



ATTACHMENT C

GREEN INFRASTRUCTURE / NATURE

INTRODUCTION

This Environmental Gap Analysis brief is intended to provide background technical research in support of ongoing City staff and technical stakeholder engagement. The factors and precedents discussed in this report will be integrated with other factors such as community mobility, social planning, waste and GHG mitigation. A key purpose of the engagement will be to listen carefully to values that are important to the community.

In consideration of both community values and technical review, City Staff and Council will need to consider priorities in implementation. Only some of the 'Potential Next Steps' listed in these document will be immediate priorities. Other steps may be deferred to a follow-on phase, or not deemed important to City of Nanaimo's context.

Precedents provided here are a snapshot in time, focused primarily on the Pacific Northwest. New programs and senior government challenge grants appear regularly. We recommend that the precedent and priorities section of this document should be updated on a regular basis – approximately once every five years.

SCOPE OF ENVIRONMENTAL GAP REVIEW

Natural scenery and biodiversity are hallmarks of Nanaimo. The harbour and estuaries, islands, lakes, forests, hills, and watercourses that make our community attractive also play key roles in making our City less vulnerable to the impacts of climate change. These areas can be affected by development and human activity. The current Official Community Plan (OCP) guides us to plan our community to protect and enhance our environment.

This technical backgrounder addresses both the natural environment and urban ‘green infrastructure’ that support or mimic ecosystem processes in the City of Nanaimo. Specific topics include:

- ▶ Water Quality and Quantity in Watersheds
- ▶ Habitat Conservation and Restoration
- ▶ Urban Forest and Vegetation Cover
- ▶ Urban Agriculture
- ▶ Environmental Rating Systems
- ▶ Environmental Performance Monitoring and Education

Technical expertise in this backgrounder was provided by Lanarc 2015 Consultants Ltd.

WATER QUALITY AND QUANTITY IN WATERSHEDS

Nanaimo has a long history of caring for its watersheds in cooperation with the Regional District of Nanaimo which holds most of the watershed headwaters.

As the City grows, and as land use density intensifies to meet other objectives, urban roof areas and pavement reduces rainfall infiltration into soil and groundwater, causing rapid runoff into streams, leading to erosion and water quality impacts in watercourses.

Stormwater best practices are required in new development in Nanaimo but improving watershed health in older neighbourhoods will require retrofit. In practice, new subdivisions and higher density developments are implementing stormwater best practices. Single family or duplex residential development are also densifying with secondary dwellings, but often do not manage their increased impervious area and related runoff as yet.

The topics below summarize recent progress and introduce potential next steps to manage water quality and water quantity in watersheds in Nanaimo:

- Rainwater management and watercourse flows
- Control Sediments and Erosion, Pollutants
- Limit Instream Erosion and Deposition

Rainwater Management and Watercourse Flows

Subject areas considered under this topic include:

- Stormwater Source Controls
- Stormwater and drainage planning and design
- Disincentivize Stormwater Discharges
- Limit instream erosion and sedimentation

RECENT PROGRESS IN NANAIMO

Most of Nanaimo streams are open to the surface, with small streams in underground piping in some headwaters and in the Downtown, port and north slope waterfront areas. New development is required to mimic the runoff of pre-development flows to keep our water resources healthy. In older neighbourhoods retrofits are needed to reduce runoff.

Major watercourses such as Millstone and Nanaimo River have been relatively stable in Nanaimo. Historic erosion and deposition had been occurring in Northfield Creek.

A draft-level GIS analysis of recent Nanaimo airphoto provided a breakdown of pervious and impervious area across the City:

49% Pervious Area

Tree Cover, Natural Areas, Lawns, & Landscape

Streams flow naturally when there is extensive cover of natural forest and meadows. Increasing pervious surfaces helps keep our City green.

~51% Impervious Area Buildings and Pavement

Where natural flows are disrupted by impervious surfaces, stormwater best practices can be used to reduce peak flows and improve water quality to protect streams.

Nanaimo's OCP includes the following policies for its watersheds:

- ▶ Protect environmentally sensitive areas, preserve aquatic habitat, and provide opportunities for nature appreciation and for fish and wildlife to thrive.
- ▶ Sustain urban forests, treed areas, and wildlife trees.
- ▶ Create a network of riparian and upland corridors to link natural habitat and support wildlife movement.

Nanaimo's current Development Permit Areas (DPAs) include:

- ▶ Watercourse DPAs to protect watercourses and their streamside riparian areas.
- ▶ Environmentally Sensitive DPAs and Development Approval Information Areas that require environmental assessments to define non-disturbance areas to protect sensitive ecosystems.

Nanaimo has a well-developed set of guidelines and approval process for implementation of streamside riparian vegetation protection.

Stormwater source controls promote rainwater capture and infiltration. This approach is increasingly common, promoted by [Metro Vancouver Stormwater Source Control Guidelines](#). Nanaimo has many excellent examples of stormwater source control implementation at the subdivision and project scale in higher density residential and commercial /industrial developments.

The Nanaimo' Manual of Engineering Standards and Specifications include requirements for major and minor stormwater systems as well as rainwater management measures. Specific targets are given for volume reduction, detention and water quality treatment. Applicants are required to account for climate change. Where developments are upstream of a watercourse, runoff volume controls must recognize both peak flows and duration of post development peak flows with a goal to match pre-development conditions as much as possible.

