

Environmental Best Management Practices for Urban and Rural Land Development



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Section Eight **POLLUTION PREVENTION AND MANAGEMENT**

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Summary

Best management practices for pollution prevention during land development include:

CONTAMINATED SITES

- Prevent site contamination
- Avoid activities that allow the escape or spread of contaminated materials

SPILL CONTAINMENT AND REPORTING

- Practice spill prevention
- Be prepared for spills
- Respond quickly when a spill occurs

PESTICIDES

- Use integrated pest management approaches
- Only use pesticides as absolutely necessary

GROUNDWATER AND WELLS

- Maintain water quantity
- Maintain water quality

MUNICIPAL LIQUID WASTE

- Regulate on-site sewage disposal systems
- Reduce urban runoff
- Follow established guidelines for liquid waste management

SOLID WASTE

- Reduce solid waste
- Reduce construction waste

AIR QUALITY

- Include air quality goals in long term plans
- Design communities to promote 'clean' transportation options
- Develop policies that promote energy efficiency
- Develop bylaws to protect air quality
- Regulate open burning
- Consider air quality in development design

WATER QUALITY

- Maintain and enhance water quality

Pollution Prevention and Management

This section of *Environmental Best Management Practices for Urban and Rural Land Development* provides a brief outline of pollution management issues. It includes discussions of:

- Contaminated Sites
- Spill Containment and Reporting
- Pesticides
- Groundwater and Wells
- Municipal Liquid Waste
- Solid Waste
- Air Quality
- Climate Change and
- Water Quality

Each of these subjects is covered extensively in separate Ministry of Water, Land and Air Protection initiatives. The purpose of this section is to provide an introduction to these topics in the context of urban and rural land development, as well as a brief outline to the considerable resources provided by the Ministry.

In dealing with each of these topics, the Ministry's goals are to:

- Protect the environment and human health and safety by ensuring clean and safe water, land and air; and
- Maintain and restore the ecological diversity of fish and wildlife species and their habitats.

For local governments and land developers dealing with these issues, specialised professional input will frequently be required.

It cost tens of millions of dollars for soil remediation and clean-up for the Concorde development on Vancouver's False Creek, before development could even begin.

8.1 CONTAMINATED SITES

Where commercial and industrial activities take place, toxic substances such as PCBs, lead, cadmium and hydro-carbons may build up in the soil, surface water and groundwater. Sites are considered **contaminated**¹ if these toxins reach levels at which they pose a threat to the environment, human health or the safety of underground services (such as short circuits in street lighting), making them unsuitable for specific land or water uses.

For land developers, the impacts of legal and financial implications of historic contamination can be significant. Soil removal/replacement can be costly, and there may be restrictions on the types of permitted development. Groundwater impacts may restrict land use unless dealt with appropriately during **remediation**, and the costs of remediation of groundwater contamination may be even higher than for soil cleanup. Note that at sites where risk assessment has been used to define the remediation process, or where sites have been cleaned up to a lesser standard, restrictions on land use will continue, and excavation and disposal of soil from the site may also be restricted.

¹**Definitions** are provided in Appendix 8-1 and in the Glossary

8.1.1 Identifying a Contaminated Site

In order to determine if a site is contaminated, the site must be assessed/investigated as required under provincial regulations. This assessment is initiated during completion of a Site Profile or during completion of a Phase 1 or Stage 1 Preliminary Site Investigation. Developers are advised to verify the status of a property prior to acquisition.

One of the objectives of the Contaminated Sites Regulations is to provide a method of screening for potentially contaminated sites. The initial process most often involves the completion of a Site Profile, which will include an investigation of the historical land use. For more information on Site Profiles, see http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/fact_sheets/19.html.

Even when the proposed development site is not known to have historical land uses that were of concern, the surrounding historical land uses may have impacted the property. Ministry resources can help to identify known contaminated sites in an area through the site registry and site specific information requests. For information on the site registry, see http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/fact_sheets/20sitregv2.pdf.

If a site is determined to be potentially contaminated then additional investigation and assessment of the sites is required. Requirements for site investigations are identified in numerous regulations, protocols and other documents provided on the Ministry's Contaminated Sites website: http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/.

8.1.2 Objectives

The objectives related to development activities on potentially contaminated sites are:

- To ensure the protection of the water, land and air, and the health of humans and wildlife;
- To ensure the safety of those using the area during and after development;
- To ensure that personnel involved in the remediation are protected in accordance with the Occupational Health and Safety Regulation; and
- To ensure that the site is appropriately investigated and remediated by qualified professionals to an appropriate standard.

8.1.3 Applicable Legislation

Developments on contaminated sites are governed by the following legislation and regulations:

- The *Environment Management Act* (http://www.legis.gov.bc.ca/37th4th/1st_read/gov57-1-toc.htm) has just recently replaced the *Waste Management Act* (http://www.qp.gov.bc.ca/statreg/stat/W/96482_01.htm). It provides the framework for regulations. Check the Ministry website for updates: http://wlapwww.gov.bc.ca/epd/waste_mgt_review/.
- Contaminated Sites Regulations (http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/WasteMgmt375_96/375_96.htm): provides detailed regulations.

