

Caring For
Our Nature

Maple Ridge Environmental Management Strategy



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April 2014

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support double-sided printing.**

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Executive Summary

The residents of Maple Ridge and the District's Council place a high value on protecting and managing the District's watersheds and natural areas to retain their ecological health. The natural environment provides a range of free services and benefits that are social, economic and environmental.

Stemming from the *Official Community Plan* (OCP) and its emphasis on the natural environment, the high rate of population growth, new challenges such as climate change, and community interest, the District decided to undertake an Environmental Management Strategy (EMS).

The purpose of the Environmental Management Strategy is to understand the ongoing challenges, to identify opportunities and viable options, and to determine priorities and next steps with respect to environmental protection and management. A key intent is to implement the principles of sustainability, affordability, and accountability in relation to costs and benefits, and to respect the values of the community, in planning for new development.

A community engagement process was used to obtain the input of stakeholders and the public through workshops and an open house. In general, there is strong support for many of the District's existing environmental management tools and programs. Residents' top priorities for environmental management are to protect ecosystems, trees and forests, and aquifers, and to improve enforcement and limit sprawl.

The EMS has three goals:

- Goal A: Conserve and manage our natural assets
- Goal B: Design and build sustainable neighbourhoods
- Goal C: Improve communications and environmental awareness

Within each of these goals, the EMS provides objectives, strategies and actions for the District's existing tools that need fine tuning, as well as some new policies and processes to complement existing tools.

The implementation plan identifies the resources, proposed phasing, relative priority and responsibilities for each proposed action. The following are some of the high priority actions recommended for implementation in the short term:

- Update Soil Deposit Bylaw
- Prepare Tree Preservation and Management Bylaw
- Prepare a system for encouraging and documenting all of a project's sustainable development practices in an integrated manner
- Consider incentives such as density bonus, density transfer, DCC reductions or priority processing
- Integrate monitoring and enforcement into policies and processes
- Consider an Environmental Advisory Committee
- Consider providing more resources to the environment section to better manage, administer and enforce bylaws, conduct outreach, collaborate with stakeholders, and to generally implement the Environmental Management Strategy

Once the EMS has been received by Council, there will be opportunities for Council to work with staff, potentially with the input of an Environmental Advisory Committee, to refine the priorities and phasing. There will also be opportunities for Council to focus on implementation details including clarification of objectives, expectations, definitions and implications.

The incentives are to support potential preservation of environmentally sensitive areas or features that are not regulated by senior agencies or by the District.





1.0 Context and Justification

1.1 Introduction

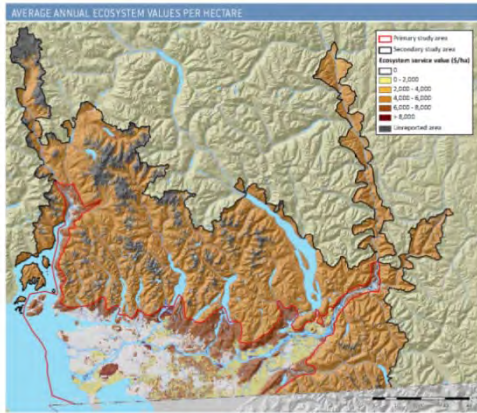
The residents of Maple Ridge and the District's Council place a high value on protecting and managing the District's watersheds and natural areas to retain their ecological health. This is reflected in the *Official Community Plan* (OCP) and has been confirmed in multiple public surveys and community visioning exercises. The historical civic support of the community for the natural environment is central to what makes Maple Ridge an attractive and sustainable place in which to live, work, and play.

Unlike so many other cities that are working to reclaim and reinstate ecosystems and natural features, the District of Maple Ridge has the unique and enviable opportunity of continuing to grow and benefit by working with the natural environment. Local governments are recognizing that maintaining and managing our natural systems is often less costly and less risky than expanding and maintaining hard infrastructure.

The natural environment provides a range of free services and benefits that can assist Maple Ridge in its pursuit of affordable, safe, and sustainable development objectives. Some of these services and benefits are as follows (see also **Appendix A**):

The estimated average annual values of ecosystem services for all benefits (including but not limited to carbon storage, air pollution abatement, water quantity, water quality, pollination, habitat, and recreation) are \$3,826 per hectare in the Lower Fraser Watershed, which encompasses Maple Ridge. – David Suzuki Foundation

This calculation is one of several quantitative evaluations of the value of natural capital.

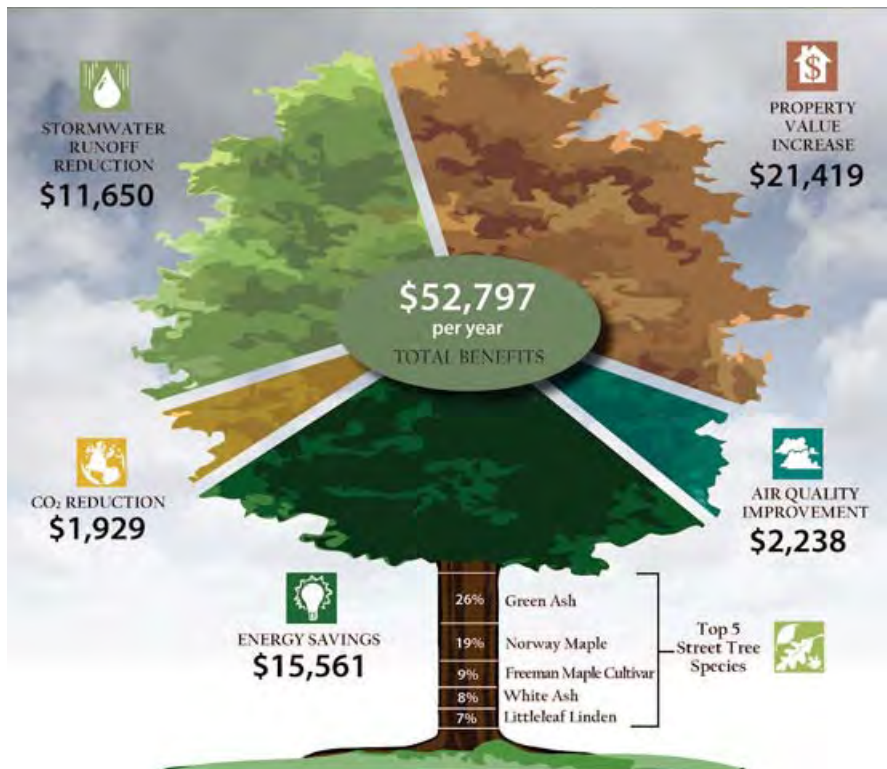


Map from Natural Capital in BC's Lower Mainland: Valuing the Benefits from Nature, David Suzuki Foundation and Pacific Parklands Foundation. 2010

Various methods are used to assign different monetary values to benefits provided by trees, but all of them recognize there is a significant fiscal value associated with services that trees provide.

There is evidence that natural plantings increase property values. A Millenium Ecosystem Assessment showed a property value increase of over \$21,000 per year resulting from green space nearby.

- **Economic** – attraction of commerce, support for agriculture, recreation and tourism; erosion control and slope stability, stormwater and rainwater management, risk reduction, temperature moderation
- **Social** –protection of aesthetic, cultural, and recreational values; physical and mental health, community pride
- **Environmental** – habitat for fisheries and wildlife, biodiversity, clean air, clean water, sequestering of carbon



Millennium Ecosystem Assessment

Maple Ridge is experiencing an annual population increase of three percent per year, as well as economic growth. This is accompanied by increasing responsibilities and duties associated with development reviews, increasing needs for environmental management in capital programs, higher expectations for environmental services from the public, the development community, and special interest groups, and needs for more environmental coordination among municipal departments on District projects and best management practices.

The District requested that an Environmental Management Strategy (EMS) be carried out to broaden an understanding of ongoing strengths and challenges with respect to environmental management in Maple Ridge, and to help the District continue to responsibly manage resources now and into the future.

The District has set a strong foundation for environmental protection through three policy documents that are based on the values of the community: the *Official Community Plan* (OCP) 2006, the *Corporate Strategic Plan* (CSP) 2007, and the *Sustainability Action Plan* (SAP) 2007. These documents include high-level objectives and policies for protecting and responsibly managing our natural resources.

Through implementing the objectives and policies that are already in place, the District has a track record of innovative environmental programs. Some of these programs and tools require upgrades to help make them more effective in dealing with ongoing challenges. In some cases, new strategies and tools are required to help the District achieve its current OCP objectives and policies, along with corporate sustainability goals.

There are also new challenges such as climate change, ongoing development pressure, and significant population growth that leads to increasing demands on natural resources. These challenges require broad thinking and actions by the District to protect the interests of existing and future residents.

Responsibilities of the environmental staff in the Maple Ridge Planning Department:

- *Processing of development applications - average of 119 per year*
- *Pre-development or pre-building permit application environmental duties: GIS analysis; meetings with applicants and consultants; site visits re watercourses, tree cutting and soil deposition; field verification and review of environmental assessments – average of 100 reviews and site visits per month*
- *Front counter inquiries and calls from realtors, home owners, and developers – average of 100 inquiries per month*
- *Phone inquiries and complaints for follow-up – average of 200 calls per month often resulting in additional site visits, enforcement actions, permit process applications, etc.*
- *Processing of applications for building permits, soils permits, erosion control permits, with some supplementary DP permits – average of 100 per year*
- *Review and processing of storwater/rainwater management applications – average of 150 per year*
- *Enforcement visits and monitoring site visits for erosion and sediment control, enhancement work, security deposit returns, etc. – average of 65 site visits per month*
- *Meetings with other departments, development stakeholders, senior agencies, public – average of 75 meetings per month per person*
- *Capital Projects and Environmental Review with Engineering, Parks, and Operations Departments – average of 10 to 15 projects per year*
- *Special Projects, Policy Review and Area Plan Review – average of 5 to 10 additional major projects per year*

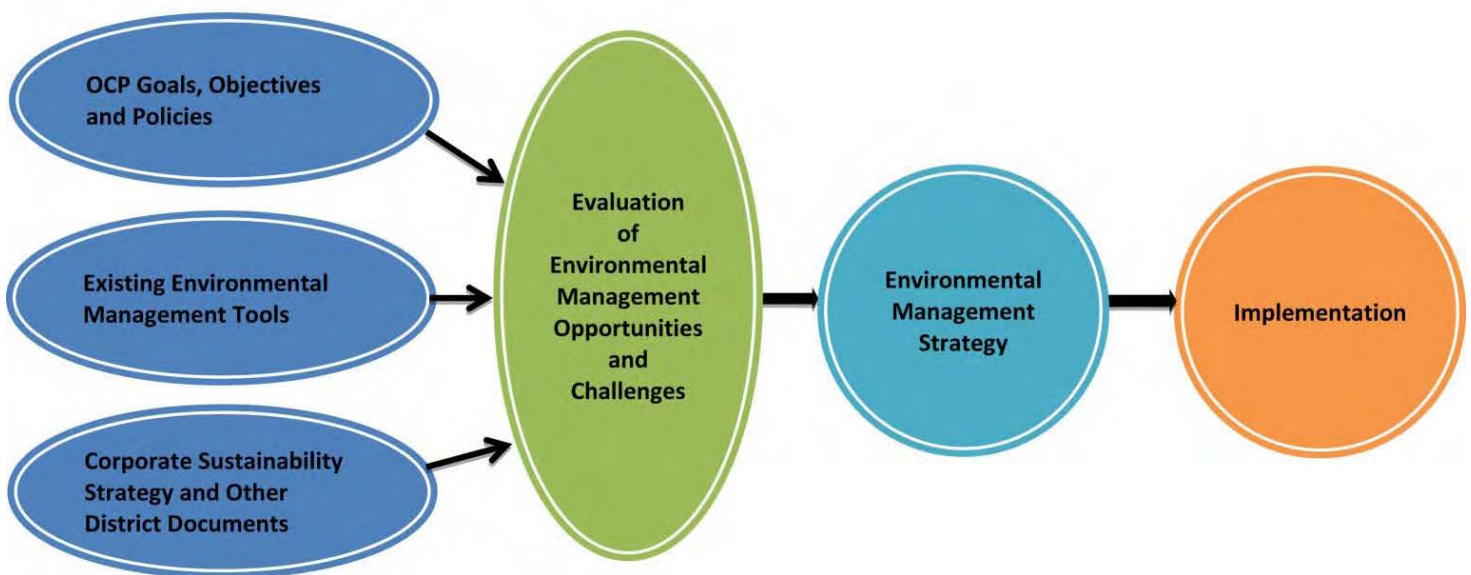
During the course of this project some home owners indicated that they paid a premium for their properties, partly because of their appreciation for the natural beauty and services that the environment provides them. Development impacts on these lands can detract from those values, monetary and otherwise.

The following are the key reasons for undertaking the EMS:

- To guide the District towards sustainable management of the natural resources that provide the community with social, economic, and ecological benefits
- To continue to attract investments in sustainable growth
- To continue building a resilient community in the face of climate change
- To maximize efficiencies and cost savings associated with the services provided by the natural environment
- To reduce impacts to neighbouring properties from development-related activity

The District is at a juncture where there is an opportunity to pro-actively plan for future generations and offset costs associated with ongoing impacts, mitigation, and potential liability concerns. The EMS builds on the existing policy framework and guides the District towards long-term sustainability (Figure 1).

Figure 1: Framework for the EMS



Benefits of Environmental Management

The benefits of a comprehensive and well-managed environmental framework are wide-ranging and well documented (see also **Appendix A**). There are many economic, social, and environmental reasons why it makes sense for local governments to protect and manage environmentally sensitive areas, significant natural features, and ecological processes. There is a growing movement across North America and the world to acknowledge these benefits and to quantify them through a variety of studies and measures (see References).

Economic benefits occur at multiple levels. The District's continuing investment in environmental programs has contributed significant cost savings with respect to less infrastructure maintenance and reduced risk and hazard abatement measures, as well as a stronger economy. The more sustainable developments appear to be attracting more awards, more attention from home buyers, and more innovative investors into our community.

The primary social benefits of environmental management are related to the way we feel about our community. When there is more natural beauty, more opportunities for outdoor recreation, and cleaner air and water, we have improved mental and physical health. We have pride in our community and a closer relationship with nature, which in itself has proven health benefits.

The environmental benefits may be the most apparent, conserving ecological processes, protecting important vegetation and providing habitat for fish and wildlife. Natural environments and ecological processes also help to manage stormwater and rainwater, protect water and air quality, prevent floods and wildfires, and conserve soils in rural and agricultural lands. The natural environment, when it is in a healthy state, is responsible for recharging aquifers and groundwater sources, controlling erosion and soil stability, and filtering pollutants out of groundwater and surface water.

Many of the environmental programs and initiatives that have been implemented to date have resulted in significant economic, social, and environmental benefits to the larger community, to corporate decision makers, as well as to land owners. The EMS is an important stepping stone to ensuring that we continue to recognize these benefits and incorporate these ecological services into planning and development processes.



Rain Garden in Boulevard

1.2 Purpose of the EMS

The purpose of the Environmental Management Strategy is as follows:

- To understand the ongoing challenges that face the community with respect to meeting the OCP objectives concerning the environment
- To identify opportunities and viable options to implement the principles of sustainability, affordability, and the values of the community expressed in the OCP
- To determine priorities and next steps with respect to environmental protection and management
- To be accountable for the implications and costs associated with development and environmental management – the costs and benefits associated with the adoption of various environmental strategies or action items along with the potential costs associated with not changing the current course of action

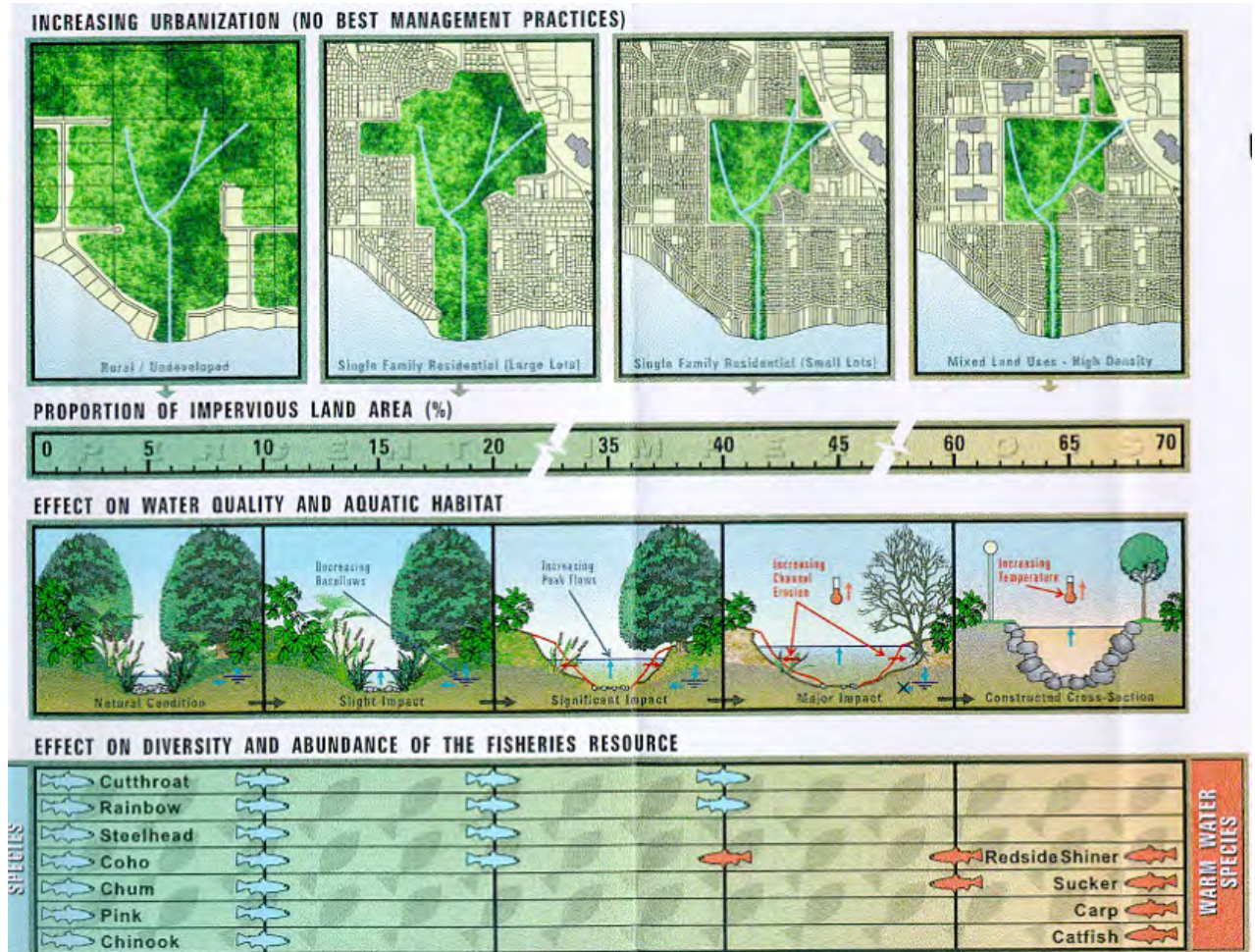


Image from Metro Vancouver report (Kerr Wood Leidal)

The intent of the Environmental Management Strategy (EMS) is neither to halt nor impede development, which is appreciated for the economic, social and ecological well-being that it brings. The primary purpose is to ensure that development continues to incorporate the OCP principles and values that draw people to Maple Ridge. This requires planning ahead for the preservation, integration, and responsible management of natural assets.

Environmental management occurs across a wide spectrum of time frames and scales. For this reason, the EMS includes strategies and tools for a variety of planning time frames and multiple geographic scales including watershed / regional, municipal and site-specific levels. In the Implementation Plan, the priorities, phasing plan and next steps chart a course for the implementation of EMS recommendations.

1.3 Existing Environmental Framework

Federal and Provincial Scale

Maple Ridge is subject to federal and provincial legislation related to environmental management. Some of the more relevant regulations include the *Fisheries Act* and its provisions (Department of Fisheries and Oceans – DFO), non-anadromous fish and wildlife protection (Ministry of Environment – MOE), and protections and regulations related to agricultural land (Agricultural Land Commission – ALC).

Senior Environmental Agencies and Regulations

Federal

Fisheries and Oceans Canada - *Fisheries Act*

Environment Canada - *Canada Wildlife Act, Species at Risk Act (SARA), Canadian Environmental Protection Act,*

Provincial

Ministry of the Environment - *Environmental Management Act (EMA)*

Ministry of Forests, Lands and Natural Resource Operations - *Water Act, Wildlife Act*

Ministry of Agriculture - *Agricultural Land Commission – Agricultural Land Commission Act, Agricultural Land Reserve Use, Subdivision and Procedure Regulation*

Regional Scale

Natural areas in Maple Ridge are influenced by the ecological networks in surrounding areas. Consideration of the regional scale is therefore an integral part of managing the environment.

Metro Vancouver has conducted a significant amount of work that provides the regional context. Metro Vancouver's *Sustainability Framework* commits to "protect and restore an interconnected network of habitat and green space, account for ecosystem services, and enhance the connection between people and nature." A suite of interconnected management plans, described below, supports the Sustainability Framework.

