

APPENDIX F

**SOURCES AND PREVENTION OF
STORMWATER POLLUTION**

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APPENDIX F SOURCES AND PREVENTION OF STORMWATER POLLUTION

1.0 INTRODUCTION

This appendix contains two sections. Section 2.0 discusses sources of stormwater contamination that are sampled for by the Capital Regional District (CRD) Stormwater, Harbours and Watersheds program. Section 3.0 discusses methods for preventing stormwater contamination.

2.0 SOURCES OF STORMWATER POLLUTION

The following discusses potential sources of contamination that can enter stormwater and affect public health and the environment.

2.1 Fecal Coliform Bacteria

Fecal coliform bacteria are present in the digestive tract of mammals (humans, livestock, dogs, cats, birds, etc.). The presence of elevated fecal coliform counts in stormwater flows can indicate the influence of failing onsite sewage treatment systems and illegal cross connections or broken sanitary sewer lines on storm drains and watercourses. Upstream sampling and dye testing of onsite sewage treatment systems assist in determining specific source(s) of high fecal coliform counts measured at the coastline.

2.2 Chemical Contaminants

Chemicals in stormwater runoff have a wide range of possible sources. General sources include contamination from road pavement materials, motor vehicles, litter, spills, poor business practices including deliberate dumping of wastes, leaching from contaminated soils and atmospheric deposition.

Motor vehicles are a major source of copper, lead, zinc and other metals in stormwater runoff, mostly from paved roads and parking areas. Atmospheric particles, street dust and road salt also have been observed to contain a wide range of heavy metals. High levels of suspended solids can carry both metals and organic compounds and are often associated with runoff from construction activities. Some of the information for this section was taken from Canadian Water Quality Guidelines (Canadian Council of Resource and Environment Ministers, 1987) and Urban Runoff Quality and Treatment (Gibb, Bennett, and Birkbeck, 1991). Common sources of the specific heavy metals of concern include those listed below:

- **Arsenic (As):** Combustion of fossil fuels, primary production of iron, steel, copper, nickel, and zinc.
- **Cadmium (Cd):** Electroplating, porcelain and pottery, soldering for aluminum, ink, batteries, photography, paint, printing, metal recyclers, oil spills and tire wear.
- **Chromium (Cr):** Electroplating, in pigments for paints and stains, road lane striping paint, brake lining wear particles.
- **Copper (Cu):** Corrosion of brass and copper pipe, sewage treatment plant effluent, electroplating wastes, some algicides, pesticides and fungicides, brake lining, wear particles, asphalt and soils.
- **Lead (Pb):** Gasoline and its combustion products, exterior and road marking paints, tire wear particles, soils and paint.
- **Mercury (Hg):** Latex paint, household detergents and bleaches, fluorescent and mercury vapour lamps, hospital wastes, laboratory wastes and dental waste.

- **Silver (Ag):** Photographic materials, electrical and electronic products such as batteries, contacts, and conductors, solders, mirrors, fungicides, and dental and medical supplies.
- **Zinc (Zn):** Tire and pavement wear particles, exterior and road marking paints, atmospheric deposition, automobile exhaust and galvanized roof gutters, culverts and pipes.

Common sources of low and high molecular weight polycyclic aromatic hydrocarbons (LPAH and HPAH) may include as follows:

- **PAHs:** Motor oil, tire wear particles, exhaust, erosion of road surfaces (asphalt), contaminated soil and atmospheric fallout.

Some common examples of business wastes that typically contain metals or PAHs are outlined in Table 1.

