



THEME D: ECOSYSTEMS



THEME D: Introduction



While Surrey has been settled by people of European descent for almost 150 years and virtually all of its original forests and wetlands have been modified by human activity, the City still contains diverse and healthy natural ecosystems that support a rich biodiversity. These ecosystems include extensive tidal flats around Boundary Bay, salmon-bearing streams and their riparian corridors, mature second-growth forests, wetlands, old fields and meadows and successional woodlands. Many of the most significant ecosystems are protected in Regional or City parks or in wildlife management areas; however, other important natural areas exist on private property that have urban development or agricultural potential.

The City of Surrey is committed to identifying and protecting its significant ecosystems and the elements supporting its biodiversity, and managing these public lands to maintain a healthy natural environment. The City also influences the management of private lands that contribute to ecological health through regulation and by encouraging best practices.

THEME D: Objectives

1. Identify, protect, enhance and manage Surrey's biodiversity and network of significant natural ecosystems.
2. Reduce exposure to natural hazards through the appropriate location and design of development.
3. Encourage and implement greener development and building practices to improve water, air, soil and habitat quality.
4. Design a community that is energy-efficient, reduces carbon emissions and adapts to a changing climate.

THEME D: ECOSYSTEMS

Protect and Enhance Healthy Ecosystems and Practice Sustainable Development

Sections

D1 Green Infrastructure and Ecosystem Management

D2 Hazard Lands

D3 Greener Site Development

D4 Energy, Emissions and Climate Resiliency



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D1 Green Infrastructure and Ecosystem Management

Identify, protect, enhance and manage Surrey’s biodiversity and network of significant natural ecosystems

The foundation of ecosystem management is the identification and protection of sensitive and significant ecosystems. The protection of Surrey’s natural ecology, one of the City’s most valuable assets, will ensure Surrey remains a highly livable, attractive and memorable place to live, work or play.

The *Ecosystem Management Strategy* (EMS) identifies a Green Infrastructure Network (GIN) made up of natural elements that exist at a site, neighbourhood, community, or regional scale. The GIN is a natural interconnected network that conserves natural ecosystem values and functions and that sustains clean air and water. The GIN provides a wide array of benefits to people and wildlife and helps the City of Surrey establish priorities for environmental management.

In order to meet Objective D1, the City will:

D1 POLICIES: General

- D1.1 Utilize the *Ecosystem Management Strategy* and the *Biodiversity Conservation Strategy* (as amended) to guide the management and protection of Surrey’s diverse ecosystems.



City of Surrey Biodiversity Conservation Strategy (2013).

D1 POLICIES: Green Infrastructure Network

- D1.2 Establish plans, strategies and policies to protect, enhance and manage the *Ecosystem Management Strategy* (as amended) Green Infrastructure Network (GIN) as shown in Figure 36 by:
- Strategically acquiring land for ecosystem conservation purposes
 - Identifying natural areas for protection in the preparation of Secondary Plans
 - Implementing Development Permit Guidelines for the protection of the natural environment as detailed in DP3 of the Implementation Section of this OCP.
- D1.3 Identify and continue to work toward identifying and protecting sensitive fisheries zones including aquatic habitats, wetlands and riparian areas as defined in conjunction with other agencies and as shown in Figure 37.
- D1.4 Preserve riparian areas and watercourses in their natural state and link them with upland natural areas to develop a connected network of natural areas throughout Surrey.
- D1.5 Facilitate wildlife movement and habitat protection by conserving, enhancing and promoting wildlife corridors through parks and by connecting hubs, open spaces and riparian areas.
- D1.6 Work toward protecting existing natural urban forests and natural vegetative coverage to maximize Surrey’s tree canopy and reach the target goal of 40 percent (40%) canopy coverage for the entire city
- D1.7 Develop and implement strategies for protecting and enhancing biodiversity throughout Surrey, such as:
- Employing conservation tools, for example, covenants, eco-gifting programs and land trusts and incentives, to encourage environmental protection on private lands
 - Retaining and protecting significant trees and undisturbed natural vegetation areas through the development process and the implementation of *Surrey’s Tree Protection By-law* (as amended) and other regulatory by-laws to achieve the City’s conservation objectives
 - Encouraging the clustering of development to achieve conservation objectives
 - Using natural buffers to manage transitions between development and Conservation/Recreation designated lands.
- D1.8 Encourage and promote the planting of native vegetation and trees on public and private property to increase overall tree canopy coverage and to enhance wildlife populations and habitat quality.
- D1.9 Encourage ecological restoration of riparian and/or significant natural areas to improve stream health, to support biodiversity and to improve ecological health of the Green Infrastructure Network.

Natural infrastructure systems in Surrey.