The *Regional Growth Strategy* (RGS) focuses on land use policies to guide the future development of the region and support the efficient provision of transportation, regional infrastructure and community services. A Regional Biodiversity Strategy informed the RGS. Maple Ridge is committed to meeting the RGS goals and objectives and the EMS is a major component of that effort.



Image from Ecological Health Action Plan, Metro Vancouver

The *Ecological Health Action Plan* (EHAP) provides a summary of how maintaining and enhancing the region's ecological health is incorporated into Metro Vancouver's plans and operations. The EHAP proposes 12 projects, within Metro Vancouver's mandate, that can be implemented in the next two to five years. These projects will expand efforts to maintain and enhance the ecosystem services in the region and will help to realize the commitments articulated in the Sustainability Framework. The EHAP provides Maple Ridge with the opportunity to partner with Metro and other municipalities on the green infrastructure network.

The most relevant EHAP project to Maple Ridge is "Advancing the Green Infrastructure Network". Tools for this include land identification and inclusion, expanding and supporting ecosystem services within the network, and advocating for enhancement and expansion of the network.

Regional Environmental Regulations

Metro Vancouver - Air Quality Management Bylaw, Regional Growth Strategy Bylaw

Excerpts from Metro's Regional Growth Strategy

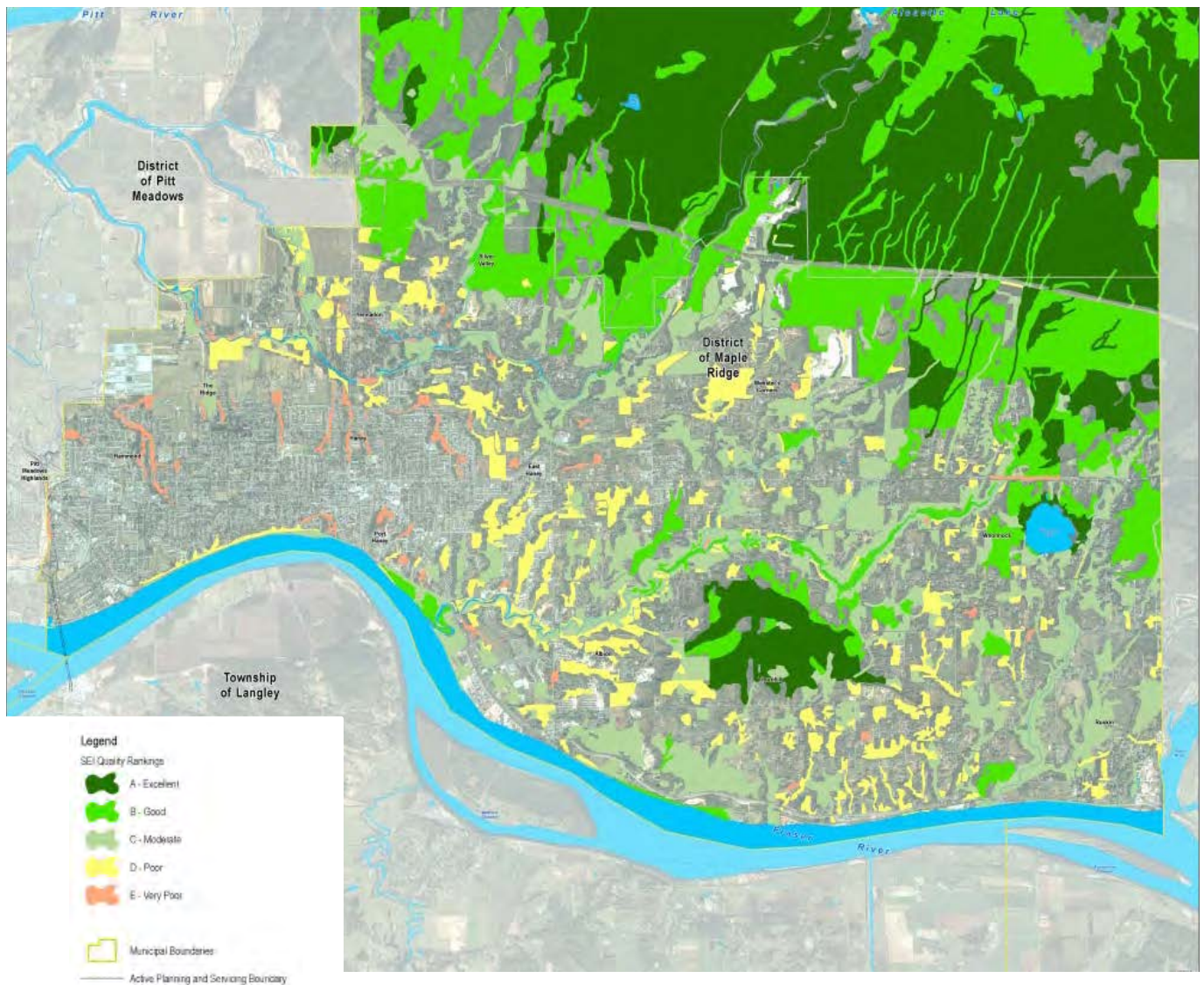
Goal 3: Protect the Environment and Respond to Climate Change Impacts

Metro Vancouver's vital ecosystems continue to provide the essentials of life -clean air, water and food. A connected network of habitats is maintained for a wide variety of wildlife and plant species. Protected natural areas provide residents and visitors with diverse recreational opportunities. Strategies also help Metro Vancouver and member municipalities meet their greenhouse gas emission targets, and prepare for and mitigate risks from climate change and natural hazards.

Objectives

- 2.2.4 Include policies which help reduce environmental impacts and promote energy efficiency.*
- 3.1.4 Identify the Conservation and Recreation areas and their boundaries on a map and include land use policies to support these Conservation and Recreation areas.*
- 3.2.6 Identify where appropriate measures to protect, enhance and restore ecologically important systems, features, corridors and establish buffers along watercourses, agricultural lands, and other ecologically important features.*
- 3.2.7 Consider watershed and ecosystem planning and Integrated Stormwater Management Plans in the development of municipal plans.*
- 3.3.4 Implement land use policies and development control strategies which support integrated stormwater management and water conservation objectives.*

Most recently, a Sensitive Ecosystem Inventory (SEI) was conducted over Metro Vancouver and Abbotsford, from January 2010 to May 2012. The project was initiated in response to the need for up-to-date, standardized ecological information for the entire region to support future decision-making. Provincial SEI standards were followed to identify and map ecologically significant and relatively unmodified Sensitive Ecosystems, including wetlands, older forests and woodlands. In addition Other Important Ecosystems such as seasonally flooded agricultural fields and young forests, which are human-modified but still have ecological value and importance to biodiversity, were included in the mapping process.



SEI Quality Rankings in Maple Ridge, Data Source: Metro Vancouver

District of Maple Ridge

The District has many existing tools for environmental management, as illustrated in **Figures 2 and 3**, and described below.

Figure 2: Existing District Tools for Environmental Management



Official Community Plan

The District's OCP (2006) was developed through an intensive public engagement and community visioning process. The OCP is based on a corporate mission statement, overall vision statement, and 45 plan principles, some of which emphasize protection of the natural environment. Chapter 5 Natural Features has environmental management as its main focus. Section 5.1 references the OCP's environmental principles, and provides objectives for natural features. Section 5.2 describes a comprehensive ecosystem management model, with goals, issues, objectives and policies for the protection of land, water, and air resources. These policies are developed further in sections 5.3, 5.4, and 5.5.

The OCP also contains objectives and policies related to:

- Land resources
- Hillside development
- Visual character
- Water resources
- Air quality
- Climate change

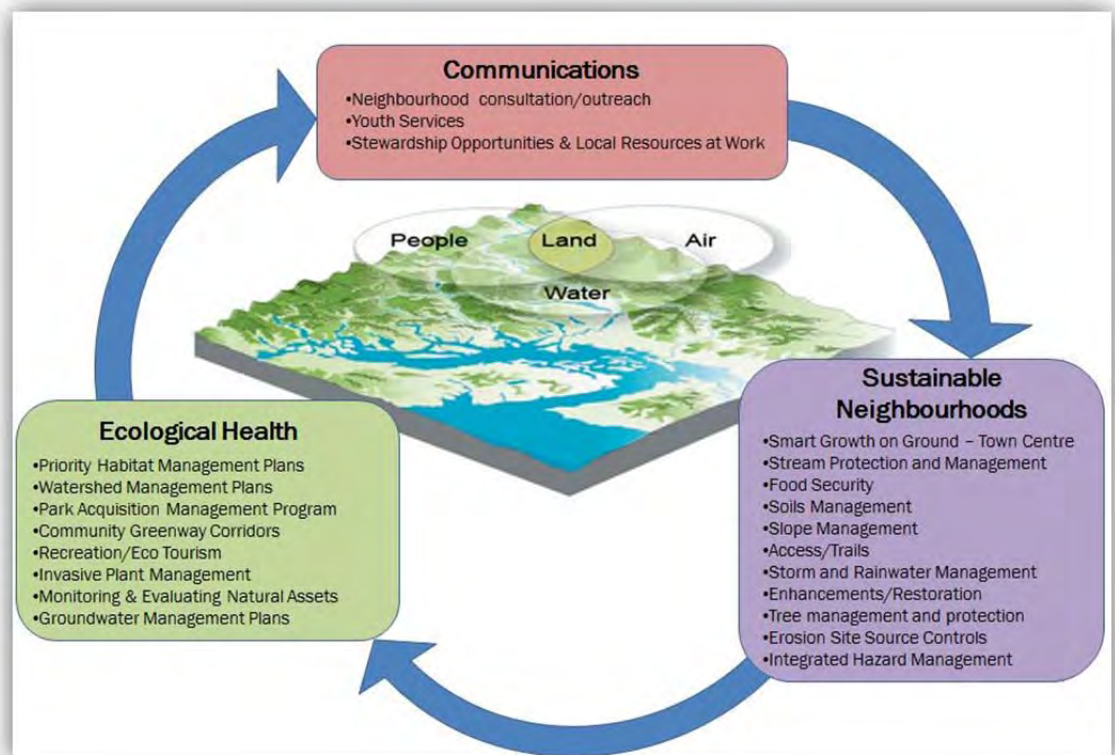
Summary of OCP Environmental Management Model – Goals

1. Protect significant ecosystems
2. Anticipate and respond to impacts of climate change
3. Determine appropriate DP guidelines and bylaws
4. Identify requirements for environmental studies or impact assessments
5. Maintain and improve ecosystem health and human safety

Summary of OCP Natural Features Objectives

1. A comprehensive approach based on ecosystem principles incorporating land, water and air
2. A perspective that anticipates climate change and strives to reduce its causes while mitigating impacts
3. A balanced evaluation process incorporating economic, social, and environmental sustainability
4. The cultivation and strengthening of community partnerships to help enhance the success of policies and programs.

Figure 3: Environmental Management Framework



Summary of OCP Environmental Development Permits

Chapter 8 of the OCP provides objectives and guidelines for Development Permit Areas (DPAs), two of which pertain to the protection of natural features. The Watercourse Protection DPA focuses on the preservation, management, and enhancement of watercourses and riparian areas. The intent of the Natural Features DPA is the protection and management of the natural environment including hillsides, forest lands, and natural hazard areas (**Appendix B**). The key purpose of these DPAs is to identify topographic and hydrological features on a potential development site to assist with the following:

- guide development to work with the natural landscape where possible and protect environmentally sensitive areas such as watercourses, wetlands, and steep slopes
- mitigate impacts from proposed developments and ensure safe practices around natural hazards
- promote enhancement and restoration of disturbed protected areas on site

Other Municipal Bylaws

A number of other District bylaws support environmental management, including the following:

- **Watercourse Protection Bylaw** (6410-2006) – emphasis on proactive mitigation to deal with erosion and sediment control measures along with innovative stormwater and rainwater management standards that focus on site source controls for all new development
- **Tree Protection Bylaw** (5896-2000) – regulatory requirements for tree cutting in designated urban areas only as well as watercourse protection areas
- **Soil Deposit Bylaw** (5763 – 1999) – locations, conditions, and fees associated with permits for soil deposit, provisions for geotechnical and floodplain assessments for soil deposit and commitment for field review
- **Soil Removal Bylaw** (6398 – 2006) – locations, conditions, and fees associated with permits for soil removal
- **Zoning Bylaw** (3510-1985) – limits building activity on slopes over 25 percent
- **Streamside Protection Regulations (SPR)** – use of the SPR was part of a Council resolution in 2004 to ensure safe and adequate protection measures for fish and sensitive fish habitat

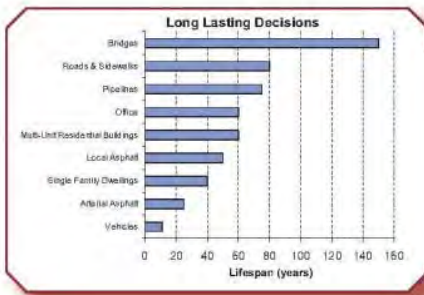
Corporate Strategic Plan (CSP)

The CSP (2007) defines the mission, vision, values and strategies that guide the Corporation. The District's mission is: "A safe, livable and sustainable community for our present and future citizens."

The District's vision for 2025 reads as follows:

"The District of Maple Ridge is among the most sustainable communities in the world. As a community committed to working toward achieving carbon neutrality, residents experience the value of a strong and vibrant local economy and the benefits of an ongoing commitment to environmental stewardship and creation of stable and special neighborhoods. Maple Ridge is a world leading example of thoughtful development and a socially cohesive community, especially as it relates to the use of leading edge "environmental technologies," social networks and economic development. Other municipalities consistently reference the District of Maple Ridge for its innovative approaches to dealing with seemingly intractable challenges."

With defined values as a foundation, the CSP outlines visions and strategies within nine focus areas: 1. Environment, 2. Transportation, 3. Smart Managed Growth, 4. Safe and Livable Community, 5. Financial Management, 6. Governance, 7. Community Relations, 8. Inter-government Relations / Networks, and 9. Economic Development.



Sustainability Action Plan (SAP)

This document (2007) builds on the Corporate Strategic Plan (CSP). For the same nine focus areas, the Sustainability Action Plan outlines the accomplishments of the preceding years and a list of actions ("What's next?"). The actions build on the pre-existing initiatives undertaken and the new strategies identified in the CSP. The document also identifies future steps for each focus area.

Environmental Mapping and Information Management System

Over the past two decades, the District has been developing its environmental mapping and information management system. The information includes the following:

- **protected features** – watercourses, wetlands, ponds, steep slopes over 25%, raptor nests, and heron rookeries
- **potential hazard areas** – geotechnical setback areas, floodplains, seismic vulnerable areas, designated high risk forest interface zones, and major erosion areas



Graphs from the Sustainability Action Plan

- **significant ecological management zones** – vulnerable aquifer zones, unique ecosystems, migratory bird nesting sites, aquatic habitats, and high probability species at risk habitat
- **greenway trail corridors** – existing and potential multi-use trail corridors and significant wildlife movement corridors
- **stormwater and rainwater management features** – infrastructure, drainage ditches, wetland areas, ponds, forests, trees, soils, and gradients
- **enhancement and restoration opportunities** – conservation areas and parks that require replanting, invasive vegetative species removal, exposed slopes and setback areas that require landscaping and re-vegetation



Japanese Knotweed

Environmental Stakeholders

The District integrates its programs with those of other agencies and stakeholders that share responsibilities and interests in environmental protection, management, and stewardship. In some cases, these relationships are partnerships aimed at achieving common goals. In others, jurisdictional matters, obligations and responsibilities have been clearly defined within a legal framework. A brief description of these stakeholders is as follows:

- **Senior Environmental Agencies** – the District has working relationships with the federal Department of Fisheries and Oceans (DFO), provincial Ministry of Environment (MOE), regional Metro Vancouver, Agricultural Land Commission (ALC), and First Nations for initiatives related to review, monitoring, and enforcement activities.
- **Non-government Organizations** – these partnerships are with organizations such as provincial land conservancies, corporations and academic institutions interested in environmental causes such as data collection, conservation and stewardship activities, carbon sequestration, and education. Partnerships with BCIT, SFU and UBC focus on municipal inventories, education programs, and watershed analysis.
- **Local Stewardship Groups** – these groups are recognized and given assistance by the District to help with environmental education and outreach, enhancement and restoration projects, and monitoring.
- **Residents and Business Owners** – the District maintains open relationships and communication with the public including business owners, developers, consultants, and land owners as evidenced by the engagement process associated with the EMS.

1.4 Engagement Process

The EMS was prepared through a collaborative process involving a variety of stakeholders and the broad community. Stakeholders included developers, realtors, businesses, development and environmental consultants, stewardship groups, community associations, and representatives from other environmental agencies (regional, provincial and federal).

The following is a summary of the key events (**Figure 4**). A separate background document containing a summary of the input received at the events is available on the District website (www.mapleridge.ca).



Visioning Workshop

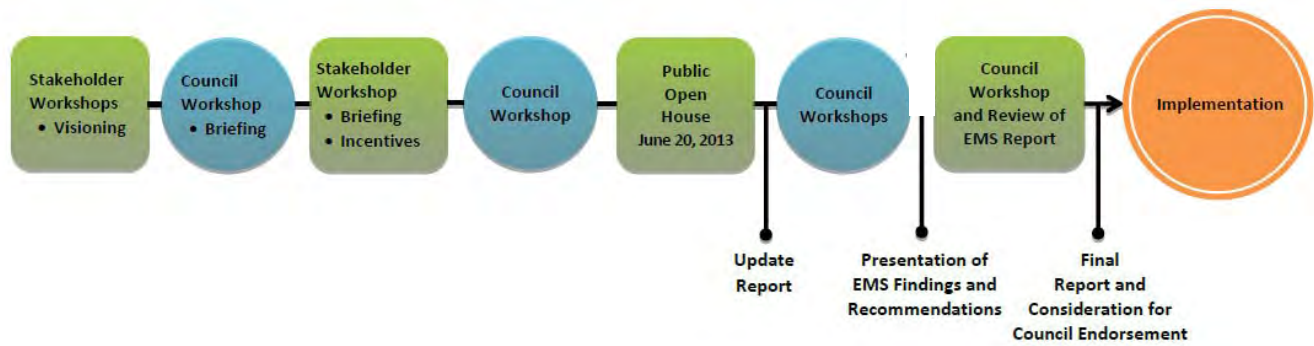
- **Visioning Workshops with stakeholders** – after being presented with an introduction to the project, stakeholders were asked to indicate their familiarity with environmental management tools in the District, to rate the District's performance in various OCP-related areas (both using an audience response system), and to identify strengths and challenges in environmental management. Participants then worked in groups to discuss: 1. ecological network strategy (mapping), 2. regulations and Development Permit Area guidelines and incentives, 3. partnerships, stewardship and environmental outreach, and 4. values and benefits of natural assets. Two separate workshops, afternoon and evening, were held on the same day.
- **Policy Workshop with stakeholders** – at the second stakeholder workshop, a presentation outlined the high-level strengths, challenges and opportunities. Participants worked in groups to indicate their level of support and comments on draft goals and strategies.
- **Public Open House** – the open house was held in a large space with many presentation panels providing information on existing mapping, policies and best practices related to environmental management. Communications about the open house were sent to a long list of stakeholders, and information was also provided to stakeholder groups and residents through newspaper ads, website posting, phone calls and letters. Two presentations at different times provided an overview of the project, including the EMS purpose, process, findings to date, goals, and potential strategies. A comment form available at the open house and on-line was filled in by 161 respondents, 78% of whom completed the entire questionnaire.



Public Open House

- **Council Workshops** – at each step in the process, workshops with Council were conducted to report on the progress of the EMS and to solicit Council feedback.

Figure 4: EMS Engagement Process





2.0 Findings

2.1 What we Heard from the Community

This section lists the input received from residents and other stakeholders first, followed by the technical findings of the consulting team.

