CLIMATE CHANGE ADAPTATION

DEVELOPMENT PERMIT AREA UPDATES IN THE DISTRICT OF WEST VANCOUVER

APRIL 2019

Prepared for:
District of West Vancouver

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Executive Summary

This report has been prepared in response to the District of West Vancouver's newly approved Official Community Plan (OCP) which proposes the creation of two new Development Permit Areas (DPA), for wildfire risk reduction and shoreline protection. The creation of Wildfire and Shoreline DPAs will help protect against the increasing risks that climate change poses to West Vancouver's developed areas, wildland and coastal ecosystems, and interface areas.

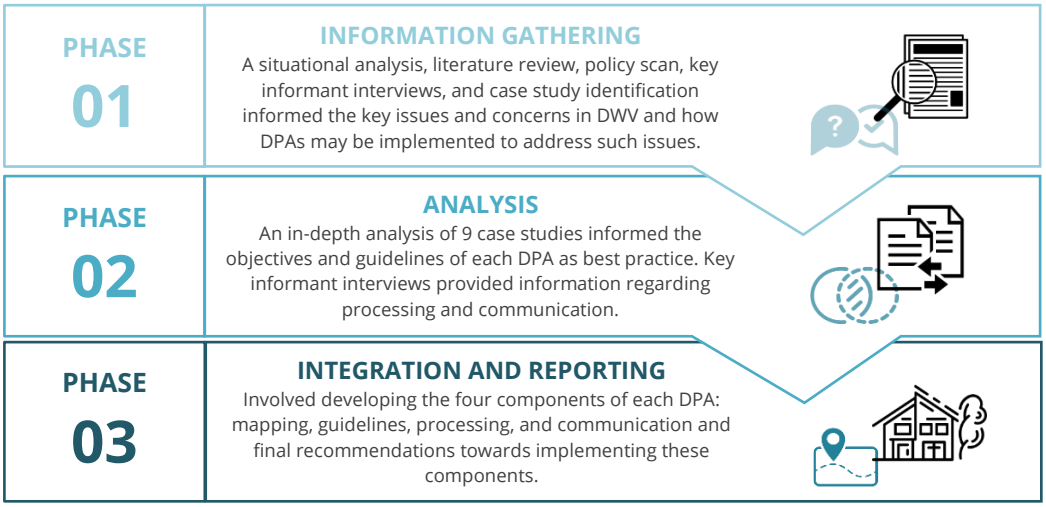
Areas of concern for the District include the challenges that increasing risks that wildfire and coastal hazards pose to the natural setting, ecological assets, high-valued private assets, access and evacuation constraints, and public safety.

In response to these issues, DPAs are a useful tool that can be used to reduce risks by applying building construction and landscaping restrictions to development projects. By regulating private development and redevelopment projects, DPAs ensure that development occurs in a way that maximizes personal safety, minimizes potential hazards to properties and interface communities, and protects the natural environment. The communication and engagement material associated with the DPA have the opportunity to decrease risk beyond the regulatory guidelines themselves by increasing awareness and willingness of homeowners to adopt mitigation measures and practices.

The purpose of the project is to support the District's Planning Department by investigating and developing recommendations for Council on the parameters of these two DPAs, including their objectives, boundaries, content, and approval processes.

To achieve these outcomes, the planning process has been divided into three phases:

EXHIBIT 1.
PROJECT RESEARCH PHASES



This report presents the final research findings and recommendations for the Wildfire Hazardous Conditions and Shoreline Protection DPA in the District of West Vancouver. Each DPA is presented as a stand-alone package that includes the recommended objectives and content for the development permit, as well as area and mapping boundaries. Based on best practices of successful DPAs identified in the analysis, final recommendations have been listed within each package.

The overarching objectives of each DPA are to prevent personal injury, protect structures from damage and/or property loss, conserve the ecological assets of forested areas and the shoreline, and to maintain public access to recreation areas along beaches, cliffsides, and forested trails.

These objectives are achieved through the recommended building design and landscaping guidelines proposed in this report. The recommendations cover implementable actions for implementing each DPA, including the internal review and approval process and communications and engagement program.

Final recommendations are categorized into four sections:

Further technical work

Further technical work, such as a CWPP and coastal risk assessment should be completed prior to the adoption of each DPA, as these technical reports will identify the District's wildfire hazards, vulnerabilities, and risks.

Creation of DPA content

DPA guidelines and boundaries should be developed in consultation with Qualified Professionals (QP) and respond to the existing hazards, vulnerabilities, and risks in the District.

Approval process and internal review

As each site and development proposal is unique, the internal process for handling and approving development projects must be coordinated across several departments at the District.

Communication and engagement

Communication of climate change risks, hazards, vulnerability and risk mitigation actions may require a full public engagement strategy. The framing and delivery of such public education programs affect residents' willingness to participate and act on climate risks. Effective public education is key to preventing or minimizing wildfire and coastal risks. All communication efforts should reflect how implementing a Wildfire and/or Shoreline DPA is about public safety while respecting the uniqueness of the District.

A summary of the recommendations is listed on the following page. A full list of recommendations can be found in Exhibits 10 and 15.

EXHIBIT 2.
SUMMARY OF WILDFIRE DPA RECOMMENDATIONS

CATEGORY	RECOMMENDATIONS
Further Technical Work	**1.1.** Complete a Community Wildfire Protection Plan
Development of DPA Content	**2.1.** Develop DPA guidelines based on the information presented in the CWPP **2.2.** Develop DPA building design and landscaping guidelines with guidance of a QP experienced in wildfire management and risk reduction **2.3.** Align DPA guidelines with those developed in the District of North Vancouver **2.4.** Align DPA guidelines with other strategies, reports and guidelines
Approval Process and Internal Review	**3.1.** Require applicant to submit a Wildfire Assessment Report **3.2.** Require applicant to submit a Coordinated Assessment Strategy Statement **3.3.** If development occurs in an area with overlapping DPAs, appoint a coordinating QP **3.4.** Require the completion of a post-construction report and landscaping deposit **3.5.** Implement an internal approval process to increase interdepartmental communication
Communication and Engagement	**4.1.** Develop a robust public education program that effectively communicates risk and responsibility to a wide range of stakeholders **4.2.** Consider the audience and respond to their interests, values, and concerns **4.3.** Integrate core communication and engagement principles when communicating with stakeholders **4.4.** Communicate hazards and vulnerabilities **4.5.** Communicate wildfire risk reduction as a shared responsibility **4.6.** Incorporate scientific information and lived experience into communications **4.7.** Engage with residents at a wide range of events and sessions **4.8.** Communicate directly after wildfire season **4.9.** Communicate the importance of becoming a resilient community

EXHIBIT 3.
SUMMARY OF SHORELINE DPA RECOMENDATIONS

CATEGORY	RECOMMENDATIONS
Further Technical Work	**1.1.** Complete a coastal flood risk assessment
Development of DPA Content	**2.1.** Align DPA with risk assessment, other strategies, reports, and guidelines **2.2.** Develop DPA guidelines with the guidance of qualified professionals **2.3.** Develop guidelines that allow for flexibility while continuing to prioritize protection of environment, public safety, and property
Approval Process and Internal Review	**3.1.** Require the submission of an Environmental Impact Mitigation Report and a Coastal Hazard Mitigation Report **3.2.** Consult relevant government bodies for permit approval if development occurs in an area where aquatic habitat is affected **3.3.** Require the submission of a Coordinated Assessment Strategy Statement by a QP at the time of the application **3.4.** If development occurs in an area with overlapping DPAs, appoint a coordinating QP **3.5.** Require the completion of a post-construction report and landscaping deposit **3.6.** Implement an internal approval to increase interdepartmental coordination
Communication and Engagement	**4.1.** Develop a robust public education program that effectively communicates risk and responsibility to a wide range of stakeholders **4.2.** Consider the audience and respond to their interests, values, and concerns **4.3.** Integrate core communication and engagement principles when communicating with stakeholders **4.4.** Communicate the hazard and vulnerability distinct to the District **4.5.** Communicate risk mitigation actions **4.6.** Incorporate visualizations into risk communications strategy **4.7.** Incorporate scientific information and lived experience into communications **4.8.** Consider appropriate use of language for risk communications strategy **4.9.** Engage with residents at a wide range of events and sessions

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Acronyms

CWPP Community Wildfire Protection Plan
DNV District of North Vancouver
DPA Development Permit Area
DWV District of West Vancouver
FCL Flood Construction Level
GIS Geographic Information Systems
HHWM High High Water Mark
LGA Local Government Act
NSEM North Shore Emergency Management
OCP Official Community Plan
QP Qualified Professional
SDM Structured Decision Making
SPP Shoreline Protection Plan
WUI Wildland Urban Interface

Introduction

Municipalities in the Lower Mainland of British Columbia are at risk of experiencing more frequent and severe weather events such as flooding, drought, landslides, and wildfires (Metro Vancouver 2016). These events may cause significant social, economic, and environmental disruptions such as personal injury and property damage or loss. The District's OCP calls for new policy tools to protect the District from such events which have been attributed to climate change.

As per the OCP, there is an opportunity for local government to adopt climate change adaptation measures through the implementation of two DPAs for areas at risk of wildfire and coastal hazards. The objectives, guidelines, exemptions, and final recommendations that were developed as part of our planning process address these issues.

DPAs are one of many tools that a local government can use to address climate change. They allow municipalities to regulate private development projects to ensure that the development occurs in a way that maximizes personal safety, minimizes potential hazards to properties and interface communities, and protects the natural environment.

DPAs regulate the design, landscaping, and location of private development to reduce the risk of destruction from wildfires in the wildland-urban interface (WUI) and adapt shoreline properties to rising sea levels, king tide events, and flooding. They are flexible policies that facilitate cooperation between homeowners, developers, and local government and allow for unique site characteristics to be accommodated where they are deemed acceptable by Qualified Professionals (QP) and municipal planners.

Conditions for approving a development permit application within the boundaries of a Wildfire DPA include building design considerations like fire-retardant or fire-resistive materials on roofs, exterior walls, windows, decks, and ventilation, as well as landscaping measures that reduce the risk of wildland fires from entering and spreading through a community.

Similarly, conditions for approving a development permit application within the boundaries of a Shoreline DPA include the siting of permanent structures, the elevation of habitable space, shoreline protection measures, landscaping, provisions for water quality and stormwater management, and construction requirements.

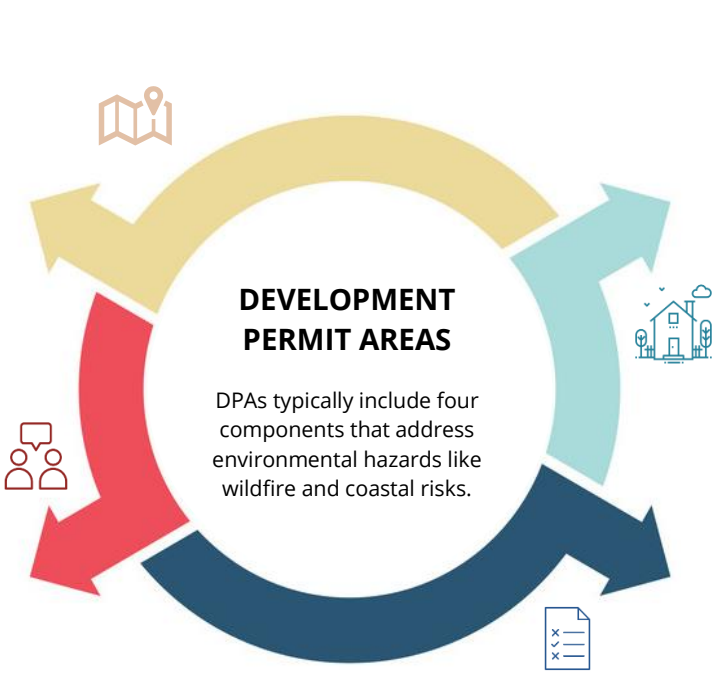
Project objectives

This report investigates how DPAs can be used as a local government tool for climate change adaptation. The purpose of this project is to assist the District in the development of two new DPAs – a hazardous conditions DPA for wildfire risk mitigation and an environmental protection and hazardous conditions DPA for shoreline protection. The objectives of this project are to:

1. Develop DPA templates, guidelines, and GIS maps for the wildfire and shoreline risk areas;
2. Recommend an approval process for both DPAs, including a process diagram detailing procedure; and
3. Outline communication and engagement recommendations for each DPA.

