



Official Community Plan Policies Supporting Climate Resilience

A Resource Guide for Communities in the
Canadian Columbia Basin

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Basin **trust**

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This resource guide was prepared by:

Deborah Curran, D. Curran & Co.

Tamsin Lyle, Ebbwater Consulting

Columbia Basin Trust Communities Adapting to Climate Change Initiative:

- Ingrid Liepa, Communications and Outreach
- Kate Mahoney, Coordinator
- Jeff Zukiwsky, Community Project Liaison

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Kris Belanger, Regional District of East Kootenay

Deborah Carlson, West Coast Environmental Law

Donna Dean, Regional District of Kootenay Boundary

Meeri Durand, Regional District of Central Kootenay

Jenny Fraser, British Columbia Ministry of Environment, Climate Action Secretariat

Jeff Ginalias, Regional District of Kootenay Boundary

Meredith Hamstead, Columbia Basin Trust, Water Smart Coordinator

Mitchell King, Regional District of Central Kootenay

David Lapp, Engineers Canada

James Littley, Okanagan Basin Water Board

Mike Maturo, Urban Planning Consultant

Andrew McLeod, Regional District of East Kootenay

Kathy Moore, City of Rossland

Troy Pollock, City of Kimberley

Hans Schreier, University of British Columbia

Jan Thingsted, Columbia Shuswap Regional District

Anna Warwick Sears, Okanagan Basin

Disclaimer

The bylaw provisions in this report are provided for information purposes only and are intended as a resource for communities in the Columbia Basin Trust region. The provisions do not constitute legal advice nor do they provide a complete bylaw. Changes in legislation, the common law and conditions that are specific to the local site or government require special consideration to ensure that bylaws are legal. Please consult qualified legal counsel to draft and review Official Community Plan bylaws.

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1. Introduction

As climate change brings new risks and challenges for communities, Columbia Basin Trust is supporting local governments in their efforts to adapt to climate change.

The Trust has been working with communities in the Columbia Basin since 2008 to help them understand the impacts of a changing climate and the actions necessary to proactively address those changes. Many communities in the region face similar weather- and climate-related challenges, including more frequent extreme weather events, flooding, wildfires and water supply issues. Local governments are recognizing the need for policies and bylaws that address the local impacts of climate change and increase community climate resilience.

This resource guide provides local governments with guidance and examples for the integration of climate-resilient policies into Official Community Plan (OCP) bylaws and Development Permit Area (DPA) guidelines. The policies in this document may also be relevant to other strategic planning processes including Regional Growth Strategies, Parks and Trails Master Plans and Economic Development Plans.

The OCP and DPA provisions in this guide come from two main sources: 1) existing OCP policies and DPAs from Basin communities, British Columbia and beyond,¹ and 2) climate

1 Appendix A provides a complete list of local governments with links to their respective OCPs.

adaptation plans, climate adaptation resource guides and the combined experience of the guide's authors and the consulting team associated with the Trust's climate change initiatives. The policies presented are not intended to be prescriptive and are intended to provide a range of ideas and options for local governments in the Basin to consider.

The guide's provisions address extreme precipitation, flooding, temperature extremes, wildfires, water resources and drought. Although the guide's primary focus is climate adaptation, it includes policies designed to reduce greenhouse gas emissions while also supporting resilience to climate change.

1.1 Increasing Climate Resilience



There is strong scientific consensus that the climate is changing on a global scale. Studies commissioned by the Trust in 2007 and 2011 concluded that the climate in the Canadian Columbia River Basin has changed in the last century and is likely to continue changing in the future.²

Projected changes by the 2050s (relative to Basin climate conditions from 1961 to 1990) include:

- average temperature increases of 1.6 to 3.2 C
- median decreases in summer precipitation of six per cent
- median increases in winter precipitation of seven per cent.

The number of extremely hot days, frequency of warm spells and intensity of rainfall events are also projected to increase.

These climate changes are expected to result in a wide range of impacts to the natural environment, including retreating glaciers, changes in stream flows and biodiversity, more frequent wildfires and more extreme weather events that will, in turn, impact people living in the Basin.

Given the climate changes that have already occurred and are expected to occur on both local and global scales, it is important for Basin residents, businesses, communities and governments to take these projected changes into account when planning their social, economic and environmental futures.

2 Murdock, T.Q., J. Fraser and C. Pearce (editors). (2007). *Preliminary Analysis of climate variability and change in the Canadian Columbia River Basin: Focus on water resources*. Pacific Climate Impacts Consortium report and Murdock, T.Q. and A.T. Werner (2011). *Canadian Columbia Basin Climate Trends and Projections: 2007-2010 Update*. Pacific Climate Impacts Consortium report.

Local governments are on the front line of climate impacts related to land use planning, infrastructure and essential community services and, as a result, need to undertake adaptation actions. Adaptation involves both preparing for the future climate and its impacts and adjusting or responding to the changes already under way. Some climate changes will present opportunities and others will present challenges that may not always have obvious solutions.

Climate resilience is the ability of human and ecological systems to absorb weather and climate-related stresses while retaining the same basic structure and way of functioning. It includes the capacity of those systems to cope with, adapt to and recover fully or partially from climate-related stress and change. Local governments can use OCP bylaws to increase community climate resilience by adopting policies that:

- preserve and enhance the natural environment, which helps moderate the impacts of extreme weather events and a changing climate
- promote partnerships with nearby communities, agencies and landowners for the effective management of adjacent lands in relation to climate impacts
- locate development away from hazardous areas or reduce risks to developments already located in hazardous areas
- build additional capacity into infrastructure systems that serve multiple purposes, such as natural or recreational spaces that can also act as flood control
- seek to build the capacity of staff and residents to better understand climate trends, projections, impacts and opportunities to increase resilience
- promote climate-resilient buildings and infrastructure that can withstand a variety of environmental stresses
- address social sustainability and economic development factors associated with climate resilience.

The policy approaches in this document are best viewed as climate adaptation strategies aimed at increasing a community's resilience by reducing its vulnerability to current and future climate impacts. Given the inherent uncertainty in future climate projections and impacts on communities, adaptation is best viewed as any action that reduces a community's vulnerability to a weather- or climate-related hazard.

Appendix B lists additional resources related to community resilience and adaptation planning.

1.2 Using This Guide

1.2.1 Structure



This resource guide follows the same format as most standard Official Community Plans. **Section Two** sets out OCP policies that increase resilience to climate change with a focus on planning, growth management, infrastructure and utilities and the natural environment. Also included are policies addressing transportation, parks and recreation, social and economic sustainability, food security, energy and monitoring. Each subsection includes an introduction and overview of the rationale for climate-resilient policies, followed by examples of specific OCP policies. **Section Three** explains the designation of DPAs and sets out a range of guidelines that address climate resilience. These include DPAs for protection of the natural environment, hazardous conditions (wildfire interface, steep slope, flood and avalanche), water and energy conservation and guidelines for professional reports. Information about Development Approval Information Areas is also provided.

It should be noted that some policy provisions appear in several different sections. This overlap reflects the fact that similar policies can be implemented to achieve different objectives.

Throughout the guide, two types of text boxes are used:

Sources of existing local government policies and guidelines; most are from British Columbia, and some from local governments in the United States are also included.

Examples of specific OCP provisions, DPA guidelines and other community planning policies drawn from existing documents that advance climate resilience. Most examples come from Columbia Basin communities and demonstrate the leadership these communities have taken on integrating climate adaptation into OCPs.

Margin notes are included to provide additional information or examples related to specific policies or policy sections.

1.2.2 Who This Guide Is for

Although the guide is designed specifically for the Columbia Basin region and the climate impacts most prevalent in this region, it is applicable to other regions of British Columbia and may be of interest to jurisdictions outside of BC.

The guide is intended to support:

- local government planners, elected officials and other staff and planning and consulting contractors involved in the development of OCP provisions and DPA guidelines
- advisory committee members, planning commissions, active community members, engaged citizens, non-profit groups and other organizations and individuals who may be supporting development of an OCP in their communities.



1.2.3 Terminology

Various terms associated with climate adaptation and resiliency are used in this document. Commonly used terms are defined below.

Climate: The prevailing weather-related factors—such as temperature, precipitation, atmospheric pressure, wind velocity and humidity—in a given region, measured over several decades.

Climate adaptation: Actions that reduce the potential impacts of current and projected future climate; being ready for a future that is different from what the community has experienced in the past due to changes in weather and climate.

Climate change: A detectable shift in the average (mean) and/or variability of a climate factor from one time period (typically decades or longer) to another.

Climate change mitigation: Reducing greenhouse gas emissions that contribute to climate change.

Climate resilience: The ability of human and ecological systems to absorb weather and climate-related stresses while retaining the same basic structure and way of functioning, including the capacity of those systems to cope with, adapt to and recover fully or partially from climate-related stress and change.

Extreme weather events: Events that occur less than five per cent of the time, such as extreme precipitation events, thunderstorms, extreme temperatures, tornadoes, windstorms and dust storms.

Weather: The day-to-day conditions of the atmosphere: e.g. whether it is raining, snowing, sunny, hot or cold.

1.2.4 How to Use This Guide

This document can be read in several ways:

1. comprehensively, from start to finish, as a means of increasing awareness of policies that promote climate resilience and how Basin communities are adapting to climate change.
2. by accessing specific sections for guidance, as needed, to update OCPs or otherwise develop and implement climate-resilient policies and actions.

While this guide does not provide a comprehensive code or template for addressing climate resilience through OCP policies and DPA guidelines, it identifies good practices, provides examples of language that can be incorporated into OCP policies and DPA guidelines and demonstrates the range of approaches local governments are using to address climate resilience.



2. Official Community Plan Policies

Official community plans set the vision for a community over a five- to 20-year period. They articulate a community's objectives and policies on land use, community development and operations. More specifically, they must include the location of different land uses, restrictions on the use of land subject to hazardous conditions or that is environmentally sensitive to development and the location and phasing of road, sewer and water systems.³

Policies in OCPs are important in two ways. First, they establish the vision for future growth and development in a community—taking into account infrastructure and environmental protection needs—which provides a map for orderly and planned land use changes. Second, they provide guidance to local government staff, the subdivision approving officer and elected decision makers. This guidance function can be enhanced by specific metrics for monitoring how well an OCP is achieving its goals. However, it is important to note that OCP policies are rarely specifically enforceable. Although bylaws must be consistent with OCPs,⁴ courts will defer to local councils to determine what is consistent or inconsistent with an OCP.⁵ Therefore, specific and mandatory OCP policies are more likely to be enforceable than broad and voluntary ones.

³ *Local Government Act*, R.S.B.C. 1996 c.323 s.877.

⁴ *Ibid*, s.884.

⁵ See, for example, *Residents and Ratepayers of Central Saanich Society v Central Saanich* 2011 BCCA 484 (leave to appeal to SCC dismissed).

2.1 General Policies



Overview

Climate change will result in a range of impacts on local government infrastructure, operations and planning activities. General policies within an OCP can help local governments increase their awareness of and attention on potential climate threats and opportunities and prioritize actions. This includes, for example, risk assessments, vulnerability assessments or climate adaptation planning. Climate-resilient policies may also address public education and awareness, as well as emergency management for extreme climate events. Provisions may include direction to consider climate change at both the staff and council levels.

Policy Provisions

The policies in this section are adapted from the following OCPs: Castlegar (Chapter 7), Rossland (Chapter 14), Kaslo (Chapter 17), Slocan (Chapter 5), Fernie (Chapter 7), Elkford (Chapter 4), Saanich (Chapter 4), North Vancouver (District) Chapter 10, Victoria (Chapters 12 and 18) and Richmond (Part 2.5 and Chapter 2).

1. Develop and regularly update a Climate Adaptation Plan that:

- assesses and prioritizes climate risks across all aspects of the [Name of local government]
- recommends adjustments to plans, policies and operations that strengthen community resiliency to future climate risks
- includes targets and monitoring activities.

