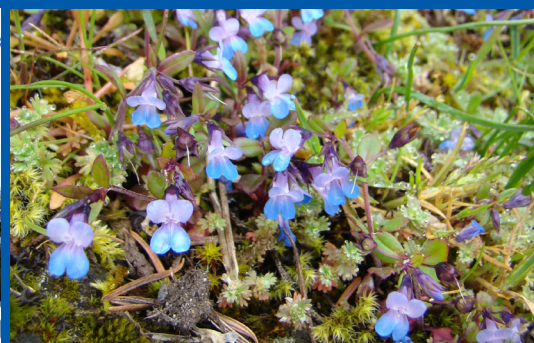


Environmental Guidelines for Urban and Rural Land Development in British Columbia



Section Two

This section of *Develop with Care* describes the objectives, requirements, and guidelines for local governments and other approval agencies in environmental planning at a community level.

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Lotus pinnatus.
Photo: Charles Thirkill

Cover Photos: Clark’s Nutcracker, multi-family development, Blue-eyed Mary. Photos: Judith Cullington



Community Planning and Land Management

“Healthy, intact, urban ecosystems purify our air, regulate micro-climate, maintain river flows and groundwater levels, treat our waste, and mitigate natural hazards, in addition to providing cultural and recreational activities. These ecological services have supported the extraordinary growth and progress of humanity but are now at risk due to the compounding factors of population growth and their invisibility in our modern economies. The degradation and loss of these natural assets can have serious economic impacts, threatening health, food production, and basic needs such as clean air and water” (Molnar 2011).

This section of *Develop with Care* is intended primarily for people who are responsible for community planning or the development of large sites. Many decisions that are made at this ‘big picture’ level are critical for ensuring tools are in place to maintain species, ecosystems, and natural processes.

For the purposes of this document, ‘community’ plans include those that cover entire regional districts (e.g., regional growth strategies, regional **greenways**¹ plans, and regional parks plans), plans for all or part of a community (e.g., official community plans, parks plans, local area plans, liquid waste management strategies, and air quality strategies), and plans for large sites (e.g., comprehensive development plans). These types of plans are typically based on jurisdictional boundaries.

Community plans also include plans developed at a landscape level, often developed by multi-partnered groups that represent a variety of community interests. These plans address a geographical area with natural boundaries such as **watershed** plans and integrated stormwater management plans.

Community plans set the stage for effective environmental planning and development at the site level, which is discussed in [Section 3: Site Development and Management](#) and [Section 4: Environmentally Valuable Resources](#).

‘Local government’ includes regional districts and municipalities.

In this document, ‘wildlife’ includes all native wild animals AND plants.

2.1 Benefits of Environmental Planning

Good environmental planning at the community level is essential for the health of the community and its citizens, as well as for the natural environment and wildlife. This **natural capital** is the foundation of many economic, environmental, and social benefits.

People like to live in communities that have a healthy natural environment. This preference is reflected in higher property values in those communities and in their ability to attract ‘footloose’ businesses that can locate anywhere.

“Natural capital is the extension of the economic notion of capital (manufactured means of production) to goods and services relating to the natural environment. Natural capital is thus the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services into the future.”
(Wikipedia, accessed March 2012)

¹ **Highlighted** words are defined in the [Glossary](#).



Good for business: “Land use planning strategies adopted initially for environmental concerns have been found not only to improve the local environment and living conditions, but also to attract business and increase economic value of the area” (Quayle and Hamilton 1999).

The cost of NOT protecting the environment: The draining and dyking of wetlands in one Lower Mainland community led to serious flood problems, and required \$40 million in remedial projects (Wetland Stewardship Partnership 2010).

“While the role of municipal governments is not explicitly acknowledged in the Constitution, it is this level of government that has arguably the greatest influence on the health of natural capital. As the level of government closest to its constituents and natural resources, local governments can promote the conservation of natural capital through planning decisions, infrastructure development, and local economic development” (Molnar 2011).

- ◆ The natural environment is important for **human health**. Trees and other vegetation help filter pollutants from the air and water, and the presence of greenspace can positively affect our emotional and mental health.
- ◆ Healthy natural ecosystems help **buffer environmental extremes** such as storms, floods, and droughts. Conversely, failure to protect natural ecosystems and wildlife may bring unintended consequences and costs related to erosion, flooding, loss of pollination services, **extirpation** of species at risk, groundwater contamination, and reduced water quality.
- ◆ Less infrastructure means **lower maintenance costs** for local governments. For example, clustered neighbourhood developments are good for the environment because more land is left in its natural state, and they are good for the pocketbook because servicing costs are reduced. It can cost significantly more to provide infrastructure and services to low density suburbs than it does to provide sustainable service delivery to an existing neighbourhood.
- ◆ Developers benefit from **greater certainty** about where they can build. Community plans that identify natural environmental values, hazards, and environmental goals and policies allow developments to be planned correctly from the start and avoid the need to address environmental concerns that emerge during the development process. This approach can result in both cost and time savings for the developer and for the local government.

To learn more, see [Appendix C: Benefits of Environmental Protection](#).

2.2 Objectives

Decisions made by local government elected officials and their staff have a profound influence on the natural environment in their communities. Local governments are encouraged to meet the following environmental objectives during land planning and development in urban and rural areas.

- ◆ Ensure community plans, policies, and bylaws promote sound management of ecosystems, species, air quality, and water quality and quantity; benefitting people, ecosystems, and species now and into the future.
- ◆ Reduce greenhouse gas emissions and integrate considerations of climate change risks (climate adaptation) into planning processes and development projects;
- ◆ Protect residents and their property by siting development so as to avoid or minimize hazards.



- ♦ Find ways to maximize resource recovery from liquid and solid waste, while protecting human health and the natural environment.

Many regulatory and other tools are available to local governments to help them protect and enhance the natural environment. Some of the most frequently used tools are discussed in the [Green Bylaws Toolkit](#) and include zoning, use of development permit areas, bylaws for tree protection and soil removal, and **conservation covenants**. See [Appendix F: Protection and Conservation Tools](#) for a more complete list.

A summary of legislation related to environmental protection during land development is provided in [Appendix A: Summary of Legislation](#).

Environmentally Valuable Resources

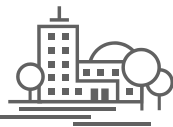
This document refers to 'Environmentally Valuable Resources', which are all features, sites, and species whose presence enhances the biodiversity of the area. Environmentally Valuable Resources range in size from small patches to extensive landscape features and can include rare or common habitats, plants, and animals. They can include

- rare and endangered species and ecosystems, including sensitive ecosystems
- rocky outcroppings, caves, cliffs, islands
- old vacant buildings, which may shelter bats or birds
- large snags, veteran trees, hollow trees
- wetlands, seepages and vernal pools, even if they are wet for only a few months each year
- riparian vegetation, including vegetated gullies
- meadows/grasslands
- winter ranges for ungulates (deer, bighorn sheep, etc.)
- snake/lizard dens, turtle nesting sites
- raptor nest trees, heronries
- wildlife travel corridors (including riparian corridors)
- areas of concentrated wildlife use
- fish spawning and/or rearing areas
- regionally significant ecosystems and species



Turtles. Photo: Jenny Balke

For more information, see [Section 4: Environmentally Valuable Resources](#).



2.3: Guidelines for Community Planning.

“During the course of a three-year term in office in local government, an elected official will make approximately 4,000 decisions—small and large—related to governance. They range from the position they take on a telephone call with a constituent, to a comment or suggestion to staff on a project, and to the casting of a vote on a major resolution for an item such as a budget or an OCP [Official Community Plan]” (Habitat Acquisition Trust 2004).

Choices made by local governments, for example regarding zoning or servicing, affect the natural and built environment. The cumulative effects of many seemingly harmless decisions can have a significant impact on environmental features, function, and condition. Thoughtfully-crafted community plans can avoid or minimize environmental issues before they occur, and can reduce liabilities and costs related to environmental damage. [Appendix E](#) provides checklists for local governments and others to review during the development of community plans and site developments.

2.3.1 Smart Planning

Also known as Integrated Community Sustainability Planning (ICSP), Smart Planning is an approach which reflects the following principles.

- ♦ **Long-term thinking:** plans are future-oriented to enhance sustainability and take into account implications for future generations.
- ♦ **Broad in scope:** plans consider the community’s environmental, economic, social and cultural sustainability, including governance systems. They may also consider a broad geographic or (bio)regional approach.
- ♦ **Integration:** planning processes/plans reflect a coordinated approach to enhance community sustainability through linkages between different types of plans or planning activities as well as across departments and organizations.
- ♦ **Collaboration:** planning processes engage community members and other partners to support community sustainability (e.g., First Nations, neighboring communities, non-government organizations, private sector, and other orders of government).
- ♦ **Public engagement and education:** planning processes are designed to enhance public understanding, participation and input.

The Canada–BC–UBCM Gas Tax Agreement funding can be used toward Integrated Community Sustainability or Smart Planning projects. See <http://www.ubcm.ca/EN/main/funding/gas-tax-fund.html>.

For a discussion on the costs of sprawl, see Suburban Sprawl: Exposing Hidden Costs, Identifying Innovations. This study by Sustainable Prosperity finds that while many of the costs of suburban sprawl are hidden, they are nevertheless “real and substantial.” <http://www.sustainableprosperity.ca/article3820>

Encourage walking and cycling. Photo: Judith Cullington





Smart Planning for Communities

Smart Planning for Communities (SPC), a program of the Fraser Basin Council, is a B.C.-wide, collaborative initiative providing resources and tools to local and First Nations governments for planning socially, culturally, economically, and environmentally sustainable communities. The Smart Planning for Communities initiative offers practical and current information and advice on integrated community sustainability planning; builds mutually beneficial partnerships; and provides an information-sharing and resource network. The goal is stronger, more vibrant and sustainable communities.

As of late 2011, about 80 local governments had completed or initiated a community sustainability planning process, ranging from small towns with less than 1,000 residents to mid-sized cities with over 50,000 residents, with a variety of situations and challenges. Some examples from throughout the province are:

Village of Telkwa - www.telkwa.com - City of Cranbrook - www.cranbrookconnected.ca
 City of Rossland - www.rossland.ca - City of Prince George - www.myPG.ca
 District of Saanich - www.saanich.ca - Sunshine Coast Regional District - www.onecoast.ca
 The SPC website www.smartplanningbc.ca includes community experiences, on-line resources, and e-learning opportunities.

- ◆ **Implementation:** plans are living documents that are kept off the shelves and put into action.
- ◆ **Monitoring and evaluation:** setting targets and tracking results to celebrate progress and focus efforts on areas that need the most improvement.

The concept of 'broad in scope' places the natural environment on equal footing with the built environment and other elements. 'Integration' encourages planning and strategies that pursue multiple coordinated goals, for example protecting stream water quality, managing stormwater, providing public greenspace and encouraging outdoor activities that support local tourism businesses.

DESIGN SMART, GREEN COMMUNITIES

- ☑ Adopt a smart planning approach to community development. The Province provides a [smart planning assessment template](#) to help communities assess their readiness to embark on such a process.
- ☑ Review the Province's [Guide to Green Choices](#) for information and examples of green community development that creates livable communities with more nature and reduced energy consumption and greenhouse gas emissions.
- ☑ Use '[smart growth](#)' principles in designing communities. These focus on a compact land use footprint, protection of resource lands, and designing communities that encourage walking and cycling. For more information, see the [Smart Growth BC](#) website, the Climate Action Toolkit's [actions for land use](#), and the [Smart Bylaws Guide](#).

The Province defines Green Communities as "complete, compact communities that encourage mixed-use development and the use of alternative modes of transportation to reduce greenhouse gas (GHG) emissions. [They] promote lighter infrastructure and energy efficient buildings that are easier on the environment and use alternative energy sources. They are communities that recognize the value of preserving and protecting wetlands and treed areas. Finally, Green Communities are resilient and meet citizens' essential needs." <http://www.cscd.gov.bc.ca/lgd/pathfinder-greencommunities.htm>

The 2009 BC Sprawl Report looks at the linkages between health and sprawl, noting that urban form and walkability have significant impacts on residents' health, notably lower body mass index and reduced hypertension. <http://www.smartgrowth.bc.ca/Default.aspx?tabid=155>



SUPPORT HEALTHY BUILT ENVIRONMENTS

A healthy community creates conditions that encourage people to make healthy choices where they live, work, learn, and play. Health-promoting environments support physical activity, healthy eating, safety from injury and exposure to harms, social interaction, and accessibility for all.

How communities are planned and built, and the services and resources provided within them, directly impacts the health of individuals as well as the natural environment. Developing land use planning policies and practices that encourage healthy lifestyle choices contribute to vibrant and sustainable communities. The built environment can influence the distances people must travel to work, the convenience of buying healthy foods, the air people breathe, or the safety of a neighbourhood. These factors can promote good nutrition, physical activity and increased leisure time, resulting in better mental and physical health.

- ☑ Make the community pedestrian- and cycle-friendly. This encourages people to walk and bike, improving their health and reducing greenhouse gas emissions. Walkable neighbourhoods are typically characterized by higher residential density, increased mixed land use and higher connectivity.
- ☑ Enhance connectivity with efficient and safe networks. Enhancing street connectivity provides active transportation users with more direct routes, thereby reducing travel time to a destination.
- ☑ Create mixed land use. Neighbourhoods with a variety of amenities within close proximity of home encourages physical activity.

Transport Canada notes that sustainable and active transportation improves the health of Canadians. Air pollution is reduced when people drive less, and the physical activity reduces obesity and heart conditions. <http://www.tc.gc.ca/eng/programs/environment-utsp-publichealth-995.htm>

Support community gardens. Photos: Judith Cullington





Health Authority Support

Health authorities can support local governments by providing advice and expertise on health, acting as a resource for local government staff and elected officials to develop healthy public policy, providing community health profiles, and facilitating partnerships and opportunities to work together on joint healthy community actions.

The physical features of the built environment include: healthy neighbourhood infrastructure; healthy transportation networks; healthy natural environments; healthy food networks; and healthy housing.

Health Authority staff from the Health Protection programs can facilitate efficient response to land use referrals. They can review neighbourhood design, transportation design and the natural environments, and draw on the expertise of their health authority colleagues on the other physical features.

The Health Protection program also has the legislative responsibility for public drinking water and sewerage systems.

For further information see:

- PlanH website <http://planh.ca/take-action/healthy-environments>
- Creating a Healthier Built Environment in British Columbia <http://www.phsa.ca/NR/rdonlyres/F22E3EA8-D466-4504-B3CA-A2A37ACA6EFB/0/CreatingaHealthierBuiltEnvironmentinBC.pdf>
- Healthy Built Environments website <http://www.phsa.ca/HealthProfessionals/Population-Public-Health/Healthy-Built-Environment/default.htm>
- Healthy Families BC website <http://www.healthyfamiliesbc.ca/your-community>

☒ Encourage higher-density developments that can easily be served by public transit. If good transit is available, residents are more likely to use this service, resulting in less air pollution and less traffic congestion. Special consideration is needed for smaller communities with limited transit options and that are unable to create high density compact design.

☒ Use community design to reduce traffic accidents and injuries. For example, use traffic calming measures to slow traffic speeds, and ensure sidewalks are safe for use by people using walkers and wheelchairs.

☒ Design the community so as to limit the production of, and exposure to, air pollution, noise pollution and other environmental hazards. For example, avoid placing industrial use next to residential. See also the air quality guidelines in **Section 2.6**.

☒ Support the creation of family eating areas in public spaces and community gardens, encouraging residents to grow healthy, local foods. This also helps build community connectedness and gets people outside.

☒ Encourage the building of healthy homes that are dry, clean, pest-free, safe, contaminant-free, ventilated, and maintained.

☒ Connect with the [local health authority](#) for information on ways to work collaboratively on environmental and human health aspects of planning.

The 2011 Healthy by Nature Forum explored three principles: spending time in nature improves human health; human health depends on healthy ecosystems; and parks and protected areas contribute to vibrant, healthy communities. Presentations and other resources are available from <http://healthybynature.ca/>.



Protect wildlife habitat
by building in already
developed areas.

Pileated Woodpecker.

Photo: Trudy Chatwin



ENCOURAGE GROWTH AND REDEVELOPMENT IN EXISTING DEVELOPED AREAS

The best way to protect wildlife habitat in rural areas is to encourage new developments to locate in already-developed urban areas. Densification of existing urban areas is cost effective (because local governments do not have to provide infrastructure out to new subdivisions) and can stimulate neighbourhood rejuvenation. It is more environment-friendly because it minimizes the loss of ecosystems and resource lands in rural areas by reducing the amount of 'new' land that is required for development, and may result in improvements to the neighbourhood's air, water and soil quality.

- ☑ Minimize the amount of **greenfield** development by setting and maintaining clear urban containment boundaries.
- ☑ Develop appropriate zoning and servicing so that growth and development are concentrated in areas that are located away from Environmentally Valuable Resources, resource (agricultural and forest) lands, hazard areas, and heritage sites.
- ☑ Encourage densification of development in areas with low environmental values in exchange for the protection of areas with high environmental values by using tools such as density bonusing and density transfer (see [Appendix F: Protection and Conservation Tools](#)).
- ☑ Encourage the redevelopment of **brownfield** and **greyfield** sites. This can be done through the use of tax incentives and lower development cost charges for redevelopment sites. Where there is potential for these sites to be contaminated, follow the guidelines in Section 3.9.3 and ensure that local government officials are familiar with the fact sheet on [Site Profiles: Local Government and Approving Officer Duties](#).