Table 1. Chemical Groups and Typical Sources

Chemical Group	Contaminant	Type of Business	Type of Product or Waste
Metals	Cadmium Chromium Copper	Electroplating	Plating solutions, rinses
	Cadmium Chromium Copper	Metal Cleaning	Caustic and derusting solutions
	Copper Lead Zinc	Foundries	Flue gas scrubbing solutions
	Chromium Lead Zinc	Paint Manufacturing	Pigments, preservatives
	Cadmium Aluminum Lead	Photoprocessing/Printing	Photofinishing effluents, inks
	Lead Zinc	Automotive Repair/Gas Stations	Fuel and oil, brake fluid, used antifreeze, radiator flush
	Copper Lead Zinc	Radiator Repair	Used coolant, flushing solutions
PAHs		Automotive	Petroleum products
		Metal Cleaning	Caustic, derusting solutions
		Pesticides	Formulation solvents

3.0 PREVENTION OF STORMWATER POLLUTION

This report has identified the existence of contamination in some Salt Spring Island Electoral Area (SSI EA) stormwater flows. The levels of contaminants vary but in some cases are elevated to the point where they may affect human health or have adverse impacts on watercourses and aquatic life. Changes in some of the activities in the community should be considered to reduce the amount of contamination entering stormwater.

In 1996, the CRD developed *A Guide to Existing Best Management Practices (BMP) and Stormwater Program Development* (Hull and Miller, 1996). BMPs are strategies intended to prevent contamination by either altering activities causing contamination (source control BMPs) or by treating water to remove contaminants before being released to storm drains and watercourses (treatment BMPs). BMPs are directed at many activities including residential, industrial, commercial, institutional and agricultural.

The Ministry of Environment (MOE) and the CRD have developed a series of brochures to provide the public with ways of preventing contamination from entering stormwater and the marine coastline. Some of these methods for preventing stormwater contamination are as follows:

3.1 Urban Activities

3.1.1 Around Your Home

- Pave as little of your property as possible. Use gravel, interlocking stone or brick instead of concrete or asphalt.
- Direct roof drains or gutter systems over lawns (but not over onsite sewage systems) where bylaws allow.
- Reduce your use of environmentally harmful products. Use alternatives such as baking soda, vinegar and hot water as a drain cleaner or vinegar and water as an all-purpose cleaner.
- Dispose of household hazardous waste such as paint at collection or recycling depots; never dump them directly into storm drains.
- If you have oil heating, regularly check your fuel storage tank for leaks and replace or repair the tank if necessary.
- Drain your hot tub and swimming pool water slowly onto your lawn (but not onto your disposal field), not into storm drains. Dechlorinate the water before draining.
- Sweep driveways and sidewalks instead of hosing them off.

3.1.2 Around Your Yard

- Collect and dispose of pet wastes appropriately. Do not dispose of it in stormwater flows.
- Reduce your use of fertilizers and pesticides. If you must use them, follow instructions and be careful using them near a watercourse or water body.
- Prune infested vegetation and use natural predators to keep pests in check. Pesticides can kill beneficial and desirable insects, such as ladybugs, as well as pests.
- Compost yard and kitchen waste and use it to boost your garden's health as an alternative to chemical fertilizers.
- Grow native plants in your garden—they often require less water, fertilizer and pesticides.
- Plant trees, shrubs and plants to slow water running off your property. This helps to prevent soil erosion and to increase water absorption.
- Set your mower to cut only the top 1/3 of the grass blade. Your lawn will be healthier, absorb more rain, and filter sediments.

3.1.3 Around your Car

- Check your car's fuel, oil, brakes, transmission, exhaust and cooling systems regularly. Fix leaks or problems immediately.

- Use a drop cloth if you choose to fix it yourself.
- Recycle used motor oil, antifreeze and batteries at collection centres.
- Use phosphate-free biodegradable products to clean your car. Wash your car over gravel or grassy areas, but not over an onsite sewage system. Go to a car wash if necessary.
- Use your car less often. Walk, bike, carpool or take public transit.

