Cowichan Valley Regional District

Climate Change Adaptation and Risk Management Strategy

Prepared by ICLEI Canada
For: Cowichan Valley Regional District

CVRD

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Acknowledgements

Local government direction
The CVRD Board directed the development of the CVRD Climate Change Adaptation and Risk Management Strategy. 2020 Board members include:

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Project Team Members
The Cowichan Valley Regional District's (CVRD) Climate Change Adaptation and Risk Management Strategy was coordinated by the CVRD's Environmental Services Division. A large number of Regional staff participated in various capacities to identify climate risks and vulnerabilities, and define adaptation actions:

Local government contributions:

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- City of Duncan
    - Planning - Michelle Geneau
- District Municipality of North Cowichan
    - Planning – Chris Hutton
    - Engineering – Dave Preikshot and Shaun Chadburn
- Town of Ladysmith
    - Planning – Jake Belobaba
- Islands Trust – William Shulba

Community contributors
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Island Health	Ladysmith Resource Centre Association
School District 79 – Students and Staff	The Land Conservancy of BC
Social Planning Cowichan	Cowichan Neighbourhood House
Cowichan Climate Change Collaborative	Duncan CRC
Cowichan Therapeutic Riding Association	St. Andrews Pres. Church
Buddha Society	Ministry of Agriculture
Cowichan Estuary Nature Centre	The Land Conservancy
Cowichan Lake and River Stewardship Society	Clements Centre Society
Mosaic Forest Management	Cowichan Green Community
First Nation Health Authority	Ladysmith First United Church
Cowichan Estuary Nature Centre	Chemainus Climate Solutions
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Glossary of Terms

Adaptation: Includes any initiatives or actions in response to actual or projected climate change impacts and which reduce the effects of climate change on built, natural and social systems.

Adaptive Capacity: The ability of built, natural and social systems to adjust to climate change (including climate variability and extremes), to moderate potential damage, to take advantage of opportunities, or to cope with the consequences.

Climate: The weather of a place averaged over a period of time, often 30 years. Climate information includes the statistical weather information that tells us about the normal weather, as well as the range of weather extremes for a location.

Climate Change: Climate change refers to changes in long-term weather patterns caused by natural phenomena and human activities that alter the chemical composition of the atmosphere through the build-up of greenhouse gases which trap heat and reflect it back to the earth's surface.

Climate Impact: The effects of existing or forecast changes in climate on built, natural, and human systems. One can distinguish between potential impacts (impacts that may occur given a projected change in climate, without considering adaptation) and residual impacts (impacts of climate change that would occur after adaptation).

Climate Projections: Climate projections are a projection of the response of the climate system to emissions or concentration scenarios of greenhouse gases and aerosols. These projections depend upon the climate change (or emission) scenario used, which are based on assumptions concerning future socioeconomic and technological developments that may or may not be realized and are therefore subject to uncertainty.

Greenhouse Gas (GHG) Emissions: Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation, emitted by the Earth's surface, the atmosphere itself, and by clouds. Water vapour (H_2O), carbon dioxide (CO^2), methane (CH_4), nitrous oxide (N_2O), ozone (O^3), and chlorofluorocarbons (CFCs) are the six primary greenhouse gases in the Earth's atmosphere in order of abundance.

Mitigation: The promotion of policy, regulatory and 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.

Natural/Green Infrastructure: The range of measures/systems that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters.

PM2.5 - PM2. 5 refers to particles that have diameter less than 2.5 micrometers (more than 100 times thinner than a human hair) and remain suspended for longer. These particles are formed as a result of burning fuel and chemical reactions that take place in the atmosphere.

Resilience: The capacity of a system, community or society exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure.

Sustainable Development: Sustainable development is the organizing principle for meeting human development goals while simultaneously sustaining the ability of natural systems to provide the natural resources and ecosystem services on which the economy and society depend.

Together for Climate Project: The Together for Climate project was a two-year initiative, led by ICLEI Canada and funded by the Real Estate Foundation of BC, that engaged eight communities across Vancouver Island to develop climate adaptation strategies.

Weather: The day-to-day state of the atmosphere, and its short-term variation in minutes to weeks.

Our Vision for Cowichan Valley Regional District

Cowichan Valley Region District will take a proactive approach to prepare the social, economic, and environmental systems to the impacts of a changing climate.

Overarching Goals

- Build upon the CVRD's current work on climate change adaptation and hazard preparedness;
- Increase the resilience of infrastructure, programs and services to the changing climate in the Cowichan region;
- Protect the health, prosperity, and well-being of residents, especially vulnerable populations, to climate extremes;
- Foster sustainable development and economic growth, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies;
- Protect, conserve, and improve terrestrial and aquatic ecosystem health from the impacts of climate change; and
- Improve the awareness, knowledge, skills and resources of government, citizens and business people regarding climate adaptation.

Implementation Principles

Implementation of actions developed within the CVRD Climate Change Adaptation and Risk Mitigation Strategy (CCARMS) are intended to:

1. Support decision making with knowledge and information;
2. Build capacity to translate knowledge into action;
3. Be adaptive and flexible to accommodate the uncertainty inherent to climate change;
4. Work to achieve other regional goals and priorities;
5. Integrate existing plans and strategies more effectively;
6. Work with partners effectively and strategically.

The CVRD recognizes the need to demonstrate leadership within our communities throughout the region, by taking progressive and innovative steps to achieve the vision of the Climate Change Adaptation and Risk Management Strategy. The CVRD has a responsibility to anticipate and prepare for potential impacts of climate change to our community, and we are committed to taking action in the face of uncertainty to make the region a more resilient place to live, work, and play.

1. Introduction

Climate change is a global issue that creates impacts at the local level. The people that live and work in the Cowichan Valley are experiencing the impacts of climate change now as part of their everyday lives. With changing climatic conditions comes the increased likelihood of prolonged heatwaves, wildfires, droughts, and flooding, all of which increase the impacts felt throughout the community.

Over the past ten years, the Cowichan Valley Regional District (CVRD) has experienced an increase in these extreme weather conditions[1]. Recent summer drought conditions in the region have resulted in low water levels in lakes and rivers across the region, prompting water restrictions. In 2009, the Cowichan region experienced one of its most damaging flooding events in recent history, where dozens of homes were flooded and many residents were evacuate, roads and schools were flooded and closed, and property damage was extensive – this was a one in seven year event. In the time since this flood event, new flood protection infrastructure was established along the Cowichan River. In 2018, 2019 and 2020, the region experienced even higher flood levels on the Cowichan, Koksilah and Chemainus Rivers which would historically be expected to occur every 20 to 40 years. These events have become the 'new normal' in Cowichan Valley, and we must prepare the community, infrastructure, and the environment to the consequences that come with a changing climate.

To prepare for these challenges, we have been proactively working with regional partners to better understand how climate change will impact the community, and to take steps to adapt the social, natural, and built environments to these changes. We recognize that in order to advance the CVRD's and our municipal Official Community Plans' visions and aspirations, we must take action to adapt to the effects of a changing climate. By developing a collection of creative local solutions to the complex and global problem of climate change, we can meet the challenge while seizing and maximizing opportunities that improve the community development, livability, and quality of life for all our residents.

The CVRD's adaptation planning work is guided primarily from the following Regional District documents: 2014 and 2020 CVRD Corporate Strategies, The Cowichan New Normal Strategy, Transition 2050 Strategy and finally the Cowichan 2050 strategy. The CCARMS is also supported by strategic plans and key policy documents from member municipalities, including North Cowichan's Strategic Plan 2019-2022, Town of Ladysmith's Strategic Pan 2020-2023, City of Duncan's Climate Action Charter & Strategic Plan 2020-2022, and the Town of Lake Cowichan's Official Community Plan.

[1] **Weather vs. Climate:** Weather and climate are sometimes used interchangeably, but actually have different meanings. Weather describes local conditions in the atmosphere over a short period of time – from minutes to days or weeks, and even seasons. Weather conditions typically include a combination of temperature, precipitation (rain, ice or snowfall), humidity, wind, cloudiness and visibility. Climate, in contrast, describes the average weather conditions of a place over a period of at least 30 years. To understand how the climate is changing, we must compare observations of past climate periods and long-term trends with the results of climate modelling for future climate periods.

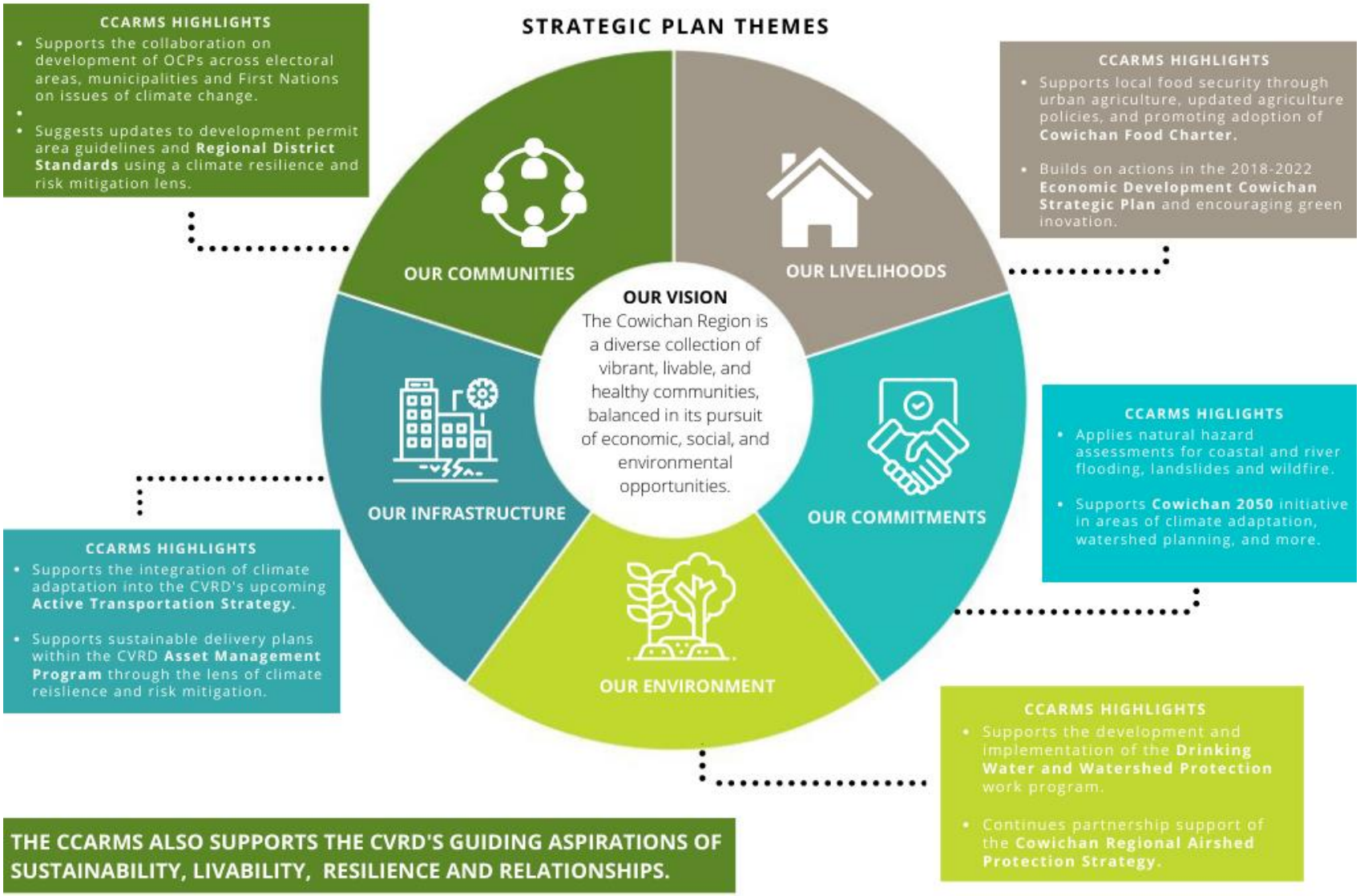


Figure 1: Relationship between the CVRD's Strategic Plan 2020-2022 and the CCARMS

The CVRD's Corporate Strategic Plan for 2020 to 2022 highlights five interconnected themes – economic prosperity (Our Livelihoods), honouring regional commitments (Our Commitments), maintaining infrastructure systems (Our Infrastructure), enhancing community livability (Our Communities) and protecting natural assets and diverse ecosystems (Our Environment). This Climate Change Adaptation and Risk Management Strategy (CCARMS) feeds into all five theme areas in varying ways, and is intended to support Regional priorities through a climate change resilience lens. Figure 1 demonstrates how the CCARMS works to support pillars of the Corporate Strategic Plan.

To date, the CVRD has followed a risk-based adaptation approach, whereby case studies and risk assessment processes have been undertaken to examine a particular issue and potential adaptive opportunities. These include studies that focus on specific hazards (e.g., flood, slope failure and sea level rise), impacts (e.g., drought, surface water contamination, etc.). This approach is common and is usually followed by the creation of an overarching strategy that can be used as a framework to document previous efforts and to guide future action. The goal of the CCARMS is to coalesce, contextualize, and celebrate previous and ongoing initiatives, while serving as a framework for the development of supporting tools, process and new strategic programs. The strategy can also guide land use planning, provisions of services, and infrastructure decisions, to the extent that these are under CVRD jurisdiction.

The CCARMS was developed under the New Normal Cowichan program - a multi-phased program to take action on climate change adaptation sets the current road map for the Region's adaptation planning. This work involves five phases and is intended to be iterative in nature:

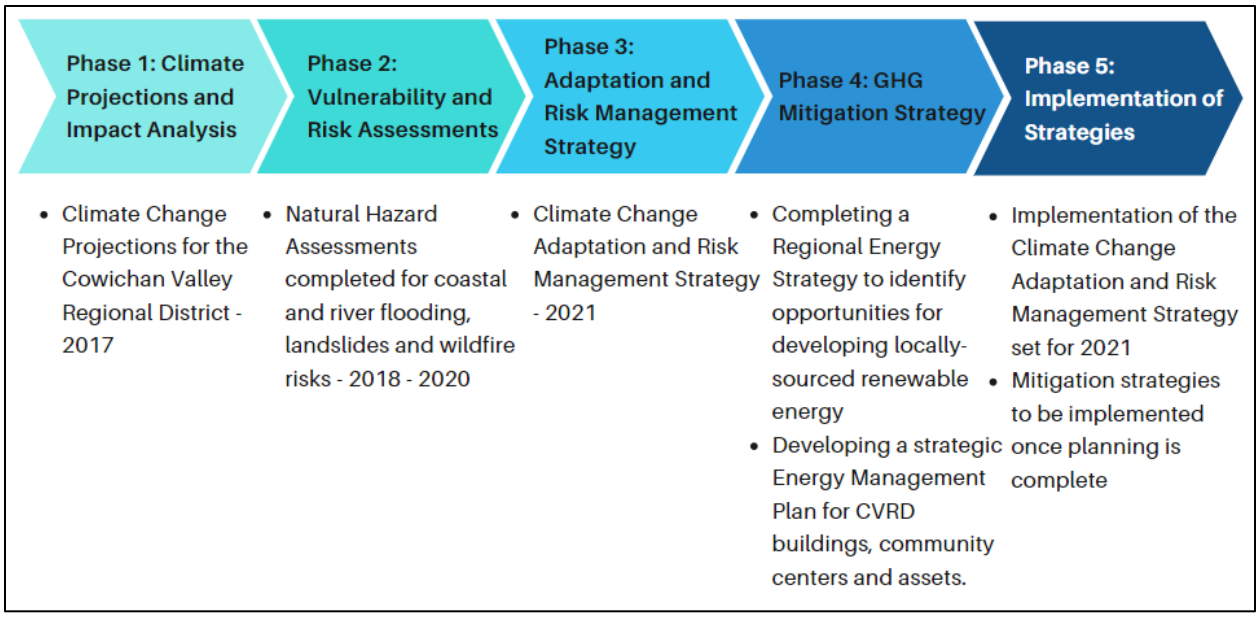


Figure 2: Steps of the New Normal Cowichan program

This Strategy represents completion of Phase 3 – the creation of a Climate Change Adaptation and Risk Mitigation Strategy. More details on the New Normal program are provided in Section 3.

1.2 Adaptation vs. Mitigation

The focus of the CCARMS is on adaptation and risk management. Climate change adaptation refers to initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Examples of adaptation actions may include flood control features, improving stormwater management practices, and updating design standards to withstand extreme weather, or communicating with vulnerable populations on the health effects of extreme heat. Climate change mitigation, on the other hand, refers to initiatives and measures that reduce the amount of greenhouse gases released into the atmosphere, and which ultimately cause climate change. Examples of mitigation actions may include switching carbon based heating to new technologies and renewable energies, making older equipment more energy efficient, reframing land use patterns to maximize community infrastructure and reducing car dependent sprawl or changing behaviour. It can be as complex as a plan for a new community or as simple as improvements to building heat efficiency. Both adaptation and GHG mitigation are part of the foundation essential for managing climate change risks.

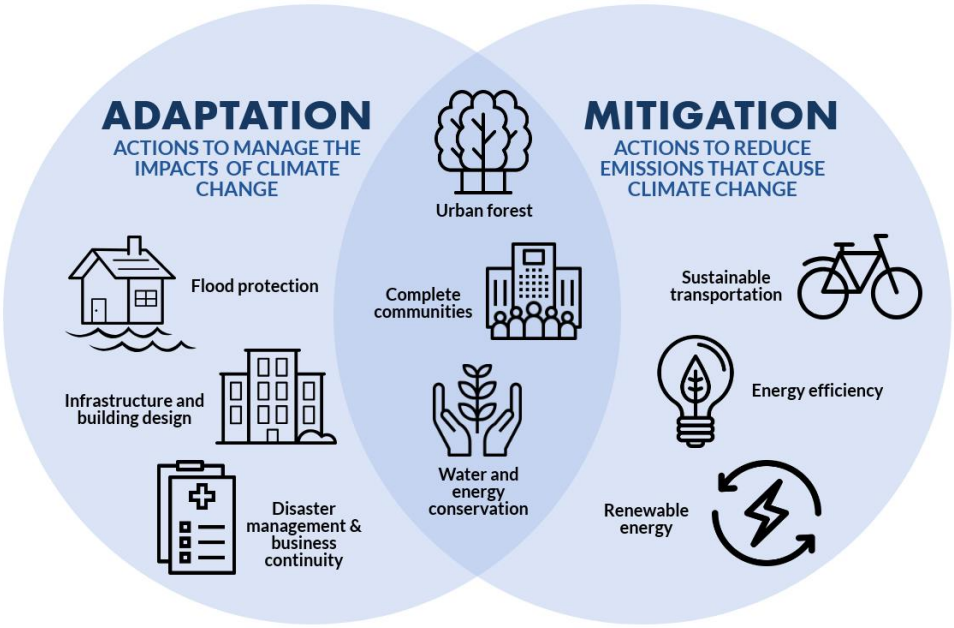


Figure 3: Adaptation vs. Mitigation

2. Climate Work in the Region

The impacts of changing extremes in temperature and precipitation are becoming evident, and challenging all levels of government to develop more low carbon and resilient communities. This section outlines key policy documents that guide climate change adaptation planning in the region, as well as a summary of the mitigation work that is happening alongside the development of the CCARMS. As discussed previously, mitigation and adaptation planning are not mutually exclusive, and while this

Strategy focuses on adaptation it is important to acknowledge ongoing emissions reductions programming in the region and to utilize this information to align adaptation work where feasible.

2.1 Scope

Given that climate change is a global issue, there is a temptation to plan for issues that are beyond the regional sphere of influence. However, the goal of the CCARMS is to build local capacity and respond to climate change impacts within the Cowichan Valley region.

Three issues emerged as concerns but are not included in the scope of the Strategy:

- The first is the possibility of a large and unexpected influx of people from elsewhere due to global climate conditions. Although projections indicate a significant departure from the past, the regional climate is projected to be mild relative to global climate changes and may lead to new interest in human migration to the region. The region may need to prepare for an unplanned increase in population, some with means, and others who will likely need support services.
- The second is global food security, which depends on global factors such as trade, consumption factors, and changing climate conditions ofexport countries. While local food production is addressed in the strategy, global food supply is not. In this area, as in others, an adaptive management approach will be taken that emphasizes the need to monitor and respond to global changes locally, and
- The third is the threat of local cascading system failures caused by global system failures impacting biodiversity, economic health, technology, or peace and security. A case in point is COVID-19 and its global effects on people, supply chains, political tensions and ultimately the community fabric of resiliency.

2.2 Adaptation and Mitigation Work in the CVRD

Climate change policy in the region is captured in several planning documents that guide the policies and strategic direction on adaptation planning for the corporation and community. To date, two processes have driven most of the climate action in the CVRD:

- Provincial direction to reduce greenhouse gas (GHG) emissions, as seen in corporate energy and GHG strategies, as well as the regional energy strategy; and
- Adaptation efforts, which have largely focused on water resources planning, in terms of droughts and floods (e.g., Lake Cowichan water supply and fisheries, and impacts related to the river) and growing natural hazards.

The CVRD worked with local government partners to co-create Cowichan 2050, a collaborative strategy for achieving shared regional goals, largely focused on relationship building and alignment. It is hoped that this process and ongoing relationship building will address major changes in the region in the coming decades, such as how best to coordinate and share information regionally, the development of regional growth strategies, and land use planning collaboration.[i] The framework is both a process and

commitment that recognizes the interdependency of challenges such as adaptation to climate change and population growth, and argues that neither can be dealt with by any one organization or government. Cowichan 2050 acknowledges the need to re-evaluate climate change action and focus more on regional adaptation, as impacts are becoming more apparent every day.