In Nanaimo, stormwater source controls are not common or required by regulation at the single/duplex/triplex lot scale. Like in other jurisdictions with this exemption, a large portion of watershed areas in low density development is left out of rainwater management requirements. As increased impervious area is created through addition of larger residences or carriage/lane homes in single-family neighbourhoods, this exemption could lead to increasing impacts on watercourses, aquatic habitats and downstream infrastructure over time.

POTENTIAL NEXT STEPS

While up to common practice in this area, Nanaimo could consider additional steps:

- ▶ Reviewing potential implementation of rainwater management in single/duplex/triplex or carriage home developments, with application requirements graduated to the degree of proposed imperviousness. The intent is to mitigate increasing annual flows that cause instream erosion and deposition and habitat impacts.
- ▶ Collecting data on impervious area in existing developments, categorized by roof and surface pavement.

- ▶ A regulatory limit on cumulative impervious area as a percent of parcel area, in particular in single/duplex/triplex or carriage home residential developments.
- ▶ Recognition of pervious paving as one means to limit effective impervious area.
- ▶ Design guidelines and standard drawings, potentially in the MOESS, for pervious paving, absorbent landscape, rain gardens, infiltration chambers, roof rainwater leader disconnection, in parallel with other recommended practices.
- ▶ Creation of a stormwater utility, which would set a fee on impervious area and require annual payment.
- ▶ Use of funding from a stormwater utility to establish a program to accelerate stormwater management and water quality improvements on public lands (streets, parks, greenways city lands).
- ▶ Add stormwater source controls to road renovation projects, to reduce rate of runoff from city streets or parking areas.
- ▶ Review instream erosion and deposition sites, and design / implementation of habitat-sensitive management practices.
- ▶ Ticketing enforcement provisions to address breaches of total impervious area, lack of sediment control, water quality offences, etc.

KEY POLICY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ City of North Vancouver Stormwater Management Website, Tools and Bylaws
 - **Purpose:** To require and support implementation of stormwater source controls at all scales of development, including single family homes
 - **Method:** Provides well illustrated guidance, standard details and calculation sheets on sizing and implementation of stormwater source controls
- ▶ [Seattle Stormwater Manual Vol. 3-Project Stormwater Control \(2017\)](#)
 - **Purpose:** To reduce flow rates and volumes of stormwater runoff, levels of pollutants contained in runoff, and to convey runoff.
 - **Method:** Describes and provides technical requirements for selecting, analyzing, designing, constructing, and maintaining stormwater best management practices.
- ▶ [Vancouver Rain City Strategy \(2019\)](#)
 - **Purpose:** To advance rainwater management practices and services.
 - **Method:** Includes a strategic plan, sets targets, and outlines an action plan. Recommends 46 programs and initiatives to be developed and implemented over the coming 30 years.
- ▶ [Seattle - RainWise Rebate Program](#)
 - **Purpose:** To reduce sewer backups and pollution and erosion in waterways by incentivizing the adoption of stormwater BMPs.
 - **Method:** Provides rebates for hiring contractors to install raingardens or cisterns on single-family properties.
- ▶ [Victoria - Stormwater Utility Charges](#)
 - **Purpose:** To provide a monetary incentive for property owners to reduce stormwater runoff from their properties.
 - **Method:** Includes removing stormwater fees from property taxes and instead charging an annual utility bill based on impervious area of property, length and type of road frontage, and property type, and rewards credits and rebates for installing SWM BMPs
- ▶ [Portland - % for green program](#)
 - **Purpose:** To support the adoption of green infrastructure that manages stormwater, enhances livability, or provides other environmental benefits.
 - **Method:** Provides funding for stormwater BMPs that treat water from public ROW or go beyond stormwater management requirements for a property.

Control Sediments and Erosion, Pollutants

Subject areas considered in this topic include:

- Construction on private lands / frontage
- Construction on public lands / streets
- Operations (e.g. spill control into storm sewers)
- Catch basin cleaning

RECENT PROGRESS IN NANAIMO

Nanaimo's OCP includes the following policies for sediment and erosion control:

- ▶ Control erosion during development.
- ▶ Restore eroded areas.

Nanaimo's Sewer Regulation and Charge Bylaw 1982 No. 2496 prohibits discharge of identified pollutants to the public sanitary sewer system and regulates connections and cross-connections.

The City provides a web-based Erosion and Sediment Control brochure that describes common practices. Site signage is required at all construction sites to remind of rainfall and erosion risks.

POTENTIAL NEXT STEPS

- ▶ Update and promote public and small builder awareness materials and training programs to illustrate common best practices to reduce erosion.
- ▶ Add Erosion and Sediment Control best practices and standard details to Nanaimo Engineering standards, to serve as a reference for public and private projects – especially for small projects.
- ▶ Add a ticketing offense with more expedient small fines compared to court procedures that bring attention to the issue. Such fines can be reissued each day of ongoing offense.
- ▶ Renew and increase implementation of regular catch basin cleaning practices.
- ▶ Implement end of pipe water quality management practices.