At the time of writing (March 2004), the Contaminated Sites Regulation is under review by the Minister's Advisory Panel on Contaminated Sites. For updates, see http://wlapwww.gov.bc.ca/epd/epddpa/contam_sites/ministers_panel/ministerspanel.html

- At the time of writing portions of the Hazardous Waste Regulation still apply to the storage, treatment or disposal of certain materials. For more information see: http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/WasteMgmt63_88Special/63_88.htm
- *Land Titles Act* (http://www.qp.gov.bc.ca/statreg/stat/L/96250_00.htm): addresses Site Profile exemptions and registration of covenants.
- *Local Government Act* (http://www.qp.gov.bc.ca/statreg/stat/L/96323_00.htm), *Vancouver Charter* (http://www.qp.gov.bc.ca/statreg/stat/V/vanch_00.htm) and *Islands Trust Act*: (http://www.qp.gov.bc.ca/statreg/stat/I/96239_01.htm): contain contaminated sites provisions related to various municipal permits.
- *Property Law Act* (http://www.qp.gov.bc.ca/statreg/stat/P/96377_01.htm): deals with real estate transactions.
- *Petroleum and Natural Gas Act* (http://www.qp.gov.bc.ca/statreg/stat/P/96361_01.htm): provides for certificates of restoration.

Recent changes to the [Contaminated Sites Regulations](#) set out a five-part management process for dealing with contaminated sites. The five steps are:

- Identification and assessment;
- Investigation and determination/decision;
- Planning and determining liability;
- Remediation; and
- Evaluation/monitoring.

For more information on these five steps see [Appendix 8-2](#).

QUALIFIED PROFESSIONALS

The Ministry of Water, Land and Air Protection maintains a list of qualified professionals for contaminated sites management. See: http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/roster/roster_of_experts.html
 Additional information about qualified professionals is also provided by the Association of Professional Engineers and Geoscientists of B.C., available online at www.apeg.bc.ca.

8.1.4 Best Management Practices for Local Governments and Developers

PREVENT SITE CONTAMINATION

- Implement pollution prevention strategies, which are far more cost effective than having to remediate after the fact.
- Practice due diligence when preparing property transactions, including providing/requesting a site profile where required. For more information see the “Highlights for Realtors, Property Vendors and Purchasers” http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/fact_sheets/11.html
- If in doubt, contact the Ministry or a qualified professional with contaminated sites experience.

AVOID ACTIVITIES THAT ALLOW THE ESCAPE OR SPREAD OF CONTAMINATED MATERIALS

- ☑ Whenever contamination is suspected, avoid activities that would spread or allow escape of the contaminated materials.

8.1.5 Useful Sources

The Ministry of Water, Land and Air Protection maintains a Contaminated Sites website at: http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/index.html. This website includes extensive information for local governments and land developers.

8.2 SPILL CONTAINMENT AND REPORTING

Accidental release of contaminants can have serious environmental and financial implications to the community and to the person or company responsible for the spill. This section provides guidance when dealing with accidental release of contaminants, such as:

- Fuels, special wastes, dangerous goods and other hazardous substances; or
- The release of sediments, drilling salts/mud, construction materials, sewage and other polluting substances.

8.2.1 Objectives

The objectives related to spill containment and reporting on development sites are:

- To minimise the ecological, legal and financial consequences of accidental spills; and
- To provide environmentally-sound and technically-feasible approaches to prevent spills and to mitigate and recover from spill impacts.

8.2.2 Applicable Legislation

Spill containment and reporting is governed by the following legislation and regulations:

- *Environment Management Act*, Spill Reporting Regulation (http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/263_90.htm): specifies the requirements related to reporting and to taking action regarding the spill.
- *Local Government Act* (http://www.qp.gov.bc.ca/statreg/stat/L/96323_26.htm#part26_division12): Part 26, Division 12 governs municipal approvals of site profiles for contaminated sites.
- *Canada Fisheries Act* (<http://laws.justice.gc.ca/en/F-14/60199.html#rid-60275/>): governs the release of deleterious substances into fish habitat (s 34-43).



PHOTO: DAVE POLSTER

8.2.3 Best Management Practices for Developers

PRACTICE SPILL PREVENTION

- Develop a plan that identifies potential accidents and ways to avoid them.
- Become familiar with any local government bylaws regarding spill containment.

BE PREPARED FOR SPILLS

- Have a response plan and prior arrangements with qualified spill contractors to handle spills.
- Provide (or have arrangements) for suitable disposal of spill materials and contaminated soils, water, and other materials.
- Train workers in spill prevention and the ways to respond should a spill occur.

Report spills to the Provincial Emergency Plan: call 1-800-663-3456

RESPOND QUICKLY WHEN A SPILL OCCURS

- Immediately contain or control a spilled material, or reduce any threats from the spill, such as water contamination.
- Ensure the safety and protection of all personnel on the site.
- Report all spills to the Provincial Emergency Program (1-800-663-3456) as required under the provincial [Environment Management Act Spill Reporting Regulations](#) and federal legislation.

8.2.4 Useful Sources

Provincial spill notification overview:

<http://wlapwww.gov.bc.ca/eeeb/spillnoti/notifica.html>

Industrial emergency response plan preparation:

<http://wlapwww.gov.bc.ca/eeeb/indusguide/industcplan.html>

Federal Environmental Emergencies Program http://www.ec.gc.ca/eeue/home/home_e.asp

Examples of municipal best management practices used in the City of Victoria:

http://www.city.victoria.bc.ca/cityhall/pdfs/rockbay_bsnss.pdf

Workplace Hazardous Materials Information System (WHIMIS) regulations under provincial Occupational Health and Safety Regulations:

<http://regulation.healthandsafetycentre.org/s/Part5.asp?ReportID=18022&hilite=whmis>

Transport of Dangerous Goods (TDG) regulations:

<http://www.tc.gc.ca/tdg/clear/part8.htm>

Partnerships Toward Safer Communities (PTSC) program to improve public safety and safety of emergency responders by reducing the frequency, severity and consequence of natural and human caused emergency incidents: <http://www.ptsc-program.org/>