Fernie OCP Policy 7-B.1

- Prepare a *Climate Change Adaption Plan* to better understand how Fernie is exposed to future climate risks and identify and assess actions to increase community resilience.

Slocan OCP Objective 5.1.5

- Encourage a local action plan towards a sustainable society and adaption to the effects of climate change.

2. Improve the implementation of the Climate Adaptation Plan by taking an adaptive management approach by, for example, instituting environmental performance objectives, targets and monitoring.

Richmond City Centre Area Plan (at 2-62) on Adaptive Management:

- Adaptive management is a systematic process of learning to continually improve management policies and practices over time. Recognizing the dynamic conditions of natural and social systems, this approach enables the City to continually strengthen policies based on assessments of local performance, outcomes of action taken and evolving best practices.

3. When implementing costly and long-term climate adaptation measures, conduct cost-benefit analysis to ensure social, economic and environmental benefits outweigh the costs.
4. Develop and regularly update a Community Energy and Emissions Plan that identifies policies, targets and actions for reducing greenhouse gas emissions and increasing energy efficiency.
5. Consider climate change, impacts and strategies to increase climate resilience in all long-term decision making, such as when undertaking long-range planning and reviewing land use development patterns, infrastructure standards and flood management policies.

Elkford Policy 4.1.2

- Bids, tenders and contracts for planning and development in the District shall make reference to climate change and utilize as a resource the Climate Change Adaptation Strategy.

Kaslo Policy 17.2.7

- Council shall consider climate change, its potential impacts and mitigation measures when reviewing new development applications and undertaking long-term planning initiatives.

Fernie Policy 7-B.6

- Consider future climate change impacts and adaptive responses in long-term planning and development decisions.

6. Enhance partnerships with senior, regional and local governments, public agencies, community organizations, businesses and individuals for the efficient and effective coordination of climate resilience planning, policies and initiatives, including risk and vulnerability assessment of local climate impacts.

Rossland Policy 14.2.17

- Seek opportunities to develop strategies to reduce vulnerability to and adapt to climate change impacts in collaboration with federal and provincial agencies, the Regional District of Kootenay Boundary, research organizations, the academic sector and others.

7. Strengthen community resilience by increasing local self-reliance and resource (food, energy and water) security.
8. Raise community awareness of climate-resilient actions that can be implemented by homeowners, such as water conservation, FireSmarting and on-site stormwater management.
9. Support and encourage the provincial government to enhance tools and information available to help communities better manage climate risks, including but not limited to weather and climate monitoring, climate projections, design guidelines and planning support.

Kaslo Policy 17.2.2

- Council shall support and encourage provincial government initiatives to enact legislation to provide local governments with the necessary tools to better address climate change and energy efficiency issues.

2.2 Growth Management, Land Use and Buildings



Overview

Policies relating to growth management, land use and buildings address the location of development and the resilience of housing, including the ability of buildings to deal with more extreme temperatures and weather events. Climate change can increase the risk of flooding, landslides, wildfire and extreme weather-related events. Adopting policies that direct development away from hazardous areas and into appropriate centralized serviced areas can protect critical buildings and infrastructure from both wildfire and extreme weather-related events. This may also serve to speed up recovery from events that impact critical buildings and infrastructure.

Policy Provisions

The policies in this section are adapted from the following OCPs: Fernie (Chapter 7), Elkford (Chapter 5), Kaslo (Chapter 17), San Francisco (Policy 13.4), Dawson Creek (Chapters 3 and 13), Kamloops (Chapter 2) and Saanich (Chapter 4).

1. Restrict development in designated hazard land areas, which include steep slopes, flood plains and wildfire interface areas. Consider how future climate projections will change hazard land designations.

Elkford Objective 5.1.3 and Kaslo Policy 17.2.8

- The requirements of the Climate Change Adaptation Strategy are considered for all new development and are implemented on a scaled basis...lands susceptible to increased risk of natural hazards related to climate change are either not considered for development, or mitigation measures are taken when affordable and realistic.

2. Direct new development and focus infrastructure investment within growth boundaries to maximize the efficient use of community infrastructure and utilities.
3. Do not consider changes to, or extension of infrastructure beyond, a growth boundary except as part of a comprehensive review of the Official Community Plan.
4. Do not provide servicing to new residential subdivisions, commercial or industrial uses that locate outside a growth boundary.

Elkford Objective and Policies 5.3.4

- ...By focusing development within the serviced area of Elkford and within the District Growth Boundary, the District reduces additional risks to buildings and structures from wildfire events.



5. Adapt the model Climate-resilient Subdivision and Development Servicing Bylaw developed for Basin communities to local conditions and use it to promote climate resilience through the subdivision and development approval process.
6. Require all new development to take low-impact development and FireSmart approaches to site and building design.

Note: In 2013, the Trust supported the development of a model climate-resilient Subdivision and Development Servicing (SDS) Bylaw to help communities increase the climate resilience of their SDS bylaws and minimize the long term costs associated with developing and operating infrastructure over its full life or service cycle. Find the model SDS bylaw at www.adaptationresourcekit.squarespace.com

Elkford Policies 5.5.2 and 5.8.2

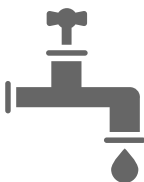
- New development shall utilize Low-impact Development standards to promote and support water balance and groundwater retention standards.
- Institutional and District-owned buildings will implement adaptation to climate change risks with features including, but not limited to: utilization of FireSmart guidelines, leading water conservation practices and stormwater management techniques.

7. Reduce development cost charges (DCCs) for climate-resilient projects that reduce loading and use of water supply and stormwater infrastructure.

San Francisco Policy 13.4

- Green development specifically relates to the environmental implications of development. Green building integrates the built environment with natural systems, using site orientation, local sources, sustainable material selection and window placement to reduce energy demand and greenhouse gas emissions.

2.3 Infrastructure and Utilities



Overview

Infrastructure and utilities including, roads, domestic water supply and sewers are a primary mandate of local governments. Climate change could result in the deterioration and damage of infrastructure due to:

- increased peak stormwater flows leading to flooding
- increased freeze/thaw stress on road surfaces, buildings and pipes
- more snow weight on roofs.

Risks to potable water supplies from both flood and drought events are also a significant concern. Extreme events, such as landslides, wildfires or windstorms, could cause additional infrastructure damage. These risks may be exacerbated by the condition of existing, aging infrastructure in many communities.

Policies for reducing greenhouse gases and increasing the energy efficiency of infrastructure are also included below.

Policy Provisions

The policies in this section are adapted from the following OCPs: Castlegar (Chapters 7 and 20), Elkford (Chapter 6), Kaslo (Chapter 17), Kelowna (Chapter 7), North Vancouver (Chapter 11), Saanich (Chapter 4), Victoria (Chapters 10, 11), Kamloops (Chapter 6) and Richmond (Parts 2.7 and 2.9, Chapter 12).

2.3.1 General

1. Adopt a long-term life cycle asset management approach that addresses the challenges of climate change in the design, maintenance and renewal of infrastructure and facilities.

Castlegar Policy 7.4.2

- Consider the effects of climate change on water quantity, stormwater, vulnerability to extreme weather events and ecosystem changes.

2. Coordinate the planning, development, construction, funding and operation of infrastructure to promote advancements and innovations in adaptive and multi-functioning infrastructure and utility standards.
3. Complete an integrated resource management strategy during the planning and development of public infrastructure to maximize opportunities for waste reduction, energy conservation or generation and reduction of the ecological impacts of the infrastructure (construction, operation, maintenance and decommissioning).
4. New buildings and infrastructure should be designed with consideration of future modifications and improvements that will facilitate climate adaptation. For example: high ceilings in buildings that allow for future space cooling retrofits, a wastewater treatment facility that allows for future water reclamation and distribution capabilities, facades that have the ability to add future shading and/or flood defence infrastructure that can easily be heightened or extended in the future.
5. Require resource recovery planning as a primary component of infrastructure projects to maximize opportunities for liquid, material and energy recovery from the co-management of water, solid and liquid waste systems.
6. Regularly review development cost charges to ensure new developments pay for the additional infrastructure they require and existing developments that increase on- or off-site climate resilience over their lifespans. For example: those developments that reduce demands on existing infrastructure pay reduced development cost charges.
7. Integrate and co-locate infrastructure and facilities to take advantage of energy and resource system opportunities such as capturing waste heat, heat exchange, energy generation and stormwater reuse.
8. Take advantage of opportunities to locate power distribution lines underground to reduce wildfire risks and power outages caused by extreme weather events.

2.3.2 Water Supply

1. Assess the vulnerability of water supply systems to climate changes, including higher temperatures, more extreme weather and changing hydrologic patterns and develop strategies to reduce water supply system vulnerability.
2. Prior to increasing capacity in the water supply system, seek to reduce or shift water demand by implementing both public and utility-driven demand management.
3. Minimize water consumption by implementing best practices for water conservation including distribution system metering and/or universal metering, water loss management, rigorous data collection and analysis, public education and equitable rate structures to achieve long-term revenue sufficiency for both water and wastewater utilities.

Castlegar Policies 7.7.6, 7.7.7 and 20.6.1

- Continue to implement universal water metering as a method to address unnecessary water use and continue to support water conservation.
- Identify municipal facilities to retrofit for water and energy conservation.
- Following water meter installations, revisit the City's water use statistics and trends to better estimate volumes for leakage and other unaccounted-for-water.



Note: The Trust's Water Smart initiative has worked with 25 communities to improve leak detection and water loss management practices, reduce the amount of water used on lawns and gardens and provide water metering assessment and support. Visit www.cbt.org/watersmart.

4. Develop and implement aquifer protection measures using the Protection of the Natural Environment Development Permit Area.

Elkford Policies 4.2.4-3 and 6.3.1-2

- Work with regional stakeholders to identify and implement watershed management opportunities...implementing guidelines for development in headwaters of tributaries and rivers in the region and enforcing buffer zones in riparian areas, particularly those rivers and streams that feed into the aquifer.
- Protect and manage the quality and quantity of water within the watersheds of the community to ensure long-term preservation of water resources.

5. Evaluate the development of infrastructure that allows recycled water to be distributed for non-potable uses, to the extent accommodated by provincial legislation.
6. Develop and implement a long-term plan for the upgrade and renewal of water supply infrastructure, including the implementation of sustainable water loss management and data collection best practices.

Example: The Village of Nakusp is in the process of implementing a purple pipe program that would treat wastewater effluent and then pump it to the village cemetery for irrigation.

7. Consider future climate change and its projected impacts on local watersheds, hydrological systems and water supply and demand in all long-term water supply planning, including Source Protection Plans and Water Master Plans.
8. Consider future temperature and snowfall projections when determining the depth-of-bury of water supply lines.

Example: In 2013, the City of Revelstoke completed a Source Protection Plan using the Drinking Water Source-to-Tap Assessment Guidelines. The assessment considered how existing water supply risks, including wildfire, avalanches, stream channel stability and wind throw, are likely to change in the future and recommended actions for improving drinking water protection.

2.3.3 Stormwater Management

1. Support an integrated watershed planning approach for the management of surface water, rainwater and groundwater resources that promotes healthy aquatic ecosystems, resilience to climate change and the maintenance of hydrological functions.
2. Require a Stormwater Management Plan for new development that optimizes water storage capacity on-site and balances pre- and post-development surface flows and groundwater recharge.

Elkford Policy 7.3.1-3

- All new subdivision development shall require a stormwater management plan and all stormwater is to be contained on site.



3. Develop and implement a Stormwater Management Master Plan.
4. Establish and protect green infrastructure, such as open spaces, forest, street trees, fields, parks, gardens and green or living roofs and walls to attenuate peak flows and inhibit flash flooding.
5. Preserve land that is required for current and future flood and stormwater risk management.
6. Assess the vulnerability of the stormwater system to future climate changes, particularly increased extreme rainfall events, to prioritize system upgrades.
7. Increase stormwater system maintenance including debris removal from culverts and catch basins and replace culverts that will increasingly be at risk for chronic flooding.
8. Incorporate overland flood routing to major drainage features into new development and explore the use of private land for flood attenuation.
9. Utilize the ecological services, such as stormwater interception and water quality treatment, provided by natural systems.