While this Strategy deals with adaptation and risk reduction, CVRD has a number of existing initiatives and policies that address climate change GHG mitigation. Legislation requires all BC local governments to set GHG reduction targets at the municipal and regional district level. The CVRD and partner local governments have established carbon reduction targets for the communities within the official community plans. The Municipality of North Cowichan, for example has identified specific ways in which land use planning is implementing these strategies at the community level. The CVRD undertook an Energy Consumption and Density Mapping analysis of the region to explore specific pathways to reach zero emissions and tangible targets.

The CVRD is one of 180 local governments in BC to have signed the BC Climate Action Charter. The Charter commits the CVRD to lowering its corporate carbon footprint and taking community-wide actions that demonstrate leadership on sustainable development. We have also made a commitment to measure the carbon footprint of corporate emissions, and we publish information about the corporate and community-wide sustainability actions each year through Climate Action Revenue Incentive Reports (CARIP). Additionally, we are proud to have maintained Carbon Neutral operations since 2012.

In 2012, the CVRD completed its Regional Energy Strategy that analyzed opportunities for developing locally sourced renewable energy and how such systems would reduce the community's GHG emissions. This strategy also provides some clear strategies about how the communities can adapt to changes and increased energy costs, including such pathways as developing local energy utilities and district heat to address the dual challenges. The CVRD also developed a strategic Energy Management Plan in 2012 for CVRD buildings, community centres and assets such as the water and sewer systems. The majority of recommendations arising from this strategy are all but complete at this time, and an updated phase 2 strategy is in development. Moreover, in response to Bill 27 (known as the Local Government [Green Communities] Statutes Amendment Act), the CVRD's Land Use Services is currently in the process of updating their goals and objectives for GHG emissions at a community level in the coming years under a modernized Official Community Plan (MOCP). This will likely take a focused review of the impacts of sprawl, housing efficiency, and support to local low carbon industries that create more resilient communities. When this MOCP is completed the CVRD is planning to have concluded the GHG Mitigation Strategy (Phase 4) for the region by way of identification of clear pathways and mechanisms to reduce the community level emission to the identified targets and timelines inline with the community, provincial, federal and municipal partner commitments.

In 2014, in partnership with the BC Ministry of Environment, the CVRD undertook a detailed regional emission inventory to understand and quantify air quality emissions and identify key drivers and impacted communities. This work led to the formation in 2016, of the regional airshed protection

roundtable with a focus on communities vulnerable to public health impacts of PM2.5. The work regarding other sources serves as an effective baseline for future target setting and trend analysis going forward.

In the interim prior to the completion of a formal GHG community based mitigation strategy the CVRD is currently working with municipal and regional district partners towards GHG emissions reduction initiatives at a household level, under a Vancouver Island local government partnership (Transition 2050) program. The objective of the program is to develop strategies and projects that will double the GHG emissions reductions achieved from residential retrofits in program communities in the short term, while establishing a clear path to achieving medium-term and 2050 targets. This program focused on recommendations for updated policies as well as targeted initiatives focused on the residential heat sector to help inform official community plans, including new emission targets and supporting bylaws.

2.3 Role of Local Governments and Regional Partnerships in Adaptation

While the ability of local governments to reduce emissions is challenging and largely focused on the slow transformation of an already built environment, the CVRD and other local government decision-makers are well-positioned to take action on climate change adaptation, for several reasons. Firstly, local government's legislative mandate includes many services that will be directly impacted by climate change - from infrastructure and utilities to parks and recreation. Adapting to new climate conditions is crucial to continuing to deliver high-quality services. Secondly, as the local governments are the closest to the community, they are well placed to identify unique vulnerabilities to climate change and to prepare responses tailored to the regional and community needs. Thirdly, planning for climate change is fiscally responsible. The cost of climate change for Canada is expected to be $5 billion per year by 2020 in Canada, and depending on the levels of continued global emissions growth, could rise to be $21 billion to $43 billion per year by 2050[ii]. Adaptation can significantly reduce these costs and is a fiscally prudent measure given the extent of people and services affected by climate change impacts.

While local and regional governments are best positioned to address climate change issues, collaboration and partnerships amongst regional stakeholders will be vital to the success of the CCARMS. These include partnerships with CVRD's member municipalities and First Nations but extends beyond local governments to include other local community agencies, such as environmental and social benefit organizations. As a corporation, the CVRD only has direct control over regionally-owned assets and services, and has indirect control via policies and regulations over land use patterns and building processes. However, the impacts of climate change will both, directly and indirectly, affect multiple systems in the region, such as transport networks, power, potable water supply, food distribution networks, waste management facilities, drainage infrastructure and telecommunication systems. As such, partnerships will be vital in addressing geographic areas, systems, and stakeholders that do not fall explicitly within the jurisdiction of the CVRD. The mission of adapting to climate change is a great opportunity to have the region think and work more collaboratively on an ongoing basis, and to ensure that each stakeholder is doing their part to achieve a greater vision of the Cowichan region.

3. Adaptation Planning Approach

CVRD's New Normal Cowichan: a multi-phased program to take action on climate change adaptation sets the current road map for the Region's adaptation planning. This work now involves five phases and is intended to be iterative in nature and where possible allow for implementation as soon as possible:

- Phase 1: Climate Projections and Impacts Analysis
- Phase 2: Vulnerability and Risk Assessments
- Phase 3: Adaptation and Risk Management Strategy
- Phase 4: CVRD GHG Mitigation strategy
- Phase 5: Implementation of the Strategy

The completion of the Climate Change Projections for the Cowichan Valley Regional District report completed the Phase 1 climate projections and impacts analysis. It supported the next two phases of the planning process, by providing climate projections for the region that illustrate the dramatic changes we can expect in years to come. Phase 2 of the project was largely completed (but iterative as new issues emerge) through the publication of the Natural Hazard Risk Assessment Study reports. These included detailed risk assessments and mapping of floodplains, a coastal sea level rise risk assessment, dam safety reviews and risk assessments, geohazard risk assessments (of the north slope of Cowichan lake), and the completion of the Sh-hwuykwselu (Busy Place) Creek Stormwater Management and Mitigation Plan. Each of these assessments, as well as the prior energy and agricultural climate adaptation work, provides key insights into the emerging issues and potential strategies to address them. Recommendations and project findings are included throughout this Strategy to guide adaptation planning and actions for implementation.

This document represents the completion of Phase 3 - the development of a Climate Change Adaptation and Risk Management Strategy. The purpose of this document is to contextualize and coalesce outputs of Phase 1 and Phase 2 of the project and to make recommendations on the types of adaptation and mitigation interventions that can be undertaken by the CVRD and its regional partners going forward.

3.1 Recognizing and Reviewing Existing Work

A key pillar of the CCARMS is the importance of recognizing current and past work on climate change adaptation, both by the CVRD and regional stakeholders. Some of this work has occurred on an ad hoc basis – human beings have after all been adapting to severe weather conditions for centuries. However, much of the recent regional adaptation work has been purpose-driven and specific, taking a hazard-based approach to adaptation planning. Consequently, the work on adaptation has been captured in a vast array of localized studies, risk assessment, policy documents, educational campaigns, and service delivery practices. As such, it is the intention of this Strategy to both recognize existing and planned adaptation initiatives in the region and suggest potential new actions in areas of perceived gaps.

In order to contextualize climate change work in the region, and make these relevant recommendations, this Strategy includes a review of a number of policy documents published by the CVRD and its regional partners. These documents were used to pull out existing recommendations from newly published

studies, as well as summarize work to date on existing climate change impacts and local stressors. A complete list of reviewed policy documents is included in the table below.

Table 1: List of projects, plans, program and policy documents reviewed as part of CVRD's CCARMS

• Climate Projections for the Cowichan Valley Regional District • Cowichan 2050 Call to Action & Backgrounder • CVRD New Normal website • FloodSmart, DroughtSmart • 2010 State of the Environment Report • 2014 State of Environment Updates - Invasive species, Climate Action, Farmland and Food Security • Geohazard Risk Assessment - North Slope of Cowichan Lake (2019) • Lake Cowichan Landslide Assessment (2020) • Risk Assessment of Floodplains and Coastal Sea Level Rise • Regional Dam Safety Reviews and Risk Assessments (Youbou, Shawnigan, Stocking) Ashburnham) • Sh-hwuykwselu (Busy Place) Creek Stormwater Management and Mitigation Plan	• Plan for the Environment - Corporate Sustainability Strategy 2012 • Cowichan/Koksilah Flood Mapping (2020) • Riverbottom Road Flood mapping (2020) • Lower Cowichan/Koksilah River Floodplain Map (2008) • Lower Cowichan / Koksilah River Integrated Flood Management Plan (2009) • Regional Rockslide Inventory and Susceptibility Assessment (2020) • Cowichan Lake Rockslide Flood Mapping Risk Assessment (2020) • Updated Shawnigan Lake Flood mapping and flood warning system (2020) • CVRD Natural Hazard Risk Tolerance Policy • Cowichan Water Use Plan • 2017 Emergency Preparedness Workbook • CVRD Residential Retrofit Acceleration Strategy – T2050 • CVRD Asset Management Policy • Natural Disaster Mitigation Program and CVRD Case Studies • Green Shores for Homes Summary Report • Drinking Water and Watershed Protection Service: 10 year workplan	• Water Balance Express • Emergency Alert Registration "CivicReady" • North Cowichan Climate Action Plan • Ladysmith Sustainability Plan • City of Duncan Climate and Energy Plan • Town of Lake Cowichan OCP • Bonsall Creek Watershed Management Plan (2016) • Invasive Plant Species Strategy • King Tides Project • CVRD electoral area OCP's • GHG reduction projects – corporate • GHG reductions and energy conservation projects – community • CVRD Agricultural Overview • The Cowichan Basin Water Management Plan • CVRD ESA/Conservation strategy

Furthermore, the CVRD has a number of upcoming climate-related initiatives planned, including harmonization and modernization of existing electoral area OCPs, implementing the 10 year Drinking Water and Watershed Protection Plan, developing a regional Active Transportation Strategy, completing additional landslide and coastal risk assessment, conducting floodplain mapping of the Chemainus river, as well as an update to the CVRD's Energy and GHG Strategy.

It is important to note that although this strategy is a stand-alone document, it is important that climate adaptation is mainstreamed—or integrated—into ongoing and future initiatives. The management of climate risk needs to be something that actors and agencies across the Cowichan Valley incorporate into the decision-making processes, whether they are emergency managers, infrastructure operators, or those that work to reduce social vulnerability. It is also essential that residents themselves are informed and supported as the climate changes. The emphasis on mainstreaming makes it clear that this strategy cannot be implemented by one organization alone; it requires deep and sustained regional collaboration.

Risk-based management is another important pillar in the approach that this strategy embodies. Although a range of known and potential climate change impacts exist, only those that present the biggest risk, and to which the community is most vulnerable, will be acted upon given limited resourcing. By using risk-based management, the public and decision-makers can focus their efforts on the impacts that matter most, resulting in the highest return on investment, and the most assurance of effective adaptation.

4. The Science of Climate Change

The climate system is complex, comprising of many interrelated and interacting components. Climate is the result of a culmination of various biogeophysical factors over a long period of time and differs from weather. Climate change can be simply defined as any change in global or regional climate patterns over time and can be the cause of natural factors and human activity. Although natural variation has characterized the Earth's climate system for millions of years, the past 10,000 have been relatively stable – until recently.

Human activities are having a direct impact on the Earth's climate. The two main ways that anthropogenic activities are affecting the Earth's climate are through changes in land-use (e.g., deforestation) and the combustion of fossil fuels (e.g., carbon-based energy sources). Burning fossil fuels (e.g., coal, oil, and natural gas) releases carbon dioxide (CO_2) and other greenhouse gases (GHGs) into the atmosphere. Carbon dioxide is a heat-trapping gas that builds up in the atmosphere over time, it functions like a blanket, trapping in heat that would otherwise be lost to the upper layers of the atmosphere (see Figure 3 below). This blanket effect is causing the planet's atmosphere to warm, which disrupts the stability of the climate system. Although CO_2 is necessary for life, the role of CO_2 in the climate system goes beyond plants taking it in and humans breathing it out. Burning fossil fuels puts more CO_2 into the atmosphere than the system can handle and causes CO_2 to build up in the Earth's atmosphere and oceans, leading to a series of ecological and climatic problems.

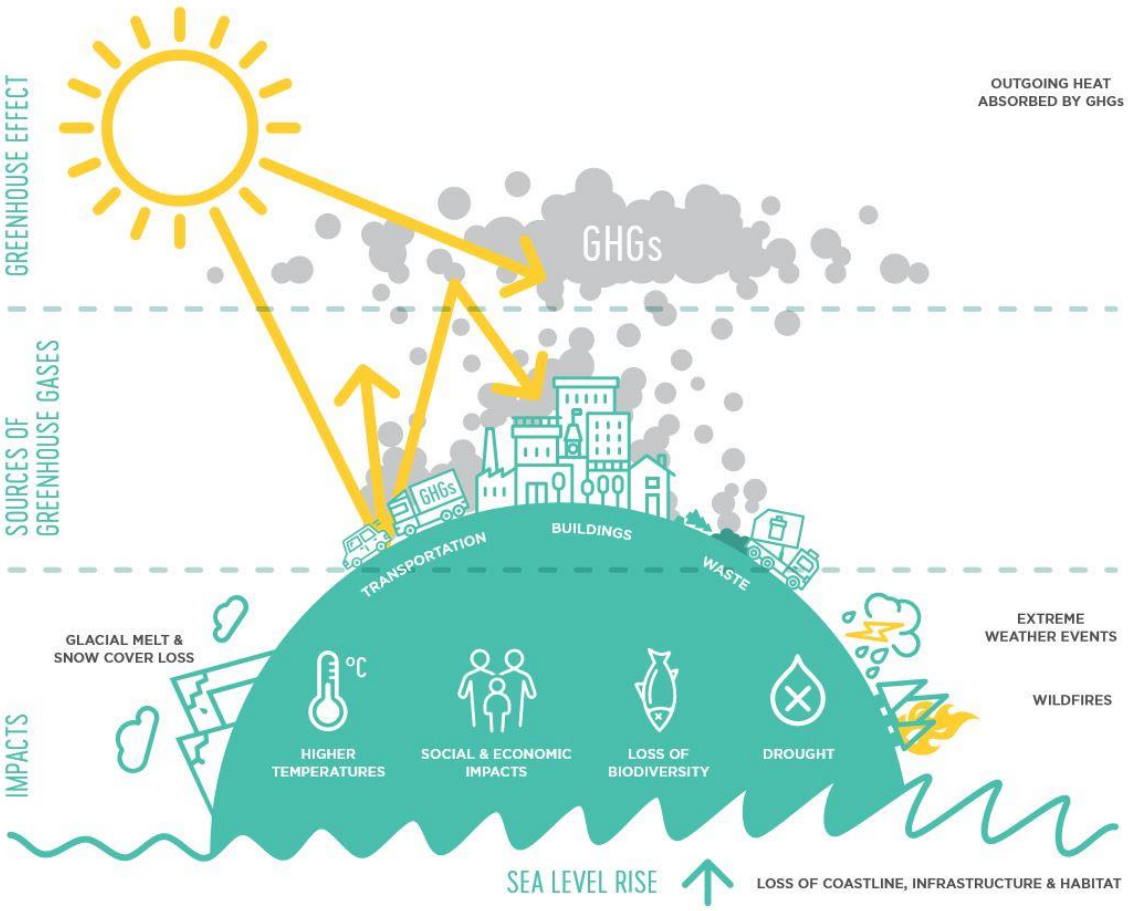


Figure 4: Image representing the sources, mechanisms, and impacts of climate change. Image retrieved with permission from the City of Victoria's Climate Leadership Plan (2018)

4.1 Climate Change in the CVRD

In 2017, the CVRD and its regional stakeholders produced Climate projections for the Cowichan Valley Regional District report, which outlines projected climatic changes in the region over the next century. This collaborative effort drew on the best available science to quantify the various ways that the Cowichan Valley's climate would change and to discuss some of the impacts that these changes would have on the Natural Environment and the Human Environment.

The purpose of the report is to inform regional risk assessment, decision making, and planning for the Cowichan Valley region. Figure 4 provides an overview of key projected changes for the region according to a business as usual emissions scenario (RCP 8.5). More detailed information on local climate change projections for the region can be found in the original projections report.

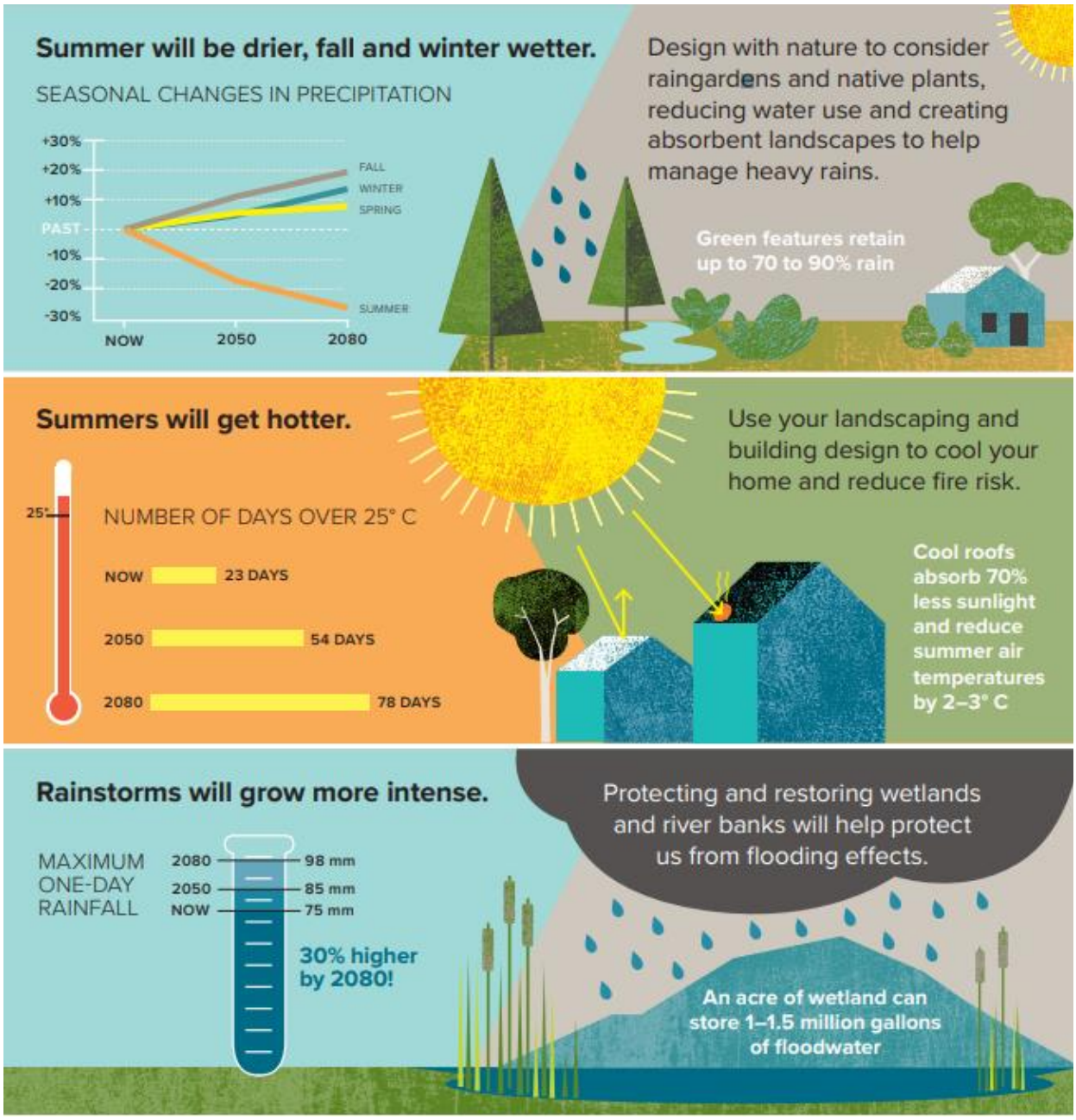


Figure 5: Summary of Climate Projects for the CVRD - RCP8.5

4.2 Sea-Level Rise

Ocean levels will rise as a result of climate change; how fast this will happen is currently unknown. According to Natural Resources Canada's (NRCan) "Canada's Marine Coasts in a Changing Climate" report, sea-level rise (SLR) will not affect all areas of the British Columbia coast equally, largely due to differences in vertical land movement (i.e., glacial rebound). Other effects that also contribute to regional variability include the decreased gravitational pull of melting glaciers on nearby ocean waters and changes to ocean currents that affect the topography of the sea surface[iii]. The study, however,

concludes that the largest amounts of relative sea-level rise are projected to occur on the southern Vancouver Island, which includes portions of the CVRD[iv].

In 2011, the provincial government issued guidelines for coastal flood hazards. These guidelines recommend that local governments plan for a 1 m rise in global mean sea level by 2100, and between 1.4 m to 3.4 m by the year 2200[v]. However, these guidelines are widely considered out of date. In 2017, the National Oceanographic and Atmospheric Administration (NOAA) recommended a revised "extreme" upper bound scenario of 2.5 m by the year 2100, which was subsequently adopted in the third US National Climate Assessment[vi]. A comparison of the recommended curve for SLR policy in BC and the NOAA's updated predicted global SLR scenarios are presented below. The Province of BC has indicated that they will be revising their guidelines in the near future.