Canadian Society for Chemical Engineering (CSCHE) Process Safety Management Division product loss prevention programs that promotes awareness, understanding and use of process safety management (PSM) tools, services and techniques within Canadian facilities including manufacturing and distribution operations, research facilities and laboratories: <http://www.chemeng.ca/maine.html>

National Fire Protection Association (NFPA) codes and standards, research, training, and education pertaining to spill prevention, mitigation and recovery: <http://www.nfpa.org/catalog/home/index.asp>

Canadian Council of Ministers of the Environment (CCME) environmental standards, strategies and objectives: <http://www.ccme.ca/about/index.html>

Canadian Chemical Producers' Association (CCPA) Responsible Care program to promote safe and environmentally sound management of chemicals throughout their life cycle: <http://www.ccpa.ca/english/who/index.html>

International Organisation for Standardisation (ISO) technical standards: <http://www.iso.ch/iso/en/aboutiso/introduction/index.html>

British Columbia Used Oil Management Association program to facilitate and increase collection, management and recycling of used lubricating oil in British Columbia: <http://www.usedoilrecycling.com/html/about.htm>

Coast Guard Tank Truck to Marine transfer requirements: http://www.pacific.ccg-gcc.gc.ca/er/oiltransfer/index_e.html

8.3 PESTICIDES

Pesticides are materials that are used to reduce the damage from pests by killing or repelling them. They include herbicides used to kill plants, insecticides used to kill insects, fungicides used to kill fungal organisms (mould, rot, etc.) as well as treatments used as wood preservatives.

8.3.1 Objectives

The objectives related to pesticide use during land development are:

- To ensure the protection of the water, land and air, and the health of humans and wildlife; and
- To ensure that pesticides are used safely.

8.3.2 Applicable Legislation

Storage of pesticides and disposal of pesticide containers is strictly regulated. Many pesticide applications must only be made by trained and registered applicators. Approvals are required for public land applications and certain large scale private lands.

Pesticide use is governed by the following legislation and regulations:

- B.C. *Pesticide Control Act* (http://www.qp.gov.bc.ca/statreg/stat/P/96360_01.htm). This is being replaced by the *Integrated Pest Management Act*

(http://www.legis.gov.bc.ca/37th4th/3rd_read/gov53-3.htm) which will come into effect when the associated regulations are completed—probably in the late summer of 2004.

- B.C. *Pesticide Control Act* Regulation (http://www.qp.gov.bc.ca/statreg/reg/P/319_81.htm) governs the sale, use and handling of pesticides.
- Canada *Pest Control Products Act* (<http://laws.justice.gc.ca/en/P-9/>) regulates products used for the control of pests and the organic functions of plants and animals.

8.3.3 Best Management Practices for Local Governments and Developers

Before any pesticide use can be justified there should be a comprehensive assessment of the need and impacts on a program basis. **Integrated Pest Management (IPM)** is the decision making process that will lead to appropriate strategies and actions for reducing pest damage which may or may not involve the use of pesticides. If pesticides are selected through the IPM process, their use will have been selected as being both necessary and the most appropriate control for the situation. Practicing IPM will also direct the land manager to pest prevention and future reduction in the need to apply pesticides.

USE INTEGRATED PEST MANAGEMENT APPROACHES

- Develop and follow an Integrated Pest Management (IPM) approach for all pest problems, including the following principles:
 - (a) planning and managing ecosystems to prevent organisms from becoming pests;
 - (b) identifying potential pest problems;
 - (c) monitoring populations of pests and beneficial organisms, pest damage and environmental conditions;
 - (d) using injury thresholds in making treatment decisions;
 - (e) reducing pest populations to acceptable levels using strategies that may include a combination of biological, physical, cultural, mechanical, behavioural and chemical controls; and
 - (f) evaluating the effectiveness of treatments

ONLY USE PESTICIDES AS ABSOLUTELY NECESSARY

- Ensure all pesticide applications adhere to the requirements of [Pesticide Control Act](#) and [Regulations](#).
- Consult and inform all parties who may be affected by the pest control activities.
- Read and follow all label directions.
- Hire licensed and certified applicators when required legally and if unsure of the effectiveness or impacts of the pesticides.

8.3.4 Useful Sources

Integrated Pest Management Control website:

<http://wlapwww.gov.bc.ca/epd/epdpa/ipmp/>

Pest Management Regulatory Agency (PMRA) <http://www.hc-sc.gc.ca/pmra-arla/english/index-e.html>

8.4 GROUNDWATER AND WELLS

Groundwater serves as the water source for a large number of British Columbians and their businesses. Groundwater is also an integral part of the hydrologic cycle and essential to the maintenance of ecological health for many ecosystems and the species that live there. Groundwater contributes to the year-round flow for streams and rivers.

8.4.1 Objectives

Protection of the groundwater system is essential for people and wildlife. Objectives for groundwater protection with regard to urban and rural land development are:

- To protect the groundwater system from pollution caused by chemicals such as pesticides and fertilisers, contaminants such as petroleum products, landfill leachates or industrial contaminants, and biological wastes such as manure and sewage; and
- To maintain groundwater levels and flows consistent with healthy ecosystems and sustainable human use.