KEY POLICY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ [City of North Vancouver Sediment Control Plan Requirements](#)
 - **Purpose:** To provide specific guidance on required erosion and sediment control.
 - **Method:** Sediment control plans signed and sealed by a professional engineer are required, including plans, specifications and design calculations, a monitoring program, and an operation and maintenance program. Engineer waived for single/two family.
- ▶ [King County - Stormwater Pollution Prevention Manual \(2016\)](#)
 - **Purpose:** To reduce pollution in waterways caused by storms.
 - **Method:** Provides information on implementing stormwater BMPs on Commercial, Multi-family, Residential properties.
- ▶ [Seattle - Stormwater Manual Vol. 2: Construction Stormwater Control \(2017\)](#)
 - **Purpose:** To prevent pollution of surface water, groundwater, downstream infrastructure and resources.
 - **Method:** Provides requirements for erosion and sediment control plans, info on how to select controls, and standards and specifications. The requirements apply to all construction projects.
- ▶ [Maple Ridge – Watercourse Protection Bylaw No. 6410 & Watercourse Protection DP Requirements](#)
 - **Purpose:** To prevent pollution of surface water, groundwater, downstream infrastructure and resources.
 - **Method:** Requires contractors to retain a Qualified Environmental Professional to provide an Erosion and Sediment Control Plan on lots near watercourses, with steep slopes, or during rainy season. Monitoring is required in certain conditions.

OTHER BACKGROUND LINKS

- ▶ [City of Nanaimo - Erosion and Sediment Control Brochure](#)
 - **Purpose:** To provide information on erosion and how to address it during construction.
 - **Method:** Includes background information on erosion and an overview of principles and methods for source erosion control, runoff control, and sediment control.
- ▶ [City of Campbell River - Subdivision and Development Servicing Bylaw No. 3419 \(2010\) Section II Design Standards, Part 5 Erosion & Sediment Control](#)
 - **Purpose:** To control erosion on all developments that may be susceptible to erosion.
 - **Method:** Sets performance standards and prescriptive standards.

HABITAT CONSERVATION AND RESTORATION

Most natural habitat in Nanaimo is associated with stream ravines and riparian areas. These provide a series of green corridor (habitat greenways) that connect to corridors and mountainside natural areas in the Regional District of Nanaimo. Other areas of Nanaimo are urban, but still have potential to support adapted flora and fauna and to provide ecosystem services.

Restoration of urban streams is underway. Departure Creek restoration is a collaboration between the City, Snuneymuxw First Nation, Departure Bay Neighborhood Association, and Departure Bay Streamkeepers to

enhance fish and wildlife habitat and create more opportunity for residents to enjoy nature in their neighborhood.

The topics below summarize recent progress and introduce potential next steps to manage and restore habitat in Nanaimo:

Support Stream / Fish / Amphibian Habitat
Control Sediments and Erosion, Pollutants
Support Bird / Bat / Pollinator Populations

Support Stream / Fish / Amphibian Habitat

Subject areas considered under this topic include:

Instream Habitat Complexing
Riparian Area / Shade Integrity
Provision of Fish Passage / remove barriers
Stream Daylighting and complexing
Estuary Habitat Improvements
Foreshore Habitat Improvements

RECENT PROGRESS IN NANAIMO

Nanaimo's OCP Development Permit Areas (DPAs) include:

- ▶ Watercourse DPAs to protect watercourses and their streamside riparian areas.
- ▶ Environmentally Sensitive DPAs and Development Approval Information Areas that require environmental assessments to define non-disturbance areas to protect sensitive ecosystems.

Nanaimo Watercourses Development Permit Areas require a development permit for removal of soil, vegetation, trees, paving, and construction in areas within a Streamside Protection and Enhancement Area. The Zoning Bylaw 4500 includes specific setback requirements.

New development is required to follow sustainability checklists that encourage a high standard in climate-conscious and eco-friendly design.

POTENTIAL NEXT STEPS

- ▶ Continue estuary and riparian area restoration projects in cooperation with Regional District of Nanaimo, Snuneymuxw First Nation and community groups.
- ▶ Improvements to fish passage, estuaries and marine foreshore, considering green shores where applicable.
- ▶ Update educational materials on the importance to fish and aquatic habitat of riparian area conservation/restoration, stormwater source controls and infiltration to groundwater, and erosion and sediment and other pollution controls.
- ▶ Add a ticketing offence to address minor non-conformance with riparian protection requirements.

KEY POLICY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ [Canada DFO - Shoreline Structures Environmental Design \(2002\)](#)
 - **Purpose:** To mitigate negative impacts from shoreline development on fish and wildlife habitats.
 - **Method:** Includes planning and management guidance and detailed environmental design concepts.
- ▶ [Seattle - Cedar River Watershed Aquatic and Riparian Restoration Strategic Plans \(2008\)](#)
 - **Purpose:** To restore aquatic and riparian ecosystem services and evaluate success
 - **Method:** Includes a framework for implementing aquatic and riparian restoration, strategies for screening and prioritizing sites for restoration, and for documenting projects.