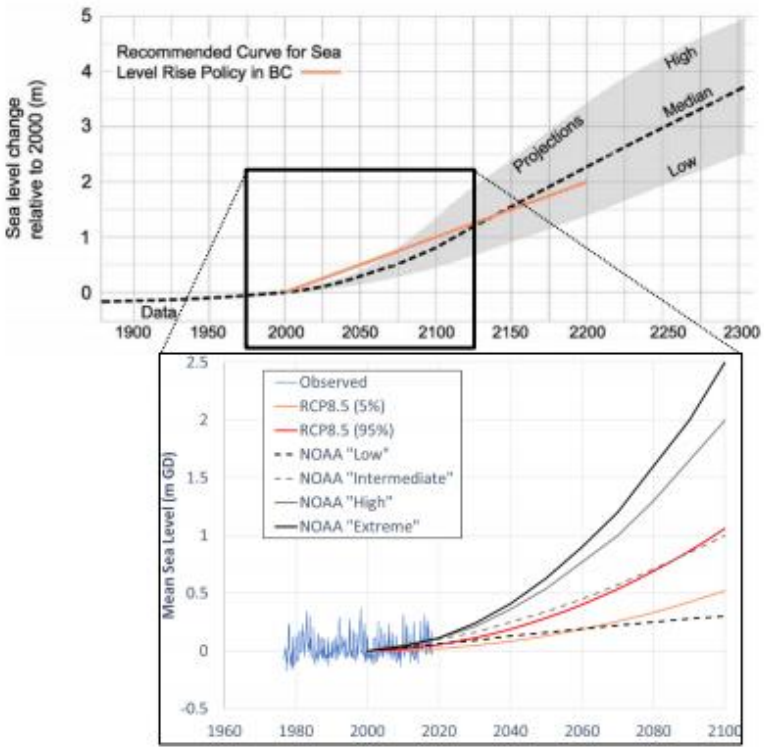


Figure 6: Global SLR from MoE (2011) (top plot) and updated predicted global SLR scenarios and observed ocean levels at Patricia Bay (NOAA, 2017) (bottom plot)[vii].

4.2.1 Regional Sea-Level Rise

In 2019, the CVRD undertook a risk assessment of floodplains and coastal sea-level rise. The study analyzed three plausible global SLR scenarios based on current global trends 1.0 m (intermediate), 1.5 m (intermediate-high) and 2.5 m (extreme). Risk analysis results of the coastal study region identified several areas of high risk based on percentage of land flooded, including Cowichan Tribes, the Municipality of North Cowichan, Cowichan Bay, and Halalt First Nations group. Subsequent analysis was conducted on given elements exposed for each affected jurisdiction, including people and societal

impacts, environmental impacts, local economic impacts, local infrastructure impacts, and public sensitivity impacts. A summary of key findings includes:

- Substantial populations are exposed under the present-day scenario, predominantly within the Cowichan Tribes, North Cowichan, and Cowichan Bay areas;
- The number of exposed residential buildings nearly doubles with 1m SLR, from 43 under present-day (representing $17.2M) to 83 ($39.6M), with the number of buildings exposed increasing by 156% for the 1.5 m SLR scenario, and 314% for the 2.5 SLR scenario;
- Exposure of industrial properties increase almost fourfold with 1 m SLR, with most affected in North Cowichan and Cowichan Bay;
- For all scenarios, most changes to exposed watercourses and terrestrial and sensitive ecosystems occur within the North Cowichan, Cowichan Bay, Cowichan Tribes and Ladysmith jurisdictions;
- A significant number of roads and culverts are exposed under present-day flood scenarios and are relatively sensitive to increased flood levels with SLR. The number of bridges exposed to flooding increases from 9 under present-day to 11 under 1.5 m SLR scenario; and
- Affected agricultural areas and urban and developed areas are predominantly in the Cowichan Tribes, Cowichan Bay, and North Cowichan jurisdiction and are moderately sensitive to SLR[viii].

4.3 Uncertainty

It is important to note that uncertainty is an integral part of the study of climate change. Uncertainty is factored into climate change scenarios, models, and data, and reflects the complex reality of environmental change and the evolving relationship between humans and the planet. Climate change cannot be predicted with absolute certainty in any given case, and all data must be considered with this in mind. While it is not possible to anticipate future climatic changes with absolute certainty, climate change scenarios help to create plausible representations of future climate conditions. These conditions are based on assumptions of future atmospheric composition and on an understanding of the effects of increased atmospheric concentrations of greenhouse gases (GHG), particulates, and other pollutants.

5. Summary of Impacts and Risks

In our modern economy, almost every human activity is linked to the use of fossil fuels. Similarly, almost everything that sustains and enriches our lives is affected, either directly or indirectly, by the changing climate. The extent and magnitude of climate change effects will vary over time and with the ability of different societal and environmental systems to mitigate or adapt to change. Even if we were to stop emitting all GHGs tomorrow, temperatures would continue to rise as already released carbon dioxide will remain in the atmosphere for thousands of years. That is why adaptation is essential to reduce the damages from climate change that cannot be avoided.

This section outlines the key findings from varying climate change risk assessment processes that informed the prioritization of impacts for the CVRD's CCARMS – including outputs from BC Provincial Risk Assessment process, as well as regional risk assessments from varying sectors.

5.1 Provincial Risk Assessment Findings

In 2019, the BC Climate Action Secretariat published its Preliminary Strategic Climate Risk Assessment for British Columbia report. The project set out to develop a risk assessment framework and apply it in an initial assessment of climate risks to BC at the provincial level. The CVRD participated in this planning process and has followed a similar but more localized process. Major findings from the assessment concluded that severe wildfire season, seasonal water shortages, and heatwaves are the three highest-ranked risks facing the province overall in 2050. Other high-ranking risks included ocean acidification, glacier mass loss, and long-term water shortages.

Key to the risk assessment findings was the understanding that geographical variability plays a significant role in the likelihood and consequence results of the assessment. The CVRD is most concerned with climate risks that are projected to affect the southern, coastal areas of BC and Vancouver Island and more specifically the Cowichan region. Consequently, risks of highest concern from the assessment include:

- **Landslides -** There is a high landslide risk in the mountain terrain in which the Cowichan Valley Regional District is located; there is also a high likelihood of heavy precipitation that can trigger landslides.
- **Water shortages –** Slight increases in annual precipitation and more frequent high intensity rainfall events are anticipated, yet this may not lead to greater water supply as rising temperatures could counteract these changes. The critical water supply areas will transition from snow and rain dominated systems to rain dominated with little or no snowpack to sustain summer water flows. Multiple seasons with high temperatures and below-average precipitation can result in water shortages. Large uncertainties are associated with predictions of multi-year dry spells.
- **Invasive Species –** There will be an increase of invasive species, specifically knotweed by 2050, especially in certain geographic areas where the climate is suitable for knotweed habitat. This includes most of southern BC and Vancouver Island. Forestry, agriculture and aquatic impacts are also highly likely
- **Vector-borne diseases -** Ticks are found over a wide geographic area of BC, however, most ticks responsible for Lyme disease are found in the south of BC, particularly Vancouver Island. West Nile virus is also listed as a possible impact of climate change, and could be spread more easily due to increased range and ecological conditions favorable to mosquitos.
- **Flooding** - Moderate flood frequency is driven by increased precipitation, more frequent heavy rain events, and increased temperatures causing greater snowmelt. Although the location and severity of flooding varies from year to year, climate change is expected to increase the frequency of both major and moderate flood events, which could have significant infrastructure, environmental, economic, and human health consequences.
- **Coastal Storm Surge** - Sea level rise due to increasing temperatures as well as king tides and El Niño cycles may result in storm surge flooding during a king tide event along the BC Coast and Vancouver Island. Although there is uncertainty regarding how climate change may affect

coastal storms over time, sea level is projected to rise which will increase the extent and frequency of significant coastal flood events.

- **Severe Wildfire Season** - Severe wildfires could contribute to negative health outcomes for residents across the province, due to direct exposure to smoke, particulate matter, and other hazardous substances (e.g., polycyclic aromatic hydrocarbons, volatile organic compounds). Additionally, severe wildfires may disrupt operations and damage infrastructure across multiple industries, including tourism, timber, mining, and agriculture, resulting in economic losses. Wildfires may disrupt infrastructure systems such as transportation, electricity supply, telecommunications, water treatment, and sewage systems. Given the CVRD's largely resource and rural nature a large wildfire would have potentially substantial consequence to the region's residential populations.
- **Reduction of Ecosystem Connectivity** - Ecosystem connectivity is vital for facilitating movements of wildlife populations, maintaining species diversity, and maintaining high-quality habitats. Climate change and human development threaten ecosystem connectivity by disconnecting, fragmenting and changing species' habitat availability and causing ecosystem shifts.

The BC Risk Assessment provides a starting point for considering, prioritizing, and coordinating risk management activities across the province. The CVRD utilized outputs and lessons learned from the Risk Assessment process to inform local assessment and adaptive actions, which will require a coordinated method to manage.

5.2 CVRD Hazard and Risk Assessment Processes

As mentioned previously, the CVRD has followed a hazard-based adaptation approach, whereby hazard-specific risk assessment processes have been undertaken to evaluate climate change impacts across varying areas within the CVRD. These risk assessment were utilized to inform this overarching Strategy, and were intended to be used to guide adaptation actions and further efforts. At a regional scale, the CVRD and its regional partners have conducted several detailed climate-related risk assessments which are summarized below.

Natural Hazards – The CVRD has completed and continues to expand its Natural Hazard Risk Assessments, including assessments of geohazards and landslide risks, flood and erosion risks, and coastal sea-level rise.

Infrastructure and Asset Management – In 2020, the CVRD completed its Corporate Strategic Asset Management Plan, including a Vulnerable Infrastructure and Risk Assessment. Key impacts of concern as identified from the assessment include damage to infrastructure and energy transmission systems due to increased frequency and severity of storm events and storm surges; reduced recharge of groundwater sources due to decreased precipitation; increased watering and irrigation needs due to decreased precipitation and drought; changes to lake ecosystems, including change in temperature, chemical composition, habitat/species, and increase in algal blooms; damage to infrastructure and

interruption of services due to wildfire; and increase in erosion and/or decrease in slope stability due to loss of vegetation.

Surface Water Supply – In 2019, a regional referendum supported the establishment of a new government function - the Regional Drinking Water and Watershed Program to ensure that all watersheds have watershed management plans and that future infrastructure and land use decisions are based on watershed science. The program will focus on understanding water quality and water supply across the region to inform future planning and protection. There are several threats to our water supply including climate change, population growth and land use. In response to these challenges, the CVRD has undertaken many initiatives to understand the impacts to surface water supply and to determine strategies to protect it. In 2009, the CVRD created the Cowichan Basin Water Management Plan, and later in 2018 the Cowichan Water Use Plan which is driving the current engineering design of a new weir to increase long term water storage at Cowichan Lake to address water supply concerns in the Cowichan Watershed. The CVRD has also undertaken several modelling efforts, including the CVRD Water Balance Model which allows users to explore how their property development/redevelopment plans can help our region better manage rainwater resources. The CVRD has also created the Coupled Groundwater-Surface Water Model of the Cowichan Valley to understand the contributions of groundwater to the surface water system, and the Agriculture Water Demand Model to understand the region's agricultural water needs.

Groundwater – The majority of our community and individual water systems in the region rely on groundwater for their source. As such, the CVRD has undertaken mapping the location and vulnerability of aquifers in our community to aid in land use decision-making for the protection of groundwater quality. Moreover, in South Cowichan specifically a number of studies have been conducted regarding water quality and quantity in the area. These include but are not limited to the South Cowichan Water Plan Study and the Preliminary Groundwater Budgets for varying areas.

Water Quality – A number of studies have been rolled out in the CVRD that address water quality issues in the region's lakes and rivers. Some examples of these include the Shawnigan Lake Water Quality Assessment and the South Shawnigan Creek Water Quality Study.

Dam Safety - CVRD undertook a comprehensive dam safety review and risk assessment of the four dams owned by the CVRD: Ashburnham Creek Dam, Shawnigan Lake Weir, Stocking Lake Dam and Youbou Creek Dam. The reviews included geotechnical, structural and hydrotechnical analyses of the dams, along with an assessment of operating procedures and emergency plans, resulting in a series of prioritized recommendations for each dam. The reviews recommend that the consequence classification be increased from Significant to High for the Stocking Lake Dam and Shawnigan Lake Weir due to the potential for loss of life within the dam breach flood inundation areas. In addition, a number of recommendations were made for each dam, including high priority recommendations for significant repairs or replacements to some of the dams.

Air Quality - There is solid scientific evidence at a national level of a strong link between air pollution levels and impacts on human health. In 2015, the CVRD, in partnership with key community stakeholders, developed Cowichan's Regional Airshed Protection Strategy. It identifies the necessary steps to be undertaken in order to develop an effective response to growing air quality concerns in the region. The strategy was informed by a 2014 Air Quality Study for the Cowichan region, which indicated that there are occasional exceedances of the provincial PM2.5 objectives from 2009 to 2013. The Study also indicated that the exceedances were primarily due to local open burning and wood burning appliances (winter), and forest fires located in other regions (summer). The CVRD operates an air quality monitoring system under the global purple air network to help communicate and infom the public in real time.

Watershed Risk Assessments - In 2019, CVRD undertook a Watershed Risk Analysis, which analyzed slope failure, river flooding, coastal flooding, surface water quality, and surface water supply risk. The Hazards were assessed across 14 watersheds in the CVRD to determine individual risks. Hazards which ranked highest across the watersheds include stream water quality and groundwater contamination. Watersheds of particular concern included Cowichan River, Koksilah River and Shawnigan Creek. The risk model and framework has been developed to allow for ongoing updates as more data is collected.

In summary, the impacts of climate change on the Cowichan Valley can be summarized in four main categories: impacts to green and grey infrastructure; impacts to community health and emergency management; impacts to green growth and sustainable development; and impacts to ecosystems and bioregional carrying capacity. A summary of these high level impacts are presented in Table 3.

Table 2: Summary of High-Level Impacts for the CVRD

HIGH LEVEL IMPACTS	
Grey and Green Infrastructure	- Significant pressure on stormwater management and drainage systems - Increasing impacts of low flow on surface and groundwater resources. - Increased potential of overflow for sewage and water treatment facilities - Transportation infrastructure under stress from changing and more extreme conditions - Sea level rise, erosion, bank instability, and landslides - Increased storm events affecting hydro and communications systems - Difficulty maintaining existing levels of service in compound failures
Community Health and Emergency Management	- Increased particulate matter in the air and ground-level ozone - Uncertainty leading to compromised mental health - Increased social support required for vulnerable populations - Heat and air quality stress to populations
Green Growth and Sustainable Development	- Largest impacts to agriculture and forestry, and tourism - Increase in heat stress, sunscald, invasive species, pests, and plant diseases, threatening crop productivity - Increased competition for water resources - Tree growth decline and mortality of species

	- Increased food security issues
Ecosystems and Bioregional Carrying Capacity	- Decrease in water availability and storage for summer months especially due to changes in demographics and population - Increase in contaminants in watershed - Increase in invasive species, pests and pathogens - Changing biological and reproductive cycles - Loss of salmon affecting long-term viability of forest ecosystems and first nations food and cultural needs

5.3 Existing Stressors

Many factors influence how a community will experience the impacts of climate change. While climate change projections tell us how conditions are expected to change in the long-term, existing stressors within a region, such as geographic vulnerabilities, population growth, urban development, food security, etc. can affect how vulnerable a certain area is to climate change impacts. These factors and the non-equal distribution across the landscape are important to consider when designing short and long-term adaptation strategies.

5.3.1 Geographical Conditions

The CVRD is made up of a range of areas that are highly susceptible to both current stressors as well as the forecasted changes. These are variable based on topography, elevation and the downscaled climate projections. Most of our communities are along the coastal zone and reliant on groundwater resources and sea level rise, along river valleys prone to changes in river flooding conditions, erosion or slope stability, along lakes and susceptible to large flood events. A large portion of our communities are also rural in nature and rely on their own water and sewer infrastructure as well as being at risk of wildfire. All communities are vulnerable to systems-based risk such as disruption to systems failure highlighted by the COVID-19 pandemic.

The majority of the region's population is within the Coastal Douglas-fir Biogeoclimatic Zone of Vancouver Island. The climate of this zone is often characterized by warm, sunny summers and mild, wet winters. Unlike more exposed coastal areas such as the west coast of Vancouver Island, our zone experiences long dry summers, which are a major factor in its ecology. The Coastal Douglas-fir Zone is home to a unique and sensitive group of ecosystems, and includes seaside parkland, dry forest, rock outcrop, and wetland habitats and contains many rare plants. The area is home to many estuaries, where rivers and streams flow into the sea, which provide habitat for a variety of life. Much of the Coastal Douglas-fir Zone has been developed as residential or industrial land. The most important industries are agriculture, small-scale forestry, pulp mills, and tourism. Because of the area's long dry summers, soil-water conservation is a significant management concern.

5.3.2 Population Growth and Development

A conservative estimate suggests that about 25,000 additional people are expected to live in the Cowichan region by 2050. This number represents a 31% increase over the current population of approximately 83,000[ix]. There is also a significant increase in residential growth, which is driving development. The addition of 25,000 new residents to the region could also be equivalent to developing an area twice the size of the Town of Ladysmith (2,400 hectares)[x].

With increasing population comes an increase in residential growth development and the number of residential buildings. Development has also severely impacted sensitive ecosystems in the Cowichan region leaving them increasingly vulnerable to additional pressures due to climate change, as undisturbed lands continue to decline and resilience diminishes. Lands currently affected by resource and residential development total about 275,000 hectares, over 75% of the region's 360,000-hectare land area. Disturbed and developed land alters natural functions, affects the provision of natural services (e.g., watershed functions), and impacts many important ecological values which may be at increasing risk in the future.

5.3.3 - Socioeconomic Conditions

The CVRD is a largely rural area. This provides both benefits and pressures to our community. While it limits the development of complete, compact communities due to population densities, it does afford us an increased resilience to many flood and heat-related impacts, as well as some measures of food security, due to larger lots and lower densities. The rural landscape of our community also impacts infrastructure delivery, transportation planning, energy distribution and the provision of social services.

There are also number of underlying trends and sensitivities that amplify the community health risks associated with climate change. For example, housing costs are rising, and there are increasing housing affordability and homelessness issues in the Cowichan region. Moreover, those who are already socially isolated and marginalized due to a combination of geographic isolation, low-income, or other forms of inequality, are those who are most immediately vulnerable to the effects of climate-related pressures.

Emergency preparedness will also become both increasingly complex and more important. The CVRD sits in a larger region prone to a range of natural hazards including earthquakes, forest fires, and flooding. As the impacts of climate change accelerate, more extreme and less predictable weather patterns will require an even more robust approach to ensuring that communities are prepared for these conditions.

5.3.4 Water and Food Security

Food and water security are issues across the Vancouver Island Coastal Region. Water availability for food production is under pressure from increased demand from all sectors and fluctuations in supply due to climate change. Careful management of water supplies is essential to support the region's need and vision for expanded food production, protect water sources for other uses and reduce environmental impacts (e.g., ensure increased withdrawal of water for irrigation is not affecting adjacent ecosystems and ensure sufficient water flow in rivers to support fish spawning)[xi].

The 2009 Cowichan Area Agricultural Plan State of the Industry Report proposes the following strategic direction in support of food security and food self-sufficiency: "…develop and/or maintain a resource base so that the agriculture industry can produce a basic diet for 45% of the local population"[xii]. The

Cowichan region is currently achieving a level of food self-sufficiency between 10 to 19%, far less than the goal of 45%[xiii]. Like the rest of Vancouver Island, 80-90% of the region's food is dependent on long-distance transport via truck and ferry, and currently there is only a 2-3 day supply of food in case of crisis in the region. As such, Cowichan's food system is both environmentally unsustainable and extremely vulnerable to rising oil prices, climate change, and emergency situations.

Another existing stressor is water consumption. The supply of water is a major concern for the Cowichan region. Despite this region's often wet winters, water is a limited resource – especially during dry summers. As the population of the region increases, there will be additional pressures on water supply[xiv]. The CVRD's Agriculture Water Demand Model found that under an extreme climate scenario, water demands could be 30% higher by mid-century than they were in the baseline year of 2003[xv]. Moreover, the Koksilah Watershed in the region has been experiencing significant water supply issues in recent years, with the Koksilah River experiencing exceptionally low flows in the summer months in recent years. Climate change threatens to exacerbate the over-allocation of water in the area, which will have cascading impacts to local agriculture and fisheries.

In addition to water consumption issues, a significant portion of the CVRD population is food insecure. Based on recent research by the PROOF, an interdisciplinary research team investigating household food insecurity in Canada, approximately 21% of citizens with children, and 11% of citizens without children, are food insecure on Vancouver Island[xvi].

These existing stressors should be considered when developing adaptation actions, in order to determine interventions that increase local resiliency and work to address other factors that contribute to a community's overall vulnerability to climate change.

6. Theme Areas and Objectives

As discussed, the impacts of climate change are complex and interrelated. Climate change may well be the most complex systems problem that we have ever faced. In the modern economy, almost every human activity is linked to the use of fossil fuels or other sources of climate-altering greenhouse gases. Changes to the climate over the next decade will have multiple impacts in the region, and it is important to take a step back and examine how these impacts will affect vital systems in the community. For the purposes of this Strategy, we have organized impacts and our adaptive responses across four key areas:

1. **Resilient Grey and Green Infrastructure** - Improve the climate resiliency of the built environment in terms of its durability, functionality and sustainability.
2. **Community Health and Emergency Management** – Enhance protection of community members' health and safety from the risks associated with extreme weather impacts and changing climate conditions.
3. **Green Growth and Sustainable Development** – Increase the adaptability of businesses and industry in a changing climate to enable a thriving regional economy.
4. **Ecosystems and Bioregional Carrying Capacity** – Preserve and enhance local biodiversity and the resilience of the natural environment and water resources throughout the region.

Sections 7 - 10 outline how these areas are impacted and at risk from climate change, as well as what we are currently doing to adapt to these risks, and what we need to do over the next five years. In addition to actions specifically related to each category, we need to consider 'Cross Cutting Actions', which foster essential capacities that will increase the overall climate resilience, especially for vulnerable or exposed communities. These are captured under Section 11.