8.4.2 Applicable Legislation

Groundwater use is subject to the following legislation and regulations:

- The government has recently (July/04) enacted the **Ground Water Protection Regulation (GWPR)**. The GWPR is designed to protect British Columbia's valuable ground water resource and is a new regulation under the *Water Act*. The primary purpose of the regulation is to set out standards to safeguard and maintain the integrity and efficient use of the ground water resource, and to ensure activities related to well water and ground water are undertaken in an environmentally safe manner. **Phase 1 of the regulation** deals with installing effective surface seals around wells, securely capping and floodproofing wells, and permanently closing unused wells to protect ground water quality. The GWPR also establishes the qualifications for well drillers and well pump installers and provides for a provincial registry of those possessing the qualifications (<http://wlapwww.gov.bc.ca/wat/gws/>)
- The *Water Utility Act* administered by Land and Water BC Inc. A water utility under the *Water Utility Act* is a person/business who owns or operates equipment or facilities for the delivery of domestic water service to five (5) or more persons or to a corporation for compensation (<http://www.lwbc.bc.ca/03water/utilities/index.html>). Related to this is a document entitled "Evaluating Long-Term Well Capacity for a Certificate of Public Convenience and Necessity"

(http://wlapwww.gov.bc.ca/wat/gws/gwdocs/eval_well/well.htm#P35_1246). This is a guide for professional engineers, hydrogeologists and other consultants involved with the development of groundwater supplies for private water utilities regulated under the *Water Utility Act*.

- Groundwater projects that extract large quantities of water must be reviewed under the B.C. *Environmental Assessment Act* (http://www.qp.gov.bc.ca/statreg/stat/E/02043_01.htm). For more information see Reviewable Groundwater Projects (http://wlapwww.gov.bc.ca/wat/gws/gws_eao.html).
- The *Drinking Water Protection Act* (http://www.legis.gov.bc.ca/2001/3rd_read/gov20-3.htm) governs groundwater that is used for drinking water supply.

8.4.3 Best Management Practices for Local Governments

MAINTAIN WATER QUANTITY

- Ensure that there is a sufficient water supply for household, fire suppression and other needs before approving subdivisions. Hire a professional groundwater consultant for fractured bedrock aquifers, community well systems and complex hydrogeologic conditions.
- Consider other groundwater/well users when approving developments, to avoid aquifer over-use and subsequent incursions of salt water or poor water quality.
- Design stormwater systems to maximise the infiltration of uncontaminated stormwater to augment groundwater supplies (see the Stormwater Runoff website and *Stormwater Planning: A Guidebook for British Columbia* below in [Useful Sources](#)).

Reining in the Rain is a case study of the city of Bellingham's use of rain gardens to manage stormwater in parking lots. http://www.psat.wa.gov/Publications/Rain_Garden_book.pdf

MAINTAIN WATER QUALITY

- Ensure that Well Protection Plans are conducted consistent with the Well Protection Toolkit.
- Ensure that land use planning considers water quality and water source protection.

8.4.4 Best Management Practices for Developers

MAINTAIN WATER QUANTITY

- Ensure groundwater supply and lot sizes are sufficient to avoid well interference. Use the guidelines in Design Guidelines for Rural Residential Community Water Systems.
- Recognize the limitations of living in a Mediterranean type climate where we have hot, dry summers and wet winters; design for these conditions.
- Promote conservation; (drought resistant vegetation, and low water-use homes).
- Design for preservation of natural ecosystems and wetlands.
- Direct rainfall into the groundwater system rather than into pipes and into surface water drainages. For more information see the *Stormwater Planning: A Guidebook for British Columbia* and the Stormwater Runoff website below in [Useful Sources](#).

MAINTAIN WATER QUALITY

- Ensure proper well construction and promote the new groundwater regulations (Standards for well construction, testing, maintenance and closure; protection of well head and flood-proofing).
- Locate wells on high ground and away from any potential contaminant sources.
- Protect groundwater systems from contamination by providing and using impervious sumps for concrete wash water and other potential construction contaminants.
- Do not intercept shallow groundwater systems with ditches, drain tiles or other similar structures.
- Carefully follow manufacturer's instructions when applying pesticides or fertilisers to ensure that they do not enter the groundwater system.
- Design and construct sewage and septic systems to prevent leaks and ensure proper functioning condition.
- Close and seal abandoned wells to prevent contamination and to address safety concerns.

8.4.5 Useful Sources

Province of B.C. Groundwater website: <http://wlapwww.gov.bc.ca/wat/gws/index.html> for a wealth of information including Aquifer Mapping, the Well Log database and data from the Observation Well network. Also on the website is a link to: The *Well Protection Toolkit* (http://wlapwww.gov.bc.ca/wat/gws/well_protection/wellprotect.html): which provides guidelines for the development and implementation of a well protection plan to prevent contamination of community well water supplies in British Columbia.

Land and Water BC Inc. (<http://www.lwbc.bc.ca/03water/utilities/index.html>) for a publication entitled Design Guidelines for Rural Residential Community Water Systems. This guideline covers the design of new waterworks systems or extensions and replacement works to existing systems providing domestic water service for housing in rural areas.

Ministry of Health Services, Public Health Protection: (<http://www.healthservices.gov.bc.ca/protect/water.html>) for information on Drinking Water Protection and particularly the publication entitled SAFE WATER SUPPLY Vital to Your Health

Stormwater Planning: A Guidebook for British Columbia (<http://wlapwww.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html>) and the Stormwater Runoff website (http://wlapwww.gov.bc.ca/wat/wq/nps/NPS_Pollution/Stormwater_Runoff/SW_Main.htm).

Environment Canada groundwater website:

http://www.ec.gc.ca/water/en/nature/grdwtr/e_gdwtr.htm

The Groundwater Foundation in the US Midwest (<http://www.groundwater.org/>): general information.

The National Ground Water Association (<http://www.ngwa.org/>): scientific information on groundwater and information for homeowners and local municipalities.