Figure 36: EMS Green Infrastructure Network (GIN)

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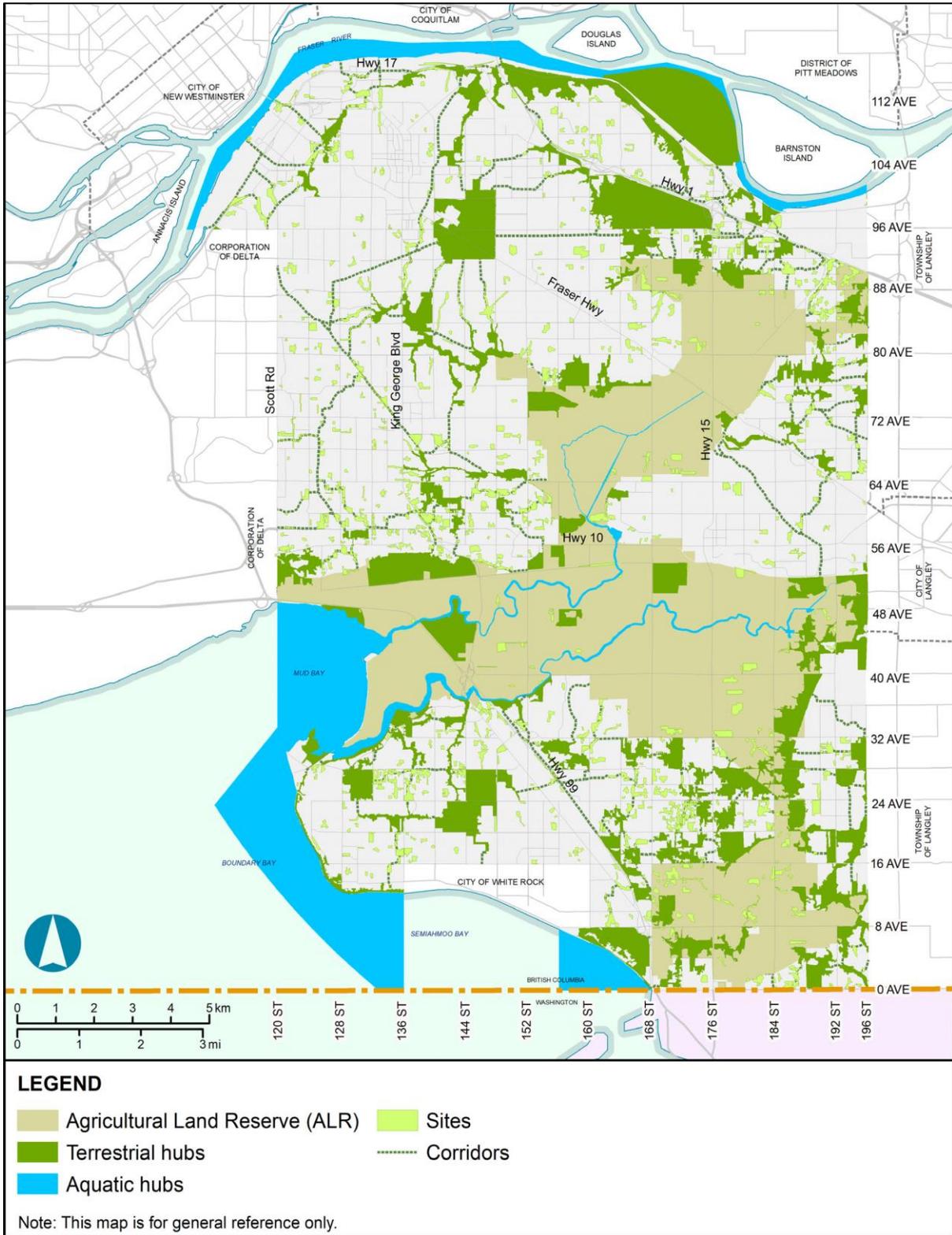
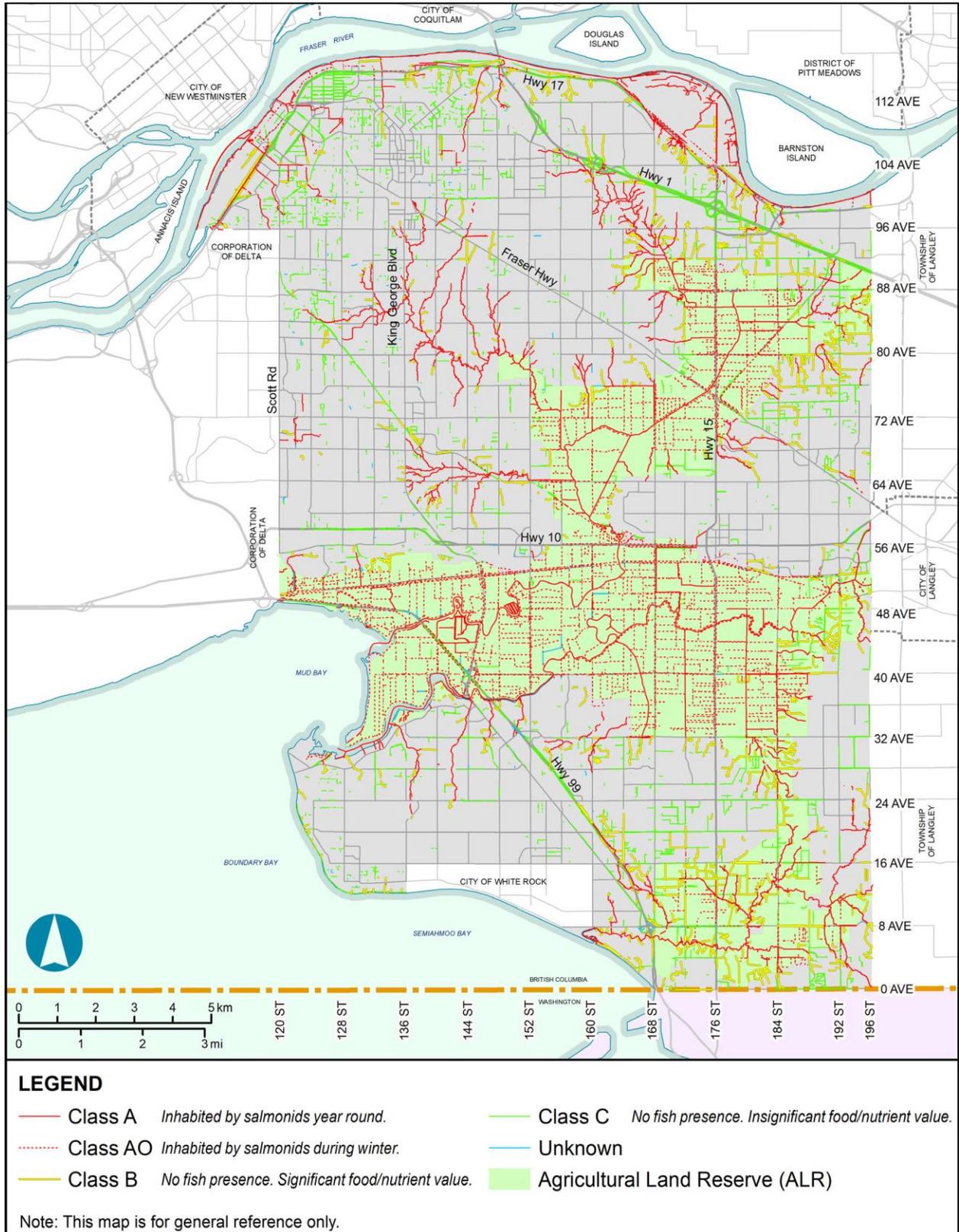