Example: The City of Nelson and the City of Castlegar completed climate change vulnerability assessments of their stormwater infrastructure using Engineers Canada's Public Infrastructure Engineering Vulnerability Committee (PIEVC) protocol. See www.pievcc.ca.

10. Wherever feasible, restore or “day-light” culverted sections of creeks to enhance flood protection and restore ecological services.

Castlegar Policies 20.4.3, 20.4.5, 20.4.6, 20.4.7 and 20.4.9

- Continue with the practice of infiltration to groundwater in locations where this is appropriate.
- Consider rooftop water storage for irrigation on larger buildings.
- Consider using permeable pavers and permeable pavement surfaces in specific locations such as parking areas, emergency access lanes or other locations where appropriate.
- Utilize surface channels and swales for major storm events rather than major piped systems.
- Promote onsite stormwater management, rather than conveying stormwater to a collection system. Onsite stormwater management should strive to direct only overflow to formal overland or other collection systems.

2.4 Transportation



Overview

Transportation and transportation infrastructure will be affected by extreme events including rainstorms, snowstorms, wildfires, avalanches and landslides, which could result in increased closures and requirements for maintenance and repair. Changes or fluctuations in temperature and precipitation could impact road maintenance requirements. Transportation policies that address climate adaptation will generally focus on a) planning for transportation systems that are resilient and adaptable to extreme weather conditions, b) retrofitting transportation infrastructure that is vulnerable to extreme weather and c) integrating non-motorized transportation routes more fully. Local governments may also use transportation corridors for other functions such as firebreaks.

Policy Provisions

The policies in this section are adapted from the following OCPs: Elkford (Chapter 7), San Francisco (Climate Action Strategy) and Victoria (Chapter 7).

1. Prepare and maintain an integrated, multi-modal transportation master plan that supports climate resilience by, for example, strategically placing new roads and sidewalks to act as firebreaks and away from climate-sensitive hazard lands and ensuring appropriate emergency access and egress.
2. Support the development of a regional emergency transportation system by partnering with regional and provincial agencies in the identification of an integrated network of road, water and air transport facilities defined as critical infrastructure to be upgraded and maintained to retain functionality following a damaging climate event, such as a flood, fire or landslide.

Elkford Objective 7.2.1 and Policy 7.2.1-5

- Recognize links between transportation and land use planning in the ability of the District to adapt to climate change.
- Strategically place new roads and sidewalks to act as firebreaks and access throughout the District.

3. Adopt low-impact development standards for the transportation network including stormwater management techniques such as requiring permeable surfaces to reduce runoff.

Elkford Policies 7.2.3-1 and 7.2.3-3

- New road construction shall utilize stormwater management techniques including, but not limited to, permeable surfaces, French drains and swales to reduce water runoff.
- ...revise the Subdivision Bylaw to require on-site water retention and minimize water runoff in roads for new development.

4. Support the replacement of short span bridges with longer spans, where appropriate, to reduce the exposure of bridge pillars and supports to flood risk.
5. Assess vulnerability of existing transportation corridors to climate-sensitive hazards such as flooding, landslides, debris flows and avalanches and undertake appropriate measures to increase human safety.

2.5 Natural Environment

Overview



The natural environment, including forests and riparian areas, provides a valuable buffering service to communities by absorbing many impacts of normal and extreme weather events.

Many communities have well-established practices of protecting the natural environment during development and strategically integrating it with the built form of developed areas. Strategies such as riparian setbacks—which protect wildlife and habitat near lakes, rivers and streams—serve to keep property and people away from flood, landslide and erosion risk areas. This increases community resilience and reduces infrastructure costs. Functioning natural systems can aid in the proper functioning of infrastructure, especially infrastructure related to water supply and stormwater management. Some communities are taking a multi-functional approach to infrastructure and land. Single use areas, such as natural areas, may see added functions such as biodiversity, flood control and passive recreation.

Biodiversity can be supported by the presence of connected and linear natural areas that facilitate the movement of species across the landscape, which is preferable to an ecological island or stand-alone park. Securing riparian corridors is important to enhancing climate resilience due to their high ecological productivity and important role in stormwater management and water supply.



Policy Provisions

The policies in this section are adapted from the following OCPs: Elkford (Chapters 5-7), Kaslo (Chapter 14), Fernie (Chapters 4 and 7), Castlegar (Chapter 18), Kelowna (Chapters 6 and 7), San Francisco Climate Action Strategy, North Vancouver (Chapter 9), Dawson Creek (Chapter 6), Victoria (Chapter 10), Kamloops (Chapter 7) and Richmond (Chapter 9).

2.5.1 General

1. Apply ecosystem-based management and integrated watershed planning approaches for the comprehensive management of land and surface water, rainwater and groundwater resources to promote healthy terrestrial and aquatic ecosystems, maintenance of hydrological functions and resilience to climate change.
2. Partner with adjacent private and public landowners and managers to support climate-resilient management strategies in surrounding ecosystems and forests.
3. Consider climate change implications in environmental management efforts to conserve biodiversity and enhance the health of natural areas and ecosystems.
4. Enhance natural resilience to climate change by reducing threats such as habitat fragmentation and destruction, eutrophication, pollution and the introduction of invasive species.

Elkford Objective 6.1.1 and Policy 6.1.1-6

- Protect and preserve environmentally sensitive areas in the District of Elkford.
- Align policies for residential, commercial and industrial development with those that address natural ecosystem functions (i.e. water quality, climate change, flood protection, habitat protection).

5. Account for future climate projections when developing and implementing development permit area guidelines for riparian areas.
6. Promote the use of native plant species to protect local biodiversity and minimize watering requirements.
7. Implement a Tree Preservation Bylaw that includes measures to conserve and support local biodiversity.

2.5.2 Biodiversity, Connectivity and Natural Areas Planning

1. Identify, map and restore ecologically important wildlife corridors, habitats and features to protect sufficient natural landscapes and increase community and ecological resilience.
2. Identify opportunities to acquire, enhance and protect important natural areas and ecological assets through redevelopment, rezoning, capital projects, policies and development application requirements.
3. Develop and implement an invasive species management strategy to reduce the spread of invasive species and corresponding loss of biodiversity.
4. Integrate targets and policies for ecological values into other planning processes and policies including stormwater management planning, flood protection and interface wildfire management.

Note: The Village of Salmo, in collaboration with the BC Wildlife Federation and the Salmo Watershed Streamkeepers, completed a wetland restoration project on Wilde Creek, constructing a stormwater retention basin to reduce flood risk from extreme precipitation events.

5. Take advantage of opportunities to reclaim, restore and improve existing wetlands and natural areas to increase water infiltration and stormwater management capabilities.
6. Create an aquatic habitat bank program to acquire property to compensate for unavoidable losses to aquatic habitat and to create resilience in the [Name of stream or river] watershed.

Note: The City of Kelowna is taking an innovative approach to retrofitting the Mission Creek corridor to increase resiliency in that riparian system. It has adopted a habitat compensation bank scheme to acquire land along the creek as compensation for altering or losing habitat elsewhere, with the goal of recreating wetlands and securing additional land for flooding.

Elkford Objective 6.2.2 and Policy 6.2.2-1

- Elkford utilizes, where possible, natural river features and geographic assets (contours, natural gullies, etc.) to adapt to risks posed by climate change.
- Identify and designate zones along the Elk River and its tributaries that can be designated and used for “overflow” water collection areas during extreme flooding events.

2.6 Hazardous Areas



Overview

The presence of steep slopes, creeks, ravines, flood plains, avalanche paths and forested lands combined with extreme weather make many communities susceptible to natural hazards including landslides, debris flows, floods, avalanches and wildfires. Projected increases in winter precipitation, the frequency of extreme rainfall events and wildfires could all contribute to increased frequency of landslides and debris flows. Likewise, increases in winter temperatures, rain-on-snow events and increases in freeze/thaw cycling could increase avalanche frequency in some locations. Projected increases in summer temperatures, very hot days, longer warm spells, reduced summer precipitation, fuel accumulation and pest outbreaks may contribute to increased wildfire frequency. These hazard areas can encompass commercial, social, economic and/or ecological assets and activity, which may be subject to damage or disruption when natural hazard events occur. Planning in natural hazard areas should improve the resilience of property and infrastructure while protecting the safety and well-being of citizens.

Policy Provisions

2.6.1 General

The policies in this section are adapted from the following OCPs: Elkford (Chapters 5-7), Fernie (Chapters 4 and 7), Castlegar (Chapter 18), Kelowna (Chapters 6 and 7), District of North Vancouver (Schedule B) and BC Ministry of Forest Lands and Natural Resource Operations Flood Hazard Land Use Management Guidelines (2014 Proposed Amendments).

1. Account for future climate when developing and implementing Natural Hazard Development Permit Areas to address landslide, flood, debris flow and/or avalanche risks.

2. Develop and implement measures to reduce risks of landslide, flood, debris flow and avalanches to existing buildings and infrastructure.
3. Continue to update hazard area mapping for areas such as avalanche zones and flood zones to ensure that mapping for Natural Hazard Development Permit Areas remains current and public health and safety is maintained.
4. Develop tools to aid in risk management such as vulnerability assessments and flood risk mapping to help reduce the risk of natural hazards to people and property.
5. Communicate hazardous area risks to residents, particularly those who may be exposed and vulnerable to impacts.
6. The [name of local government] will consider purchasing residential, commercial and industrial lands and properties that are subject to regular flooding impacts.
7. Establish a secondary setback flood defence behind primary flood defence barriers where possible.
8. Development in steep slope hazard areas shall consider the potential for increased risk of landslides and erosion associated with increased extreme precipitation events.

Example: In 2013 the Regional District of East Kootenay (RDEK) completed a Regional Flood Hazard Study (Phase 1) to prioritize flood hazard areas, describe potential effects of climate change on flood hazards and outline a framework to implement a regional flood management plan. With respect to climate change and flood risk, the report concluded that the RDEK is likely to see an increase in debris flow, debris flood and flood activity; increased peak discharge in creeks and streams; and reduced effectiveness of existing dikes and flood infrastructure.

Note: Resources and guidance on hazard area mapping and management are provided in Appendix B.

Elkford Policy 7.4.1-3

- Prevent new subdivision development on slopes over 30 degrees as climatic changes may lead to an increase in peak flows and glacial melt may increase the risk of erosion and landslides on steep slopes.

Castlegar Policy 18.4.3

- Prevent development within areas adjacent to steep slopes (greater than 30 per cent), areas of soil subsidence, rock fall, land slip or erosion hazards which are known or suspected.



9. Require the registration of restrictive covenants as a condition of development approval, subdivision, or the issuance of a building permit in high-risk flood and debris flow hazard areas to ensure that:
 - purchasers are made aware of potential flooding and/or debris flow issues and the ongoing role that property owners must assume to protect their investment given changing climate conditions
 - the [Name of local government] is saved harmless in the event of damage to individual properties as a result of flooding and/or debris flows.

Fernie Policies 4-B.7 and 7-B.5

- Include climate and hydrological changes, trends and risks in all environmental risk assessment processes, including implications for flooding levels and extreme precipitation events.
- Review and update existing flood plain mapping and management bylaws to account for climate change...

Castlegar Policy 18.4.4

- Protect against damage associated with flooding events by encouraging agricultural, park and open space recreational land uses in the flood plain.

Elkford Policies 7.4.1-4 and 7.4.1-6

- Update the flood plain designation and related mapping to incorporate new climate science and projections.
- Accommodate passive uses in flood plain areas, such as parks and trails.

2.6.2 Wildfire

1. Undertake a Wildfire Management Plan that identifies high-risk wildfire areas, establishes guidelines and actions for addressing wildfire hazards and considers future climate changes and implications for forest composition and fuel load.