OTHER BACKGROUND LINKS

- ▶ [Portland - Salmon Safe Certification Report \(2016\)](#)
 - **Purpose:** To acknowledge ecologically sustainable land management practices.
 - **Method:** Includes an evaluation of Portland's watershed management policies and programs.
- ▶ [Seattle - Landscape Synthesis Framework for Cedar River Watershed \(2009\)](#)
 - **Purpose:** To provide guidance for planning and implementing restoration, protection, and conservation projects over a 50-year timeframe.
 - **Method:** Uses a landscape template to guide ecosystem conservation and restoration.

Support Bird / Bat and Pollinator Populations

Subject areas considered under this topic include:

- Nesting tree conservation
- No clearing during nesting season
- Bird feeder / water best practice guidelines
- Bird domestic predator best practice guidelines/controls
- Bird / glass collision / night light best practice guidelines
- Artificial Bird Nest Boxes
- Artificial Bat Roost Boxes
- Pollinator gardens and flowering green roofs
- Insecticides (e.g. controls over use or applications)
- Biodiversity Strategies

RECENT PROGRESS IN NANAIMO

Nanaimo's OCP does not specifically mention bird, bat or pollinator populations, but the policies below are aimed at more general habitat protection:

- ▶ Protect environmentally sensitive areas, preserve aquatic habitat, and provide opportunities for nature appreciation and for fish and wildlife to thrive.
- ▶ Sustain urban forests, treed areas, and wildlife trees.
- ▶ Create a network of riparian and upland corridors to link natural habitat and support wildlife movement.

Nanaimo maintains the Pesticide Use Bylaw 2010 No. 7102 which prohibits the use and/or application of pesticides for maintaining ornamental vegetation.

Other local governments in Canada and Metro Vancouver have policies to support bird populations and pollinators, but this is a policy gap in Nanaimo. However, bird and bat habitat has been considered and implemented in Nanaimo restoration projects.

POTENTIAL NEXT STEPS

- ▶ Promote the Naturescape Series of documents (part of the Stewardship Series, and available from the Habitat Conservation Trust Fund), by adding references on the Nanaimo website. This can encourage Naturescape practices on private lands. Also consider adding these guidelines to development permit requirements and continue to incorporate them into public projects.
- ▶ Review and consider implementing a bird policy that is patterned after City of Toronto initiatives to reduce collisions of birds with large unmarked glass surfaces. Recent CSA guidelines also apply.
- ▶ Increase local knowledge and incentives for inclusion of bird and bat houses in residential yards and parks.

- ▶ Implement wildlife tree and downed large woody debris and related ecosystem biodiversity in Nanaimo parks and public works.
- ▶ Ensure tree clearing is restricted in the nesting season, in concurrence with BC Environment best practices.
- ▶ Consider partnering with the ButterflyWays project to increase pollinator gardens.
- ▶ Continue to encourage rewilded meadows (and potentially green roofs) that are designed to support pollinators.
- ▶ Develop a biodiversity strategy for Nanaimo that consolidates policies for habitat conservation, habitat restoration and Naturescape for a wide variety of species.

KEY POLICY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ [Vancouver - Bird Strategy \(2015\)](#)
 - **Purpose:** To address the biological, social and economic challenges to creating healthy conditions for native bird species.
 - **Method:** Discusses habitat loss, invasive species, pet predation, building collisions, human disturbance.
- ▶ [Vancouver - Bird Friendly landscape Operational Guidelines \(2015\)](#)
 - **Purpose:** To guide public land operations and maintenance staff, stewardship groups and landscape industry personnel in maintaining landscapes with bird-friendly methods.
 - **Method:** Defines work windows based on bird-breeding times, defines vegetation structure for bird habitat, mowing methods, use of tree and plant debris for habitat, and other habitat structures.
- ▶ [Vancouver - Bird Friendly Design Guidelines for DP \(2015\)](#)
 - **Purpose:** “To protect, enhance and create bird habitat in the city, as well as reduce threats to birds in the urban environment.”
 - **Method:** Outlines voluntary landscape and building design guidelines.