Figure 37: Fish Watercourse Classifications

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D1 POLICIES: Partnerships and Education

- D1.10 Support and partner with senior governments, Metro Vancouver and other local governments and agencies to protect sensitive ecosystems in Surrey.
- D1.11 Work cooperatively with the farming community to identify opportunities to protect and enhance wildlife habitat in agricultural lands, while recognizing the primary role of food production.
- D1.12 Work with the development community, and community stakeholders groups such as watershed stewardship groups, environmental groups and the City’s Environmental Sustainability Advisory Committee (ESAC), to identify opportunities to enhance biodiversity at all levels.
- D1.13 Continue to develop programs and information supplements that raise public awareness and understanding about ecosystem planning and management.
- D1.14 Develop educational and instructional programs that help property owners understand how to retain natural vegetative cover and how to use native and drought resistant plants.
- D1.15 Use Surrey’s Environmental Sustainability Advisory Committee (ESAC) to provide input and advice on environmental issues in relation to City policies and initiatives.

Example of signage used to educate users of sensitive ecosystem areas; located at entrance to Serpentine Wildlife Area in South Surrey.



D1 POLICIES: Implementation

- D1.16 Incorporate the protection and restoration of ecosystems and biodiversity into all Secondary Plans and Local Area Plans.
- D1.17 Consider biodiversity objectives in the design and review of all capital projects and the review of all development applications.
- D1.18 Incorporate wildlife habitat considerations into capital project planning and construction including using narrower roads, wildlife bridges or large culvert underpasses, where feasible.
- D1.19 Use Development Permit Guidelines to reduce night light pollution in urban areas.
- D1.20 Investigate the use of financial tools as a way to protect significant natural hubs and sites within Surrey's Green Infrastructure Network.
- D1.21 Explore mechanisms to facilitate a fair and equitable distribution of the costs of managing ecosystems and biodiversity in Surrey.
- D.22 Incorporate bird-friendly designs and material specifications into Development Permit Guidelines to help reduce window collisions and bird deaths in urban areas.



Mud Bay in Surrey.

D2 Hazard Lands

Reduce exposure to natural hazards through the appropriate location and design of development

Natural hazards include such forces as flooding, landslides, land erosion, seismic movements and wildfires that threaten public safety and property. These hazards pose a greater concern in certain areas than others due to slope stability, soil conditions, floodplain elevations and proximity to sources of risk. Locating and designing development to reduce the risk of exposure to natural hazards is a key component of sustainability, ensuring public safety and reducing property loss.

In order to meet Objective D2, the City will:

D2 POLICIES: General

- D2.1 Avoid development in areas subject to natural hazards including flood-prone hazard lands and steep or unstable slopes (see Figure 38 and Figure 39) to reduce exposure to risk due to natural hazards.
- D2.2 Where development or building in areas subject to natural hazards is unavoidable, permit such development only where effective protective measures are taken as certified by a Qualified Professional (see DP2 of the Implementation Section of this OCP).
- D2.3 Work with the development and construction industry, educational institutions, professional organizations, utility companies and other levels of government to make information on sustainable development costs, benefits and implementation practices readily available, easy to understand and applicable to the development environment in Surrey.



Flooding challenges/hazards in Surrey can occur frequently in lowland areas.