Fernie Policy 4-B.2

- Update fire hazard mapping based on emerging and changing climate conditions, risks and trends.

2. Develop and implement Wildfire Interface Development Permit areas based on local forests, topography, access, built form and wildfire characteristics and situations.
3. Partner with neighbouring land owners and land managers to share in the management of forest areas adjacent to the [Name of local government].
4. Require the registration of restrictive covenants as a condition of development approval, subdivision, or the issuance of a building permit in high-risk wildfire areas, to ensure that:
 - potential purchasers are made aware of wildland urban interface wildfire risks and the ongoing role that property owners must assume to protect their investment given changing climate conditions
 - all roofing material and installation requirements must meet the Class 'B' fire rating requirements contained within the current Building Code
 - the [Name of local government] is saved harmless in the event of damage to individual properties as a result of the spread of fire through the wildland urban interface
 - fuel-reduced buffers around individual homes from the house to property boundary or 10 metres in distance, whichever is the lesser, are maintained. In this respect, "fuel-reduced" shall mean an area which may contain natural tree cover and is maintained by the owner with no accumulation of combustible debris
 - all eaves, attics, decks and openings under floors are screened to prevent the accumulation of flammable material
 - all wood-burning appliances are installed with approved spark arresters.

Elkford Objectives and Policies 4.2.4-2, 6.5.1-2 and 6.4.3-7

- The District will work the RDEK and other landowners outside the municipal boundaries to share in the management of forest areas in the Elk Valley... [to] enhance regional, forest, resource and recreation management and wildfire planning.
- The District will consider acquiring a community forest license to manage crown land within its boundaries...safeguarding forest stands against wildfires.
- Prioritize trail development in high and extreme fire risk areas. Trails can be used for firebreaks and emergency access routes.

2.7 Parks, Recreation and Trails



Overview

As with other infrastructure, local governments are increasingly looking to parks, recreation areas and trails as multi-functional assets. They can help protect biodiversity and ecosystem functions, provide recreational opportunities and are part of the green infrastructure in communities. Climate-resilient approaches to parkland will seek to designate sufficient parks, protected areas and corridors to allow for ecological adaptation and resilience. Local government OCP policies will generally focus on park and trail planning, the multi-functionality of park infrastructure and parks operations and maintenance.

Policy Provisions

The policies in this section are adapted from the following OCPs: Elkford (Chapter 6), North Vancouver (Chapter 4), Dawson Creek (Chapter 3), Victoria (Chapter 9), Richmond (Chapter 10 and Part 2.6).

1. Integrate green infrastructure such as natural areas, stormwater management measures, urban forests, parks and recreation areas throughout the community to preserve existing ecological resources, support biodiversity and reduce climate risks.
2. Recognize and enhance the ecosystem services provided by parks and open space and promote planning and design that enhances biodiversity, carbon sequestration and air and water quality.
3. Work with adjacent municipalities, regional, provincial and federal governments, First Nations and community groups to create a network of regional parks, trails, services and facilities.



Elkford Policy 6.4.1-3

- Utilize the Parks and Trails Master Plan as an opportunity to develop a detailed implementation plan for related climate change adaptation strategies.

4. Include parks as secondary flood areas in stormwater management planning and flood plain mapping.

Elkford Policies 6.4.2-5, 6.4.3-7 and 8.2.4.4-P3

- Land within the flood plain and adjacent to natural drainage courses may be used for open space and walking trails.
- Prioritize trail developments in high and extreme risk fire areas. Trails can be used for firebreaks and emergency access routes.
- Open spaces shall be preserved for recreational use and to enhance stormwater management.

5. Ensure all new park acquisitions maximize opportunities for biodiversity protection, stormwater management, flood control and/or other functions that increase climate resilience.

Elkford Policy 8.2.4.2-P1

- Landscaping in the Parks and Greenways designation shall use natural plants and where possible shall enhance stormwater retention.

6. Conserve water by improving the efficiency of existing irrigation systems, improving park construction standards, designing for water conservation, using non-potable water and converting park and civic building landscapes to reduce the amount of irrigated turf where appropriate.

2.8 Social Sustainability



Overview

Climate resilience policies focused on social sustainability can involve engaging the public and creating partnerships. Engaging with the public and facilitating their understanding of climate change and how it impacts their community can ease acceptance of measures to increase climate resilience that might otherwise be resisted. Local governments can also use public education and public committees to support climate adaptation efforts. Constituents of social resilience, including robust governance systems, a diversity of livelihood choices and strong social networks, are important assets for buffering the effects of extreme weather-related events and natural hazards on communities.



Policy Provisions

The policies in this section are adapted from the following OCPs: Elkford (Chapter 4), Kaslo (Chapter 17) and Richmond (Chapter 6).

1. Deliver local programs and initiatives to increase awareness and empower the community and the [Name of local government] to take action to reduce risks and prepare for changing climate conditions.
2. Advocate that senior governments and other organizations continue and expand programs that assist the community and [Name of local government] to take climate action, including grant programs and other incentives.
3. Ensure that climate impacts and climate adaptation measures aimed at reducing climate risks do not lead to disproportionately adverse effects on vulnerable populations.

Example: To support its climate adaptation efforts, the District of Sparwood developed a Communications and Citizen Engagement Strategy focused on engaging residents and developing communications materials to build support for adaptation actions related to flooding, wildfire, extreme weather and water supply.

Kaslo Policies 17.2.9 and 17.3.0

- Citizens are to be informed about and engaged in local monitoring and implementation of actions to mitigate and adapt to climate changes.
- Council shall engage the community by raising awareness respecting climate change.

Elkford Objective and Policies 4.2.2-2

- The District will involve residents in monitoring and adapting to environmental changes and planning for Elkford's future climate conditions.

2.9 Economic Development



Overview

Resilience to climate change may become an increasingly important factor in local and regional economic health. Projected changes in climate are likely to have significant impacts, both positive and negative, on industries that Basin communities rely on, such as forestry, mining, tourism, hydroelectric development and agriculture. Communities that begin to address these potential changes now may find themselves in a better economic position in the future. There can be an economic justification for adaptation actions that reduce the consequences of impacts before they occur since they are typically more cost-effective than reactive measures or emergency response. Moreover, some climate resilience actions are complex, have long lead times, or require a number of partnerships to be established and may take many years to effectively implement.

Policy Provisions

The policies in this section are adapted from the following OCPs: Elkford (Chapter 7), Dawson Creek (Chapter 12), San Francisco (Environmental Protection Element Policy 14.4) and Richmond (Chapters 6).

1. Consider future climate projections and impacts in economic development decisions, including resource extraction activities such as forestry, mining, oil and gas, tourism development, agriculture, hydroelectric power generation and other climate-sensitive sectors.

Example: The City of Kimberley completed a climate adaptation strategy in 2009, considering potential economic impacts to the local tourism sector. The strategy recommended a variety of actions to both reduce economic threats and capitalize on opportunities – including diversifying winter tourism products, exploring shoulder season tourism products and reducing tourism-related water consumption.

Elkford Objective 7.1.1-4

- Utilize adaptation to climate change as an economic development stimulus. For example, the District could promote economic diversification through a fuel reduction program that utilizes local businesses.
2. Support private sector investment in climate adaptation through climate-resilient infrastructure such as renewable energy, integrated stormwater management and water conservation.
 3. Promote commercial, industrial and residential building design appropriate for local climate conditions as a measure to build the expertise of the local development sector to deliver climate-appropriate, resilient and adaptive infrastructure.
 4. Develop a culture of green entrepreneurship by building [Name of local government]'s brand as an innovator in climate resilience and sustainability.
 5. Develop and support strategies and technologies that connect sustainability to the local economy through the reduction of energy consumption and greenhouse gas emissions. This includes addressing opportunities for local sourcing, waste reduction, energy and land conservation and low carbon emissions.

2.10 Food Production and Food Security



Overview

Food security and its component elements of food systems, agricultural land and local production are receiving more attention from local governments seeking to increase community resilience in the context of an international food system. Food production in many parts of the world will be affected by climate change, which will, in turn, create opportunities and challenges for global food production and distribution. Agriculture in the Basin may be positively affected by increases in temperature and negatively affected by temperature variability, extreme events and changes in seasonal water availability. Even where agricultural land is not being farmed, local governments can provide direction on maintaining the productive potential of existing agricultural lands and undertaking collaborative food system planning with other levels of government and the community.



Policy Provisions

The policies in this section are adapted from the following OCPs: Castlegar (Chapter 23), Fernie (Chapter 4), North Vancouver (Chapter 6), Dawson Creek (Chapter 9), Victoria (Chapter 17) and Richmond (Chapter 7).

1. Work with regional partners to enhance the capacity of regional food systems to be resilient to climate impacts, including water shortages, extreme weather events and fluctuations in global food and energy prices.
2. Identify short- and long-term food supply and infrastructure needs as part of a critical infrastructure assessment in [Name of local government] climate adaptation planning.

Fernie Policy 4-G.8

- Ensure agriculture is included as an area of concern in the proposed Fernie Climate Change Adaptation Plan.

Castlegar Policy 23.3.1

- Implement the recommendations [for local food production and security] in the “Adapting to Climate Change” Report.

3. Participate in coordinated community and regional efforts to develop a more sustainable local and regional food system that increases community adaptability and resilience to climate change.
4. Work with farmers, neighbouring municipalities, regional districts, the provincial government and other stakeholders to increase the regional food supply by establishing policies, tools and initiatives to protect and expand farmland and implement strategies to support food system infrastructure such as meat, fruit and vegetable processing facilities.
5. Maintain existing agricultural land reserve (ALR) boundaries. Withhold exclusions from the ALR unless there is a substantial net benefit to agriculture, the agricultural community is consulted and the loss of ALR land increases community food system resilience.
6. Work with the provincial government and the agriculture sector to understand and address future climate impacts on regional food production and food security, including potential changes to water availability, impacts related to floods and storms and new growing opportunities.

2.11 Energy



Overview

Access to energy and the resilience of energy infrastructure are important aspects of climate resilience. Energy conservation and energy efficiency are tools to reduce carbon emissions that can also provide important climate adaptation benefits. Potential reduced reservoir levels in extreme drought years will mean the possibility of reduced generating capacity for hydroelectricity providers, leading to the need to find other sources of electricity or costly imports from outside the province. Receding glaciers will affect future water supplies and may exacerbate the problem in the long term. As well, climate policies aimed at reducing



fossil fuel use could mean rising costs of electricity, even from renewable sources. Reducing community demand for power lessens community vulnerability to cost increases and shortages. Considering energy efficiency within climate adaptation measures ensures that energy efficiency gains will have mitigation benefits that continue under a changing climate.

Local government OCP policies addressing energy and the resilience of energy infrastructure generally focus on developing infrastructure for local and renewable energy, energy efficiency in buildings and financing energy efficiency and system upgrades. Local governments can increase resilience by diversifying sources of energy and making infrastructure and buildings more energy efficient.

Policy Provisions

The policies in this section are adapted from the following OCPs: Kelowna (Chapter 7), North Vancouver (Policies 10.2), Dawson Creek (Chapter 4), Victoria (Chapters 6 and 12) and Richmond (Chapter 12 and Part 2.5).

1. Promote an energy smart future where energy needs for space heating and cooling, domestic hot water and electricity production are met through local, affordable, efficient and renewable energy systems.
2. Promote the development of district energy systems in major development projects, including institutional and industrial facilities and in planning within growth boundaries.
3. Design new developments that can easily be retrofitted with new energy technologies, including solar thermal, district energy systems and heat pumps.
4. Require developers to conduct assessments for energy efficiency, energy resilience and alternative energy for large developments undergoing rezoning.
5. Promote energy efficiency in new capital projects, expansions and retrofits to civic buildings and infrastructure.
6. Develop and regularly update a Community Energy and Emissions Plan that identifies policies, targets and actions for reducing greenhouse gas emissions and increasing energy efficiency and resiliency including, but not limited to, conservation and diversification.
7. Incorporate energy management best practices, efficient equipment and monitoring systems into new civic buildings, community amenities and infrastructure.