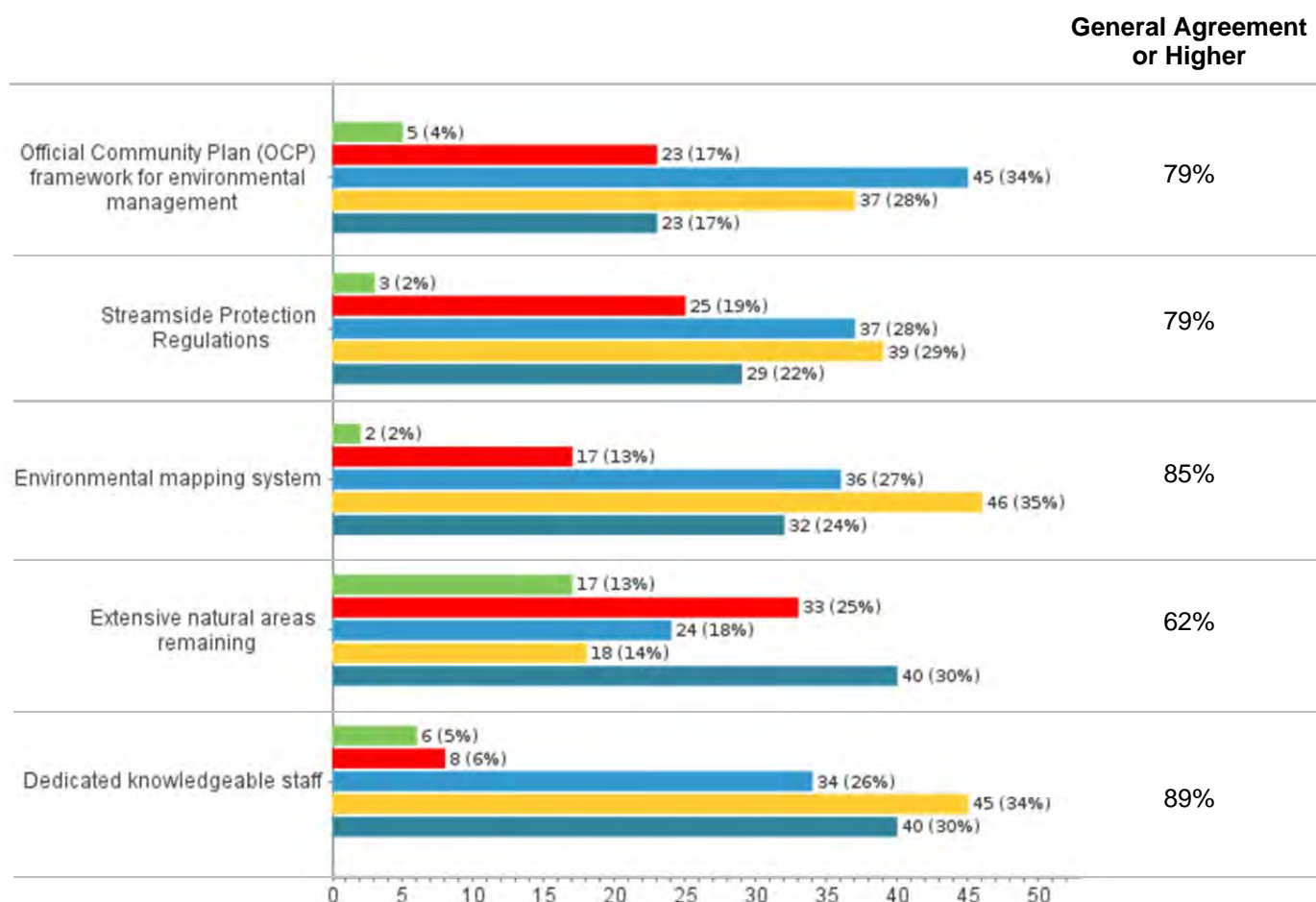
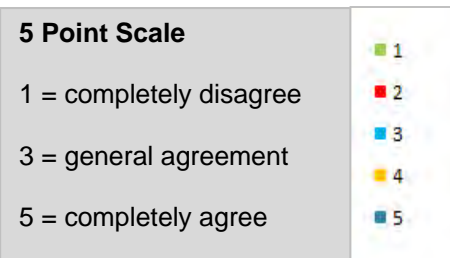
The successes, challenges and opportunities described in this section were formulated through stakeholder workshops and confirmed in the community survey. The bulleted lists provide a high-level summary of the primary comments received in response to each question.

Successes

There appears to be broad consensus among the community and other stakeholders regarding the successes of environmental management in Maple Ridge (**Figure 5**).

Figure 5: Community Questionnaire Responses on Successes of Environmental Management

The following have been identified as successes related to environmental management in Maple Ridge. To what extent do you agree or disagree that these are successes?



The following is a summary of key stakeholder themes and comments related to strengths:

- The OCP objectives and policies reflect the values of the community with respect to the importance of protecting environmentally sensitive areas, responsible and sustainable management of natural resources, a stewardship ethic, and ecological resiliency.
- Participants recognize that infrastructure, housing, employment, and quality of life are all interconnected with the environment.



Flooding near Fraser River

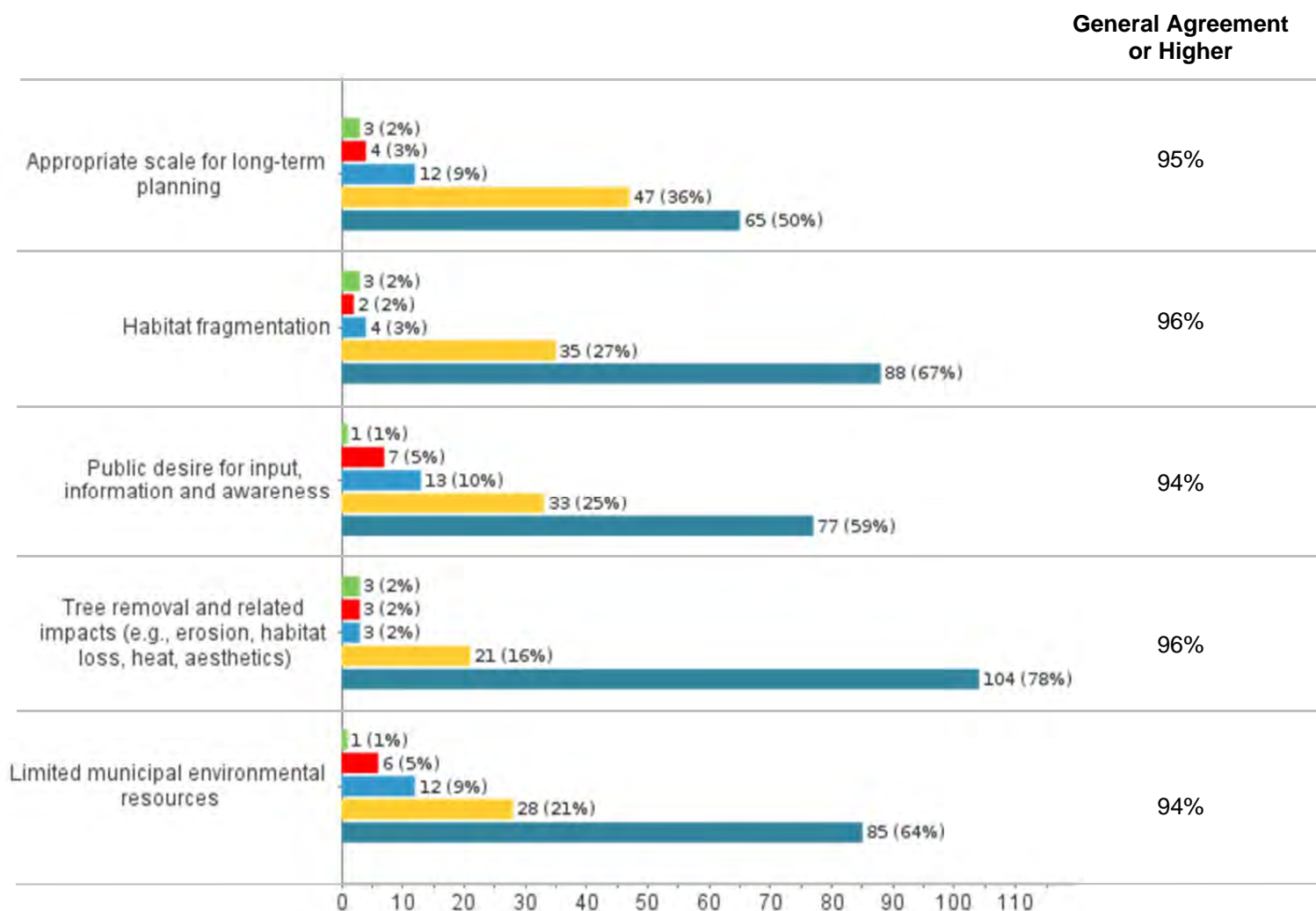
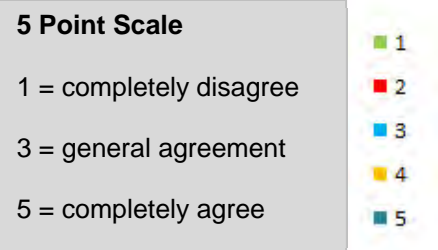
- New rainwater management and erosion control measures have helped to lower infrastructure costs, reduce risks of flooding and erosion, and educate the community regarding water management and natural resources.
- The District, through adoption of the Streamside Protection Regulations, has achieved progressive setbacks for protection of fish-bearing watercourses.
- The District's environmental mapping system is readily available and it provides staff, decision-makers, developers, stakeholders and the public with useful background information on natural resources.
- Stakeholders are passionate about the unique natural characteristics of Maple Ridge, including the vast tracts of nature at upper elevations, the many creeks, riverfront, lakes, and wetlands throughout the community, the fish and wildlife living in these ecosystems, and the open space associated with farmland.
- The public acknowledge that District staff are committed to protection and management of the environment. Staff engage in collaborative dialogue, attempt to keep pace with ongoing needs and issues, and support environmental stewardship groups.
- Stakeholders strongly support collaboration and communication among those working on environmental planning and management.

Challenges

There is also extremely strong agreement among stakeholders and the community regarding the challenges related to environmental management (**Figure 6**).

Figure 6: Community Survey Responses on Challenges of Environmental Management

The following have been identified as challenges related to environmental management in Maple Ridge. To what extent do you agree or disagree that these are challenges?



The following is a summary of key stakeholder themes and comments related to challenges:

- There are concerns that the District is starting to fall behind in terms of identifying and protecting important natural areas at the broader-scale.
- There is a desire for more information and analysis regarding the highest and best use of municipal public lands. Stakeholders expressed interest in leaving natural areas that are owned by the municipality intact in many cases because of the multiple values of

The City of Campbell River has developed a series of fact sheets, cartoons and videos that explain the development process in user-friendly, graphic format.



Land Cleared for Development

the natural environment such as recreation, eco-tourism and habitat protection.

- Stakeholders are concerned because the District is vulnerable to habitat fragmentation due to its complex topography; development can cut off connectivity or reduce the integrity of essential wildlife habitat. Corridors for fish and wildlife generally flow north-south from the higher elevations to the developed areas along watercourses. East-west corridors are also important, as is provision of habitat refuges near and within urban areas. Cumulative impacts associated with development can lead to fragmentation of significant habitat hubs and major wildlife movement corridors if these lands are not preserved or managed properly.
- Maple Ridge stakeholders appreciate many of the free and valuable services that surrounding natural landscapes provide, and development or disturbance to these areas can result in significant impacts to the community as a whole, including local businesses, property owners, and residents.
- Many of the District's stakeholders would like environmental information to be more easily accessible via handouts, website materials, maps and signage on environmental resources, values and benefits.
- Stakeholders are also interested in having more clarification related to development applications and homeowner requirements for environmental protection and management.
- Interest groups would like more opportunities to provide input into planning and management processes, and to strengthen communication among themselves and with the District.
- Tree removal in urban, suburban, and rural areas is one of the primary concerns of residents and other stakeholders. Stakeholders are aware of the multiple environmental, social and economic values of trees, and that fact that these values increase over time for each healthy tree. There is interest in stronger regulations to ensure appropriate mitigation and compensation for tree removal, to ensure neighbours are not being negatively affected, and for permits and fees to help offset costs associated with removal of trees.
- There are concerns that the District does not have enough environment staff or resources to implement, monitor, and update all of the ongoing environmental programs, update and administer bylaws, review development applications and other permits, respond to environmental inquiries, conduct monitoring, enforce regulations, coordinate community stewardship and outreach programs, and liaise with senior agencies.

Opportunities

Residents and other stakeholders expressed significant support for the potential strategies related to environmental management that were presented for consideration at the public open house and on the comment form.

The following is a summary of key stakeholder themes and comments related to opportunities:

- A strong conservation ethic among the community is evident, and this is the basis for very high interest in identifying, protecting and managing ecosystems and habitat.
- Ecosystems will be healthier and more intact if there is more implementation and enforcement of existing policies and regulations.
- Better protection of trees and forests will provide multiple benefits to the community.
- Opportunities to protect watersheds, groundwater and aquifers at a broad planning scale will result in healthier human and non-human communities.
- Stakeholders would like to see permanent protection of many of the natural areas outside of the urban area boundary. To accomplish this, it is important to plan development in clusters within the urban area boundary thereby containing sprawl.

Stakeholders' top priorities for environmental management:

Protect ecosystems

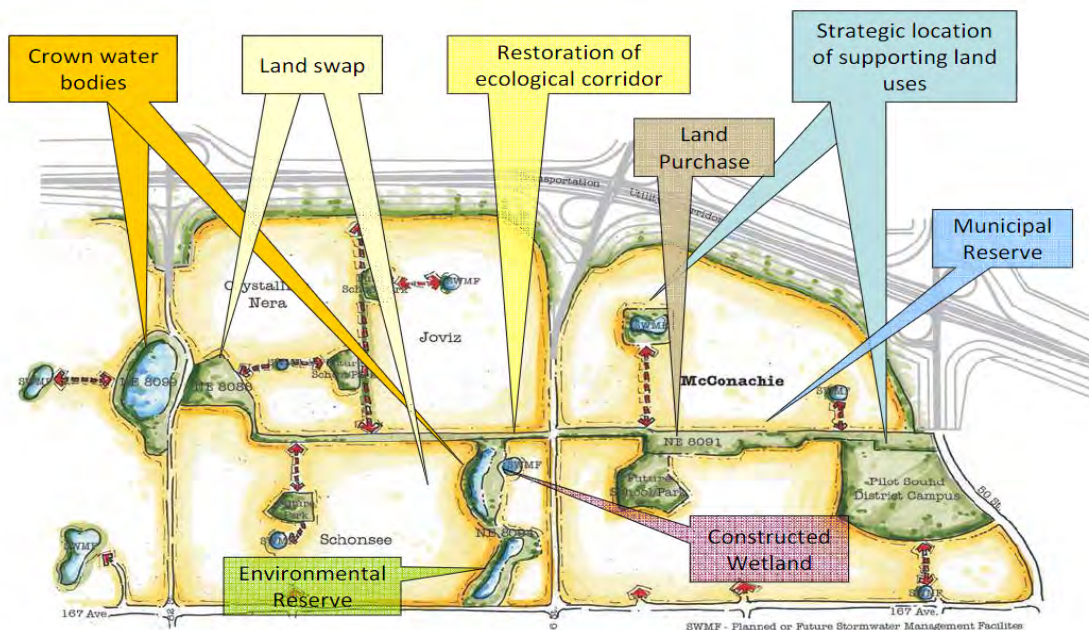
Protect trees and forests

Protect aquifers

Improve enforcement

Use existing strategies and tools to limit sprawl

Source: community open house and survey input



Potential tools and incentives for assembling an ecological network

- Support for evaluating the values and benefits of natural assets is significant; however, many respondents also said, ‘we know the benefits, let’s get on with protecting the assets’.
- There is significant support for incentives for protection of environmentally sensitive areas and features that are not currently regulated. Others stated that protection of natural assets should occur without incentives, due to their concern about the densities that could result from density bonus/transfer tools.
- There is strong support for managing soil deposition and the resulting spread of invasive species on agricultural land, including tools for education, implementation and enforcement/accountability.
- Stakeholders would like to see more collaboration and greater public awareness, to be achieved through more extensive communication and education, being inclusive of all, and involving youth.
- There are requests for more municipal resources (mainly staff), as well as tools to leverage the resources to maximize benefits.

2.2 Consulting Team Findings

Analysis by the consulting team confirms the strengths and challenges discussed in the previous sections. The following are some technical findings that identify how the District can build upon what is already in place to continue to develop in a sustainable, safe, and affordable manner. Refer to **Appendix C** for a more thorough analysis of existing policies and gaps.

Successes

- The District’s environmental mapping and information management system has been cost effective and useful as background information in the formation of innovative development plans that fit with the natural landscape rather than the conventional practice of making the landscape fit the development. This system provides property owners and developers with preliminary information that helps avoid initial costs for field studies and assessments of topography, hydrology, natural hazards, protected areas and features, land use concerns, and other important information. The map information also helps staff, municipal decision makers and developers understand what studies and mitigation or protection may be required for future development.
- The environmental Development Permit Areas in the OCP include low impact development guidelines that encourage the use of ecological design principles and best management practices that work with the natural environment. This lowers municipal infrastructure maintenance costs, and reduces additional costs

required by staff having to carry out extensive municipal monitoring and enforcement for development projects. This is different from previous development practices whereby taxpayers sometimes had to cover costs for retroactive solutions resulting from inappropriate development.

- Environmental DPA guidelines support appropriate studies with recommendations for abatement of natural hazards which also reduces municipal liability and related costs associated with risks such as flooding or other natural hazards. This has increased overall awareness in the community regarding responsible water management practices and landscape treatments.
- The SPR has generally resulted in sound scientifically-based protection measures for long-term health for fish and surrounding aquatic habitat. In addition to ecological benefits, there have been many other socio-economic benefits to the District and tax payers in terms of cost savings related to stormwater infrastructure, energy conservation, erosion and slope stability, hazard abatement, and groundwater management. It has also given the District the ability to incorporate community greenway trails, habitat enhancement measures, and eco-tourism opportunities into setback areas without having to purchase additional lands for trail connections or go through time consuming senior environmental agency review processes.
- There are some new Integrated Stormwater (and Rainwater) Management Plans and Watershed Management Plans underway in the District. These will expand the application of environmental



Creek and Riparian Area

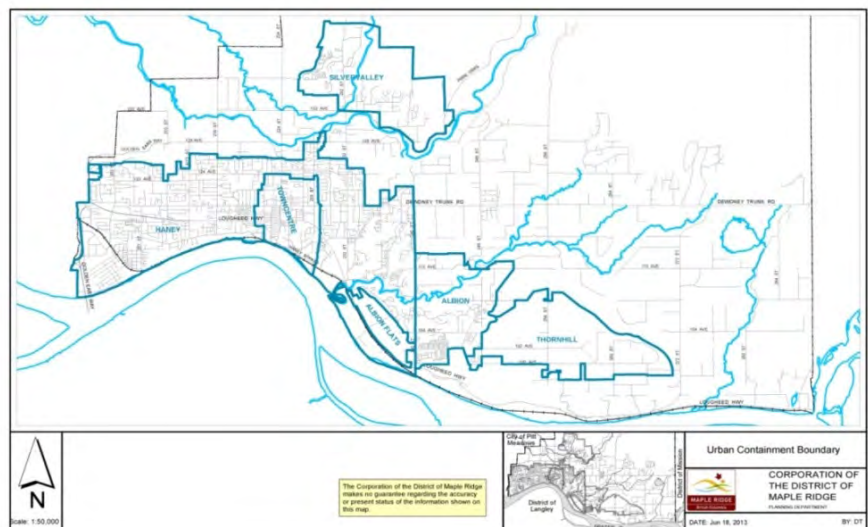
Environmental Programs that have been Successful in Maple Ridge

Maple Ridge and its developers have been recognized as regional and provincial leaders and award winners for environmental management initiatives, and have received national acknowledgements. Recognitions have been received in the following areas:

- *Environmental Mapping and Information Systems (national award)*
- *Watercourse Protection Regulations*
- *Rainwater Management Site Source Control Standards*
- *Erosion and Sediment Site Source Control Regulations*
- *Habitat Enhancement and Restoration Programs*
- *Environmental Development Permit Guidelines*
- *Recycling and Waste Reduction*
- *Municipal Energy Conservation Program and Green Buildings Program*
- *Town Centre 'Smart Growth on the Ground' Program*
- *Carbon Sequestration and Reforestation*
- *Corporate Hybrid Vehicle Fleet Management*
- *Many awards to developers and builders, mostly from Greater Vancouver Home Builders' Association and 'Georgie' awards from the Canadian Home Builders' Association of BC for projects that include sustainable development and environmental design measures*

management tools and make the importance of water resource management more prominent within the District. These plans will also provide baseline information for future analysis of conditions and trends.

- Environmental coordination and integration of environmental regulations and processes among multiple departments helps the District become a more sustainable corporate entity, with a focus on leading by example with respect to sustainable practices in the community.
- The District actually has extensive language in the OCP about reducing sprawl. The OCP includes urban area boundaries, and the District has been developing area plans to promote infill rather than sprawl for the past decade. Retaining new development within the urban area boundary is one of the most important measures the District can take to protect environmentally significant lands outside this boundary.



Habitat Fragmentation from Land Clearing

Challenges

- Habitat fragmentation is occurring and the cumulative, incremental, and indirect impacts that can occur with successive developments are difficult to monitor and remediate. If habitats become too fragmented, biodiversity and ecosystem health can be threatened. This can result in cumulative long-term impacts that require expensive remediation or reclamation. Other municipalities have spent significant funds to restore lost natural areas, such as daylighting of creeks.
- Land clearing for development and resource extraction can disrupt watersheds, threaten soil stability, cut off significant movement corridors for wildlife, and it can lead to negative impacts for

homeowners reliant on wells for drinking water around vulnerable aquifer areas.