Within each theme area, actions have been divided by Regionally-led actions, and community and partnership-based actions. Community and partnership-based actions are those in which CVRD would be a supporting player in meeting adaptation goals, but implementation would be led by an organization outside of the Regional government. In some cases, these actions are aspiration interventions that will require additional engagement with key implementation partners, and are expected to be iterative in nature.

For each of the theme areas, key objectives have been identified. These 21 primary objectives are presented in the table below.

Resilient Grey and Green Infrastructure	
1	Consider climate change information in land use planning and the design, construction, and maintenance of infrastructure.
2	Improve the climate change risk management of critical regionally-owned and community infrastructure
3	Continue to upgrade stormwater management systems and pursue integrated flood management (IFM) approaches for reducing flood damage.

4	Reduce the risk of power outages due to extreme weather events
5	Work with community partners to expand the use of green infrastructure to manage the impacts of climate change.
Community Health and Emergency Management	
6	Minimize wildfire risk and associated impacts to public health and safety, especially amongst vulnerable or exposed populations.
7	Minimize disaster risk caused by natural hazards and extreme weather events among residents, businesses, and the wider community.
8	Work with community partners to minimize health issues caused by extreme heat days, especially for highly vulnerable populations
9	Work together to strengthen emergency management capacity to respond to weather-related emergencies
Green Growth and Sustainable Development	
10	Attract, retain and expand local agriculture and agri-food businesses to support food security.
11	Support regional business innovation and continuity in the fact of a changing climate
12	Improve local water security for agricultural lands, and continue to monitor, assess, and manage water.
13	Support and encourage community stakeholders to incorporate climate adaptation into agricultural and food security planning.
14	Encourage local forest industry to adapt to changing climate conditions
Ecosystems and Bioregional Carrying Capacity	
15	Steward, protect, and restore the region's ecosystems and biodiversity in an era of climate change and continued population growth.
16	Steward, protect and restore Cowichan region watersheds in the face of growing climate change impacts, continued population growth, and other development pressures, including forestry and mining
17	Prepare for shifts of ranges of existing species and influxes of new invasive species.
18	Support education and outreach programming on watershed health, tree planting, and ecosystem management
Cross Cutting Actions	
19	Research, monitor, and disseminate lessons learned on climate change projections, impacts, and adaptive actions.
20	Mainstream climate change adaptation into Regional policies, programming and actions.
21	Maximize collective impact against climate change through partnerships with local Nations

7. Resilient Green and Grey Infrastructure

Recognizing that climate change will put additional stress on CVRD's critical green and grey infrastructure, the region is committed to strengthening the resilience of its infrastructure systems to climate change and other non-climatic factors (e.g., land-use changes, population growth, aging infrastructure) to prevent disruptions of essential services and ensure the safety of the community.

7.1 Impacts

Existing infrastructure and buildings will be affected by increased extreme precipitation events, more intense storm events, hotter temperatures, longer dry periods, and year-to-year variability of these conditions. In particular, extreme rainfall indicators, which illustrate future extreme weather events, will increase in frequency and intensity, past currently planned for thresholds. This is important context in the design of critical infrastructure in the region. A further detailed study should be taken to refine regional Intensity- Duration-Frequency (IDF) curves and other design criteria for the region, especially for infrastructure that is expected to last for many decades. As these rain events and flooding increase, along with heatwaves and droughts, the need for improving the resilience of infrastructure will become greater.

As a region with significant low-lying coastal areas and floodplains, sea-level rise will also present multiple land use planning challenges across the region and subsequent impacts to communities' ecosystems and infrastructure. The effects of sea-level rise will be compounded by increased winter storms that can push seawater further inland. This could result in increased erosion and flooding, increased risk to coastal infrastructure and marinas, as well as increased maintenance and repair costs, and loss of property.

7.1.1 Stormwater Systems

Increased rainfall and storm intensity are expected to put significant pressure on the region's formal and informal limited stormwater management and drainage systems. Extreme precipitation may cause existing natural drainage systems to overspill, soil saturation, steam overflow, and flooding in low-lying areas. Additional areas may require the development of drainage master plans in the future. These conditions may also combine to impact slope stability, leading to increased risk of landslides. This also threatens personal property and public infrastructure and buildings.

7.1.2 Sewage and Water Treatment

As flows increase during severe storm events, the sewage and water treatment facilities will likely struggle. Increased rainwater inflows to sewage treatment facilities lead to a reduction in system efficiencies, resulting in a higher potential of overflow and impacts on the environment and public health. Furthermore, increased turbidity in surface water supply will affect water quality, and result in increased treatment costs, maintenance, and potential boil-water orders for surrounding communities.

7.1.3 Roads and Transportation

Changes to freeze-thaw cycles, shifting precipitation patterns, more frequent flooding events, and increased summer temperatures all have an impact on annual operations and maintenance plans, as well as long-range planning decisions of transportation networks. There could also be opportunities associated with changing conditions, such as more year-round active transportation and improved road safety during winter months.

7.1.4 Housing and Buildings

Many opportunities exist to adapt housing to climate change on a household level. Technologies such as onsite renewable energy generation, water recapture and reuse, onsite stormwater detention and management, resilient landscaping, green roofs and walls, passive shading, and other alternative building approaches and materials can increase the resilience of built assets to various climate change impacts by providing energy security, passive cooling, and reducing damage from storms. New construction should be planned with the future climate in mind, accounting for things like increased snow loads, increased wind events, and higher temperatures. Siting parameters such as preserving natural area buffers and avoiding high hazard areas can help to reduce impacts.

7.1.5 Energy Use and Distribution

Shifts in energy demand will accompany temperature changes, as heating demands decrease, and cooling demands increase over time. This will be particularly true in developed areas, and summer energy supply may become a challenge for the region and throughout the province. This is particularly a challenging issue as the primary energy produced in the province is hydro and relies on stable snow inputs. Moreover, the Province's Site C dam project has highlighted the environmental, economic, social, health and First Nations concerns of large scale energy initiatives in the province. Looking to the future, smaller scale distributed systems should be prioritized, as they can provide increased electrical system reliability, help reduce peak power requirements, reduce land-use effects, and reduce vulnerability to power outages due to extreme weather or system-wide failure.

7.2 Work to Date

The CVRD has completed a number of risk assessment studies that speak to the vulnerability of infrastructure and assets to climate change impacts. These include but are not limited to: the Risk Assessment of Floodplains and Coastal Sea-level Rise; Regional Dam Safety Reviews and Risk

Assessments; Sh-hwuykwselu (Busy Place) Creek Stormwater Management and Mitigation Plan; Regional Rockslide Inventory and Susceptibility Assessment (2020); Cowichan Lake Rockslide Flood Mapping Risk Assessment (2020) and Geohazard Risk Assessment - North Slope of Cowichan Lake. These risk assessments all contain recommendations for how the CVRD can incorporate climate change projections into future development and land-use planning. The CVRD has also undertaken numerous floodplain mapping efforts, including high-resolution mapping for the eastern coastline – from Mill Bay to their northern boundary, the Lower Cowichan/Koksilah River Floodplain Map and the Lower Cowichan/Koksilah River Management Plan, the Riverbottom Road floodplain mapping and channel migration analysis, and updated Shawnigan Lake Floodplain Maps. The remaining large floodplain in the region, the Chemainus River, is still to be updated from the historic provincial mapping, when resources permit. To manage the effects of coastal flooding, the CVRD has undertaken an impact analysis and preliminary mapping of the eastern shoreline areas to determine the potential impacts of sea level rise and increased storm events in these areas. This work will lay the foundation for future infrastructure analysis as well as land use planning in the various impact zones.

In terms of public education, the Region has developed the FloodSmart initiative as part of New Normal Cowichan, which offers resources, tools, and tips for homeowners, business owners, and farmers to best prepare for and adapt to flood events. Other significant outreach projects include the King Tides Project, which provides information about sea level rise and climate change, high tide predictions for the region, and an interactive StoryMap to upload and view geolocated photos of sea level rise in the region.

The CVRD also has an Asset Management Policy, which sets out the overall objectives and direction of the CVRD Asset Management Strategy, both of which strive for resilience amongst its built assets, among other goals. A recently completed climate assessment tool for its assets formally incorporates both ongoing climate impacts as well as projected changes impacting operations and management. As the CVRD moves forward, it will be considering the processes and mechanism available to include natural assets in its management framework at a watershed level.

Lastly, as a result of much of the natural hazards assessment work, the CVRD has recognized that it needs clear policy to support some of the difficult decisions ahead, where it may not be possible to develop or redevelop lands safely. As such, it has developed a Natural Hazards Risk Tolerance policy that provides the policy framework necessary in hazard areas, moving forward.

7.3 Ongoing and Future Work

Objective #1: Consider climate change information in land use planning and the design, construction, and maintenance of infrastructure.

- **Action 1.1 –** Continue conducting climate risk assessments as part of the CVRD Asset Management Plan and ensure rigorous data collection and tracking.
- **Action 1.2 –** Conduct a further detailed study on the future Intensity-Duration-Frequency (IDF) curves to aid in engineering decision-making and building infrastructure resilience

- **Action 1.3 –** Update development and infrastructure retrofit policies to incorporate climate change information.
- **Action 1.4 –** Promote higher development standards that reflect the best available climate information by updating by-laws, design requirements, development guidelines, and zoning regulations.
- **Action 1.5 –** Ensure natural hazards (e.g., erosion, flooding, sea-level rise, etc.) are considered in land-use planning to protect development from hazardous conditions and maintain the functionality of green and grey infrastructure.
- **Action 1.6 -** Develop bylaws for managing flood, run-off, erosion, and stormwater
- **Action 1.7 –** Update official community plans to direct future development, redevelopment, and infrastructure to areas with low hazards and environmental sensitivity.
- **Action 1.8** – Update Development Permit Areas (DPAs) to reflect the results from Natural Hazard Risk Assessments.

Objective #2: Improve the climate change risk management of critical regionally-owned and community infrastructure.

- **Action 2.1 –** Conduct regular assessments on all critical, regionally-owned infrastructure and asset systems to account for climate change impacts and provide ongoing support to member municipalities and First Nations communities to include climate change considerations into their asset management
- **Action 2.2 –** Ensure that important community infrastructure and essential services have integrated climate change considerations in developing redundancies and strengthening their resilience.
- **Action 2.3 –** Upgrade and maintain all critical infrastructure to meet identified climate projection impacts as well as long term sea level rise considerations (2.5m at this point)

Objective #3: Continue to upgrade stormwater management systems and pursue integrated flood management (IFM) approaches for reducing flood damage.

- **Action 3.1 –** Explore opportunities and investigate methods to expand the integration of green infrastructure within CVRD assets (with a focus on biodiversity, water management, and cooling mechanisms).
- **Action 3.2** – Explore opportunities to integrate natural landscaping and innovative engineering techniques on CVRD properties to enhance or restore already impacted green infrastructure and maintain performance.
- **Action 3.3 –** Explore the possibility of a “no adverse impact” flood-level policy for future developments on floodplains.
- **Action 3.4 –** Develop an Integrated Flood Management Plan to account for climate change for all regional floodplains and coastlines.

Objective #4: Reduce the risk of power outages due to extreme weather events

- **Action 4.1 –** Continue to explore opportunities and the feasibility of decentralized energy generation, and distribution in the CVRD as well as energy generation, storage, and distribution for regional assets.

7.4 Community and Partnership-Based Actions

Objective #5: Work with community partners to expand the use of green infrastructure to manage the impacts of climate change.

- ***Action 5.1 -*** *Work with member municipalities and partners to consider how green infrastructure can be expanded on private properties.*

8. Health and Emergency Management

Climate change is already affecting human health and safety and will continue to pose challenges in the future. The extent of these effects depends on how quickly the climate changes, and how well we adapt to new environmental conditions. Climate change and its related health risks can have both physical and social impacts, as well as consequences for emergency preparedness.

8.1 Impacts

8.1.1 Physical

Temperature and precipitation have a direct relationship to air quality and human health. Hotter and drier summers may lead to an increase in wildfires, causing decreases in air quality. The Cowichan region's topography, mixed with its historic reliance on the forest industry and wood burning, has led to the Cowichan Valley in particular as having some of the poorest air quality in BC. Warmer summer temperatures also cause increases in ground-level ozone, which can cause breathing problems, triggering asthma, reducing lung function, and causing lung disease (particularly in vulnerable populations such as children, older adults, and people who are active outdoors).

Temperature can also have a direct impact on human morbidity and mortality. Although the CVRD may experience less heat stress than other areas of Canada, stress levels felt by individuals may be high as much of the population is accustomed to moderate temperatures and is less prepared to accommodate high temperatures. In extreme cases, the region may see increased allergies and hospitalization of vulnerable populations due to poor air quality, heat stroke, and increases in environmental and vector-

borne diseases, such as Lyme disease and West Nile virus. Also, as water quality is compromised, it will likely be more difficult to supply clean drinking water to regional citizens.

8.1.2 Social

Climate change can also pose an indirect impact to mental health and well being from a variety of factors. Vulnerable populations who do not have the resources to adapt to heat stress, loss of income, property damage, and other stresses that may come with a changing climate require increased social support. The threat of more frequent and extreme weather could cause anxiety and symptoms of PTSD in certain vulnerable groups. Similarly, increased summer temperatures will result in increased energy use for air conditioning, which could be exacerbate energy insecurity and energy poverty. Into the long-term, sea level rise could result in the loss of cultural and historical sites.

8.1.3 Emergency Management

As the climate continues to change, increased incidences of acute climate events, such as forest fires, floods, and landslides, will become more frequent and severe. Consequently, Emergency managers will have a large role to play in communicating and managing the increase in natural disasters. It is also important for emergency managers to work closely with regional planners to ensure plans are not dependent on critical infrastructure that may be stressed during future extreme events. Cascading impacts, such as water shortages compounded with increased wildfires will create challenging conditions for firefighters and preparing for long-term water storage will become even more critical to maintaining community health and resilience.

8.2 Work to Date

Nearly all OCPs and CVRD strategy documents highlight the following policy directions:

- Promote the health and safety of all residents;
- Protect communities from natural hazards and risks through emergency preparedness; and
- Enhance and protect air quality.

Several OCPs and CVRD strategy documents also highlight the following additional policy directions:

- Foster social inclusivity and safety regardless of age, gender, race, or cultural background;
- Cooperate with other agencies and governments to enhance emergency preparedness;
- Support community capacity, education and awareness surrounding emergency preparedness; and
- Promote safety through environmental design and the built environment.

The CVRD's Emergency Management division has several public education and outreach materials for residents to prepare themselves for acute weather and natural disaster emergencies. For example, the Emergency Preparedness Workbook provides emergency preparedness information and resources for residents and businesses. It includes guides, questionnaires, checklists, and challenges that help prepare for, communicate during, and recover from emergency situations. Some of these include the 26 Weeks

to Emergency Preparedness Guide, the Emergency Preparedness Challenge, the Disaster Recovery Planning Questionnaire, the British Columbia Emergency Management System Fact Sheet, Communication and Reunion Plan, and Emergency Planning for Farms.

Air quality monitoring networks and mapping are currently tracked by the CVRD and by PurpleAir. The CVRD also administers its CivicReady platform - a mass communication service available to the CVRD residents and visitors to receive emergency and routine notifications. These include key communications such as evacuation alerts and routes, resiliency centres, severe weather alerts, and more.

As discussed previously, social resilience is a key component of climate change adaptation, especially from a health and well-being perspective. Social Planning Cowichan (SPC) researches, forms partnerships, creates strategies and informs the Cowichan public about social planning issues. One of their primary areas of focus is climate change adaptation and building resiliency into Cowichan neighbourhoods from the ground up. The Social Policy Toolkit produced by SPC outlines a process of building climate-resilient communities through identifying pre-existing strengths and resources in neighbourhoods, developing social cohesion, and building well-educated communities. Residents are left with tangible actions they can take to play their part in adapting to a changing climate, and local governments receive recommendations and actionable items.

8.3 Ongoing and Future Work

Objective #6: Minimize wildfire risk and associated impacts to public health and safety, especially amongst vulnerable populations.

- **Action 6.1 –** Conduct wildfire risk assessments in both residential and rural areas, identifying areas that are particularly vulnerable or exposed..
- **Action 6.2 –** Ensure the region's Community Wildlife Protection Plan (CWWP) is made more accessible and widely known in order to increase understanding and uptake of the plan across the region.
- **Action 6.3 –** Continue to promote FireSmart tools and prevention principles to help residents better protect themselves and their properties from wildfire risks.
- **Action 6.4 –** Establish community clean air shelters to mitigate the impact of wildfire smoke on vulnerable populations.
- **Action 6.5 –** Continue to support the Cowichan Regional Airshed Roundtable and actions in the Cowichan Regional Airshed Protection Strategy.

Objective #7: Minimize disaster risk caused by natural hazards and extreme weather events among residents, businesses, and the wider community.

- **Action 7.1** - Establish a monitoring system for current and future precipitation intensities, reservoir levels, river flows/levels and sea level rise to provide real time alerts when water levels exceed/rise beyond predetermined thresholds.
- **Action 7.2 –** Develop, test, and update emergency response plans that address flooding, extreme heat, wildfire, and landslides.
- **Action 7.3 –** Enhance communications to the public on their role in emergency preparedness.
- **Action 7.4 –** Develop and deliver ongoing education and outreach to homeowners and the larger community on the issues and impacts of increasing natural hazards affecting the region.
- **Action 7.5 –** Develop a regional Natural Hazards Disaster Risk and Recovery Strategy (NHDRRS)

8.4 Community and Partnership-Based Actions

Objective #8: Work with community partners to minimize health issues caused by extreme heat days, especially for highly vulnerable populations

- ***Action 8.1:*** *Encourage the development of shared cooling spaces on-site in all building housing vulnerable populations (e.g., shelters, daycares, long-term care homes, etc.), with an emphasis on priority areas.*
- ***Action 8.2****: Continue to update the Cowichan Communities Health Profile to ensure continuous improvement and actions towards improving regional health.*
- ***Action 8.3****: Develop early warning systems and response plans that alert community members when projected heat conditions or poor air quality days pose a health risk.*

Objective #9: Work together to strengthen emergency management capacity to respond to weather-related emergencies

- **Action 9.1:** Strengthen the capacity of organizations that assist in disaster response to prepare for potential climate change impacts.
- **Action 9.2:** Pilot a neighbourhood resilience program with municipal partners to expand equitable neighbourhood resilience planning, especially in high-risk areas

9. Green Growth and Sustainable Development

A changing climate brings challenges and opportunities. The biggest impacts in economic development will likely be in the agriculture and forestry industries, while tourism may also be affected. Warmer temperatures and prolonged summer drought, combined with extreme out-of-season storm events can be expected to bring uncertainty to the forestry, agricultural, and tourism sectors. Alongside these impacts in the Region, there are also potential opportunities that could be seized under changing climate conditions – a prolonged growing season, shifts in production, etc. The actions in this strategy aim to minimize economic impacts while trying to seize any opportunities across the region.

9.1 Impacts

Growing seasons are expected to become longer due to fewer frost days and an increase in growing degree days. However, due to increased heat stress, sunscald, invasive species, pests, and plant diseases, both plant health and crop productivity will be affected. Additionally, increased competition for water resources in the region, and inappropriate timing of pollinators, may limit the ability of traditional crops and species to grow. While some agricultural production may experience challenges, opportunities for diversity and higher crop productivity are also possible. Food security may also become an increasingly important issue, as global food systems change, and local crop production varies from year to year due to changing conditions.

The forestry industry may experience a decline in tree growth and an increase in tree mortality rates, especially among vulnerable species, as a result of reduced snowpack, frost days, and summer precipitation, combined with overall increasing temperatures. Increased risk of extreme rain events in winter, with their increased erosion potential, can be expected to challenge harvest opening sizes, cut-block orientation, road-building and deactivation practices, slope-stability practices, blow-down

prevention, rotation lengths, and commercial viability. Increased risk of forest fires, lower growth rates, and stress to forest health from new diseases and pests will be key considerations for forest managers in the future. Moreover, water shortages during dry spells and increase in water costs could have economic impacts on the forestry industry in the long-term.

Within the tourism industry, warmer and drier summer may benefit tourism, however, droughts and high temperatures may impact people's ability to enjoy summer activities. Winter sports will be harder to sustain over the years, being replaced by recreation activities all year round. Although, some recreation may become less attractive due to changes in the ecosystem.

9.2 Work to Date

In 2014, the CVRD updated the Farm Land and Food Security chapter of the State of the Environment report. This document provides an in-depth look at the current state of the agricultural industry, detailing assets and limitations and how these are likely to shift in the future. A detailed inventory of land, land use, agricultural products, land management practices, and the economics of local farming was created to help understand the strengths and weaknesses of the Cowichan agricultural sector in the Cowichan Valley Regional District Agricultural Overview. In 2010, the Cowichan Green Community also published its 2010 Food Security Plan to track food security developments in the community and to highlight collective and individual barriers that still exist.

In order to better understand local agriculture and water security issues, the CVRD developed, in partnership with the Ministry of Agriculture, the Agriculture Water Demand Model, which assesses current and future agricultural demands on water supply. The study examined crop, irrigation system type, soil texture, and climate data for all land zoned for agricultural use (including Agricultural Land Reserve land and First Nations land) in order to calculate water use and water demand. As a follow up to that work in 2015, the CVRD worked with the agricultural community on the Integrated Farm Water Planning Pilot, which created a toolkit that helps farmers evaluate water supply, storage capacity and future water use, and recommends strategies to achieve better water management. This toolkit relies on data from the CVRD Water Demand Model. Phase Two of the project tested the toolkit with 8–10 farms that exhibit a variety of water issues.

Multiple irrigation management workshops have also been delivered across the region to educate and build capacity within the agricultural community so that they may effectively undertake and better implement these climate adaptation measures.

9.3 Ongoing and Future Work

Objective #10: Attract, retain and expand local agriculture and agri-food businesses to support food security.