2.12 Emergency Management



Overview

The purpose of emergency management is to save lives, reduce human suffering and protect property and the natural environment in the event of an emergency or disaster. A changing climate increases the likelihood of extreme weather events that could result in emergency or disaster situations. Emergency management has four components: prevention and mitigation, preparedness, response and recovery. Emergency management for a changing climate begins with identifying climate risks and climate-sensitive hazard areas and developing appropriate strategies to manage and mitigate the risks with the goal of increasing the overall climate resilience of a community.

Policy Provisions

1. Use a risk management framework to identify climate risks, set priorities and decide on strategies to manage and mitigate risks.
2. Work with Emergency Management BC and local service organizations to prepare for and respond to emergencies created by extreme weather events and consider how climate change will affect future preparedness and response.
3. Maintain and regularly update [Name of local government] hazard, risk and vulnerability assessments and consider these studies in plans, policies, bylaws and decisions for maintenance, upgrades and replacement of public and private property as well as any new developments.
4. Prepare and maintain a transportation master plan that supports climate resilience by, for example, ensuring appropriate emergency access and egress.
5. Support the development of a regional emergency transportation system by partnering with regional and provincial agencies in the identification of an integrated network of road, water and air transport facilities defined as critical infrastructure to be upgraded and maintained to retain functionality following a damaging climate event.



2.13 Monitoring and Evaluation



Overview

Monitoring and evaluating the extent to which local government plans and policies are implemented and their effectiveness, is important for promoting local government accountability. Some local governments are developing monitoring and reporting programs that set specific metrics for each OCP chapter. Such metrics can help local governments monitor progress on climate adaptation if they include metrics to measure climate impacts, vulnerability and action.

Policy Provisions

The policies in this section are adapted from the following OCP: Victoria (Chapters 22 and 23).

1. Develop and implement a monitoring and evaluation program that is integrated with the [Name of local government] OCP and that assesses:
 - progress toward plan goals and objectives
 - effectiveness of initiatives in achieving goals and objectives
 - issues, risks and challenges associated with plan outcomes
 - adjustments to policies or practices to enhance achievement of results
 - lessons learned and opportunities to incorporate new knowledge into policy and practice.
2. Develop a systematic approach to reporting and releasing monitoring and evaluation results.
3. Develop and regularly update a series of indicators and short-, medium- and long-term targets as part of a monitoring and evaluation program.
4. Prepare regular status updates and publicly present monitoring and evaluation results on the implementation of the [Name of local government] OCP.

Example: A “made-in-the-Basin” indicator framework to measure community progress on climate adaptation and resilience was completed in 2015 by Columbia Basin Trust and the Columbia Basin Rural Development Institute. Visit www.cbt.org/climatechange or www.cbrdi.ca/climatechangeadaptation/ to learn more about the State of Climate Adaptation and Resilience for the Columbia Basin (SoCARB) indicator suite.

Example: Several communities in BC have taken a proactive approach to monitoring and evaluation of the effectiveness of their OCPs. For example, Whistler has monitored some 250 indicators—from ecological to economic—through the Whistler 2020 initiative; the District of Saanich OCP includes metrics in each chapter to track OCP policy progress; and Fernie has developed a Quality of Life Index which tracks progress on implementation of the City’s OCP.



3. Development Permit Areas

Development Permit Areas (DPAs) support community resilience by providing local governments with site-specific control over the layout and design of development. Local governments can designate DPAs for a variety of purposes with the intent of imposing site-specific conditions on development within those areas. Purposes for DPAs include protection of the natural environment, its ecosystems and biodiversity, protection of development from hazardous conditions and establishment of objectives to promote water conservation and the reduction of greenhouse gas emissions.⁶ Land within a DPA must not be subdivided or construction started unless the owner obtains a development permit from the local government. Used as a supplement to zoning, DPA guidelines set out in the OCP provide direction to staff on how development should be shaped through compliance with development permits.

Procedural Considerations

Below are descriptions of what is required under sections 919.1 and 920 of the *Local Government Act* to establish credible DPAs:

6 The jurisdiction for DPAs is set out in sections 919.1 and 920 of the *Local Government Act*, R.S.B.C. 1996 c.323.

1. Designation of the DPA in the OCP:

- a. The extent of the DPA must be delineated. Ideally, DPAs are identified through mapping. However, written designations can roughly identify the area in the short term until detailed mapping is undertaken to clearly identify the boundaries of the DPA. Absent mapping, there may be disagreement about whether or not a DPA applies to a parcel or part of a parcel; therefore detailed mapping of natural areas, hazards and other features will make DPAs significantly stronger.
- b. Justification for the designation: Justification means describing the special condition or objective for the DPA. For example, for hazards, describe how the DPA will reduce risk to life and property. Justification requires evidence that supports the designation of the DPA, such as a technical study or staff memo that identifies special features or hazards.

2. Guidelines on how the objectives for the DPA will be met:

- a. Guidelines set out the requirements that applicants must follow to receive a development permit from a local government. They can be suggested standards or mandatory requirements.

3. Conditions under which a development permit is not required:

- a. Typically called exemptions in the OCP or zoning bylaw, these are routine or unique situations where a development permit would be redundant or deemed unnecessary.
- b. Typical exemptions include the following:
 - i. Maintenance of public works and emergency works.
 - ii. Non-structural repairs or renovations to a permanent structure provided that there is no expansion of the building's footprint and provided that such repairs or renovations do not increase the gross floor area of the structure.
 - iii. Replacement or repair of an existing deck, provided the locations and dimensions do not change.
 - iv. Routine maintenance of existing landscaped and lawn areas;
 - v. Habitat creation, streamside restoration or similar habitat enhancement works in accordance with [Name of Local Government] bylaws.
 - vi. Planting of vegetation, except for the planting of trees within 10 metres of the top of a steep slope.
- c. Each local government has unique administrative processes, development activities, ecological conditions and geology that will warrant a different set of exemptions. It is up to each local government to assess, through practice, what type of development in what areas warrant additional DPA conditions.

Good Practices

Good practices for DPAs relate to promoting a connected and functioning natural environment, avoiding hazards and understanding the impacts of new development. Maintaining connectivity between ecosystem elements across the private land base is one of the primary purposes of DPAs for protection of the environment. This promotes resilience and provides ecosystems more latitude to adapt over time.

Local governments may also seek to understand the impacts of new development or their suitability for a particular site, particularly in relation to steep slopes, wildfire or flooding hazards, by requiring that applicants provide studies and opinions from registered professionals. The ability to request this information comes with designating all DPAs as Development Approval Information Areas (Section 3.4) under section 920.01 of the *Local Government Act*.

Note: If a local government wishes to require applicants to provide additional information in the form of studies or technical reports, they must designate a Development Approval Information Area pursuant to sections 920.01 and 920.1. There is no jurisdiction under DPAs for local governments to request information of an applicant beyond information typically found in an application, such as the applicant's name and property. See section 3.4 below for more information.

Local governments may track the implementation of DPA conditions by mandating that applicants post security and monitor new infrastructure and site conditions with explicit direction to fix any plantings or infrastructure that fail.

Some local governments also put users on notice that the DPA guidelines require the industry to step up to a new standard or to be creative. Two examples are provided below.

City of Dawson Creek DPA Guideline for Water Conservation in Multi-Family, Commercial and Light Industrial Areas (at 16-25)

- Note: These guidelines will involve a higher level of technical rigour and expertise in landscape and irrigation design (for multifamily/ICI sectors only) compared to current typical practice. This may present some challenges initially; however they will also serve to stimulate capacity building for implementation of best practices.

District of North Vancouver Energy and Water Conservation and Greenhouse Gas Emissions Reductions Development Permit Areas encourage integrated performance-based design (at 115)

- These guidelines are not intended to be a definitive listing. Rather, they suggest issues to be considered and designers may respond to these guidelines in a variety of different ways. Creativity is encouraged. Except where specific standards are referenced, these guidelines are not prescriptive. Designers are directed to consider a variety of synergistic approaches, particularly, passive design strategies, rather than active mechanical systems, to reduce a building's energy and water consumption and greenhouse gas emissions and improve occupant thermal comfort.

Note to Reader

The following sections provide examples of DPA guidelines including protection of the natural environment, hazardous areas (wildfire, flood/debris flow, avalanches and steep slopes) and energy and water conservation. Generic guidelines that are important to any DPA regime, such as monitoring and performance bonding, have not been included. Likewise, technical guidelines such as tree replanting requirements and specifications for registered professionals that are relevant to DPAs in general are not reproduced. It is important to note that although DPA permits to achieve water and energy conservation may relate to buildings, they cannot exceed the standards set by the provincial building code.

The DPA guidelines provided below are quite broad and general in nature, rather than specific and prescriptive. This approach has been taken for a variety of reasons:

1. Every community has different priorities as well as different climatic and environmental conditions. As such, hazards will manifest locally in different ways and varying guidelines will be needed to manage risk appropriately.
2. The use of DPAs and the requirement for Professional Reports (Section 3.5) and Development Approval Information Areas (Section 3.4)—which require professionals to assess risks and make recommendations in hazardous areas—serve to reduce municipal staff workloads and local government liability.

Note: The DPA justifications and guidelines in this guide do not constitute comprehensive DPA regimes. They focus solely on provisions that promote climate resilience. They should not be relied upon as complete codes for DPAs.

3.1 Protection of the Natural Environment



Overview

For DPAs designated for protection of the natural environment, ecosystems and biodiversity, a development permit may:



- specify areas of land that must remain free of development, except in accordance with any conditions contained in the permit
- require specified natural features or areas to be preserved, protected, restored or enhanced in accordance with the permit
- require natural water courses to be dedicated
- require works to be constructed to preserve, protect, restore or enhance natural water courses or other specified natural features of the environment
- require protection measures, including that vegetation or trees be planted or retained in order to:
 - preserve, protect, restore or enhance fish habitat or riparian areas
 - control drainage
 - control erosion or protect banks.

3.1.1 General

The natural environment, including forests and riparian areas, provides a valuable buffering service to communities by absorbing many of the impacts of normal and extreme weather events. As such, maintaining connectivity and biodiversity across the landscape can be an important climate resilience strategy.

Guidelines

The guidelines in this section are adapted from the following OCPs: North Vancouver (Protection of the Natural Environment, Schedule B Part 3), Kelowna (Natural Environment, Chapter 12) and Richmond (Chapter 14).

1. Retain and protect intact ecosystems and their connectivity, reconnect fragmented ecosystems by establishing corridors and protecting habitats and avoid the creation of isolated islands of ecosystems.
2. Design infrastructure and buildings so that new infrastructure and building design has no net effect on existing or natural hydrology.
3. Locate and design development to minimize any damage to biodiversity corridors and protected areas.
4. New structures on a parcel should be located as far away from biodiversity corridors and protected areas as is feasible.
5. There will be no net loss of biodiversity corridors or protected areas. Where land and/or natural vegetation in the biodiversity corridor or protected area is disturbed or damaged due to development, the applicant may be required to provide habitat compensation.
6. Use trees, shrubs and ground cover appropriate for the projected future climate conditions (sun, shade, moisture) and soil type.
7. Retain trees and vegetation in a manner that balances FireSmart principles with ecosystem needs.
8. Retain wildlife trees (including fallen trees and snags, trees with cavities), leaf litter, fallen debris and natural grasslands in a manner that balances FireSmart principles with ecosystem needs.
9. Establish buffers and wildlife corridors that are large enough to protect the ecological integrity of environmentally sensitive areas. The exact location and extent of buffer areas will be determined utilizing contemporary best management practices.
10. Plan, design and implement development in a manner that will not diminish the natural function of ecosystems as a consequence of removing vegetation, altering surface water and groundwater regimes and separating habitat types.
11. Manage natural disturbance regimes such as wildfire to ensure the environmental integrity of old growth and mature forests while minimizing damage to human infrastructure and values.
12. Conduct harvesting and tree removal in accordance with the specific characteristics of the forest ecosystem and its contribution to local biodiversity and ecosystem integrity, including the amount of interior habitat, proximity to connectivity corridors and other old growth or mature forest patches, constituent elements of the patch including the presence of red or blue-listed ecological communities and patch condition.