- ▶ [Toronto - Best practices for effective lighting \(2017\)](#)
 - **Purpose:** To minimize the negative impacts of urban light sources on human and nocturnal animal life.
 - **Method:** Outlines design considerations for reducing light pollution.
- ▶ [Toronto-Bird Friendly Best Management Practices “Glass” \(2016\)](#)
 - **Purpose:** To encourage architectural design that reduces bird collisions with built structures.
 - **Method:** Outlines architectural design best practices.
- ▶ [Calgary - Responsible Pet Ownership Bylaw](#)
 - **Purpose:** “To ensure that cats and dogs live in safety and harmony with their owners and neighbours.
 - **Method:** A bylaw barring pets from being at large. Calgary was given the inaugural Safe Cats Safe Birds Award from Nature Canada.
- ▶ [Richmond – Bat Friendly Community Certification](#)
 - [Richmond Bat Public Info Web Page](#)
 - **Purpose:** To recognize municipalities that protect and create habitat, provide information about bats to residences, and promote bat education.
 - Richmond was the first lower mainland community to achieve this certification. Their initiatives include: Terra Nova Park, Richmond Nature Park, ecological management policies, pesticide and riparian response policies.
- ▶ [Community Bat Projects of BC – BC Bat Friendly Communities Guide \(2018\)](#)
 - **Purpose:** To help communities manage and enhance bat habitat.
 - **Method:** Includes basic information about bats and tools for protecting habitat, creating habitat, and mitigating hazards to bats.
- ▶ [Naturescape British Columbia Guides](#)
 - **Purpose:** To restore, preserve, and enhance wildlife habitat in urban and rural landscapes.
 - **Method:** Includes information on how to plan projects, describes various types of habitat elements and how to maintain them.
- ▶ [Port Moody Naturescape Policy](#)
 - **Purpose:** To support residents in implementing Naturescape principles on private property, and to mandate NatureScape principles on City projects.
 - **Method:** Includes landscape design principles and education and outreach resources.
- ▶ [Pollinator Partnership Canada - Selecting Plants for Pollinators Lower Mainland \(2017\)](#)
 - **Purpose:** To improve the health of pollinator populations by educating the public on plant species selection.
 - **Method:** Lists plant species native to Lower Mainland Eco-region that attract pollinators.
- ▶ [Toronto - Pollinator Protection Strategy \(2018\)](#)
 - **Purpose:** To protect and sustain healthy pollinator populations.
 - **Method:** Outlines actions the City and public can take.
- ▶ [Suzuki Foundation - Butterfly Ways](#)
 - **Purpose:** To protect and sustain healthy butterfly populations.
 - **Method:** Outlines actions the public can take.
- ▶ [City of Coquitlam – Landscaping Near Sensitive Bear Habitat](#)
 - **Purpose:** To discourage bears from visiting residential landscapes.
 - **Method:** Outlines landscape design and maintenance practices.
- ▶ [Edmonton - Wildlife Passage Engineering Guidelines \(2010\)](#)
 - **Purpose:** To maintain habitat connectivity and reduce human contact in transportation projects.
 - **Method:** Provides transportation designers with design recommendations.

- ▶ [Toronto Guidelines for Biodiverse Green Roofs \(2013\)](#)
 - **Purpose:** To create habitat and promote biodiversity on green roofs.
 - **Method:** Outlines design guidelines.

OTHER BACKGROUND LINKS

- ▶ [Vancouver Biodiversity Strategy \(2016\)](#)
 - **Purpose:** To support biodiversity in parks and other public and private lands.
 - **Method:** Outlines goals, targets, objectives, and actions.

URBAN FOREST AND VEGETATION COVER

Nanaimo's urban forest protection regulations encourage street trees and retention of natural forest areas in our parks and neighbourhoods. Forest areas support rainwater management and healthy streams.

New streets commonly have boulevards with a growing inventory of urban street trees.

The topics below summarize recent progress and introduce potential next steps to manage the urban forest in Nanaimo:

- Control Invasive Species
- Manage Natural Woodland Areas
- Manage Private Trees
- Manage Street Trees

Control Invasive Species

Subject areas considered under this topic include:

- Vegetation Invasives Management in City Parks / Streets
- Vegetation Invasives Management on Private Lands
- Wildlife Invasives Management e.g. Canada Geese

RECENT PROGRESS IN NANAIMO

Nanaimo's OCP and development permits do not address invasive species specifically, other than a prohibition on planting invasive species. Nanaimo maintains the Pesticide Use Bylaw 2010 No. 7102 which prohibits the use and/or application of pesticides for maintaining ornamental landscapes.

Nanaimo's *Controlling Invasive Plants: Information and Process Package* provides background, identification and management techniques for key invasive plants in Nanaimo. Volunteers in Parks is a program that includes removal of invasive plants.

POTENTIAL NEXT STEPS

- ▶ Create an invasive plant inventory and update it every 5 years.
- ▶ Continue to organize a community-supported workplan that encourages volunteers to reverse invasive species incursions into Nanaimo lands.
- ▶ Publicize recent accomplishments and current challenges and priorities.
- ▶ Re-invigorate Nanaimo and partnership actions to continue to manage removal of priority invasive species and replanting of eradicated sites with desirable native species where appropriate.
- ▶ Consider implementation of a noxious weed control bylaw and related ticketing enforcement for select species on private lands.

KEY POLICY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ City of North Vancouver Invasive Plant Management Strategy (updated 2013)
 - **Purpose:** To organize volunteer efforts to remove invasives from parks.
 - **Method:** Focusses efforts on about 20% of City park areas that were invaded
- ▶ [Portland - Invasive Plants Management Strategy \(2008\) and Invasive Plant Policy Review \(2011\)](#)
 - **Purpose:** To reduce invasive plant populations.
 - **Method:** Identifies how invasive plant management practices can be integrated into City programs, estimates costs, identifies potential funding sources.
- ▶ [Portland - Integrated Pest Management Program \(2019\)](#)
 - **Purpose:** “To manage pests that are harmful to the health, function or aesthetic value of park landscapes in an efficient, effective, and environmentally responsible manner, while paying careful attention to public and employee safety.”
 - **Method:** Procedures for applying and handling pesticides in various environments and for various pest types.
- ▶ [Vancouver - Integrated Pest Management Policy](#)
 - **Purpose:** To reduce pesticide use in the management of public lands.
 - **Method:** Primarily use cultural and biological controls.
- ▶ [Metro Vancouver – Livestock Invasive Plant Control Pilot \(\\$150K, 3-year program\)](#)
 - **Purpose:** To test alternatives to pesticides for invasive plant control.
 - **Method:** Includes investigating the feasibility, costs, benefits of targeted grazing, and field testing with contractors.