8.5 MUNICIPAL LIQUID WASTE

Municipal liquid waste is defined under the *Environment Management Act* as: “(a) effluent that originates from any source and is discharged into a municipal sewer system, (b) effluent from residential sources discharged to the ground, or (c) effluent specified by a manager to be included in a waste management plan.”

Proper management of municipal liquid waste is essential for the health of people and natural ecosystems. Municipal liquid wastes can carry pathogenic organisms and endocrine-disrupting chemicals as well as organic matter and chemicals harmful to human health and the environment. Liquid wastes generated by industrial processes are not included in these best management practices except as these are discharged into municipal sewage systems.

8.5.1 Objectives

Objectives for liquid waste management seek to minimise the impact of these materials on the people and the receiving environment. The objectives for liquid waste are:

- To ensure that discharges from municipal sewage treatment plants do not adversely affect human health and the environment;
- To meet or exceed requirements for liquid waste discharge as set out in the legislation and regulations; and
- To develop liquid waste management plans.

8.5.2 Applicable Legislation

Liquid waste management is governed by the following legislation and regulations:

- The *Environment Management Act* (http://www.legis.gov.bc.ca/37th4th/1st_read/gov57-1-toc.htm) has just recently replaced the *Waste Management Act* (http://www.qp.gov.bc.ca/statreg/stat/W/96482_01.htm). Check the Ministry website for updates: http://wlapwww.gov.bc.ca/epd/waste_mgt_review/.
- Sewage Disposal Regulations: http://www.qp.gov.bc.ca/statreg/reg/H/Health/411_85.htm
- Municipal Sewage Regulation: <http://wlapwww.gov.bc.ca/epd/epdpa/mpp/msrhome.html> and http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/129_99.htm

- Conditional Exemption Regulation (http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/201_94.htm) (outlines when the Municipal Sewage Regulation is applicable and when the Sewage Disposal Regulation is applicable).

8.5.3 Best Management Practices for Local Governments

REGULATE ON-SITE SEWAGE DISPOSAL SYSTEMS

- ☑ Ensure that the requirements of the [Sewage Disposal Regulations](#) are met or exceeded in developing on-site residential sewage disposal systems where the discharge is less than 5000 gallons/day or 22.7 m³/day; otherwise, the [Municipal Sewage Regulation](#) applies.
- ☑ Follow the best management practices for on-site sewage systems provided in the Ministry's Municipal Best Management Practices for Water Quality (http://wlapwww.gov.bc.ca/wat/wq/nps/BMP_Compndium/Municipal/MunicipalHome.htm).
- ☑ Consult the Toolkit for the Development of Management Programs for On-site Sewage Systems (http://www.pyr.ec.gc.ca/GeorgiaBasin/reports/sewage_systems_toolkit/summary_e.htm).



PHOTO: TODD CASHIN

REDUCE URBAN RUNOFF

- ☑ Follow the best management practices for controlling urban runoff provided in the Ministry's Municipal Best Management Practices for Water Quality (http://wlapwww.gov.bc.ca/wat/wq/nps/BMP_Compndium/Municipal/MunicipalHome.htm).

8.5.4 Best Management Practices for Developers

FOLLOW ESTABLISHED GUIDELINES FOR LIQUID WASTE MANAGEMENT

- ☑ Follow established guidelines and regulatory requirements for liquid waste management. ([Liquid Waste Management Plans](#) in concert with the [Municipal Sewage Regulation](#)).
- ☑ Consult with a qualified professional in the development of liquid waste management plans and to register a discharge under the Municipal Sewage Regulation.

8.5.5 Useful Sources

Province of B.C. water quality best management practices: http://wlapwww.gov.bc.ca/wat/wq/nps/BMP_Compndium/BMP_Introduction/bmphome.htm

Ministry of Environment, Lands and Parks. 2002. *Urban Runoff Quality Control Guidelines for the Province of British Columbia*. Municipal Waste Branch, Environmental Protection Division. Available from Ministry of Water, Land and Air Protection offices.

Stormwater Planning: A Guidebook for British Columbia

(<http://wlapwww.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html>)

The City of Kamloops has posted their liquid waste management plan (<http://www.city.kamloops.bc.ca/water/sewer/lwmpplan/options.shtml>). Check other local government websites for their liquid waste management plans.

The Living by Water project provides helpful information on septic systems and sewage treatment for individual residences (www.livingbywater.ca/).

8.6 SOLID WASTE

Municipal solid waste is the normal refuse that is generated by residential, commercial, and institutional sources, as well as demolition, land clearing and construction activities. Management of solid waste in urban and rural land development centres on minimising the need to dispose of wastes by following the 4 Rs principle – Reduce, Reuse, Recycle and Recover. There will however, continue to be a need to deal with solid wastes that can not be addressed following these principles.

8.6.1 Objectives

The primary objectives of the solid waste program with respect to urban and rural land development are:

- To ensure the protection of the water, land and air, and the health of humans and wildlife; and
- To minimise the amount of materials that need to be dealt with in landfills or by other disposal means.

8.6.2 Applicable Legislation

Solid waste management is governed by the following legislation and regulations:

- The *Environment Management Act* has just recently replaced the *Waste Management Act* (see http://wlapwww.gov.bc.ca/epd/waste_mgt_review/).
- The *Waste Management Act* (http://www.qp.gov.bc.ca/statreg/stat/W/96482_01.htm) provided the foundation for solid waste management in British Columbia. The mandate for regional districts to prepare solid waste management plans was established in that Act in 1989. Check the Ministry website for updates: http://wlapwww.gov.bc.ca/epd/waste_mgt_review/

8.6.3 Best Management Practices for Local Governments

REDUCE SOLID WASTE

- Develop a solid waste management plan. For more info see the Municipal Solid Waste website: http://wlapwww.gov.bc.ca/epd/epdpa/mpp/solid_waste_index.html.