D2 POLICIES: Steep Slope Hazards

- D2.4 Require geotechnical assessments for development and capital projects on slopes steeper than 20 percent (20%). The location and boundaries of known Steep Slope Hazard Lands are shown conceptually (see Figure 38). These approximate locations may be revised with additional study or as development proceeds.
- D2.5 Designate Development Permit areas and implement Development Permit Guidelines for development within Steep Slope Hazard Lands, including mitigating measures or restrictions (see DP2 of the Implementation Section of this OCP).

- D2.6 Protect identified steep slopes as green space unless shown by a geotechnical or engineering study that the steep slope can accommodate a proposed development. Development will only be supported if it can be shown by a Qualified Professional that no detrimental impact is being placed on adjacent lands or on the proposed development itself. Where it is demonstrated by a Qualified Professional that development may occur on steep slopes, the developer shall provide the City with a Save Harmless Covenant. Development must proceed in strict compliance with the recommendations of the geotechnical report.
- D2.7 Require geotechnical investigations where potentially unstable soils are encountered during development. Reports by a Qualified Professional are to determine the extent of the expanse of soils and make recommendations to eliminate or mitigate any potential hazards.

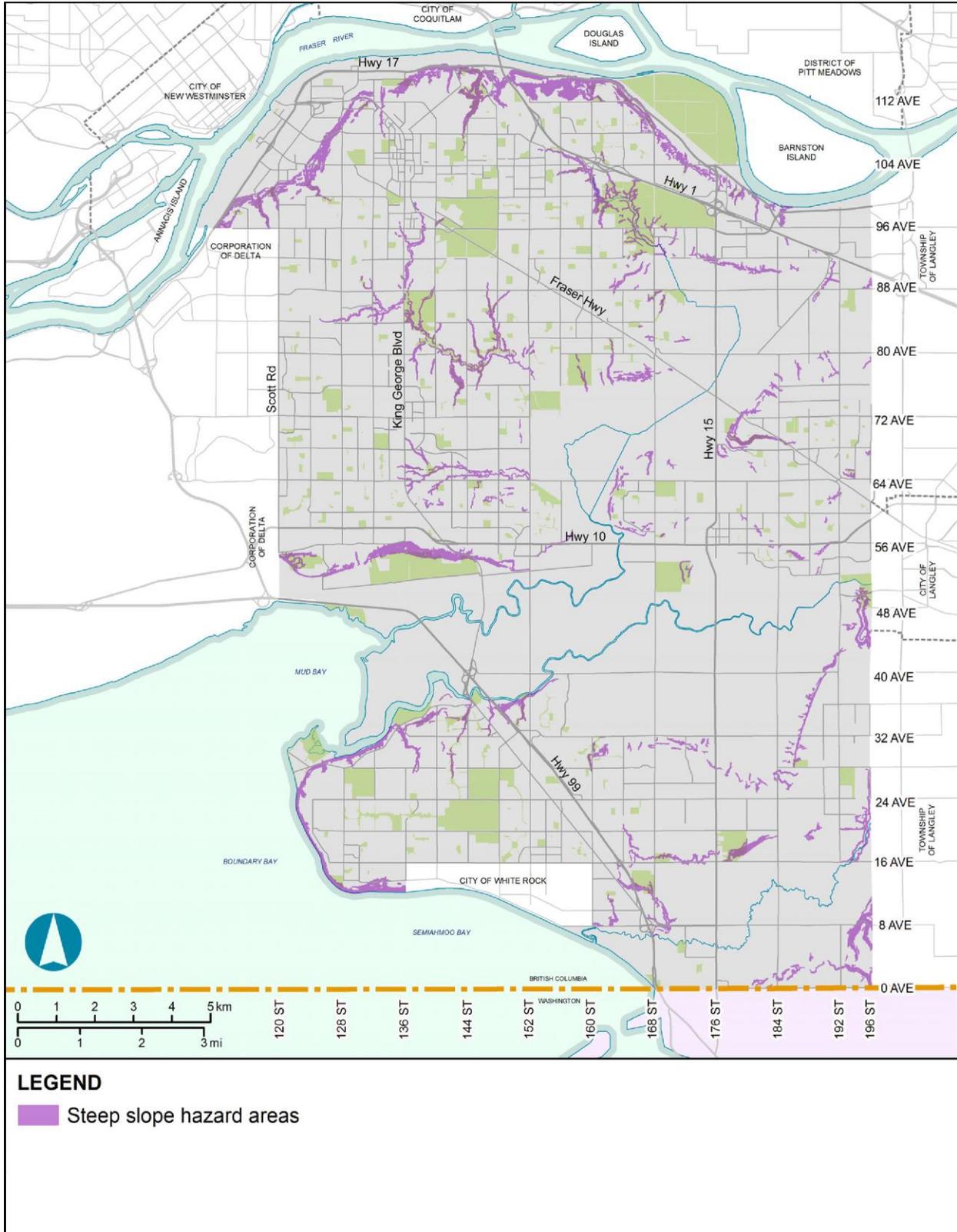
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Unstable banks and steep slope hazards in Surrey.