3.2 Onsite Sewage Systems

- You must obtain permission from the Vancouver Island Health Authority before installing, repairing or upgrading an onsite sewage treatment system. This will ensure that your system meets local requirements for density, setbacks, size, location and construction.
- Take the time to be aware of your system—owners have to play a role in the management and maintenance of their system. Create a map of your lot showing the location of the onsite sewage system and leave it for the next owners.
- Have your septic tank inspected yearly and pumped out every two to five years by a septic service company. Regular pumping is cheaper than having to rebuild a disposal field.
- Upgrade your onsite sewage treatment system when you upgrade your home (i.e., when you add a bedroom or suite).
- Practice water conservation—use water wisely. For example, run the dishwasher only when full and use low-flow showerheads and toilets.
- Don't use garburators—this will reduce the amount of solids and grease you put into the system.
- Don't put toxic chemicals down the drain because they can kill the bacteria at work in your onsite sewage system and can contaminate water bodies.
- Avoid pouring grease or fats down the drain.
- Use biodegradable household cleaners instead of bleach or other hazardous products.
- Avoid flushing pet wastes into the system.
- Don't drive, pave or put heavy objects or machinery over the disposal field.
- Avoid planting trees or shrubs near the disposal field because their roots can damage or plug the pipes.
- Don't over water the disposal field or allow roof or perimeter drains to run onto the disposal field.

3.3 Agricultural Activities

- Reduce the use of fertilizers, pesticides, and herbicides by adopting integrated pest management techniques and nutrient management plans. These plans are designed to help you use your farm's manure more efficiently as a fertilizer. If you must use chemicals, follow instructions carefully and avoid applying them close to the edge of a water body.
- Plant cover crops and/or relay crops to use excess soil nutrients and hold soil in place over the winter.
- Practice conservation tillage, contour farming or strip cropping.
- Follow the Code of Agriculture Practice for Waste Management and have a Best Agricultural Waste Management Plan prepared for your farm. This type of plan outlines what actions are necessary to ensure your farm is in full compliance with the code. The plan includes manure storage calculations, a farm layout map and site specific recommendations.
- Locate confined animal facilities away from water bodies. Divert incoming and outgoing runoff from these facilities.
- Construct adequate manure storage facilities.
- Do not spread manure during wet weather (fall and winter), on frozen ground, in low-lying areas prone to flooding, within three metres of ditches, five metres of streams and 30 metres of wells, or on land where runoff is likely to occur. In some situations, greater setbacks from watercourses may be required.
- Install barrier fencing to prevent livestock from grazing on stream banks.
- If livestock must cross streams, provide gravelled or hardened access points.
- Provide alternate watering systems, such as troughs, dugouts or nose pumps for livestock.

- Maintain or create a buffer zone of vegetation along a stream bank, river or lakeshore and avoid planting crops right up to the edge of a water body.
- Protect and preserve natural wetlands in your area. Use natural swales and hollows as sediment traps.
- Do not alter natural water bodies or shorelines or build ponds or dams without proper guidance and authorization from your nearest regional office of the MOE.

3.4 Industrial/Commercial Activities

There are a series of documents (the stewardship series) developed by the provincial and federal government for the protection of fish habitat. One of these documents is *Stream Stewardship. A Guide for Planners and Developers* (MOE and Ministry of Municipal Affairs, 1994), which has the following objectives:

- Describe the fishery resource and habitat requirements which are essential to maintain healthy streams.
- Provide an outline of the land development process in British Columbia identifying key stages and approvals required.
- Highlight existing planning tools and encourage their use for the protection of fish habitat and other environmentally sensitive areas.
- Suggest economic issues which should be addressed which influence appropriate development proposals.
- Introduce the Land Development Guidelines which describe techniques for the protection of productive conditions during land development.
- Describe the environmental approval process which oversees the protection of fish habitat during land development.

The guide refers to the Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck, 1993) developed by the MOE and the federal Fisheries and Oceans Canada (F&OC). This document provides specific BMPs (strategies for preventing pollution) for land development near creeks, streams, wetlands and lakes to protect water quality. The document suggests that each land development project be subject to the following guideline objectives:

- Provision and protection of leave strips adjacent to watercourses
- Control of soil erosion and sediment in runoff water
- Control of rates of water runoff to minimize impacts on watercourses
- Control of instream work, construction and diversions on watercourses
- Maintenance of fish passage in watercourses for all salmonoid life stages
- Prevention of the discharge of deleterious substances to watercourses

The SSI EA should consider these objectives, as well as the guidelines in both of these documents, when assessing future development.

4.0 REFERENCES

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