8.6.4 Best Management Practices for Developers

REDUCE CONSTRUCTION WASTE

- Reduce the amount of construction and demolition refuse by encouraging source separation of materials at construction sites and deconstruction of buildings instead of machine demolition.
- Reduce the amount of land-clearing waste by limiting the amount of clearing undertaken. This also helps to protect natural habitats, minimize erosion and sediment concerns and may increase the property sales values.

8.6.5 Useful Sources

Municipal solid waste management website:

http://wlapwww.gov.bc.ca/epd/epdpa/mpp/solid_waste_index.html

Columbia Shuswap Regional District solid waste management plan website (example of waste reduction goals and techniques): <http://www.csr.d.bc.ca/works/solid-waste.htm>

U.S. Environmental Protection Agency Municipal Solid Wastes website:

<http://www.epa.gov/epaoswer/non-hw/muncpl/>

The Nova Scotia government has banned land-filling of organic materials and has created significant composting facilities and an infrastructure that encourages recycling:

<http://www.region.halifax.ns.ca/wrms/businesswaste.html>

8.7 AIR QUALITY

Good air quality is essential to the health of British Columbians and the health of the local ecosystems. Poor air quality can result from industrial pollution, agricultural emissions, vehicle exhaust, open burning and from natural forest fires. Preservation of good air quality and the prevention of air quality degradation is an important part of urban and rural land development.

8.7.1 Objectives

The objectives for air quality during urban and rural land development are to maintain good air quality by:

- Addressing air quality in community plans;
- Promoting 'clean' transportation options; and
- Preventing or minimising actions that degrade air quality (e.g. open burning).

8.7.2 Applicable Legislation

The *Environment Management Act* (http://www.legis.gov.bc.ca/37th4th/3rd_read/gov57-3-toc.htm) has recently replaced the *Waste Management Act* (http://www.qp.gov.bc.ca/statreg/stat/W/96482_01.htm) as the basis for most of the air quality regulations.

The federal government can regulate a wide variety of materials, including air pollution, under the *Canadian Environmental Assessment Act* (<http://laws.justice.gc.ca/en/C-15.2/>)

A variety of regulations (<http://wlapwww.gov.bc.ca/air/airregs.html>) govern air quality, including:

- Solid Fuel Burning Domestic Appliance Reg: http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/302_94.htm (regulates wood stoves)
- Open Burning Smoke Control Regulation: http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/WasteMgmt145/145_93.htm

Local and municipal governments can pass bylaws regulating burning and other air pollutants.

8.7.3 Best Management Practices for Local Governments

INCLUDE AIR QUALITY GOALS IN LONG-TERM PLANS

- Recognise air quality concerns in Official Community Plans to avoid incompatible land uses such as polluting sources near sensitive land use such as schools, hospitals and residences.
- Develop airshed plans that address the cumulative impacts of sources within an airshed or community and identify strategies to maintain or improve air quality.

DESIGN COMMUNITIES TO PROMOTE 'CLEAN' TRANSPORTATION OPTIONS

- Design communities so that walking and bicycle riding is encouraged and driving is discouraged. For more information see the Smart Growth B.C. website (www.smartgrowth.ca).
- Reduce standards for parking requirements in areas well served by transit.

DEVELOP POLICIES THAT PROMOTE ENERGY EFFICIENCY

- Encourage the construction of energy-efficient buildings that meet the LEED (Leadership in Energy and Environmental Design) Green Building Rating System™ (see http://www.usgbc.org/LEED/LEED_main.asp).
- Consider high-efficiency standards for all new residential gas furnaces and boilers (i.e. 90% vs. 80% for typical new furnaces).
- Consider minimum efficiency standards for all new and replacement gaseous fuel boilers and heaters for industrial/institutional/commercial facilities.

DEVELOP BYLAWS TO PROTECT LOCAL AIR QUALITY

- Require the paving of all traffic areas permitted for new industrial and commercial developments (to reduce dust).
- Require that any new or replacement wood burning appliance meets the standards of the B.C. [Solid Fuel Burning Domestic Appliance Regulation](#).

Several B.C. communities are involved in airshed planning, including the Greater Vancouver Regional District <http://www.gvrd.bc.ca/air/pdfs/AQMP.pdf>; Bulkley Valley-Lakes District: <http://www.bvldamp.ca/>; and Prince George: http://wlapwww.gov.bc.ca/nor/pollution/environmental/air_mgmtplan_final.html

The Greater Vancouver Regional District Sustainable Region Initiative Energy Task Group has proposed several actions to reduce energy use in the short and long term. See <http://www.gvrd.bc.ca/sustainability/SRI-IssueGroupReports/report1.htm>

- ☑ Enact anti-idling bylaws to limit excessive on-site idling by heavy duty vehicles, or excessive idling in school pick-up areas and transit exchanges.

The Regional District of Central Okanagan has a smoke control bylaw to reduce the emissions from open burning, campfires and wood burning appliances. For information see <http://www.cord.bc.ca/departments/inspections/inspectionsSmokeCtrl.aspx>

REGULATE OPEN BURNING

- ☑ Ensure that all burning is conducted in accordance with the requirements under the *Waste Management Act* and other legislation (<http://wlapwww.gov.bc.ca/air/airregs.html>).
- ☑ Control or prohibit residential backyard burning. See the [Model Municipal Bylaw for Regulating Residential Backyard Burning](#).
- ☑ Prohibit burning in residential neighbourhoods during air quality advisories due to fine particulates, except where wood is the primary heating source.
- ☑ Maintain and enhance urban forests and trees. In an urban environment, trees play an important role in filtering pollutants from the air and removing carbon. They also help to reduce energy consumption by providing wind-breaks and shade (see Tree Canada Foundation website <http://www.tcffca.ca/programs/urbanforestry/benefits.htm>).