Figure 38: Steep Slope Hazard Areas

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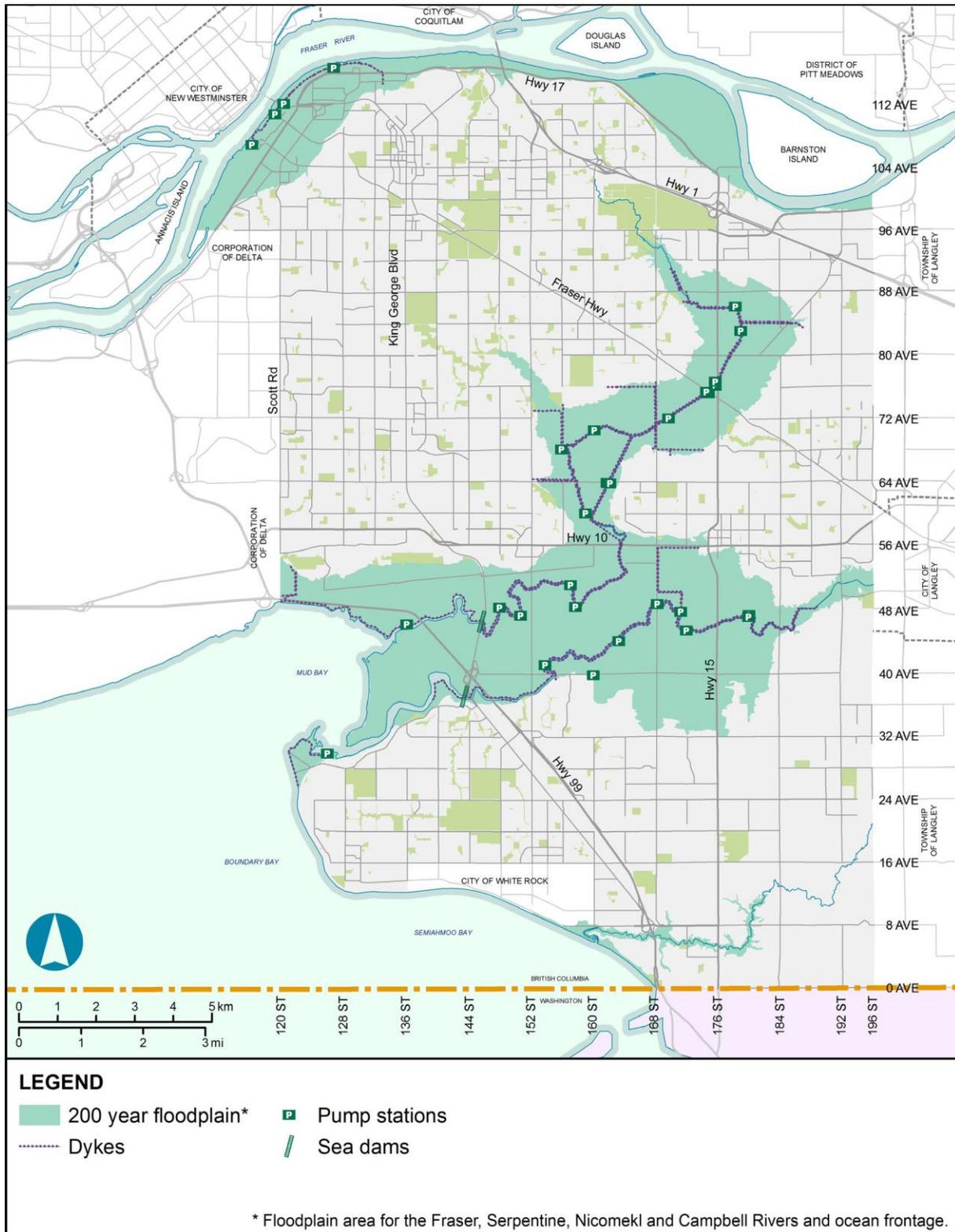
D2 POLICIES: Flood Hazards

- D2.8 Restrict new urban development in areas subject to flooding, including the 200 year floodplain of the Pacific Ocean and the Fraser, Serpentine, Nicomekl and Little Campbell Rivers, as revised from time to time (see Figure 39).
- D2.9 Permit development in areas subject to flood hazards only when it is demonstrated by a Qualified Professional that the proposal meets current flood protection requirements, at the time of development, with respect to proposed uses, building materials and required building elevations (see DP2 of the Implementation Section of this OCP). A Save Harmless Covenant indemnifying the City is required for all development within flood prone areas.
- D2.10 Consider and prepare for the projected impacts of climate change on flood hazard areas due to sea level rise and flood risk. Take into account the effects of long-term climate change such as increased flooding events, increased runoff due to development and a reduced percentage of overall mature tree cover.
- D2.11 Continue working toward meeting Agricultural and Rural Subsidiary Agreement (ARDSA) standards for flood protection in agricultural low land areas within the city.



Lowland flooding of agricultural land along the Nicomekl River in Surrey.

Figure 39: Flood Prone Hazard Areas



D3

Greener Site Development

Encourage and implement greener development and building practices to improve water, air, soil and habitat quality

“Greener development” is a term that describes when buildings, other structures and site works, such as plazas, walkways, parking areas, drainage systems and landscaping, are constructed to incorporate and enhance natural ecosystems and processes to a greater extent than conventional development. Examples of greener buildings include those that are heated or cooled using renewable energy sources that are constructed using recycled materials or that have living green roofs or walls which reduce storm runoff and provide habitat for insects and wildlife. Examples of greener site development include rain gardens, permeable pavement and parking areas, site lighting that uses renewable energy sources or plantings of native trees, and shrub communities that reduce the need for irrigation and pest control.