Manage Natural Woodland Areas, Street and Private Property Trees

Subject areas considered under this topic include:

- Forest Management for Species / Age Diversity
- Forest Management for Cover / Erosion Control
- Conservation of Forest Endangered / of Concern Species
- Expansion of Woodland Areas
- Street Tree and Urban Forest Canopy Resilience through Species / Age Diversity
- Replacement and Expansion of Street Tree Cover
- Tree Protection Requirements
- Protection During Construction
- Tree Replacement Requirements

RECENT PROGRESS IN NANAIMO

Nanaimo's OCP includes the following policies for its natural woodlands and urban trees:

- ▶ Protect environmentally sensitive areas, preserve aquatic habitat, and provide opportunities for nature appreciation and for fish and wildlife to thrive.
- ▶ Design with nature to protect hillside character using cluster development to preserve open space.
- ▶ Sustain urban forests, treed areas, and wildlife trees.
- ▶ Create a network of riparian and upland corridors to link natural habitat and support wildlife movement.

Nanaimo's Management and Protection of Trees Bylaw 2013 No. 7126 sets out requirements for tree permits, Tree Management Plans, tree protection and replacement. Heritage Trees are identified.

Nanaimo provides a Tree Voucher which subsidizes the cost of planting trees on private land.

The *Urban Forest Management Strategy* (2010) provides an overview of Nanaimo's urban forest, its benefits and management. Appendices address tree health, planting species and guidelines.

A climate-related trend that has been noted but not quantified is stress and dieback associated with some tree species – particularly western red cedar. It is suspected that this dieback is related to on-going heat and water stress associated with longer summer dry periods than historic norms. This theory warrants further research and identification of management actions if necessary.

POTENTIAL NEXT STEPS

- ▶ Undertake a supplementary study to the 2010 *Urban Forest Management Strategy* to assess the cause and future trend of climate change on both the park forested areas and on free-standing native trees in Nanaimo. Recommend management actions if appropriate (e.g. whether to allow stress and dieback to occur as a contributor to wildlife trees, or whether and where to intervene with soil or water supports, etc.).
- ▶ Review the implementation status and upcoming programs to implement existing and new recommendations in the *Urban Forest Management Strategy*, considering select stand thinning and

underplanting with climax species, additional control of trail erosion and human encroachment into wooded areas, ongoing invasive species management and riparian restoration, and ecologically sensitive management of danger trees within reach of trails, parking and overhead power lines.

KEY POLICY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ [Vancouver-Urban Forest Strategy \(2018\)](#)
 - **Purpose:** To protect and enhance Vancouver’s urban forest.
 - **Method:** Sets goals, targets, and actions, and recommends policy updates.
- ▶ [Metro Vancouver -Urban Forest Climate Adaptation Framework \(2017\)](#)
 - **Purpose:** To increasing the resilience of the urban forest to climate change.
 - **Method:** Includes an identification of risks, assessment of regional vulnerability, and a framework and guidelines for building resilience.
- ▶ [King County - Forest Carbon Credit Program](#)
 - **Purpose:** To protect existing tree canopy and provide more public parks.
 - **Method:** Creates carbon credits by permanently protecting threatened forests and tree canopy.
- ▶ [City of North Vancouver – Street Tree Master Plan \(2004\)](#)
 - **Purpose:** To create a long-term planning framework for the planting, maintenance and funding of the Nanaimo’s street trees.
 - **Method:** Defines goals and principles, outlines design and management guidelines, an implementation and maintenance strategy, tree protection guidelines, and tree planting and maintenance standards and specifications.
- ▶ [Metro Vancouver - Design Guidebook Maximizing Climate Adaptation Benefits Trees \(2017\)](#)
 - **Purpose:** To support landscape design projects, design guidelines updates, and the design of new developments.
 - **Method:** Describes the climate adaptation benefits of trees and outlines checklists for success for tree planting in various contexts.
- ▶ [Portland - Free Street Tree program](#)
 - **Purpose:** To increase urban tree canopy cover.
 - **Method:** “Provides free street trees and four years of establishment care (including watering) for commercial, industrial, and multi-family residential properties.”
- ▶ [Seattle Green Factor Program \(Code Chapter 23.86.019 Green Factor measurement\)](#)
 - **Purpose:** To improve the quality and quantity of landscaping in new development.
 - **Method:** Defines a score-based code requirement.
- ▶ [City of New Westminster – Tree Protection Program](#)
 - **Purpose:** To decrease urban forest canopy decline.
 - **Method:** Establishes a bylaw and permitting requirements.

URBAN AGRICULTURE

Urban agriculture is ‘growing food within an urban area, where agricultural land did not previously exist. It includes community gardens, farmers markets, hobby beekeeping, keeping urban chickens, shared garden plots,

edible landscapes, and growing food in your backyard' (City of North Vancouver Living City Summary Report).