The Federation of Canadian Municipalities offers resources for local governments and developers relating to brownfield sites (<http://www.fcm.ca/home/programs/green-municipal-fund/program-resources/brownfields.htm>) as well as funding to support brownfield remediation (<http://www.fcm.ca/home/programs/green-municipal-fund/what-we-fund/projects/brownfields.htm>).



Greenfield sites are places that have not previously been used for urban or rural land development. Brownfields are “abandoned, vacant, derelict, or underutilized commercial and industrial properties where past actions have resulted in actual or perceived contamination and where there is an active potential for redevelopment”.^a They include places such as former gas stations, dry cleaners, and sites where there has been manufacturing, handling or use of chemicals. Where aging strip malls and shopping centres are being redeveloped they are sometimes referred to as greyfields. Redevelopment of these brownfield and greyfield sites is good for communities.

^a National Round Table on the Environment and the Economy <http://www.env.gov.bc.ca/epd/remediation/brownfields/index.htm>

AVOID RURAL SPRAWL

‘Rural sprawl’ is the growth of low density developments, including resort sites, into the suburbs and rural areas surrounding towns and cities. This sprawling growth impacts wildlife habitat through land clearing, building, road development, and increased human activity. This type of development will become increasingly expensive for homeowners as the price of gasoline rises, and for local governments as they pay for infrastructure maintenance and replacement.

☑ Discourage ‘satellite’ developments outside of the urban containment boundary. These are more expensive to service, cause habitat fragmentation, and displace many wildlife species that do not tolerate human presence. Satellite developments are also more prone to public safety risks from wildfire and conflicts with wildlife.

☑ Avoid large-lot² subdivisions. Unless the footprint of the development can be restricted (for example, through a conservation covenant), these types of subdivisions can destroy large amounts of wildlife habitat. Often large lots are further subdivided into smaller lots, which destroys remaining wildlife habitat. Where rural development occurs, concentrate growth in small areas to reduce the impact on wildlife habitat and to reduce servicing costs.

☑ Encourage the development of sustainable drinking water, sewage and stormwater systems with appropriate governance structures. See **Section 2.7** for information on stormwater management and water quality protection; **Section 2.9.1** for information on liquid waste management planning

☑ Consider the impact to aquifers from developments. Assess the cumulative impacts of onsite sewerage systems on multiple lots, and of the overall impact of onsite sewerage systems within a given area on drinking water supply, water table mounding, surface water quality, and groundwater contamination as part of sustainability planning. See **Section 2.7.3** for additional information on groundwater management.

☑ Review the [Groundwater Bylaws Toolkit](#) to assess and protect groundwater resources. This guide provides land use management tools to support the protection of groundwater resources.

Saltspring Island is using density transfer to direct development away from sensitive ecosystems and into less environmentally sensitive areas (<http://www.islandstrust.bc.ca>).

The City of Kelowna reduced its development cost charges for high density developments in the urban core and sub-centres (B.C. Sprawl Report 2001 <http://www.smartgrowth.bc.ca/Portals/0/Downloads/SprawlReport.pdf>).

A study in Alberta shows that rural residential development is a fiscal drain for a community, while working landscapes (agriculture) break even (Miistakis Institute for the Rockies <http://www.rockies.ca/programs/cocs.htm>).

² The definition of ‘large’ lot will vary between urban and rural areas.



2.3.2 Inventory and Mapping

Before environmental values can be protected, they must be identified. [Appendix D: Sources for Environmental Mapping and Inventory](#) provides information on sources of environmental data, and [Appendix B: Bio-inventory Terms of Reference](#) provides guidance on conducting site-level environmental inventories.

Ecosystems and wildlife habitat should be mapped at a scale of between 1:10,000 and 1:20,000 for local landscape level planning. Provincial standards for inventory and mapping are provided by the Resource Inventory Standards Committee <http://www.for.gov.bc.ca/hts/risc/about.htm>.

Many different sources of information are available at the Community Mapping Network website <http://www.cmnbc.ca/>

The Species at Risk & Local Government website <http://www.speciesatrisk.bc.ca/> provides information on species at risk for local governments.

The Province uses TEM (Terrestrial Ecosystem Mapping) and PEM (Predictive Ecosystem Mapping) to provide ecosystem mapping that integrates the abiotic (non-living) and biotic components of the landscape. <http://www.env.gov.bc.ca/ecology/tem/>

SELECT APPROPRIATE SCALES FOR ENVIRONMENTAL PLANNING AND MAPPING

- ☑ Select scales for maps and plans that best address environmental considerations including cumulative and long-term impacts. This may be a community-wide or landscape scale, a watershed scale (which may involve more than one jurisdiction), or a smaller scale such as a sub-watershed, neighbourhood, or local area plan. Ensure environmental planning at the micro scale is consistent with that of broader area plans.
- ☑ Map areas of environmental value in adjacent communities so that wildlife corridors, impacts on neighbouring wildlife habitats, and potential conflicts with wildlife can be considered across jurisdictional boundaries.

GATHER AVAILABLE ENVIRONMENTAL INFORMATION

- ☑ Identify any existing environmental mapping and inventory information. This should include information on
 - ⤴ terrestrial ecosystems (including **sensitive ecosystems** such as grasslands);
 - ⤴ aquatic and riparian ecosystems, including small and **ephemeral** streams, wetlands and coastal shorelines;
 - ⤴ known locations and habitats of species at risk, including **federally-listed** and **provincially-ranked** species;
 - ⤴ **wildlife corridors**;
 - ⤴ specialized habitats such as wildlife trees and talus slopes; and
 - ⤴ areas with potential for wildlife conflicts.

Be aware that regional scale mapping may not identify small but locally important natural areas—these will need to be identified on the site or neighbourhood level plans. Not all maps and inventories are available in digital format—seek out other documented information including unpublished sources. Provincial staff can help you locate and interpret sources of information and may establish a data-sharing agreement with you to ensure that up-to-date information is available for decision making.



☒ **Do not include information on specific locations of species at risk on community maps without consulting provincial regional staff**, as such publicity could further endanger some species. This information may be provided, by permission from the Province, to developers and their consultants for the purpose of preparing development plans that avoid impacts on species at risk, or to local conservation organizations for the purposes of protecting the species; however, the information should not be made public. Identify and map areas with potential **Environmentally Valuable Resources** (see **page 2-5**) where more detailed environmental inventory will be required prior to any development.

☑ Collect species abundance data and distribution maps from other databases such as the [Species and Ecosystems Explorer](#), [Nature Counts](#) and [eBird Canada](#).

☑ Determine whether the area of interest overlaps with an [Important Bird Area](#). If so, check the online site summary to identify the bird species present and their habitat requirements (breeding, overwintering etc.).

☑ Identify areas that are subject to flooding, sea level rise, erosion, wildfire, tsunamis, and other natural hazards in community plans. For more information, see **Section 2.8: Guidelines for Hazard Management**.

☑ Identify vulnerable aquifers (see **Section 2.7.3: Groundwater**).

☑ Identify and map other areas that may not be 'environmentally sensitive' but are nonetheless important components of wildlife habitat in the community. Examples include second-growth forests, hedges on agricultural lands, and seasonally flooded fields.

☑ Identify Agricultural Land Reserves and lands zoned for agriculture.

☑ If your community includes protected areas (such as federal, provincial, and regional parks or ecological reserves), contact the protected areas staff to obtain information on the area's special values.

☑ Identify areas protected by conservation covenants. These will be registered against the title of the land. For more information, see the [BC Lands in Trust: Registry of Lands](#).

Nature Counts (www.naturecounts.ca) is managed by Bird Studies Canada to facilitate the collection, management, analysis and sharing of natural inventory and monitoring data, with a particular focus on birds and other vertebrates such as amphibians, reptiles and bats. Data available includes B.C. waterbird surveys, B.C. Breeding Bird Atlas surveys, and many others.

The Important Bird Areas (IBA) Program is an international science-based initiative, coordinated by BirdLife International (www.birdlife.org). Its goal is to identify, conserve, and monitor a network of sites that provide essential habitats for birds. Canada has approximately 600 designated IBAs with 84 located in B.C. The IBA program is non-regulatory and many IBAs in B.C. are located on private lands or other lands outside of protected areas. The IBA Canada website (<http://www.ibacanada.ca/>) provides a search engine to access maps, and identify bird species, habitat types, and land use activities at Important Bird Areas.



CONDUCT ADDITIONAL INVENTORIES AS NEEDED

For more information on site-level inventory, see [Appendix B: Bio-inventory Terms of Reference](#).

- ☑ Work with other governments, community groups, and appropriately qualified professionals to conduct additional community-wide inventories of species and ecosystems. This will help address existing information gaps and hazard assessments and identify potential wildlife conflict issues.
- ☑ Establish Development Approval Information Areas in Official Community Plans for areas where Environmentally Valuable Resources are likely to exist. This will enable the local government to require additional inventory information prior to site development.
- ☑ Obtain information from site-level mapping and inventories done by developers and their consultants (see [Section 3: Site Development and Management](#)) and add it to local government inventories and the provincial database.
- ☑ Identify lands that have previously been used for commercial or industrial purposes, and may require environmental investigation and perhaps remediation in support of redevelopment. Schedule 2 of the [Contaminated Sites Regulation](#) under the *Environmental Management Act* lists those commercial and industrial land uses and activities that have a potential to cause contamination. Persons carrying out certain land use actions (e.g., applying for a development permit, rezoning, etc.) at sites with a “Schedule 2” history are legally required to identify these sites. See [Section 3.9.3](#) for further information on dealing with contaminated sites.
- ☑ Periodically update the Official Community Plan to incorporate new inventory information.

Conduct inventories as needed.
Photo: Grant Bracher





IDENTIFY HERITAGE SITES AND FIRST NATIONS INTERESTS

Archaeological sites are areas that contain the physical evidence of past human activity. Most archaeological sites are automatically protected by the [Heritage Conservation Act](#) and may not be disturbed or altered without a permit. There are substantial penalties for unpermitted site alteration.

- ☑ Contact the [Archaeology Branch](#) (Ministry of Forests, Lands and Natural Resource Operations) for the location of known archaeological sites and information on the archaeological resource management process. The Archaeology Branch has produced the [British Columbia Archaeological Resource Management Handbook for Local Governments](#) to assist in integrating archaeological resource management into local government planning and application review processes. [Additional information](#) for local governments is available on the branch website.
- ☑ Identify sites that may contain **heritage** and archaeological features (e.g., culturally modified trees and middens), including First Nations sites that are protected under the [Heritage Conservation Act](#). Note that it may not be appropriate to publicly identify these sites.
- ☑ Work with local First Nations to identify areas of special cultural significance, including sites not identified as provincially protected. Some areas may be used for the gathering of medicinal plants, or for special ceremonies. Developments near these areas may affect these cultural values, even if the site itself is protected.
- ☑ Contact the [Heritage Branch](#) for advice on heritage conservation and practices, and review [Heritage Conservation: A Community Guide](#), which includes information on conservation tools. Local governments can obtain information on the known or probable locations of archaeological sites from the [Archaeological Site Inventory Section](#). Site alteration reports are not available to local governments.



Identify culturally modified trees.
Photo: Judith Cullington



2.3.3 Community Plan Development

CONSIDER ALL ASPECTS OF THE ENVIRONMENT IN COMMUNITY PLANS

☒ Ensure that community plans address a range of environmental aspects, including

- ▲ ecosystem and species protection and restoration;
- ▲ wildlife corridors;
- ▲ climate change **mitigation** and **adaptation**;
- ▲ green communities and green buildings;
- ▲ protection of water quality and quantity;
- ▲ air quality;
- ▲ hazard lands;
- ▲ waste reduction; and
- ▲ cumulative impacts.

☒ Set measurable targets for environmental protection and management.

See [Appendix E: Checklists](#) for items to consider during plan development.

SET ASIDE OPEN SPACES AND AREAS WITH HIGH ENVIRONMENTAL VALUES

The community plan should include (or refer to) a conservation or biodiversity plan that identifies core conservation areas, **buffers**, wildlife corridors, and other important conservation areas. This conservation plan should link to similar plans in adjacent jurisdictions.

☒ Set aside areas with Environmentally Valuable Resources as ‘no-development’ areas where possible. For more information, see [Section 4: Environmentally Valuable Resources](#) and [Appendix F: Protection and Conservation Tools](#).

☒ Where future development sites include Environmentally Valuable Resources, designate these areas and appropriate buffers (see [Section 4.3.1](#)) as development permit areas (DPAs) in Official Community Plans. DPAs should include guidelines that limit how development can occur and address ways to protect ecosystem values. For example, the timing of construction should be restricted so that it does not interfere with bird nesting or fish spawning periods. For other examples of DPA guidelines, see the [Green Bylaws Toolkit](#), the [Sensitive Ecosystems Inventory Conservation Manual for East Vancouver Island/Gulf Islands](#), and the [Technical Report for the Central Okanagan](#).

The City of Vancouver has set an ambitious goal to be the “Greenest City in the World” by 2020. This included adopting 15 specific targets such as clean air, clean water climate leadership, access to nature, and zero waste. <http://vancouver.ca/greenestcity/index.htm>

The Green Bylaws Toolkit includes bylaw language that local governments in B.C. are using to protect sensitive ecosystems and explains the various legal approaches to protection, their benefits and drawbacks. See <http://greenbylaws.ca/> for the most up to date version of this toolkit.



- ☑ Identify wildlife corridors that link natural areas and are wide enough to allow for wildlife movement, and keep these areas development-free.
- ☑ Develop park plans and greenways plans that protect and connect Environmentally Valuable Resources for the long term.

ESTABLISH POLICIES AND BYLAWS THAT SUPPORT ENVIRONMENTAL PROTECTION AND STEWARDSHIP

Local policies and bylaws (or lack thereof) can have a significant impact on the success of environmental protection and stewardship.

- ☑ Ensure that the Official Community Plan is worded to permit and encourage the development of supporting environmental bylaws.
- ☑ Ensure that bylaws and regulations allow for innovative approaches to environmental protection. Some new technologies can provide significant environmental benefits at minimal or reduced cost. For more information, see the [Green Bylaws Toolkit](#) and the [Smart Bylaws Guide](#).
- ☑ Encourage progressive development standards such as narrower roads which result in reduced need for impervious surfaces. For more information on progressive development standards see [Section 3.6](#) and the [Smart Growth BC](#) website.

The Federation of Canadian Municipalities has compiled an online listing of 'green' municipal bylaws from across Canada. Topics include brownfields, energy, transportation, waste, water, and multi-sector policies. <http://www.fcm.ca/home/programs/green-municipal-fund/resources.htm>

ESTABLISH ENVIRONMENTAL DESIGN GUIDELINES IN COMPREHENSIVE DEVELOPMENT ZONES

Where there are opportunities to develop or redevelop large parcels of land, a site-specific comprehensive development zone allows a local government to customize zoning regulations, permitted uses, greenspace requirements, and other needs for that site.

- ☑ Establish goals and policies for
 - ▲ protecting and restoring areas with Environmentally Valuable Resources;
 - ▲ protecting and creating wildlife corridors and urban greenspaces;
 - ▲ designing sustainable 'green' communities;
 - ▲ minimizing waste, water, and energy use; and
 - ▲ enhancing on-site rainwater infiltration and rainwater management.

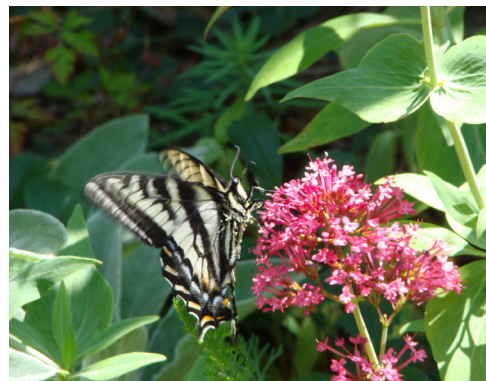
Local governments in B.C. need to finance the infrastructure and amenities needed to accommodate growth. [Community Amenity Contributions: Balancing Community Planning, Public Benefits and Housing Affordability](#) is a guide to help local governments to understand the risks and challenges related to obtaining community amenity contributions.

The Comox Valley Conservation Strategy (CVCS) is a proactive effort to stem the ongoing loss and fragmentation of sensitive ecological areas in the region. Their "Nature Without Borders" Strategy was published in 2008 to identify and map, protect, and restore the remaining sensitive ecosystems. It identifies areas where development should not occur, advocates for an expanded biodiversity network of linkages (corridors) between these protected areas; and provides a regional framework for conservation. Local governments have used this to develop a new Regional Growth Strategy, shape Official Community Plans, and to create Development Permit Areas to guide growth and development. <http://www.cvconservationstrategy.org/>



Provide incentives for the protection of Environmentally Valuable Resources.