Based on these objectives, the project process and creation of each DPA was divided into four components as illustrated below.

EXHIBIT 4.
FOUR COMPONENTS OF A COMPLETE DPA



Planning Methods and Process

Several research methods were used to meet the project objectives. These include a review of relevant literature and policies, key informant interviews, in-depth case study analysis, and orthographic analysis and GIS mapping.

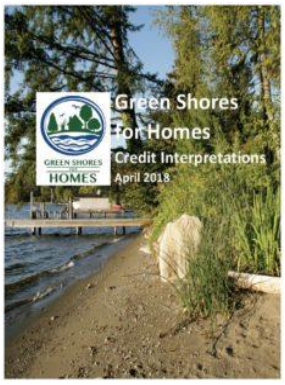
Review of relevant literature, policies, and documents

FireSmart manuals (2003), Canadian Wildland Fire Management Strategy (2009), B.C. Firestorm Report Provincial Review (2004), *Green Shores* guides (2015, 2016), and Metro Vancouver's Climate Change Projections (2016). These reports emphasize the increasing risks associated with climate change, the potential impacts that these risks pose to communities in B.C., and the use of DPAs as a local government tool that can address these risks through the adoption of building design and landscaping development guidelines on private residential property.

FireSmart Homeowner's Manual

Wildfire guidelines for homes are informed by standards, with FireSmart manuals being the standard for Canada, as recommended in federal and provincial strategies and reports. FireSmart manuals for hazard assessments categorize guidelines into two parts: A) building design and construction considerations, and B) fuel management and landscaping considerations.

Green Shores guidelines were developed by the Stewardship Centre for British Columbia (SCBC). *Green Shores* includes recommendations and policy tools for local governments, a rating and credit system for homeowners, technical information and research on shoreline protection, and public engagement and education resources. The standards are based on four principles: 1) preserve the integrity of shoreline processes; 2) maintain or enhance habitat diversity and function; 3) minimize or reduce pollutants; and 4) reduce cumulative impacts to the shoreline environment.



Green Shores Guides

Key informant interviews

Interviews with municipal staff at the District provided a thorough understanding of the key issues, concerns, and opportunities that can be addressed through the implementation of DPAs where wildfire risk, shoreline erosion, or coastal hazards exist. Some departments contacted included Planning, and Emergency Services. Site visits also provided greater contextual information of the existing conditions, hazards, and risks.

Interviews were conducted with municipal staff outside of the District that were identified based on the precedent case studies analyzed. These interviews provided further information based on best practices and lessons learned in topic areas including the development of a DPA, the internal review and approval process of development permit applications, as well as communication and engagement principles. These interviews highlighted key successes in the development, implementation, and engagement around DPAs that ultimately informed the final recommendations.

Staff from both Metro Vancouver and NSEM were interviewed and provided contextual information regarding the risks of climate change in the region. Metro Vancouver also provided first-hand accounts and insight regarding the Whyte Lake fire of 2018.

A complete list of all interviews conducted is provided in *Appendix A*.

Case study analysis

Case studies were chosen based on their relevance to the District, particularly in areas of similar high property values and risk of destruction or property loss from wildfire and/or coastal hazards; topography and climate; and ecological assets.

An in-depth analysis was conducted to compare the objectives, exemptions, requirements, and boundaries to be included in each DPA. These categories informed the development of the proposed DPAs using a 'made in DWV' approach to ensure that the DPA content reflects the issues, concerns, and opportunities in the District.

A complete list of case studies and their relevance to the District is provided in *Appendix B*.

Orthographic Analysis and GIS Mapping

GIS shapefiles provided by the District were used when mapping the boundaries of each DPA based on existing and proposed development. An orthographic analysis was conducted to determine the recommended boundaries of the Wildfire DPA. Orthographic images of the District were analyzed to determine the most heavily forest-covered areas found to be adjacent to residential properties. For the boundaries of the Wildfire DPA, attention was made to residential areas north of Highway 99, and below the 1200-meter contour line, as well as the isolated forested areas such as Horseshoe Bay. These were considered alongside shapefiles containing existing and future residential development in the District, and major roads were considered for their ability to serve as fire breaks.

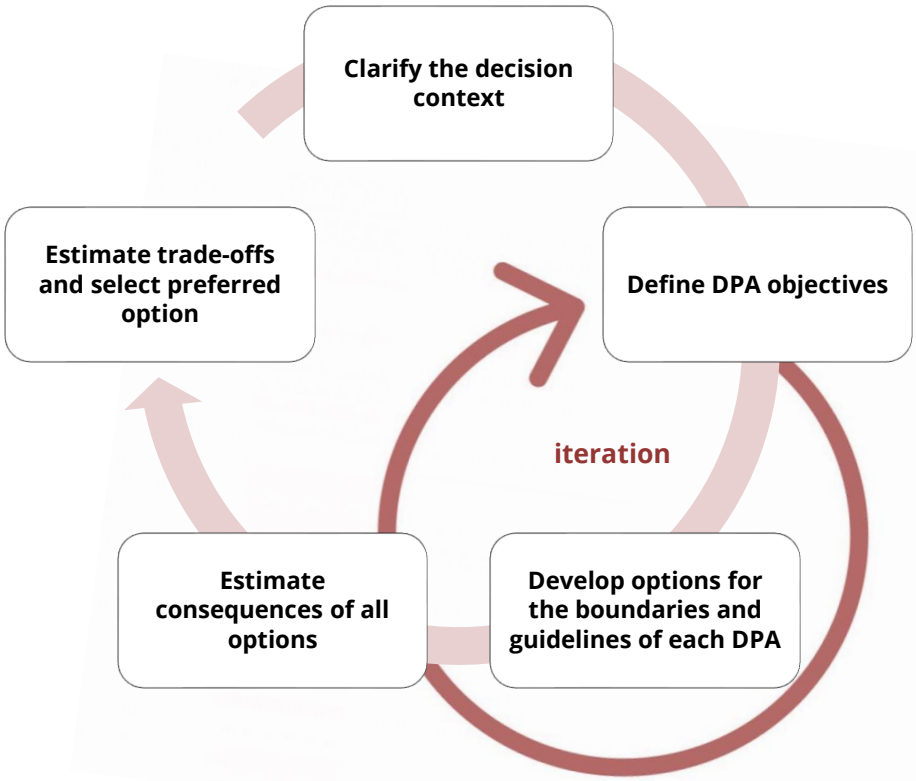
The Shoreline DPA boundaries were mapped based on a single 30-meter buffer extending from the ocean layer. This buffer was found to provide the best coverage of shoreline properties and maintained shoreline DPA coverage across a variety of shoreline types. The 30-meter buffer option was chosen out of a number of options. Other DPA boundaries that were tested in GIS included boundaries with 15-meter buffers from the ocean layer, boundaries that included elevation criteria such as 1-meter or 5-meter contours, and options that incorporated slope steepness criteria. Ultimately, the 30-meter buffer was chosen based on ease of application, coverage, use in case-study examples, and consistency across varying shoreline types.

Structured Decision Making

Structured Decision Making (SDM) is a planning process used to evaluate options, estimate consequences, and make recommendations in complex decision situations. The SDM process involves clarifying the context in which a decision is being made and defining objectives that are used to evaluate a range of options in order to make decisions and recommendations.

As an iterative process, the SDM framework was used throughout the project to clarify the project problem and identify the roles and concerns of stakeholders; to develop a set of objectives for each DPA which then informed the development of a criteria that was used to evaluate a range of possible mapping options; estimate the consequences and trade-offs of different mapping options; and finally develop the content, boundaries, guidelines, and exemptions that are proposed in each DPA package. A detailed account of the SDM process is provided in *Appendix C*.

EXHIBIT 5.
STRUCTURE DECISION MAKING PLANNING PROCESS



Research Findings

An in-depth analysis of these findings is provided in *Appendix D*.

Increasing coastal hazards

The shoreline faces two major challenges: coastal risks from storm surge, king tides, and sea level rise, and threats to the natural ecology of the shorelines (Stewardship Centre for BC 2016). With a developed and urbanized waterfront, these properties face coastal risks that will be made worse by climate change (Metro Vancouver 2016).

Public Safety

Fires are difficult to manage due to a build-up of fuel loads, limited water supply and site access, and uncertain wind direction. Hardened shorelines on the coast may exacerbate erosion, putting shoreline properties at risk, and properties with habitable space on the ground floor may not be built to withstand a serious flood event.

Increasing wildfire risk

Hotter, drier, and longer fire seasons threaten residents, homes, businesses, and other critical infrastructure in the District. As communities have expanded into forested areas, BC has seen an increase in human-caused fires (Climate Change and Fire Management Strategy 2009).

Assets at risk

Coastal and wildfire hazards extend across much of the District and have the potential to impact much of the District's high-valued housing stock. There is a priority to protect these high-value assets (including private property, municipal infrastructure, and community assets), and the people that use them.

Public perception of risk

Homeowners may be hesitant to adopt wildfire and shoreline risk mitigation measures for a number of reasons. They may not be aware or perceive risk, they may not believe it to be their responsibility, they may believe it is too time-consuming or costly, or if they may believe they should not be imposed on their private property.

Existing policy measures

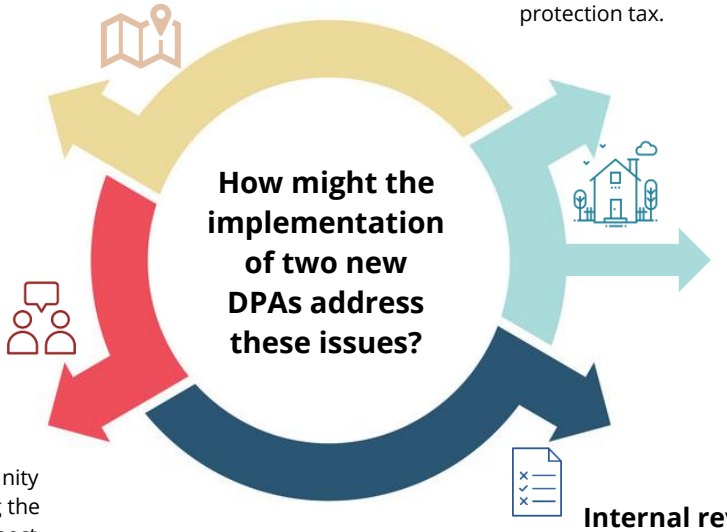
The District has a number of policies in place that relate to environmental and hazardous conditions. These policies do not yet specifically address wildfire and shoreline hazards. It cannot be assumed that homeowners will take voluntary mitigative measures, and policy should seek to illustrate measures specific to these hazards.

Understanding of hazards and mapping

DPAs highlight the need to develop a risk assessment in the District in order to identify areas of highest vulnerability. With uncertainty surrounding sea level rise levels along the coast and complex factors involved in the fate and trajectory of wildfires, a risk assessment will ensure that the boundaries and guidelines accurately respond to the District's needs.

Working in tandem with other policy

The use of DPAs are limited to new development and redevelopment of existing properties. By introducing these DPAs, there is an opportunity to consider complementary policy tools such as area plans, zoning bylaws for building materials and subdivision establishment, covenants for vegetation setbacks, and incentives such as exclusion from fire or coastal protection tax.



Coordination of emergency response

Wildfire and shoreline hazards know no jurisdictional boundaries, so DPA guidelines should consider those implemented by neighbouring municipalities. This allows for coordinated efforts across the North Shore.

Communication and engagement principles

DPAs should be implemented with complementary communication material. This presents an opportunity for the District to use the following the four principles (Barisky 2015): connect to shared values such as preparedness, prevention, responsibility; include local, relevant, observable impacts so residents understand how hazards impact *them*; clearly state benefits of action; give community members meaningful roles and the opportunity to engage in protection.