The City of Surrey is committed to implementing greener development practices, both in its own civic facilities and sites and in private-sector development.

In order to meet Objective D3, the City will:

D3 POLICIES: General

- D3.1 Support land development and construction that minimizes impacts on the natural environment and that enhances environmental sustainability.
- D3.2 Develop and promote educational materials and programs for developers, homeowners and professionals to encourage greener development and building practices.



Sediment from poor site development practices.

D3 POLICIES: Site Development

- D3.3 Maximize the retention of existing native vegetative cover on development sites to help provide environmental benefits by controlling development-caused erosion and runoff.

D3.4 Encourage the planting of native plants adapted to local soil and water conditions to enhance local wildlife habitat, micro-climates and air quality.

D3.5 Use and install wildlife-supporting plant communities that provide food, nutrients and habitat.

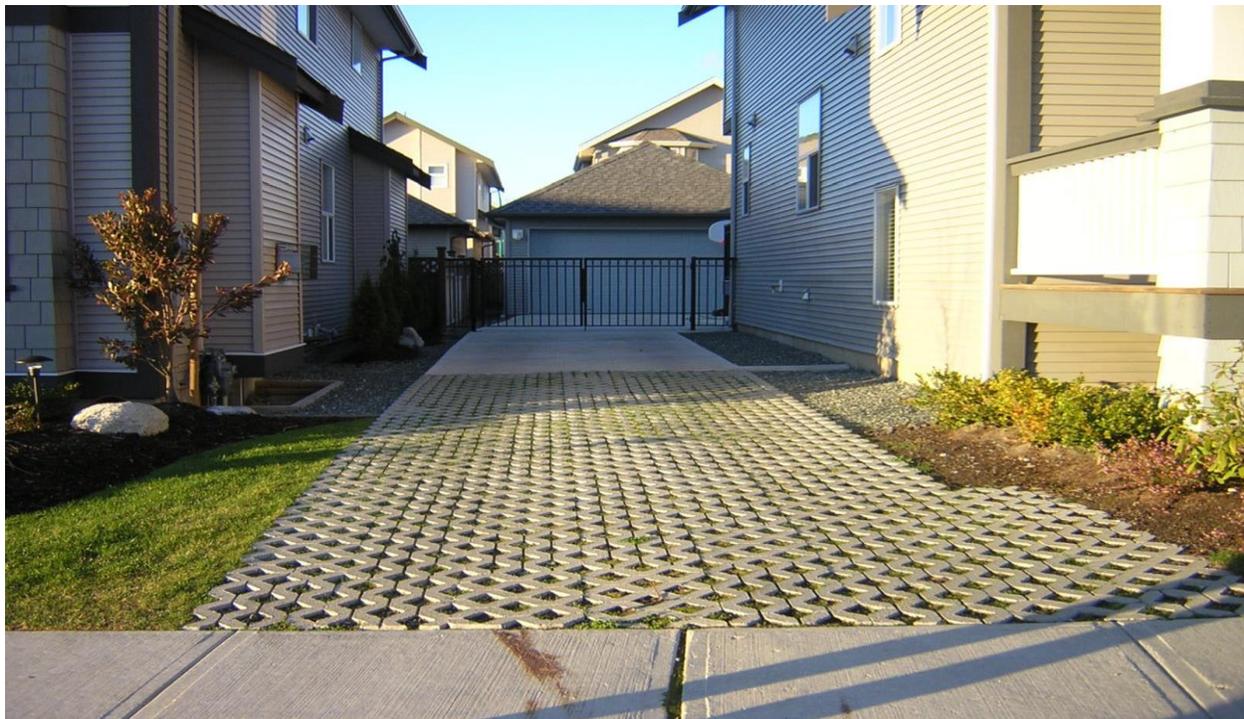
D3.6 Support sustainable development practices that reduce site erosion, maintain water quality, base flows and natural flow patterns for any receiving watercourses by limiting creek erosion, avoiding flooding and protecting aquatic habitats.

D3.7 Support site development that employs Best Management Practices that maximizes on-site infiltration of runoff and minimizes the extent of impermeable surfaces.
- D3.8 Require adequate control of sedimentation and erosion in runoff water during construction and ensure all facilities designed for erosion and sediment control meet the *Surrey Erosion and Sediment Control By-law* (as amended).

D3.9 Provide adequate growing material and soil depth on development sites and public boulevards to properly accommodate tree roots and adequate growth capacity to sustain site landscaping.

D3.10 Require the implementation of strategies for reducing construction waste and maximizing the reuse and recycling of construction material.

Green paving standards used in East Clayton neighbourhood
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D3 POLICIES: Buildings

- D3.11 Incorporate facilities for composting and recycling into development to reduce waste.
- D3.12 Encourage innovative housing and building design to achieve energy conservation, water conservation, waste reduction and greenhouse gas (GHG) reduction.
- D3.13 Integrate sustainable building features such as green roofs, green walls, rain gardens, on-site infiltration, clean energy systems, reduced light pollution, energy efficient buildings and wastewater recycling as well as community gardens into the design of buildings and sites.
- D3.14 Encourage the reduction, reuse and recycling of domestic water through appropriate site landscaping and building design technology.