Photo: Judith Cullington



The Islands Trust has created a Natural Areas Protection Tax Exemption and can issue 'Tax Exemption Certificates' to property owners who voluntarily give permanent legal protection to specific types of natural areas on their property. <http://www.islandstrustfund.bc.ca/>

PROVIDE INCENTIVES FOR ENVIRONMENTAL PROTECTION AND STEWARDSHIP

- ☑ Use the federal Eco-gifting program to encourage donations of environmentally sensitive lands/waters. For more information, see the [Eco-gifting](#) website or [Green Legacies: A Donor's Guide for B.C.](#)
- ☑ Provide incentives, such as awards for 'green' developments or fast-tracking of approvals, for well-planned developments that dedicate large amounts of greenspace and protect Environmentally Valuable Resources.
- ☑ Encourage the protection of riparian areas through eligible tax exemptions under the Community Charter ([Section 225](#)).

For more suggestions, see [Appendix F: Protection and Conservation Tools](#).

2.3.4 Cumulative Impacts

Decisions made at a site-by-site level can affect the natural environment well beyond the boundaries of the development. The cumulative impact of seemingly innocuous choices made at the site level can result in significant unintended consequences.³

"Urban planning has its greatest impact on the environment through the land use it determines. Longer commutes between home and work mean more roads, more habitat loss, air pollution and urban runoff. Sustainable communities are those that address long term environmental impacts in their design and function" (Schaefer et al. 2004).

CONSIDER THE CUMULATIVE IMPACTS OF SITE-LEVEL DEVELOPMENTS

- ☑ Consider potential environmental impacts at the larger scale and over time. How is the site part of the environmental 'big picture'? How will climate change affect important climate sensitive components over time? Will changes to hydrology impact downstream floodplains, wetlands, and aquatic ecosystems? Would the development contribute to the fragmentation of wildlife habitat or affect wildlife movement patterns?

³ Kay et al. 2010. http://cardi.cornell.edu/cals/devsoc/outreach/cardi/publications/upload/Policy_Brief_Sept10-draft05.pdf



Cumulative Effects Framework

The Ministry of Environment and Ministry of Forests, Lands and Natural Resource Operations are responsible for managing a range of environmental values including native species, ecosystems and ecological goods and services (e.g., water quality, water quantity, and air quality). These two ministries are jointly leading a project to develop and implement a Cumulative Effects Framework, to provide a more strategic approach to assessing and managing cumulative effects in natural resource decision-making in B.C. The proposed framework brings consistency to the assessment and monitoring of a commonly defined set of environmental, social and economic values and will provide more effective and consistent information to support decision-making.

Will development create cumulative impacts on surface and groundwater quality? Will it result in the loss of free ecosystem services such as flood control or natural pollination, or to the loss (local extirpation) of a species?

☒ Plan to avoid or mitigate cumulative impacts on such things as water quality and landscape fragmentation which will result from development when an area is fully built out.

The World Resources Institute has prepared *Ecosystem Services: A Guide for Decision Makers* to enable decision makers to link ecosystems and economic development. <http://www.wri.org/publication/ecosystem-services-a-guide-for-decision-makers>



Consider the cumulative impacts of development.
Photo: Judith Cullington



The Economics of Ecosystems and Biodiversity (TEEB) study is a major international initiative to draw attention to the global economic benefits of biodiversity, to highlight the growing costs of biodiversity loss and ecosystem degradation, and to draw together expertise from the fields of science, economics and policy to enable practical actions moving forward. <http://www.teebweb.org/>

The City of Toronto has a checklist for low-rise residential developments of five or more units. This includes mandatory and voluntary actions for air quality, energy efficiency, water quality and quantity, ecology, and solid waste. <http://www.toronto.ca/planning/environment/index.htm>

CONSIDER THE IMPACTS OF DEVELOPMENT ON NEIGHBOURING SITES

- ☑ Identify potential off-site impacts (such as increased sedimentation downstream) prior to development, and design the development to avoid or mitigate them.
- ☑ Consider the impacts of different types of development on adjacent ecosystems. For example, a shopping mall with bright parking lot lights could be detrimental to an adjacent wetland because many wetland creatures use darkness to hide from predators, and plants that flower according to length of daylight may be affected by the bright lights. A housing development with appropriate buffers may be far less damaging, or lights can be designed to maintain darkness around the wetland.
- ☑ Plan for large 'no-development' buffer zones around sensitive or protected areas (parks, ecological reserves, or other areas protected for their conservation values). Protected areas add to the quality of life for the whole community, but without proper planning, neighbouring developments reduce the ecological value of these areas. See [Table 4-1](#) for suggested buffer distances.
- ☑ Consider the possible impacts of new developments located adjacent to farmlands; including pressures to develop agricultural lands, concerns from the new neighbours about noises and smells from farming activities, and disturbance to wildlife that use the farm fields. The [Farm Practices Protection \(Right To Farm\) Act](#) protects farmers in the agricultural land reserve protecting them from nuisance lawsuits when they are using normal farm practices.

Place 'no-development' buffer zones around sensitive habitats.
American Pika.
Photo: Trudy Chatwin





2.4 Guidelines for Ecosystem and Species Protection

Land development can threaten species and ecosystems in many ways:

- ♦ **Habitat destruction.** As habitats are lost to development, road building, and other human activities, the wildlife that depend on these areas for their life processes will be displaced.
- ♦ **Habitat fragmentation.** Some species do not tolerate human presence. Roads, trails, and 'satellite' subdivisions introduce human activities into new areas, which displace shy species. Roads and trails can also restrict species' movements between habitats and/or reduce habitats to small isolated areas.
- ♦ **Islandization.** In many urban and suburban areas, the only remaining natural ecosystems are small isolated remnants, or 'islands', cut off from one another. This limits the amount of genetic mixing or repopulation that can occur and leaves the local wildlife vulnerable to external influences such as: predation by pets; increased mortality when attempting to access adjacent habitats; and lack of pollinators or dispersal mechanisms.
- ♦ **Invasive species.** Invasive alien species are introduced in a variety of ways and take over the natural habitats of native species. They also compete for food, water, space, and light. Some 'successful' invaders such as knapweed and English Ivy can completely displace native vegetation, creating monocultures and radically altering the ecosystem.
- ♦ **Reduced ecosystem and species diversity.** Only the more adaptable species are able to tolerate human activities, while increased predation from cats and dogs results in the direct loss of vulnerable species or reduced resiliency to climate change.

The guidelines listed below are designed to avoid or minimize these impacts during land development. Other impacts from human activities (e.g., hunting and fishing) will also affect wildlife populations but are beyond the scope of this document.

Left: Glasswort Arrowgrass and
Nuttall's Alkaligrass
Photo: Orville Dyer

Right: Sagebrush grassland,
wetland.
Photo: Brenda Costanzo

The B.C. Conservation Framework aims to maintain the rich biodiversity of the province. It provides a set of decision support tools to enable collaboration between government and non-government resource managers and practitioners using clearly defined criteria to:

- 1) prioritize species and ecosystems for conservation; and
- 2) determine the most appropriate and effective management actions.

For more information see <http://www.env.gov.bc.ca/conservationframework/>



ECOLOGICAL NEEDS

The following ecological principles should guide urban and rural land development:

- **Larger sites provide a greater variety of habitats.** A naturally vegetated 40 ha site will support a greater diversity of species and habitats than a similar 10 ha site. Some species require a minimum size area in which to live. Also, smaller sites are more prone to the 'edge effect.' In a forest, for example, some plants live only in the interior of the forest where there is less light, less wind, and higher humidity. There is proportionately more interior habitat in a large forest than in a small patch of trees.
- **Diversity is better.** Greater ecosystem diversity tends to support greater species diversity. Maintaining a diversity of ecosystems helps ensure a variety of food sources and cover and preferred breeding and rearing areas is maintained. Individual species may utilize several different types of habitat. Great Blue Herons, for example, need tall trees for roosting that are near wetlands or shorelines where they can feed. Other species need different habitats at different stages of their life cycle. For example, caterpillars eat different plants than do adult butterflies.
- **Closer is better.** Different populations of a species have a better chance of interbreeding (which helps maintain genetic diversity) if habitat patches are close together because individuals are able to move more easily from one habitat to another. Areas that are ecologically isolated have a greater chance of losing species (referred to as 'local extirpation').
- **Linkages help.** There is a better chance of preventing fragmentation effects if individuals or whole populations can safely move from one area to the next. For many species, the risk of predation is lower and the chance of surviving catastrophic natural events (such as fire or flood) or impacts from human activities is much higher if their habitats are connected. In urbanized areas, riparian corridors, recreational greenways, street boulevards, and backyards can provide these types of linkages.
- **Redundancy helps ensure sustainability.** If there is only one remaining population of a species in an area, the chances of extirpation are very high. Having several populations in different locations increases the likelihood of overall species' survival. This is similar to the economics principle that a diverse portfolio is more likely to survive long-term changes in the market.
- **Small habitats can be critical to species' survival.** The collective influences of many small habitats can be as great as a single larger park. These small habitats are critical areas for many urban species, and some may contain remnant populations of rare or endangered species. Other small habitats may be important because they provide a link between larger habitats or they provide a home for species that have adapted to living in urban and suburban environments. Some habitat features (e.g., standing snags and ephemeral pools) have environmental values that are far greater than the mere area they occupy.
- **Buffers help protect core areas.** The impacts of human activity and other ecosystem stressors, such as invasive species, tend to be greatest at the edges of ecosystems. A buffer area helps protect core areas from these impacts. For example, a forest buffer between a mall parking lot and a wetland can filter some of the pollutants from stormwater, reduce the number of shopping carts that are thrown into the wetland, shade the edges of the wetland, and reduce the noise and visual impact of the parking lot.

(adapted from Cullington 2001)



2.4.1 Habitat Protection

Habitat reservoirs are large areas that support a range of native plant and animal species and several ecosystem types. They are important areas for the protection and recovery of many species at risk. Ideally, a habitat reservoir will contain a variety of habitat types. **Habitat refuges** are smaller patches of habitat, including remnants of natural ecosystems and human-modified areas such as playing fields, and naturalized backyards. They provide important habitats for species, such as hummingbirds, that are more tolerant of people.

- ☑ Identify habitat reservoirs and refuges in community plans. Habitat reservoirs should be as large as possible (recognizing that, in general, their size will be larger in rural areas than in urban areas).
- ☑ Retain a variety of ecosystem types such as forested patches, wetlands, and grasslands that are adjacent to one another. This encourages use by a diversity of wildlife as many species need different habitat types close together (referred to as **edge habitat**).
- ☑ Provide protection for habitat reservoirs and refuges, including their buffer areas, in community plans. Where it is not possible to preclude development, establish development permit areas or other tools that require sensitive development so that natural values are retained.
- ☑ Work with [local land trust organizations](#) to encourage the use of conservation covenants on private lands/waters with high environmental values or to purchase of some of these lands. Work with community groups to protect and enhance the site's habitat values.
- ☑ Work with appropriately qualified professionals to develop management plans for habitat reservoirs that will address long-term protection of ecological values. This may include managing impacts from such things as recreation, edge effects, invasion by non-native species, insect infestations, and fire control.

The Greater Vancouver Regional District defines habitat reservoirs as areas that are larger than 30 ha, and major habitat reservoirs as areas larger than 200 ha.

Conservation covenants can provide long-term protection. A conservation covenant registered against 20 parcels of forest land on Galiano Island survived a legal challenge in the Supreme Court of British Columbia to cancel the covenant. <http://islandstrust.bc.ca/tc/pdf/tcrptannual2004-2005.pdf>

Left: Band-winged Meadowhawk.
Photo Jenny Heron.

Right: Mountain Goat.
Photo: Ryan Jensen picturebc.ca





“Movement corridors have been found to increase migration and the abundance of wildlife found in the urban environment” (Wilkie 2004).

Douglas College’s Institute of Urban Ecology in Vancouver has created a ‘Green Links’ program to encourage the linking of fragmented urban habitats through backyards. For more information, see <http://www.douglas.bc.ca/visitors/urban-ecology/restoring/activities.html>

IDENTIFY AND SET ASIDE WILDLIFE CORRIDORS

Plants and animals need food, water, and shelter to survive. Just as humans need roads and sidewalks to get between homes and shops, animals need a safe route between their nests or dens and foraging areas. Wildlife corridors provide that safe passage that allows species to move between areas of habitat. They also provide year-round habitat for less mobile species such as plants, invertebrates, and small mammals.

- ☑ Identify existing wildlife travel corridors (including corridors for large species such as deer and smaller species such as frogs) and use development permit area or zoning designations to restrict development in these corridors.
- ☑ Enable larger wildlife to cross roads and highways. See the [Wildlife Crossing Structure Handbook](#).
- ☑ Enable smaller species such as amphibians to safely cross or go under roads. See [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#).

2.4.2 Buffers

ESTABLISH BUFFERS AROUND AREAS WITH ENVIRONMENTALLY VALUABLE RESOURCES

Buffers help maintain areas with high environmental values over the long term. Target buffer widths are provided in [Table 4-1](#).

- ☑ Establish buffers around all Environmentally Valuable Resources (see page 2-5). Buffers should be ‘no-development’ zones, and natural vegetation (ground cover, shrubs, and trees) should be retained within the buffer. Ensure that development permit areas include the buffer area as well as the Environmentally Valuable Resources.
- ☑ Ensure that local government bylaws support the protection of stream and riparian buffer (see [Section 4.3.1](#)). Where the [Riparian Areas Regulation](#) is in effect, bylaws must meet the requirements of this regulation.
- ☑ Where possible, buffer areas should be on public lands so that they are not compromised by private landowners’ activities. Another option is to place conservation covenants on buffer areas that are on private land, but these covenants must be enforced to prevent intrusion into the buffer area. Other options for buffer protection include easements and stewardship agreements. For more information, see [Appendix F: Protection and Conservation Tools](#).
- ☑ Consider property tax reductions for the gifting of conservation covenants or other natural area protection mechanisms.



Protect riparian buffers.
Photo: Judith Cullington



2.4.3 Development near Farmland

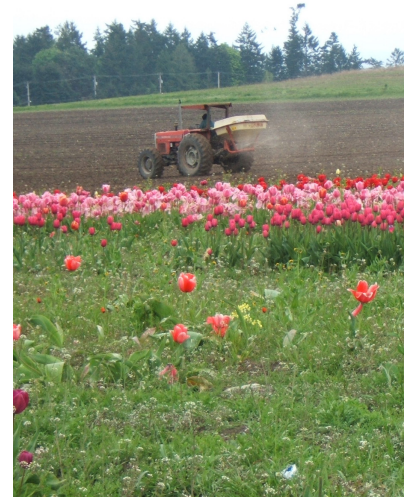
Farming occurs in almost every settled part of B.C, and much of this activity takes place next to urban and suburban areas. Farming is an essential activity that provides food and jobs for British Columbians. However, where farming activities take place adjacent to urban areas, they may generate what is perceived by the community as “disturbances”, such as noise, odour, bright lights, and crop spraying. Farmers may experience trespass, property damage, or flooding from nearby development. Local government decisions can affect agricultural sustainability.

PROTECT AGRICULTURAL LAND USES

Through the [Agricultural Land Commission Act](#) the Province established an Agricultural Land Reserve (ALR) to preserve farmland and encourage farming within the ALR. Subsequently, the Province enacted the Right to Farm Bill that included the [Farm Practices Protection \(Right to Farm\) Act](#) and consequential amendments to the [Local Government Act](#) and [Land Title Act](#). This suite of legislation was intended to protect farmers from liability in nuisance when following normal farm practices, limit how restrictive local governments could be with respect to farming in the ALR and provide local governments with tools to regulate and to encourage farming in the ALR.

Local governments can proactively encourage farming by employing “Edge Planning” and techniques to design “Farm-Friendly Subdivisions” near the ALR (see next page). In addition, local governments are encouraged to:

- ☑ Review the Ministry of Agriculture’s [Guide for Bylaw Development in Farming Areas](#) to adopt a wide range of Minister’s Bylaw Standards in a local government’s Zoning Bylaw.
- ☑ Develop an Agricultural Area Plan (AAP) to supplement the Official Community Plan.
- ☑ Establish an Agricultural Advisory Committee (AAC) to provide expert advice on agricultural matters.
- ☑ Promote awareness of ALR lands and farming, for example through signage that informs residents and prospective purchasers of the proximity of farm land and implications of farming activity.
- ☑ Review the Strengthening Farming Program’s [Subdivision Approving Officers Toolkit](#).



Protect agricultural land uses.
Photo: Judith Cullington



See the Subdivision Near Agriculture: A Guide for Approving Officers document at <http://www.agf.gov.bc.ca/resmgmt/publist/800Series/820500-1Subdivision-A-Guide.pdf> for additional suggestions.



Design farm-friendly subdivisions.
Photo: Josh McCulloch picturebc.ca

UNDERTAKE EDGE PLANNING

The Agricultural Land Reserve (ALR) is a provincial zone in which agriculture is recognized as the priority use. Farming is encouraged and non-agricultural uses are controlled. The ALR boundary is a useful place to apply “Edge Planning” techniques to promote land use compatibility. Successful urban/agricultural edge planning involves both the local government and the farming community.

- ☑ Where development areas are adjacent to farmland, conduct a detailed inventory to identify edge planning areas on both sides of the ALR boundary.
- ☑ Consult the [Guide to Edge Planning](#) for design and permitted activities in the buffer areas.
- ☑ On the urban side, encourage ‘farm-friendly’ designs (see below).
- ☑ Work with farmers to encourage appropriate management and activities in the farm side of the buffer.