Internal review and approval process

The recommended internal review and approval process for a DP application considers requiring a hazard assessment prior to starting development, and a post-construction check after the development has been completed. This process ensures accountability and consistency in development projects.

Planning Context

The landscape of the District is unique in that it is nestled between both low-lying and cliffside coastlines as well as a heavily forested mountain range. The urban interface between both the shoreline and wildlands provide opportunities for access to nature and a quality of life that attracts many residents to the District. This proximity also introduces hazardous conditions and risks, especially as human development and climate change increase. Minimizing climate change impacts and human-caused threats to this landscape is a concern for the District.

Development along the northern side of Highway 99, like properties that are directly adjacent to or surrounded by forested areas, are at greater risk of being affected by wildfires. Other vulnerable areas, including those more isolated communities adjacent to forest land with limited site access, such as Eagle Island, Whytecliff Park, Sunset Highlands, and parts of Caulfield Village that are situated adjacent to the Lighthouse Park, are also areas of concern.

Shoreline vulnerabilities relate to risks of erosion and rising seas. Thus, areas most vulnerable to these risks are along the District's low-lying coastline. Stearman beach was identified as being a vulnerable area along the waterfront as many coastal properties along the beach are at an elevation at or below 5 meters and feature 'hard' shoreline protection measures. The area faces risks of both coastal flooding (e.g. storm surge, king tides) and debris flooding from Cypress Creek. If coastal and creek flooding events were to coincide, cumulative impacts could heighten the risk. Ambleside Village is located in the south-east corner of the District and contains residential properties below the current Flood Construction Level of 4.5 meters. These properties face risk of inundation from storm surge and king tides.

Supporting policies in the District and North Shore

The District has implemented similar DPAs that seek to regulate development that exist within environmentally sensitive or hazardous areas. Although none of them are specific to wildfire or shoreline hazards, they may compliment the work of these DPAs. Existing DPAs of note include: Watercourse Protection and Enhancement Areas; Zone NE 6 (Natural Environment); Telegraph Hill and Tyee Point; and Upperlands.

In relation to the Wildfire DPA, the District is currently engaged in the process of completing a Community Wildfire Protection Plan (CWPP) as part of the Strategic Wildfire Prevention Initiative. The CWPP and risk assessment that comes from typically inform the parameters of the Wildfire DPA as well as training, emergency response, and public education initiatives.

North Shore Emergency Management facilitates the North Shore Interface Wildfire Working Group, which brings together stakeholders from various departments of all three North Shore municipalities. Protocols and procedures have been developed through this group to support collective response to wildfires. NSEM staff are also working on a resilience plan that will help inform and identify wildfire risks in the District by better understanding the vulnerabilities to wildfires in the District.

In relation to the Shoreline DPA, the District has implemented a Shoreline Protection Plan (SPP) which has helped inform the recommendations of the Shoreline DPA in this report. The SPP was launched in 2006 and has been updated on numerous occasions since, with the mission statement to protect and enhance one of the District's greatest natural assets.

The resilience plan work by NSEM staff will also help to inform and identify shoreline risks in the District. The Sea Level Rise Adaptation Strategy that has come out of DNV's Climate Change Adaptation Strategy, and although it is still in its early stages, it will provide a risk assessment and community engagement that will benefit. Additional work from the Fraser Basin Lower Mainland Flood Strategy plans for river and coastal flood will extend from Squamish to White Rock and will be of use to the District upon completion.

Whyte Lake fire, August 2018

On August 8th, 2018, a fire was reported near Horseshoe Bay in Whyte Lake Park, the District's largest park which consists of trails, a lake, wetlands, creeks, and old-growth forest. Just one day prior, the West Vancouver Fire Department had warned of how the District's very dry conditions had put the community at risk, asking residents to do their part to prevent fires and raising the District's fire danger rating to 'Extreme'.

The fire started at night and by morning it had grown in speed and size. Response crews had limited road access to the fire, and while the local Fire Department typically responds to fires within municipal boundaries, this particular fire required additional response and support from Coastal and Metro Fire Services, North Shore Emergency Management, District and City of North Vancouver Fire Departments, West Vancouver Fire and Rescue crews, West Vancouver Police Department and numerous District staff.

It took just over a week to contain the fire, which burned approximately three hectares of forested land. The Whyte Lake fire resulted in the temporary closure of public access to a number of trails in the District and was thought to have contributed to higher smoke concentrations and levels of fine particulate matter in the regional air quality. The fire response required the closure of one traffic lane on Highway 99, but had the fire continued to grow in size, response crews would have required a long-term closure of Highway 99.

The Whyte Lake fire illustrates how wildfire risk in the District can disrupt the lives of residents through diminished air quality or water supply, transportation congestion and blockages, closure of parks and trails, and even harm to property and individuals. It also underscores the idea that wildfire prevention is a shared responsibility. Emergency responders are actively engaged in activities to prepare and respond to both structural and wildland fires. However, in order to reduce community vulnerability to wildfire risks, residents must also do their part to prepare by following year-round fire bans, staying vigilant in their community, and immediately reporting any unsafe fire activities or smoke in the area. For homes within the proposed Wildfire DPA, it will also require residents to learn how to prepare their homes and landscaped areas by following the guidelines laid out in the DPA if undergoing a development project and engaging in voluntary practices found in the *FireSmart* Homeowner's Manual (2003).

King tide flooding events

King tides give us a glimpse into a future with sea-level rise. They are the highest tides of the year, measuring approximately one meter higher than the normal high tide. Both natural and predictable, they typically occur in December, January, and February.

If a king tide were to coincide with a strong storm, the extra height from the tide could cause serious flooding and erosion damage. The risks from king tides and storm surge not only include water damage, but also debris flow such as logs that can impact and damage structures. Sea level rise will magnify the risks of king tides and storm surge even further, as predictions warn of an additional 1-meter rise to the current sea level by 2100. This new reality would dramatically change West Vancouver's shoreline.

King tides are already affecting West Vancouver. In 2012 a storm event during the king tide flooded the Silk Purse Gallery and Music Box buildings in John Lawson Park. Since 2014, District staff have put temporary protective measures in place at these buildings to manage flood impacts from these king tides. The protective measures include a water-filled barrier that surrounds the buildings for around 6 weeks each winter. In late 2018, storm surge overtopped several sea walls and paths, forcing their closure during a storm.

As climate change continues to intensify, it will no longer just be the extreme events like king tides and storm surge that threaten homes, businesses, municipal services, and valued public assets such as parks, playfields, and cultural buildings. As the seas rise, daily tides of the future will begin to resemble today's king tides, and future king tides will put more of our community at risk of inundation.

King tide events in the District, as well as across the Lower Mainland, illustrate the impact of changing tides on both municipal infrastructure, community assets like the Silk Purse Gallery and the shoreline, as well as private dwellings that are located near the foreshore. DPAs are an important regulatory tool for keeping shoreline properties safe from future king tides.

Wildfire Hazardous Conditions DPA


Justification
Area
Category
Objectives
Exemptions
Guidelines
Application
Boundaries Map
Process Diagram
Communication Materials
Recommendations

Justification

The OCP includes the consideration of introducing a new DPA addressing wildfire risk (hazardous conditions) as a means of protecting against associated risks to West Vancouver's wildland-urban interface area.

Wildfire events can result in significant economic, social, and environmental losses. The District of West Vancouver is 87.3 square kilometers in size, with existing neighbourhood areas making up only 33 percent of this area. Much of the land area includes undeveloped and forested areas. The wildland-urban interface extends across the entire municipality and either borders or encompasses the majority of the District's high-valued housing stock. Forested areas surrounding the District are also at risk because these areas are popular for outdoor recreational activities.

The guidelines in this DPA were developed based on the assumption that the District, like the neighbouring DNV, is at moderate to high risk from wildfire, with areas where the probability of wildfire occurrence is extreme and the consequences of a large fire are likely to be significant given asset values, access and evacuation constraints, population size and topography. The District is expected to experience drier summers and extended fire seasons as a result of climate change which can exacerbate the risks and consequences of a wildfire event.

Applying Wildfire hazardous conditions development guidelines to both existing and new development will mitigate the likelihood and consequences of wildfire scenarios.

Area

All existing and new development within the DPA boundaries identified on *Figure 4* are subject to the Wildfire Hazardous Conditions development permit guidelines. Specific guidelines apply to the high risk and moderate risk areas, as defined below.

Wildland Areas: Areas that are predominantly undeveloped forested areas. If new development is proposed in these areas, *FireSmart* Assessments may be required, as determined municipal planning staff.
High Risk Areas: Areas where properties are located directly adjacent to the wildland area. In these areas, a number of guidelines related to building design and construction, landscaping and fuel management may be required.
Moderate Risk Areas: Areas where properties are not directly adjacent to the wildland area but comprise areas located within a 200-meter buffer around the High-Risk Areas. In these areas, a small number of building and landscape guidelines may be required to protect the materials that most susceptible to fire, while others are voluntarily encouraged.[1]

The lands identified as the Wildfire Hazardous Conditions DPA are designated as hazardous condition to help protect buildings and properties near interface boundaries from heat radiation, direct flame contact, and/or airborne embers produced by interface wildfires.

Category

The designation of a development permit area for the protection of development from hazardous conditions is pursuant to Section 488(1)(b) of the *Local Government Act.*

[1] Although much of the District is at risk to wildfire as it is developed in the WUI, there are varying risks. For properties located directly adjacent to the wildlands, the risk is greatest; for homes located further from the wildlands but still within a distance that embers can alight vulnerable materials, properties should also be subject to development requirements. When developing the boundaries of the Wildfire DPA with guidance of a QP, the District may choose to 1) only include properties within the highest risk area in the DPA, 2) include both high risk and moderate risk properties under the same development guidelines, or 3) apply different development guidelines to properties located in the high risks areas versus those in the moderate risk areas. This DPA is written to reflect the latter.

Objectives

The objectives of the Wildfire DPA are to:

1. Prevent personal injury;
2. Protect structures from damage and property loss; and
3. Conserve or preserve natural environment and ecological assets.

Exemptions

Pursuant to section 488(4) of the *Local Government Act,* a development permit is not required in respect of the following:

a. When the proposed development will not be impacted by the identified hazardous condition, the determination of which may need to be by a Qualified Professional, registered in British Columbia, who has submitted an assessment accepted by the District of West Vancouver, which concludes that the property is not subject to the hazardous condition; or
b. A development for which a building permit is not required under the district's Building Bylaw, except for a *complete roof replacement*; or
c. A renovation to the existing building, other than an *addition* to the building and *complete roof replacement*; or
d. Auxiliary buildings except for detached auxiliary residential dwelling units; or
e. Auxiliary residential dwelling units with an existing dwelling unit, provided no *addition* to the existing dwelling unit is proposed; or
f. Development on lands subject to a covenant that is registered in favour of the District under section 219 of the Land Title Act for the protection of development from wildfire; or
g. A subdivision for lot consolidation or road widening; or
h. Any development comprised entirely of non-flammable materials such as metal, stone or concrete; or
i. Vegetation or tree removal.

Guidelines

1.0 High Risk Areas

1.1 Building Design and Construction Guidelines

The following guidelines relate to building design and construction, and apply to subject development located within the 'High Risk Area' shown on *Figure 4*:

- Class A fire rated roofing materials should be used, and asphalt or metal roofing should be given preference;[2]
- Decks, porches and balconies should be sheathed with *fire resistive materials;*[3]
- Fire-resistive decking materials, such as solid composite decking materials or *fire-resistive* treated wood, should be used;
- All eaves, attics, roof vents and openings under floors should be screened to prevent the accumulation of combustible material, using 3-millimeter, non-combustible wire mesh, and vent assemblies should use fire shutters or baffles;[4]
- Exterior walls should be sheathed with *fire resistive materials;*[5]
- All windows should be tempered or double-glazed to reduce heat and protect against wind and debris that can break windows and allow fire to enter the *new building or structure;*
- All chimneys and wood-burning appliances should have approved spark arrestors; and
- Building design and construction should generally be consistent with the highest current wildfire protection standards published by the National Fire Protection Association or any similar, successor or replacement body that may exist from time to time.