- The tree protection regulations are not adequately protecting or managing trees and forests in developed or developing areas, thereby not taking enough advantage of the ecological, economic, and social services that are provided by trees. The District is not being fiscally compensated for negative impacts associated with tree clearing or replacement costs compared to other municipalities.
- The District has experienced poor quality soil deposits coming into rural areas, with associated impacts such as reduction of soil productivity, spread of invasive species, and drainage issues associated with fill.
- Groundwater management strategies considered in the OCP policies have yet to be undertaken, and some of the areas with known aquifers are identified as future development areas. Aquifers are of critical importance in some development areas because local residents rely on aquifers to supply them with adequate amounts of clean water for drinking and for irrigation of agricultural lands; these aquifers also support natural vegetation. Disturbance to some aquifers can have detrimental effects on human health, the viability of commercial operations, and the overall health of the surrounding landscape.
- The environmental mapping system is an excellent resource; however, it has not been fully incorporated into the District's policies and programs. It is being used as background information, rather than being endorsed by Council and being used within strategies and programs e.g., as Development Permit maps. Most municipalities, based on the consultants' experiences, value having detailed DP maps. This may be something for Maple Ridge to consider in the future.
- Rainwater management on-site source controls are important environmental management tools being implemented by District staff, even though the actual regulation is buried in the Watercourse Protection Bylaw. The consultants feel that this should have more prominence in bylaws or policies to ensure that all District departments and developers are aware of it.
- The three environmental staff appear to be stretched very thin in light of significant and increasing demands. Some of these include increasing demands for outreach liaison work with external stakeholders; increasing demands for coordination on internal projects, task forces, plans and operations; increasing development reviews, monitoring and enforcement of complex projects; assuming

There are three maps at the back of this report that might be considered by Council and a potential Environmental Advisory Committee in the future as an approach to environmental DP mapping.



Riparian Area Fencing Removed and Area Converted to Mowed Grass

The most widely used definition for climate change adaptation is “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.”

Intergovernmental Panel on Climate Change

some responsibilities previously covered by senior environmental agencies; and expanding expectations from stakeholders and the public. More of everything is being requested or demanded of environmental section staff, but it cannot be accomplished without more staff resources.

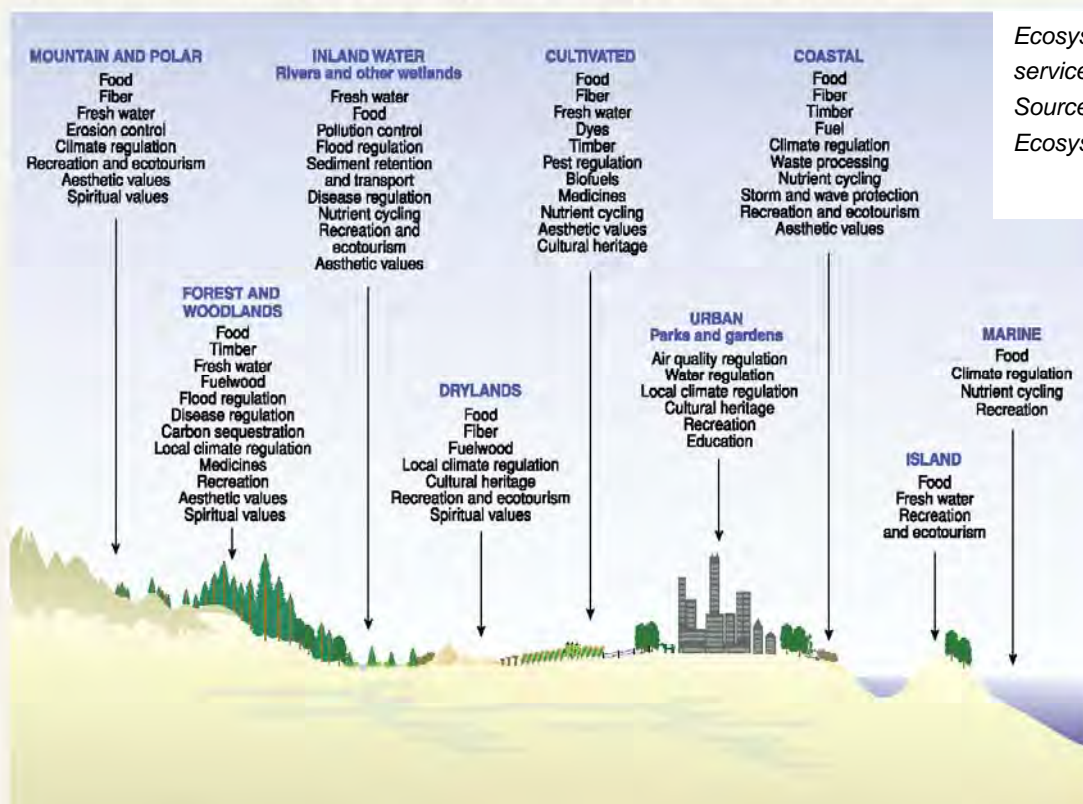
Opportunities Related to Existing Tools

The existing bylaws and policies have served the District well in the past, but with the additional pressures and demands of a growing population and associated complexities of environmental management, the existing tools require some clarification, strengthening and fine tuning.

- The key opportunity is to strengthen and enforce environmental management in the context of population increases and other threats such as climate change in order to reduce infrastructure costs and liability concerns. Stormwater management, erosion control, and risks related to extreme weather events can all require expensive engineering solutions to mitigate impacts. Natural forested areas additional costs of maintaining these natural areas are small related to the benefits achieved by protecting them.
- There is an opportunity to clarify the language in some of the District's bylaws and regulations to better convey the importance and content of some of the District's environmental management policies, and to clarify requirements, processes, and definitions related to the development review process. The consulting team observed that the language is not always entirely clear. The dedicated and knowledgeable environmental staff help to clarify requirements for applicants and the public; however, clearer language would increase efficiency in development application and approval processes.
- There is an opportunity to integrate, field check and add to the District's environmentally sensitive area mapping, and to use this mapping within strategies and programs, e.g., as Development Permit maps (see Challenges). This work may involve field verification by local consultants and District staff over time, integration of relevant information from Metro's Sensitive Ecosystem Inventory, and the addition of terrestrial habitat information, updates to watercourses, slope assessments, hazard assessments, and invasive species mapping, plus identification of existing and potential enhancement areas. This mapping would increase efficiency in the development application and approval process. Rather than needing to visit District staff to become aware of the full range of environmentally sensitive areas, these would be in the public domain as part of the OCP and other policy maps. Other potential applications related to the map information include visual landscape analysis, natural capital evaluation, and establishing performance targets and monitoring for ecosystem health.

- There is an opportunity to build upon the ongoing work related to rainwater management and on site source controls. One step is to incorporate these tools within Subdivision Servicing Bylaws and ISMP design standards for consistency with the environmental bylaws. Other opportunities are to build upon the ISMPs by establishing higher landscape design standards in certain new development areas, evaluating terrestrial ecosystem health in relation to baseline conditions (e.g., vegetation cover, pervious surface area), establishing effective performance targets with respect to impervious and pervious surfaces within a watershed, or establishing tree canopy cover targets.

Different combinations of services are provided to human populations from the various types of ecosystems represented here. Their ability to deliver the services depends on complex biological, chemical, and physical interactions, which are in turn affected by human activities.



Ecosystems and some services they provide, Source: Millennium Ecosystem Assessment

- The Natural Features DPA currently addresses hillside development and management of natural hazards. There are opportunities to focus this DP more specifically on terrestrial habitat and hillsides, addressing all hazards in an integrated and comprehensive manner in a separate Natural Hazards DP (see next section). Guidelines related to hillside management need improvements to address forest protection and management, visual impact assessments, and correlation with hazard and groundwater management guidelines. There may be an opportunity to enhance the hillside management guidelines by reviewing hillside development that is based on these

Metro Vancouver and the cities of Vancouver and Burnaby have been working to rehabilitate and enhance some sections of Still Creek, one of only two remaining visible streams in urban Vancouver.

This work involves:

- *Returning creekside habitat to native plantings*
- *Removing concrete and naturalizing creek banks*
- *Adding interpretive plaques and boardwalks to provide recreational and educational opportunities*

The work requires major resources. In 2013, chum salmon returned to a rehabilitated portion of the creek.

guidelines, identifying environmental and visual issues, and refining the guidelines to address those issues.

- The primary options related to soil removal and deposit issues are to strengthen policies and practices with respect to soil retention, including monitoring, to protect agricultural and rural lands from removal of topsoil, contamination, or large scale deposits of fill.
- There are always opportunities to expand environmental education to all age groups and to leverage partnership opportunities so that environmental protection and management become more widely adopted and supported by the community and stakeholders. Like most other municipalities, the District has challenges related to education, monitoring, enforcement, and long-term protection of environmental resources. The opportunities are best achieved by having “eyes on the ground” during, immediately after and long after development has occurred. This can be accomplished through District staff resources, consultants for developers, and also through continuing investment in volunteers groups and citizens, e.g., ‘adopt a creek’ stewardship.
- Incorporation of environmental measures into property titles and strata agreements is another tool for helping to spread information to future land owners.

Opportunities for New Tools

The analysis of the District’s tools shows that there are some gaps that would be best addressed with some new environmental management tools. The following is a summary of some of the primary opportunities:

- A key opportunity is to identify the areas within and extending beyond the District that are the most important locations needed to retain healthy ecosystems. An ecological network management strategy could identify the larger watercourses, significant recreation, natural heritage, and/or conservation hubs, and important aquifer recharge areas that provide essential services to businesses and residents. The network could specify the appropriate width of greenway buffers needed to achieve connectivity and continuity around significant wildlife movement corridors and watercourses such as Whonnock Creek or the Fraser River. This tool could help to guide many environmental planning and management activities.

- There are significant opportunities to develop new tools for protecting and managing trees. This could be accomplished through a new Tree Preservation and Management Bylaw. Another option is a comprehensive urban forestry program for integrated management of trees and forests within urban and rural areas. Protection of the tree canopy is a common best practice, with extensive information available on the qualitative and quantitative benefits and many bylaw examples available. More focus on urban forestry could help the District to increase its tree canopy and to improve the health of trees on public and private land. A proposed new Urban Forester position could be helpful to Maple Ridge in forest and tree management related to the responsibilities in Parks, Fire Department, Planning, Environment, Engineering and Operations so there could be an opportunity to share resources.
- Groundwater management plans and integrated watershed management plans (IWMPs) are tools that can be used to provide an understanding of surface and groundwater resources, and this information can be used to guide development planning with respect to stormwater, rainwater and groundwater management, helping to protect the quality and quantity of water resources for current and future generations. While this is already in the District's policies, the District may need to establish monitoring practices and/or incentives to make these objectives more achievable.
- There is significant interest among stakeholders in the formation of an Environmental Advisory Committee (EnvAC), which would function similar to other District committees. The EnvAC can help to provide a balanced voice on environmental considerations. It is important to recognize that working with an EnvAC is a demand on staff time. Staff need to prepare information for meetings, take minutes, follow up on discussions and communications, and related tasks.
- An integrated Natural Hazards Development Permit would be a useful tool for consideration of development in hazardous areas. The District's regulations related to natural hazards are currently contained within the Natural Features DP. Integrating them into a separate DP would clarify and simplify the processing of applications involving natural hazards, which can be quite distinct from sites containing natural features but no hazards.

Best Practices for Environmental Advisory Committees (EnvACs):

- *It is not appropriate for EnvACs to have a role in the development review process as this can cause costly delays. EnvACs have been successful in BC when they address high-level topics or municipal initiatives such as environmental policies in the OCP, tree canopy goals and cosmetic pesticide use, e.g., Vernon.*
- *It is important to have members with technical capacity because the EnvAC needs to provide input on the pros and cons related to acceptable risk. The Terms of Reference for the EnvAC, especially the determination of when they will become involved in projects, is critically important.*
- *Some BC communities with Environmental Advisory Committees include Surrey, Richmond, Delta, Saanich, Vernon, and Esquimalt.*
- *EnvACs require dedicated staff resources.*

The document, [Preparing for Climate Change: An Implementation Guide for Local Governments](#) (West Coast Environmental Law, Governments of Canada and BC, and Fraser Basin Council, October 2012), and the [Plan2Adapt interactive planning tool website](#) (pacificclimate.org) provide information and tools for incorporating climate change considerations into municipal planning.

Climate change adaptation and climate change mitigation (reducing greenhouse gas emissions) are related, and both are important for local government. However, they serve different ends: climate change adaptation is about dealing with the problems created by climate change, and climate change mitigation is about not making the problem worse. The goal of adaptation, much of which can be addressed through environmental policy, is to reduce vulnerability and risk associated with climate change. Many approaches to adaptation increase overall community resiliency and have multiple benefits.

Planning for Climate Change

The District's OCP talks about anticipating and responding to the impacts of climate change and building ecological resilience for adaptation to climate change and hazards. The following are the potential impacts of climate change in Maple Ridge, according to the Plan2Adapt website, supplemented with local knowledge:

- high climate variation and more intense storms
- increase in temperature
- longer dry season
- high probability of flooding and erosion (Fraser River to small creeks)
- debris flows and landslides
- wildfires
- shift in hydrologic regime classification

These impacts have the potential to affect biodiversity, agriculture, forestry, hydrology, infrastructure, public safety and land uses. There would be environmental, social and economic impacts in all of these areas.

Some of the primary climate change adaptation strategies that can address these potential impacts include:

- protecting the quantity and quality (ecological health and biodiversity) of natural areas
- rainwater management to slow run-off and decrease erosion
- protecting and enhancing the tree canopy
- conserving water and energy

Many of these climate change adaptation strategies are already being addressed in the District through existing environmental policies and programs. These strategies are also fully integrated into the EMS. In fact, having an extensive and healthy natural environment is the primary climate change adaptation strategy as well as being a primary goal of the EMS.



3.0 Environmental Management Strategies

3.1 Introduction to the Goals

This section outlines the EMS goals. These are based on a synthesis of the stakeholder and public input, as well as the technical findings. The goals are designed to be clear and consistent with existing municipal objectives and OCP policies.

There are three goals:

Goal A: Conserve and manage our natural assets

The natural assets covered by this goal are the mostly undeveloped fish and wildlife corridors and hubs within the District's planning area as well as the extensive natural areas within and surrounding the District that are administered by others. These natural assets support ecological health and biodiversity; they also provide natural capital values, green infrastructure services, and other economic, social, and environmental benefits to the community.

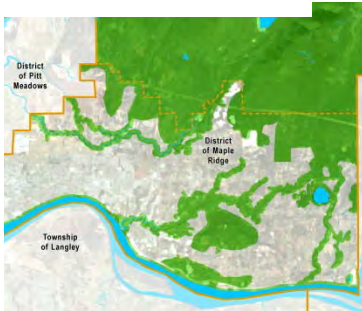
Stakeholders have expressed extremely strong support for protecting and managing the health, ecological integrity and diversity of terrestrial and

EMS Goals at a Glance

- *Goal A: Conserve and manage our natural assets*
- *Goal B: Design and build sustainable neighbourhoods*
- *Goal C: Improve communications and environmental awareness*



Upper Watersheds in Maple Ridge



Key Natural Assets in Maple Ridge



Rainwater Management in Silver Valley



Tree Planting by Youth

aquatic ecosystems that support fish, wildlife and all other species. This support applies to the hubs and corridors governed by the District and the partnerships that will be required to achieve connectivity and management coordination at a broader scale. Ecosystem protection and biodiversity are important investments for the future that require appropriate planning, communication, and collaboration using a variety of geographic scales, participants, and time frames with respect to implementation.

This goal is about investing in healthy urban and rural forest areas, protecting water quality and quantity, and supporting and managing healthy habitats and high priority environmentally sensitive areas, features, and processes. It includes an emphasis on ecological resiliency to ensure minimal impacts from climate change. Ecological resiliency is achieved through avoiding impacts on environmentally sensitive areas and features, and enhancement and restoration where possible.

Goal B: Design and build sustainable neighbourhoods

This goal focuses on areas to be developed, and guiding these new communities to achieve environmental, social and economic benefits. The work required to fulfil this goal involves refining bylaws and practices for better protection and management of watercourses, habitats, existing trees, and soils, especially on steep slopes. The incorporation of environmental tools and strategies into the development process promotes accountability by all stakeholders with respect to costs, risks, and impacts associated with development activity. Appropriate mitigation and low impact design help to offset impacts from development, and ongoing investment in innovative design solutions promote sustainable development.

Stakeholders are extremely strong supporters of sustainable neighbourhoods, especially design and management that results in ‘smart’, attractive, and affordable development. This type of neighbourhood can benefit land owners and municipal taxpayers through development cost savings, protection of environmental resources, and provision of social opportunities.

Goal C: Improve communications and environmental awareness

This goal focuses on how all participants – Mayor and Council, staff, other organizations, stakeholder groups, business interests, and the public – will work together to understand and implement the EMS.

Stakeholders have a strong interest in better and more communication, and education programs that focus on environmental awareness and education. This will build upon what the District already has in place, considering new communication and engagement tools.

3.2 Objectives, Strategies and Actions

This section identifies the objectives, strategies and actions for achieving the goals. The strategies and actions are specific, measurable, achievable, and realistic. They are based on a synthesis of input from the workshops and review of the District's OCP and strategic plans. **Appendix D** shows the connections between the objectives and the OCP and other strategic documents. **Appendix E** provides an overview of the analysis that was used to prepare the strategies and actions. The implementation plan is outlined in Section 4.0.

Goal A: Conserve and manage our natural assets

Objectives

1. Protect the District's key ecological resources, such as watercourses, aquifers hubs, corridors, patches, and watersheds.
2. Maintain the health of natural areas.
3. Extend natural connections beyond the municipality.
4. Build ecological resilience for adaptation to climate change and hazards.
5. Consider the potential values and financial benefits of undeveloped land in planning.
6. Provide incentives to encourage developers to protect some natural areas.
7. Protect agricultural land in recognition of the values it provides, such as productive soil, wildlife habitat, stormwater infiltration, and food.

Strategies and Actions

- A1. Identify, protect and manage Crown lands and watershed areas within and extending beyond the District's boundaries in collaboration with other jurisdictions.
 - a. Encourage the preparation of Sustainable Management Plans to protect and manage larger watersheds or land areas in collaboration with the Province, Metro Vancouver and surrounding municipalities.
 - Encourage the preparation of an integrated and sustainable management plan for the Blue Mountain area that includes economic, social, and ecological interests, due to its extremely high environmental, recreation/tourism and cultural values to multiple jurisdictions including the District of Maple Ridge and First Nations.

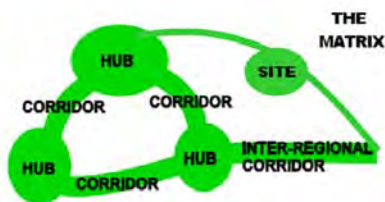
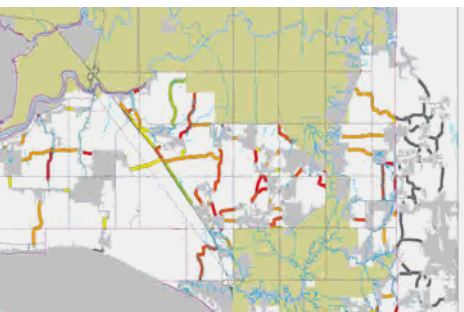
Local governments can increase the resilience and adaptive capacity of ecosystems by improving the "connectivity" of natural landscapes within their jurisdictions, and allowing species the opportunity to shift to more suitable habitats as the climate changes. Biodiversity corridors can be established along rivers, roads, and trails.

www.countdown2010.net/2010/wp-content/uploads/FS6Climate_small.PDF

- Work with Metro Vancouver and others on a Fraser River Foreshore Plan.

The 5,668-hectare Lower Seymour Conservation Reserve (LSCR) is an example of the type of protected area that could be achieved on Blue Mountain. The LSCR contains spectacular and diverse landscapes, including alpine meadows, forested slopes and river flood plains, all within minutes of downtown Vancouver. The LSCR planning process was designed to balance the multiple objectives for this unique area and ensure the sustainability of the LSCR. The main attraction is a 10-kilometre-long paved path that is used extensively by cyclists and walkers. The LSCR also hosts a variety of education and research programs.

- b. Continue to encourage the preparation of interdepartmental (Engineering, Planning, Parks and Operations) Integrated - Watershed Management Plans (IWMPs) that include information on surface and groundwater resources, recommendations and performance targets for ecological health, and evaluations of environmental performance in relation to those targets, where this can be accomplished cost effectively.
- c. Revise the OCP aquifer map to include areas where residents are reliant on well water for drinking, household use and irrigation, in addition to provincially designated vulnerable aquifer areas, and encourage the preparation of Groundwater Management Plans for all of these aquifer areas.
- d. Collaborate with others on the management of resources within and extending beyond the District.
 - Encourage the Province to coordinate and consult with the District with respect to the use and management of Crown land within or near District boundaries.
 - Support eco-tourism and recreation sector users in the management of natural areas and the separation of conservation zones from recreational activities.
 - Consider partnerships with groups such as land conservancies, land trusts, foundations, and Metro Vancouver on land conservation initiatives.



From the City of Surrey Ecosystem Management Study

- A2. Identify, protect and manage the terrestrial and aquatic ecosystems that support important habitats within the District's administrative boundaries.
 - a. Prepare an ecological network management strategy that identifies lands to be acquired, potential acquisition tools and priorities for acquiring this land as opportunities arise. The ecological network will be based on the District's ESA mapping and Metro Vancouver's SEI mapping that identifies the general location and condition of unique or significant aquatic and terrestrial ecosystems and major wildlife

habitat hubs and movement corridors that are priority targets for protection as wildlife habitat conservation areas or ecosystem management areas due to their significance and/or sensitivity.

A3. Evaluate the socio-economic values and benefits of natural assets.