DESIGN FARM-FRIENDLY SUBDIVISIONS

Where new roads and subdivisions are planned:

- ☑ Encourage clustering of residences to maximize buffering between residences and agricultural land.
- ☑ Encourage developers to use double-paned or sound-proofed windows, and place decks and patios away from the farm side.
- ☑ Encourage vegetated buffers between the subdivision and the ALR boundary. These will also provide wildlife habitat and may create a location for new trails.
- ☑ Use cul-de-sacs rather than roads that end at the ALR boundary, to avoid creating pressure to extend development into the ALR land.
- ☑ Use rainwater management techniques (see [Section 3.7.1](#)) to ensure that runoff from roads and subdivisions does not increase flooding or reduce groundwater supplies to agricultural lands.
- ☑ For more information see the Ministry of Agriculture’s Strengthening Farming Program website at <http://www.al.gov.bc.ca/resmgmt/sf/>.



2.4.4 Urban Forests

“Urban forests” include the trees and their associated ecosystems, including understorey biota and soils, within a community (urban or rural). This term includes both public and private lands, including parks, boulevards, remnant ecosystems, residential yards, commercial and industrial lands and open spaces.

PROTECT AND ENHANCE URBAN FORESTS

- ☑ Map the urban forest to know where it is located, as well as its species diversity, age profile, and health. The USDA Forest Service has a free suite of tools called [I-Tree™](#) for measuring and assessing the urban forest.
- ☑ Develop an Urban Forest Management Plan. [Planting our Future: A Tree Toolkit for Communities](#) provides information on tools and strategies that could be included.
- ☑ Ensure tree protection bylaws encourage the planting of new trees and limit the cutting of mature trees.
- ☑ Where possible and appropriate, maintain and plant large trees. At maturity, large trees provide significantly more green infrastructure benefits than smaller specimens.
- ☑ Where new trees are to be planted, ensure that there is adequate soil volume and space for the tree to grow to its full size. Soil vaults and structural soils help to provide sufficient room for roots to grow; and barriers can be placed underground to prevent roots growing into infrastructure (such as sewers and cable networks).
- ☑ Design the urban forest with the future in mind. Trees that are planted today will mature in very different climates. For information, see [Urban Forests: A Climate Adaptation Guide](#).
- ☑ Encourage or require the use of native tree and shrub species (suited to local ecosystems and climate) in landscaping. Select species that are adapted to local conditions.
- ☑ Invest in appropriate stock selection, good planting techniques and young tree care to give trees the best chance for a long and healthy life. See the [Compendium of Best Management Practices for Canadian Urban Forests](#) for good arboriculture practices.
- ☑ Where there is no space for large trees (e.g., in very urban settings), use green roofs, green walls and the extensive use of shrubs and underplantings to provide greenspace in the city.
- ☑ Use the urban forest along boulevards and backyards to connect different habitat patches.



Ensure there is space for trees to grow large. Photo: Judith Cullington

Planting Our Future: A tree toolkit for communities provides an overview of tool and strategies to help communities enhance the urban forest and address some of the challenges. <http://www.toolkit.bc.ca/news/planting-our-future>

Evergreen Canada provides information on ways to protect urban habitats in Keeping it Green: A Citizen's Guide to Urban Land Protection in Canada. For more information, see <http://www.evergreen.ca/en/cg/cg-resources.html>.



Benefits of urban forests

Urban forests are increasingly being recognized for their contributions to reducing air pollution, managing stormwater, reducing atmospheric carbon dioxide, and providing wildlife habitat. Studies have found the following benefits from urban forests.

- **Reduction of air pollution.** Trees improve air quality by intercepting particulate matter and absorbing airborne pollutants such as sulphur dioxide, nitrogen oxides, and ozone. Particulates and other pollutants can be harmful to human health. While results vary, some studies show benefits from street trees. In Germany, streets with trees had 3,000 particles per litre of atmospheric contaminants compared with levels of 10,000–12,000 particles per litre for streets without trees.
- **Carbon sequestration.** Carbon dioxide—a major cause of climate change—is absorbed by trees as they grow. The six million trees that grow in Sacramento County, California store more than eight million metric tonnes of carbon and remove an estimated 304,000 tonnes of carbon per year.
- **Energy savings.** Trees shade buildings in summer, so less air conditioning is needed, and they act as windbreaks in winter, which results in lower heating costs. Energy savings depend on the climate but are greatest when trees are planted on the east and west sides of buildings. In Sacramento, CA, trees planted on the south and west sides of houses reduced summertime electricity bills by an average of US\$25.16.
- **Stormwater management and erosion control.** Tree canopies intercept rainfall and reduce the impact and erosive force of raindrops that hit the ground. Tree roots help bind soils in place, especially on slopes. Where streams overflow their banks, trees help slow water flow and reduce the erosion capacity.
- **Psychological and health benefits.** Patients recovering from abdominal surgery who had a view of woods recovered more quickly, required less medication, and had fewer complications than patients who had a view of a brick wall. Office workers who had views of natural spaces experienced less job pressure and greater job satisfaction than colleagues who had no view or a view of the built environment. Research has found that for every additional 343 trees per square km, asthma rates drop by 25 per cent in young children.
- **Increased property values.** In Portland, OR, street trees growing in front of or near a house added an average \$8,870 to its sale price and reduced its time on the market by nearly two days. Houses fronted with more street trees experienced lower crime rates, as did houses with large yard trees. Trees may reduce crime by signalling that a neighborhood is well cared for.

All studies are reported in Harris et al. 1999 and the U.S. Department of Agriculture Forest Service 2010 and 2011. For more information on the benefits of trees, see the Tree Canada Foundation website <http://treecanada.ca/en/resources/benefits-trees/> and the Urban Ecosystems and Social Dynamics Program website <http://www.fs.fed.us/psw/programs/uesd/uep/>.

Benefits of street trees exceed costs by 5:1—City of North Vancouver

The City of North Vancouver study of its street trees found that the City has more than 5,350 street trees and spends just under \$100,000 per year in maintaining them (pruning, tree and stump removal, watering, replacements, etc.). However, these street trees provide a benefit of just over \$500,000 per year (\$94 per tree) to City residents. Benefits include energy savings, greenhouse gas (CO₂) reduction, air quality improvement, watershed management and stormwater savings, aesthetic benefits, and property value increases. Over the 50-year lifespan of a typical tree, the City could realize total benefits valued at over \$25 million.

For more information, see <http://www.cnv.org/~media/C97820B68C5045C2BAB1D6720FB2D36E.pdf>



2.4.5 Restoration and Enhancement

MANAGE INVASIVE PLANT SPECIES

Many invasive plants and animals in British Columbia are **alien** to North America. They are sometimes referred to as ‘non-native’, ‘exotic’, or ‘introduced’ species. If left unchecked, they can displace native plants and animals and become one of the dominant species in their new habitats. Invasive species are one of the primary causes of many native species being designated as ‘at-risk.’

Invasive species are recognized as the second greatest factor (after habitat loss) driving the extinction of native species and the loss of biodiversity worldwide. Their effects on biodiversity are immense and often irreversible. Invasive species also have widespread negative economic impacts; they have decreased farm and ranch income in British Columbia by an estimated \$50 million a year.

Development can contribute to the spread of invasive plants through soil disturbance (which allows invasives to establish) and sometimes through the use of inappropriate species for landscaping. Prevention, early detection and eradication of invasives is the most economical and effective means of management; these plants are most easily dealt with before they become widespread. The best control option will depend on a number of factors including; knowledge of the potential damage of the invasive plant, relative abundance of the invasive plant species, characteristics of the site, the cost of the control method, and the environmental impact of the invasive species and the control option. It is important to ensure new invasive plant species or vegetative reproductive plant parts are not introduced into a new area.

Invasive species cause losses of more than \$50 million a year for B.C. agriculture.

Giant hogweed (left) and Grey Squirrels are both invasive species.
*Photos: Dave Polster and
Judith Cullington*





Rabbit Management

The Corporation of Delta has developed a feral rabbit management plan that includes capture, sterilization, and release for the 500 or so feral rabbits around the civic precinct. The plan includes the goal of humanely capturing between 20 to 25 rabbits per week for approximately five months. These rabbits are the result of generations of abandoned pets; a practice considered as cruelty in both the Prevention of Cruelty to Animals Act and the Criminal Code. The municipality plans to introduce a bylaw to restrict sale of unsterilized rabbits in pet stores. http://www.corp.delta.bc.ca/assets/Communications/PDFs/feral_rabbit_management_plan_get_underway_in_civic_precinct.pdf

The Invasive Species Council of British Columbia has been established to coordinate and address invasive plant issues, including impacts on economics, human health, and environmental values. <http://www.bcinvases.ca/>



Cats, especially feral cats, are estimated to kill more than two million birds each year in Canada. This can significantly impact local bird populations.

Photo: Marlene Caskey

☑ Contact the [Invasive Species Council of BC](#) for information concerning regional weed committees to identify ways to manage invasive plants of concern in your area. Also see the regional information in [Section 5: Regional Information Packages](#), and the [Alien Species](#) website.

☑ Consider the use of development permit area guidelines or covenants to control landscaping plans.

MANAGE INVASIVE AND FERAL ANIMAL SPECIES

Species such as feral rabbits and cats can create problems for local governments and are costly to control.

☑ Address issues proactively before populations become large. Bylaws that prohibit the sale of un-neutered animals and feeding of wildlife can be helpful.

☑ Require that dogs be leashed in sensitive habitats (such as beach areas) to prevent them from chasing birds or other wildlife.

☑ Encourage cat owners to keep their pets indoors. Domestic pets, especially cats, can be significant predators of wildlife. Require local pet stores to sell only spayed or neutered cats and rabbits, as both species can become a nuisance and environmental concern if they are abandoned.

The American Bullfrog is an invasive alien species that has taken over many lakes and wetlands in British Columbia. It is a voracious predator that eats other frogs and amphibians, fishes, small snakes, and even small songbirds and ducklings.

Photo: W. Leonard





Volunteers can help with removing invasive species and putting up nest boxes.
Photos: Judith Cullington and Trudy Chatwin

DEVELOP RESTORATION PLANS FOR DEGRADED HABITATS

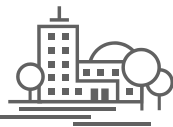
Some communities have large areas of damaged habitat that could potentially be restored.

- ☑ Work with appropriately qualified professionals and conservation organizations to develop landscape-level restoration plans for habitats that have been degraded. The plans should consider the impacts of future developments and future climates, which may limit the success of site-level restoration efforts. The B.C. Chapter of the [Society for Ecological Restoration](#) can help to locate such professionals.
- ☑ Encourage ecosystem enhancements during the redevelopment of brownfield and greyfield sites.
- ☑ Support community efforts to restore ecosystems (e.g., programs such as Streamkeepers, Wetlandkeepers, regional Weed Committees and the Grasslands Conservation Council projects).
- ☑ Provide recognition for community members who are undertaking voluntary conservation and stewardship of public or private lands.

The Garry Oak Ecosystems Recovery Team has prepared a detailed guidebook for restoring Garry Oak ecosystems. Restoring British Columbia's Garry Oak Ecosystems: Principles and Practices is available from www.goert.ca/restoration.

The Comox Valley Project Watershed Society's Keeping it Living project is a multi-stakeholder program that has developed a long term management plan for the restoration and protection of the Courtenay River Estuary. <http://keepingitliving.ca/>

The South Okanagan Similkameen Conservation Program works to maintain and restore the unique natural ecosystems of the area. <http://www.soscp.org/>



2.5 Guidelines for Climate Change

According to the Federation of Canadian Municipalities, up to half of Canada's greenhouse gas emissions (350 million tonnes) are under the direct or indirect control or influence of municipal governments (<http://fcm.ca/home/programs/green-municipal-fund.htm>).



LEED™ buildings help to reduce energy and water use.

Photo: Judith Cullington

Global temperatures are rising, and most of the warming in the past 50 years has been due to human activities that release greenhouse gases (such as carbon dioxide and methane) into the atmosphere. This warming is resulting in changes to freshwater, marine, and terrestrial ecosystems. For an introduction to the basics of climate science, see the Pacific Institute for Climate Solutions [Climate Insights](#).

2.5.1 Greenhouse Gas Emissions

The Province of British Columbia's strategies for reducing greenhouse gas emissions are set out in the [Climate Action Plan](#). This sets a target of reducing greenhouse gas emissions by 33% by 2020, and 80% by 2050 (as compared to 2007 levels). Most local governments in British Columbia have committed to supporting greenhouse gas reductions in their communities as signatories to the [B.C. Climate Action Charter](#). Reducing greenhouse gas emissions is vital for the future livability of this planet and province.

Local governments have an important role to play in greenhouse gas emissions reduction, through decisions relating to land use, transportation, and building design and operation. The Climate Action [Toolkit](#) website and the [Green Communities](#) website are excellent sources of relevant information for B.C. local governments.

Legislation Supporting GHG Reduction

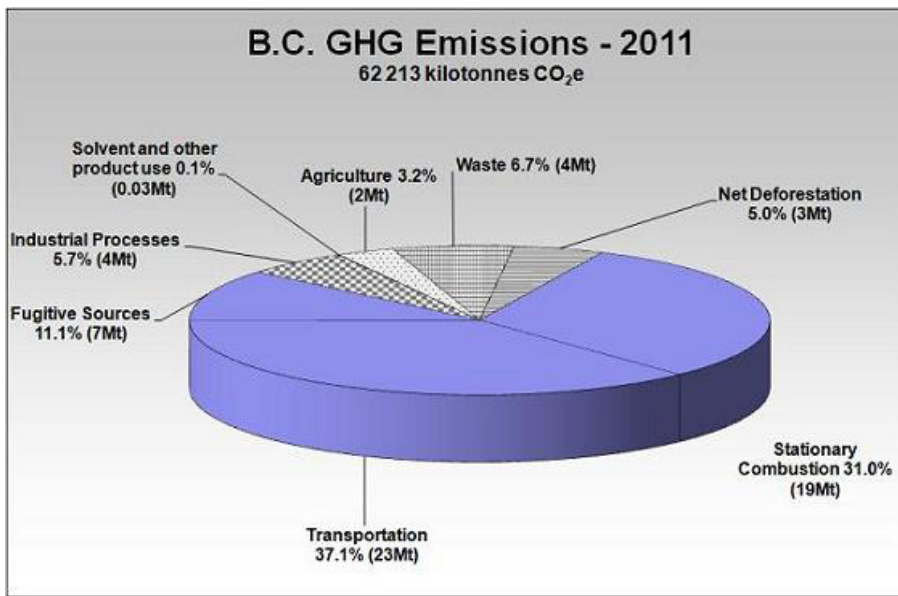
The Government of British Columbia has recently introduced and enacted a number of significant pieces of climate-action legislation that frame B.C.'s approach to reducing greenhouse gas (GHG) emissions and preparing the Province for the emerging low-carbon economy.

- [Carbon Tax Act](#)
- [Greenhouse Gas Reduction \(Cap and Trade\) Act](#)
- [Greenhouse Gas Reduction \(Emissions Standards\) Statutes Amendment Act](#)
- [Greenhouse Gas Reduction \(Renewable and Low Carbon Fuel Requirements\) Act](#)
- [Greenhouse Gas Reduction Targets Act \(GGRTA\)](#)
- [Greenhouse Gas Reduction \(Vehicle Emissions Standards\) Act](#)
- [Local Government \(Green Communities\) Statutes Amendment Act](#)
- [Zero Net Deforestation Act](#)
- [Utilities Commission Amendment Act](#)



Figure 2 1: Sources of greenhouse gas emissions in B.C.

Source: <http://www2.gov.bc.ca/gov/topic.page?id=50B908BE85E0446EB6D3C434B4C8C106#1>



REDUCE LOCAL GOVERNMENT CORPORATE EMISSIONS

The Climate Action Charter includes a voluntary commitment by local governments to become carbon neutral in respect of their corporate operations (i.e., the operation of the local government itself). The [Climate Action Toolkit](#) provides many examples and success stories of ways that local governments in B.C. are reducing their own greenhouse gas emissions.

- ☒ Review the options to achieve corporate carbon neutrality in the [Becoming Carbon Neutral Guide](#).



The City of Colwood has a plug-in electric truck used by its Public Works Department. In addition to reducing greenhouse gas emissions, the truck also saves the municipality about \$3,500 per year in fuel costs. (M. Baxter, pers.comm.)

Photo: City of Colwood



“People living in communities with densities of at least 25 units per hectare, an interconnected street system, integrated land uses, and viable connections to local and regional transit contribute 40% less greenhouse gas emissions per capita on average than those in status quo developments” (Smart Growth on the Ground <http://www.smartgrowth.bc.ca/Programs/SmartGrowthontheGroundSGOG/tabid/71/Default.aspx>).

☑ Improve the energy efficiency of public buildings and facilities such as swimming pools, water systems, and sewage treatment plants by reducing the energy used for heating and cooling, and/or using alternative energy sources such as solar, wind, and thermal energy. For more information, see the Federation of Canadian Municipalities [Municipal Retrofits Guide](#).