- **Action 10.1 –** Develop strategic agriculture plans and promote direct farm marketing for areas in the region with a significant agricultural sector.
- **Action 10.2 –** Support urban agriculture and/or small-scale production within residential areas to support food security.
- **Action 10.3 –** Strengthen agriculture policy directions in all Official Community Plans (OCPs) in CVRD.
- **Action 10.4** - Expand communications and education to local residents on the importance of buying locally and accessing local markets.

Objective #11: Support regional business innovation and continuity in the face of a changing climate

- **Action 11.1 –** Develop a Regional Circular Economy Strategy/Action Plan
- **Action 11.2** - Work with Private Managed Forest Land (PMFL) Program partners to maintain currency with the policy and practices to protect the working forest base and values of non-timber forest products.
- **Action 11.3 -** Work with local businesses and tourism industries to explore adaptation options, business continuity planning, and diversification in the face of a changing climate.

9.4 Community and Partner Based Actions

Objective #12: Improve local water security for agricultural lands, and continue to monitor, assess, and manage water.

- ***Action 12.1 –*** *Support and continue promotion of sustainable farming practices and innovative technologies pertaining to water usage.*

Objective #13: Support and encourage community stakeholders to incorporate climate adaptation into agricultural and food security planning.

- ***Action 13.1*** *- Encourage farmers to develop Environmental Farm Plans.*
- ***Action 13.2*** *- Encourage area municipalities to adopt the Cowichan Food Charter.*

Objective 14: Encourage local forest industry to adapt to changing climate conditions

- ***Action 14.1 -*** *Encourage the adoption of climate change adaptation into forest management planning for local industries.*

10. Ecosystems and Bioregional Carrying Capacity

The Cowichan region is well known for the diversity and natural beauty of its ecosystems and its watersheds. As one of the most biologically rich areas in Canada, the region consists of a complex mosaic of rare bio-geoclimatic zones, habitats, and species. The CVRD is also home to 18 watershed planning areas that have most of their jurisdiction in the region with several others overlapping with neighbouring regional districts. The watersheds provide valuable goods and services to the region including drinking water, fish and wildlife habitat, drought mitigation, flood and water quality regulation, climate regulation, erosion control, food and wine production, and support for the industries and employment. However, due to challenges related to climate change, population growth, and urban development, natural assets and watershed areas are under significant pressure.

10.1 Impacts

10.1.1 Ecosystems

Climate change affects both terrestrial and aquatic ecosystems. Warmer temperatures may affect the timing of biological cycles, enhance the potential for invasive species, pests, and others that compromise native species in the region.

In terrestrial ecosystems, periods of drought intermixed with intense precipitations at other times can have a negative impact on the soil composition affecting the absorption and retention of water, leading to increased risk of slope failure, overland flooding, stream collapse, and transport of silt to water bodies. Drought-like conditions are expected to bring about an increase of wildfires, trees being blown down, stressed upland forest water-holding capacity, among others. Moreover, species may migrate to the region from the south in order to look for less warm temperatures.

10.1.2 Watershed Health

Changes in precipitation patterns and snow will directly affect the groundwater resources of the region since the majority come from groundwater wells and in some cases regional lakes and rivers. When temperatures are high and the demand for water is high, it is expected that the water supply will strain during those periods. The quality of the water will also be affected due to drier and warmer summers, as well as extreme rainfalls. Erosion of upland soil and turbidity arising from flash floods will also impact the quality of the water, compromising drinking water systems where water treatments may be not adequate.

10.1.3 Bioregional Carrying Capacity

With respect to regional growth, long-rage planners are encouraged to consider the carrying capacity of the region including water supply, supporting infrastructure in high impact areas, as well as potentially limiting growth areas. Hazards such as flooding, landslides, and others should be included in the planning processes.

10.2 Work to Date

10.2.1 Biodiversity and Conservation

In 2010, the CVRD Environment Commission produced a series of comprehensive State of the Environment Reports to assess the status of a variety of environmental indicators and issues that signal the health of the environment within the regional district. These reports examined the status of water, air, fish, agricultural land, biodiversity, population and growth, the implications of climate change and the management of waste. With regards to human interactions with the environment and the compounding impacts of climate change, the report emphasized the need for ongoing flood and drought management, agricultural modifications and impacts, water management plans, and the need for increased energy resiliency.

The CVRD has also developed key strategies for conserving, protecting, and enhancing its natural areas and local biodiversity. The 2014 Invasive Plant Species Strategy provides an assessment of the risks posed by invasive plant species to human health, ecological systems and economic interests. The CVRD is also currently in the process of developing a Conservation Strategy, which has identified sensitive ecosystems in the region and will provide guidance in the conservation and protection of ecological areas for the future.

10.2.2 Watershed Management

The residents of the CVRD recognize the importance of the Region's water resources and recently (2018) voted to support the development of a Regional Drinking Water and Watershed Protection service. The program's 10-year workplan (One Water – One Region) was adopted by the CVRD Board in February 2020, and sets out a ten year strategy to protect water quality and understand and manage our watersheds more effectively in order to ensure long-term water supply. The CVRD is also in the process of developing Watershed Plans for the Region's watersheds that provide water for the growing communities. Watershed planning in the region has focused on, to date, four main documents, including

the Bonsall Creek Watershed Plan, Cowichan Basin Water Management Plan, the Yellowpoint Benchlands Watershed Planning and the South Cowichan Watershed Strategy.

Most recently, the CVRD completed a stages 1-8 of a provincial Water Use Plan that will set the stage for a revised water license for storage on Cowichan Lake. The Region is also currently working on the subsequent detailed designs for the removal and engineering of a new structure. Recent funding from the federal Disaster Mitigation and Adaptation Fund (DMAF) will support the implementation of both the water use plan as well as enhance flood resilience throughout out the Cowichan System.

Public education on water use is also essential to ensure residents and key community players are using and conserving water in a responsible way. The "New Normal" and cowichan lake weir (https://cowichanlakeweir.ca/weir-design/) websites provide up-to-date information on lake storage, water quality, water temperatures, and impacts for fish. The CVRD also has a watershed atlas and web platform for public use that helps inform watershed management, while continuing to examine the increasing risk of natural hazards in the area.

10.2.3 Carrying Capacity Considerations

Effective growth management demands a regional perspective and lens. Currently, all municipal OCPs state their support for a regional growth strategy, while several of the Electoral Area OCPs include statements about how the impacts of growth are experienced on a regional scale. Growth management is clearly tied to several planning areas, notably ecosystems and biodiversity, transportation, services and infrastructure, and climate adaptation.

OCPs are consistent in recognizing growth management as a fundamental component of creating complete, healthy, livable, and efficient communities. While some OCPs have explicit growth management goals and policies, others have growth management-related policies more implicitly woven throughout other sections

The CVRD Corporate Sustainability Strategy (2012) includes a Human Settlement priority area that states: "Our communities are developed in balance with the regional ecology, such as through compact communities and density that respects the environment's carrying capacity." It also contains the following milestone: "regional urban containment boundaries defined"[xvii]. There is also currently a major project underway that is looking to amalgamate and align all the electoral area OCPS under one major OCP. This project will bring in a suite of sustainability considerations into the modernized OCP and updated planning framework.

10.3 Ongoing and Future Work

Objective #15: Steward, protect, and restore the region's ecosystems and biodiversity in an era of climate change and continued population growth

- **Action 15.1** - Conduct ongoing research to update the Environmentally Sensitive Areas (ESA) Strategy and ensure climate change impacts are adequately addressed over the long-term.

Action 15.2 - Develop a robust regional Growth Management Strategy that is in line with community needs and which takes into account regional carrying capacity for water supply, waste management, food systems, and transportation.

- **Action 15.3 -** Continue to proactively manage all CVRD-owned forested areas to increase forest resilience to wildfires, while considering biodiversity in its planning.

Objective #16: Steward, protect and restore Cowichan region watersheds in the face of growing climate change impacts, continued population growth, and other development pressures, including forestry and mining

- **Action 16.1 -** Review codes and drainage rules to evaluate their ability to protect and improve stream flows, seeps, springs, wetland function, water quality (including temperature), vegetation and habitat, and stormwater management during hotter and drier summers.
- **Action 16.2 -** Ensure the Drinking Water and Watershed Protection (DWWP) planning process develops long-term Community Water Security Plans and updates Watershed Plans with climate projections to reduce future conflicts over water use.
- **Action 16.3 -** Develop coordinated watershed management plans to assist and inform land use planning

Objective #17: Prepare for shifts of ranges of existing species and influxes of new invasive species

- **Action 17.1** - Review and update Invasive Species Strategies to include novel species and emerging species affecting the region as a result of climate change.

10.4 Community and Partnership-based Actions

Objective #18: Support education and outreach programming on watershed health, tree planting, and ecosystem management

- ***Action 18.1 -*** *Create awareness of watershed health and function via public education programs, such as school forums, information for farmers and watershed tours.*
- ***Action 18.2 -*** *Work with community members and industries located on sensitive aquifers to educate and implement a code of shared responsibility to protect water quality.*
- ***Action 18.3*** *- Support expansion of current and explore new voluntary programs promoting increased native, drought-tolerant vegetation and reduced hardscape on private property.*

11. Cross-Cutting Actions

In addition to the impacts outlined in the categories above, there are a number of objectives and actions that build capacity and encourage advancing overall resilience in the CVRD. In addition to the objectives below, climate risk management needs to be routinely integrated in virtually all aspects of the CVRD and municipal partners' work, including setting policy, making budget decisions, updating zoning and other codes, investing in infrastructure, delivering health services and fostering emergency preparedness.

Objective # 19: Research, monitor, and disseminate lessons learned on climate change projections, impacts, and equitable adaptive actions

- **Action 19.1 -** Establish relationships with subject matter experts who conduct research on global climate change impacts, understand their effects on the CVRD and identify communities most in need of intervention.
- **Action 19.2 -** Communicate long-term climate change projections and related research to community stakeholders, partners, and the public.
- **Action 19.3 -** Keep up to date with best practices for adaptation action, and work with local communities to inform climate impacts and equitable adaptation and risk mitigation planning.

Objective # 20: Mainstream climate change adaptation into Regional policies, programming and actions

- **Action 20.1 -** Conduct a review of the region's OCPs and other key service-level plans and policies (e.g., Emergency Management Plan, etc.) to identify where climate change language and considerations can be integrated.

Objective #21: Maximize collective impact against climate change through partnerships with local First Nations

- **Action 21.1 -** Continue to work with local First Nations on the development of coordinated and collaborative climate adaption initiatives and programs.

12. Implementation and Governance

The Climate Change Adaptation and Risk Management Strategy is intended to prepare the CVRD and its regional partners in preparing for the impacts of climate change. The Strategy also includes a range of other organizations who lead or support those actions using a sphere of responsibility framework. A strong focus on implementation, governance, and monitoring and review frameworks will be key to ensuring the continued success of the Strategy. The implementation framework includes guidance on Strategy oversight and governance, integration with existing plans and policies, and education and outreach where it is possible to assign those responsibilities.

12.1 Actions Tables and Preliminary Implementation Considerations

Detailed action tables, which include preliminary implementation considerations, have been identified for each actions included in the CCARMS. These can be found in Appendices A – E. The action tables are intended to help identify and allocate resources required to implement priority actions. Alongside every priority action, the tables include:

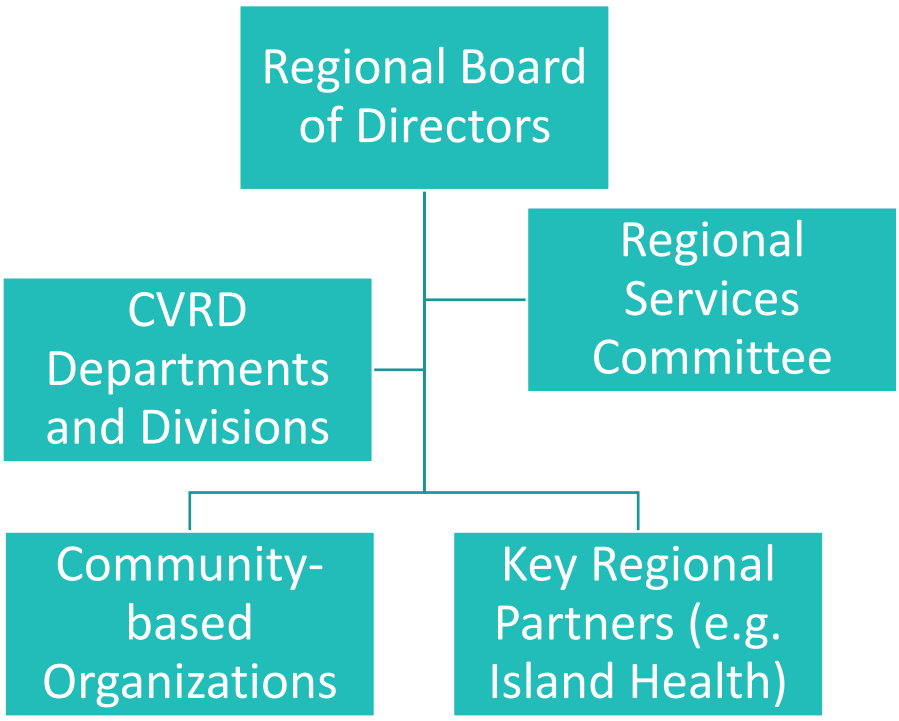
- Supporting actions that may be undertaken to support the achievement of the overall action, and are usually more specific and detailed in nature
- Timeframe for implementation
- Suggested lead and supporting organizations for implementation.

It is important to note that the CCARMS and subsequently the action tables are treated as living documents, and actions may change as a result of changing circumstances or information. Moreover, further collaboration will be required with regards to the community and partnership-based to ensure the suggested actions and sub-actions align with organizational priorities. Therefore, it is expected that these actions may change or evolve as implementation progresses.

It is also important to note that many of the actions identified in the tables are already underway. A detailed implementation plan and schedule will be determined for the CCARMS and each priority actions to determine its current status, and additional remaining tasks required to complete the action.

12.2 Adaptation Strategy Oversight and Governance

The organization and governance model for the implementation of the CCARMS can be characterized as “Regionally-led and community supported”. The benefits of this model are that it enables the Region to play a leadership role, while sharing the responsibility for Strategy implementation, and leveraging the capital of regional partners for those strategies that are beyond the CVRD’s direct control. The potential roles for implementation are presented in the graphic below and demonstrate the governance structure and reporting hierarchy for tracking progress on the Strategy over time.



12.2.1 Actions that are led by the CVRD

The Regional Board of Directors will be responsible for the official adoption of the Adaptation and Risk Management Strategy. They will also approve subsequent annual work plans and resourcing for actions that are a responsibility of the CVRD.

The Environmental Services Division will continue as the champions of the Adaptation and Risk Management Strategy and will be responsible for tracking progress on implementation. It will also be responsible for coordinating with regional stakeholders to measure success on implementation.

12.2.2 Community and Partnership-based Action

Member municipalities, other key regional partners, and community-based organizations involved in the implementation of the CCARMS will be involved via a regional roundtable process to coordinate and guide its implementation. These organizations will be key in the implementation of the 'Community and Partnership-based Actions'. Further collaboration will be required with this group in order to ensure the suggested actions and sub-actions align with organizational priorities. It's expected that these actions may change or evolve as implementation progresses. Representatives in this external working group would represent the interest and responsibilities of regional partner organizations. It is anticipated that this group would meet throughout the year, with a minimum of two meetings per year. The purpose of these meetings would be to develop annual workplans and to report on progress at year-end.

12.2 Communication, Education and Outreach

It is important to create a shared understanding of the importance of climate change impacts and identify opportunities for adaptation to be integrated into mainstream thinking of all residents, visitors, and other relevant community stakeholders. Engaging all audiences in an ongoing conversation about the benefits of climate action is critical for the long-term success of the Strategy. It's recommended that

the CVRD, along with its regional partners, develop a communication strategy for the CCARMS that ensures residents are kept up to today on progress, and provide them with opportunities to take action at the household and community level.

13. Monitoring and Evaluation

13.1 Indicators

Indicators help to monitor progress over time. In order to gauge progress, baseline data must also be collected. Roles and responsibilities for collecting this data must also be assigned. The CVRD is currently in the process of developing indicators for its OCP modernization. As such, it will be important to align adaptation indicators with OCP indicators in order to not repeat efforts and use data across multiple program areas.

For the purpose of this Strategy, indicators are likely to be process-based. That is, they measure whether the CVRD and its regional partners have made progress on implementation. The development of outcome-based indicators (i.e., metrics that track the effectiveness of actions) is less straightforward and will most likely need to be determined as implementation progresses.

The creation of a sustainable evaluation framework should be conducted using a five-step framework described at a high-level below:

1. **Develop/ Refine Indicators**: Indicators can be both process and outcome based, the former devoted to gauging steps toward building capacity and measuring progress on implementation, while outcome indicators seek direct lines of evidence to support a cause-effect relationship.
2. **Collect Data**: Need to identify baseline data requirements – what information is needed to measure a change
3. **Analyse and Evaluate**: Analysis should centre around identifying upward or downward trends
4. **Communicate Results**: Communication between data holders, data users, and decision-makers is integral throughout the performance measurement process.
5. **Strive for Continuous Improvement**: Monitoring and evaluation is not an end but rather a means towards improved and enhanced decision-making

As the implementation of the CCARMS advances, so too should this evaluation framework.

13.2 Annual Reporting

Each lead organization will be responsible for reporting on the progress of implementation for their assigned actions. In order to do so, the CVRD will develop an internal reporting template for organizations to fill out on an annual basis via the roundtable. The reporting template will track information relating to progress and adjustments to actions from the CCARMS – including specific information such as budgets, timelines, sub-tasks, etc. as well as progress and measurements on indicators identified, or on new indicators. There is also an opportunity for organizations to list new tasks or initiatives that have been undertaken that support the implementation of the Adaptation and Risk Mitigation Strategy. The reporting template will help the Environmental Services Division to measure progress over time and provide a platform to share outcomes from the Strategy on an annual basis to organizations and the public.

13.3 Strategy Review Schedule

A formal review of the Strategy is planned to occur every five years. An update to the Regional Board of Directors on the progress of the Strategy will occur on an annual basis using the feedback from the reporting template. Fundamentally, the 5-year review is intended to gauge the implementation status of priority actions and identify whether these actions are helping to improve the adaptive capacity of the CVRD and its community.

The progress on implementation will be greatly informed by the reporting template, which will allow the Environmental Services Division to determine the status of priority actions. However, it will also help the Region to consider such questions as:

- How many actions have been undertaken by various organizations?
- How many organizations/staff have been involved in implementing the Strategy?
- How has the community been involved in the implementation of the Strategy?
- How has the Strategy increased the general and technical capacity of both the corporation and community to adapt to climate change impacts?
- How is climate change information being considered in decision-making processes within the region and community?
- How effective have the actions been in achieving the Strategy's objectives?
- How has awareness regarding climate change and adaptation increased in both the corporation and community?

This information will subsequently facilitate an update to the CCARMS.