Support Local Edible Gardens and Local Food Use

Subject areas considered in this topic include:

- Public Community Edible Garden systems / supports
- Support for food gardens on private lands / roof / yards
- Support for community markets to exchange local food
- Support for walk-to groceries with local food
- Support for local food restaurants
- Support for local food delivery
- Bee-keeping policies
- Poultry policies
- Provisions for other livestock

RECENT PROGRESS IN NANAIMO

Nanaimo's OCP includes a section on Food Security:

- ▶ Develop sustainable local food systems.
- ▶ Encourage partnerships for food security.
- ▶ Ensure access to food.

The OCP policies list a variety of actions to support local urban agriculture and food security.

Nanaimo Zoning Bylaw 4500 allow urban food gardens and roadside stands in all zones, subject to conditions.

POTENTIAL NEXT STEPS

- ▶ In coordination with steps to increase absorbent landscape and water conservation, encourage land managers and homeowners to include food production in their landscape areas. Exempt edible food garden areas from calculations for stormwater or water use budgets.
- ▶ Consider community interest in additional community gardens. Candidate locations may be found in the expanding open space system, in either parks or large roadside spaces that are otherwise underutilized, subject to meeting safety considerations.
- ▶ Nanaimo may consider whether parts of the parks system can be partners with Metro Vancouver or local Regional Districts in exploring use of livestock (e.g. goats, sheep) for invasive vegetation control.

KEY POLICY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ [Vancouver - Urban Agriculture Policy for Parks \(2015\)](#)

- **Purpose:** To assist residents and community groups in finding suitable land and connecting project partners.
- **Method:** Sets criteria for public consultation, requirements for how urban agriculture projects can operate.
- ▶ [Vancouver - Urban Agriculture Design Guidelines for Private Realm](#)
 - **Purpose:** To provide guidance to designers of urban agriculture installations, and to guide City staff in assessing proposals for new installations
 - **Method:** Outlines design considerations and lists appropriate edible plant species.
- ▶ [Vancouver – Food Strategy \(2013\)](#)
 - **Purpose:** To improve equity and sustainability in Vancouver’s food system.
 - **Method:** Includes public consultation, identification of gaps and vulnerabilities, defines goals, principles, and actions for food production, processing, access, and waste.

- ▶ [Seattle – Food Action Plan \(2012\)](#)
 - **Purpose:** “To get more healthy food to more Seattle residents, expand opportunities to grow food in the City, strengthen our regional food economy, and reduce food-related waste.”
 - **Method:** Defines 40 actions to be implemented.
- ▶ [Portland – Urban Food Zoning Code Update \(2012\)](#)
 - **Purpose:** To “support community food production and distribution with the primary goal of increasing access to healthful affordable food for all Portland residents.”
 - **Method:** Proposes zoning code amendments.
- ▶ [Vancouver - Urban Honey Beekeeping Bulletin \(2015\)](#)
 - **Purpose:** To ensure public safety and bee health.
 - **Method:** Outlines requirements and responsibilities for urban beekeepers.
- ▶ [Vancouver - Backyard Hens Guidelines \(2010\)](#)
 - **Purpose:** To ensure public safety and hen health.
 - **Method:** Includes recommendations for the humane and sanitary keeping of backyard hens and includes bylaw amendments.
- ▶ [Seattle - Urban Agriculture Permits](#)
 - **Purpose:** To “create a more sustainable and secure local food system by increasing opportunities to grow and sell food in all zones.”
 - **Method:** Changes to the land use code.
 -

OTHER BACKGROUND LINKS

- ▶ [Vancouver - Community Garden Portal \(web page\)](#)
 - **Purpose:** To direct residents to nearby community gardens.
 - **Method:** Includes a map of community gardens and instructions on how to apply for a plot.

ENVIRONMENTAL PERFORMANCE MONITORING / EDUCATION

Subject areas considered under this topic include:

Environmental Rating Systems
Public Information, Events and Training

Environmental Rating Systems

Subject areas considered under this topic include the following monitoring and performance rating systems:

LEED (Leadership in Energy and Environmental Design)

A widely used building rating system that recognizes building projects for meeting environmental performance criteria. Performance metrics have been established for many criteria: project location, transportation access, sustainable site development practices, water efficiency, energy and emission efficiency, materials and resource use, indoor environment quality, and innovative practices.

SITES (Sustainable Sites Initiative)

A landscape rating system that recognizes development projects all scales (larger than 185.8 m²) for meeting environmental and social performance criteria. Performance metrics have been established for many criteria including: site selection, pre-design site assessment practices, water management, management of soils and vegetation, material use, human health and well-being, construction practices, site operations and maintenance, education and performance monitoring, and innovative practices.

Green Shores

A rating system that recognizes coastal development projects for minimizing their environmental impacts and restoring previously degraded ecosystem functions. In addition to the rating system, Green Shores also delivers educational sessions and publishes design guides to empower developers, designers, and homeowners to implement sustainable coastal development practices. Performance metrics have been established for many criteria, including: Site selection, site design, impacts on the public, habitats, stormwater, sedimentation, contamination, and climate change.

ENVISION

A rating system that recognizes civil infrastructure projects for sustainable planning, design, construction, and operation. Performance metrics have been established for many criteria, including quality of life, leadership, resource allocation, natural world, climate change, and risks.