PLAN FOR COMMUNITY GREENHOUSE GAS EMISSION REDUCTIONS

- ☑ Find out about your local government’s community greenhouse gas emissions by checking the [Community Energy and Emissions Inventory](#) (CEEI).
- ☑ Set greenhouse gas targets, policies and actions in [Official Community Plans](#) (OCP) and [Regional Growth Strategies](#) (RGS) as required under the B.C. Local Government Act. Consider air quality goals at the same time; for example, diesel buses are more fuel efficient and emit fewer greenhouse gases than their gasoline counterparts, however, they emit more particulate matter that degrades local air quality.
- ☑ Develop [community energy and emissions plans](#) (CEEPs) or [integrated community sustainability plans](#) (ICSPs) .
- ☑ Work towards complete, compact energy efficient community design. For more information see **Section 2.3.1 Integrated, Smart Planning for Communities** and the [Fraser Basin Council Smart Planning for Communities](#) website.
- ☑ Create [Development Permit Areas for Climate Action](#). These can include requirements relating to energy conservation, water conservation and greenhouse gas emissions reduction for:
- ▲ landscaping (e.g., requiring drought tolerant plantings);
 - ▲ siting of buildings and other structures (e.g., building orientation to capture solar energy);
 - ▲ form and exterior design of buildings and other structures (e.g., provision of overhangs for summer shade, summer ventilation);

Useful resources for climate action include:

- B.C. local governments’ Climate Action Toolkit website <http://www.toolkit.bc.ca/>
- Green Communities website <http://www.cscd.gov.bc.ca/lgd/pathfinder-greencommunities.htm>
- LiveSmart Community website <http://www.livesmartbc.ca/community/>
- Fraser Basin Council’s Smart Planning for Communities website http://www.fraserbasin.bc.ca/programs/smart_planning.html
- The Federation of Canadian Municipalities (FCM) Partners in Climate Protection website <http://fcm.ca/home/programs/partners-for-climate-protection.htm>



- ▲ specific features in the development (e.g., naturalized ponds that capture and store rainwater runoff); and,
- ▲ machinery, equipment and systems external to buildings and other structures (e.g., rainwater collection systems, geothermal systems).
- ☑ Capture methane from landfills and use it as an alternative energy source. The [Landfill Gas Management Regulation](#) establishes province-wide criteria for landfill gas capture from municipal solid waste landfills. The regulation focuses on greenhouse gas emission reductions from landfills with the objective of maximizing reductions of landfill gas emissions and identifying potential opportunities to increase landfill gas recovery.
- ☑ Establish an approach and set of tools for planning and managing community infrastructure to reduce greenhouse gas emission and maximize the recovery of value from waste resources. For more information, see [Resources from Waste: A Guide to Integrated Resource Recovery](#) and **Section 2.9 Waste**).

ENCOURAGE ENERGY-EFFICIENT DEVELOPMENTS

- ☑ Use progressive design standards that promote energy efficiency. For examples, see the [Site Design Manual for B.C. Communities](#).
- ☑ Encourage the construction of energy-efficient buildings (new and retrofitted) that meet the LEED™ (Leadership in Energy and Environmental Design) [Green Building Rating System](#) or the [Built Green Canada](#) standards.
- ☑ Establish high-efficiency standards for all new residential gas furnaces and boilers, and consider establishing minimum efficiency standards for all new and replacement gas boilers and heaters for industrial, institutional and commercial facilities. For more information, see [LiveSmart for Contractors](#) for best practices in building construction.
- ☑ Consider options for [district energy](#) where many homes and/or businesses share heating and cooling provided by a nearby, central facility. Heating typically includes both space heating and domestic hot water.

SUPPORT 'GREEN' TRANSPORTATION OPTIONS

Transportation choices affect the livability of a community and the way people get around. These choices affect how much land is used for roads and related infrastructure, greenhouse gas emissions, and community health and affordability.

- ☑ Develop transportation strategies that address ways to reduce greenhouse gas emissions and air pollution. For more information on innovative transportation solutions, see the [Victoria Transport Policy Institute](#) website.

The City of North Vancouver's district energy system, operated by the Lonsdale Energy Corporation, provides low cost energy to homes and offices and reduces greenhouse gas emissions. <http://www.cnv.org/server.aspx?c=2&i=98>

LiveSmart BC provides incentives for clean energy vehicles and electric vehicle charging infrastructure. <http://www.livesmartbc.ca/incentives/transportation/index.html>



Photo: Judith Cullington



The City of Victoria has been replacing some overmature and unsafe street trees with edible chestnuts and walnuts (D. Speed, 2012 pers. comm.).

Agriculture needs a secure water supply. The Ministry of Agriculture and Agriculture and Agrifood Canada have developed a model that determines how much water agriculture needs for the current irrigated area and what will be needed in the future, based on predicted climate change. This tool can be used to determine agriculture water reserves and water resource planning for communities with respect to agriculture. The Okanagan report can be seen at <http://www.waterbucket.ca/aw/>.

- ☑ Encourage the use of electric vehicles by providing [electric vehicle charging infrastructure](#) in public locations, and encouraging developers to provide charging stations in new developments.
- ☑ Encourage alternative development standards that reduce reliance on personal vehicles. For example, the number of available parking spaces per unit could be reduced in areas that are well served by public transit. For more information, see [Parking Management Strategies, Evaluation and Planning](#).

SUPPORT OPPORTUNITIES FOR LOCAL FOOD PRODUCTION

Locally grown food offers numerous benefits, including lower greenhouse gas emissions for transportation, fresher and more nutritious food, local jobs, and contributions to the local economy from direct farm sales and agri-tourism. [The B.C. Agrifoods: A Strategy for Growth](#) includes several strategies to promote and support local food production.

Local governments can also support opportunities for growing local food.

- ☑ Encourage the creation of community gardens, especially in areas where residents do not have front or back yards where they can grow food at home.
- ☑ Support the development of local farmers' markets, for example through appropriate zoning.
- ☑ Protect agricultural land from development. Note that land that may currently be seen as unviable for food production may have agricultural value in the future, as climates and technologies change. For more information on the protection of agricultural land see **Section 2.3.1**.
- ☑ Consider opportunities for food production on local government lands, for example working with community groups to plant and harvest fruit and nut trees on residential streets.

RETAIN CARBON IN VEGETATION AND SOILS

- ☑ Retain forests, wetlands, grasslands, and other ecosystems that act as **carbon sinks**.
- ☑ Develop policies that promote the retention and enhancement of urban forests, grasslands, and other carbon-absorbing ecosystems. Maintain trees near buildings to reduce heating and cooling demands. For more information, see the [Tree Canada Foundation](#) website.
- ☑ Ensure that urban forests are resilient to climate change, including more frequent drought and heatwaves, and increased risk of pest and disease infestations. See [Urban Forests: A Climate Adaptation Guide](#) and **Section 2.4.3**.



Wetlands are good
carbon sinks.
Photo: Judith Cullington

2.5.2 Adaptation to Climate Change

Whilst actions to reduce greenhouse gases are critical, communities also need to prepare for the unavoidable climate change impacts. This is referred to as “adaptation”. Communities will face many new risks and opportunities related to changes in the frequency and severity of extreme weather events, such as intense rainfall, heat waves, and drought conditions, and this may push infrastructure, social safety nets and environmental systems past their current capacities. Adaptation involves making changes in decisions, activities, and thinking in response to observed, or in preparation for expected changes in climate.

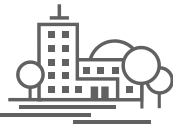
IDENTIFY, PREPARE FOR AND ADAPT TO CLIMATE-RELATED RISKS

- ☑ Follow the lead of other communities in B.C. and find out more about how climate change could affect your community. Start with the [Plan2Adapt](#) tool.
- ☑ Once you understand what’s at stake, plan to increase your community’s resilience. Comprehensive information about how to do this is available on the [ReTooling for Climate Change](#) website.
- ☑ Learn about the tools that local governments can use to implement climate change adaptation plans with [Preparing for Climate Change: An Implementation Guide for Local Governments in British Columbia](#).
- ☑ Promote and use a diverse set of strategies to help species and ecosystems deal with climate change. This can include: creating and/or maintaining landscape and watershed connectivity to enable dispersal of species; identifying and reducing threats to ecosystem resilience; and maintaining diverse ecosystems.

Understanding of future climate change, its impacts, and adaptation is evolving. Researchers and others working with local governments across Canada have developed new tools to help communities identify relevant impacts and integrate climate change adaptation into new and existing plans. These tools include regional climate science services, guidebooks, risk management processes and case studies. See the [Bibliography](#) for sources of information.

Climate adaptation in B.C. communities

Both large and small communities in B.C. have identified ways in which they are vulnerable to climate change and its projected impacts, and developed and implemented plans to increase their resilience. The ReTooling for Climate Change website describes some of these local government initiatives at <http://www.retooling.ca>.



Mountain Pine Beetle killed wood
has increased wildfire risk.
Photo: Judith Cullington



Winter storms on the west coast can bring high water and waves to coastal regions. When combined with high tides, these conditions can cause widespread damage due to flooding and erosion. Canada's Department of Fisheries and Oceans has partnered with the B.C. Ministry of Environment to develop a storm surge prediction system to help local governments and emergency managers better prepare for severe coastal storms. <http://www2.gov.bc.ca/gov/topic.page?id=F09F1EC7576643CEB5FB1536913730BA#storm>

PREPARE FOR SEA LEVEL RISE

Global average sea levels have already risen by about 20 cm since the 1800s. The sea level along the B.C. coast is expected to rise up to 120 cm more by 2100 (see the [sea level rise](#) website).

In addition to increased average ocean water levels, sea level rise will result in

- ▲ more frequent and extreme high water levels, resulting in increased risk of erosion and flooding; and
- ▲ loss of coastal marshlands and other important habitats due to “coastal squeeze”. Coastal squeeze will occur as sea levels rise and coastal habitats are not able to migrate up-slope due to steep rocky shorelines or built structures (e.g., rip rap, sea walls, dikes, etc.).

For more information on sea level rise projections, its implications for B.C. and current guides and resources to help plan for the impacts of sea level rise see the [sea level rise](#) and [flood safety](#) websites.

- ☑ When making development decisions in coastal areas, consult B.C.'s [Sea Dike and Coastal Development Guidelines and Coastal Flood Mapping Guidelines](#) for guidance on locating buildings and other infrastructure in the face of rising sea levels.
- ☑ Recommend that developers follow [Green Shores](#) guidelines when developing in coastal areas.
- ☑ See [Section 4](#) for more information on coastal ecosystems and guidelines for protection.



2.6 Guidelines for Air Quality

Good air quality is essential to the health and well-being of British Columbians and the integrity of local ecosystems. Preserving the quality of our air is an important part of urban and rural land development, both in terms of minimizing the emission of air pollutants and limiting human exposure to such pollutants through appropriate planning, legislation, and actions.

INCLUDE AIR QUALITY GOALS IN COMMUNITY PLANS

- ☑ Get to know air quality in your community. Real-time air quality data are available on www.BCairquality.ca. This includes actual pollutant concentrations and the Air Quality Health Index (AQHI) – a measure of the combined health risks of three of the major pollutants in the air. The BC Lung Association prepares an annual [State of the Air Report](#) that summarizes air quality levels in B.C. over the previous year, and reports on current and emerging issues and the actions being taken to address these issues. During the wildfire season, the Western Canada [BlueSky Smoke Forecasting System](#) provides hourly forecasts of smoke concentrations from wildfires.
- ☑ Recognize air quality concerns in official community plans and regional growth strategies. This will help to avoid placing new schools, hospitals, and vulnerable residents near polluting sources.
- ☑ Ensure air quality improvement is a key consideration in planning processes.
- ☑ Where air quality is a concern, work with air quality authorities to develop airshed plans that address the cumulative impacts from pollution sources within an airshed or community, and identify strategies to maintain or improve air quality. Have these plans and strategies reflected in community plans. For more information, see the [Provincial Framework for Airshed Planning](#).

DEVELOP BYLAWS AND PROGRAMS TO PROTECT LOCAL AIR QUALITY

- ☑ Local governments have the authority to develop and implement bylaws that will protect the health and well-being of local residents. Many B.C. communities have passed bylaws to reduce vehicle idling, regulate or ban open burning, and reduce emissions from wood stoves and fireplaces (see the [Inventory of Air Quality Bylaws](#)). Several communities have also implemented programs to reduce emissions and to increase public awareness of air pollution, including what they can do to protect local air quality.

Several B.C. communities are involved in airshed planning, including Metro Vancouver <http://www.metrovancouver.org/services/air/ReviewProcess/Pages/default.aspx>; Bulkley Valley-Lakes District <http://www.cleanairplan.ca/cap.shtml>; and Prince George <http://pgairquality.com/>.



Develop bylaws to protect air quality.
Photo: Judith Cullington



Metro Vancouver has introduced a “Non-Road Diesel Engine Emission Regulation” to reduce emissions from older diesel-powered machines that are not used or intended for transportation on public roads, such as excavators, forklifts and power generators. Owners are required to register and pay a fee for the machines, but the fee is lowered or eliminated if the emissions are reduced, providing an incentive to reduce pollution. The bylaw addresses the harmful effects that diesel soot emissions have on human health locally as well as global warming caused by soot emissions. <http://www.metrovancouver.org/nonroaddiesel/Pages/default.aspx>

There is evidence that trees and shrubs can help to absorb some air pollutants at the community or regional scale. However, at a local scale, studies on the impact of trees on air quality near roadways show mixed results. These trees can also buffer traffic noise, promote cooling, and may increase carbon dioxide conversion to oxygen.

- ☑ Reduce smoke from wood stoves and fireplaces by
 - ▲ requiring that new or replacement appliances meet the standards of the [B.C. Solid Fuel Burning Domestic Appliance Regulation](#) (see Environment Canada’s [Model Municipal By-Law for Regulating Woodburning Appliances](#));
 - ▲ considering a ban on installation of wood-burning appliances in areas where fine particles pose a serious health concern;
 - ▲ prohibiting wood-burning during air quality advisories except where wood is the sole adequate heating source;
 - ▲ banning excessive generation of smoke; and
 - ▲ implementing [wood stove exchange programs](#) and promoting better wood burning techniques.
- ☑ Ensure that all open burning is conducted in accordance with the [Environmental Management Act](#) and other legislative requirements. The [BC Smoke Management Framework](#) outlines what requirements apply to open burning and other smoke sources.
- ☑ Prohibit residential backyard burning without a permit, and consider prohibiting burning at all times. See the [Model Municipal Bylaw for Regulating Residential Backyard Burning](#).
- ☑ Provide alternatives to open burning for disposing of woody debris (e.g., chipping programs) and yard and garden waste. Local alternatives to open burning can be found at <http://www.bcairquality.ca/topics/rcbc-alternatives.html>.
- ☑ Enact bylaws or implement programs to reduce excessive idling, particularly in school pick-up areas and public transit exchanges. For more information on anti-idling policies, see Natural Resources Canada’s [Idle-Free Zone](#) website, [Cracking Down on Idling: A Primer for Canadian Municipalities on Developing and Enforcing Idle-free Bylaws](#), and the [Hub for Action on School Transportation Emissions](#).
- ☑ Where road dust is an issue, encourage additional paving, improved street and lot sweeping operations, and promote dust management best practices such as the use of dust suppression materials. For information on best management practices, see http://www.env.gov.bc.ca/epd/bcairquality/reports/roaddustbmp_june05.html.
- ☑ When siting developments near agricultural operations, recognize that odour or dust resulting from normal farm practices (that do not contravene the [Environmental Management Act](#)) are allowed under the [Farm Practices Protection \(Right to Farm\) Act](#). See also information on edge planning in **Section 2.3.1**.



Provide setbacks from major transportation routes. Photo: Wendy Coomber picturebc.ca

- ☑ Promote use of best management practices for agriculture to avoid conflicts over odour, outdoor burning and other issues related to farm practices. For examples, see http://www.agf.gov.bc.ca/resmgmt/fppa/refguide/farm_nuisance/870218-64_Odour.pdf and http://www.agf.gov.bc.ca/resmgmt/fppa/refguide/farm_nuisance/870218-62_Dust.pdf.

PROVIDE SETBACKS OR MITIGATE IMPACTS FROM MAJOR TRANSPORTATION ROUTES

Higher levels of air pollutants are found near freeways and busy traffic corridors and have been linked to a wide array of health effects. The health of susceptible populations (e.g., infants, children, pregnant women, the elderly and those with heart or lung disease) is of particular concern in these situations. Air quality impacts should be carefully considered when siting buildings where people spend large amounts of time (7–8 hours per day or more) and buildings that house susceptible populations (e.g., daycares, schools, hospitals, long-term care facilities and residents). Increased awareness of these public health concerns is also needed when developing land-use policy, building design and environmental/air quality management programs. Other planning considerations, such as availability of land, accessibility of facilities and desire for compact, walkable neighbourhoods, may mean that setbacks are not feasible. In these cases mitigative options may be necessary to reduce resident exposure to air pollutants. For more information see [*Develop with Care 2012: Environmental Guidelines for Urban and Rural Land Development in British Columbia. Supporting Information—Air Quality.*](#)



Provide cycling and walking routes away from busy traffic corridors.