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[2] Class A fire-rated roof assembly offers the best protection. Examples of Class A roofing material include clay tile, concrete tile, metal and asphalt shingles.

[3] Most deck boards are combustible, including dimensional wood, plastic and wood-plastic composites. Select fire rated composite decking material for your deck and sheath the underside of the deck with non-combustible sheathing, such as fiber cement board or metal screening. Maintenance is very important, even if the deck is sheathed.

[4] Open eaves create an entry point for sparks and embers. Select noncombustible materials, such as fiber-cement board or stucco. Noncombustible materials such as galvanized steel, copper and aluminum.

[5] Some types of construction materials such as vinyl siding can melt when exposed to high temperatures, allowing the fire to reach the underlying wall components and penetrate the interior of the building. Stucco, brick, fiber cement boards/panels and poured concrete all offer superior fire resistance.

1.2 Fuel Management and Landscaping Guidelines

The following guidelines relate to fuel management and landscaping, and apply to subject development within the 'High Risk Area' shown on *Figure 4*:

- Landscaping within 10 meters of the principal building must be clearly indicated and primarily comprised of species with low flammability, as demonstrated in the *FireSmart* Canada website manual for landscape planting;
- All areas within 1.5 meters of the principal building should be free of coniferous vegetation;
- Any newly planted coniferous trees within 10 meters of the principal building should be adequately spaced (3-6 meters apart) and not overhanging building roofs and decks;
- If removal of trees or vegetation is deemed necessary by the QP for the purpose of reducing wildfire risk, District approval is required, and replacement trees or vegetation may be required by the District;
- All wood, vegetation and construction debris identified in the QP's report should be removed within three months of permit issuance, or immediately during high fire risk seasons, and the District may require security in connection with such removal; and
- If deemed necessary by the QP for the purpose of reducing wildfire risk, a defensible space of at least 10 meters should be managed around buildings and structures with the goal of eliminating fuel and combustible debris, reducing risks from approaching wildfire and reducing the potential for building fires to spread to the forest, and the required defensible space may be larger in areas of sloping ground where fire behaviour creates greater risk.

2.0 Moderate Risk Areas

2.1 Building Design and Construction Guidelines

The following guidelines relate to building design and construction, and apply to subject development located within the 'Moderate Risk Area' shown on *Figure 4*:

- Class A or B fire rated roofing materials should be used, and asphalt or metal roofing should be given preference; and
- It is encouraged for decks, porches, balconies and exterior walls to be sheathed or coated with *fire resistive materials*.

2.2 Fuel Management and Landscaping Guidelines

The following guidelines relate to fuel management and landscaping, and apply to subject development within the 'Moderate Risk Area' shown on *Figure 4*:

- It is encouraged for landscaping to be designed based on *FireSmart* landscaping standards to ensure minimal fuel loading and provide resistance to wildfires;
- The type and density of fire-resistive plantings should help mitigate the interface fire impacts;[6]
- Any newly planted coniferous trees within 10 meters of the principal building should not overhang building roofs and decks;
- If removal of trees or vegetation is deemed necessary by the QP for the purpose of reducing wildfire risk, District approval is required, and replacement trees or vegetation may be required by the District; and
- All wood, vegetation and construction debris identified in the QP's report should be removed within three months of permit issuance, or immediately during high fire risk seasons, and the District may require security in connection with such removal.

3.0 Alternatives

Where a QP registered in British Columbia has undertaken an assessment and determined the fire hazard to be low provided specific conditions are met, the requirements noted above in sections 1.0 through 2.2 may be relaxed. Any relaxation of guidelines requires that provisions are in place to ensure development is carried out in accordance with the conditions noted in the assessment conducted by the QP.

[6] Characteristics of fire-resistant plants: moist, supple leaves; accumulates minimal dead vegetation; water-like sap with little odour; low amount of sap or resin material.

Application

The applicant must follow the steps detailed below to obtain a Wildfire Hazardous Conditions development permit:

1. Hire a Qualified Professional (i.e. Registered Professional Forester, Registered Forest Technician, Registered Professional Engineer, or Community Forester) to complete a Wildfire Assessment and Mitigation Report which details how the development will follow the Wildfire development permit guidelines or otherwise. Within this report, the QP must submit a Coordinated Assessment Strategy Statement which states that the coordinating professional has reviewed the entire project proposal and has considered the geotechnical, stormwater management, environmental, and civil design considerations and that these do not conflict with each other or our bylaws, design standards, or policies.
2. The Wildfire Assessment and Mitigation Report will be reviewed by various departments including, but not limited to the Fire Department, the Environmental Section of our Planning Department, the Parks Department, the Building Department, and the Engineering Department. If the recommendations or risk mitigation policies are agreed upon by all parties, then the District will issue the development permit. Development permits are registered on title.
3. Following the completion of the development project, the QP is required to complete a post-construction report prior to the District issuing an occupancy permit. The Environment Department and Building Inspector must sign off before an occupancy permit is issued.

Reference Materials

BC Wildfire Service: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/for-your-home-community

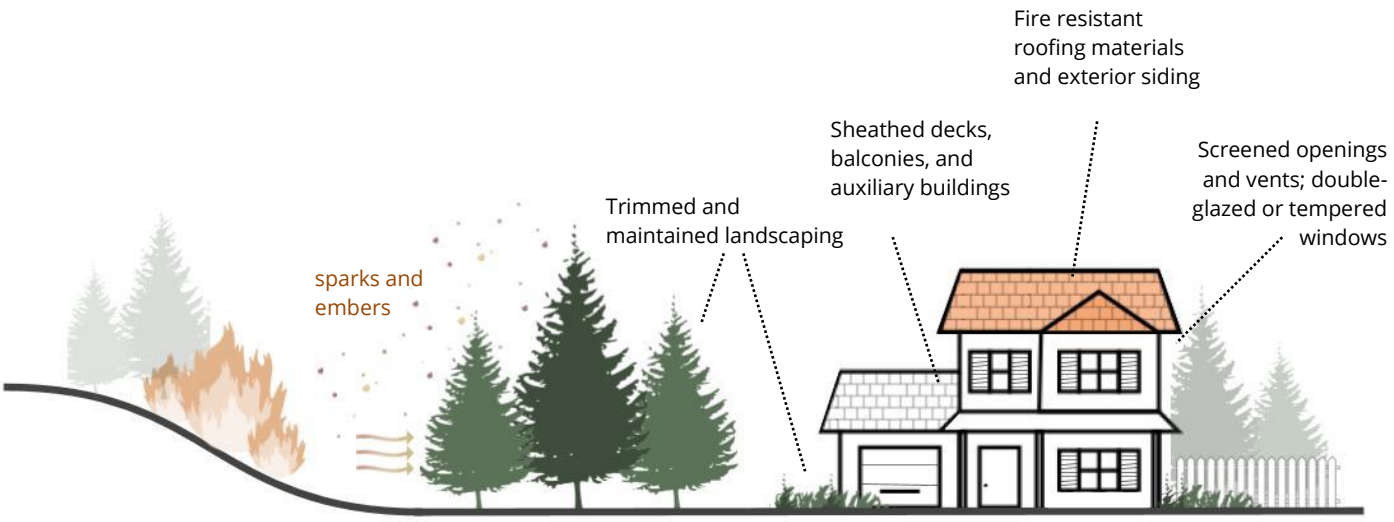
FireSmart Homeowners Manual: *FireSmart* Begins at Home

FireSmart: Protecting Your Community from Wildfire

National Fire Protection Association 1141: Standard for Fire Protection Infrastructure for Land Developments in Suburban and Rural Areas

National Fire Protection Association 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire

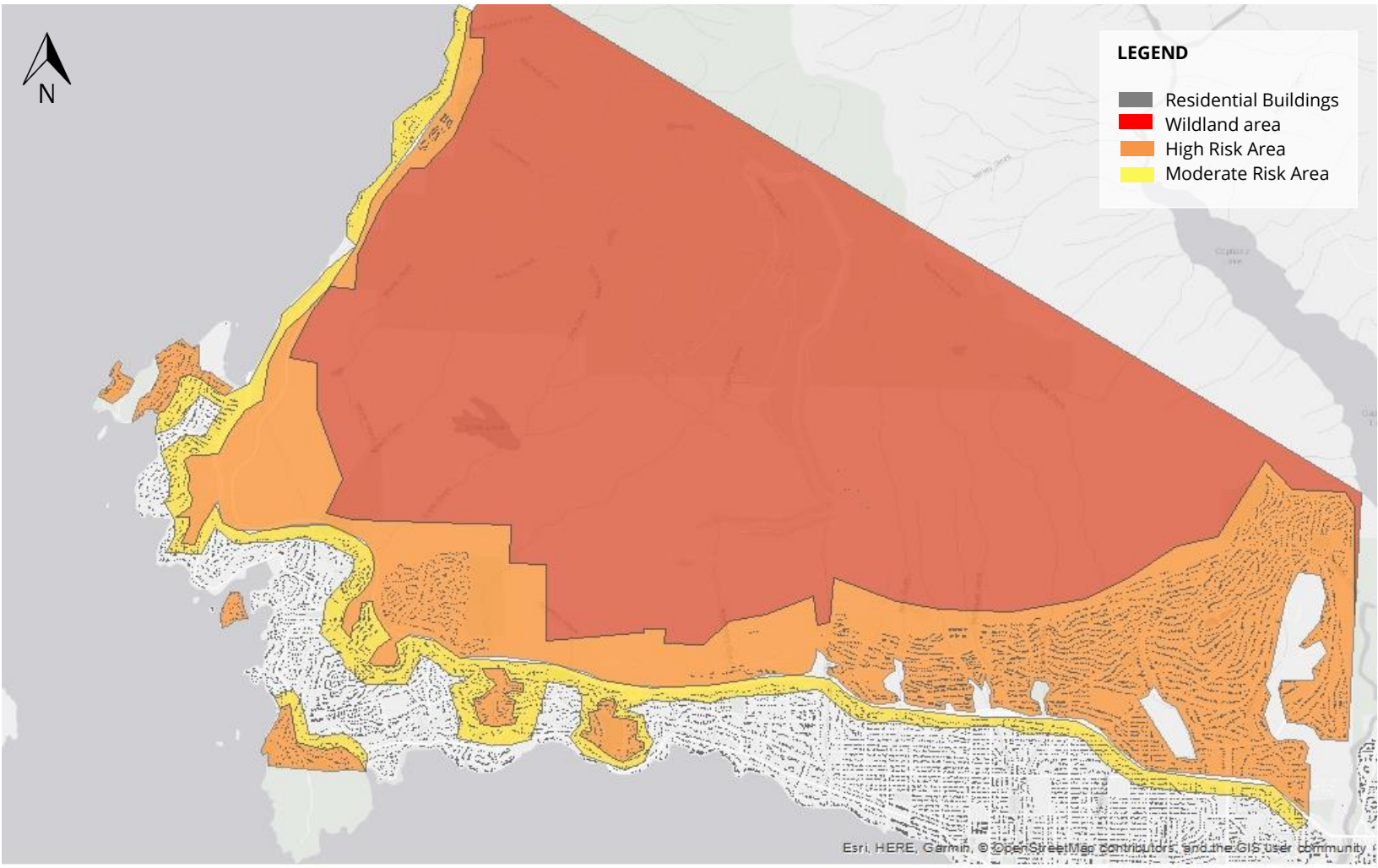
EXHIBIT 6.
ILLUSTRATED WILDFIRE DPA GUIDELINES



District of West Vancouver Wildfire DPA Boundaries

The following map outlines the recommended Wildfire DPA Boundaries for the District. Interviews and case study findings suggest that the map incorporate findings from the risk assessment. Thus, this map is to be updated upon completion of a wildfire hazard risk assessment which will come from the CWPP.

EXHIBIT 7.
MAP OF RECOMMENDED WILDFIRE DPA BOUNDARIES



Process Diagram

Diagram represents application and approval process for development permit applications without variance. For applications with variance, see Development Variance Permit (DVP) process.