13. Manage early succession and second growth forests to develop mature and, eventually, old growth forest characteristics to improve habitat quality and connectivity and, where appropriate, wildfire management.
14. Prohibit land disturbance that would have a negative impact on ground and surface water conditions (e.g. temperature and quality) and recharge rates.
15. Maintain or restore the historical pattern of flood inundation where possible to preserve seasonal flooding as part of natural hydrological and ecological cycles.

3.1.2 Protection of the Natural Environment (Riparian)

Wetland and riparian ecosystems represent areas of high biological function and offer important climate buffers for communities, including flood mitigation. Riparian areas may also function as corridors for movement of wildlife as well as genetic material for biodiversity. DPAs for Protection of the Natural Environment (Riparian) can require the preservation of hydrological function and restoration of riparian habitat. Local governments will typically require any development to be set back a minimum distance, such as 30 metres, from a riparian area and prohibit development from harming riparian ecosystems. Local governments will often designate a streamside protection area, such as 30 metres from top of bank, within which no development may occur. The guidelines below assume that a streamside protection area has been designated.

Guidelines

The guidelines in this section are adapted from the following OCPs: Elkford (Riparian Area), Kaslo (Lakefront Protection and Stream Protection), North Vancouver (Streamside Protection, Schedule B Part 3), Kelowna (Natural Environment, Chapter 12) and Richmond (Chapter 14).

1. Locate all development outside of streamside protection areas. Where that is not possible, locate development as follows:
 - a. at minimum, 15 metres from the top of bank or edge of wetland
 - b. to avoid any damaging impact to and intrusion into the streamside protection area
 - c. to prevent net loss of habitat in the streamside protection area.
2. Address the need for habitat compensation when land and/or natural vegetation in the streamside protection area is or may be disturbed or damaged due to proposed development. If habitat compensation is deemed to be required, a qualified professional will prepare a habitat compensation plan that will include the details of the habitat compensation project based on a principal of no net loss to the streamside protection area. Compensatory habitat should be provided at a 2:1 ratio. On-site compensation is preferred but not mandatory. Compensation for lost habitat and ecological functions may involve either or both restoration of existing habitat and creation of new habitat.

3. Development will meet or exceed the requirements of the provincial *Fish Protection Act* (Riparian Areas Regulation).
4. Natural features, including tree cover and vegetation, will be enhanced and natural drainage maintained.
5. New structures on a parcel will be located as far away from the stream or wetland as possible and as far away from the stream or wetland as existing permanent structures, if any, on the parcel.
6. Maintain or restore the natural processes of disturbance events and ecological succession such as natural flow regimes of streams, stream channel geometry, seasonal flooding and storage capacity, stream channel movement, windthrow or blowdown of trees and natural slope failures.
7. Protect and manage natural watercourses as open streams.

Elkford Riparian Area DPA Guidelines

- No development or alteration shall take place:...within a 30-metre strip on both sides of a stream...Native vegetation and trees are to be retained to control erosion, protect banks and protect fish and wildlife habitat.

Kaslo Stream Protection DPA Guidelines

- Any proposed development must have a 25-metre setback from the edge of the river banks.

3.2 Protection From Hazardous Conditions



Overview

For DPAs designated for protection from hazardous conditions, a development permit may:

- specify areas of land that may be subject to flooding, mud flows, torrents of debris, erosion, land slip, rock falls, subsidence, tsunamis, avalanche or wildfire, or other hazard, as areas that must remain free of development, except in accordance with conditions in the permit
- require, in an area that the permit designates as containing unstable soil or water that is subject to degradation, that no septic tank, drainage and deposit fields or irrigation or water systems be constructed
- in relation to wildfire hazard, include requirements for the character of the development, including landscaping and the siting, form, exterior design and finish of buildings and other structures
- in relation to wildfire hazard, establish restrictions on the type and placement of trees and other vegetation in proximity to development.



3.2.1 Wildfire Interface

A DPA enacted to address wildfire hazards may specify areas of land that cannot be developed and may include requirements respecting the character of development, including landscaping and the siting, form, exterior design and finish of buildings and other structures.

Depending on the scale of development, a local government may require a wildfire risk assessment that identifies appropriate risk management and mitigation strategies while maintaining the ecological functions of a forested landscape. It is recommended that a restrictive covenant or building scheme be registered on title to alert successive owners to the responsibilities of wildfire mitigation activities required of landowners.

Guidelines

The guidelines in this section are adapted from the following OCPs: Elkford (Wildfire), North Vancouver (Wildfire Hazard, Schedule B Part 4), Kelowna (Hazardous Conditions, Chapter 13) and Lake Country (Wildland Fire).

The following guidelines assume that a Wildfire Management Plan is in place, as recommended in section 2.6.2.

3.2.1.1 Siting

1. Pursuant to the wildfire management plan, all applicants shall submit a pre-development wildfire risk assessment and mitigation plan as required under the [Name of Local Government] Development Approval Information Area.
2. New buildings or structures should be located as far away from any wildfire risk areas as is feasibly possible. For parcels located entirely within a wildfire risk area, new buildings or structures should be located as far away from any contiguous undeveloped forested areas or areas containing hazardous forest fuel types or accumulations as is reasonably feasible.
3. Development shall be set back a minimum of 10 metres from the top of ridgelines, cliffs or ravines. Variation of the setback may be considered if a wildfire risk assessment can justify a change in the setback.
4. Access points suitable for evacuation and the movement of emergency response equipment are required. Roadways must be placed between forests and new development to both improve access to the interface for emergency vehicles and provide a fuel break between the wildland and the subdivision.



Elkford Wildfire DPA Guidelines (designated as those areas that are subject to the risks of wildfire events, requiring mitigation and fuel treatment)

- A developer shall be required to produce a pre-development fire hazard and fire risk assessment.
- New construction shall incorporate FireSmart building materials and construction standards where appropriate.
- New development shall ensure there is a sufficient supply of water for firefighting.
- New development shall develop roads and trails to act as firebreaks and access.
- Areas designated shall undergo regular fuel reduction and treatment programs.

3.2.1.2 Hazard Reduction and Mitigation

1. Building design and construction must be consistent with the highest current wildfire protection standards published by FireSmart Canada or a similarly mandated successor.
2. All new servicing that is in, or within 10 metres of, a wildfire interface should be underground, or, where this is not feasible, poles of non-combustible materials should be used, such as concrete.
3. Wildfire hazard reduction will mimic the natural effects of localized ground fires to support restoration of the natural environment.
4. The following guidelines apply to the area on a property within 10 metres of the dwelling units located on the property:
 - use non-combustible landscaping material
 - ensure there are no trees, limbs or shrubs overhanging roofs or growing under the eaves of buildings
 - plant only small shrubbery or garden plants but not juniper or cedar hedges
 - space and maintain trees so that canopy spacing is a minimum of 3 metres
 - prune coniferous trees so that there are no branches to a height of 2.5 metres (up to three whorls of live branches may be left on smaller trees)
 - maintain hedges below a height of 2 metres (juniper and cedar hedges are discouraged)
 - use native vegetation
 - keep piled debris (firewood, building materials and other combustible material) out of this zone
 - remove (at least annually) surface litter, downed trees and dead and dying trees.
5. Establish firebreaks where appropriate, which may be in the form of cleared parkland, roads, trails, or utility rights-of-way.
6. If the removal of trees or vegetation is deemed necessary by a qualified professional to reduce wildfire risk, the [Name of local government] approval is required and replacement trees or vegetation may be required.

7. The following provisions shall be registered on subdivision, either as part of a building scheme or a restrictive covenant:
- buildings, roofs, decks and other structures within the Wildland Interface DPA must be constructed with fire-resistant materials
 - roofs will have a steep pitch to prevent the collection of tree debris or other combustible materials
 - generally, no outbuilding used to store wood will be constructed within 10 metres of a dwelling unit. If the outbuilding must be located within 10 metres of a dwelling unit, it must be constructed utilizing fire resistant materials for the roof and exterior walls
 - chimneys should have spark arrestors and be closed with 3-mm non-combustible wire
 - eaves and attic vents shall be screened using 3-mm non-combustible wire to prevent entry of wind-blown embers
 - outside stairways, decks, porches and balconies must be constructed with or sheathed in fire-resistant materials
 - evergreen tree and shrub species must not be planted within 10 metres of a dwelling unit
 - tree, shrub, herb and grass species that are drought tolerant and not highly combustible shall be used in site landscaping
 - all windows must be double paned or tempered
 - manufactured homes must be skirted with fire-resistant material.
8. Proposed deviations from the provision immediately above can be submitted to [Name of local government] as an alternative solution and will be considered if the applicant can verify that the expected level of performance meets or exceeds the level of fire safety conferred by the above measures.

3.2.2 Steep Slope Hazard

A DPA enacted to address slope hazards (including land slip and rock falls) may specify areas of land that cannot be developed and may include requirements respecting the character of development, including landscaping and the siting, form, exterior design and finish of buildings and other structures.

Guidelines

The guidelines in this section are adapted from the following OCPs: Castlegar (21st Street), Fernie (Avalanche), North Vancouver (Protection of Development from Slope Hazards, Schedule B Part 4) and Kelowna (Hazardous Conditions).

The following guidelines could be applied in the Slope Hazard DPA:

1. Applicants may be required to provide a hazard or risk assessment report prepared by a qualified professional, pursuant to the [Name of Local Government] Development Approval Information Area designation.

2. Reporting by the qualified professional should reference APEGBC Legislated Landslide Assessments for Proposed Residential Developments in BC.
3. Any structural mitigation measures must be designed by a qualified professional.
4. Development should minimize any alterations to steep slopes and the development should be designed to reflect the site rather than altering the site to reflect the development.
5. Terracing of land should be avoided or minimized and landscaping should follow the natural contours of the land.
6. Buildings, structures and landscaping should be located as far as reasonably possible from steep slopes.
7. Potential slope hazard areas should remain free of development. If that is not possible, mitigation should be undertaken to reduce risk and conditions should be imposed as necessary to reduce potential hazard as determined by a qualified professional.
8. The construction of structures, pathways/trails, driveways, utilities, drainage facilities, septic fields, swimming pools, hot tubs, ponds, landscaping or other uses at or near the top or base of steep slopes should be avoided. At minimum, a 10-metre buffer area from the top or base of any steep slope should be maintained free of development except as otherwise recommended by a qualified professional. On very steep slopes, this buffer area should be increased.
9. Vegetation should be maintained and/or reinstated on steep slopes and within any buffer zone above the slopes or along pre-existing drainage channels.
10. The base of slopes should not be undercut for building, landscaping or other purposes, except in accordance with the recommendations of a qualified professional.
11. For homes at the base of slopes, it is preferable for bedrooms to be constructed on the downslope side of the home.
12. Designs should avoid the need for retaining walls, particularly to minimize cutting of the uphill slope. Large single plane retaining walls should be avoided. Where retaining walls are necessary, smaller sections of retaining wall should be used. Any retaining structures in steeply sloped areas must be designed by a qualified professional.
13. Water should be diverted away from slopes, yards and structures in a controlled manner and ponding should be avoided near slopes.
14. Property, roof drainage and landscaping should be designed and maintained to shed water away from steep slopes.



15. Rock fall mitigation recommendations will be provided for rock fall hazards on the subject, adjacent and potentially affected properties.
16. Disturbed slopes should be reinforced and re-vegetated, especially where gullied or where bare soil is exposed. Planting should be done in accordance with the recommendations of a Landscape Architect or Registered Professional Forester and a permit issued by the [Name of local government].
17. The extent of paved or hard-surfaced areas should be limited and absorbent or permeable surfaces should be used instead to reduce runoff and encourage infiltration where appropriate.
18. Any development within the Steep Slope DPA will have a restrictive covenant registered on title identifying the land as hazardous.