Appendix A: Resilient Green and Grey Infrastructure Actions

Action ID	Action	Description	Anticipated Timing	Lead Department(s)	Supporting Organization(s)
Objective #1: Consider climate change information in land use planning and the design, construction, and maintenance of infrastructure.					
1.1	Continue conducting climate risk assessments as part of the CVRD Asset Management Plan and ensure rigorous data collection and tracking.	Understanding climate change impacts to the CVRD is crucial in managing assets effectively, ensuring sustainable service delivery, and making prioritized and informed investment decisions over the long-term. In order to do so, the CVRD will continue to conduct climate risk assessments using their Climate Risk Assessment Framework. This Framework establishes a methodology to identify vulnerable asset systems and assess risks. As well, in order to ensure continuous improvement of asset systems, it will also be necessary to continue thorough data monitoring and collection (e.g. integrating up-to-date climate data into assessments). Employing these strategies is essential in supporting decision-making, maximizing life cycle and benefits of assets, improving the overall return on investments, and most importantly reducing all infrastructure risks related to climate change.	Medium-term (2-5 years)	CVRD – Asset Management Group; CVRD – Environmental Services; All CVRD asset owners	Municipal Partners; CVRD - LUS
1.2	Conduct a further detailed study on the future Intensity-Duration-Frequency (IDF) curves to aid in engineering decision-making and building infrastructure resilience.	Expected increases in the frequency and intensity of rainfall and extreme temperatures will not only have impacts on infrastructure repair and recovery costs, but may also cause extended disruptions of infrastructure services. CVRD climate projections provide metrics for projected increases in both the amount of precipitation as well as the distribution, with more rainfall projected to fall during intense storm events. It is challenging to apply these metrics directly to infrastructure planning. Intensity-Duration-Frequency (IDF)	Medium-term (2-5 years)	CVRD - Environmental Services	Municipal Partners and CVRD – LUS MOSAIC, Province of BC (FLNRO, MOTI, ENV)

		curves are the metrics commonly used to represent characteristics of extreme rainfall. These curves are a set of guidelines that inform the design and implementation of municipal infrastructure (e.g. sewers, stormwater management ponds or detention basins, street curbs and gutters, catch basins, swales, pumps, etc.), from pipe size to pump strength and construction practices. The CVRD will conduct a more detailed study of future IDF curves with climate considerations, in order to better contribute to the planning, design, and management of stormwater infrastructure that can handle current and future rainfall events. Supporting actions could include the following: • Coordinate this specific analysis with the new DWWP program to ensure that climatic and hydrological data is collected and utilized effectively and that updates to the IDF values are in line with on the ground effects. • Investigate the most appropriate design IDF curve to reflect changing climate parameters within the region both spatially and elevationally, recognizing the substantial variability over the region. • Develop a plan to regularly update the design IDF curve and implement during update to relevant guidelines and standards.			
1.3	Update development and infrastructure retrofit policies to incorporate climate change information.	Climate change has exposed and will continue to expose our buildings and infrastructure to chronic stresses (e.g. rising summer temperatures) and acute shocks (e.g. ice storms, heatwaves, wildfires, etc.), creating new vulnerabilities in the built environment. Much of the building stock and infrastructure we see today will still be present for decades to come. As such,	Medium-term (2-5 years)	CVRD – Asset Management	Municipal Partners and CVRD - LUS

		continuously retrofitting our buildings and infrastructure for changing climate conditions will help reduce their exposure to climate hazards, lengthen asset life, reduce maintenance and repair costs, and ultimately increase their resilience to climate change. CVRD will update its building and infrastructure retrofit policies to incorporate climate change information. In particular, these policies will be regularly updated to reflect new climate projections and infrastructure technologies (e.g. grey and green infrastructure). Supporting actions could include the following: • Explore opportunities to enhance, education, and support communities in building better than the basic retrofit standard. • Conduct ongoing research to identify suitable best management practices around retrofits and implement into the CVRD's policies, and ongoing and future CVRD building projects.			
1.4	Promote higher development standards that reflect the best available climate information by updating by-laws, design requirements, development guidelines, and zoning regulations.	Swiftly evolving data, technologies, and knowledge necessitate ongoing review and updating of where and how infrastructure is built and maintained. As such, the CVRD will apply a climate change lens to the ongoing review and updating of their zoning by-laws, development guidelines and standards, design requirements, and other specifications. Incorporating climate change considerations into these documents will ensure that risks are adequately addressed and that new infrastructure and planning projects are resilient in the face of future climate conditions. Supporting actions could include the following: • Develop a policy for regularly updating development standards to reflect new climate change projections and	Medium-term (2-5 years)	CVRD – LUS; CVRD – Engineering Services	Municipal Partners; CVRD – Engineering Services

		infrastructure technologies (e.g. grey and green infrastructure) • Conduct research to identify suitable best management practices and standards for design, construction, and maintenance that can be adopted and implemented into the CVRD's standards and ongoing and future projects. • Update relevant by-laws (e.g. zoning), development standards and design requirements.			
1.5	Ensure natural hazards (e.g., erosion, flooding, sea-level rise, etc.) are considered in land-use planning to protect development from hazardous conditions and maintain the functionality of green and grey infrastructure.	Some parts of the CVRD are more vulnerable to natural hazards (e.g. erosion, flooding, sea-level rise, wildfires, extreme weather events, etc.), often as a result of past land-use decisions and/or geographic features. Localized studies (e.g. mapping, inventories, and risk assessments) can help target adaptation information or programs towards more vulnerable neighborhoods and areas. With climate change projected to increase the incidence and intensity of extreme weather events, the CVRD will ensure that natural hazards are considered in land-use planning decisions. In turn, this will increase the resilience of vulnerable areas to climate change impacts, protect public safety, and maintain the functionality of the grey and green infrastructure. Supporting actions could include the following: • Inventory and assess current status of flood risk • Identify neighborhoods with higher incidences and/or risk of flooding (possibly using complaints/anecdotes as part of the mapping process) • Use flood-risk maps to help identify priority areas for green space, tree planting, flood risk reduction	Medium-term (2-5 years)	CVRD – Environmental Services; CVRD - LUS	CVRD – LUS; Municipal Partners; MMAH - BC Building Standards and Safety Branch

		information/incentives, information on insurance options, etc. • Consider how to encourage flood resilience measures in targeted areas (e.g. for buildings in designated flood plains or at a higher risk of urban flooding - including upstream measures to reduce flood risk downstream) • Incorporate updated IDF curve data into stormwater management plans, liquid waste management plans and long-term water supply plans. • Consider integration of natural hazards into land use guidelines.			
1.6	Develop bylaws for managing flood, run-off, erosion, and stormwater	Supporting actions may include: • Review current floodplain boundaries and other geo-hazard risk assessment to determine boundaries and areas of high-risk • Establish Flood Construction Levels (FCLs) to keep living spaces, electromechanical systems and areas used for the storage of goods damageable by floodwaters above flood level. • Establish development permit guidelines for flood protection in areas vulnerable to sea level rise and riverine flooding and adjust existing development permit guidelines as necessary			

1.7	Update official community plans to direct future development, redevelopment, and infrastructure to areas with low hazards and environmental sensitivity.	Official Community Plans (OCPs) provide overall policy context for regulatory bylaws (e.g. zoning, development cost charge, etc.). In relation to land use, OCPs contain policy statements and mapping dealing with future land use, development, and redevelopment. OCPs are also required to identify and document areas that are environmentally sensitive or subject to natural hazards, and may contain policies restricting development in such areas. As the region's highest order planning document, it is important this is updated to reflect the results from any Natural Hazard Risk Assessments conducted. More specifically, it should state that future development, redevelopment, and operation/construction of critical infrastructure should only be carried out in areas with low hazards and environmental sensitivity. In doing this, the CVRD can ensure that future policies and construction is in line with this document.	Medium-term (2-5 years)	CVRD – LUS	CVRD – Environmental Services; Municipal partners
1.8	Update Development Permit Areas (DPAs) to reflect the results from Natural Hazard Risk Assessments.	A Development Permit ensures that proposed developments meet the policies and objectives of the Official Community Plan (OCP). The OCP specifies areas that fall under a Development Permit Area (DPA). A DPA is comprised of development guidelines that address matters related to the protection of the natural environment, protection of farm land and protection from hazardous conditions. DPAs may also guide the form and character of development, promote energy and/or water conservation and the reduction of greenhouse gas emissions. The CVRD will update its DPAs as needed to reflect the results from any Natural Hazard Risk Assessments conducted by the region. These DPAs will guide how development occurs. In turn, this ensures greater public safety, protection of vulnerable ecosystems, and avoided/minimized costs to	Medium-term (2-5 years)	CVRD – LUS	CVRD – Environmental Services; Municipal partners

		public and private assets and infrastructure over the long-term.			
Objective #2: Improve the climate change risk management of critical regionally-owned and community infrastructure					
2.1	Conduct regular assessments on all critical, regionally-owned infrastructure and asset systems to account for climate change impacts and provide ongoing support to member municipalities and First Nations communities to include climate change considerations into their asset management.	As heat waves, intense rainfalls, and other extreme weather events occur more frequently in the future, it will be crucial for CVRD to regularly conduct climate change vulnerability and risk assessments on critical, regionally-owned infrastructure and asset systems. These assessments will take into account the risks to infrastructure service and delivery as well as public health and safety concerns. By proactively identifying potential at-risk critical infrastructure, these assessments direct where adaptive measures should be prioritized and help improve the safety of infrastructure. Examples of critical regionally-owned infrastructure could include the following: sewer systems, water pumping stations, water systems, select drainage systems, important road intersections, regionally-owned vulnerable population facilities (i.e. long-term care facilities, seniors' facilities), data security systems, and important operational equipment. Supporting actions could include the following: • Identify relevant critical infrastructure and assets • Analyze their locations, interdependencies and consequence of loss.	Short-term (1-2 years)	CVRD – Asset Management; CVRD Engineering Department	Municipal Partners and CVRD – Water and Sewer Utilities; CVRD – LUS; CVRD - Parks and Facilities

		• Develop a policy to ensure that critical infrastructure is assessed every few years to incorporate climate change considerations and public safety concerns (i.e. updating inspection and maintenance protocols, priority response protocols in the event of an emergency, etc.). • Incorporate findings into asset management, liquid waste management plans, stormwater management plans, long term water supply plans, O and M and budgeting. • Conduct ongoing research into best practices in asset management regarding climate and green infrastructure and encourage sharing and collaboration between member municipalities and First Nations communities.			
2.2	Ensure that important community infrastructure and essential services have integrated climate change considerations in developing redundancies and strengthening their resilience.	Important community infrastructure and essential services will always be needed by community members, and may even be more important, during or following an extreme weather event. Recognizing that climate change could pose major threats to this, CVRD will ensure that that critical community infrastructure and essential services are operational during emergencies and periods of inclement weather. In the case of power outages, it will be imperative that community infrastructure and services have access to back-up power and business continuity plans in place. Supporting actions could include the following: • Identify what infrastructure, organizations, businesses, etc. may not be required by legislation to maintain backup power, but are nevertheless very important to the functioning of the community during an extreme weather event such as flooding or heatwaves, or during a power outage (e.g. community centres, shelters, long-	Mid-term (1-5 years)	CVRD – Engineering Services, CVRD - Community Services	Member Municipalities; CVRD - Economic Development

		term care homes, daycares, community support organizations, schools, food banks, etc.) • Establish system redundancy for important community infrastructure and essential services • Encourage identified essential services to develop Business Continuity Plans that consider installing/maintaining backup power, cross-training of staff, identify alternative fuel/energy suppliers, storing vital information off-site, necessary communication protocols, etc. • Educate community organizations and businesses on backup power planning and purchasing options, and explore possibility of providing grants to specific organizations/groups.			
2.3	Upgrade and maintain all critical infrastructure to meet long term sea-level rise considerations (2m at this point)	Ongoing sea-level rise over the coming decades poses huge adaptation challenges, especially for low-lying coastal and floodplain settlements. Given the specific issues and uncertainties related to the speed and impacts of sea-level rise, it will be crucial for the CVRD to upgrade and maintain all their critical infrastructure to a minimum 2.5 metre elevation rise as determined by the CVRD Sea Level Rise Risk Assessment. To attenuate water flow and flooding, reduce stormwater runoff, and manage other impacts of sea-level rise, the CVRD will employ a variety of strategies: o Nature-based solutions and “soft armouring” techniques (e.g. protection and maintenance of coastal ecosystems, beach nourishment and planting vegetation, using natural breakwater such as oysters, etc.) o Hard infrastructure solutions (e.g. seawalls, rip rap, elevated buildings, dikes, levees) o Pre-emptive managed retreat of assets away from coastlines	Medium-term (2-5 years)	CVRD – Engineering Services, CVRD Parks	CVRD - Environmental Services

		○ Management of saltwater intrusion impacts to groundwater sources Supporting actions could include the following: • ongoing review of what critical infrastructure needs be upgraded or maintained in order to meet the provincial planning recommendations • Prioritize upgrading assets based on level of urgency, risk to the asset or synergies with other upgrades. • Consider appropriate adaptive solutions and prioritize nature-based solutions to the extent possible. • Establish a policy mechanism that limits hard armouring techniques along vulnerable coastlines (where soft armouring techniques/nature-based solutions would be preferred)			
Objective #3: Continue to upgrade stormwater management systems and pursue integrated flood management (IFM) approaches for reducing flood damage.					
3.1	Explore opportunities and investigate methods to expand the integration of green infrastructure within CVRD assets (with a focus on biodiversity, water management, and cooling mechanisms).	With climate change projections depicting an increase in the full spectrum of rainfall events (including extreme precipitation events), effective stormwater management will be required to combat surface runoff and flooding. A method by which the CVRD will better manage these concerns into the long-term, is through exploring opportunities to expand green infrastructure and use of Low Impact Development (LID) features across regionally-owned properties. This includes projects such as rain gardens, permeable pavement, green roofs, blue roofs, and more. These strategies will provide additional benefits such as regulating temperatures, mitigating the urban heat island effect, increasing infiltration of clean water runoff (as opposed to contaminated water, e.g. from salted roads), and improving psychological and social well-being.	Medium-term (2-5 years)	CVRD – Engineering Services	CVRD – LUS; CVRD – Parks and Facilities

		Supporting actions could include the following: • Establish a green infrastructure target • Develop and promote LID and green infrastructure pilot projects in prominent public spaces, employing a coordinated approach that integrates stormwater management with public parks and open spaces. • Develop targeted trainings/communications materials on LID options for different types of land and properties.			
3.2	Explore opportunities to integrate natural landscaping and innovative engineering techniques on CVRD properties to enhance or restore already impacted green infrastructure and maintain performance.	In comparison to conventional landscaping, natural landscapes are inherently low maintenance and self-renewing, and can have many ecological, environmental, educational, recreational and economic benefits associated with its application. Connected naturalized areas can also help restore and/or enhance landscape functions with the surrounding ecosystem, such as improving flood risk management, strengthening the protection of watercourse corridors, while also creating habitat for local wildlife and pollinators. The Conservation Strategy will include recommendations for connecting a network of environmentally sensitive areas across the region. Some of the strategies could include the following: o Increased boulevard trees and naturalization of public spaces o Increased stewardship funding for naturalization, maintenance, and/or enhancement of natural areas, including aquatic and riparian areas, wetlands, forests, etc. o Allow currently manicured areas to naturalize.	Medium-term (2-5 years)	CVRD – Engineering Services	CVRD – LUS; CVRD – Parks and Facilities
3.3	Explore the possibility of a “no adverse impact” flood-level policy	Given that the impacts and damages related to flooding is on the rise, more effort needs to be directed towards minimizing this damage and reducing losses. A “no adverse impact”	Medium-term (2-5 years)	CVRD – LUS	CVRD – Environmental Services; Municipal partners

	for future developments on floodplains.	floodplain is one in which the action of one property owner or community does not adversely affect the flood risks for other properties or communities as measured by increased flood stages, increased flood velocity, increased flows, or the increased potential for erosion and sedimentation, unless the impact is mitigated as provided for in a community or watershed based plan. This would shift the focus from techniques and standards used for flood prone development to how adverse impact results from those land use changes can be appropriately planned for and alleviated. The CVRD will conduct research and explore the possibility of implementing a policy surround “no adverse impact” for further developments on floodplains. A policy surrounding this would require those who alter flooding conditions to mitigate the impact their actions have on individuals and adjacent communities. In doing so, the proposed policy would promote fairness, responsibility, community involvement and planning, sustainable development, and local land use management, while not infringing on private property rights.			
3.4	Develop an Integrated Flood Management Plan to account for climate change for all regional floodplains and coastlines.	Floods are the most common natural disaster in Canada with the largest impacts on society. Lack of prevention measures and increased flood-sensitive land use planning has resulted in increased flood damage over the recent years. The CVRD will develop an Integrated Flood Management Plan to better manage the future impacts of climate change across all regional floodplains and coastlines. An Integrated Flood Management (IFM) approach aims to maximize the productivity and efficient use of floodplains and coastal zones, while minimizing the loss of life and impact on livelihoods and assets through protective measures.	Medium-term (2-5 years)	CVRD – Environmental Services	CVRD – LUS; Municipal partners; First Nations and Indigenous communities

		More specifically, the Integrated Flood Management Plan will assess flood and flood-related hazards from all possible sources (e.g. rivers, creeks, urban stormwater, groundwater, and related hazards such as erosion, landslides, etc.); identify opportunities to manage risk based on a wide range of possible actions; and make decision that consider the different ways each decision might affect people, the community, and the environment. Supporting actions could include the following: • Develop long-term work plan that positions future flood management work (following the provincial risk assessment approach) alongside the ongoing flood hazard and vulnerability projects that CVRD and area municipalities are currently undertaking. • Integrate the results of the Risk Assessment of Floodplains and Coastal Sea Level Rise into policy documents to support the administration of land development, regulations, flood control bylaws, emergency preparedness, management of coastal saltwater intrusion impacts to drinking groundwater sources and long-term planning and budgeting. • Ensure the development of multi-jurisdictional flood management mechanism to maintain and manage necessary flood infrastructure now and in the future.			
Objective #4: Reduce the risk of power outages due to extreme weather events					
4.1	Continue to explore opportunities and the feasibility of decentralized energy generation, and distribution in CVRD as well as energy generation, storage, and distribution for regional assets.	In the event of power outages resulting from extreme weather events and emergencies, it will be necessary to continue operating critical services and assets, protect vulnerable populations, and minimize interruptions and impacts to businesses and the larger community. Decentralized energy can simultaneously improve energy security, reduce the vulnerability of a larger power grid, and	Medium-term (2-5 years)	CVRD – Engineering Services	BC Hydro

		foster local resilience as these subsystems would operate autonomously from the larger grid. The CVRD will continue to take steps to reduce the risk of power outages through reassessment of its Regional Energy Strategy in light of today's investment costs and development patterns. This may also involve exploring local uptake of technologies such as: ○ Biomass-or biogas-fueled district energy systems ○ Solar PV energy generation ○ Combined heat and power or energy storage for multi-residential buildings ○ Micro-grids in industrial or business parks Supporting actions could include the following: • Explore opportunities and the feasibility of decentralized energy generation, storage, and distribution for CVRD assets. • Ensure that all community buildings have ability to operate off grid for emergency response periods.			

Community and Partnership-Based Actions

Member municipalities, other key regional partners, and community-based organizations will be key in the implementation of the 'Community and Partnership-based Actions'. Further collaboration will be required with this group to ensure the suggested actions and sub-actions align with organizational priorities. It is expected that these actions may change or evolve as implementation progresses.

Action ID	Action	Action Description	Anticipated Timing	Potential Lead Organization(s)	Potential Supporting Organization(s)
Objective #5: Work with community partners to expand the use of green infrastructure to manage the impacts of climate change.					
5.1	Work with partners to consider how green infrastructure can be expanded on private properties.	Expanding the use of green infrastructure on private property can contribute to more effective stormwater management, improved ecosystem health, improved public health, and potential economic savings. As such, the CVRD will work with member municipalities and other partners to explore opportunities and consider how green infrastructure on private properties can be most effectively utilized to control or mitigate a range of climate impacts. Supporting actions could include the following: • Integrate recommendations and green infrastructure options with new guidelines, policy, and standards, including: Procurement Policy; Zoning bylaw; Development Permit guidelines • Set -municipality wide targets and key performance indicators for tree canopy, green space, rainwater management, and permeable surfaces • Expand public education on green infrastructure retrofitting for private property (e.g. residential, commercial, and/or industrial)	Medium-term (2-5 years)	Member municipalities, CVRD Environmental Services	Municipal Partners; CVRD – Planning; Island Health, Real Estate Foundation, Partnership for Water Sustainability

		• Incorporate natural assets into the municipalities' corporate Asset Management Plans • Restore natural areas and green spaces with climate-resilient native vegetation and tree species, prioritizing areas vulnerable to climate impacts (e.g. heat, flooding, habitat loss, etc.). • Promote use of green roofs. • Explore the use of green infrastructure in off-channel storage options on a continual basis			

Appendix B: Health and Emergency Management Actions

Action ID	Action	Action Description	Anticipated Timing	Lead Department(s)	Supporting Organization(s)
Objective #6: Minimize wildfire risk and associated impacts to public health and safety, especially amongst vulnerable or exposed populations.					
6.1	6.1 Conduct wildfire risk assessments in both residential and rural areas, identifying areas that are particularly vulnerable or exposed.	Projected hotter and drier weather in the region will increase the likelihood of more frequent and higher-severity wildfires. Wildfires have impacts across systems, ranging from direct impacts to infrastructure, properties, and homes, impacts to wildlife habitat and timber, air pollution harmful to human health, and more. As such, the CVRD will continue conducting wildfire risk assessments in residential and rural areas. Emphasis will be given to identifying particularly vulnerable or exposed areas. Results from these assessments will ensure more proactive and prioritized wildfire planning and management, and will maintain the health and safety of community members – especially in areas that are particularly vulnerable.	Short-term (1-2 years)	CVRD – Public Safety	Municipal partners
6.2	Ensure the region's Community Wildlife Protection Plan (CWWP) is made more accessible and widely known in order to increase understanding and uptake of the plan across the region.	A key method of ensuring the continued health and safety of community members and vulnerable populations in the event of a wildfire, is through the establishment of a Community Wildfire Protection Plan (CWWP). The purpose of these plans is to identify areas at high risk and assign planning priorities in an effective and efficient manner. They establish a cooperative framework to improve community safety, reduce the risk of property damage, and protect natural resources. Information contained within the CWPP are designed to guide development of fires awareness education, local planning tools, and management of forest lands adjacent to communities at risk.	Medium-term (2-5 years)	CVRD - Public Safety	Municipal Partners

		The CVRD will ensure their Community Wildlife Protection Plan is made more accessible to member municipalities and the public in order to increase overall understanding, buy-in, and uptake of the plan and its recommendations across the region. This includes residents, business owners, industry, and the public at large. ○ Updates to the CWWP should be published online and advertised on the CVRD's social media accounts, announced at public meetings, press releases, and education events. ○ Updates to the CWWP should be shared with local industry partners; in particular forest companies who may be interested in collaborating on wildfire management strategies (e.g. direct fuel management treatments).			
6.3	Continue to promote FireSmart tools and prevention principles to help residents better protect themselves and their properties from wildfire risks.	Much of the region is forested land susceptible to wildfires, which are projected to be further exacerbated by climate change. Interface fires, where a wildfire threatens residential areas or infrastructure, pose a risk in rural and semi-rural areas and on the fringes of village and urban centres. Based on recent large wildfires elsewhere in British Columbia, all portions of the community are likely to be at risk or affected by smoke. Alongside impacts to our built, economic, and environmental systems, more frequent wildfires pose a serious threat to public health and safety. In particular, they drastically reduce air quality leading to impacts on human health (e.g. respiratory issues, less exercise from decreased outdoor activity, impact on outdoor workers, etc.) As such, the CVRD will continue to promote FireSmart tools and prevention principles to help residents proactively mitigate wildfire risk and protect their homes and properties. A particular	Medium-term (2-5 years)	CVRD - Public Safety	Municipal Partners

		focus will be given to promotion and increased uptake of these tools and prevention principles amongst front line communities including those located in high hazard areas and vulnerable populations (i.e. socially-isolated, seniors, , those who are experiencing homelessness, youth, persons with disability, those with preexisting health conditions such as respiratory conditions, etc.) Proactively mitigating fire risk through FireSmart tools and prevention principles will result in less frequent or less intense wildfires, reduction of greenhouse gas emissions (since wildfire smoke releases CO2 into the atmosphere). Supporting actions could include the following: • Distribute personal home assessment forms that residents can complete on their own. • Make FireSmart publications relevant to residents available at local libraries and other regional information centres. • Display FireSmart posters in public places and on trailheads. • Consider hosting an open house at local fire stations with FireSmart information. • Target information to reach vulnerable or exposed populations and as broad an audience as possible across the region: who needs information (prioritize audiences); who can help share information (trusted communication partners); and who has the information (reliable sources of information and new research).			
6.4	Establish community clean air shelters to mitigate the impact of wildfire smoke on vulnerable populations.	Clean air shelters can be a room/area or an entire building that has a filtration system that minimizes particulates generated from wildfire smoke. There are no specific standards for clean air shelters, but the objective is to minimize the amount of outdoor air that is entering the building/space.	Medium-term (2-5 years)	CVRD – Public Safety CVRD Community Services	CVRD Asset Management

		• Establish partnerships and develop policies and procedures to use community spaces for this purpose (prioritize new/retrofitted spaces where possible). • Identify the best sites to locate these clean air shelters within the community, targeting vulnerable populations. • Establish clear communication strategies for vulnerable populations • Conduct a more in-depth social inventory to better understand who the vulnerable people are in the community and what additional support they might need in the face of this climatic event.			
6.5	Continue to support the Cowichan Regional Airshed Roundtable and actions in the Cowichan Regional Airshed Protection Strategy.	Government agencies, First Nations, industry, and NGOs collaborated to identify air quality issues, identify specific goals, actions and key organizations to do the work that can improve regional air quality. The result of this was the Cowichan Regional Airshed Protection Strategy, which will inform the combined efforts of a collaborative airshed protection round table. In the Cowichan, the air contaminant of greatest concern is PM2.5, which refers to particulate matter that is less than 2.5 microns in diameter. This contaminant can travel deep into the lungs and become lodged there, causing heart and lung disease, and premature death. There are occasional exceedances of the provincial PM2.5 objectives due to local open burning and wood burning appliances (winter), and forest fires located in other regions (summer). The CVRD will: • continue to support the Cowichan Regional Airshed Roundtable	Short-term (1-2 years); ongoing implementation	CVRD – Environmental Services	CVRD Solid Waste and Recycling CVRD – Public Safety

		• implement actions within the Strategy • initiate a review and update of the Strategy in collaboration with partners			
Objective #7: Minimize disaster risk caused by natural hazards and extreme weather events among residents, businesses, and the wider community.					