Photo: Judith Cullington



Where setbacks from busy roads can be accommodated:

- ☒ Provide a minimum 150 m setback from busy roads, especially for buildings that house susceptible populations. A 'busy road' is defined as a road with more than 15,000 vehicles/day based on annual daily average traffic counts.
- ☒ Avoid locating buildings that house susceptible populations along major truck routes, or use additional setbacks near truck routes or truck distribution centres. Elevated air pollutant concentrations are measurable as far as 750 m from truck routes. Heavy-duty trucks generally emit larger quantities of air pollutants, including diesel exhaust particles, a probable human carcinogen and likely the most harmful vehicle-related pollutant.
- ☒ Avoid locating buildings that house susceptible populations near major intersections. Traffic-related pollution has been shown to be especially elevated surrounding intersections and "stop-and-go" traffic.
- ☒ Establish cycling and walking routes at least one or two blocks away from busy traffic corridors.

When setbacks from busy roads may not be feasible (such as in densely-populated urban areas):

- ☒ Consider building design features that will reduce exposure, such as placement of air intakes, loading dock locations or additional air filtration.

Additional options to reduce exposure to air pollution include:

- ☒ Avoid creating 'street canyons' which can trap air pollution. This can be achieved by staggering buildings that are perpendicular to predominant wind direction or allowing high-rise buildings only on one side of the street.
- ☒ Adopt smart growth, transportation demand management and active transportation policies and programs that reduce fossil fuel use (see **Section 2.5.1**). These policies will yield both air quality and greenhouse gas benefits.



2.7 Guidelines for Water Use and Management

2.7.1 Rainwater Management

Land development alters the natural water balance. When vegetation and soils are replaced with roads and buildings, less rainfall infiltrates into the ground, less water gets taken up by vegetation, and more water flows overland as surface runoff. This surface runoff picks up contaminants and sediments as it travels across paved areas and carries them to local streams and coastal foreshore areas. The traditional method of ‘pave and pipe’ development has resulted in a variety of environmental impacts, including damage to streams and fish habitat.

The Water for British Columbia website <http://www.env.gov.bc.ca/wsd/#> provides access to information on a wide variety of water topics.

More recently, the benefits of a preventative ‘integrated rainwater management’ approach has been recognized. This approach focuses on managing rainwater at the site by encouraging infiltration, rather than dealing with surface stormwater runoff as a problem. An integrated approach recognizes that most rainfall events come in the form of light showers or heavy rain, while extreme storms make up only a small portion of rain events (**Figure 2-2**).

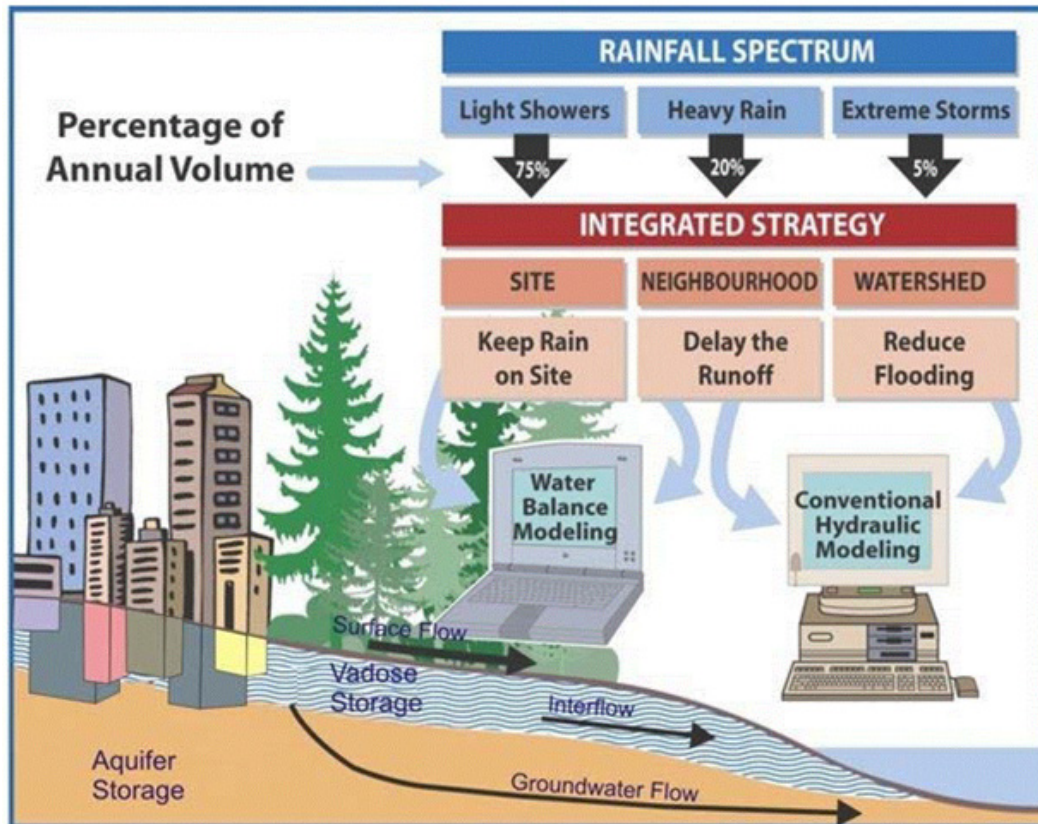


Figure 2 2: Rainfall spectrum

Source: *Stormwater Planning: A Guidebook for British Columbia*



DEVELOP A RAINWATER MANAGEMENT PLAN

Stormwater Planning: A Guidebook for British Columbia and the *Primer on Rainwater Management in an Urban Watershed Context* provide detailed guidelines for integrated rainwater management based on the 'ADAPT' principles:

- ⬆ Agree that rainwater is a resource (for fish and wildlife, water supply, and recreational use)
- ⬆ Design for the complete spectrum of rainfall events (from small to large storms)
- ⬆ Act on a priority basis in at-risk drainage catchments
- ⬆ Plan at four scales—regional, watershed, neighbourhood, and site
- ⬆ Test solutions and reduce costs by using adaptive management

☑ Refer to the Guidebook, Primer and the [Waterbucket](http://www.waterbucket.ca) website for guidelines for integrated rainwater management.

☑ Follow the best management practices in the *Municipal Best Management Practices for Water Quality* as a means of controlling urban runoff.

PROMOTE INTEGRATED RAINWATER MANAGEMENT

☑ Develop local bylaws that encourage and support integrated rainwater management planning. Bylaws should require ongoing maintenance of rainwater management facilities to ensure their continued functioning.

☑ Help prevent future stream degradation by making land use decisions that are informed by Integrated Stormwater Management Plans to prevent future stream degradation.

☑ Update Master Drainage Plans and Integrated Stormwater

The Waterbucket website (<http://www.waterbucket.ca>) provides information on sustainable water management, including rainwater management and green infrastructure.

Create rain gardens to manage runoff.
Photo: Jeremy Gye





This curb cut allows road runoff to seep into the ground.

Photo: Judith Cullington

Management Plans to reflect an integrated rainwater management approach.

☑ Work with the development community to manage rainwater onsite as much as possible (see [Section 3.7.1](#)). Encourage developers to use the [Water Balance Model](#) for onsite rainwater modelling, using landscape-based solutions that allow each property in a neighbourhood to capture, store and slowly release rainwater into the ground to replenish aquifers and streams.

2.7.2 Surface Water

MONITOR WATER QUALITY

The Province has developed [water quality guidelines](#) that apply at a provincial scale. These guidelines set standards for ‘safe’ levels of substances for the protection of a given water use, including drinking water, aquatic life, recreation, and agriculture.

The guidelines may be modified through the development of site-specific water quality objectives: science-based tools that provide an effective basis for managing the resources in aquatic ecosystems and describe conditions that should be met to protect the designated uses of freshwater, estuarine, and marine ecosystems. The development of water quality objectives is led by the Ministry of Environment, in consultation with local stakeholders. Guidance for the development of water quality objectives is provided in the [Guidance for the Derivation and Application of Water Quality Objectives in British Columbia](#).

☑ Conduct ongoing monitoring of surface water, groundwater and ecological systems to assess the effectiveness of integrated stormwater management plans, and to provide information to the development community.



- ☑ Work with the Province's environmental impact assessment biologists and local stakeholders to develop an effective water quality monitoring and assessment program. Include biological monitoring such as benthic invertebrates in streams and report out regularly.
- ☑ Ensure that continuous improvements are made when water quality does not meet Provincial Guidelines or Objectives.

MAINTAIN SURFACE WATER QUANTITY AND QUALITY

Local governments must ensure that there is a sufficient water supply for household use, fire suppression, and other needs before approving subdivisions; however, it is equally important to ensure that developments maintain or mimic predevelopment hydrology (both overland and underground water flows) to avoid unforeseen impacts on ecosystems and species. For example, if rainwater is piped directly into a stream, less water is available to recharge groundwater aquifers that supply drinking water, wetlands and seasonal streams, while peak flows directly impact the function and stability of instream habitats.



Create pervious surfaces for parking.
Photo: Judith Cullington

- ☑ Ensure that zoning density at build-out does not exceed water availability, including the needs of fish, wildlife and other water users.
- ☑ Ensure that any stormwater runoff does not negatively affect the water quality of receiving waters, including surface water bodies and groundwater.
- ☑ Link development bylaws to water quality objectives for total suspended solids, to provide a means of controlling the source of contaminants. Limiting total suspended solids (TSS) and turbidity in streams provides a significant degree of protection in controlling contaminants such as microorganisms, metals and hydrocarbons.
- ☑ Monitor surface flows, for example checking for low flows in sensitive streams.
- ☑ Understand the importance of, and preserve, groundwater discharges to surface water bodies, such as the protection of base flows in groundwater dependent ecosystems.
- ☑ Encourage the use of pervious surfaces for roads, driveways, and parking lots; minimize paved areas.
- ☑ Include rainwater management from public and commercial lands in watershed planning. Public roads and highways as well as commercial parking lots and outside paved work areas can be large contributors of non-point sources of pollutants to streams.



☑ Protect the quantity and quality of water on the interflow zone from impacts caused by development (**Figure 2-2**). This is the area where the rainwater seeps into the soils and makes its way slowly to streams, picking up dissolved nutrients that provide a food source in aquatic habitats.

The Province is modernizing its water laws. The *Water Sustainability Act* will repeal most of the *Water Act*, which has been the primary water law since 1909. Many provisions of the *Fish Protection Act* will also be brought into the *Water Sustainability Act* and a new *Riparian Areas Protection Act* is being created to ensure continued protection of riparian areas.

2.7.3 Groundwater

MAINTAIN GROUNDWATER QUALITY AND QUANTITY

Groundwater is an important source of drinking water for many communities in British Columbia. Many wells that provide water to communities or municipalities, however, are located in areas where human activities can affect water quality. The impact is most severe where community wells draw water from shallow aquifers that are vulnerable to contamination from land use activities and non-point sources of pollution.

☑ If your community is reliant on well water, work with your water purveyor to develop a well protection plan. The [Well Protection Toolkit](#) provides guidance to do this.

☑ Identify aquifers in your area that are vulnerable to contamination. Intrinsic aquifer vulnerability maps (see box) have been developed for several parts of B.C., including the Okanagan, Grand Forks, the Fraser Valley, and Vancouver Island. These maps provide information on the relative degree of natural protection of the groundwater from

Well Protection Areas

The well protection area or capture zone is the land area around the well that contributes water to the well—any precipitation (snow or rain) that lands in this area may eventually end up in the well water. There are a number of methods to determine the extent of the capture zone ranging from a fixed radius around the well to more complex methods that require a qualified hydrogeologist. The methods are described in the Well Protection Tool Kit. Maps indicating the well capture zones for selected community water supplies where a well protection plan has been prepared are available through ImapBC.

ImapBC (<http://webmaps.gov.bc.ca/imfx/imf.jsp?site=imapbc>) has a layer called “Well Capture Zones” in the “Fresh Water and Marine” folder. There are also links to the documents associated with well protection plans stored on Ecocat (<http://www.env.gov.bc.ca/ecocat/>) outlining the methodology used to delineate the capture zone(s) in communities such as Cobble Hill (Lepitre et. al. 2006). New capture zones will be added to ImapBC as they become available.

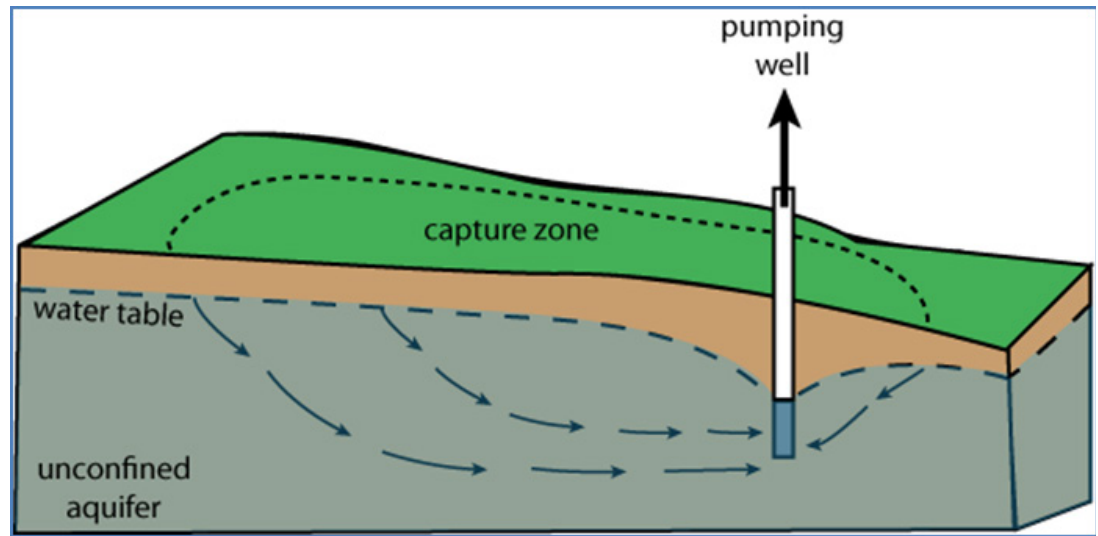
Vulnerability Maps

Vulnerability maps can be viewed using iMapBC (<http://webmaps.gov.bc.ca/imfx/imf.jsp?site=imapbc>) by opening the Aquifer Intrinsic Vulnerability layer found in the “Fresh Water and Marine” folder. Technical guidance documents outlining the methodology and data used to develop the maps can be found on EcoCat: <http://www.env.gov.bc.ca/ecocat/>. Details on the use of the vulnerability maps can be found in the guidance document, which is located on EcoCat (Liggett et. al., 2011).



Figure 2 3: Schematic diagram of a well capture zone showing the land surface area that contributes water to the well

From Liggett et al. 2011



contamination due to the physical characteristics of the land and subsurface. They are prepared at a regional scale and are useful as a screening tool, but are not meant to replace site investigations or to be used for lot scale assessment.

☑ Manage the well protection area (or capture zone) and protect it from contamination. This is the land area around a well that contributes water to the well (i.e., the area where any precipitation that falls may eventually end up in the well water) (**Figure 2-3**).

☑ Consider the vulnerability of the groundwater supply when developing Official Community Plans and approving new land uses which might impact groundwater quality. Evaluating groundwater vulnerability requires:

- 1) an understanding of the hydrogeology of the aquifer, including the level of groundwater development and the pollutant transport potential, and
- 2) a source analysis of potential contaminants for existing and proposed land use activities.

☑ Consider other groundwater/well users when approving developments, in order to avoid aquifer over-use, well interference, potential incursions of salt water, or reductions in water quality.

Non-point sources of pollution going into stormwater have been linked to vehicle miles travelled, so preventing future automobile dependency should be included in land use planning. For example, creating walkable, compact neighborhoods that support active transportation choices and investment in transit can also be seen as proactive approaches to reducing non-point sources of pollution to local streams. See Section 2.3.1 for additional information.



- ☑ Consider groundwater quality impacts when selecting stormwater control facilities to meet development requirements for on-site retention. For example restricting the use of underground infiltration systems for stormwater disposal in high risk development areas.
- ☑ Where groundwater supplies are at risk of contamination, establish bylaws that restrict the conversion of native vegetation to inappropriate landscape types (such as lawns) that depend on inputs of large amounts of water, which then may travel back into the aquifer carrying fertilizers and pesticides.

2.7.4 Erosion and Sediment Control

CONTROL EROSION AND SEDIMENT

Community-level decisions can influence the ability to control erosion and **sediment** generation at the site level (see [Section 3.7.3](#)). Land clearing is the riskiest activity that can lead to soil loss and unwanted sediment transport into streams. It is important to also know your geomorphology and soils to determine how erodible they are.

Erosion prevention should be the top priority. A need for sediment control indicates failed erosion prevention.

- ☑ Identify areas with a high risk of sediment movement and erosion potential within the watershed and identify these as hazard development permit areas. Erosion and sediment control should be considered on a watershed-wide basis to ensure that development in one part of the watershed does not cause downstream impacts such as bank slumping due to erosion or sediment build-up in natural pools.
- ☑ Develop policies on how site development should be carried out in high risk areas to minimize sediment generation.
- ☑ Establish timing restrictions that prevent clearing of sites at times when work or soil conditions could result in substantial erosion and sediment generation (e.g., during periods of high rainfall or snowmelt).
- ☑ Prepare, apply and enforce sediment and erosion control bylaws for all phases of development.
- ☑ Ensure land clearing is staged and minimizes exposed soils.