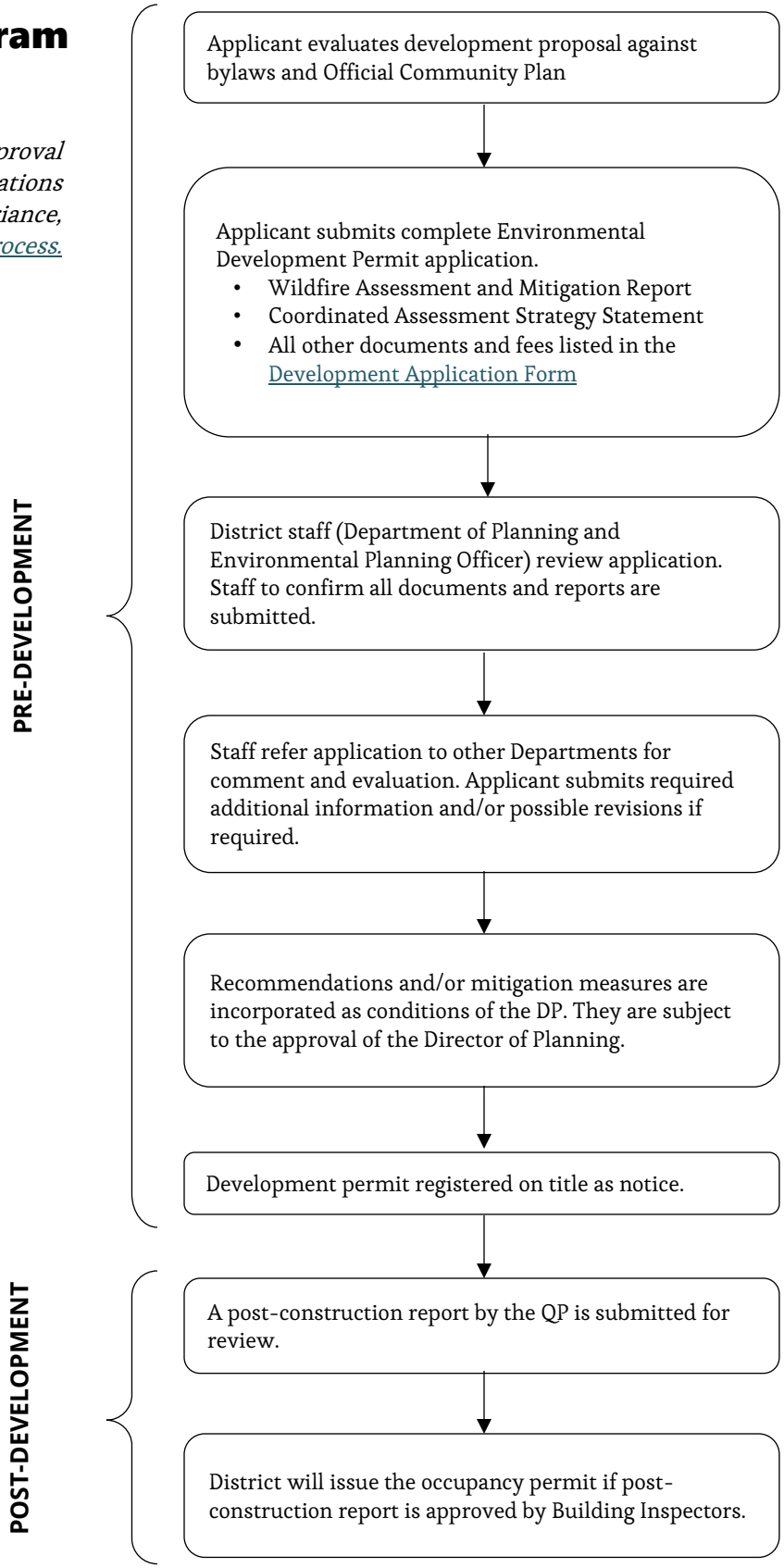


EXHIBIT 8.
WILDFIRE PROCESS DIAGRAM

Communications Materials

EXHIBIT 9.
SAMPLE WILDFIRE DPA BROCHURE

See Appendix E for full size brochure.

What is a Wildfire DPA?

The Official Community Plan calls for the creation of development permit areas (DPAs) to protect the District from natural hazards like wildfire risk.

The District has experienced wildfires like the Whyte Lake Fire in August 2018 that caused closures of trails and air quality advisories. With more frequent summer droughts and an increasing number of hot days, wildfire risk is real and can impact our forested areas and neighbourhoods.

A Wildfire DPA is adopted as a means of reducing the risk of fire spreading in a community. It includes the forests at risk of wildfire and the adjacent properties when undergoing redevelopment projects. The guidelines regulate building materials like roofing, exterior walls and decking as well as the type and location of landscaping around homes that are most vulnerable to fire.

Wildfire DPAs have been adopted in surrounding municipalities like the District of North Vancouver.

CONTACT INFORMATION

Background information and the detailed DPA guidelines, exemptions, and maps are available on the District website at:

https://westvancouver.ca/home-building-property/development-applications/other-development/development-permits

Planning & Development Services
750 17th Street
West Vancouver BC
V7V 3T3

604-925-7040

WILDFIRE DEVELOPMENT PERMIT AREA

Helping homeowners adopt fire smart building and landscaping in West Vancouver

ABOUT

The Wildfire DPA is established to:

1. Prevent personal injury

2. Protect structures from damage and property loss

3. Conserve or protect the natural environment and ecological assets

The following is an overview of the guidelines to reduce risk to homes in the Wildfire DPA.

1. Fire resistive materials should be used for roofs, decks, porches, and exterior walls.

2. Eaves and vents should be screened and spark arrestors should be installed on chimneys.

3. Windows with tempered or double-glazed glass.

4. Landscaping, particularly within 10 meters of the main structure, should be designed and maintained to minimize debris.

5. Ladder fuels on trees within 30 meters of your home should be thinned.

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PERMITTING PROCESS

1. If your property is included within one or more DPAs, discuss your proposed work with District staff early in the process. The proposed work may require an assessment by a Qualified Professional (QP) detailing how the project mitigates risk.

2. If more than one DPA is involved, you may be required to appoint a lead professional to coordinate the process.

3. The QP assessment process will identify the most appropriate fire mitigation measures for your home and property.

4. District staff will review the application in accordance with the DPA guidelines.

•5. Following the completion of the development project, the submission of a post-construction report is required prior to occupancy. This report ensures that all necessary wildfire mitigation measures are complete.

Recommendations for the Successful Implementation of a Wildfire DPA

EXHIBIT 10.
FINAL RECOMMENDATIONS AND RATIONALE FOR WILDFIRE DPA

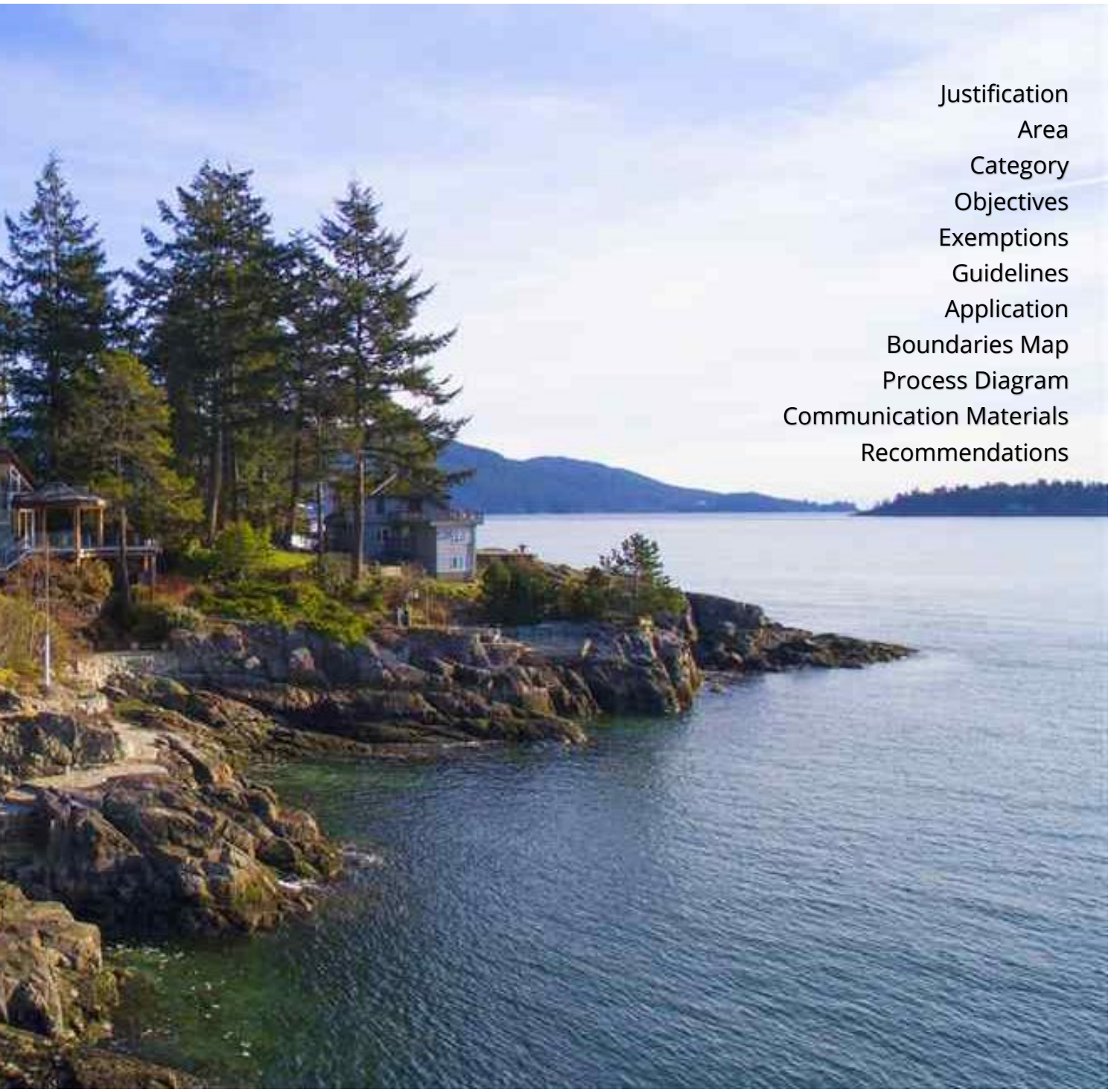
	RECOMMENDATIONS AND CONSIDERATIONS	RATIONALE
	FURTHER TECHNICAL WORK	
1.1.	**Complete a Community Wildfire Protection Plan** • Identify wildfire risks in the District • Establish technical criteria for DPA content and boundaries	A CWPP typically precedes the development of a DPA. It contains the findings and recommendations pertaining to a risk assessment, education and communication, structure protection, emergency response, training, fuel management, and post-fire rehabilitation. This work will inform the development of DPA guidelines, its boundaries, as well as communication and engagement considerations.
	DEVELOPMENT OF DPA CONTENT	
2.1.	**Develop DPA guidelines based on the information presented in the CWPP**	DPA guidelines and boundaries should reflect the wildfire risks specific to the District.
2.2.	**Develop DPA building design and landscaping guidelines with guidance of a QP experienced in wildfire management and risk reduction**	As per interview findings, the building design and landscaping guidelines should ensure that all guidelines contribute to the mitigation of potential damage or loss of properties in the case of a wildfire event as outlined in the DPA objectives.
2.3	**Align DPA guidelines with those developed in the District of North Vancouver** • DNV is currently undergoing an update of the CWPP (2019) which may also lead to an update of their Wildfire DPA guidelines. The District may align their DPA guidelines with the updated ones in DNV.	Aligning guidelines may help mitigate wildfire risk where forest is shared across the North Shore; may contribute to the coordinated effort of emergency response across the North Shore; and may contribute to a stronger communications program that emphasizes the importance of wildfire mitigation actions across the North Shore as a coordinated effort.
2.4	**Align DPA content with other strategies, reports, and guidelines** • *FireSmart* (2003), BC Wildland Fire Management Strategy (2010)	Such reports emphasize wildfire management strategies and considerations for risk reduction.