7.1	Establish a monitoring system for current and future precipitation intensities, reservoir levels, river flows/levels and sea level rise to provide real time alerts when water levels exceed/rise beyond predetermined thresholds.	There is a real concern about increased volumes and stream flashiness in the creeks overall due to increased development throughout watersheds. These high-volume events have the potential to harm habitat, erode banks, cause channel migration in areas where there is no room for the stream to move, causing flooding and impacting public and private property, as well as the health and safety of community members.
		
		As these high volume events are expected to increase with climate change, the CVRD will establish monitoring systems at key locations along lake and riverine systems to provide real-time data and alerts when water levels exceed or rise at a rate beyond predetermined thresholds.
		
		Supporting actions could include the following:
		• Determine resource gaps, locations of stream level loggers, and overall approach to establishing a successful monitoring system for reservoir levels, river flows/levels and sea level rise.
		  ○ Install more rain gauges around the Region to collect rainfall data
		  ○ Continue to investigate the utility of stream level loggers for creeks. Install new loggers where appropriate to assess stream carrying capacity and flooding potential.
		  ○ Identify areas where private and public lands would be at most risk in order to develop policies to guide prevention and mitigation.
			Short-term (1-2 years)	CVRD – Environmental Services	Municipal partners

7.2	Develop, test, and update emergency response plans that address flooding, extreme heat, wildfire, and landslides.	With climate change impacts ranging across temperature, precipitation, and extreme weather – the CVRD will be exposed to a variety of weather-related hazards and emergencies, including fires, flooding, extreme temperature events, and more. Regional emergency preparedness and response plans help coordinate and mobilize local emergency services, sometimes in collaboration with member municipalities, to mitigate impacts and restore the community during and after an emergency. Frontline communities including those more exposed to weather related hazards (i.e. outdoor workers and folks living in hazard areas) and vulnerable populations (i.e. socially-isolated, seniors, those who are experiencing homelessness, youth, persons with disability, those with preexisting health conditions such as respiratory conditions, etc.) could need prioritized or specialized emergency services as a result. The CVRD will develop, test, and update emergency response plans in order to better deal with emergencies and hazardous conditions related to climate change. In particular, emphasis will be given to responses addressing flooding, extreme heat, wildfire, and landslides. This will involve an all-hazards approach to address daily operations, roles and responsibilities, critical activities (e.g. emergency shelters, emergency staffing), critical interdependencies with non-regional infrastructure/facilities), along with other key items. The following actions will be considered in the development, testing, and updating of emergency response plans: • Conducting an impact analysis to identify essential and secondary services and operations, lines of authority, potential financial and operational impacts, timelines in which essential operations, processes, and services should	Short-term (1-2 years)	CVRD – Public Safety	CVRD – Environmental Services; Municipal partners

		resume, and resources needed to resume services and for general division recovery • Cross-training staff, researching alternative suppliers, and storing records, documents, and vital data off-site. • Communicating the Emergency Response Plan(s) process and responsibilities to staff			
7.3	Enhance communications to the public on their role in emergency preparedness.	More extreme weather, temperature, or other natural hazard events may present increased health and safety challenges for the general public. Enhancing the capacity of community members to effectively engage in disaster preparedness and emergency management is key to building a disaster-resilient region. Community members need to be aware of their responsibility to take individual actions to prepare for emergencies and to proactively participate in collective responses to maintaining the safety of their neighbors and community. In doing so, the region will explore and employ multiple approaches and lines of communication with the public (such as television, internet, e-mail, text message updates, social media channels, and radio). This can better guarantee clear and continuous information exchange between emergency managers and the public before emergencies occur, as well as during the different phases of an emergency situation. Supporting actions could include the following: • Increase the uptake of personal, car, and household emergency kits. • Targeted delivery of information to vulnerable or exposed populations and as broad an audience as possible across the region: who needs information (prioritize audiences); who can help share information (trusted communication	Medium-term (2-5 years)	CVRD – Public Safety	Municipal partners; First Nations and Indigenous communities

		partners); and who has the information (reliable sources of information and new research). • Link information on the health and safety risks with related social/economic impacts to make more of an impact. • Ensure information on risks includes information on local programs/services to help, where applicable (e.g. available cooling/warming centres, etc.) • Share information on how to prepare a household 72-hour emergency preparedness plan			
7.4	Develop and deliver ongoing education and outreach to homeowners and the larger community on the issues and impacts of increasing natural hazards affecting the region.	As the climate continues to change, it will be important for homeowners to be better informed and better prepared. By educating homeowners on practical measures they can take to adapt to the impacts of climate change, the City/Town will build a better, more resilient community. Particular attention will be given to using the findings from hazard risk assessments to communicate with homeowners located within the highest risk hazard zones about their risks and potential impacts. This information will also be made public (i.e. through Region's website and other communication avenues). The following strategies will be considered in the implementation of this action: • A communications campaign that raises awareness to residents on how they can adapt their homes and lifestyles to prepare for the impacts of climate change, (e.g. including better lot-level stormwater controls, making homes FireSmart, etc.) • Enhanced information to include insurance coverage options for homeowners and renters.	Medium-term (2-5 years)	CVRD – Environmental Services	CVRD – Public Safety; CVRD – LUS; Municipal partners; First Nations and Indigenous Communities

		• Home visits and assessments of flood risk, and targeted information outreach to properties that may be at higher risk of flooding, wildfires, etc. and more 'one-to-one' interventions. • One-to-many interventions (e.g. demonstration events, training programs for at-risk neighbourhoods).			
7.5	Develop a regional Natural Hazards Disaster Risk and Recovery Strategy (NHDRRS)	The CVRD will embark on the development of an overarching Natural Hazards and Disaster Risk Recovery Strategy (NHDRRS) that outlines the specific natural hazards that pose a risk to the region (i.e. flooding, wildfire, landslides, sea-level rise, extreme temperatures, etc.) as well as hazard-specific recovery strategies to mitigate the impacts of these events, ensuring public safety and service continuity. Supporting actions could include the following: • Ensure that communication strategies are in place between departments and that frontline crews are effectively trained to manage extreme weather events. • Continue to carry out natural hazard risk assessments (i.e. landslide hazard mapping, flood mapping, wildfire, etc.) for the region in order to better understand how to combat their impacts over the long-term. • Ensure that communication strategies are in place between departments and that frontline crews are effectively trained to manage extreme weather events. • Develop supporting governance and implementation policies	Medium-term (2-5 years)	CVRD – Environmental Services	CVRD Public Safety, Regional Emergency coordination group.

Community and Partnership-Based Actions

Member municipalities, other key regional partners, and community-based organizations will be key in the implementation of the 'Community and Partnership-based Actions'. Further collaboration will be required with this group to ensure the suggested actions and sub-actions align with organizational priorities. It is expected that these actions may change or evolve as implementation progresses.

Action ID	Action	Action Description	Anticipated Timing	Potential Lead Organization(s)	Potential Supporting Organization(s)
Objective #8: Work with community partners to minimize health issues caused by extreme heat days, especially for highly vulnerable populations					
8.1	Encourage the development of shared cooling spaces on-site in all building housing vulnerable populations (e.g. shelters, daycares, long-term care homes, etc.), with an emphasis on priority areas**.**	Extreme heat can pose a major health risk to vulnerable populations, including seniors and those living in social housing. Providing air conditioning on-site in individual units and common areas ensures that residents have an accessible area to cool down during extreme temperatures. As such, the CVRD will work with its member municipalities and partners to encourage the building of shared cooling spaces on-site for all shelters and long-term care homes, daycares (and other buildings and residences). Supporting actions could include the following: • Identify priority buildings that do not have air conditioning in common areas and assess available spaces for cooling on-site, considering both tenant demographics and feasible cooling capacity (e.g. window AC, HVAS system) • Set a new policy for temperature threshold when cooling rooms must be made available (e.g. Heat Alert days, etc.).	Medium-term (2-5 years)	Provinical Agencies	Municipal Partners; CVRD – Planning; Island Health
8.2	Continue to update the Cowichan Communities Health Profile to ensure continuous improvement and actions towards improving regional health.	The Cowichan Communities Health Profile is a health determinants profile for the Cowichan region, Geographically coinciding with the Cowichan Valley Regional District (CVRD). This work provides a tool for Cowichan region residents, agencies and community leadership to help identify	Short-term (1-2 years)	Our Cowichan Communities Health Network	Municipal Partners; CVRD - Community Services

		factors that may need attention in order to improve local health and well-being. This report presents the status of factors in the Cowichan region that comprise the health determinants recognized by the Public Health Agency of Canada. As the initial assessment was completed in 2014, a process for managing and monitoring health risks must be identified, including identifying when and how future community profiles should be updated, tracking indicators, and documenting and sharing lessons learned from the process. As such, actions to support this review may include: • Working with the OCCHN to track progress and share lessons learned from the Community Health Profile. • Assisting with the implementation of recommended actions for Next Steps from the profile. • Ensuring the outputs and lessons learned from the Community Profile are considered in Regional policies, plans, and programming as appropriate.			
8.3	Develop early warning systems and response plans that alert community members when projected heat conditions or poor air quality days pose a health risk.	• Work with Island Health to investigate the extent and nature of heat concerns for health of community members in order to establish appropriate threshold levels • Work collaboratively with Island Health to determine appropriate channels for communications, including opportunities to utilize CVRD Regional communication tools/networks • Utilize the BC Centre for Disease Control's online Health Prediction mapping platform to support health protection during hot weather	Short-term (1-2 years)	Island Health & MOE	Municipal Partners; CVRD - Public Safety CVRD Environmental Services

Objective #9: Work together to strengthen emergency management capacity to respond to weather-related emergencies					
9.1	Strengthen the capacity of organizations that assist in disaster response to prepare for potential climate change impacts.	Supporting actions could include the following: • After weather-related emergency events, assess collective response to identify effectiveness, deficiencies and resources needed to build future resilience. • Encourage community organizations, local organizations, businesses, and institutions to review and update Business Continuity Plans • Engage with community and regional stakeholders to identify duties, responsibilities and response protocols strengthening collaboration and coordination • Promote opportunities for small businesses to learn about emergency management	Medium-term (2-5 years)	CVRD - Public Safety	Municipal Partners; CVRD - Environmental Services
9.2	Pilot a neighbourhood resilience program with municipal partners to expand equitable neighbourhood resilience planning, especially in high-risk areas	Neighbourhood resilience planning is an effective means to prepare for the impacts of climate change at a community or neighbourhood level. A neighbourhood resilience program would aim to: • Support neighbourhoods to identify equitable resilience planning opportunities • Identify, Support and amplify current resilience-building initiatives • Build neighbourhood capacity to collectively plan and prepare for, respond to, and recover from emergencies Supporting actions could include the following:	Long-term (5-10 years)	Social Planning Cowichan	CVRD, Transition Cowichan, VIHA, Cowichan Green Communities, Youth Leadership Groups

		• Research and review other municipal and regional models for neighbourhood resilience programs to identify best practices. • Research existing toolkits and methodologies for neighbourhood resilience planning, and utilize and adapt them as necessary to local circumstances. • Determine appropriate community partners and/or neighbourhood areas to pilot potential program. • Research potential grant or funding opportunities to support neighbourhood resilience program.			

Appendix C: Green Growth and Sustainable Development Actions

Action ID	Action	Action Description	Anticipated Timing	Lead Department(s)	Supporting Organization(s)
Objective #10: Attract, retain and expand local agriculture and agri-food businesses to support food security.					
10.1	Develop strategic agriculture plans and promote direct farm marketing for areas in the region with a significant agricultural sector.	A thriving agri-food sector requires a secure land base, retaining existing businesses and attracting further investment through value added production and expansion. This requires sustainability of assets and infrastructure across the value chain. With the rising interest of both rural and urban populations in local goods production, strategic agriculture plans and strong, direct marketing plans prove to be vital methods to ensure a successful local food system. In order to develop more targeted strategic plans for specific areas within the region with a significant agricultural sector, the CVRD will continue to conduct or facilitate agricultural research in order to better achieve its agriculture area plan goals. In addition, the CVRD will explore methods to improve direct farm marketing to create more opportunities for farmers to have personal contact with consumers. This in turn will help farmers and producers successfully develop alternative consumer bases, increase profits, and decrease their dependence on large retailers. Supporting actions could include: • Foster more communication between the CVRD and member municipalities to enable collaboration, business growth, and local food awareness. • Consider conducting Agriculture and Agri-Food Retention and Expansion studies (similar to Ontario) to assess and evaluate the needs and opportunities in each member municipality.	Short-term (1-2 years)	CVRD – Economic Development	MAL

		• Continue to conduct water demand modelling for the Region to understand current agricultural water use and help reserve water for the future use. • Conduct a review of all ALR agriculture-zoned lands in the CVRD to determine their individual capability for agriculture/food production. • Explore opportunities to strengthen farm direct marketing by consulting with farm community leaders to understand how local zoning by-laws affect value-added on farms. • Explore opportunities to implement yearly harvest festivals, parades, and other social events to celebrate local food			
10.2	Support urban agriculture and/or small-scale production within residential areas to support food security.	Given the uncertain effects of climate change and compounding pressures of population growth, relying on external sources for food could come at a high cost. As such, supporting sustainable food production will be key in strengthening our long-term food security. Towards this initiative, the CVRD will find opportunities to support urban agriculture and small-scale production (e.g. urban hens, community gardens, SPIN farming, etc.) within residential areas. Urban agriculture and small-scale production is a people-centered and inclusive approach that can help the region address climate change at the local level and prepare the community for the future impacts of climate change. Increasing biologically productive green space will help enhance urban food security by diversifying the food supply chains, but also create multiple environmental, social, health, and economic benefits such as water management, mitigation of the urban heat island effect, restoration of biodiversity, promoting economic development and tourism, and much more. Supporting actions could include:	Medium-term (2-5 years)	CVRD – Economic Development	CVRD - LUS

		• Investigating food security policies such as, but not limited to urban hens; urban bee keeping; spin farming; community gardens; and public produce. • Consider Temporary User Permits for underutilized or vacant property for urban agriculture (for example, if a lot has been unused for X years, encourage its availability to community groups for urban agriculture projects like neighborhood pocket markets, community gardens, and public produce, until it is ready for development			
10.3	Strengthen agriculture policy directions in all Official Community Plans (OCPs) in CVRD.	The CVRD will strengthen policy directions on agriculture in all Official Community Plans (OCPs) in the region. In doing so, a particular emphasis will be put on maintaining agricultural land for agricultural purposes, thereby encouraging diversity in the sector and secondary agriculture (e.g. agritourism, organic produce, farmers, etc.) and preserving the Region's agricultural heritage and character. Updating this major overarching planning document highlights a commitment to preservation and strengthening of farmland, help limit non-agricultural development, and proactively use and manage farmland for agriculture. Supporting actions to supplement this initiative could include the following: • Attend relevant meetings with provincial or federal agencies to stay informed and up to date on climate adaptation initiatives farmers and farm businesses will be undertaking. • Integrate agritourism into OCPs to showcase best practices amongst farmers. • Encouraging updates of the Farm Development Permit Guidelines, the Zoning By-law, and other key policies and bylaws. • Support farmers and the agricultural community identify and apply for relevant Provincial and Federal funding related to implementing climate change adaptation measures, where possible.	Short-term (1-2 years)	CVRD – Planning; Municipalities	EDC, BC Young Agrarians, Cowichan Green Community

		• Examine internal purchasing policies and determine opportunities to better support local producers/local good suppliers, where possible.			
10.4	Expand communications and education to local residents on the importance of buying locally and accessing local markets.	The changing climate presents both opportunities and risks for CVRD's agri-food sector. Warmer temperatures and longer growing seasons suggest that growing conditions may improve, but climate change can also increase water stress by increasing flood and/or drought conditions. In order to better combat the uncertainty of the long-term impacts from climate change, CVRD will employ a variety of tailored strategies to expand its communications to residents regarding local, sustainable agriculture and the importance of purchasing local produce and products. Supporting actions could include the following: • Develop public education campaigns that illustrate the impacts of climate change on agriculture and that promote local, sustainable agriculture and buying locally. • Consider the development of an interactive active/potential farming map of CVRD for public, Council, staff, and farmer use. • Explore opportunities to increase positive signage regarding agriculture nearby along roads used by farm vehicles, recreational trails, etc. • Consider the development of a farm-to-plate education program for school children • Identify opportunities to raise awareness around the diversity of production and processing found in CVRD through promotional materials.	Medium-term (2-5 years)	CVRD – Economic Development	Vancouver Island Economic Alliance
Objective 11: Support regional business innovation and continuity in the face of a changing climate					
11.1	Develop a Regional Circular Economy Strategy/Action Plan	A Circular Economy is one that is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.	Medium-term (2-5 years)	CVRD – Economic Development	Government of Canada: Environment and

		Moving to renewables can only address 55% of global greenhouse gas emissions (reference). The remaining 45% of emissions come from how we make and use products, and how we produce food. A Circular Economy Strategy would drive this systems change approach to how we do business in Cowichan, address this additional 45% while developing a resilient and sustainable economy. The strategy would engage with the production, distribution, and consumption of products and materials to build new economic systems in line with a circular approach. Specific climate considerations that might need to be integrated into this action plan would include water use/reuse, waste management, industrial land, resource use: forestry and wood manufacturing sector, manufacturing, food production, and distribution, and education.			Climate Change, BC Ministry of Environment, Synergy Enterprises, Cowichan Green Community
11.2	Work with Private Managed Forest Land (PMFL) Program partners to maintain currency with the policy and practices to protect the working forest base and values of non-timber forest products.	Under the Private Managed Forest Land Act (2003), the Private Managed Forest Land (PMFL) Program encourages private landowners to manage their lands for long-term forest production; and encourages sustainable forest management practices, including the protection of key public environmental values. Working forests are those that are actively managed to generate revenue from multiple sources, including sustainably produced timber and other ecosystem services. Non-timber forest products (NTFPs) refer to products of biological origin other than timber, derived from forests. As a cardinal feature of a multi-functional forest system, NTFPs contribute to diversified income sources to the Region. In turn, this diversity increases the adaptive capacity and response options of community members working in this sector to climate change shocks, since they are not dependent on a single species or crop. The CVRD will stay up to date on potential changes to the PMFL program and to the current integrity of these within CVRD boundaries. This in	Long-term (5-10 years)	CVRD – Environmental Services; or CVRD – Economic Development	CVRD – LUS, Executive services

		turn will support long-term protection of their working forest base (i.e. so that is not converted to other land uses such as residential development) and the value of NTFPs. The CVRD will also work with other regional districts to maintain collaboration on the update of the Private Managed Forest Land Act [2003] to include natural hazards management and other local government concerns.			
11.3	Work with local businesses and tourism industries to explore adaptation options, business continuity planning, and diversification in the face of a changing climate.	Climate change can pose significant risks to businesses and the tourism industry, not only for their operations but also to their suppliers, employees, customers, and people living in areas in which they operate. The CVRD will continue to develop and nurture relationships with local industry to pursue collaborative adaptation work in the future. In particular, the CVRD will work with local businesses and tourism industries in the region to explore options in adapting to climate change impacts. This in turn will ensure better continuity of their operations, improve their ability to reduce and manage risk, and maintain a positive and proactive reputation within the community. Supporting actions could include the following: • Assess new opportunities for different forms of tourism as a result of changing climate conditions and subsequent changing demand patterns and tourist flows. • Work with tourism industries to identify and apply for tourism grants/funding to enhance events based on identified opportunities. • Engage with the Cowichan Lake District Chamber of Commerce and other partners to identify opportunities (e.g. existing meeting events, workshops, presentations, open house, etc.) to engage local businesses to learn about climate change as it relates to their day-to-day operations (e.g. green	Medium-term (2-5 years)	CVRD – Economic Development	Tourism Cowichan; Chambers of Commerce

		business practices, adaptation measures, winter maintenance measures, etc.) • Gauge local businesses' interest in establishing/participating in a local best practice network (e.g. can meet annually) to discuss adaptation measures in business operations.			