MetroVan Stormwater Monitoring Program

Although not a full rating system comparable to the programs listed above, Metro Vancouver municipalities are following requirements for regular monitoring of flows and water quality in surface watercourses and pipe outfalls. Guidance is given for adaptive management to meet targets.

RECENT PROGRESS IN NANAIMO

Nanaimo often meets LEED standards in its new public buildings.

Nanaimo's Climate Change Resilience Strategy (2020) recommends a set of indicators for adaptation action implementation.

Water quality testing in Nanaimo has been focussed on drinking water quality – where on-going testing and regular reports are provided. Monitoring of habitat values e.g. stream water quality is less consistent.

POTENTIAL NEXT STEPS

- ▶ Establish budgets and targets using the indicators in the Climate Change Resilience Strategy (2020), and monitor for success.
- ▶ Review the potential integration of LEED, SITES and/or ENVISION rating systems to provide better inclusion of site and engineering considerations in development and municipal projects.
- ▶ Implement stormwater monitoring programs and testing (consider Metro Vancouver guidelines). BIBI (Benthic Index of Biological Integrity) is a common measure to monitor watercourse and watershed ecosystems health.
- ▶ Expand testing of water quality in stormwater piped systems and choose priorities for water quality treatment installations to reduce sediment and pollutant loads from piped outfalls to watercourses or the harbour.
- ▶ Consider if there are locations in Nanaimo where the Green Shores rating system could be applicable.

KEY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ [City of Vancouver requires that all new municipal facilities be built to Leadership in Energy and Design \(LEED\) Gold](#)
 - **Purpose:** To improve the sustainability of City facilities.
 - **Method:** Internal City policy.
- ▶ [Seattle Green Factor – score-based code requirement \(Code Chapter 23.86.019\)](#)
 - **Purpose:** To increase the quality and quantity of landscaping in new developments.
 - **Method:** A score-based code requirement.
- ▶ [Seattle - Code Chapter 23.58D Green Building Standard](#)
 - **Purpose:** To reduce resource consumption and promote clean renewable energy.
 - **Method:** A land use regulation establishing that green buildings standards are required for developers to gain additional height, floor area or density, or an expedited permitting process.
- ▶ [Seattle - Sustainable Buildings and Sites Policy \(2011\)](#)
 - **Purpose:** “To maximize the environmental quality, economic vitality, and social health” of Seattle.
 - **Method:** Policy requiring development on City-owned properties to achieve LEED Gold or greater.
- ▶ [Portland - Watershed Monitoring Program \(2011\)](#)
 - **Purpose:** To measure the effectiveness of watershed protection actions, demonstrate compliance with federal regulations, and compare data with others.

- **Method:** Based on a national monitoring program EMAP (Environmental Monitoring and Assessment) using probabilistic survey design.
- ▶ [Portland - Stormwater Management Facility Monitoring Reports](#)
 - **Purpose:** To monitor performance to quantify benefits, lower maintenance costs, ensure public safety, and improve design and function.
 - **Method:** Includes infiltration testing, flow metering, flow testing, water quality sampling, and sediment and soil sampling.
- ▶ [Portland Tree Canopy Monitoring Report \(2017\)](#)
 - **Purpose:** “To understand how canopy may be changing, and understanding canopy trends will allow managers to make important decisions regarding management strategies.”
 - **Method:** Uses aerial photos to measure canopy cover over time.

Public Information, Events and Training

Subject areas considered in this topic include:

- City Web and Print Information
- Information Partnerships with Senior/Adjacent Agencies
- Cooperation with School Districts
- Cooperation with First Nations
- Cooperation with Stewardship Non-Government Organizations
- Cooperation with Professional Associations
- Cooperation with Health Authority
- Cooperation Business and Industry

RECENT PROGRESS IN NANAIMO

Nanaimo is in active partnerships with Snuneymuxw First Nation, Provincial Agencies such as BC Housing, the School District and local stewardship groups

POTENTIAL NEXT STEPS

- ▶ Consider further partnerships with adjacent RDN communities and the School District and VIU to co-fund and co-support public outreach and education programs.

KEY POLICY PRECEDENTS

The following precedents are selected from a review of current published documents in the Pacific Northwest.

- ▶ [Vancouver - Environmental Education Stewardship Action Plan \(2014\)](#)
 - **Purpose:** To improve and enhance public experiences of nature and increase understanding and awareness of nature.
 - **Method:** Includes a park stewardship program, educational programming, and funding for public-led projects.
- ▶ [WildBC - Get Outdoors Educators Guide](#)
 - **Purpose:** To empower educators to use parks and schoolgrounds as outdoor classrooms.
 - **Method:** An educator's guide, including activities for K to 12.
- ▶ [Portland - Stewardship Community Partner Program](#)
 - **Purpose:** To encourage the public to adopt green spaces.
 - **Method:** A partnership with City transportation department, the community partner maintains the adopted space.
- ▶ [Seattle - Right Place Right Project Community Partnerships \(2015\)](#)
 - **Purpose:** To help the public select appropriate stormwater BMPs for their location
 - **Method:** Includes site selection criteria, partnership opportunities, and grant assistance.