission shops, automotive machine shops, automotive repair shops, service stations, auto dealers, tire dealers, and auto body shops.

To obtain a guide, contact:
Publications Distribution Office
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600
Telephone: (360) 407-7472

Order by title and publication number. You can also download publications and guides from the Washington State Department of Ecology website at

http://www.ecy.wa.gov/biblio/automotive.html.

A Water Quality Resource Manual for the Automotive Service Industry

This manual serves as an educational tool to facilitate compliance with water quality regulations. The manual includes information on water quality problems and regulations, guidance on how to develop shop-specific BMPs and policies, and case studies on the problems and solutions of three repair shops in this region.

To obtain a copy of this manual, contact:
Puget Sound Alliance
130 Nickerson Street, Suite 107
Seattle, WA 98109
Telephone: (206) 286-1309

Vehicle Recycler Facilities

The Washington Department of Ecology has prepared a guidance document to assist vehicle recyclers in selecting best management practices. The title is "Best Management Practices to Prevent Stormwater Pollution at Vehicle Recycler Facilities."

To obtain the document, contact:
Publications Distribution Office
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600
Telephone: (360) 407-7472
Order by title and publication number. You can also download publications and guides from the Washington State Department of Ecology website at http://www.ecy.wa.gov/biblio/automotive.html.

Also refer to the Hazardous Waste Management Section listed earlier.

SCRAP METAL INDUSTRY PRACTICES

Scrap Metal Recycling Environmental Guidance Manual

Pacific Iron and Metal has developed a guidance manual for metal recyclers that suggests effective stormwater BMPs applicable in the metal recycling industry. The guidance manual has been reviewed extensively by several interested agencies and organizations in the Northwest, and it addresses regulatory issues in detail. The manual includes lists of pollutants associated with various types of recyclable materials that are likely to be encountered at typical metal recycling businesses. The guidance manual also offers suggestions for recyclers seeking the assistance of an environmental consultant.

For information on the guidance manual, contact:
Pacific Iron and Metal Telephone: (206) 628-6222
or Metro Telephone: (206) 689-3000

LABOR SUPPORT FOR IMPLEMENTATION

Washington Conservation Corps

The Washington Conservation Corps is a group of citizens, ages 18-25, who can offer free assistance on environmental cleanup projects such as stream restoration. A supervisory board of representatives from the state departments of Ecology, Wildlife, and Natural Resources oversees the Conservation Corps. The Conservation Corp's efforts are not intended for private sites, but the group may offer assistance in cooperative efforts by several businesses or residences to implement larger-scale BMPs that will benefit particularly sensitive water resources. The Department of Ecology, the Department of Wildlife, or the Department of Natural Resources must make a formal request for Conservation Corps assistance. Consequently, outside requests for services must be directed to one of these agencies.

For information, contact:
Washington Conservation Corps
P.O. Box 47600
Olympia, WA 98504-7600
Telephone: (360) 407-7248
Web site: http://www.ecy.wa.gov/programs/sea/wcc/

ACTIVITIES THAT MAY RESULT IN PROHIBITED DISCHARGES

According to King County Code 9.12.025B, the following activities may result in prohibited discharges to the surface water, stormwater or groundwater. Each activity has at least one activity sheet in this manual that describes the required best management practices specific to that activity.

This list is not a complete list of potential prohibited discharges. For the complete list, see the King County Code Title 9 for Surface Water Management at http://www.kingcounty.gov/council/legislation/kc_code.aspx.

1. Potable water line flushing

   Activity Sheet A-42 Potable Water Line Flushing or Tank Maintenance

2. Lawn watering with potable water

Activity Sheet A-26 Landscaping Activities

Activity Sheet R-5 Residential Gardening and Lawn Care

3. Dust control with potable water

   Activity Sheet A-44 Dust Control and Soil Erosion and Sediment Control

4. Automobile and boat washing

   Activity Sheet A-13 Vehicle Washing and Steam Cleaning

   Activity Sheet R-1 Residential Automobile and Boat Washing

5. Pavement and building washing

   Activity Sheet A-15 Pressure Washing of Buildings, Rooftops, and other Large Objects