Community and Partnership-Based Actions

Member municipalities, other key regional partners, and community-based organizations will be key in the implementation of the 'Community and Partnership-based Actions'. Further collaboration will be required with this group to ensure the suggested actions and sub-actions align with organizational priorities. It is expected that these actions may change or evolve as implementation progresses.

Action ID	Action	Action Description	Anticipated Timing	Potential Lead Organization(s)	Potential Supporting Organization(s)
Objective #12: Improve local water security for agricultural lands, and continue to monitor, assess, and manage water.					
12.1	Support and continue promotion of sustainable farming practices and innovative technologies pertaining to water usage.	With the goal of improving local water security and management of water, the CVRD will support and continue to promote the implementation of sustainable farming practices and innovative technologies around water usage to improve water use efficiency, conservation, and drainage. Over the long-term, this will contribute to higher yields and improved crop quality, earlier planting, reduced soil erosion, and reduced nitrogen loss. Supporting actions could include: • Conduct ongoing research of efficient agricultural water use techniques (e.g. benefits of drip irrigation versus spray irrigation, ponds, cisterns, tile drainage systems, etc.)	Short-term (1-2 years)	MAL, FLNRO	CVRD – Environmental Services; Island Health

		while being conscious of the economic stress such actions may put on farmers. • Enforce effluent (water discharge back into the environment) regulations from industry, home and farm operations Gauge interest of farmers in the region to form a local farmer-to-farmer group to share experiences and knowledge on climate resilient agriculture techniques (e.g. water and soil conservation techniques, natural and organic farming methods, use of Integrated Pest Management/Integrated Vegetation Management in place of pesticides, breeding local climate-resilient seeds, etc.).			
Objective #13: Support and encourage community stakeholders to incorporate climate adaptation into agricultural and food security planning.					
13.1	Encourage farmers to develop Environmental Farm Plans.	Farmers are often recognized as environmental stewards, with many voluntarily completing Environmental Farm Plans to improve the environmental conditions of their operations by adopting best practices that better adapt them to the future impacts of climate change. These Plans help identify environmental strengths and any potential risks on their farms. Where appropriate, it includes a prioritized action plan to reduce those risks. The CVRD will continue to encourage farmers to develop Environmental Farm Plans for their farms. Supporting actions could include the following: • Deliver Environmental Farm plan training and incentive program for those registered under the program. • Encourage farmers to minimize fertilizer runoff to minimize impacts on water quality and quantity.	Medium-term (2-5 years)	MAL	CVRD - Environmental Services

13.2	Encourage area municipalities to adopt the Cowichan Food Charter.	A food charter is a statement of values and principles that guide decision-making and orient council policy towards food security. A growing number of communities across British Columbia and the rest of Canada are officially adopting their own food charters to support the development of sustainable and socially just local food systems. The Cowichan Food Charter was developed in 2007 and updated in 2009 with input from the community. To sign the Charter is to firmly state that food, health, and the environment are connected, and that they are integral to the wellbeing of our whole community. The CVRD will continue to work with the Cowichan Green Community and other stakeholders to: • Encourage area municipalities within the Cowichan Region to sign the Cowichan Food Charter • Share and disseminate the Cowichan Charter Food Toolkit with local communities • Continue to participate as a member of the Cowichan Food Security Plan Steering Committee, and sharing lessons learned with local stakeholders	Short-term (1-2 years)	Cowichan Green Community	CVRD – Economic Development Municipal partners, VIHA
Objective #14: Encourage local forest industry to adapt to changing climate conditions					
14.1	Encourage the adoption of climate change adaptation into forest management planning for local industries.	Supporting actions could include the following: • Adapting to increased wildfire risk by incorporating climate change considerations into assessments, strategies, approaches, and policies • Incorporating climate change considerations into forest and pest management strategies to mitigate biotic risks to forests	Medium-term (2-5 years)	Forestry Sector	CVRD - Environmental Services, CVRD – LUS; Municipal Partners and Forestry Sector FLNRORD;

		• Mitigating maladaptation risk by incorporating climate change considerations into seed transfer, tree species selection, establishment of assisted migration trials, and stocking policies, standards, and guidelines • Reducing risk of blowdown loss by incorporating climate change considerations into stand management practices • Mitigating economic costs of climate change by adapting forest industry operations • Including climate change in assessment, monitoring, analysis, and planning in support of forest management decision making and adaptation planning			Managed Forest Council (PMFLC),

Appendix D: Ecosystems and Bioregional Carrying Capacity

Action ID	Action	Action Description	Anticipated Timing	Lead Department(s)	Supporting Organization(s)
Objective #15: Steward, protect, and restore the region's ecosystems and biodiversity in an era of climate change and continued population growth.					
15.1	Conduct ongoing research to update the Environmentally Sensitive Areas (ESA) Strategy and ensure climate change impacts are adequately addressed over the long-term.	As part of the region's Environmentally Sensitive areas (ESA) Strategy, it will be important to conduct ongoing research in regards to relevant climate change impacts and associated adaptation efforts so that the Strategy can adequately address these concerns over the long-term. Of particular interest is how the range of ecosystems may shift in response to changes in temperature and precipitation, and the shifting range of native species in the region. The Conservation Strategy should take these potential ecosystems shifts into account so that protection of ESAs will include areas in which these ecosystems are located both currently and in the future. In turn, these efforts will help establish updated and more accurate conservation targets, inform planning decisions and policies (e.g. land use, watershed management, fire plans, parks management, acquisition plans, etc.), better coordinate OCPs and land use decision-making, as well as aid in better understanding specific impacts to things like soil, water supply, overall ecosystem health, and more. Supporting actions could include the following: • Ensure the ESA Strategy is updated to reflect changes to conservation targets and integration of planning at a bioregional, watershed, and ecosystem level. • Account for potential shifts in native species range in ESA Strategy, including assessment of potential risks and vulnerabilities in the region, and adaptive management	Medium-term (2-5 years)	CVRD - Environmental Services	CVRD – LUS; Municipal Partners

		techniques such as expanded connectivity of conserved landscapes and other interventions. • Develop policies informed by the ESA Strategy to inform land use planning that takes into consideration climate and species needs. • Continue to conduct additional analysis of drought-related indicators to better understand specific impacts to soil, water supply, and ecosystem health at the landscape level.			
15.2	Develop a robust regional Growth Management Strategy that is in line with community needs and which takes into account regional carrying capacity for water supply, waste management, food systems, and transportation.	With current and future climate change impacts ranging across sectors and systems, a regional Growth Management Strategy will be necessary to adequately support changing regional demographics and populations over the long-term. A central component of this Strategy will be determining methodology and process for incorporating bioregional carrying capacity considerations into urban and regional planning. The concept of regional carrying capacity provides a framework for integrating physical, socioeconomic, and environmental systems into planning for a sustainable environment; thereby encompassing things like future water supply, waste management, food systems, and transportation – all of which will be key aspects of the Strategy. As part of the development and implementation of the regional Growth Management Strategy, the following actions will be considered: o Define environmental carrying capacity and then develop related targets for the protection and functions of natural systems and regional carrying capacity thresholds. o Determine a core set of indicators that reflect growth pressures and state of key factors (e.g. water, population	Medium-term (2-5 years)	CVRD – Environmental Services	CVRD – LUS; Municipal Partners

		growth, air pollution, etc.) to identify disruptions to the capacity limits. ○ Incorporate ecological targets and adaptive responses into land use planning documents for riparian and xeric areas as well as biomimicry opportunities (e.g. green roofs)			
15.3	Continue to proactively manage all CVRD-owned forested areas to increase forest resilience to wildfires, while considering biodiversity in its planning.	Wildfire has been recognized as one of the most ubiquitous disturbance agents to impact natural environments, with consequences that could range across the environmental, infrastructural, and social sectors. These impacts can occur on different spatial scales and possibly modify landscape structure, increase habitat fragmentation, and change the species composition of ecosystems. Climate change projections indicate that the combination of hotter, drier summers and decreased snowpack will increase wildfire risk. As such, it will be crucial for the CVRD to continue to proactively manage parks and other regionally-owned forested areas in order to increase their resilience to wildfires, while also increasing their health, structure, and susceptibility to other natural hazards (e.g. increased risk of landslides following wildfire season). In doing so, a particular focus will be given to ensuring local biodiversity is considered during CVRD's wildfire planning and management. Opportunities for collaboration with municipalities, particularly with North Cowichan's extensive municipal forests will be explored. The CVRD will consider the following strategies in its implementation: ○ Remove excessive ladder fuels (i.e. small trees and brush that can help a fire spread from the ground to the tree canopy) and accumulations of organic materials that build up on the forest floor.	Long-term (5-10 years)	CVRD – Various Divisions	Municipal partners PMFL partners

		○ Flag riparian and wetland areas before work starts and monitor these areas to limit disturbances as much as possible. ○ Consider a mixture of native shrubs and trees suitable for site conditions for replanting, in order to help restore the natural biodiversity of the area. This in turn will also replace non-native invasive plant and tree species that may colonize and prevent natural native regeneration from occurring. ○ Additional proactive work on all regionally-owned forested sites, including areas beyond the wildland-urban interface, to increase forest resilience, health, and structure, and to simultaneously reduce other natural hazards (e.g. the increased risk of landslides following the wildfire season).			
Objective #16: Steward, protect and restore Cowichan region watersheds in the face of growing climate change impacts, continued population growth, and other development pressures, including forestry and mining					
16.1	Review codes and drainage rules to evaluate their ability to protect and improve stream flows, seeps, springs, wetland function, water quality (including temperature), vegetation and habitat, and stormwater management during hotter and drier summers.	Supporting actions could include the following: • Update subdivision servicing Bylaws • Review and update Stormwater management regulations • Develop drainage master plans in key areas • Update pervious surface guidelines in planning documents • Develop water balance models and key information related to key infiltration areas • Integrated Stormwater Management Plans as a component of liquid waste management planning	Medium-term (2-5 years)	CVRD – Engineering Services	Municipal partners; Ministry of Transportation and Infrastructure;
16.2	Ensure the Drinking Water and Watershed Protection (DWWP) planning process develops long-term Community Water Security Plans and updates Watershed Plans with climate projections to reduce future conflicts over water use.	The purpose of the Drinking Water and Watershed Protection (DWWP) Service is to manage water effectively and to support sustainable communities within the region's watershed carrying capacities. As such, the CVRD will ensure that the planning process for this service includes the development of long-term Community Water Security Plans as well as regular updates of its Watershed	Long-term (5-10 years)	CVRD - Environmental Services	Municipal partners; Community Water Systems

		Plans to include climate change projections in order to alleviate future possible conflicts over water use. A crucial next step in this process will entail the development of an integrated hydrological monitoring climate network to allow for better tracking and monitoring of the region's climate change adaptation (and mitigation) efforts. Data collected through this initiative will allow for more targeted, specific, and accurate planning efforts. Supporting actions could include the following: • Develop water supply projections and development targets to inform carrying capacity discussions. • Incorporate climate projections, needs, and impacts into the DWWP Service (i.e. into associated by-laws, policies, plans, and the 10-year strategy). • Consider purchasing private water rights to enhance instream flows or limit conflicts and consider water marketing as a potential means of dealing with specific drought events.			
16.3	Develop coordinated watershed management plans to assist and inform land use planning	Plans may be developed for specific watersheds on a priority basis according to risks to ecological, public health and community values, recognizing that such planning can be resource intensive. Supporting actions could include the following: ○ Promote basin-wide planning for the management of flood water, sediment, and debris across jurisdictional boundaries	Short-term (1-2 years)	CVRD – Environmental Services	Municipal Partners and CVRD - Environmental Services; Stewardship organizations (e.g. Watershed Board)
Objective #17: Prepare for shifts of ranges of existing species and influxes of new invasive species					
17.1	Review and update Invasive Species Strategies to include novel species and emerging species affecting the region as a result of climate change.	Invasive species represent the second most significant cause of species extinction worldwide, after habitat loss. Invasive species can also interfere with agricultural and horticultural industries, interfere with natural forest regeneration and damage the urban tree canopy, and in some cases can have health and safety, economic and aesthetic impacts. In addition to human activities	Medium term (3-5 years)	CVRD - Environmental Services, CVRD - Parks	Municipal partners; Ministry of Forests, Lands and Natural Resource Operations and Rural Development;

		(such as trade), climate change may make it easier for new invasive species to establish themselves and thrive in the region. As such, the CVRD will conduct a review of their Invasive Species Strategies to identify and include new or novel species and emerging species that may affect the region, as a result of climate change. This in turn will ensure a long-term, organized, and targeted approach to manage invasive species in an economically efficient manner, while enhancing biodiversity and the overall ecological integrity of the CVRD's natural areas. The purpose of an invasive species strategy would be to provide an organized, targeted approach to manage terrestrial invasive species in an economically efficient manner while enhancing native biodiversity and overall ecological integrity of the City/Town's natural areas. Supporting actions could include the following: • Identify and prioritize species management activities by level of concern and response. • Educate the public on identifying new invasive species, including any threats involved. • Increase coordinated invasive species management activities in priority areas. • Update the Invasive Species by-law as required with emerging threats as a result of climate change.			Coastal Invasive Species Committee; Island Health;

Community and Partnership-Based Actions

Member municipalities, other key regional partners, and community-based organizations will be key in the implementation of the 'Community and Partnership-based Actions'. Further collaboration will be required with this group to ensure the suggested actions and sub-actions align with organizational priorities. It is expected that these actions may change or evolve as implementation progresses.

Action ID	Action	Action Description	Anticipated Timing	Potential Lead Organization(s)	Potential Supporting Organization(s)
Objective #18: Support education and outreach programming on watershed health, tree planting, and ecosystem management					
18.1	Create awareness of watershed health and function via public education programs, such as school forums, information for farmers and watershed tours.	A healthy watershed conserves water, promotes streamflow, supports sustainable streams, rivers, lakes, and groundwater sources, enables healthy soil for crops and livestock, and also provides habitat for wildlife and plants. Changing behavior through education and developing responsible attitudes among watershed citizens and communities is an important step in maintaining and improving watershed health. Supporting actions could include the following: • Continue to update and maintain CVRD's watershed atlas and web platform for public use to inform future land use planning and watershed management, while continuing to examine the increasing risk of natural hazards in the area. • Create localized watershed education and outreach resources, such as guidebooks and toolkits for the community that teach the importance of preserving watersheds and conserving water • Encourage local schools to deliver Watershed Field Trips to teach students about the importance of watersheds and their role in protecting them.	Medium-term (2-5 years)	Stewardship Organizations, CVRD - Environmental Services	Municipal Partners; CVRD - Environmental Services
18.2	Work with community members and industries located on sensitive	Water management is a shared responsibility by the federal, provincial, and municipal governments. This shared responsibility	Medium-term (2-5 years)	CVRD Engineering Services	Municipal Partners; CVRD -

	aquifers to educate and implement a code of shared responsibility to protect water quality.	necessitates close cooperation and collaboration among all levels of government, Aboriginal peoples, industries, and the public. As such, designing an effective governance framework and key principles for watershed management will be an important step in protecting water quality in the region. As such, the CVRD will work with community and industry stakeholders to create a code of shared responsibility that speaks to: • Protection of stream and aquifer health • Water allocation and groundwater regulation • Water sustainability plans and area-based regulations • Monitoring and reporting • Governance			Environmental Services, Private Utilities
18.3	Support expansion of current and explore new voluntary programs promoting increased native, drought-tolerant vegetation and reduced hardscape on private property.	Consider future ecosystem characteristics (planting trees, shrubs, grasses accordingly), also considering additional food-producing perennials and trees. Supporting actions could include the following: • Increased education to waterfront homeowners concerning stream/creek naturalization • Share guidance/resources with private landowners to encourage naturalizing of private lands that still conform to local bylaws • Support community-led native vegetation planting and nurturing programs within the CVRD • Partner with local non-profit organizations to provide backyard tree planting services to residents at a subsidized cost	Medium-term (2-5 years)	Stewardship Organizations	Municipal Partners; CVRD – Environmental Services; CVRD – LUS; Private Forest Sector

Appendix E: Cross Cutting Actions to Build Capacity and Implement Equitable Adaptation

Action ID	Action	Action Description	Anticipated Timing	Lead Department(s)	Supporting Organization(s)
Objective # 19: Research, monitor, and disseminate lessons learned on climate change projections, impacts, and equitable adaptive actions					
19.1	Establish relationships with subject matter experts who conduct research on global climate change impacts, understand their effects on the CVRD and identify communities most in need of intervention.	As the climate continues to change, global climate change impacts will continue to evolve, which could have significant consequences for the CVRD. For example, impacts to global food security, the spread of pathogenic organisms or the influx of climate change refugees, are global issues that require proactive adaptation locally. Establishing relationships with subject matter experts and higher levels of government to conduct research on global climate change, impacts, and potential local consequences will ensure that the region is prepared for issues outside the immediate jurisdiction of the CVRD. Gather data, develop metrics, and use tools to identify and prioritize communities most at risk of exposure to climate hazards. Use indicators including climate data, geographic area, demographics based on census data, social and economic vulnerability indices, and environmental screening tools.	Short-term (1-2 years)	CVRD - Environmental Services;	Municipal Partners, VIHA, PCIC, Climate Action Secretariat
19.2	Communicate long-term climate change projections and related research to community stakeholders, partners, and the public.	Supporting Actions could include the following: • Continue to share the Climate projections for the Cowichan Valley Regional District report with local stakeholders and within the corporation of CVRD • Share the outputs of the CVRD's Natural Hazard Risk Assessments with local industries, stakeholders, area municipalities, and First Nations • Continue to provide public education programs on local climate change projections and impacts for the CVRD. • Consult with representatives of frontline communities to establish focused public education messaging for vulnerable populations	Short-term (1-2 years)	CVRD - Environmental Services	Municipal Partners; stewardship organizations, VIHA

19.3	Keep up to date with best practices for adaptation action, and work with local communities to inform climate impacts and equitable adaptation and risk mitigation planning.	Supporting Actions could include the following: • Collaborate with neighbouring jurisdictions to support coordinated establishment of climate adaptation plans including the Vancouver Island and Coastal Communities Climate Leadership Plan • Continue to partner with research and academic institutions locally to support innovative research on climate change projections, risk assessments, and equitable adaptation planning • Participate in adaptation planning processes for area municipalities to share Regional research, findings, and expertise • Encourage local businesses and industry to include climate change and adaptation principles in their business continuity planning • Develop community social vulnerability profiles to understand frontline communities most at risk of climate hazards • Inventory pre-existing social, economic and physical challenges exacerbated by changing climate conditions • Identify increased risks faced by vulnerable populations • Develop written plan for engaging socially vulnerable populations • Periodic review of how the Strategy Actions affect vulnerable populations and whether access to the benefits of programs and investments is distributed based on priority risks.	Medium-term (2-5 years)	CVRD – Environmental, Land Use and Community Services	Municipal Partners VIHA, Social Planning Cowichan, Neighbouring regional districts and municipalities in the Vancouver Island and Coastal Communities area
Objective # 20: Mainstream climate change adaptation into Regional policies, programming and actions					
20.1	Conduct a review of the Harmonized OCP and other key service-level plans and policies (Emergency Management Plan, etc.) to identify	Incorporating climate change into existing plans and policies helps to mainstream these considerations into regional and municipal day-to-day activities. It will help towards ensuring community resilience in the face of climate change impacts.	Medium-term (2-5 years)	CVRD – Environmental Services - All departments of the CVRD	Municipal Partners;

	where climate adaptation objectives and actions can be integrated.	As regional plans and policies are updated on a regular basis, the CVRD will collaboratively integrate climate change considerations into existing plans and policies during review. Possible plans/policies that could incorporate climate change considerations include: Economic Development Cowichan – Strategic Plan, Regional Parks and Trails Master Plan, Solid Waste Management Plan, Emergency Management Plan, and more. Supporting actions could include the following: • Begin review of OCPs and have climate change incorporated (to incorporate in other plans and policies). • Liaise with all CVRD departments to develop inventory of all plans and policies that may need to have climate change considerations included. Work with responsible departments to incorporate climate change considerations as appropriate within their respective plans and/or policies during the next update. • Ensure that climate change is considered in the development of upcoming master planning and service-level plans, including a potential future Active Transportation Master Plan for the CVRD.			
Objective #21: Maximize collective impact against climate change through partnerships with local First Nations					
21.1	Continue to work with local First Nations on the development of coordinated and collaborative climate adaption initiatives and programs.	Inherently built upon and grounded in generations of place-based observations and experiences, Indigenous knowledge systems are central to a thorough understanding of how people perceive, understand, and adapt to climate change. Knowledge gathered from local First Nations connect an extensive knowledge of ecosystems, oral land histories, ways of knowing, and beliefs that can inform climate	Medium-term (2-5 years)	CVRD - Environmental Services	Cowichan Tribes: Ditidaht First Nation, Halalt First Nation, Lyackson First Nation, Malahat Nation, Pauquachin First Nation, Penelakut Tribe,

		adaptation, both independently and combined with scientific knowledge. As such, the CVRD will continue with local First Nations to better understand these knowledge systems, to learn to prioritize these, and to build an understanding of how they may develop coordinated and collaborative adaptation initiatives and programs. Supporting actions could include the following: • Re-establish and further relationships with the local Nations • Connect with key local representatives where appropriate • Participate in action-planning and risk assessment workshops and meetings with local Nations as appropriate • Identify areas where the Region can provide a supporting role in building resilience			Stz'uminus First Nation, and Ts'uubaa-asatx First Nation; Municipal Partners; communities; CVRD – LUS

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