- a. Use scientific studies conducted by others (e.g., UBC and Real Estate Foundation, Metro Vancouver, West Coast Law Society, Suzuki Foundation) and use readily available, inexpensive software applications to quantify ecosystem services and natural capital. These tools can also be used to better understand the use of nature benefits within Maple Ridge as part of watershed evaluation, ISMP evaluation, and annual municipal performance reviews. Use this information in public education and awareness materials and to secure support for environmental management strategies.

A4. Prepare policies related to soil deposition and environmental practices on agricultural and rural lands.

- a. Review and update the Soil Deposit Bylaw.
 - Refine the bylaw to address safety and risk management considerations for land owners and neighbours related to truck traffic activity, contamination concerns, drainage, and visual impacts.
 - Encourage and support improved practices in relation to soil deposit.
 - Encourage developers and land owners to reuse excavated native topsoils from their site where possible rather than hauling material away.
 - Discourage soil deposit that is inconsistent with the long-term management of the property, considering issues such as soil productivity and invasive species.
 - Establish a process to promote accountability with respect to supervision and reporting of soil deposit work, and a process for monitoring.
 - Identify locations for placing future soil deposit, e.g., gravel pits, power lines.
 - Require a Professional Agro-Ecologist to determine appropriate soil deposit types and locations, and compliance with ALC objectives and District OCP policies on rural agricultural and ALR lands.

- *The U.N. Millennium Ecosystem Assessment provides a useful framework for measuring the value of ecosystem services, including cultural services such as recreation, well-being, etc.*
- *There are numerous reputable organizations that currently have inexpensive and simple software applications and tools that calculate the monetary benefits of the urban forest, and these tools have been used in several Lower Mainland municipalities, e.g., District of North Vancouver, Burnaby, Surrey, Richmond, Langley, providing the opportunity for municipal level evaluation, monitoring, and comparisons over time.*



Erosion and Filling on Farmland

- b. Work with the ALC, DFO and the agriculture community on best practices for the integration of environment and agriculture, e.g., integrate portions of environmental farm lands into wildlife corridors.
 - Encourage farmers to undertake Environmental Farm Plans and collaborate with the Ministry of Agriculture on these initiatives.

Goal B: Design and build sustainable neighbourhoods

Objectives

1. Protect and enhance the urban forest, including existing forests and significant trees, with methods to support future tree cover.
2. Protect important natural and heritage resources within neighbourhoods as part of the planning process where possible, including greenway corridors, watercourses, native soils, and steep slopes.
3. Manage and minimize the impacts of development on protected and natural areas, including erosion of slopes, sedimentation of watercourses, reduced air quality.
4. Use appropriate best management practices to ensure attractive, safe, and affordable communities.
5. Use sustainable landscape design and management to reduce energy use, support wildlife, and make neighbourhoods more attractive and livable.
6. Use alternative transportation as a sustainable design measure to save energy and increase health and recreation opportunities.
7. Enforce environmental regulations.

Strategies and Actions

- B1. Explore, in collaboration with developers and other jurisdictions and organizations, the use of incentives and tools for conserving significant natural areas or features that are not protected under municipal regulations.
- a. Consider incentives and tools during the development process to protect natural areas and features.
 - Consider the use of incentives, such as property tax reductions, fast tracking of applications, environmental compensation development levies, DCC reductions, and the use of restrictive covenants rather than dedication of parkland, in return for protection of lands or features that are not regulated by senior agencies or the District.
 - Consider the use of density bonus or density transfer incentives, provided that the additional density will not have significant environmental impacts.

The City of Penticton reduced DCCs for low impact developments by 50%.

The City of Surrey assembled a number of properties now called Fergus Watershed Park for the purpose of ecological preservation and enhancement. Development levies were used to purchase the park site. As future development occurs in the area surrounding the site, developers will fund improvements within the park as part of their habitat compensation requirements.



Fergus Watershed Park in Surrey

B2. Protect, enhance and manage the urban forest in developed and rural areas in recognition of the multiple environmental, social and economic benefits provided by trees.

a. Prepare a Tree Preservation and Management Bylaw.

- Prepare a tree bylaw that applies to all large trees (size to be determined for urban and rural urban areas) in the District, with the possible exception of ALR lands with active farm status or community forestry operations.
- Include the following provisions in the bylaw: two for one tree replacement; minimum size replacement trees (e.g., 5 cm caliper deciduous, 2 m coniferous); where development properties cannot accommodate the required number of replacement trees, plant tree elsewhere in the watershed and if that is not possible provide cash in lieu towards a fund used for municipal tree planting; security deposit for tree protection, planting and maintenance; penalties for violations.
- Provide special protection for mature, unique or heritage trees as defined by the District.
- Increase monitoring and enforcement related to tree management and planting in private developments, especially related to protection of existing trees, tree removal, newly planted replacement trees, the quality and quantity of growing medium for new trees, and maintenance procedures.
- Follow the same provisions outlined for the proposed Tree Preservation and Management Bylaw as a minimum in the planting and management of trees on public land.

'Caliper' is a way of measuring trees; it refers to the diameter of the trunk at breast height, about 1.5 metres above the ground.



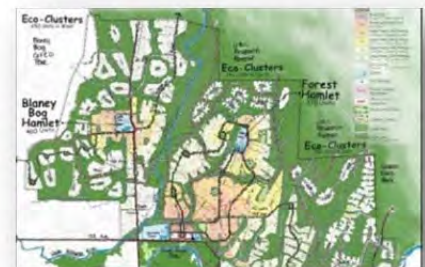
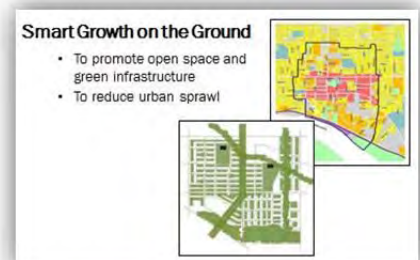
Showing the Value of a Tree

Tree canopy studies have become a common method for managing the urban forest. An urban tree canopy “is the layer of leaves, branches and stems of trees that cover the ground when viewed from above.”). A healthy urban forests offers many benefits, assisting with climate adaptation, energy use, air quality, stormwater management, water quality, wildlife, biodiversity, real estate, business, individual and community well-being, and human health. American Forests recommends a municipal tree canopy of 40% for this region to realize the multiple benefits offered by trees, including the following tree canopy targets: suburban residential – 50%, urban residential – 25%, downtown – 15%. Chilliwack’s Tree Management Bylaw requires 50 existing or planted trees per hectare of development, which is consistent with the City’s target of a 25% tree canopy. The Bylaw also requires a security deposit for existing/retained and newly planted trees. In the Shade Tree Strategic Management Plan for the City of Surrey’s Public Property Trees, it was determined that a tree canopy of 4% of the City could be achieved through street trees alone, which is consistent with calculations by American Forests.

- b. Encourage proponents of new developments to protect existing trees and forests and to design spaces for trees.
 - Identify and where possible protect mature forest stands and mature trees, especially in high visibility viewscape corridors and significant aquifer recharge areas, e.g., identify these as protection areas in development planning. Mature trees provide many times greater values than newly planted years that take a very long time to mature.
 - Require some green space within all large new intensive residential developments (multi-family or compact lots) with tree planting in these areas, e.g., open space or recreation areas, increased setbacks from roads to allow space for more trees, eco-cluster approach.
- c. Use new tools to increase the focus on tree protection, management and planning.
 - Establish urban forest tree canopy targets that apply District wide, by location (e.g., downtown, urban neighbourhood, rural neighbourhood), and by land use category (e.g., agricultural, commercial, industrial, institutional, low density residential, medium and high density residential, parks, natural areas and open space).

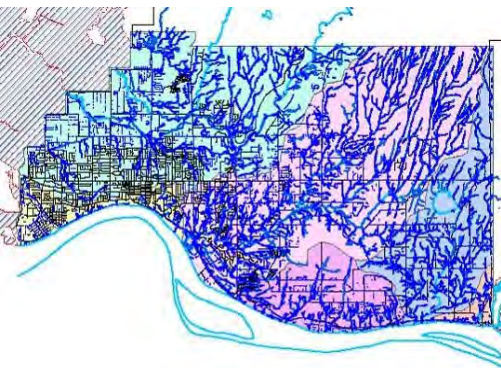


Silver Valley, Maple Ridge



Existing Tools in Maple Ridge

- B3. Review and update the Watercourse DP and Watercourse Protection Bylaws and work with stakeholders on the implementation, monitoring and enforcement components of these bylaws (see **Map 1**).
 - a. Update the text in the Watercourse DP and Watercourse Protection Bylaws to make them consistent with existing procedures and the other bylaw updates in the EMS.
 - b. Clean up language in the Watercourse DP and the Watercourse Protection Bylaw to clarify the purpose and scope of these documents, including language about protection of setback areas. Update the OCP Schedule C Natural Features map annually based on new information, e.g., changing creeks and the addition of wetlands.
 - c. Consider preparing a map that specifically supports the Watercourse DP in the future, potentially in collaboration with the EnvAC.
 - d. Continue to work with consultants, developers and property owners on an ongoing basis with respect to the implementation, monitoring and enforcement components of watercourse protection regulations.



Watercourses in Maple Ridge



Hampsted Development – Eco-cluster style development

Nanaimo is reviewing its form and character guidelines, and turning them into “sustainable design guidelines” with options for greening development.

- Provide more information about and discuss materials and landscaping that are appropriate within and near watercourse protection areas.
 - Work with developers and property owners to improve the time frame for carrying out enhancement and restoration works.
 - Establish better monitoring and enforcement tools for dealing with disturbances and habitat impacts that occur within protected watercourse setback areas, with implementation conducted by or in collaboration with developers, subsequent property managers / land owners and stewardship groups.
 - Require signs and fences on site that identify watercourse protection areas and work with stakeholders to ensure that these signs remain in place for the long term.
 - Encourage water quality monitoring over time by the District, by developers and/or land owners where negative disturbances have occurred on site.
 - Generate new tools for understanding and managing trees, e.g., expand tree database to include mapping and add major park trees, climate change impacts on tree species.
- d. Update existing bylaws to increase the focus on tree protection, management and planning.
- Revise existing bylaws, e.g., zoning (increase setbacks for trees in certain situations, require spaces for trees in new developments where possible), environmental DPAs (support tree planting for measures such as energy conservation in the NFDP), intensive residential and commercial DPAs (improvements to form and character guidelines such as a target tree canopy cover in all parking lots).
- e. Expand programs that focus on tree protection, management and planning.
- Expand the use of promotional programs and incentives to increase awareness of the benefits of tree planting and ongoing tree care on private property, and to increase the number of trees planted and/or retained on private property, e.g., incentives for tree planting or tree retention and care, free trees, tree coupons, reduced fees for services, tree planting as part of local improvement grants.
 - Adopt and follow best management practices for tree maintenance with the input of an arborist, and encourage

private land owners to follow these practices as well, e.g., through website resources.

- Consider tree planting and tree care within all municipal infrastructure projects as appropriate, e.g., tree canopy in public parking lots, along roads.

- f. In the longer term, prepare an Urban Forest Management Plan for the District that includes a comprehensive review of the urban forest and a synthesis of policies and practices, potentially including those mentioned above.

B4. Increase the profile of rainwater and stormwater management, and groundwater management, in bylaws and continue to improve implementation based on best practices.

- a. Incorporate stormwater and rainwater management on-site source control measures, as well as groundwater management requirements, into the Subdivision Servicing Bylaw.
- b. Establish appropriate stormwater and rainwater design standards to complement Metro Vancouver guidelines. Include more information on best management practices and design ideas applicable to the District in the bylaw.
- c. Coordinate and integrate Integrated Stormwater Management Plans (ISMPs) with new area plans and land use plans. Consider sub-catchment area stormwater management plans for larger developments in areas without ISMPs to help guide sustainable development.

Comox is planning an Urban Forest Management Strategy that will demonstrate how the Town will achieve Zero Net Deforestation, assess and track tree cover and enhance connectivity between forested areas.

Rainwater management has benefits that extend beyond watercourse protection and erosion and sediment control such as supporting a healthy urban forest.

The City of Abbotsford requires Water Resource Management Plans where development is proposed near key aquifers.

In Mission, Environmental Management Plans are prepared for Neighbourhood Plan areas; these are based on a comprehensive watershed approach with numerous environmental studies and sustainable development policies and guidelines.

B5. Review and update the Natural Features Development Permit.

- a. Revise the NFDP to focus on management of hillside areas, protection of environmentally sensitive terrestrial ecosystems, and groundwater management concerns (see **Map 2**).
 - Include guidelines for low impact development in relation to protection of environmentally sensitive terrestrial ecosystems, significant environmental features, and important processes such as groundwater management concerns.



Silver Valley, Maple Ridge

- Improve guidelines for hillside management in the NFDP around standards, design practices, and examples of best management practices, recognizing the needs to balance hazards, risks, ecosystem integrity and visual impacts.
 - Promote “greener” methods of slope stabilization where this will not reduce safety, e.g., instead of concrete or rock stack walls, use bioengineering or a combination of rock stack and planting.
 - Require detailed grading plans showing all proposed cut and fill and the inter-relationship with tree retention areas to ensure that proposed tree retention is achievable and safe.
 - Include guidelines that address the potential visual impacts of hillside development, including retention of trees on steep slopes.
 - For larger developments that will be visible from major roads or communities, require accurate computer-generated 3D visualizations that illustrate the proposed development, including existing and proposed trees in a sequence over time.
 - For vulnerable aquifer areas, including aquifers where residents are dependent on wells for irrigation or drinking water, require a water resources management plan by a professional and include guidelines related to the protection of water resources.
- b. Consider preparing a map that specifically supports the Natural Features DP in the future, potentially in collaboration with the EnvAC.
- B6. Prepare a new Natural Hazards Development Permit that focuses on slope hazards, floodplains, creek hazards and, in the future, wildfire hazards (see **Map 3**).
- a. Consolidate mapping and guidelines related to slopes and floodplain mapping into an integrated Natural Hazards DP.
- Base natural hazard designations and guidelines on existing information from published reports and maps, supplemented with terrain stability overview mapping if necessary, to provide an overview of the types of hazards that may be present.
 - Outline the process that should be followed in assessing hazard, risk and potential use of the property, including the types of assessment that may be required from a Qualified Professional prior to development, and the best practices to be used to reduce hazard risks.

- Explore the option of establishing a conservative factor of safety for geotechnical setbacks along rear yards that is equivalent to the factor of safety for building structures in order to reduce the District's risks.
 - Address all types of hazards in an integrated manner with references to risks, safety standards and best management practices.
 - Consider preparing a map that specifically supports the Natural Hazards DP in the future, potentially in collaboration with the EnvAC.
- b. Integrate the Wildfire DPA into the Natural Hazards DPA once the Wildfire DPA has been adopted by Council.

The District of North Vancouver contains large areas of steeply sloped forested land with many creeks and ravines, and is prone to severe weather events. These conditions may create hazards in the form of landslide/soil instability, flooding, debris flow, debris flood, and forest fire interface hazards. As part of the District's Natural Hazard Management Program, three new Natural Hazards Development Permit Areas (DPAs) have been adopted into the District's Official Community Plan to guide development that may be affected by natural hazards. The Natural Hazards Development Permit that was developed for North Vancouver is focused on all landscape level hazards including terrain stability, landslides, flooding, and wildfire. Blowdown and hazard trees are not considered in this DPA <http://www.dnv.org/article.asp?a=5018>.

Terrain stability overview mapping is an important task that a community can undertake to protect its citizens, by documenting hazards and limiting development in these areas to reduce liability. For example, the District of North Vancouver reviewed standards around the world and came up with solid risk guidelines. The approach takes into account aspects such as rear yards, encroachment of retaining walls and pools. An overview assessment can be completed for a reasonable cost.

B7. Encourage sustainable development practices that go beyond minimal requirements and capture the spirit of comprehensive "smart growth" principles.

- a. Prepare a system for encouraging and documenting all of a project's sustainable development practices in an integrated manner.
- Consider using a sustainability/low impact development (LID) checklist that is submitted with development applications as a requirement for greenfield developments.
 - Encourage the development and management of communal recreation amenities, attractive detention ponds/wetlands, greenway trails, open space areas, rain gardens and other sustainable features within large developments.

The Sustainable Sites Initiative™ (SITES™) is an interdisciplinary effort by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center at The University of Texas at Austin and the United States Botanic Garden to create voluntary national guidelines and performance benchmarks for sustainable land design, construction and maintenance practices. The website has information on pilot projects and samples of sustainability checklists.

www.sustainablesites.org

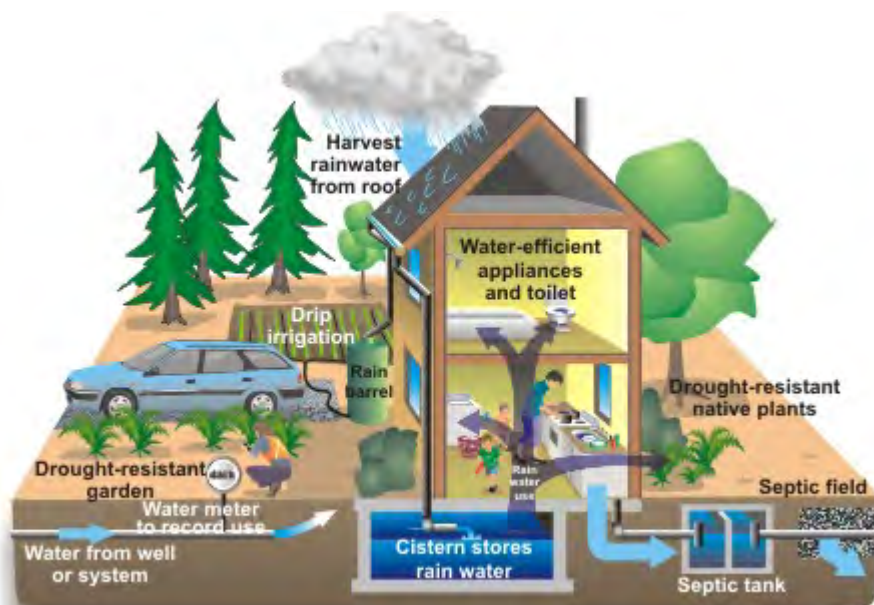
Community amenities with higher landscape treatments can create more attractive neighbourhoods.

Saanich uses a carbon calculator to evaluate the carbon-related impacts of new developments; offsets are required from the developer and they are used for programs within the community, e.g., new trails, environmental compensation or enhancement.

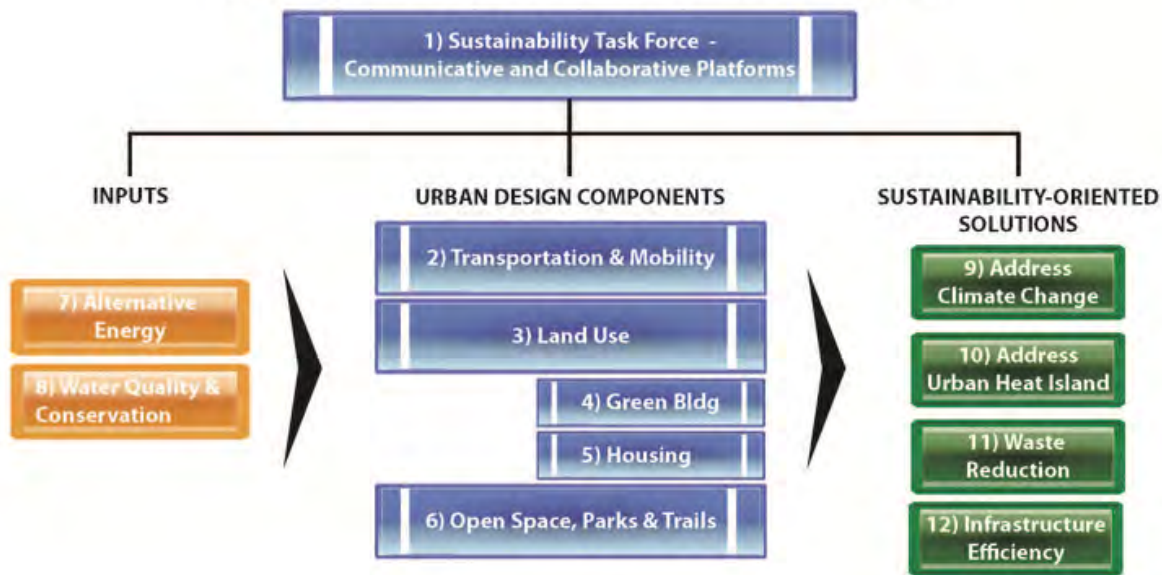
- Consider energy efficiency and conservation in building and landscape design, e.g., encourage on-demand hot water heating, geothermal heating, solar hot water, Smart meters; use passive solar siting principles to provide shade in summer, moderate wind, and encourage the penetration of sunlight and natural light into buildings to reduce the energy needed for lighting and heating.
- Encourage measures that reduce impacts on air quality, e.g., active transportation routes to reduce vehicular travel, less mowed grass to reduce the need for mowing.
- Apply some of the smart growth principles from Silver Valley to other new development, including eco-clusters, open space/neighbourhood parks, tree retention areas, protection of view corridors, and inter-neighbourhood trails, and road standards with increased landscape for rainwater management.
- Consider the use of a carbon calculator with offsets used for environmental improvements or programs within the community, e.g., new trails, environmental compensation work, environmental education programs.
- Introduce the Precautionary Principle into communication materials to emphasize the links between short-term decisions and long-term gains or losses.