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8.7.4 Best Management Practices for Developers

CONSIDER AIR QUALITY IN DEVELOPMENT DESIGN

- ☑ Consider using woody debris from land clearing for habitat enhancements (see [Section 4: Environmental Planning and Development at the Site Level](#) and [Section 7: Aquatic and Riparian Ecosystems](#)) rather than creating a disposal problem through burning, chipping or hauling off to landfills.
- ☑ Maintain healthy urban trees to help filter particulates and contaminants from the air and to moderate temperatures (see Tree Canada Foundation website <http://www.tcf-fca.ca/programs/urbanforestry/benefits.htm>).
- ☑ Consider energy-efficient designs in buildings, such as geothermal sources for heating, solar panels, use of ambient light, higher insulation, etc. For more information see the LEED website (http://www.usgbc.org/LEED/LEED_main.asp). These practices will result in long term energy cost savings.

8.7.5 Useful Sources

Air quality information: <http://wlapwww.gov.bc.ca/air/airquality/index.html>

Air quality legislation: <http://wlapwww.gov.bc.ca/air/airregs.html#1>

Particulates and smoke: <http://wlapwww.gov.bc.ca/air/particulates/index.html>

Model Municipal Bylaw for Regulating Residential Backyard Burning: <http://wlapwww.gov.bc.ca/air/particulates/pdfs/bylaw.pdf>

California has prepared a draft guide to include air quality considerations in decision-making by local land use agencies—*Air Quality and Land Use Handbook: A Community*

Health Perspective: <http://www.arb.ca.gov/programs/link97.pdf>

Smart Growth B.C.: <http://www.smartgrowth.bc.ca/index.cfm>

Burnaby Mountain Secondary School was built with a geothermal heat pump system to reduce energy costs <http://www.tbkg.com/expr01.html#>.

8.8 CLIMATE CHANGE

Human activities have increased the amounts of heat-trapping gases in the atmosphere, enhancing the warming capability of the natural greenhouse effect. Land development has the potential to add to climate change effects:

- Development can reduce the amount of tree cover (that acts as a 'sink' for greenhouse gases such as carbon dioxide).
- The siting of developments will influence the amount of driving (and hence greenhouse gas production) that homeowners do. A subdivision far from services will encourage more driving than an infill development close to urban services.
- There are many building options (e.g. solar panels, geothermal heat and increased insulation) that increase energy-efficiency, and hence decrease the amount of greenhouse gas production.

For more information see the Climate Change website, <http://wlapwww.gov.bc.ca/air/climate/>.

Climate change will be discussed in greater depth in Version 2 of this Best Management Practices document.

8.9 WATER QUALITY

Protection of water quality is important for ecological and human health. Sediment from erosion (see [Section 4.4.8: Erosion and Sediment Control](#)) and other sources of contaminants can seriously impair water quality. Drinking water for many British Columbians comes from surface sources. Protection of these sources is essential.

8.9.1 Objectives

The objective is to maintain good water quality by:

- Protecting water sources, through the maintenance of buffers and healthy riparian zones (see [Section 7: Aquatic and Riparian Ecosystems](#));
- Minimizing the release of sediment and silt into the water column;
- Minimizing the discharge of stormwater into natural watercourses; and
- Encouraging the recharge of groundwater systems through the use of porous paving and other groundwater recharge systems.

8.9.2 Applicable Legislation

Water quality is governed by the following legislation and regulations:

- The *Drinking Water Protection Act* (http://www.qp.gov.bc.ca/statreg/stat/D/01009_01.htm) protects drinking water quality;
- The federal government provides Drinking Water Quality Guidelines: http://www.hc-sc.gc.ca/hecs-sesc/water/publications/drinking_water_quality_guidelines/toc.htm

- The federal Water Quality Guidelines address both drinking water and the protection of aquatic life: <http://www.ec.gc.ca/CEQG-RCQE/English/Ceqg/Water/default.cfm>
- The *Canada Fisheries Act* (<http://laws.justice.gc.ca/en/F-14/index.html>) regulates the release of deleterious substances.

8.9.3 Best Management Practices for Developers

MAINTAIN AND ENHANCE WATER QUALITY

- ☑ Maintain wetlands, aquatic ecosystems and riparian areas in healthy conditions so that they can help protect water quality (see [Section 7: Aquatic and Riparian Ecosystems](#)).
- ☑ Control erosion and sediment generation at the source rather than trying to treat sediment-laden water (for details see [Section 4.4.8: Erosion and Sediment Control](#))
- ☑ Provide effective stormwater management (see [Section 4.4.7: Stormwater Management](#)) to control pollutants entering aquatic systems. Have a system in place to address extreme rainfall events. For information see [Stormwater Planning: A Guidebook for British Columbia](#), Chapter 7.
- ☑ Consider the use of engineered wetlands to treat stormwater prior to discharge to local streams. Storm drain systems can carry significant pollution loads from activities such as car washing, runoff from fertilised lawns, pesticides and improper disposal of solvents and oils.