   Activity Sheet A-31 Vehicle and Equipment Parking and Storage

   Activity Sheet A-32 Sidewalk Maintenance

   Activity Sheet R-6 Residential Maintenance and Repairs

6. Swimming pool and hot tub maintenance

   Activity Sheet A-33 Swimming Pool and Spa Cleaning and Maintenance

   Activity Sheet R-7 Residential Swimming Pool and Hot Tub Maintenance

7. Auto repair and maintenance

   Activity Sheet A-18 Engine Repair and Maintenance

   Activity Sheet R-3 Residential Automobile Repair and Maintenance

8. Building repair and maintenance

   Activity Sheet A-29 Building Repair, Remodeling, and Construction

   Activity Sheet R-6 Residential Maintenance and Repair

9. Landscape maintenance

   Activity Sheet A-26 Landscaping Activities

   Activity Sheet R-5 Residential Gardening and Lawn Care

10. Hazardous waste handling

    Activity Sheet A-2 Storage of Liquid Materials in Stationary Tanks

    Activity Sheet A-3 Storage of Liquid Materials in Portable Containers

    Activity Sheet A-5 Storage of Pesticides and Fertilizers

    Activity Sheet A-6 Storage and Treatment of Contaminated Soils

    Activity Sheet R-4 Residential Hazardous Waste Use, Storage and Disposal

11. Solid and food waste handling

    Activity Sheet A-8 Storage of Solid Wastes and Food Wastes (including cooking grease)

    Activity Sheet A-9 Storage of Scrap and Recycling Materials (including auto recycling facilities)

    Activity Sheet R-2 Residential Storage of Solid and Food Wastes

12. Application of pesticides

    Activity Sheet A-25 Chemical Applications other than for Landscaping

    Activity Sheet A-26 Landscaping Activities

    Activity Sheet R-4 Residential Hazardous Waste Use, Storage and Disposal

    Activity Sheet R-5 Residential Gardening and Lawn Care

Cascadia Revolving Fund	**(206) 447-9226**
King Conservation District	**(206) 764-3410**
King County Department of Development and Environmental Services	
Clearing and Grading	**(206) 296-6640**
Environmental Services	**(206) 296-6640**
Fire Marshal	**(206) 296-6675**
Code Enforcement	**(206) 266-6680**
Permits	**(206) 296-6600**
King County Local Hazardous Waste Program	**(206) 263-3050**
King County Solid Waste Division	
General Information	**(206) 296-6542**
Business Recycling Program	**(206) 296-8800**
King County Water and Land Resources Division	
Main Desk	**(206) 296-6519**
To request a water quality audit	**(206) 296-1900**
Master Builders Association	**(206) 451-7920** **(425) 641-8093**
Northwest Marine Trade Association	**(206) 634-0911**

Pacific Northwest Pollution Prevention Research Center	**(206) 223-1151**
Puget Sound Clean Air Agency (PSCAA)	**1-800-552-3565**
Seattle–King County Health Department	
Information on septic tanks and garbage containers	**Contact District Office**
Business Waste Line	**(206) 296-3976**
Waste characterization service	**(206) 296-4633**
Hazards Line (for households)	**(206) 296-4692**
Industrial Materials Exchange (IMEX)	**(206) 296-4899**
Pesticide applicator licensing	**(206) 205-4394**
University of Washington Center for Urban Horticulture-Elisabeth C. Miller Library	**(206) 543-8616**
Washington State Department of Ecology	
Northwest Regional Office (Bellevue)	**(425) 649-7000**
Waste reduction and recycling	**1-800-RECYCLE**
Reporting of Spills	**(425) 649-7000**
Washington Conservation Corps	**(360) 407-7248**
Publications Distribution Office	**(360) 407-7472**
Washington State Department of Natural Resources	**(206) 825-1631**
Washington State University Cooperative Extension - King County	**(206) 205-3100**
Master Gardener Hotline	**206-296-3440**
or for prerecorded information	**(206) 296-DIAL (3425)**
Washington Toxics Coalition	**(206) 632-1545**