Castlegar 21st Street Steep Slope DPA Guidelines

- Applications for DPA shall be accompanied by a report certified by a Professional Engineer or Geoscientist. A Surface and Foundation Drainage Plan may be required which shows that stormwater will be appropriately collected and discharged...
- No excavation or filling shall be undertaken, nor any building or permanent structure erected, constructed or placed except in accordance with the recommendations in the report.
- Minimize the removal of trees.
- Minimize slope alterations and retain the natural terrain and topography of the site.
- Avoid any disturbance of native vegetation and wherever possible retain existing native vegetation...
- May require the registration of restrictive covenants for areas that have been identified as hazardous.
- Require rock fall mitigation recommendations for rock fall hazards.

3.2.3 Flood Hazard

A DPA enacted to address flood hazards (including mud flows and debris torrents) may specify areas of land that cannot be developed and may also include requirements respecting the character of development, including landscaping and the siting, form, exterior design and finish of buildings and other structures.

Guidelines

The guidelines in this section are adapted from the following OCPs: Castlegar (21st Street), Fernie (Steep Slope), North Vancouver (Protection of Development from Slope Hazards, Schedule B Part 4) and Kelowna (Hazardous Conditions).

1. Applicants may be required to provide a hazard or risk assessment report prepared by a qualified professional, pursuant to the [Name of Local Government] Development Approval Information Area designation.



2. Reporting by the qualified professional should reference APEGBC Guidelines for Legislated Flood Assessments in a Changing Climate.
 3. Development should:
 - a. be constructed in a location and manner that will maximize the safety of the residents and property
 - b. be located in the least hazardous part of the site
 - c. comply with flood construction requirements identified by a qualified professional in a hazard or risk assessment report
 - d. not include habitable space below the flood construction level specified by the qualified professional
 - e. not increase the hazard, vulnerability or risk to other properties or structures
 - f. in connection to renovations to an existing permanent structure, where reasonable, raise the habitable space to flood construction levels.
- Example: The District of North Vancouver, being an early adopter of development permits for hazard management and having suffered a fatality from a recent event (2005 Berkley Landslide), has one of the most comprehensive natural hazard management programs in the province. Many resources are available online: <http://www.dnv.org/article.asp?c=1024>.**

3.2.4 Avalanche Hazard

A DPA enacted to address avalanche hazards may specify areas of land that cannot be developed and may include requirements respecting the character of development, including landscaping and the siting, form, exterior design and finish of buildings and other structures.

Guidelines

The guidelines in this section are adapted from the following OCPs: Fernie (Avalanche).

1. Applicants may be required to provide a hazard or risk assessment report prepared by a qualified professional, pursuant to the [Name of Local Government] Development Approval Information Area designation.
2. Reporting by the qualified professional should reference Canadian Avalanche Association Guidelines (Guidelines for Snow Avalanche Risk Determination and Mapping in Canada [2002] and The Land Managers Guide to Snow Avalanches in Canada [2002] or any updates to these documents).
3. Buildings, structures and landscaping should be located as far as reasonably possible from avalanche hazard areas.
4. Potential avalanche hazard areas should remain free of development. If that is not possible then mitigation should be undertaken to reduce risk and conditions should be imposed as necessary to reduce potential hazard, as determined by a qualified professional.
5. For homes at the base of slopes in runout zones, it is preferable for bedrooms to be constructed on the downslope side of the home.
6. Any structural mitigation measures must be designed by a qualified professional.

3.3 Energy and Water Conservation



Overview

For DPA guidelines that establish objectives to promote energy and water conservation and the reduction of greenhouse gas emissions, a development permit may include requirements for:

- landscaping
- the siting of buildings and other structures
- the form and exterior design of buildings and other structures
- specific features in the development
- machinery, equipment and systems external to buildings and other structures
- restrictions on the type and placement of trees and other vegetation in proximity to the buildings and other structures in order to provide for energy and water conservation and the reduction of greenhouse gases.

3.3.1 Water Conservation

DPAs for water conservation are intended to foster the conservation and efficient use of water, reduce the demand for water and promote the health of hydrological systems that are the foundation for water supply infrastructure. The guidelines support site and infrastructure design that mimics natural hydrology and puts water back into the ground where it falls, as well as reducing water use in buildings.

Guidelines

The guidelines in this section are adapted from the following OCPs: Castlegar (Energy, Water and GHG Reduction), Elkford (Energy Efficiency and Water Conservation), North Vancouver (Energy and Water Conservation and Reduction of Greenhouse Gases Schedule B Part 6), Dawson Creek (Multi-Family, Commercial and Light Industrial Water Conservation Guidelines, Chapter 16) and Richmond (Chapter 14).

1. Use an integrated design process to identify opportunities to reduce a building's water consumption and incorporate strategies for the capture and use of stormwater for landscaping purposes.
2. Manage stormwater and building water discharge on site.
3. Implement stormwater best management practices such as absorbent landscapes, infiltration swales, rain gardens and pervious paving to minimize runoff and increase on-site retention and infiltration.
4. Achieve at least 50 per cent of the total landscaped area as unirrigated/unwatered. All other landscaped areas will be vegetation with low water-use requirements after the establishment period.



Castlegar (Energy, Water and GHG Reduction)

- Irrigation of landscaped areas should use building run-off where possible (downspouts connected to the irrigation system).
- Stormwater should be detained on-site with slow release, as a means to stagger stormwater runoff, particularly from parking lots and large flat roof structures.
- Strongly encourage the use of bioswales as linear retention basins and native wetland plants to move runoff as slowly as possible and help biologically break down pollutants.
- The Applicant must...create and submit a Landscape Plan that...Maximizes the percentage of landscape area that is unirrigated/unwatered,...Maximizes the use of vegetation that has low water-use requirements...Minimizes mown turf areas that are high water-use areas...Uses re-circulated water systems for any water features such as pools and fountains.

5. Ensure landscape installation standards, including growing medium depth and quality, meet the requirements of the BC Landscape Standard (Latest Edition) and/or the Master Municipal Construction Document (Gold Book Edition).

3.3.2 Energy Conservation

The goal of energy conservation DPAs is to increase energy efficiency, build additional capacity for multiple energy systems and augment the resilience of buildings and infrastructure. They focus on making the best use of existing infrastructure systems and minimizing the need for system capacity expansion and extensions while creating buildings and infrastructure that can operate effectively under a range of conditions without needing additional energy or mechanical systems to adapt to climatic conditions.

Guidelines

The guidelines in this section are adapted from the following OCPs: Castlegar (Energy, Water and GHG Reduction), Elkford (Energy Efficiency and Water Conservation), North Vancouver (Energy and Water Conservation and Reduction of Greenhouse Gas Emissions, Schedule B Part 6), Dawson Creek (Multi-Family, Commercial and Light Industrial Energy Conservation and Renewable Energy Guidelines, Chapter 16), Lake Country (Greenhouse Gas Reduction and Resource Conservation), Richmond (Chapter 14) and Fort St. John (Energy Conservation and GHG Emissions Reduction).

1. The building design process will be used to identify opportunities to reduce a building's energy consumption and maximize overall building energy performance and the effectiveness of the building envelope.

Note: The *Local Government Act* allows the designation of DPAs related to energy and water conservation and the reduction of greenhouse gas emissions to include requirements respecting landscaping, siting of buildings, form and exterior design of buildings, specific features in the development and machinery, equipment and systems external to buildings. It does not allow regulation of interior building components. One approach to creating incentives for interior components is to exempt DPA energy efficiency requirements if certain interior building efficiencies are met.

2. Overall building energy performance and interior thermal comfort will be maximized through a combination of passive design strategies, including, but not limited to:

- subdivision layout that optimizes solar gain for each building
- sizing and placement of windows and the incorporation of operable windows to increase opportunities for natural ventilation and maximize solar gain and natural light
- orientation of buildings to take maximum advantage of site-specific climatic conditions, including use of prevailing breezes for cooling
- incorporation of solar shading devices to ensure that south-facing windows are shaded from peak summer sun and will receive sunlight penetration during winter months
- incorporating solar thermal or solar electric technologies, or ensuring the building is solar ready
- on-site renewable energy systems, where feasible
- mechanical systems that enable interconnection to future district energy systems in those areas identified by the [Name of local government] as having potential for such systems.



3. Design using green roofs where possible to help absorb stormwater and reduce heat gain.
4. For each development, 10 per cent of the estimated annual energy requirements should be met using on-site or community-based renewable sources such as solar thermal hot water heater, passive solar, solar photovoltaic panels, micro-wind turbine and/or ground or air source heat pump. Buildings that achieve an EnerGuide rating of 80 or higher may be exempt from this requirement.

Castlegar Energy, Water and GHG Reduction Development Permit Area Guidelines

- Where possible and within the existing block pattern, new buildings should be designed (oriented and sited) to take maximum advantage of passive solar energy.
- Where possible, provide landscaping that protects from direct sunlight in the afternoon hours or during the summer and permits sunlight penetration in the winter.
- Natural ventilation for buildings should be used as much as possible
- Green roofs are encouraged to reduce heating and cooling needs, enhance biodiversity, reduce fire hazards and realize other benefits.
- Roofing material should incorporate the use of materials that absorb less sunlight, such as light coloured materials.
- ...It is strongly encouraged that all buildings over 5,000 square feet meet at least 10 per cent of their annual combined lighting, space heating and water heating energy demand using one or more of the following renewable energy generation technologies...

3.4 Development Approval Information Areas



Overview

Some local governments designate their entire jurisdiction or all their DPAs as Development Approval Information Areas (DAIAs), which enables them to request information, studies and ecological data as part of the application process. Section 920.01 of the *Local Government Act* requires a local government to specify in an OCP the areas and circumstances for which development approval information may be required. This section sets out a sampling of guidelines indicating the type of information that a local government may require. It is important to note that the guidelines set out in this part are only a small subset of the information that local governments detail in their DPA guidelines for development approval information.

Note: The designation of DAIAs does not increase costs on developers. It is only when a local government requests additional information that developer costs may increase. Requiring professional reports tends to remove staff responsibility and liability from the development permitting process. The *Local Government Act* requires that a bylaw specify the areas for which additional reports can be requested. As such it is recommended that local governments blanket the whole community with DAIAs.

The following are examples of information that could be requested in a DAIA.

Guidelines

The guidelines in this section are adapted from the following OCPs: North Vancouver.

3.4.1 Protection of the Natural Environment

1. Where any development is proposed within a DPA for protection of the natural environment, the [Name of local government] may require that a report prepared by a qualified environmental professional be provided at the applicant's expense to assess existing conditions and impacts of the proposed development on streams and streamside areas, mature stands of trees, habitat for species at risk, wetlands, nesting sites and wildlife corridors.
2. Information on existing conditions (baseline information) on the site should be provided in a survey plan prepared by a certified BC Land Surveyor, that includes, at a minimum, the following:
 - plans at 1:100 minimum scale with north arrow and minimum one-metre contour interval; parcel boundaries and adjacent streets and rights-of-way
 - natural features including streams, wetlands, top of bank, mature stands of trees, habitat for species at risk, nesting sites and wildlife corridors
 - boundaries of the DPA for protection of the environment
 - any existing improvements on the parcel, including locations and dimensions of existing buildings, driveways, parking areas, utilities, retaining walls and landscaping
 - all trees and vegetation, highlighting vegetation and trees that will be affected or removed by the proposed development. The [Name of local government] may require that a tree assessment and retention/restoration plan be completed by a professional arborist.