D3 POLICIES: Implementation

- D3.15 Use the full range of tools available under the *Local Government Act* (as amended) to protect Surrey's ecosystems including, but not limited to, Development Approval Information Areas and Development Permit Areas and Guidelines, for the protection and management of the natural environment (see II(d) and II(e) of the Implementation Section of this OCP).
- D3.16 Evaluate and monitor development performance through the use of a sustainable development checklist to encourage greener development and building practices and to measure progress towards benchmarks for sustainability (see Implementation Section IV: Sustainability Indicators of this OCP).
- D3.17 Consider development incentives that support more energy efficient green development and building practices.



Landscaped islands in Surrey's City Centre also double as a garden.

D4

Energy, Emissions and Climate Resiliency

Design a community that is energy-efficient, reduces carbon emissions and adapts to a changing climate

Climate change is a significant global challenge with regional and local impacts, magnitude and timing that are not yet fully understood. Over the coming decades, it is expected that a changing climate will be characterized locally by drier summers with increasing drought and heat stress, and wetter winters with increasing flooding from the seasonal inundation of low-lying areas and from more intense storm events. It is also expected that higher global temperatures will result in:

- ⇒ sea level rise that will place pressure on Surrey's dyking and flood control infrastructure;
- ⇒ the possibility of higher freshet levels on the Fraser River; and
- ⇒ the loss of productive agricultural lands and natural habitats.

A separate but related issue to a changing climate is the likelihood of higher energy prices in the future as conventional energy sources are depleted and more demand pressure is placed on alternative energy sources, including hydroelectricity.

The City of Surrey is committed to reducing the use of fossil-based fuels in its corporate operations and in the community as a whole in order to reduce greenhouse gas emissions and to protect residents and business from energy price increases. The City also recognizes the need to adapt to the inevitable effects of climate change in a flexible and precautionary manner in order to protect public safety, infrastructure and property interests.

In order to meet Objective D4, the City will:

The Sustainability Dashboard is an on-line platform that tracks and shares the progress of Surrey's Sustainability Indicators over time.

SUSTAINABILITY
DASHBOARD BETA

D4 POLICIES: General

- D4.1 Implement the recommendations of Surrey’s *Community Energy and Emissions Plan* and *Corporate Emissions Action Plan* (as amended).
- D4.2a Reduce Surrey’s GHG emissions (see Figure 40) from non-agricultural and non-industrial activities to net-zero before 2050.
- D4.2b Show corporate leadership by demonstrating best practices in climate change mitigation by reducing City of Surrey corporate GHG emissions to absolute zero before 2050.
- D4.3 Support land uses, development options, transportation alternatives, built forms and infrastructure that reduce energy use and costs, integrate renewable energy sources and increase energy conservation through efficiency improvements.
- D4.4 Support the development of community-wide energy reduction targets by promoting the implementation of programs and policies that reduce energy use associated with transportation, utilities and buildings.
- D4.5 Promote the development and implementation of alternative financing strategies and mechanisms to address financial barriers associated with additional costs for efficiency and/or use of renewable energy.

D4 POLICIES: Buildings

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- D4.6 Minimize GHG emissions from buildings by using incentives and by encouraging building design and construction to exceed the *BC Building Code* (as amended) energy efficiency standards.
- D4.7 Support building designs that allow for mixed use, combining work and living spaces to reduce the need to travel for employment purposes.
- D4.8 Consider programs that advance the construction of energy-efficient development and encourage the use of, or provide incentives for, energy efficient retrofits in existing commercial, institutional and residential buildings.
- D4.9 Support building and landscaping designs that increase energy efficiency by encouraging developers to take building orientation and the local climate into consideration (e.g. passive solar building design) as part of the overall development and site design. (See DP1 of the Implementation Section of this OCP.)
- D4.10 Explore implementing requirements for new developments to accommodate infrastructure for solar hot water and/or electric vehicle charging stations.



Surrey's portable Sustainability House provides interactive information about sustainability issues.

Figure 40: Climate Change and Greenhouse Gases (GHG)

Addressing the effects of Climate Change has been referred to as the greatest challenge of our time. There is strong evidence to suggest that Climate Change is the result of greenhouse gas (GHG) emissions from human activities, primarily the burning of fossil fuels and the methane released from agricultural practices, which have the effect of retaining the sun’s energy and warming the planet above natural temperatures. The identified impacts of this warming include the loss of polar ice caps, sea level rises that threaten to flood low-lying areas, a significant increase in the number of severe weather events and the devastation of British Columbia’s forests (e.g. pine beetle infestation). If uncontrolled, it is predicted that warming could lead to the mass extinctions of one third of the planet’s species.

Transportation accounts for approximately 62% of GHG emissions in Surrey while buildings systems account for approximately 35%. Land use policies can influence transportation impacts through density and form of development while design and construction practices can make a significant impact on the energy required for buildings (e.g. heating, cooling and lighting).