8.9.4 Useful Sources

Water quality compendium: <http://wlapwww.gov.bc.ca/wat/wq/wqhome.html>

Guidelines for maintaining good water quality:

<http://wlapwww.gov.bc.ca/wat/wq/B.C.guidelines/approved.html>

City of Chilliwack (steps that residents can take to protect water quality):

<http://www.gov.chilliwack.bc.ca/main/page.cfm?id=453>

B.C. Water and Wastewater Association: <http://www.bcwwa.org/index.php>

APPENDIX 8-1: DEFINITIONS

See also Glossary

Contaminated Site: An area of the land in which the soil or any groundwater lying beneath it, or the water or the underlying sediment contains (a) a hazardous waste, or (b) another prescribed substance, in quantities or concentrations exceeding prescribed risk-based or numerical criteria or standards or conditions.

Groundwater: The water that moves down into the soil and underlying geological strata following rainfall. This water may move underground by streams and seepage.

Integrated pest management: A decision-making process that uses a combination of techniques to suppress pests and that must include, but is not limited to, the following elements:

- (a) planning and managing ecosystems to prevent organisms from becoming pests;
- (b) identifying potential pest problems;
- (c) monitoring populations of pests and beneficial organisms, pest damage and environmental conditions;
- (d) using injury thresholds in making treatment decisions;
- (e) reducing pest populations to acceptable levels using strategies that may include a combination of biological, physical, cultural, mechanical, behavioural and chemical controls;
- (f) evaluating the effectiveness of treatments

Municipal solid waste: (a) refuse that originates from residential, commercial, institutional, demolition, land clearing or construction sources, or (b) refuse specified by a manager to be included in a waste management plan.

Pesticide: A micro-organism or material that is represented, sold, used or intended to be used to prevent, destroy, repel or mitigate a pest, and includes:

- (a) a plant growth regulator, plant defoliator or plant desiccant,
- (b) a control product under the *Pest Control Products Act* (Canada), other than a device that is a control product, and
- (c) a substance that is classified as a pesticide by regulation.

Remediation: “Remediation” covers all stages of contaminated site management from preliminary investigations, through implementing remediation procedures, to final monitoring.

APPENDIX 8-2: THE FIVE STEP MANAGEMENT PROCESS FOR CONTAMINATED SITES

The five steps in dealing with contaminated sites are:

- Identifying and assessing sites;
- Investigation and determination/decision;
- Planning and determining liability;
- Remediation, including documentation of remediation completion; and
- Evaluation/monitoring.

1. IDENTIFYING AND ASSESSING SITES

Example of Site Profile requirements for City of Vancouver can be found at: <http://www.city.vancouver.bc.ca/commsvc/licandinsp/inspecti ons/environment/site profile/>

- Where there is a potential for contamination due to the history of the site, a **site profile** is prepared for use by regulators to identify potentially contaminated sites. Site profiles contain readily available information and should not require the assistance of a consultant to complete. Site profiles may be required by local governments as part of an application for subdivision, zoning, development, demolition of a structure or soil removal (at specified types of former commercial or industrial operations). Alternatively many contaminated sites are captured during due diligence investigations completed by their owners due to specific concerns or due to pending sale of the property or refinancing.

- The site profile will be **assessed by local government** to determine if the site should be subject to further investigation. If not, the site profile will be sent to the Site Registry.
- **Forms** for completing a site profile can be found at: http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/forms/index.html
- **Requirements** of local government for dealing with contaminated sites can be found at: http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/fact_sheets/5.html#top

2. INVESTIGATING SITES

- Where a site profile identifies the need, a **preliminary site investigation** (PSI) will be required. If contamination is identified during the PSI process, a detailed site investigation (DSI) will be required. Investigations are conducted by qualified professionals. DSIs require sampling and chemical analysis of soils, sediments, surface water and groundwater as necessary to determine when cleanup is needed and, following cleanup, satisfactory completion.

3. PLANNING AND DETERMINING LIABILITY

- Plans for site remediation must comply with the requirements of the Waste Management Act and the Contaminated Sites Regulation which specify that procedures satisfactory to the director must be utilised. The Ministry website (http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/index.html) provides many guidance documents and protocols that need to be adhered to.
- The regulation specifies who will be liable for clean-up.

4. REMEDIATION AND DOCUMENTING REMEDIATION COMPLETION

- There are several types of remediation:
 - Where contamination is to be **removed** so that it no longer remains at a site, or
 - Where contamination is dealt with through a **risk assessment**, or
 - Where contamination is **treated onsite**.
- The regulation provides standards for the quality of soils and water that remain at a site when cleanup is complete.
- **Certificates of compliance** can be issued by the Contaminated Sites Program if the standards set out in the regulations have been met. Conditional certificates of compliance can be issued if risk-based standards and related assessment procedures have been applied. In both cases, financial guarantees or other security may be required. (Note: conditional certificates may be phased out – check the Ministry website for details.)
- **Confirmatory sampling and analysis** to the satisfaction of the ministry are normally required if a certificate of compliance is to be issued. When contamination is managed onsite, certain conditions must be adhered to. These are necessary, for example, for protection of the environment or human health, or notification of future site owners, operators or adjoining owners or operators.
- A restrictive covenant may be required to be registered on the property title. However, specifications or conditions in a Conditional Certificate of Compliance and entry of notations in the Site Registry will substitute in many cases for a restrictive covenant under the *Land Titles Act*.

5. EVALUATION/MONITORING

- For high risk sites (sites that pose a risk to the environment, or human health and safety), complaints and compliance with certificates and orders may be undertaken by members of the Operations and Compliance Unit. Monitoring will be the responsibility of the owner of the contaminated sites and/or consultant.
- Evaluation of the monitoring information must contain a statement by a qualified professional as to the status of the site with respect to the monitoring requirements.