	INTERNAL REVIEW AND APPROVAL PROCESS	
3.1	**Require applicant to submit a Wildfire Hazard Assessment Report** • QP may include Registered Professional Forester, Registered Forest Technician, Registered Professional Engineer, or Community Forester	DNV and the City of Kelowna require a Wildfire Hazard Assessment Report to be completed by a QP and submitted at the time of application. The purpose of this report is to ensure that the proposed development follows the guidelines of the Wildfire DP and that the proposed work has a low to moderate wildfire risk rating prior to development project approval.
3.2	**Require applicant to submit a Coordinated Assessment Strategy Statement**	A Coordinated Assessment Strategy Statement is completed by the QP at application. This statement states that the coordinating professional has reviewed all of the project proposal and has considered the geotechnical, stormwater management, environmental, and civil design considerations and that these do not conflict with each other or our bylaws, design standards, or policies.
3.3	**If development occurs in an area with overlapping DPAs, appoint a coordinating QP**	DP recommendations should follow the guidelines where the hazard is greatest. A coordinated QP assessment may be necessary.
3.4	**Require the completion of a post-construction report and landscaping deposit** • Ensure the post-construction report is completed prior to obtaining an occupancy permit • Ensure this report is completed by the same QP that was retained to complete the Wildfire Assessment Report • Ensure building inspectors sign-off on this report prior to issuing occupancy	As per best practices, a post-construction report may be completed prior to obtaining an occupancy permit to ensure that construction and landscaping is completed to the standard approved by Council. This will hold development projects accountable to the guidelines of the DPA.
3.5	**Implement an internal approval process and internal review for the DPA to increase interdepartmental communication** • Departments include Parks, Engineering, Fire, Building, Environment	As each site and development proposal is unique, the internal process for processing and approving development projects must be coordinated across several departments at the District.

	COMMUNICATION AND ENGAGEMENT	
4.1	**Develop a robust public education program that effectively communicates risk and responsibility related to the DPA to a wide range of stakeholders**	As per *FireSmart* (2003) manuals, effective public education is key to preventing or minimizing wildfire risk for properties located in or near the wildland urban interface. Implementable through recommendations 4.2 - 4.8
4.2	**Consider DPA target audience and respond to their interests, values, and concerns** • Stakeholders include local government, emergency responders, developers and contractors, homeowners, residents, insurance agencies, and environmental stewardship groups.	As per Interim Report (2018), these stakeholders hold varied but intersecting roles and interests. The main priorities identified across all stakeholder groups are public safety, protection of structures, and protection of ecological assets.
4.3	**Integrate core communication and engagement principles when communicating with stakeholders** • Appeal to shared values • Ground conversations in local, relevant, and observable impacts • State the benefits of action • Encourage the community to take on a meaningful role	As per Barisky (2015), the framing and delivery of public education programs have a significant impact on residents' willingness to participate and act on climate change risks such as wildfires. These principles will be key to the communication of the DPA.
4.4	**Communicate hazards and vulnerabilities** • Increase the understanding of the community's vulnerability to wildfire hazards	Most of the communication in the District regarding wildfire risk reduction and prevention is focused on measures that can be taken from within a property in the case of structural fires. Communication and engagement programs should accurately communicate wildfire hazards that are present in the District so that residents can understand how the hazards may affect their lives.
4.5	**Communicate wildfire risk reduction as a shared responsibility** • Emphasize the shared responsibility between recreational users, homeowners, the municipality, and emergency services • Recommend homeowners to adopt voluntary measures to mitigate risk to their property • Educate the public on the District's active role in fire mitigation and risk reduction practices • Encourage proactive and self-reliant attitudes	Mitigating risks is a shared responsibility among recreational users, homeowners, and emergency responders, where prevention measures can save or significantly reduce the impact of interface fire on one's family, home, business, or community.

4.6	**Incorporate scientific information and lived experience into communications** • Successful communication will link current science such as the IPCC (2014) findings and PICS projections, with visible impacts, such as air-quality and smoke during the fire season	As per *FireSmart* (2003), there are several challenges when engaging residents in wildfire risk reduction practices. Incorporating scientific information and lived experiences in communication and engagement programs my increase awareness and inspire stewardship.
4.7	**Engage with residents at a wide range of events and sessions** • Engage with residents at Neighbourhood Association Meetings • Engage with homeowners on their properties and offer free hazard assessments using *FireSmart* score cards or *FireSmart* Home Partners App • Engage with recreation users regarding fire bans	As per interviews, personalized programming may allow people to take greater ownership and stewardship of the forest adjacent to their homes. If trying to communicate the importance of preventative actions with residents already living in the interface area, it is found to be more effective meeting face-to-face. Personalized communication is important as some residents may not fully grasp the potential risk in the case of a wildfire event until it relates to the specific risks that can affect their home.
4.8	**Communicate directly after wildfire season** • Engage with stakeholders throughout the wildfire season and directly after • Adopt the Wildfire DPA following the 2019 wildfire season such as September, when the figurative 'smoke is in the air'	Following the wildfire season, stakeholders (including recreational users, homeowners, developers, and contractors) may have higher risk perceptions of wildfire events and may be more motivated to adopt mandatory and voluntary fire prevention measures.
4.9	**Communicate the importance of becoming a resilient community** • Develop education material with NSEM and the District's Fire Department • Encourage household or family emergencies planning • Encourage residents to be prepared for emergencies and prepared to evacuate if needed	Natural hazards in the District exist beyond wildfire hazards. The community should be educated and prepared for all natural emergencies that occur.

Shoreline Protection & Hazardous Conditions DPA



Justification
Area
Category
Objectives
Exemptions
Guidelines
Application
Boundaries Map
Process Diagram
Communication Materials
Recommendations

Justification

The OCP includes the consideration of introducing a new DPA addressing shoreline risk (hazardous conditions) and shoreline protection (natural environment) as a means of protecting against associated risks to West Vancouver's low-lying coast.

The District's coastline is primarily composed of low-lying high and low bank sand and gravel beaches and rocky cliffs facing the Burrard Inlet and Horseshoe Bay. The shoreline is exposed to wave energy as well as periodic coastal flooding from storm surge and king tides, particularly in winter months. Coastal erosion is often the effect of high wave energy on the sand and gravel shoreline, particularly on lower waterfront cliff areas/ bluff sites. Both erosion and accretion are phenomena occurring due to these changes in the shoreline. High-value properties along the shoreline are at risk of destruction and loss from coastal hazards.

The District's shorelines are highly valued ecological assets such as habitats sensitive to human impact on natural shoreline processes. Accordingly, they must be managed to avoid potential negative impacts of development. They are particularly sensitive to human activities that disrupt sediment processes, such as seawalls, or upland development that is poorly sited, including vegetation clearing for yard areas. Guidelines are intended to bring shoreline regulations up to current best practice standards, such as the *Green Shores* approach.

Area

All existing and new development within 30m upland of the natural present bound of the ocean are included in the DPA area. The DPA boundaries illustrated on *Figure 7* are subject to the Shoreline development permit guidelines.[7]

Category

The designation of a development permit area for the protection of the natural environment and protection of development from hazardous conditions is pursuant to Section 488(1) (a and b) of the *Local Government Act.*

[7] A number of shoreline mapping options were experimented with, including options that were based upon 1-meter contours, 5-meter contours, shoreline typology, and slope characteristics. Ultimately, a 30-meter buffer upland of the shoreline was selected. The 30-meter buffer option was selected because of the simplicity with which it adequately covers all shoreline properties.

Objectives

The objectives of the Shoreline DPA are to:

1. Reduce the impact of coastal hazards, such as sea-level rise, storms and flooding on shoreline properties;
2. Avoid the expansion of shoreline hardening measures;
3. Minimize shoreline erosion;
4. Preserve and enhance the visual, ecological, and habitat assets of the shoreline; and
5. Maintain safe public access to recreational areas along the shoreline.

Exemptions

Pursuant to section 488(4) of the *Local Government Act* a development permit is not required in respect of the following.

a. Renovation to interiors; or
b. Small exterior renovations that do not alter existing footprint of the building; or
c. The placement of small impermanent structures such as tables, benches; or
d. Regular and emergency District maintenance activities for drainage control conducted in a manner that is consistent with the objectives of the Development Permit designation; or
e. Construction and maintenance of activities carried out by, or on behalf of, the District, including infrastructure works and works designed to enhance the coexistence of natural habitats and public trails; or
f. Emergency works, including tree cutting, necessary to remove an immediate danger or hazard; or
g. Routine maintenance of the existing landscape conditions provided no removal of vegetation or placement of fill occurs; or
h. Construction of a small accessory building less than ten square meters in size (such as tool shed or gazebo) or addition of an unenclosed balcony, deck or patio not exceeding an area of 20 square meters, provided the construction is located within an existing landscaped area and provide that the proposed structure meets all relevant setbacks; or
i. For any exemptions under this section, the District may require registration of a covenant under section 219 of the Land Title Act in such cases to ensure that development conditions are registered on title, for awareness of future owners, and to ensure long-term compliance with geotechnical or environmental report recommendations.

Guidelines

1.0 Building and Construction Guidelines

The following guidelines are required for buildings and construction processes.

- All occupied areas of buildings will be constructed at an elevation at or greater than the construction level approved by the City Engineer. Non-habitable space uses such as parking, loading, and storage areas may be located below this elevation.
- Locate development to create the least possible impact on the ecology of the shoreline and upland areas and to protect development from coastal hazards such as coastal flooding, wave impacts, and erosion.
- Construction should limit the amount of clearing, grading, and soil disturbance on the site.
- Inert materials[8] must be used in construction.
- Heavy equipment shall not be permitted on beach unless upland access is not possible. Mitigation measures acceptable to the District must be identified.
- Upland fill[9] should be clean and free of debris and contaminated material. Fill and beach nourishment proposals are subject to review and approval.
- Placement of upland fill only where necessary for restoration or enhancement; no removal of sand or other native materials.
- All work should minimize degradation of water quality.
- Stormwater drainage or runoff from rooftops or hard surfaces should not be directed over the edge of a bluff or shore bank and should incorporate water quality/quantity and erosion control features to avoid impacts on slope stability and shoreline habitat.

[8] Materials that do not consist of debris, contaminated or chemically reactive substances that could pollute tidal waters

[9] A deposit of material that could be considered as shoreline modification.

2.0 Shoreline Protection

- All shoreline protection measures must be consistent with the recommendations of a Qualified Coastal Engineer.
- Shoreline protection measures shall be limited to those necessary to prevent damage to existing structures or established uses on adjacent uplands and will only be considered if all options to locate and design without the need for shore protection measures have been exhausted.
- When required, only the softest possible shoreline protection measure (i.e. the softest measures along the continuum of "soft" measures like shoreline nourishment and vegetation-based buffers to "hard" grey protective measures, like sea walls) that will still provide satisfactory protection shall be considered.
- Shoreline protection works will not be allowed for the purpose of extending lawns or gardens, or to provide space for additions to existing structures such as pools or new buildings.
- Shoreline protection measures that will cause erosion or other physical damage to adjacent or down-current properties will not be supported.
- New developments must be designed to minimize the shoreline protection measures required for safe, useable building sites to be created when considering sea level rise over 100-year time horizon, as per the most current Provincial guidelines.
- Natural beach transport processes of erosion and accretion along shorelines should be preserved and left uninterrupted unless no alternative is possible.
- Development of the shoreline area shall not impede public access along the shoreline below the natural boundary.
- All proposed development in the Shoreline DPA is encouraged to follow the guidelines contained in the most current *Greenshores* Guide.[10]

3.0 Vegetation

- Retain natural vegetation within the area 15-meters upland of the HHWM.
- Specify natural features or areas to be preserved, protected, restored or enhanced in QP approval.