1 Organization, Communication and Collaboration	
<input type="checkbox"/>	Identify a Municipal Sustainability Policy Task Force
<input type="checkbox"/>	Unify goals, targets and programs across municipal depts.
URBAN DESIGN COMPONENTS	
2 Transportation and Mobility	
<input type="checkbox"/>	Explore and expand alternative transportation options
<input type="checkbox"/>	Understand and evaluate regional connectivity
<input type="checkbox"/>	Ensure equitable access to alternative transportation options
<input type="checkbox"/>	Develop and implement a multi-modal plan that includes rail, bus, pedestrian paths, etc.
3 Land Use	
<input type="checkbox"/>	Increase land use efficiency, promoting density and infill development
<input type="checkbox"/>	Promote livework environments
<input type="checkbox"/>	Coordinate land use plans with regional growth and transportation plans
4 Green Building	
<input type="checkbox"/>	Implement green building standards (e.g. LEED) for new construction and retrofitting
<input type="checkbox"/>	Establish goals for green development (i.e. ratio of LEED buildings to traditional buildings)
<input type="checkbox"/>	Develop incentives to encourage developers to exceed the baseline standards set.
<input type="checkbox"/>	Promote adaptive reuse of existing buildings
5 Housing Accessibility, Diversity and Affordability	
<input type="checkbox"/>	Availability of affordable housing, incl. demographic studies and distribution
<input type="checkbox"/>	Evaluation of current housing stock, local and regional trends
<input type="checkbox"/>	Examine and evaluate access to open space, mass transit, etc.
<input type="checkbox"/>	Encourage the rehabilitation of inner city areas
6 Open Space, Parks & Trails	
<input type="checkbox"/>	Protect environmentally sensitive areas
<input type="checkbox"/>	Expand parks and recreational opportunities, keeping equitable access in mind
<input type="checkbox"/>	Examine potential linkages to regional trail systems
<input type="checkbox"/>	Provide sufficient urban trail systems to meet the recreational and alt. transport needs for bikers, walkers and runners.
INPUTS	
7 Alternative Energy/Energy Conservation	
<input type="checkbox"/>	Increase use of renewable energy
<input type="checkbox"/>	Increase efficiency of existing facilities
<input type="checkbox"/>	Expand usage of alternative fuel vehicles (i.e. city fleets, etc.)
<input type="checkbox"/>	Decrease miles driven by City employees (i.e. incentives for mass transit use, modified work week, bike share, etc.)
<input type="checkbox"/>	Include consideration for both technological- and policy-based options
8 Water Quality and Conservation	
<input type="checkbox"/>	Increase efficiency (i.e. retrofitting, reuse, harvesting, etc.)
<input type="checkbox"/>	Understanding the relationship between water supplies/service and land use/growth
<input type="checkbox"/>	Water auditing
<input type="checkbox"/>	Include consideration for both technological- and policy-based options
SUSTAINABILITY-ORIENTED SOLUTIONS	
9 Climate Change and Air Quality	
<input type="checkbox"/>	Emission reduction
<input type="checkbox"/>	Pollution prevention
<input type="checkbox"/>	Collaborative partnerships
<input type="checkbox"/>	Incentives
<input type="checkbox"/>	Outreach & education
10 Urban Heat Island	
<input type="checkbox"/>	Examine material usage for roadways, sidewalks, etc to increase heat absorption
<input type="checkbox"/>	Increase usage of indigenous vegetation
11 Waste Reduction & Recycling	
<input type="checkbox"/>	Evaluate effectiveness of existing recycling programs
<input type="checkbox"/>	Encourage waste reduction (i.e. building operations and construction)
12 Infrastructure Efficiency	
<input type="checkbox"/>	Coordinate infrastructure and land use plans to maximize infrastructure efficiency

Examples of Tools, Internet Search 2013



RELATIONSHIP OF SUSTAINABILITY PLAN COMPONENTS



- b. Where a developer has “scored well” and gone beyond the minimum requirements in terms of sustainability, consider incentives such as tax reductions, density bonus or density transfer, DCC reductions or priority processing.

Example of Tools, Internet Search 2013

B8. Update other processes and practices to be consistent with the EMS.

- Continue to integrate sustainable design standards into the Subdivision Servicing Bylaw, e.g., for road design, road crossings for wildlife, increased tree planting, landscape type and amount, tree planting requirements (e.g., growing medium quality and volume), sidewalks/ trails / cycle paths, passive solar benefits through siting and landscaping, etc.
- Coordinate processes and practices among departments for consistency with the EMS.
 - Work together to direct all new development to locations within the urban area boundary, consistent with the District’s policies.
 - Continue to encourage integration, collaboration and training among departments on current environmental best management practices for major projects and daily operations so the District can lead by example.
 - Continue to encourage ongoing collaboration between implementation of the Parks, Recreation and Culture Master Plan and the EMS strategies and action plans, planning for acquisition of key natural and hazard areas as well as active parks, considering alternate forms of recreation such as trail corridors and natural play areas, and considering the neighbourhood demographics.

The Precautionary Principle is a recognized international policy and a guiding framework for decision-making that anticipates how our actions will affect the environment and health of future generations. The precautionary principle denotes a duty to prevent harm, when it is within our power to do so, even when all of the scientific evidence is not in.

Many municipalities are moving towards limiting urban growth to densification of established areas in order to reduce costs and to provide more sustainable communities.

The District of Lantzville Subdivision and Development Bylaw incorporates green infrastructure measures for rainwater management and requires the developer to post security equivalent to the cost of three years of maintenance, to ensure that the measures are operational.

Adaptive management is a structured, iterative process of robust decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring.

Spatial modelling and evaluation programs that are compatible with the District's GIS are relatively inexpensive and they can support a quantitative and qualitative analysis of natural capital or green infrastructure. Metro Vancouver, Township of Langley, District of North Vancouver, Burnaby, and Surrey are among the BC municipalities using indicators and targets.

B9. Strengthen monitoring and enforcement to encourage widespread and long-term stewardship based on the principles of adaptive management to continually improve processes and efficiency.

- a. Integrate monitoring and enforcement into bylaws, processes, and practices as outlined in B3 b.
 - Focus on education first, providing information to stakeholders on the importance of environmental management and stewardship. Where education is unsuccessful, use enforcement.
- b. Establish indicators and targets that can be used to track impacts and successes over time, e.g., width of riparian areas, vegetation health, tree canopy.
- c. Consider the use of full-cost accounting for decision-making, comparing new development on municipal lands to retention of the natural environment and the services these areas may provide to the community.

Goal C: Improve communications and environmental awareness

Objectives

1. Improve communication and collaboration among District staff and stakeholders to increase efficiency, improve understanding, and achieve more benefits.
2. Increase communication about environmental management and its benefits to the public, including financial benefits.
3. Increase education and engagement opportunities related to experiencing nature and environmental management.
4. Clarify the steps and requirements involved in the land development process.
5. Partner with other government agencies, including First Nations, on initiatives of shared interest and benefits.

Full-cost accounting may be achievable through a grant.

The District Municipality of North Cowichan, with the funding support of BC Hydro, has developed a Climate Action and Energy Plan (CAEP). The CAEP inventories the community's existing energy use and greenhouse gas (GHG) emissions, and identifies future trends in energy and GHG emissions based on population, land-use, technology and other factors. It also identifies opportunities to reduce energy consumption and emissions through policy and other municipal mechanisms. The plan includes analysis of the social, environmental and economic impacts of the strategies. Achieving the emissions targets will require a collective investment of \$25 million by 2050. North Cowichan will save about \$130 million in energy costs when it achieves the target, while also creating 613 new jobs.

6. Partner with non-government organizations on initiatives of shared interest and benefits, and support local stewardship groups in achieving common objectives.

Strategies and Actions

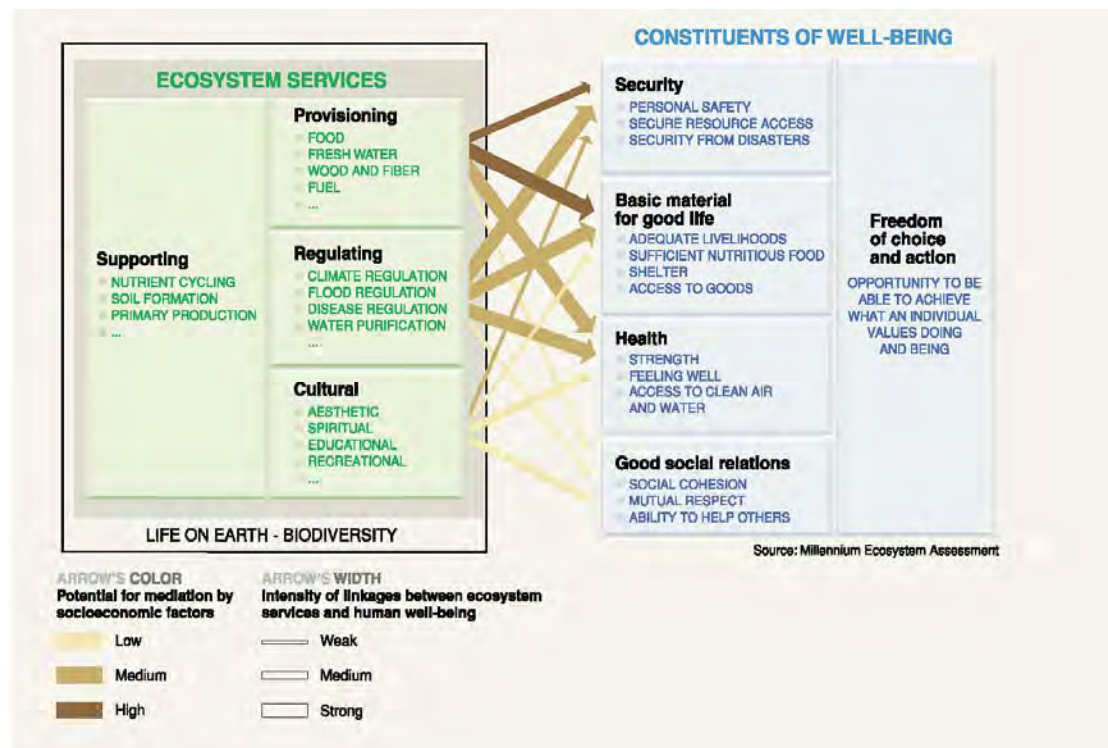
- C1. Improve communication structures and tools for use among District staff, Council and stakeholders.
 - a. Consider an Environmental Advisory Committee (EnvAC) to bring stakeholders together and to provide them stronger links with Council and staff, and more opportunities to provide input to District initiatives and projects.
 - Define the EnvAC role as advisory only with public education as one of its key functions.
 - Clearly define the Terms of Reference in terms of who participates, how they are selected, how and with whom they communicate, and what they address.
 - When considering the establishment of an EnvAC, recognize that more resources are required. Given that environmental staff are already overloaded with responsibilities as noted elsewhere in this EMS, this is a decision that requires serious consideration.
 - b. Refine communication processes to improve the flow of information related to environmental management and to leverage the work of stewardship groups.
 - Establish a structure for exploring how environmental staff might communicate and collaborate with Council members on a more regular basis to explore questions, issues, and opportunities.
 - Support stewardship groups in coordinating their efforts by connecting them with each other and hosting an annual meeting.
 - Support stewardship groups in preparing a District-wide Stewardship Plan to guide volunteer stewardship activities.
- C2. Consolidate, centralize and distribute information related to environmental management with captivating, graphically rich and educational materials.
 - a. Reformat the EMS into a digital information hub, including the importance and benefits of environmental management.
 - Prepare a set of interconnected web pages on the District website that clearly describes and illustrates background



Visioning Workshop

information, strategies, bylaws and practical tools related to the EMS, e.g., the development approval process with respect to environmental management requirements and practices, including clarification on the process and methodology associated with the streamside protection regulations and environmental DP process requirements.

- Include digital media links, links to related documents, and post all communication materials related to the EMS on these web pages.
- b. Include marketing related to environmental management in the District's communications strategy, branding the District for its environmental accomplishments and opportunities.
 - Contribute environmental information regularly to the media, digital media, Local Green Guide, and other sources, focusing on the role of the public, such as tree planting, tree care, respect for environmental protection areas, rainwater infiltration, and environmental stewardship.
 - Publicize information regularly on the successes of environmental management, especially from a cost benefit perspective and circulate this widely, including to developers.



Linkages between Ecosystems services and Human Well-being

C3. Expand environmental education opportunities in partnerships with others.

- a. Expand partnerships that extend environmental education to a broad spectrum of the community.
 - Explore opportunities to expand outreach, with roles including partnerships with stewardship groups, First Nations, and schools, and tools including workshops, web forums, and other public education and awareness programs.

Potential topics for environmental education include: nature interpretation, bear awareness, invasive species awareness, nature-scaping home gardens, food gardens, awareness / incentives for planting and maintaining more trees, rainwater management, and aquifer management. Options for outreach may include use of the community development model implemented by Parks, Recreation and Culture, and/or partnerships with other communities.

- Partner with others on education and interpretive materials, e.g., interpretive signs that identify and describe environmental features, nature/ecology centres.
- Support celebrations of community assets, potentially in combination with stewardship events.

C4. Encourage the expansion of opportunities that support nature experiences and ecotourism.

- a. Work with ecotourism, outdoor recreation and associated business interests to encourage appropriate nature experiences.
 - Encourage ecotourism and outdoor recreation businesses offering culturally, socially and environmentally appropriate nature experiences, education and information, e.g., boating, mountain biking, guided walking or biking tours, equipment rentals.
 - Consider assisting ecotourism and outdoor recreation businesses with the promotion of these opportunities.
 - Encourage and support the development of smart phone applications with information on nature experiences.

C5. Provide more resources in environmental management.

- a. Provide more staff to better manage, administer and enforce bylaws, conduct outreach, collaborate with stakeholders, and to generally implement the EMS.

In the Okanagan, public education and citizen engagement complement regulatory measures. See Okanagan Basin Water Board Homeowner's Guide to Using Rain as a Resource
www.okwaterwise.ca/pdf/HomeDrainageGuide_Okanagan.pdf

Outdoor recreation and tourism businesses need to respect existing park users, the natural environment, and First Nations culture.





4.0 Implementation Plan

4.1 Priorities and Phasing

The District of Maple Ridge will need to implement the EMS over time based on priorities and the availability of resources (**Figure 7**). The relative priority and phasing in this plan were generated by the consultants. Once the EMS is endorsed, it will be the role of staff, and potentially the EnvAC, to confirm the implementation plan and to refine it on a regular basis to reflect accomplishments and projected initiatives.

The items selected for short-term implementation include some of the tasks that require low relative effort, i.e., the “low hanging fruit”. Some of the other considerations in determining the phasing include accountability to medium and longer term costs, and implications associated with long-term cumulative impacts from development, retrofitting costs, or liability costs for the District. Another consideration is to keep options open for the future.

The actions are listed along with the following information:

- Relative effort required for implementation
 - Low – possible with existing resources
 - Medium – some new resources required

- High – significant new resources required
- Phasing
 - Short – within 1 – 3 years
 - Medium – within 4 – 6 years
 - Long – within 7 years or more
 - Ongoing
- Relative priority – priority based on benefits and costs of taking the action and not taking the action
 - Low
 - Medium
 - High
- Role – key organizations responsible, with the lead organization listed first
 - D - District
 - DFO – Department of Fisheries and Oceans
 - EnvAC – Environmental Advisory Committee*
 - MAg – Ministry of Agriculture
 - Met – Metro Vancouver
 - MFL – Ministry of Forests, Lands and Natural Resource Operations
 - P – Private sector (development industry)
- * The EnvAC are not currently listed on the implementation plan because it is not confirmed that they will exist. If Council does choose to appoint an EnvAC, one of their early tasks will be to review the implementation plan to identify their roles.

Figure 7: Implementation Plan Table

Key Actions		Resources Required	Phasing	Relative Priority	Role
Refine Existing Bylaws and Strategies					
A4 a	Update Soil Deposit Bylaw	Low	Short	High	D, MAg
B3 a	Update Watercourse DP and Watercourse Protection Bylaws	Low	Med	Med	D, DFO
B3 b	Update Natural Features DP map	Low	Med	Med	D
B4 a	Stormwater/rainwater in Subdivision Servicing Bylaw	Low	Med	Med	D
B5 a	Update Natural Features DP focus and guidelines	Med	Med	Med	D
B8 a	Sustainable design standards in Subdivision Servicing Bylaw	Med	Med	Med	D
New Bylaws, Strategies, Plans and Tools					
A1 a	Sustainable management plans at a broad scale	High	Med	Med	D, Met, MFL
A1 b	Interdepartmental IWMPs	Med	Med	High	D
A1 c	Groundwater management plans	High	Med	High	D, MFL
A2 a	Ecological network management strategy	Med	Med	High	D, Met, MFL
A3 a	Quantify values of natural assets	Low	Long	Low	D
B2 a	New Tree Preservation and Management Bylaw	Low	Short	High	D
B2 c	New tools for tree protection and planting	Med	Long	Med	D
B2 d	Update bylaws re: tree protection and planting	Low	Med	High	D
B2 e	Expand tree protection and management programs	Med	Med	Med	D
B2 f	Urban Forest Management Plan	High	Long	Low	D
B3 c	New Watercourse DP map	Low	Med	Med	D
B4 b	Stormwater and rainwater design standards	Med	Med	Med	D
B5 b	New Natural Features DP map	Low	Med	Med	D
B6 a	Natural Hazards DP for slopes and creeks	Med	Med	Med	D
B6 b	Integrate wildfire into Natural Hazards DP	Low	Long	Low	D
B7 a	System for sustainable development practices review	Low	Short	High	D
B7 b	Incentives for sustainable development practices	Low	Short	High	D
B9 a	Integrate monitoring and enforcement into policies and processes	Low	Short	High	D, P
B9 b	Use indicators and targets	Med	Med	Med	D
B9 c	Use full-cost accounting for decision-making	High	Long	Low	D
C1 a	Consider an EnvAC	Med	Short	High	D
C2 a	EMS website as an information hub	Med	Med	High	D
Management Activities					
A1 d	Collaborate on broad scale resource management	Med	Ongoing	High	D
A4 b	Improve soil deposit practices	Med	Ongoing	High	D
A4 c	Improve environmental farm practices	Med	Ongoing	Low	D
B1 a	Development process incentives and tools for nature protection	Low	Ongoing	High	D
B2 b	Development process tree protection and planting	Med	Ongoing	High	D
B3 d	Collaborate on watercourse implementation, monitoring, enforcement	Med	Ongoing	High	D
B4 c	Integrate ISMPs in area planning	Low	Ongoing	Med	D
B8 b	Coordinate among departments for EMS consistency	Low	Ongoing	High	D
C1 b	Refine communication processes	Low	Ongoing	High	D
C2 b	Environmental marketing in communications strategy	Med	Ongoing	High	D
C3 a	Expand environmental education partnerships	Med	Ongoing	Med	D
C4 a	Encourage businesses offering nature experiences	Low	Ongoing	Low	D
Other					
C5 a	Provide more resources to environmental section to implement the EMS	Med	Short	High	D

4.2 Conclusion

Once the EMS has been received by Council, there will be opportunities for Council to work with staff, potentially with the input of an Environmental Advisory Committee, to refine the priorities and phasing. There will also be opportunities for Council to focus on implementation details including clarification of objectives, expectations, definitions and implications. In some cases, supporting information may be required to support such decisions. After some of the data collection and monitoring components of the EMS are underway, it will become easier over time to clarify priorities and needs.

The District is at a crossroads. If the natural landscape and resources are planned and managed in a smart manner, then the District can potentially become more sustainable as a community in terms of growth and development. Conversely, if there is not a focus on smart managed growth, the District may lose out on the numerous services, benefits, and cost savings that the natural environment provides.



List of Acronyms

ALC	Agricultural Land Commission
CSP	Corporate Strategic Plan
DFO	Department of Fisheries and Oceans
DPA	Development Permit Area
EAC	Environmental Advisory Committee
EMS	Environmental Management Strategy
ISMP	Integrated Stormwater Management Plan
IWMP	Integrated Watershed Management Plan
MOE	Ministry of Environment
OCP	Official Community Plan
SAP	Sustainability Action Plan
SEI	Sensitive Ecosystem Inventory



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Appendix A: Benefits of Environmental Protection and Management

The following are some examples of the benefits derived from protecting natural areas and features.