The International Erosion Control Association, Pacific Northwest Chapter, is a non-profit organization of professionals who come together to share and educate on issues of erosion, sediment and stormwater control. <http://www.escpnw.com/>



2.8 Guidelines for Hazard Management

Hazard management is important for the safety of residents, their property and privately and publicly owned infrastructure. Emergency Management BC offers information on preparation for a great many types of hazard on the [Hazard Preparedness](#) webpage. The [Hazard, Risk and Vulnerability Analysis Tool Kit](#) help communities to make risk-based choices to address vulnerabilities, mitigate hazards and prepare for response to and recovery from hazard events.

Information in this section focuses on avoiding or reducing environmental hazards.

2.8.1 Flooding

Flooding has long been a concern for parts of many B.C. communities, and climate change is increasing the risk in some areas.

ASSESS AND MITIGATE FLOOD RISK

- ☑ Identify areas that are subject to flooding. For information on floodplain mapping, see the [Canada-British Columbia Floodplain Mapping Program](#).
- ☑ Consider and manage future flooding risks associated with climate change.
- ☑ Review information on flood safety on the Ministry of Environment [Flood Hazard](#) website.
- ☑ Follow the [Flood Hazard Area Land Use Management Guidelines](#) when developing or implementing land use management plans in areas prone to flooding. Areas such as alluvial fans, downstream of dykes, and on or behind dikes should be carefully considered.

The Supreme Court of British Columbia and BC Court of Appeal have confirmed the ability of local governments to use development permits to protect development from hazardous conditions. The Islands Trust won a court case against a Denman Island developer who removed trees from an unstable bluff within a development permit area designed to protect the bluff from erosion. The developer was required to pay the costs of remedial work <http://www.islandstrust.bc.ca/news/pdf/newsnov092007.pdf>.

Increases in precipitation and extreme storm events are associated with current changes in climate (IPCC, 2007). There is a growing body of evidence from BC's south coast that terrain stability, and the distribution and frequency of natural landslides, increases with increasing precipitation (Guthrie 2005, Jakob and Lambert 2009, Guthrie and Brown 2008), and that this is potentially aggravated by intense storm events (Guthrie and Evans 2004).

Follow flood hazard area guidelines.
Photo: Ministry of Environment





Alluvial and debris flow fans present a significant flood hazard to many B.C. communities. Infrequent large flood events or debris flows can suddenly alter the course of the stream on the fan as well as cause extensive overbank flooding. During flood events in the past, emergency dikes or berms were hastily constructed on alluvial fans and left in place following the flood. Because they were not built to present day engineering standards and have not been maintained over the years, many of the structures have deteriorated and now provide a false sense of security to residents who live behind these emergency structures. These works are called “orphan dikes” because no local organizations or government is responsible for the inspection and maintenance of these structures. *Photo: Province of B.C.*

- ☑ Avoid new construction on alluvial fans, which may be subject to catastrophic flooding risk. Many alluvial fans have been delineated on flood hazard maps which are available to local governments and other development approval agencies.
- ☑ Enact floodplain management bylaws to control development on lands that are subject to flooding.
- ☑ Assess flooding and erosion risks to aquatic habitats and downstream water users from stormwater runoff. Proposed developments that would increase existing levels of risk (or create new high risk effects) to aquatic habitats, downstream water users, or downstream floodplains should either not be permitted to proceed or should be required to mitigate those impacts.
- ☑ Whenever possible, refrain from approving new businesses that store or use hazardous materials in areas prone to flooding or tsunamis. Where currently such businesses are located in such areas, encourage them to have plans to secure or remove those materials if there is a threat of a flood or tsunami event.
- ☑ See Emergency Management BC’s [Personal Flood Preparedness and Prevention](http://www.embc.ca/Personal-Flood-Preparedness-and-Prevention) website for information that can be provided to residents.

The Province has updated recommendations for setbacks related to floodplains in coastal areas to reflect anticipated sea level rise associated with climate change. Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use is available from http://www.env.gov.bc.ca/wsd/public_safety/flood/structural.html#climate.

Pursuant to Section 82 of the *Land Title Act* and Section 3(3) of the *Bare Land Strata Regulations*, restrictive covenants must be placed on areas that are subject to flooding hazard in order to minimize claims on public funds and damage to property, and to warn future property owners of flooding hazards. These covenants contain flood-proofing conditions and a waiver of liability to the province and local authority. They are registered under Section 219 of the *Land Title Act* on the title of land that is subject to flooding at the time of subdivision, or on the sale or grant of Crown land. Similar conditions and waivers must be included in leases or other dispositions of Crown land that are subject to flooding, according to Part 2 of the *Land Act*.



The Climate Action Secretariat has developed a British Columbia King Tide Photo initiative (<http://www.livesmartbc.ca/connect/kingtidephotos/>), encouraging people from coastal communities to submit pictures showing the effect of extreme high tides. This helps to promote awareness of rising sea levels and potential future impacts.

The Province has updated recommendations for setbacks related to floodplains in coastal areas to reflect anticipated sea level rise associated with climate change. Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use is available from http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/draft_policy_rev.pdf.

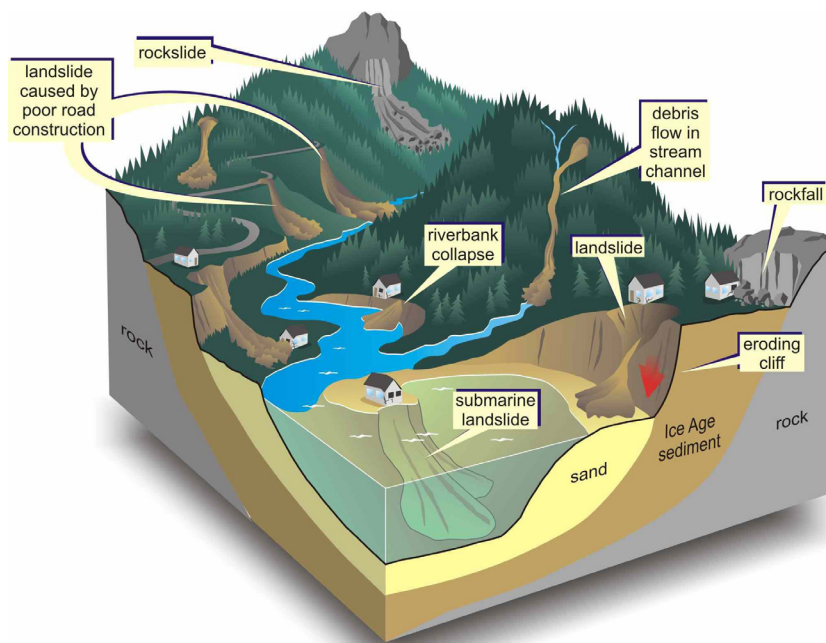
PLAN FOR SEA LEVEL RISE IN COASTAL AREAS

- ☑ Adopt and use the [*Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use*](#) for all new land development that may be subject to flooding. Adopt and use the [*Flood Planning and Response Guide for British Columbia*](#) to help reduce the risk of flood damage associated with extreme weather events.
- ☑ For information on tsunamis including preparedness see the [B.C. Tsunami Information](#) website.
- ☑ For more information on coastal ecosystems and sea level rise, see [Section 4.2.4](#).

2.8.2 Terrain Hazards

IDENTIFY AND ASSESS TERRAIN HAZARDS

- ☑ Consult available [regional terrain inventory mapping](#) and [mass wasting potential maps](#) to determine terrain suitability on proposed development sites.
- ☑ Identify and avoid development in areas vulnerable to landslides, rockfalls, or avalanches.
- ☑ Consult the [Earthquake Hazard Maps and Calculations](#) website for information on earthquakes and seismic hazard zones.





- ☑ Consider the impacts of upslope development activities (e.g., land clearing) on downslope areas. In some cases, development-related changes can trigger landslides or slumps which can damage downslope properties and pose a risk to human life.
- ☑ Ensure that sites that may have geotechnical hazards (e.g., unstable slopes, poor foundation conditions, debris flow hazards, earthquake prone soils, high water tables) are assessed by appropriately qualified professionals before development proceeds.
- ☒ Do not permit development in unsuitable areas. For safety reasons and to protect property, it is important to avoid building on, above, or below unstable areas.
- ☑ Whenever possible, refrain from approving new businesses that store or use hazardous materials in areas where terrain hazards are present. Where currently such businesses are located in terrain hazard areas, encourage them to relocate or have plans to secure or remove those materials if a threat materializes.

See [Section 3: Site Development and Management](#) for site-specific considerations for flood and terrain hazard management.

Professional engineers should follow the APEGBC Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC. <http://www.apeg.bc.ca/ppractice/documents/ppguidelines/guidelineslegislatedlandslide1.pdf>

2.8.3 Wildfires

Wildfires are a natural process in B.C.'s forests and grasslands. Many species need the fire-dependent ecosystems (forests, woodlands, and grasslands) that were common in some regions of British Columbia before current fire management regimes were implemented. The lack of natural fire return periods in these ecosystems causes changes to the ecological communities and wildlife distributions and results in increased fuel loads.

Many ecosystems, such as grasslands, depend on occasional or even frequent fires to maintain their characteristics; however, failure to plan for wildfire may leave a local government vulnerable to liability claims for damage. For more information on building 'FireSmart' communities, see [FireSmart: Protecting Your Community from Wildfire](#).

The British Columbia Wildland Urban Interface (WUI) Fire Consequence Management Plan describes the provincial government's strategy for an integrated provincial mitigation/prevention, preparedness, response and recovery strategy resulting from significant wildland urban interface fires impacting British Columbia. http://www.pep.bc.ca/hazard_plans/WUI_Fire_Plan_Final.pdf

CONSIDER THE LIKELIHOOD OF WILDFIRE BEFORE PERMITTING 'SATELLITE' DEVELOPMENTS

- ☑ Develop a Community Wildfire Protection Plan, which identifies hazards and risks from wildfires and proposes a treatment plan. The [Union of BC Municipalities](#) can provide funding to support the development of these plans.
- ☑ Establish a wildfire threat rating system that identifies areas with high fire risks so that developments can be located and planned appropriately.

A list of fire-resistant plants can be seen at <http://bcwildfire.ca/Prevention/property/Landscape/fireresistantplants.htm>. Note that some of the species identified are invasive and should be avoided.



The City of Prince George has developed a Wildland/Urban Interface Wildfire Management Strategy. This recognizes the increased hazards related to mountain pine beetle kill, and includes recommendations for future community planning and design. http://princegeorge.ca/environment/urbanforestry/forests/Documents/Wildland_Urban_Interface_Wildfire_Mgmt_Plan.pdf

Note: Burns close to homes can be hazardous and, when improperly managed, can do more harm than good. They should be conducted only by an appropriately qualified professional.

☑️ Densify within existing communities rather than building new subdivisions in areas that are prone to wildfires. Avoid creating ‘satellite’ subdivisions that may be susceptible to wildfires, especially where fireproofing requirements could damage areas with Environmentally Valuable Resources. Locating development in areas that are subject to wildfire can cause forest management strategies to shift from protecting forests to protecting homes.

BALANCE FIRE MANAGEMENT AND WILDLIFE CONSIDERATIONS

- ☑️ Work with local fire and emergency experts to ‘fire-proof’ existing developments. Fire-proofing should be completed with wildlife in mind so that important ecological features (such as brush buffers) are not destroyed.
- ☑️ Work with appropriately qualified professionals and the local fire department to re-establish controlled small, understorey fires in high risk areas. This will prevent hotter and more dangerous crown fires from occurring, and will benefit fire-dependent ecosystems. Controlled burning should be conducted as part of a well-planned ecological restoration program, and should be done within the context of both the site being treated and the surrounding landscape values.

REDUCE RISK FROM WILDFIRES

- ☑️ Encourage developers to install sprinkler systems in new homes that are close to wildfire hazard areas, and to use fire-resistant building and roofing materials when building in areas prone to wildfires.
- ☑️ Provide information to residents on ways to reduce fire risks, for example by: avoiding the build up of fuels (such as wood piles and deserted outbuildings) on and around home sites; raking up litter near homes; and using fire-resistant species for landscaping.

Manage wildfire risk.
Photo: Dave Polster





Raccoon. Photo: Grant Bracher
Grizzly Bear. Photo: Mike Weeber
picturebc.ca

2.8.4 Wildlife Conflicts

People build communities in places that are the natural homes of various plants and animals. This displaces many native species, but some adaptable species (such as deer, coyotes, raccoons, and skunks) remain or move into the area. These species often benefit from human activities and may cause conflicts.

Wildlife conflicts may consist of relatively minor nuisance complaints or more serious health, safety, or conservation concerns including:

- ▲ damage to property (e.g., flooding by beavers, burrowing by marmots, and gnawing by squirrels);
- ▲ feeding on garbage and invasion of dwellings and outbuildings (raccoons, skunks);
- ▲ predation on pets and livestock (coyotes, bobcats, cougars, wolves, bears, and birds of prey);
- ▲ disease transfer (mice and raccoons in buildings); and/or
- ▲ human injury (rattlesnakes, ungulates [deer, elk, moose] or large predators in urban areas, wildlife-vehicle collisions).

While wildlife conflict has many impacts for humans, the impacts to wildlife are just as damaging, if not more. In most cases, wildlife involved in conflict are killed. This is especially true for bears, cougar and wolf who pose significant risks to human safety when they appear in areas used by people. Large carnivores are an integral component of natural ecosystem functioning and they keep ungulate populations healthy, which in turn keep wildlife habitats healthy. Wildlife conflict is a two-way street that requires innovative solutions aimed to prevent losses to people and losses to wildlife.



Bear Smart

The Bear Smart Community program is a voluntary, preventative bear conservation program designed by the Ministry of Environment in partnership with the British Columbia Conservation Foundation and the Union of British Columbia Municipalities. It is based on a set of criteria that must be achieved for communities to be awarded “Bear Smart” status. The goal of achieving Bear Smart Community status is to address the root causes of bear-human conflicts, reduce the risks to human safety and private property, and reduce the number of bears that have to be euthanized each year. Squamish, Kamloops, Lions Bay and Whistler are the first four B.C. communities to achieve the Bear Smart designation. Information on the Bear Smart Communities program: www.env.gov.bc.ca/wld/bearsmart/bearsmintro.html Bear Aware Education: www.bearaware.bc.ca

Rattlesnakes hibernate in communal dens and may travel long distances from their dens to summer sites. Den locations and travel paths should be avoided when planning developments. For more information, see [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#).

IDENTIFY POTENTIAL WILDLIFE CONFLICTS WHEN PLANNING NEW DEVELOPMENTS

- ☑ Avoid development in or immediately adjacent to habitat reservoirs and refuges and wildlife corridors and their buffer areas. Consider the needs of large mammals (e.g., bears, moose, deer, and cougars) as well as smaller species (e.g., amphibians, snakes, and birds).
- ☑ Establish bylaws and policies that help to reduce wildlife-human conflicts. For instance, development permit area guidelines could require developments to provide wildlife travel corridors.
- ☑ Be aware of potential wildlife conflicts at airport and solid waste management facilities. For more information on airport siting, see the Transport Canada publication [Sharing the Skies](#).

REDUCE CONFLICTS WITH LARGE PREDATORS (BEAR, COUGAR)

- ☑ Identify potential bear conflicts. For more information see the Conservation Officer Service “[Bears](#)” website. The ‘[Bear Smart](#)’ [Community Program](#) identifies the requirements for [Hazard Assessment in the Bear Smart Community Program Background Report](#).
- ☑ Report information on sightings of large wildlife (bears, cougars, deer) to the Wild Safe BC [Wildlife Alert Reporting Program](#). This also allows alerts to be shared via Social Media.
- ☑ Set up a wildlife observation reporting system to help identify where wildlife are being seen in town as well as the potential reasons why.
- ☑ Respond to wildlife incidents early before they escalate into conflict.

MINIMIZE IMPACTS FROM UNGULATES

- ☑ Increasing numbers of ungulates (primarily deer) living in urban areas has led to increased conflict with the human residents of those areas. The issue of urban deer can be a hotly debated topic. The proliferation of deer in the urban environment is generally not a result of influx of migratory or dispersing animals from adjacent forested lands, but rather



increased survival of resident populations of deer. In the low elevation, urban environment, deer experience relatively benign winters, no natural predators, and abundant food sources as a result of human development. “Unnatural” green spaces such as city parks, playgrounds, and golf courses can also bolster deer populations and result in increased conflicts.

Where deer lose their wariness of people, local populations increase in human environments.

- ☑ Identify ungulate winter ranges in official community plans and avoid zoning these areas for development.
- ☑ Follow the recommendations and advice of the [*British Columbia Urban Ungulate Conflict Analysis Summary Report for Municipalities*](#) for deer management.