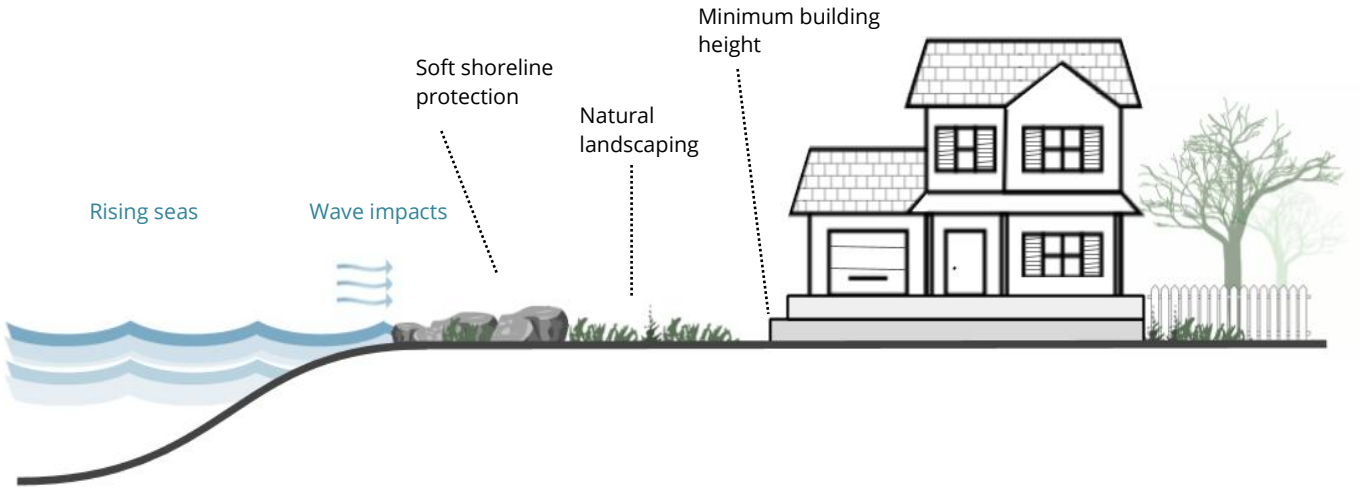
[10] The current guide is the Federal and Provincial Publication *Coastal Shores Stewardship: A Guide for Planners, Builders and Developers, and the Green Shores principles for protecting coastal environments*.

Application

Once the Shoreline Protection (Environmental Protection) DPA is triggered, the applicant must follow the steps detailed below to obtain a Shoreline development permit:

1. Hire a Qualified Professional with experience in assessing marine shoreline impacts (i.e., one of registered professional engineer with experience in geotechnical engineering for geotechnical and coastal processes, and a Registered Professional Biologist for habitat or biological assessment) to complete an assessment report which details how the development will follow the Shoreline Protection development permit guidelines. Relevant ministries outside the municipal jurisdiction, such as the Department of Fisheries and Oceans and the Ministry of Environment must be consulted for any work being done that may affect aquatic habitat.
2. Submit a Coordinated Assessment Strategy Statement which basically states that the coordinating professional has reviewed all the project proposal and has considered the geotechnical, stormwater management, environmental, and civil design considerations and that these do not conflict with each other or our bylaws, design standards, or policies.
3. The Environmental Assessment Report will be reviewed by various departments including, but not limited to the Environmental Section of our Planning Department, the Parks Department, the Building Department, and the Engineering Department. If the recommendations or impact mitigation policies are agreed upon by all parties, then the City will register a covenant and issue the DP.
4. Following the completion of the development project, the QP is required to complete a post-construction report prior to the Planning Department issuing the occupancy permit. The Environment Department must sign off before an occupancy permit is released.

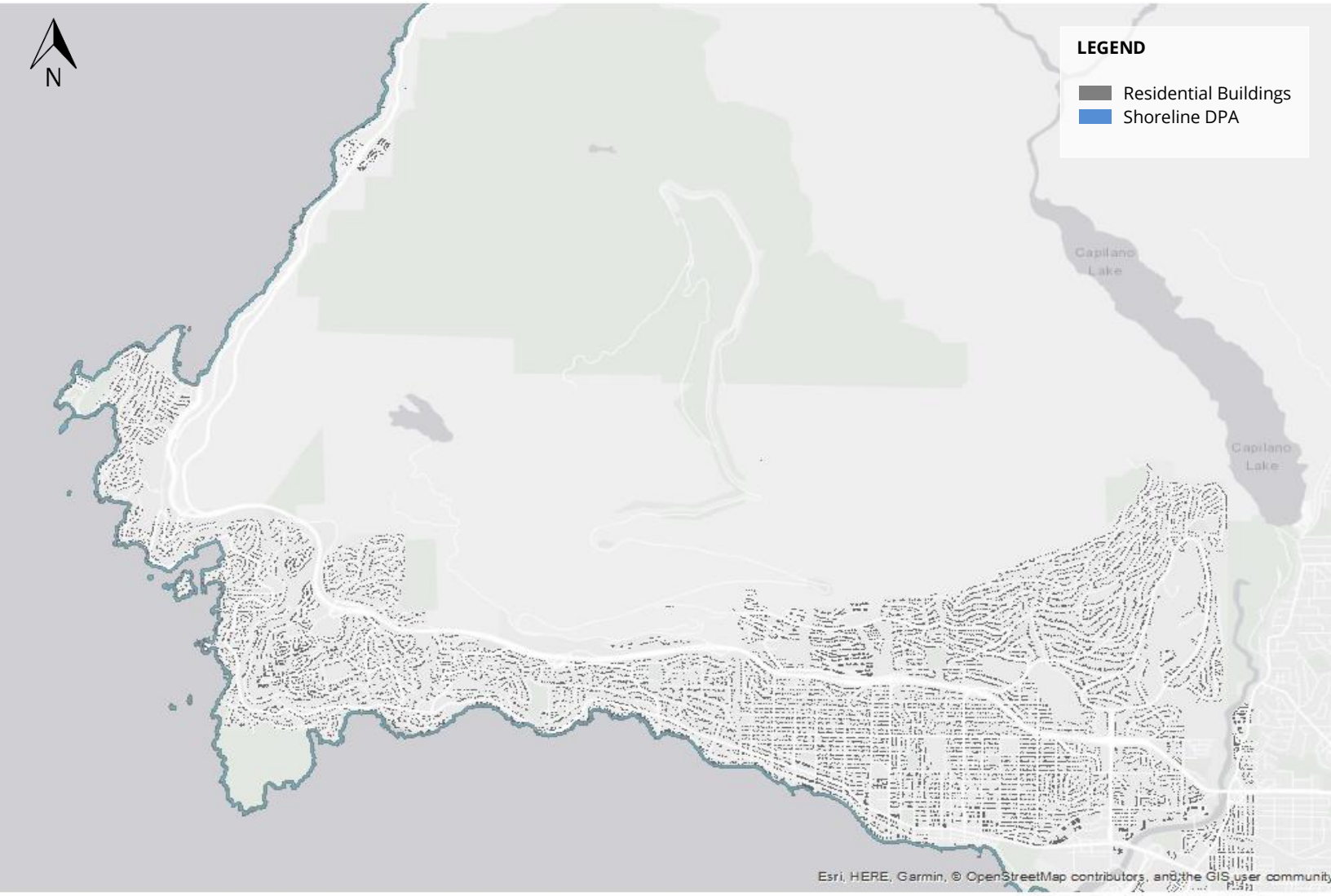
EXHIBIT 11.
ILLUSTRATED SHORELINE DPA GUIDELINES



District of West Vancouver Shoreline DPA Boundaries

The following map outlines the recommended Shoreline DPA Boundaries for the District. Interviews and case study findings suggest that the map incorporate findings from the risk assessment. Thus, this map is to be updated upon completion of a shoreline hazard risk assessment. Which will come from the Sea Level Rise Adaptation Strategy.

EXHIBIT 12.
MAP OF RECOMMENDED SHORELINE DPA BOUNDARIES



Process Diagram

Diagram represents application and approval process for development permit applications without variance. For applications with variance, see Development Variance Permit (DVP) process.

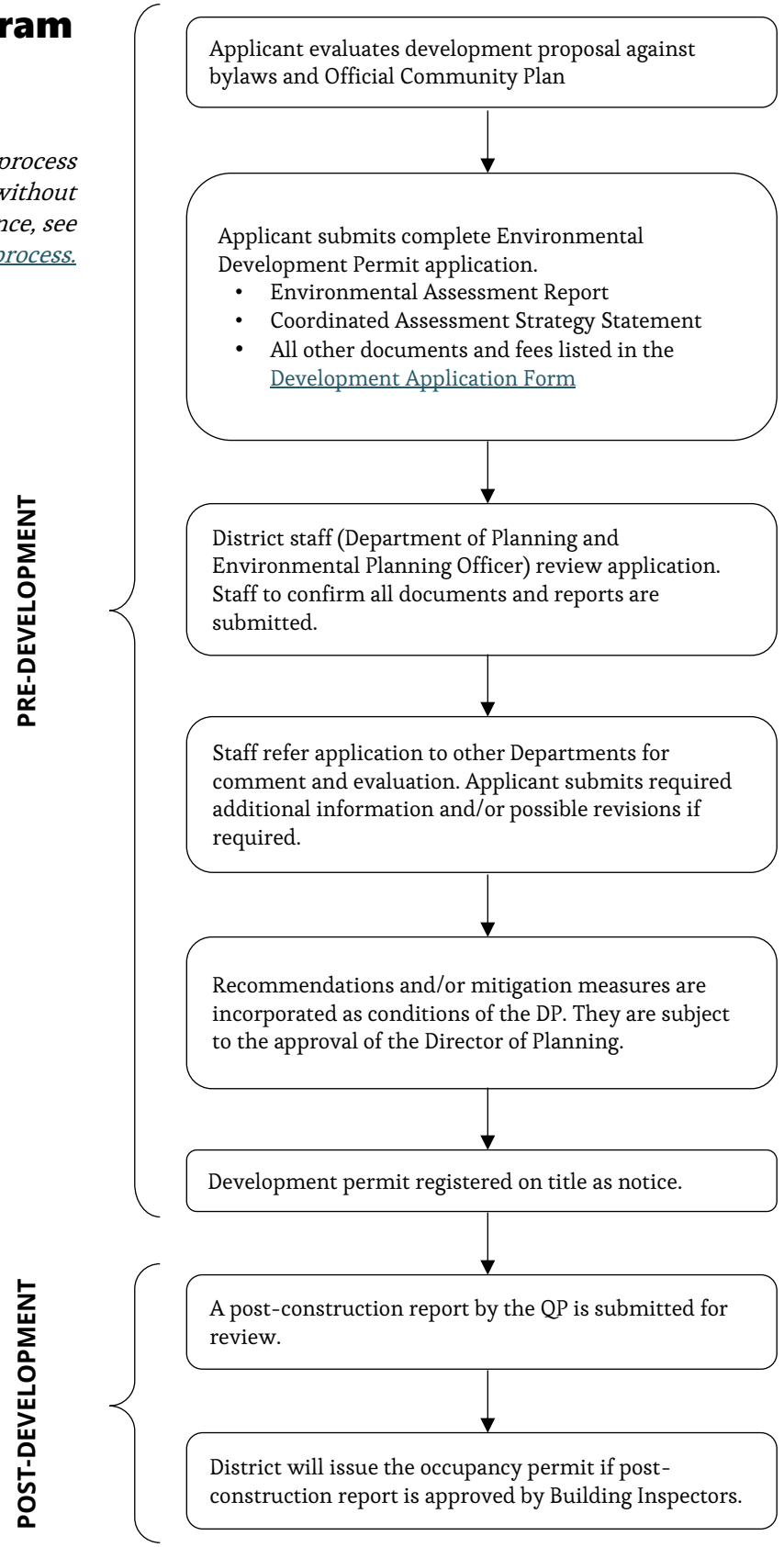


EXHIBIT 13.
SHORELINE PROCESS DIAGRAM

Communications Materials

EXHIBIT 14.
SAMPLE SHORELINE DPA BROCHURE

See Appendix E for full size brochure.

What is a Shoreline DPA?

The Official Community Plan calls for the creation of development permit areas (DPAs) to protect the District from natural hazards like sea-level rise, storm surge, and coastal flooding.

The District's shorelines contain highly valued ecological assets, such as habitats sensitive to human impact on natural shoreline processes. Accordingly, they must be managed to avoid potential negative impact of development. They are particularly sensitive to human activities that disrupt sediment processes, such as seawalls or upland development that is poorly sited, including vegetation clearing for yard areas. Guidelines are intended to bring the shoreline up to current best practice standards.