Economic Benefits

- Attracting environmentally sustainable development and innovative developers
- Reducing expenses of stormwater infrastructure and water quality mitigation costs
- Supporting agriculture activity
- Flood protection, slope stability mitigation, drought protection, and forest fire protection.
- Erosion control, soil conservation, and sediment runoff mitigation
- Providing free services such as soil conservation, drainage and natural irrigation
- Increasing tourism and new businesses oriented to outdoor recreation

- Making commercial areas more viable by increasing visitation to the District for the natural amenities
- Encouraging corporate relocation through opportunities to live, work and play in a great community
- Increasing residential values and property taxes
- Reduction of energy use by providing shade, transpiring moisture, and reducing wind speeds
- Potential for deriving carbon offset credits for protection of forest lands
- Providing pollination services for crops

Social Benefits

- Conserving rural character of Maple Ridge
- Providing a more beautiful setting for residents and visitors
- Expanding opportunities for nature-oriented recreation and access to nature
- Improving mental and physical health due to a cleaner environment and outdoor recreation opportunities
- Easing mental fatigue and providing spiritual inspiration through the presence of natural areas
- Supporting pride in the community and a greater sense of community
- Enhancing our understanding about nature and our relationship to the environment
- Making urban areas more comfortable by shading and cooling
- Reducing exposure to damaging solar radiation
- Conserving natural heritage and cultural resources
- Providing alternate transportation corridors (to motor vehicles)
- Protecting breeding and rearing areas for our food web , e.g., salmon, bees, insects
- Protecting and enhancing water supplies for communities
- Processing waste

Environmental Benefits

- Supporting healthy and diverse ecosystems, including flora and fauna

- Providing habitat and movement corridors for fish and wildlife
- Cooling streams and soils by shading
- Protecting and enhancing water quality in lakes, wetlands, rivers and streams
- Filtering pollutants from air and soil
- Protecting streams by reducing extremes of water flow through rainwater and stormwater management, keeping water temperatures cool and preventing ongoing erosion
- Recharging groundwater aquifers
- Mitigating climate change by reducing greenhouse gases through the storage and sequestering of carbon within vegetation
- Preventing erosion on steep slopes

Valuation of the Benefits¹

The following are examples of the quantitative benefits associated with retention or rehabilitation of natural resources in BC's Lower Mainland:

Carbon Storage: BC's coastal forests store up to 1,300 tonnes of carbon per hectare, and the average carbon content for biomass and soils for the Lower Mainland is estimated to be 564.5 tonnes of carbon per hectare.

The amount of carbon stored can be valued based on the value of the avoided costs of carbon emitted to the atmosphere, which is an average annual value of \$1,709 per hectare in the urban portion of Maple Ridge and \$1,858 per hectare in the undeveloped forested portion.

Air Pollution Abatement: Trees can remove 8 to 12 grams of air pollutants per square metre of canopy. The trees in the Maple Ridge area annually remove 100 kilograms of pollutants per hectare, which is valued at \$495 per hectare.

Water Quantity: The economic value of water regulation by forests is calculated in terms of the replacement construction costs for water runoff control if the forest cover was removed. The annual savings are \$612 per hectare in the urban portion of Maple Ridge and \$615 per hectare in the undeveloped forested portion.

Water Quality: Wetlands can absorb nutrients such as nitrogen and phosphorus that runs off farmlands in excessive amounts. The value of the excess nutrients, based on the value of wetland waste treatment services,

¹ Value examples in this section are from David Suzuki Foundation and Pacific Parklands Foundation, Natural Capital in BC's Lower Mainland.

ranges from an average of \$113.47 per hectare for nitrogen and an average of \$1,1347 per hectare for phosphorous.

The economic value for the benefit of water filtration is based on the potential increase in water treatment costs if the forest/wetland declined from its current cover; it equates to \$1,889 per hectare per year.

Pollination: The annual value of pollination services attributed to natural cover is estimated at \$1,668 per hectare.

Habitat: The value of protecting watersheds for salmon habitat is estimated in terms of the value that drainage areas contribute to maintaining habitat. The values range from \$1,322 to \$7,010 per kilometre of salmon stream.

Recreation: Based on an average of three economic studies of nature-based recreation, the annual economic value of nature for recreation is estimated at \$127 per hectare.

Total: The estimated average annual values of forests for **all benefits** (not all are described above) are \$5,913 per hectare in the urban portion of Maple Ridge and \$7,432 per hectare in the undeveloped forested portion. The average values for the Lower Fraser Watershed, which encompasses Maple Ridge, are \$3,826 per hectare.

The **total** annual value of the benefits for the Lower Mainland is **\$5,386 million**.



Appendix B: Official Community Plan DPAs

OCP Provisions

Both the current and the previous Official Community Plans established Development Permit Areas to protect environmentally sensitive areas. The current Official Community Plan, adopted in 2006, has streamlined this approach as follows:

- **Watercourse Protection Development Permit (WPDP):** DP guidelines that require new developments and building applications to:
 - a. protect watercourses and wetlands using the Streamside Protection Regulations (SPR), with limited jurisdiction in ALR lands
 - b. ensure they provide sufficient studies and mitigation recommendations to encourage innovative site design with respect to dealing with potential hazards, ecological significant features, and rainwater management
 - c. encourage enhancement and restoration for disturbed areas or sparsely vegetated areas within setback zones
- **Natural Features Development Permit (NFDP):** DP guidelines that focus on management of slopes and hillside areas over 15%, floodplains, and lands within 50 metres of park or conservation areas to carry out following:
 - a. Retain natural vegetation, trees, and soils where possible;
 - b. Minimize cutting and filling of slopes to mimic natural topography;
 - c. Ensure sufficient studies to encourage safe and innovative site design including protection of ecologically significant features, confirmed hazardous areas, and natural drainage.



Appendix C: Background Analysis to Support Strategies and Actions

This appendix includes the analysis of strengths and challenges that was used to generate strategies and actions.

Goal A

Existing Tools

The following section provides a list and a brief evaluation of the tools that the District currently uses to meet the Goal A objectives. Opportunities for potential ways to improve these tools are provided.

Existing Tools	Strengths	Challenges	Opportunities
Environmental Mapping	<ul style="list-style-type: none"> Existing mapping is an excellent resource for staff, developers, and consultants of record Maps are used by staff to determine boundaries of DP areas and the need for DP applications Maps identify potential hazards on site or off site, in addition to 	<ul style="list-style-type: none"> Protection of corridors/natural areas outside of watercourses (i.e. federal/provincial regulation) is limited, e.g., upland habitats, wildlife corridors, wildlife interface areas Maps are technical, on multiple layers and not well distributed 	<ul style="list-style-type: none"> Prepare user-friendly summary maps of the important environmental areas – (major ecosystems, greenway trail and watercourse corridors, park conservation areas, steep slopes, environmental DP areas, floodplain boundaries, natural heritage features, aquifer boundaries) and

Existing Tools	Strengths	Challenges	Opportunities
	providing context for applicants on what is required	<ul style="list-style-type: none"> • Implications and applications of ESA mapping are not well understood 	distribute these widely <ul style="list-style-type: none"> • Use the District's mapping, combined with SEI mapping, to prepare an ecological network management strategy and to update NFD and WDP maps
Soil Deposit Bylaw	<ul style="list-style-type: none"> • Bylaw exists 	<ul style="list-style-type: none"> • Illegal fill is commonly placed on agricultural land due to a lack of legal fill locations • Concerns include truck traffic, contamination, drainage, and visual impacts 	<ul style="list-style-type: none"> • Refine bylaw to address safety and risk management considerations • Improve processes and provide information to address impacts • Require Agro-ecologist input

Gaps not Addressed by Existing Tools

The following is a list of gaps in environmental management which are not addressed by the existing tools. Opportunities for potential ways to address these gaps are provided.

Gaps	Recommendations
<ul style="list-style-type: none"> • No recognition of priority ESA lands in Maple Ridge to be protected or managed and no District program to identify and acquire ESA lands • Lack of incentives for property owners to contribute additional lands for conservation 	<ul style="list-style-type: none"> • Identify priority ESA lands for conservation and for management strategies • Identify potential tools which to help District acquire lands that may not otherwise be protected (e.g., terrestrial ecosystems, diverse and distributed habitat areas, greenway corridors) through various incentive mechanisms and partnerships, e.g., land conservancies, partnership with MV Ecological Health Strategy • Plan for ESAs at watershed scale to neighbourhood to site-specific scales
<ul style="list-style-type: none"> • Lack of a sustainable management strategy for larger watersheds and lands outside municipal boundaries 	<ul style="list-style-type: none"> • Work with the Province, Metro and surrounding municipalities on the planning and protection of Crown land and larger watersheds that cross municipal boundaries • Encourage an integrated and sustainable management plan for areas including the Blue Mountain area and input on Provincial decisions
<ul style="list-style-type: none"> • Lack of a Fraser River Foreshore Plan 	<ul style="list-style-type: none"> • Work with Metro and others on a Fraser River Foreshore Plan
<ul style="list-style-type: none"> • Lack of Groundwater Management Plans (GMP) 	<ul style="list-style-type: none"> • Encourage GMPs for vulnerable aquifer areas as well as other aquifer areas in Maple Ridge where residents are dependent on groundwater for irrigation or drinking water
<ul style="list-style-type: none"> • Limited authority over environmental protection and best practices within the ALR 	<ul style="list-style-type: none"> • Work with the ALC, DFO and agriculture community on Best Practices for integration of environment and agriculture, e.g., combine environmental farm lands into wildlife corridors
<ul style="list-style-type: none"> • New developments can have interface challenges with surrounding natural areas 	<ul style="list-style-type: none"> • Encourage Integrated Sustainable Management Plans for outlying Crown lands

Gaps	Recommendations
<ul style="list-style-type: none"> Have not yet worked on a plan to recognize the value of undeveloped municipal lands or to pursue the use of carbon offset credits 	<ul style="list-style-type: none"> Evaluate the socio-economic values and benefits of natural assets (e.g., use Suzuki data to evaluate the financial benefits of healthy airsheds, biodiversity values, eco-tourism opportunities, education opportunities, attractive municipal park assets that attract clean industry and high wage businesses)

Goal B

Existing Tools

The following section provides a list and a brief evaluation of the tools that the District currently uses to meet the Goal B objectives. Opportunities for potential ways to improve these tools are provided.

Existing Tools	Strengths	Challenges	Opportunities
Tree Protection Bylaw	<ul style="list-style-type: none"> Bylaw exists 	<ul style="list-style-type: none"> Many trees are being lost to development especially in rural areas Bylaw is restricted to urban area, no mitigation or replacement tree costs are required, no consideration of impact on neighbouring properties 	<ul style="list-style-type: none"> Replace the Tree Protection Bylaw with a Tree Preservation and Management Bylaw that incorporates appropriate mitigation requirements, including tree cutting and replacement costs Identify specific trees that require protection, e.g., specimen trees, heritage trees Include monitoring in the bylaw
Tree Planting and Urban Forestry	<ul style="list-style-type: none"> Community Ecosystem Restoration Initiative Program will plant 300,000 native trees in parks and on municipal land over multiple years Street tree program, some planting required in new developments 	<ul style="list-style-type: none"> Despite these programs, trees are being lost on private property (see Tree Cutting Bylaw above) 	<ul style="list-style-type: none"> Introduce programs and incentives to promote planting and care for trees on development projects and private property Use tools such as tree canopy target, an expanded tree inventory Update other bylaws to increase the focus on trees Provide information and incentives to the public on the importance and benefits of trees Conduct an Urban Forest Management Plan
Watercourse Protection Development Permit (WPDP)	<ul style="list-style-type: none"> Use of SPR vs. RAR offers more social, economic, and environmental benefits given the unique landscape that Maple Ridge has around it 	<ul style="list-style-type: none"> Setbacks do not necessarily allow for recreation corridors or hazard setbacks, protection of species at risk or larger community greenway buffers especially along the larger significant 	<ul style="list-style-type: none"> Make corridors wide enough to accommodate both wildlife and recreation on the larger watercourses and features, e.g., Whonnock Lake, Alouette River, Fraser River in East Maple Ridge, Whonnock River Update mapping based on the SPR Add implementation, monitoring and enforcement related to protection of water quality

Existing Tools	Strengths	Challenges	Opportunities
		rivers or creeks such as Whonnock Creek <ul style="list-style-type: none"> • Water quality may not be addressed adequately 	
Watercourse Protection Bylaw	<ul style="list-style-type: none"> • Bylaw includes erosion control and rainwater management on-site source controls 	<ul style="list-style-type: none"> • Rainwater management guidelines are buried in this bylaw and warrant a higher profile 	<ul style="list-style-type: none"> • Include rainwater management guidelines in the Subdivision Servicing Bylaw
Integrated Stormwater Management Plans (ISMP)	<ul style="list-style-type: none"> • Engineering Dept has initiated ISMPs 	<ul style="list-style-type: none"> • ISMPs are not integrated with area plans 	<ul style="list-style-type: none"> • Encourage integration of ISMPs and land use planning
Natural Features Development Permit (NFDP)	<ul style="list-style-type: none"> • NFDP focuses on hazard areas which are identified and addressed 	<ul style="list-style-type: none"> • Lack of clear guidelines around hazard management standards for floodplains and steep slopes, or for tree clearing on steep slopes, and protection of groundwater in vulnerable aquifer areas • Aquifers are still being compromised in vulnerable areas of east Maple Ridge and Thornhill • Still allowing too much development outside of urban containment boundary • Hillsides are not being adequately protected, e.g., vegetation retention, visual quality 	<ul style="list-style-type: none"> • Add low impact development guidelines re: terrestrial ecosystems • Prepare more specific hillside guidelines that address hazards, risks, design options, visual aesthetics and visual assessment tools • Include provisions related to water resources investigations and guidelines in vulnerable aquifer areas
Zoning Bylaw	<ul style="list-style-type: none"> • Zoning bylaw is currently under review 	<ul style="list-style-type: none"> • Zoning bylaw has limited steep slope restrictions 	<ul style="list-style-type: none"> • Integrate increased regulations and performance measures for development on steep slopes into the zoning bylaw.
Subdivision Servicing Bylaw	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Subdivision servicing bylaw provides minimal direction on sustainable design standards, e.g., performance targets for permeability 	<ul style="list-style-type: none"> • Integrate sustainable design standards into the subdivision servicing bylaw, e.g., for rainwater management, road design, road crossings for wildlife, tree planting, landscape type and amount, sidewalks/ trails / cycle paths, passive solar benefits through siting and landscaping, etc. •

Existing Tools	Strengths	Challenges	Opportunities
Conservation land acquired through development	<ul style="list-style-type: none"> District receives land for conservation and/or hazard management purposes 	<ul style="list-style-type: none"> Neighbouring properties intrude into the conservation area, e.g., dumping garden waste, encroachments 	<ul style="list-style-type: none"> Improve monitoring, enforcement and stewardship Incorporate community greenway corridors

Gaps not Addressed by Existing Tools

The following is a list of gaps in environmental management which are not addressed by the existing tools. Opportunities for potential ways to address these gaps are provided.

Gaps	Opportunities
<ul style="list-style-type: none"> There has not been much attention paid to a higher level of sustainability that would address climate change resiliency 	<ul style="list-style-type: none"> Improve integration of regulations and DP guidelines to deal with climate change resiliency such as storms, floods, slopes, groundwater, terrain stability, tree retention Encourage sustainable development practices that go beyond minimum requirements, considering checklists and carbon offsets for community projects as tools
<ul style="list-style-type: none"> Approach to hazards is not integrated 	<ul style="list-style-type: none"> Prepare a new Natural Hazards DP to consolidate mapping and guidelines related to slope, creek and wildfire hazards
<ul style="list-style-type: none"> Monitoring and enforcement are key challenges, confirmed by strong public opinion on this topic, with few policies or resources for this 	<ul style="list-style-type: none"> Include monitoring and enforcement provisions in policies where possible
<ul style="list-style-type: none"> Environmental values and costs are not evaluated in the planning process 	<ul style="list-style-type: none"> Include full cost accounting, including short term and long term costs and benefits, in development evaluation and decision-making processes

Goal C

Existing Tools

The following section provides a list and a brief evaluation of the tools that the District currently uses to meet the Goal C above. Opportunities for potential ways to improve these tools are provided.

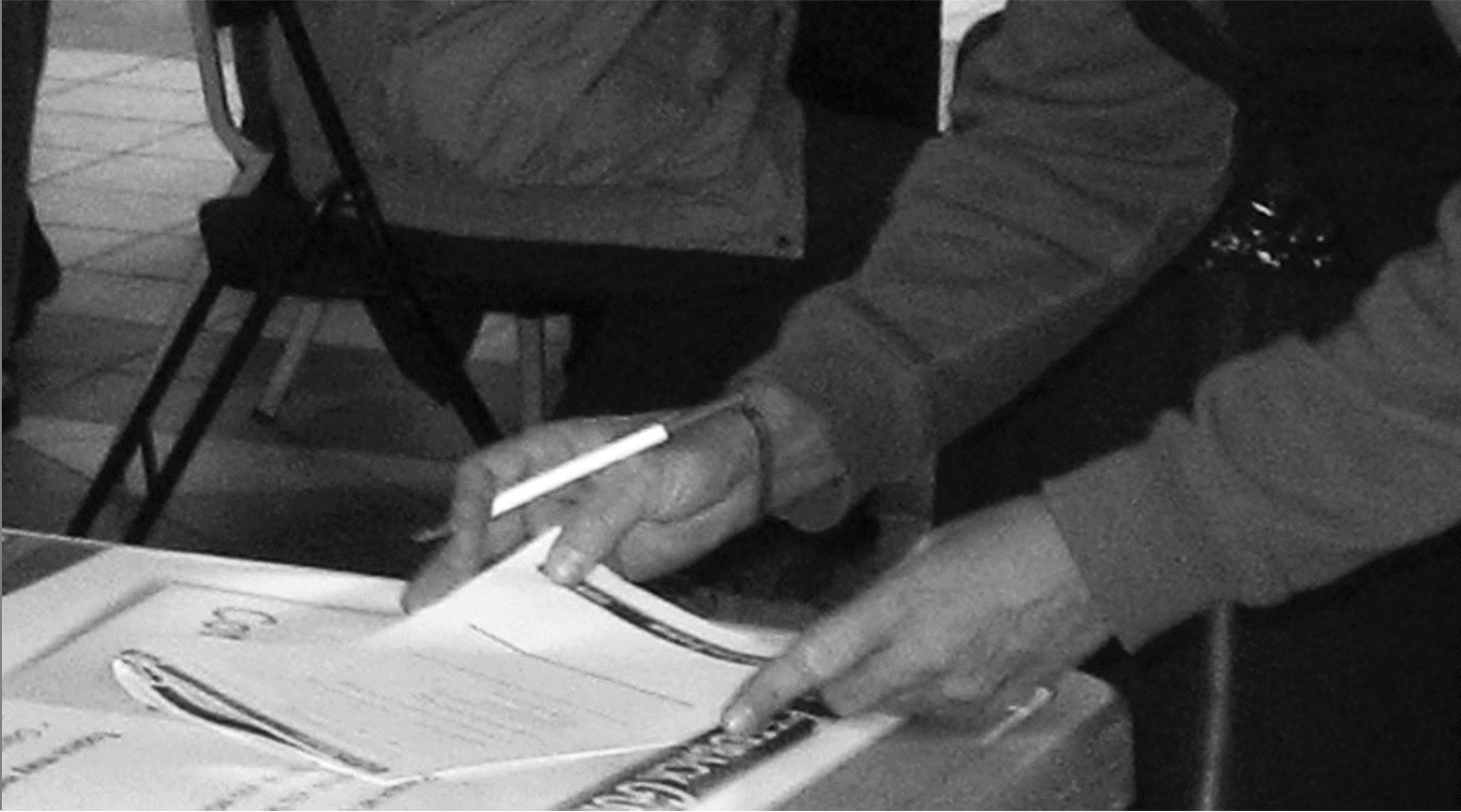
Existing Tools	Strengths	Challenges	Opportunities
Communication processes	<ul style="list-style-type: none"> Environment staff communicate informally with a broad network of stakeholders 	<ul style="list-style-type: none"> Staff would like more communication with Council and stewardship groups would like more support in terms of communication 	<ul style="list-style-type: none"> Formalize environmental staff communications with Council Support stewardship groups in their own communications and organization among various groups
Environmental	<ul style="list-style-type: none"> A significant 	<ul style="list-style-type: none"> Environmental 	<ul style="list-style-type: none"> Prepare an EMS information hub on the

Existing Tools	Strengths	Challenges	Opportunities
Information	amount of environmental information exists	information is not consolidated, centralized or regularly distributed	District's website <ul style="list-style-type: none"> • Increase the use of digital media • Include marketing related to environmental management in the District's communications strategy
Environmental Education	<ul style="list-style-type: none"> • District has an environmental experiential education program K-7 	<ul style="list-style-type: none"> • No District environmental education programs at the secondary school level 	<ul style="list-style-type: none"> • Expand environmental education opportunities in partnerships with others
Nature and Ecotourism Experiences	<ul style="list-style-type: none"> • District has many nature trails within and surrounding the urban area • Haney Horsemen manage some trails with financial support from the District • Economic Development group is working on this 	<ul style="list-style-type: none"> • Nature experiences in the District are not well developed or widely marketed 	<ul style="list-style-type: none"> • Encourage the expansion of opportunities for nature experiences and ecotourism • Encourage ecotourism businesses, e.g., equipment rentals, tour operators • Assist businesses with marketing • Encourage smart phone applications

Gaps not Addressed by Existing Tools

The following is a list of gaps in environmental management which are not addressed by the existing tools. Opportunities for potential ways to address these gaps are provided.

Gaps	Opportunities
<ul style="list-style-type: none"> • The District does not have an Environmental Advisory Committee (EnvAC) 	<ul style="list-style-type: none"> • Consider an EnvAC with careful attention to the role, membership and functions on this group
<ul style="list-style-type: none"> • Limited staff resources to manage ongoing development and building permits, assist with District projects, oversee enquiries, work with environmental stakeholders, and administer / enforce bylaws, etc. 	<ul style="list-style-type: none"> • Provide more staff resources to environment to better manage, administer and enforce bylaws, collaborate with stakeholders and conduct outreach activities



Appendix D: Cross-reference of EMS Objectives to Other Documents

The following lists show the relationship between the EMS objectives and the District’s Official Community Plan (OCP), Community Sustainability Strategy (CSP) and Sustainability Action Plan (SAP).