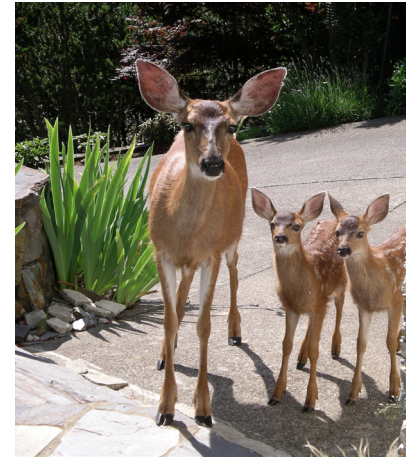
MINIMIZE IMPACTS FROM NUISANCE WILDLIFE (RACCOONS, RABBITS, COYOTES, BEAVER)

Bylaws to prohibit the feeding of deer and raccoons can help to minimize problem wildlife in populated areas.

- ☑ Select plant species for urban parks and restoration projects that are less attractive to wildlife.
- ☑ Refer to the [*Beaver Management Guidelines*](#) and the [*Beaver and Beaver Dam Management*](#) sections of the *Standards and Best Practices for Instream Works* when dealing with beaver issues. Information on beaver dam removal is also provided by [*Fisheries and Oceans Canada*](#).
- ☑ Prevent raccoons from becoming a nuisance by prohibiting the feeding of wildlife, and reminding homeowners to properly manage their garbage. For additional ideas, see [*Living with Wildlife: Raccoons*](#).

For additional information, see:

- ▲ WildsafeBC (<http://wildsafebc.com/front>)
- ▲ BC Conservation Officer Service Human-Wildlife Interactions (http://www.env.gov.bc.ca/cos/info/wildlife_human_interaction/index.html)
- ▲ Okanagan Similkameen Conservation Alliance Living with Wildlife in B.C. Guides (<http://www.osca.org/okanagan/eco/nature/444-Living%2Bwith%2BWildlife%2BGuides>)
- ▲ Washington Department of Fish and Wildlife Living with Wildlife Fact Sheets: (<http://wdfw.wa.gov/living/species/>)



Blacktail deer:
Photo: Grant Bracher



2.8.5: Management of Hazardous Materials

To prevent harming human health and the environment, it is essential that hazardous waste is handled, stored, transported, treated and disposed of properly. While the Provincial Government is responsible for hazardous wastes under the [Environmental Management Act](#) and the [Hazardous Waste Regulation](#), local governments can create local bylaws for storage, containment, and recovery from hazardous materials spills. Local government, as a first line of action/defence in emergency management, will have to take action/responsibility where a citizen or business owner/operator does not or cannot.

PRACTICE PREVENTION

- ☒ Ensure local First Responders (and the public) are aware of hazardous materials in use.
- ☒ Place restrictions on storage or use of hydrocarbons (e.g., home heating fuels, above ground storage tanks).
- ☒ Encourage the replacement or substitution of hazardous materials with more environmentally friendly products.
- ☒ Ensure any hazardous materials used by the local government are properly handled and stored.

PLAN FOR SPILL EMERGENCIES

- ☒ Develop comprehensive plans to respond to spills, addressing immediate actions, safety, notification, and use of qualified contractors.
- ☒ Post information regarding the protection of the environment such as markings on storm sewers and notification of Spill Reporting requirement with telephone numbers in areas the public often use, such as parks or near waterways.
- ☒ Ensure public works and others are appropriately trained to respond to spills of hazardous materials.
- ☒ Refer to the Ministry of Environment's [Environmental Emergency Program](#) website for further information and updates on spill prevention, preparedness, response, and recovery requirements.



2.9 Guidelines for Waste Management

2.9.1 Liquid Waste

Municipal liquid waste includes stormwater and municipal wastewater (sewage), both of which can carry organic matter, organisms, and chemicals that are harmful to human health and the environment. Proper management of municipal liquid waste is essential for maintaining the health of humans and natural ecosystems. In order to discharge municipal effluent, discharges must be authorized by a [Liquid Waste Management Plan](#) approved by the Minister of Environment or be registered under the [Municipal Wastewater Regulation](#).

DEVELOP A LIQUID WASTE MANAGEMENT PLAN

Liquid waste management plans allow local governments to develop community-specific solutions for wastewater management that meet or exceed existing regulations.

- ☑ Develop a [liquid waste management plan](#) that ensures discharges from municipal wastewater treatment plants do not adversely affect human health and the environment. See the [Interim Guidelines for Preparing Liquid Waste Management Plans](#).
- ☑ Consider opportunities for capture of heat and energy from wastewater collection and treatment systems. Some examples of Integrated Resource Recovery (IRR) case studies can be seen at http://www.cscd.gov.bc.ca/lgd/infra/irr_case_studies.htm.
- ☑ Consider opportunities for the beneficial use of reclaimed water from municipal wastewater treatment. Highly treated reclaimed water can be used for a wide variety of beneficial purposes, including: toilet flushing, irrigation, creek enhancement, and industrial applications. See the [Reclaimed Water Guideline: A Companion Document to the Municipal Wastewater Regulation Made under the Environmental Management Act](#) for guidance on developing reclaimed water projects that comply with provincial regulations.
- ☑ Use source control programs to reduce the volume of harmful chemicals that can enter wastewater and stormwater collection systems.
- ☑ Develop a rainwater management plan (sometimes called a stormwater management plan), under the framework of the liquid waste management plan, that meets or exceeds the legislative and regulatory requirements for liquid waste discharge. See also **Section 2.7.1** for information on rainwater management.

Integrated Resource Recovery (IRR) is an approach and a set of tools for planning, designing, and managing community infrastructure to maximize the recovery of value from waste resources while reducing the demand for new resources. It forms an integral part of the provincial Green Communities approach and contributes to sustainable service delivery. http://www.cscd.gov.bc.ca/lgd/infra/resources_from_waste.htm

The Village of Nakusp is using re-claimed wastewater to irrigate the Village's green spaces, offsetting summer peak demands on the drinking water system. http://www2.news.gov.bc.ca/news_releases_2005-2009/2007CS0064-001079.htm

The City of Penticton's Advanced Waste Water Treatment Plant I uses effluent as a heat source for HVAC; while reclaimed water is used at nearby parks and schools. <http://www.penticton.ca/EN/main/departments/waste-water.htm>

The City of Cranbrook worked with Ducks Unlimited Canada to restore a nesting habitat for wetland game birds, using high-quality effluent from the wastewater treatment plant. http://kootenaybiz.com/cranbrook/article/cranbrook_wins_on_wastewater_management

The City of Vancouver's Olympic Village features a neighborhood energy utility that recovers heat from sewage. <https://vancouver.ca/home-property-development/false-creek-neighbourhood-energy-utility.aspx>



The Capital Region District has a source control program to reduce the amount of contaminants entering the wastewater and stormwater collection systems. For information, see <https://www.crd.bc.ca/about/what-we-do/sewers-wastewater-septic/regional-source-control>.

For more information on developing a liquid waste management plan or stormwater management plan see the [Liquid Waste Management Plans](#) website.

DEVELOP A BIOSOLIDS MANAGEMENT PLAN

Biosolids are the beneficial by-product of stabilized or treated municipal wastewater sludge.

☒ Develop a biosolids management plan. Biosolids can be used in many ways, for example as a soil amendment. For more information on beneficial use of biosolids, see CCME [Guidance Document for the Beneficial Use of Municipal Biosolids, Municipal Sludge and Treated Septage](#) and requirements under the [Organic Matter Recycling Regulation \(Environmental Management Act\)](#).

For more extensive information on various attributes of biosolids, see the [Tools and Resources](#) section of the Organics website.

2.9.2 Solid Waste

Municipal solid waste is the normal refuse that is generated by residential, commercial and institutional sources, and by demolition, land clearing and construction activities. Solid waste management in urban and rural land development focuses on minimizing the need to dispose of wastes by following the '5 Rs' principle—Reduce, Reuse, Recycle, Recover, and manage Residuals.

DEVELOP A SOLID WASTE MANAGEMENT PLAN

☒ Develop and implement a [solid waste management plan](#). The *Environmental Management Act* requires that all regional districts prepare and submit a solid waste management plan to the Ministry of Environment. This includes strategies to reduce municipal solid waste,

The City of Port Moody had a diversion rate of 75% in 2011 and hopes to reach 80% by 2020. This follows an award-winning communication campaign to change residents' attitudes towards solid waste. <http://www.portmoody.ca/index.aspx?page=43&recordid=32&returnURL=/index.aspx>

The Regional District of Nanaimo sets limits on the amount of garbage that they collect, but allows for unlimited recycling and green waste collection. <http://www.nanaimo.ca/EN/main/departments/Engineering-Public-Works/garbageAndRecycling.html>

Integrated Resource Recovery (IRR) is an approach and a set of tools for planning and managing community infrastructure to maximize the recovery of value from waste resources. It forms an integral part of the provincial Green Communities approach. http://www.cscd.gov.bc.ca/lgd/infra/resources_from_waste.htm



following the sequential pollution prevention hierarchy: reduce, reuse, recycle, plus recovery and residuals management. For more information, see the [Waste Management](#) website.

☒ Work towards “Zero Waste”—a solid waste management policy framework that goes beyond recycling to focus first on reducing waste and reusing products and then recycling and composting/digesting the rest. This policy provides financial as well as environmental benefits.

SUPPORT RECYCLING AND RECOVERY

B.C.’s approach to recycling is through industry-led product stewardship programs under the [Recycling Regulation](#). Also known as Extended Producer Responsibility (EPR), industry-led product stewardship places the responsibility and costs for end-of-life product management, including collection and recycling, on producers and consumers and not the general taxpayer or local government. See the [Waste Management](#) website for program details.

☒ Maximize opportunities for recycling of materials by:

- ▲ Supporting the development of re-use and remanufacturing businesses in your community;
- ▲ Informing the public of the [EPR stewardship programs](#); and/or
- ▲ Imposing bans on the landfilling of relevant products, when appropriate.

☒ Through zoning, support eco-depots (collection facilities) that provide convenient and easy access for consumers to drop off items for recycling. Convenient access to collection increases recycling. Appropriate zoning is necessary for collection facility development. View the [Action Plan to Enhance Extended Producer Responsibility](#) to see solutions proposed by stewards to improve EPR in BC, including collection facilities. Find out which products industry stewards recycle and the agency responsible at <http://bcstewards.com/>.

☒ Capture methane gas from landfills and use this energy source for heating or producing electricity. Methane is a significant greenhouse gas with 21 times the heat-trapping effect of carbon dioxide. For more information on the Landfill Gas Management Regulation, applicable guidelines and which landfills are captured by this regulation, see the [Landfills](#) website. Capturing landfill gas can help communities work towards [carbon neutrality](#).

There is a positive business case for reducing the amount of waste we generate in B.C. The Zero Waste Business Case <http://www2.gov.bc.ca/gov/topic.page?id=2D645A21C6614A8A8FFBE84389B22884> also provides rationale for the creation and retention of remanufacturing and recycling-reliant facilities within B.C. to prevent leakage of these jobs to other jurisdictions.

The Regional District of Nanaimo has achieved a 350 kg per capita landfill disposal rate, one of the lowest in Canada <http://www.rdn.bc.ca/cms.asp?wpID=224>. In 2010, the average per capita disposal rate per person in B.C. was 587 kg. Japan is the world leader at 377 kg. Check your Regional District’s Disposal Rate: http://www.env.gov.bc.ca/soe/indicators/waste/municipal_solid_waste.html



Encorp Pacific has implemented a 5 star Depot Program to continue to raise the standard and provide the best possible recycling experience. <http://www.return-it.ca/programs/5star/>

☑ Consider an organic waste disposal ban in your community to reduce the volume of waste going to landfills and find opportunities for beneficial reuse, such as backyard or community composting. For more information, see the [Model Organics Strategies](#) webpage and information on the [Organic Matter Recycling Regulation](#) of B.C.

☑ Encourage food waste reduction through behavioral changes. For more information, see [Reduce Food Waste](#) webpage.

MANAGE RESIDUALS

Landfilling is a part of integrated solid waste management. Disposal of materials to landfill is the least preferred management option in the waste management hierarchy after reduce, reuse, recycle and recovery. However, landfills will continue to remain an essential component of solid waste management even with high diversion rates in order to manage the wastes that cannot be practically removed from the waste stream.

☑ Carefully design and manage landfills to minimize risks to public health and safety and to ensure environmental protection. The [Landfill Criteria for Municipal Solid Waste](#) provides guidance for best management practices including siting, design, construction, operation and closure of Municipal Solid Waste (MSW) landfills. _

2.9.3 Hazardous Wastes

Hazardous wastes can be generated anywhere. Large industrial operations can generate hazardous wastes that include spent chemicals used in their processes. Businesses such as autobody shops and automobile service centres can generate hazardous wastes including waste solvents, oils or paints. Residential properties can also generate a variety of hazardous wastes including oils, flammable liquids, cleaning products, paint and asbestos waste. Asbestos waste can be generated when renovating or demolishing any older building, industrial, municipal or residential. Buildings constructed prior to 1990 have a greater chance of containing asbestos materials.

Wastes range from paints, oils and solvents to acids, heavy metal-containing sludges and pesticides. They may be deemed “hazardous” for many different reasons:

- ▲ They are corrosive, ignitable, infectious, reactive and toxic (the “acute” hazard characteristics); and/or
- ▲ They have the potential to harm human health or the environment in a subtle manner over long periods of time (the “chronic” hazards).



Asbestos waste can be generated from the destruction of older buildings.

Photo: Judith Cullington

CONSIDER SUITABLE LOCATIONS FOR SITING FACILITIES WHICH GENERATE OR RECEIVE HAZARDOUS WASTES

The generation, storage, handling, transport, treatment and disposal of hazardous wastes are regulated by the [Hazardous Waste Regulation](#) and the [Environmental Management Act](#). Businesses that generate certain quantities of hazardous wastes must register the waste and store the waste as required by the Hazardous Waste Regulation. Those that transport hazardous wastes must be licensed and use appropriate manifests. Facilities that receive hazardous waste must register with and receive approval of their plans from the Ministry of Environment. These facilities tend to manage larger quantities (and potentially types) of hazardous wastes. For that reason, should there be an emergency, such as a fire or spill, the risk to human health or the environment could be greater than for hazardous wastes generators that store smaller quantities or fewer types of hazardous wastes.

☒ Consider siting restrictions for facilities that receive hazardous wastes based on local considerations. Local governments may also wish to consider the need for public consultation if a hazardous wastes receiving facility is proposed for their community. The Hazardous Waste Regulation does not require a public consultation process.



Further information on hazardous wastes can be found at <http://www2.gov.bc.ca/gov/topic.page?id=4C31A8F4F63B414D807AE4CF35EF9E36>.



Develop facilities for managing household hazardous wastes.
Photo: Ian Graeme

☑ Support the development of facilities for receiving and properly managing household hazardous waste. The Hazardous Waste Regulation does not prohibit homeowners from discarding hazardous waste in their household refuse. However, the discharge of even small quantities from a large number of households could result in the contamination of soil and groundwater around local government landfills. Household hazardous waste collection facilities have been set up across the province for a variety of household hazardous wastes. More information on opportunities to recycle household and other hazardous wastes can be found at the [Recycling Council of BC](#). Local governments can encourage the responsible management of household hazardous wastes through initiatives such as education programs.

☑ Take all reasonable actions to avoid burning asbestos-containing materials at landfills or other locations. Airborne asbestos fibres are a health hazard. Waste asbestos needs to be properly contained as required by the HWR. Improper containment of the waste could result in the spread of asbestos fibres at the generation site, while in transport or at the landfill.

2.9.4 Management of Agricultural Wastes and By-products

Manures and other agricultural wastes and by-products are not considered part of municipal liquid or solid waste streams, and responsibility for managing these rests with individual agricultural producers. Local government should be aware that there are federal and provincial regulations and guidelines to assist agricultural producers in managing their operations and their agricultural wastes and by-products in an environmentally-sound manner.

Provincially, all agricultural operations are covered by and must follow the requirements in the [Agricultural Waste Control Regulation](#) (AWCR) under the *Environmental Management Act*. The AWCR describes practices and activities for storing, using and managing agricultural wastes and by-products in an environmentally-sound manner. Federally, agricultural activities are regulated to ensure they do not impact water quality, and fish and wildlife habitat. For example, prior to any works or management activities in or about a watercourse or wetland and associated riparian areas, a producer must receive authorization from Fisheries and Oceans



Canada.

More information can be found at the following links:

- ▲ Sustainable Agriculture Management Branch of the Ministry of Agriculture – introductory page: <http://www.agf.gov.bc.ca/resmgmt/index.htm>
- ▲ Nutrient management: <http://www.agf.gov.bc.ca/resmgmt/NutrientMgmt/index.htm>
- ▲ Riparian area management: <http://www.agf.gov.bc.ca/resmgmt/riparian/index.htm>
- ▲ Agricultural water management – includes information and recommendations on issues such as flooding, droughts, and emergencies: <http://www.agf.gov.bc.ca/resmgmt/water/index.htm>
- ▲ BC Environmental Farm Plan (EFP) Program - the EFP Program complements and enhances the current environmental stewardship practices of producers and includes a Reference Guide and Management Guides as well as reports: http://www.agf.gov.bc.ca/resmgmt/EnviroFarmPlanning/Documents_and_Reports.htm
- ▲ Agricultural Waste Management – includes factsheets, publications and information for farmers and ranchers, such as the Manure Spreading Advisories: <http://www.agf.gov.bc.ca/resmgmt/WasteMgmt/index.htm>