3. Information on the proposed development should, at a minimum, include:
 - locations and dimensions of proposed buildings, driveways, parking areas and utility services
 - any temporary encroachment(s) by clearing, grading and other construction-related activities and suitable measures to mitigate and/or compensate such encroachment(s).
4. A written analysis should be provided by the applicant demonstrating that the proposed development is consistent with the applicable development permit guidelines and further identifying any mitigation or compensation measures that are consistent with the guidelines, including measures that may be specified as development permit conditions.
5. If the [Local government designated staff] is not satisfied that the information is sufficient to comply with this section in scope, level of detail or accuracy or in any other respect, the director may, within 30 business days of receipt of the information submitted by the applicant, require the applicant to provide, at the applicant's expense, further information to reasonably comply with this section.

3.4.2 Hazardous Conditions

1. The types of information that may be required in support of development applications include the following:
 - environmental assessment and mitigation plan by a qualified environmental professional;
 - geotechnical stability assessment by a qualified Professional Engineer or Geoscientist as defined in the APEGBC Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC
 - hydrological assessment of drainage patterns and potential flood and hydraulic hazard by a qualified Professional Engineer or Geoscientist as defined in the APEGBC Professional Practice Guidelines for Legislated Flood Assessments in Changing Climate
 - assessment of fire hazards and mitigation measures by a registered forest professional, qualified by training or experience with at least two years' experience in the assessment, fuel management prescription development and mitigation of wildfire hazards in BC
 - structural design and assessment by a qualified Professional Engineer for structural works
 - site information based on a survey plan prepared by a certified BC Land Surveyor
 - current state of title certificate and copies of all restrictive covenants registered on title, including relevant schedules and attachments
 - a peer review of a qualified professional's report
 - reports or other information from additional qualified professionals such as designers or BC Registered Professional Landscape Architects, as appropriate to the development permit application.



3.5 Professional Reports



Overview

Local governments are increasingly providing applicants and their consultants with more detailed expectations for professional reports. This section sets out some examples of information requirements for professional reports that relate to increasing climate resilience. The guidelines set out in this part represent a subset of the information local governments may detail in their DPA guidelines for professional reports.

Guidelines

The guidelines in this section are adapted from the following OCPs: North Vancouver (Schedule B Part 4), Kelowna (Natural Environment, Chapter 12) and Richmond (Chapter 12).

1. Assessment reports should address the potential for fire, landslip, rockfall, slope failure, debris flow, debris flood or flooding, or other hazard and the impact of the proposed development on or by such natural hazard conditions should be analyzed and assessed.
2. Assessment reports should consider climate projections to a future time period commensurate with the life cycle of the infrastructure that may be affected (e.g. >50 years for residential buildings) and the impacts future climate will have on the proposed development.
3. The appropriate method of assessment and level of effort should be determined by the applicant's qualified professional based on all relevant circumstances, including, without limitation, the type of hazard, the nature and extent of proposed development, the particular development permit designation(s) and local site conditions.
4. Where a potential for loss of life exists, the applicant's qualified professional may be required to provide a detailed quantitative risk assessment using the risk tolerance criteria or factor of safety calculations in respect of the proposed development.

Appendix A: Official Community Plan References

Castlegar (City) 2011 Official Community Plan

http://www.castlegar.ca/pdfs/OCP_Bylaw_1150.pdf

Elkford (District) 2010 Official Community Plan

<https://elkford.civicweb.net/Documents/DocumentList.aspx?ID=41535>

Elkford (District) 2010 Schedule A to the Official Community Plan

<https://elkford.civicweb.net/Documents/DocumentList.aspx?ID=3917>

Fernie (City) 2014 Official Community Plan

<http://www.fern timers.ca/EN/main/city/documents-publications/official-community-plan.html>

Fort St. John (City) 2011 Official Community Plan

<http://www.fortstjohn.ca/node/913>

Kamloops (City) 2004 Official Community Plan

<http://www.kamloops.ca/kamplan/index.shtml>

Kaslo (Village) 2011 Official Community Plan

<https://kaslo.civicweb.net/Documents/DocumentDisplay.aspx?Id=1838>

Kelowna (City) Official Community Plan

<http://www.kelowna.ca/CM/page357.aspx>

Lake Country (District) 2010 Official Community Plan

<https://lakecountry.civicweb.net/Documents/DocumentList.aspx?ID=9912>

North Saanich (District) 2011 Community Wildfire Protection Plan

<http://www.northsaanich.ca/Assets/Z+Old+Files/PDF+Files/!+Agendas/2011+Agendas/2011-06-06+CWPP.pdf>

North Vancouver (District) 2011 Official Community Plan

<http://www.cnv.org/Your-Government/Official-Community-Plan>

Revelstoke (City) 2006 Community Wildfire Protection Plan for the City of Revelstoke

<http://www.cityofrevelstoke.com/DocumentCenter/Home/View/272>

Richmond (City) 2009 City Centre Area Plan Bylaw 7100 Schedule 2.10

http://www.richmond.ca/_shared/assets/city_centre556.pdf

Richmond (City) 2012 Official Community Plan

<http://www.richmond.ca/cityhall/bylaws/ocp/sched1.htm>

Rossland (City) 2011 Official Community Plan

<http://www.rossland.ca/official-community-plan>

Note: links were tested and accurate at time of publication and are subject to change.

Saanich (District) 2008 Official Community Plan

http://smartplanningbc.ca/_Library/docs/2_3cc_ocp_adopted_jul808_amended_may1710.pdf

San Francisco (City) (no date) Official Community Plan

http://www.sf-planning.org/ftp/General_Plan/index.htm

Slocan (Village) 2011 Official Community Plan

http://www.fraserbasin.bc.ca/_Library/docs_SPC/Schedule_A-D_-_SlocanOCP.pdf

Victoria (City) 2013 Official Community Plan

<http://www.victoria.ca/EN/main/departments/planning-development/community-planning/official-community-plan.html>

Note: links were tested and accurate at time of publication and are subject to change.

Appendix B: Additional Resources

Policy Area	Resources
Climate Adaptation Planning (general)	<p>Australia Greenhouse Office (2006). Climate Change Impacts and Risk Management: A guide for Business and Government. www.environment.gov.au/system/files/resources/21c04298-db93-47a6-a6b0-eaaaae9ef8e4/files/risk-management.pdf</p> <p>Bizikova L., T. Neale and I. Burton (2008). Canadian Communities' Guidebook for Adaptation to Climate Change: Including an approach to generate mitigation co-benefits in the context of sustainable development. First Edition (Vancouver: Environment Canada and University of British Columbia). www.fcm.ca</p> <p>Carlson, Deborah (2012). Preparing for Climate Change: An Implementation Guide for Local Government in British Columbia (Vancouver: West Coast Environmental Law Association) http://www.wcel.org/sites/default/files/WCEL_climate_change_FINAL.pdf</p> <p>Columbia Basin Trust (2012). Climate Change Impacts and Adaptation in the Canadian Columbia Basin: From Dialogue to Action. www.cbt.org/uploads/pdf/DialoguetoAction_Final_lo-res.pdf</p> <p>International Council for Local Environmental Initiatives (no date). Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation (Toronto: ICLEI). www.fcm.ca/Documents/tools/PCP/changing_climate_changing_communities_guide_for_municipal_climate_adaptation_EN.pdf</p> <p>Richardson, G.R.A. and Otero, J. (2012). Land Use Planning Tools for Local Adaptation to Climate Change (Ottawa: Government of Canada). http://publications.gc.ca/collections/collection_2013/nrcan-nrcan/M4-106-2012-eng.pdf</p> <p>United States Environmental Protection Agency (2014). Being Prepared for Climate Change: A Workbook for Developing Risk-Based Adaptation Plans. http://www2.epa.gov/cre/being-prepared-climate-change-workbook-developing-risk-based-adaptation-plans</p>
Flood, Erosion, Debris Flow	<p>APEGBC Guidelines for Flood Assessment in a Changing Climate http://www.retooling.ca/_Library/docs/Legislated_Flood_Assessments.pdf</p> <p>Flood maps in BC: www.env.gov.bc.ca/wsd/data_searches/fpm/reports/</p> <p>Funding Guidebook for Flood Mapping in BC www.bcrea.bc.ca/docs/government-relations/2014-05floodplainmapguidebook.pdf?sfvrsn=2</p>

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Policy Area	Resources
Flood, Erosion, Debris Flow	<p>BC Land Use Management Guidelines www.env.gov.bc.ca/wsd/public_safety/flood/fhm-2012/amend_invite.html</p> <p>U.S. FEMA Floodproofing Guidelines http://www.fema.gov/floodproofing</p> <p>Cities and Flooding: A Guide to Integrated Urban Flood Risk Management https://www.gfdrr.org/cities-and-flooding-guide-integrated-urban-flood-risk-management-21st-century</p> <p>Queensland, Australia. Planning for Stronger More Resilient Flood plains Guide http://qldreconstruction.org.au/publications-guides/land-use-planning/planning-for-stronger-more-resilient-flood-plains</p>
Landslide/ Steep Slope	<p>APEGBC Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC https://www.apeg.bc.ca/For-Members/Professional-Practice/Practice-Guidelines</p> <p>District of North Vancouver Natural Hazards Management Program http://www.dnv.org/programs-and-services/managing-natural-hazards</p>
Avalanche	<p>Guidelines for Snow Avalanche Risk Determination and Mapping in Canada (2002). https://www.avalancheassociation.ca/store/ViewProduct.aspx?id=3992676</p> <p>The Land Managers Guide to Snow Avalanches in Canada (2002). https://www.avalancheassociation.ca/</p>
Wildfire	<p>City of Kelowna (2011). Community Wildfire Protection Plan (Kelowna: City of Kelowna). http://www.kelowna.ca/CM/page383.aspx</p> <p>District of Langford (2002). An Interface Fire Hazard Planning Model: A Case Study of the District of Langford (Victoria: District of Langford). http://www.doc4net.com/doc/57603330959</p> <p>Partners in Protection (2003). FireSmart: Protecting Your Community from Wildfire (Edmonton: Partners in Protection). www.firesmartcanada.ca/images/uploads/resources/FireSmart-Protecting-Your-Community.pdf</p>

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Policy Area	Resources
Environmental Protection	<p>Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure (2007). www.greenbylaws.ca/images/greenbylaws_web1207.pdf</p> <p>International Council for Local Environmental Initiatives (no date). Finding the Nexus: Exploring Climate Change Adaptation and Biodiversity (Toronto: ICLEI). http://www.icleicanada.org/programs/biodiversity</p> <p>Fraser Basin Council (2011). Rethinking Our Water Ways: A guide to water and watershed planning for BC communities in the face of climate change and other challenges. www.rethinkingwater.ca/_Library/docs/FBC_WaterGuide_FINAL.pdf</p>
Energy Conservation	<p>City of Vancouver (2009). Passive Design Toolkit for Homes (Vancouver: City of Vancouver). www.vancouver.ca/files/cov/passive-home-design.pdf</p> <p>City of Vancouver (2009). Passive Design Toolkit: Large Buildings (Vancouver: City of Vancouver). www.vancouver.ca/files/cov/passive-design-large-buildings.pdf</p> <p>Ministry of Community, Sport and Cultural Development (2011). Development Permit Areas for Climate Action: A Guide for Energy Conservation, Water Conservation and GHG Emissions Reduction (Victoria: Government of BC). www.cscd.gov.bc.ca/lgd/library/dpa_guide/dpa_guide.pdf</p> <p>San Francisco Department of the Environment 2013 Update (2013). Climate Action Strategy (San Francisco: City of San Francisco). http://www.sfenvironment.org/download/san-francisco-climate-action-strategy-2013-update</p>
Water Conservation	<p>City of Vancouver (2009). Water Wise Landscape Guidelines (Vancouver: City of Vancouver). www.vancouver.ca/files/cov/waterwise-landscape-guidelines.pdf</p> <p>Brandes, O.M., Renzetti, S. and Stinchcombe, K. (2010). Worth Every Penny: A Primer on Conservation-Oriented Water Pricing. www.poliswaterproject.org/sites/default/files/Pricing%20Primer%20Finalpdf</p>

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