Goal A

EMS Objectives	Links to other District Documents
1. Protect the key ecological resources.	<p>CSP strategy (p 3)</p> <p>Identify and devise effective protective mechanisms for environmental features (such as watercourses) and areas that require special recognition and management.</p> <p>OCP goals (Ch 5, p 3)</p> <p>Protect significant ecosystems in the Municipality</p> <p>OCP objectives (Ch 5, p 7)</p> <p>To identify, protect and enhance ecosystems, sensitive areas and other natural features that have significant ecological value.</p> <p>To ensure that soils, vegetation and mature trees are maintained and protected where</p>

EMS Objectives	Links to other District Documents
	<p>possible and encourage the use of native species when replanting is necessary.</p> <p>To encourage the retention of forest and woodland areas in Maple Ridge.</p> <p>Create a parks acquisition and development funding strategy (SAP page 11).</p> <p>Preserve natural assets that could positively contribute to economic development (CSP Strategy page 7).</p>
<p>2. Maintain the health of natural areas.</p>	<p>OCP goals (Ch 5, p 3)</p> <p>Anticipate and respond to the impacts of climate change on land, water and air resources</p> <p>Maintain and improve ecosystem health and human safety.</p>
<p>3. Extend natural connections beyond the municipality.</p>	<p>CSP strategy (p 7)</p> <p>Enhance the trail systems so that they can be used to enhance economic development.</p>
<p>4. Build ecological resilience for adaptation to climate change and hazards.</p>	<p>OCP objective (Ch 5, p 2)</p> <p>A perspective that anticipates climate change and strives to reduce its causes while mitigating its effects.</p> <p>OCP goals (Ch 5, p 3)</p> <p>Anticipate and respond to the impacts of climate change on land, water and air resources.</p> <p>OCP objective (Ch 5, p 7)</p> <p>To protect persons, property, and landscape from risk or hazards due to flooding, standing water, hazardous terrain, and forest fire while protecting environmental features to as great an extent as possible.</p>
<p>5. Consider the potential values and financial benefits of undeveloped land in planning.</p>	<p>OCP goals (Ch 5, p 3)</p> <p>Determine guidelines and standards ... in and around environmentally sensitive areas.</p> <p>Identify situations where additional environmental studies or impact assessments are required as part of the development process.</p>
<p>6. Provide incentives to encourage developers to protect some natural areas.</p>	<p>SAP (p 9)</p> <p>Create a Financing Reserve for Sustainability related Projects. The District will establish a funding reserve to finance environmental projects with strong business cases. Repayments to the reserve will be made through savings in operating budgets.</p>
<p>7. Protect agricultural land in recognition of the values it provides, e.g., wildlife habitat, infiltration, food.</p>	<p>OCP objective (Ch 5, p 4)</p> <p>Acknowledge and foster the role that agricultural lands have on the environment.</p> <p>OCP objective (Ch 5, p 8)</p> <p>To preserve agricultural land in support of community values.</p>

Goal B

EMS Objectives	Links to other District Documents
1. Protect and enhance the urban forest, including existing forests and significant trees, with methods to support future tree cover.	<p>OCP objective (Ch 5, p 7)</p> <p>To ensure that soils, vegetation and mature trees are maintained and protected where possible...</p> <p>To encourage the retention of forest and woodland areas in Maple Ridge.</p>
2. Protect important natural and heritage resources within neighbourhoods as part of the planning process where possible, including greenway corridors, watercourses, native soils, and steep slopes.	<p>SAP (p 7)</p> <p>Create new Development Permit Area (DPA) Guidelines to protect Environmentally Sensitive Areas (ESAs).</p> <p>CSP strategies (p 6)</p> <p>Provide a variety of parks, trails, open spaces and gathering places.</p> <p>Preserve and enhance heritage resources to provide citizens with the historic context of the Community.</p> <p>OCP objective (Ch 5, p 10)</p> <p>To protect rare and critical environments.</p> <p>OCP objectives (Ch 5, p 13/14)</p> <p>To preserve the natural integrity of watercourses, wetlands, and riparian areas through adequate protection, enhancement, and restoration measures.</p>
3. Manage and minimize the impacts of development on protected and natural areas, including erosion of slopes, sedimentation of watercourses, reduced air quality.	<p>OCP objectives (Ch 5, p 10)</p> <p>To promote safety of hillside design and construction, and minimize flooding, ponding, and potential land movement.</p> <p>To minimize soil instability, erosion and downstream siltation.</p>
4. Use appropriate best management practices to ensure attractive, safe, and affordable communities.	<p>OCP objectives (Ch 5, p 13/14)</p> <p>To adopt a comprehensive and innovative approach to the management of rainwater and stormwater issues and to manage storm and rainwater in a manner that protects and maintains the ecological features of the District's watercourses.</p> <p>To ensure water quality is protected and is made available for residents' consumption.</p> <p>To promote wise water consumption throughout the District and to protect groundwater resources as an important source of water supply, especially in non-urban areas.</p>

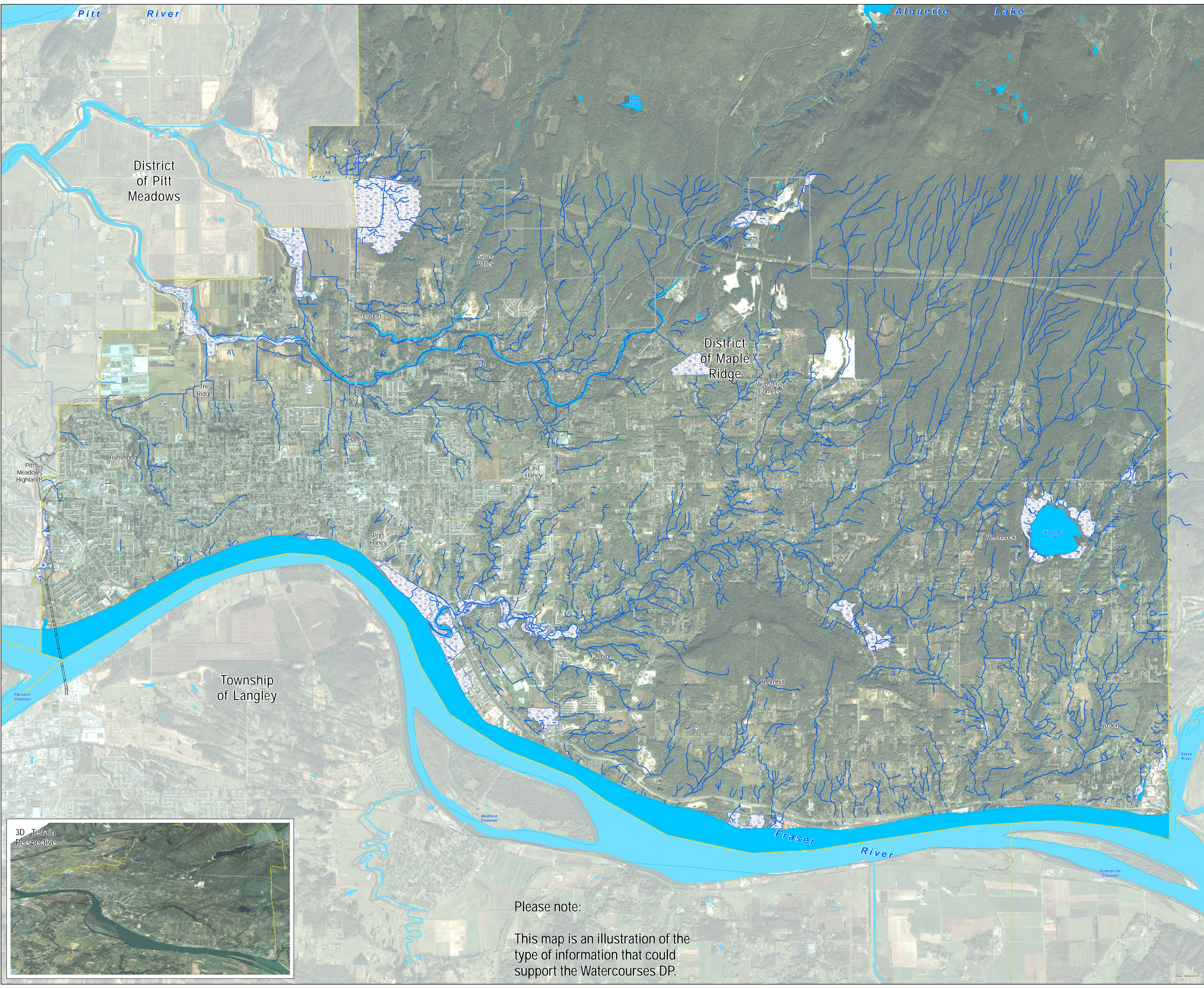
5. Use sustainable landscape design and management to reduce energy use, support wildlife, and make neighbourhoods more attractive and livable.	<p>CSP strategy (p 6)</p> <p>Ensure development standards incorporate sustainability, crime prevention, safety and security concepts.</p> <p>OCP objectives (Ch 5, p 11)</p> <p>To maintain the visual quality of hillsides with new development.</p> <p>To minimize adverse neighbourhood impacts with new development.</p> <p>To maintain and foster the unique natural features of Maple Ridge through sensitive hillside development and the protection of viewscales.</p>
6. Use alternative transportation as a sustainable design measure to save energy and increase health and recreation opportunities.	<p>CSP strategies (p 4)</p> <p>Maintain and enhance a multi-modal transportation system within Maple Ridge to provide citizens with safe, efficient alternatives for the movement of individuals and goods.</p> <p>Promote alternative modes (pedestrian, bike, public transit) of travel to reduce reliance on the Automobile.</p> <p>SAP (p 7)</p> <p>Create an Active Transportation Plan.</p>
7. Enforce environmental regulations.	<p>OCP objective (Ch 5, p 10)</p> <p>To encourage development densities that are sensitive to and appropriate for the natural grade of land.</p>

Goal C











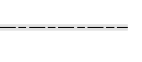
EMS Objectives	Links to other District Documents
1. Improve communication and collaboration among District departments and stakeholders to increase efficiency, improve understanding, and achieve more benefits.	Added by workshop participants and public input based on a perception that inter-departmental communication and collaboration could be improved.
2. Increase communication about environmental management and its benefits to the public, including financial benefits.	<p>CSP strategy (p 3)</p> <p>Continue to promote individual, business and community responsibility for the stewardship of natural resources.</p> <p>CSP strategy (p 9)</p> <p>Develop methods to communicate on a timely basis with citizens and community groups.</p>
3. Increase education and engagement opportunities related to experiencing nature and environmental management.	<p>CSP strategy (page 9)</p> <p>Provide information about and actively promoting the actions individual citizens and businesses can take to augment the District's sustainability efforts.</p>

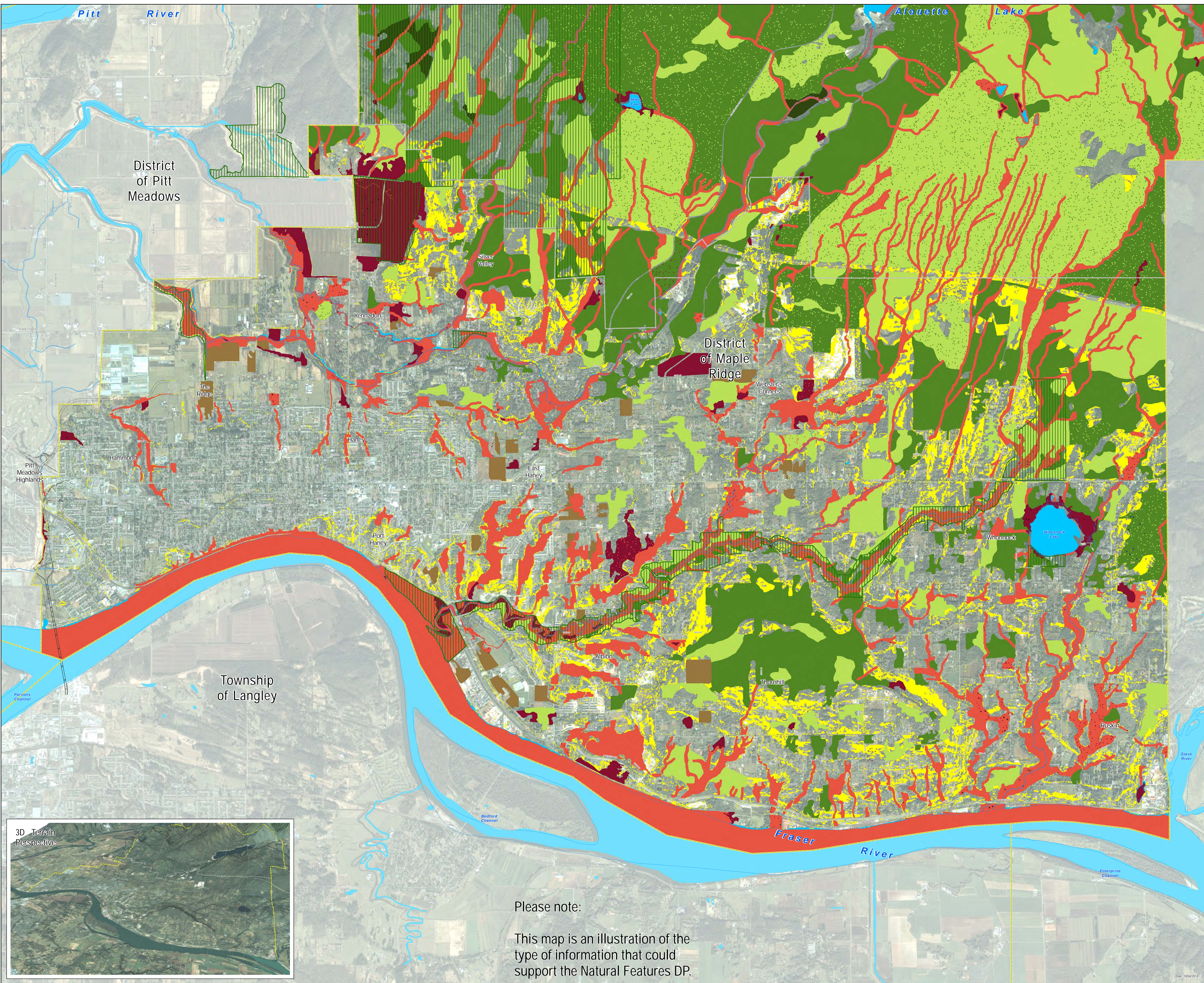
EMS Objectives	Links to other District Documents
<p>4. Clarify the steps and requirements involved in the land development process, and use processes that are inclusive.</p>	<p>CSP strategy (p 5)</p> <p>Develop a land use management and development processes that are clear, timely, open, inclusive and consultative.</p> <p>CSP strategy (p 9)</p> <p>Provide a continuum of opportunities that encourage and enable citizen participation in local government and local government decision-making.</p>
<p>5. Partner with other government agencies, including First Nations, on initiatives of shared interest and benefits.</p>	<p>CSP strategy (p 3)</p> <p>In partnership with other levels of government, adjacent municipalities, First Nations and community groups, develop programs and projects to preserve and enhance the natural assets of Maple Ridge.</p> <p>CSP strategies (p 3)</p> <p>Develop and maintain strong, positive working relationships with our adjacent neighbours, the municipalities of Pitt Meadows and Mission; the Katzie and Kwantlen First Nations; our fellow members of the Greater Vancouver Regional District and the Fraser Valley Regional District.</p> <p>Enhance relationships with provincial and federal employees and politicians to further the legitimate interests of the District.</p> <p>OCP objectives (Ch 5, p 13/14)</p> <p>To participate in Regional, Provincial, and Federal programs and projects aimed at protecting and improving the District's water resources.</p>
<p>6. Partner with non-government organizations on initiatives of shared interest and benefits, and support local stewardship groups in achieving common objectives.</p>	<p>CSP (p 3/4)</p> <p>In co-operation with other regional stakeholders, identify improvements to the inter-municipal transportation system within the Lower Mainland and the Fraser Valley.</p> <p>Continue to leverage our voice and enhance our relationships with the UBCM, FCM and the LMLGA.</p> <p>Identify and promote the use of partnerships and networks with public agencies; crown corporations; business; not-for-profit; community groups; and volunteers to provide local government and community services in a cost-efficient, effective and timely manner.</p>

- Legend
- Watercourses
 - Wetlands
 - Municipal Boundaries
 - Active Planning and Servicing Boundary



Please note:
This map is an illustration of the
type of information that could
support the Watercourses DP.

- Legend
-  Mature Forest
 -  Old Forest
 -  Riparian
 -  Woodland
 -  Wetland
 -  Young Forest
 -  Old Field
 -  15 - 30% slopes
 -  Major Parks
 -  Municipal Boundaries
 -  Active Planning and Servicing Boundary

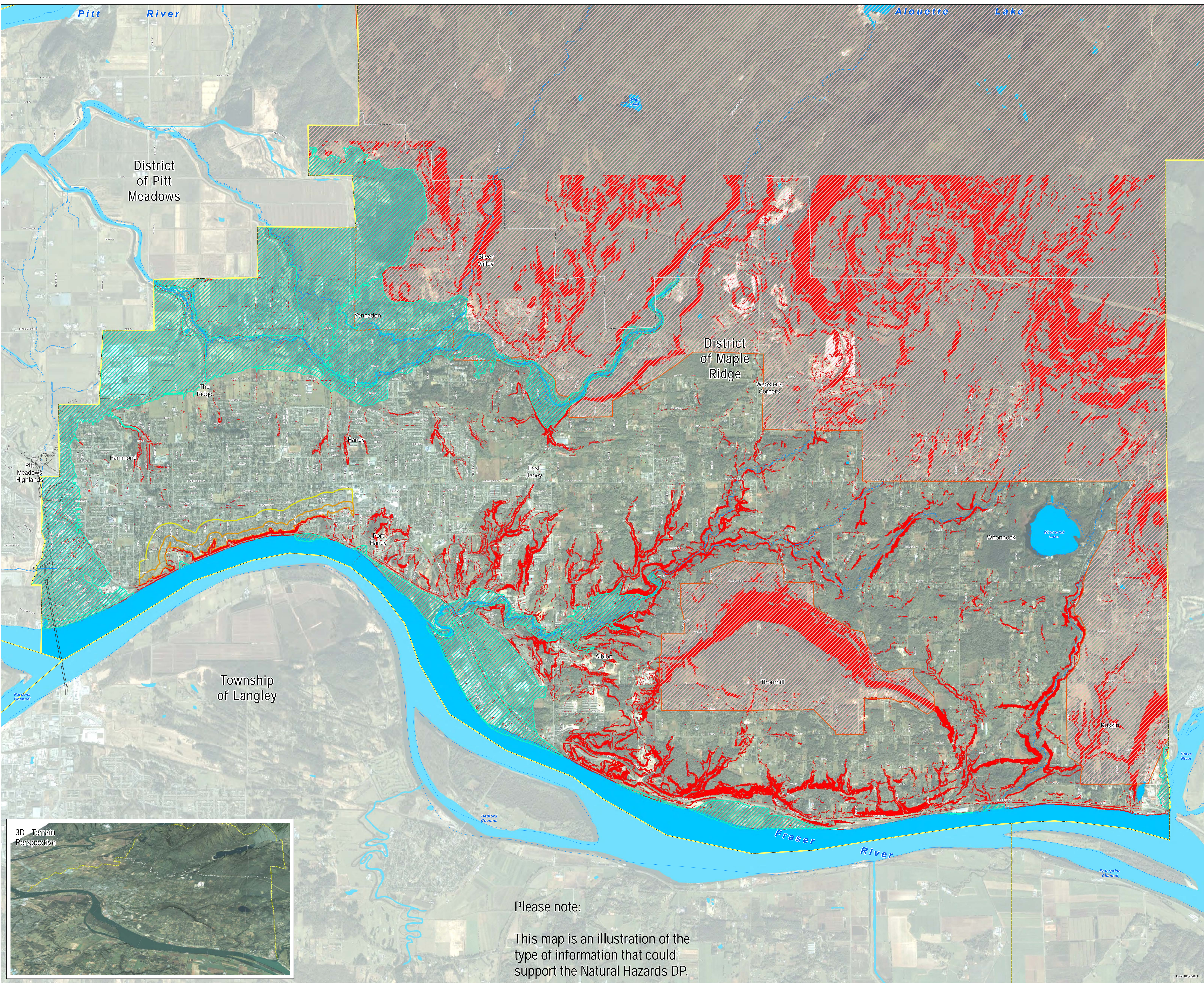


Please note:

This map is an illustration of the type of information that could support the Natural Features DP.

Legend

-  >25% slope
-  Escarpment Area (100m buffer)
-  Escarpment Area (300m buffer)
-  Provincial Floodplain Areas
-  Draft Wildfire DP Areas
-  Municipal Boundaries
-  Active Planning and Servicing Boundary



Please note:

This map is an illustration of the
type of information that could
support the Natural Hazards DP.