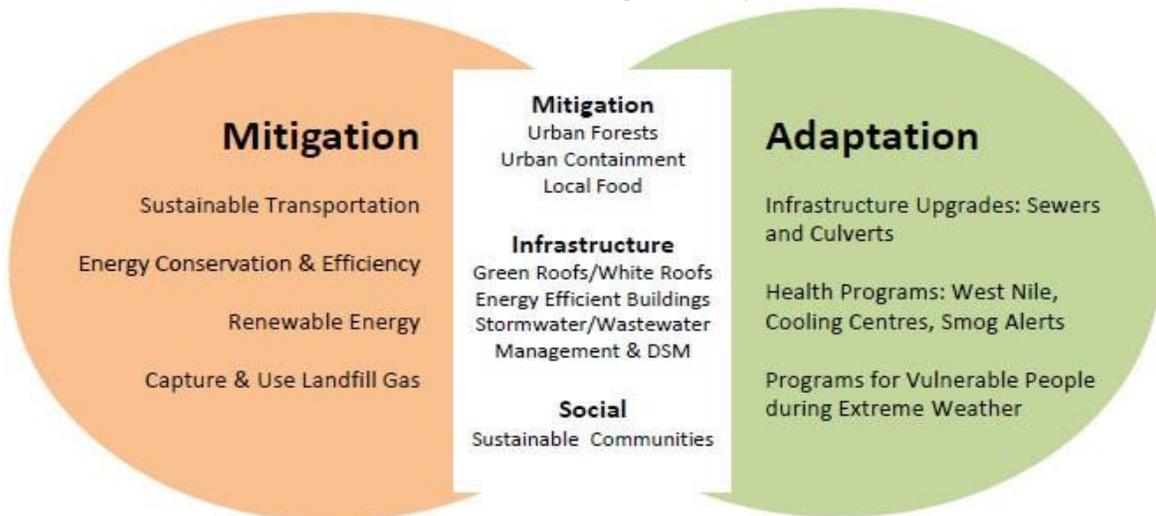
To meet the extraordinary challenge of effectively dealing with Climate Change, the Provincial government has legislated significant reductions in GHG emissions within British Columbia. Furthermore, the BC government requires local governments to establish their own GHG reduction targets and to implement policies and actions to meet these targets.

Addressing Climate Change involves the two inter-related components of mitigation and adaptation, defined as:

Mitigation : policy, regulatory or project-based measures that contribute to the stabilization or reduction of greenhouse gas concentrations in the atmosphere. Renewable energy programs, energy efficiency frameworks and substitution of fossil fuels are examples of climate change mitigation measures. Iso known as “avoiding the unmanageable”.

Adaptation: actions that respond to actual or projected climate impacts and which reduce the effects of climate change on natural or human systems (e.g. increasing drainage capacity to accommodate changing precipitation patterns). Also known as “managing the unavoidable”.

The principal long range tool for addressing climate change within the municipal sphere of influence is the creation of complete, compact communities that support the objectives of energy efficient buildings, sustainable energy systems and alternative transportation modes. Higher development densities, with a mix of land uses, are essential to achieving these objectives.



D4 POLICIES: Land Use

- D4.11 Ensure all new Neighbourhood Concept Plans (NCP) use information from appropriate agencies, including BC Hydro and Fortis BC, to determine neighbourhood-level projections and assessments of future energy use. Identify opportunities for energy efficiency improvements, energy conservation and use of renewable energy technologies.
- D4.12 Use development and design review applications, as well as Development Permit Guidelines, to implement energy policies supportive of community-based energy systems.
- D4.13 Develop policy that supports the evaluation of a development based on its projected levels of energy consumption and greenhouse gas emissions (GHG), including options for alternative energy supply such as District Energy and on-site generation of renewable energy.

D4 POLICIES: Transportation

- D4.14 Reduce GHG emissions within Surrey by focusing on the following:
- encouraging land use patterns that reduce vehicle use
 - advocating for improved vehicle efficiencies including enhanced tailpipe and vehicle emission standards
 - supporting the expanded use of alternative fuel vehicles
 - developing programs that work to eliminate unnecessary idling
 - actively promoting transportation alternatives through a range of Transportation Demand Management measures including parking management
 - continuing to work with TransLink to improve transit service.



Surrey's Electric Vehicle Fleet located at the New City

D4 POLICIES: Energy Supply

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- D4.15 Promote the use of low-carbon, renewable energy sources to reduce reliance on fossil fuels and enhance local energy security through community energy solutions.
- D4.16 Explore innovative ways to produce, supply and store energy at the building, neighbourhood and community levels.
- D4.17 Support the use of District Energy as a method of promoting energy security while providing the flexibility to integrate a range of renewable energy sources over time.
- D4.18 Focus the initial development of Surrey's District Energy system within City Centre, developing future systems in Town Centres and along high-density corridors.
- D4.19 Continue to consult with community stakeholders including the development community, land owners, residents, commercial tenants and public institutions, in the development of any District Energy system in Surrey.
- D4.20 Within designated energy service areas, develop financial and policy tools to enhance the financial viability of District Energy implementation.

D4 POLICIES: Climate Adaptation

- D4.21 Implement Surrey's *Climate Adaptation Strategy* (as amended) to aid the City in anticipating and minimizing the impacts of short-and long-term climate change on infrastructure, development, human health, water supply, energy security, drainage and flooding, agriculture and natural systems.
- D4.22 Develop guidelines that specify how building design and material specifications can be used to adapt to the impacts of climate change.
- D4.23 Incorporate climate change adaptation into the City's risk management framework to ensure integration and implementation of Surrey's *Climate Adaptation Strategy* (as amended) across City departments.



Living wall installed on Surrey's Semiahmoo