The Shoreline DPA includes the low-lying areas at risk from coastal hazards and in need of shoreline protection. The DPA applies to existing development undergoing construction projects, but the guidelines strongly recommend that all construction, land alterations, and renovations within the Shoreline DPA adopt mitigative measures.

CONTACT INFORMATION

Background information and the detailed DPA guidelines, exemptions, and maps are available on the District website at:

https://westvancouver.ca/home-building-property/development-applications/other-development/development-permits

Planning & Development Services
750 17th Street
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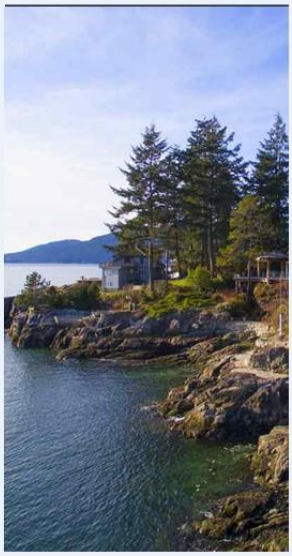
V7V 3T3

604-925-7040

SHORELINE DEVELOPMENT PERMIT AREA



ABOUT

The Shoreline DPA is established to:

1. Reduce the impact of coastal hazards, such as sea-level rise, storms, and flooding on shoreline properties

2. Avoid the expansion of shoreline hardening measures

3. Minimize shoreline erosion

4. Preserve and enhance the visual, ecological, and habitat assets of the shoreline

5. Maintain safe public access to recreational areas along the shoreline

The following is an overview of the guidelines to reduce risk to homes in the Wildfire DPA.

1. Permanent structures should be located as far away from the shoreline.

2. Building design and construction should be generally consistent with the recommendations put forth in the Green Shores Guidelines.

3. Habitable structures should meet minimum height requirements put forth in the provincial regulations for Flood Construction Levels.

4. Landscaping: a vegetation assessment and retention/restoration plan may be required from a Qualified Professional.

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PERMITTING PROCESS

1. If your property is included within one or more DPAs, discuss your proposed work with District staff early in the process. The proposed work may require an assessment by a Qualified Professional (QP) detailing how the project mitigates risk.

2. If more than one DPA is involved, you may be required to appoint a lead professional to coordinate the process.

3. The QP assessment process will identify the most appropriate environmental impact and hazard mitigation measures for your home and property.

4. District staff will review the application in accordance with the DPA guidelines.

5. Following the completion of the development project, the submission of a post-construction report is required prior to occupancy. This report ensures that all necessary wildfire mitigation measures are complete.

Recommendations for the Successful Implementation of a Shoreline DPA

EXHIBIT 15.
FINAL RECOMMENDATIONS AND RATIONALE FOR SHORELINE DPA

	RECOMMENDATIONS AND CONSIDERATIONS	RATIONALE
	Further Technical Work	
1.1.	**Complete a risk assessment** • Identify hazards & vulnerability • Follow Provincial Guidelines for coastal hazard risk assessment • Refer to the Sea Level Rise Adaptation Strategy for North Shore could be based on work conducted so far by the Fraser Basin Council on sea level rise.	A risk assessment identifies coastal hazards and vulnerable areas within the District. The sea level rise risk assessment will come out of the Sea Level Rise Adaptation Strategy. This informs the content and boundaries of a DPA, communication and engagement materials, as well as the appropriate FCL. Best practice is to identify risk prior to development of a Shoreline DPA.
	Development of DPA Content	
2.1.	**Align DPA with risk assessment, other strategies, reports and guidelines** • Align sea level rise protection measures with ongoing initiatives by neighbouring municipalities and NSEM • Refer to the Sea Level Rise Strategy for the North Shore, Fraser Basin Council Vulnerability Assessment, Provincial Guidelines, and *Green Shores* reports	Aligning the DPA allows for information sharing and collaboration with agencies completing similar work.
2.2.	**Develop DPA guidelines with the guidance of qualified professionals** • QPs with experience in shoreline protection and coastal hazards can identify specific needs for vulnerable areas identified in the District	Relying on a QP ensures that scientific expertise informs the DPA guidelines. From the case study analysis, it was found that other municipalities with shoreline DPAs require guidance of QPs.
2.3	**Develop guidelines that allow for flexibility while continuing to prioritize protection of environment, public safety, and property** • Enable flexibility of guidelines, particularly on highly-constrained sites • Maintain enough stringency to visibly protect the shoreline environment, public safety, and property protection.	Interviews indicate that flexible DPA guidelines are more likely to be practical and achievable by homeowners and developers. Flexible, non-prescriptive guidelines can be used to manage the issues brought by highly constrained sites by allowing variances to be applied for such cases.

	Internal Review and Approval Process	
3.1	**Require the submission of an Environmental Impact Mitigation Report and a Coastal Hazard Mitigation Report** • QPs may include a Registered Professional Biologist with experience in habitat assessments or a Registered Professional Engineer with expertise in geotechnical engineering and coastal processes	All municipalities in the analysis were found to require an Environmental Assessment Report to be completed by a QP with experience in assessing marine shoreline impacts and submitted with the original application. Each report ensures that the proposed development follows the guidelines of the Shoreline DP and that the proposed work has a low or moderate coastal risk rating as well as low or moderate environmental impact on the shoreline prior to development approval.
3.2	**Consult relevant government bodies for permit approval if development occurs in an area where aquatic habitat is affected** • May include the Department of Fisheries & Oceans (DFO) and the BC Ministry of Environment	*Green Shores* indicates that compliance with applicable aquatic and environmental legislation may be required for works along the shoreline. Provincial and federal permits may be required, and some activities may be restricted.
3.3	**Require the submission of a Coordinated Assessment Strategy Statement by a QP at the time of the application**	This Statement notes that the coordinating professional has reviewed all of the project proposals and has considered the geotechnical, stormwater management, environmental, and civil design and that these do not conflict with each other or our bylaws, design standards, or policies.
3.4	**If development occurs in an area with overlapping DPAs, appoint a coordinating QP**	DP recommendations should follow the guidelines where the hazard is greater, while following a coordinated QP assessment.
3.5	**Require the completion of a post-construction report and landscaping deposit** • Report should be completed by the same QP that was retained to complete the Environmental Assessment Report • Report will ensure DPA guidelines are met before returning the landscaping deposit • Building Inspectors may need to know that a post-construction report is required prior to issuing an Occupancy Permit	Some municipalities require a post-construction report to be completed prior to obtaining an occupancy permit. Some also require a landscaping deposit to ensure completion of landscaping or other mitigation works to manage environmental damage. The landscaping deposit helps to ensure full compliance with DPA guidelines.
3.6	**Implement an internal approval to increase interdepartmental coordination** • Departments include Engineering, Parks, Building, Environment	As each site and development proposal is unique, the internal process for processing and approving development projects must be coordinated across several departments at the District

	Communication and Engagement	
4.1	**Develop a robust public education program that effectively communicates risk and responsibility related to the DPA to a wide range of stakeholders**	As per interview findings, communication of shoreline risk mitigation and adaptation efforts relevant to the DPA may require a comprehensive public engagement strategy.
4.2	**Consider DPA target audience and respond to their interests, values, and concerns** • Stakeholders include local government, emergency responders, developers and contractors, homeowners, residents, insurance agencies, and environmental groups.	As per Interim Report (2018), these stakeholders hold varied but intersecting roles and interests. The main priorities identified across all stakeholder groups are public safety, protection of structures, and protection of ecological assets.
4.3	**Integrate core communication and engagement principles when communicating DPA content with stakeholders** • Appeal to shared values • Ground conversations in local, relevant, and observable impacts • State the benefits of action • Encourage the community to take on a meaningful role	As per Barisky (2015), the framing and delivery of public education programs around climate change related risks such as sea level rise have a significant impact on residents' willingness to participate and act on these risks. This applies to communicating the importance of DPAs.
4.4	**Communicate the hazard and vulnerability distinct to District of West Vancouver** • Hazard: Area of the District that is along the shoreline or at risk of coastal hazards • Vulnerability: The North Shore is a hazard-prone area. As a result, assets and people are exposed, introducing risk.	As per the OCP, coastal hazards emerge from sea level rise caused by climate change, king tides exacerbated by sea level rise, debris flow from nearby creeks, storm surge from winter storms, coastal erosion from wave impacts and development impacts, and the combination of these hazards. As per best practices for flood risk prevention in the Lower Mainland, seismic hazards ought to be considered.
4.5	**Communicate DPA risk mitigation actions** • To help communities prepare their properties, residents should understand their individual roles and actions to take. • Clarify the division of responsibility over protecting the shoreline and reducing coastal risk. • Facilitate risk reduction through building social capital. • Present adaptation options and trade-offs (i.e. defend, adapt, retreat).	The Planning Department must ensure shoreline protection within the boundaries of the foreshore and at the level of private development. Other jurisdictions are responsible for areas beyond the foreshore or particular aspects involving protection of marine species and habitat (e.g., Ministry of Environment & Department of Fisheries and Oceans) (Stewardship Centre of BC (2014). The Sea Level Rise Adaptation Strategy, which may provide further guidance on coastal risk mitigation and shoreline protection measures.

4.6	**Incorporate visualizations into risk communications strategy** • Possible communication media and materials can include glossy primers and brochures, public art, door-knockers, social media, cartoons, images, and graphics, as well as detailed images that illustrate locational impacts of flooding on homes and assets.	Literature and interview findings convey that visualizations should be used to communicate adaptation options and trade-offs. Refer to best practice examples of visualizations such as City of Vancouver (2018) report, Vancouver's Changing Shoreline; Collaborative for Advanced Landscape Planning's Delta RAC 2.0; District of North Vancouver's Geoweb Hazard Layer; and graphics and videos from the City of Surrey's Coastal Flood Adaptation Strategy to understand effectiveness of visualizations in communicating risk.
4.7	**Incorporate scientific information and lived experience into communications** • Successful communication will link current science such as the IPCC findings and PICS projections, with visible impacts from past events like annual king tides.	As per best practices identified in interviews, scientific information and lived experience are equally valuable for communication of shoreline risk to the public. Incorporating scientific information and lived experiences in communication and engagement programs may increase awareness and inspire stewardship.
4.8	**Consider appropriate use of language for the DPA's risk communications strategy** • Direct discussions and goals in terms of the community health, safety, and livability • Stay high level for homeowners and talk about what it means for them • Use direct language, develop key messages, and stick to a narrative • Avoid the use of alarmist language	As per interview findings, language considerations are a vital aspect of risk communication, especially around sensitive topics such as damage or loss to private property. Using realistic but non-alarmist language assuages fears of the public and acknowledges uncertainties and sensitivities of shoreline risk concerns.
4.9	**Engage with residents at a wide range of events and sessions** • Meet with homeowners face-to-face and on-site to show the specific risks that can affect their home; share evidence that property values are not at risk because of adaptation measures • Provide homeowner associations engagement material to relay to their networks • Provide homeowners with brief informational handouts and letters • Use videos and engaging social media messaging to reach people at their home and be considerate of individuals' time • Time events to coincide with natural events such as king tides	As per interviews, ensure residents are personally prepared and aware of the risks. Host EOC and provide situational awareness across the North Shore and liaise with other levels of government where they need to request support Interviews and best practices advise that risk communications occur at the neighbourhood level.

Conclusion

Project Constraints and Limitations

As the purpose of this project was to conduct preliminary research to inform the development of objectives, guidelines, exemptions, boundaries, internal process, and communications materials of two DPAs, several stakeholders were not interviewed. These include homeowners, residents, recreation users, developers and contractors, insurance companies, and environmental stewardship groups. Moving forward, input from homeowners may be useful to inform communication and engagement principles; input from a QP would guide the content and boundaries of the DPA; input from developers and contractors may provide insight on ways to incentivize homeowners to incorporate voluntary mitigative measures into their property building construction and landscaping design; and input from insurance companies may provide insight into how insurance policies might look for properties that have adapted building and landscaping design to be climate ready.

Wildfire and coastal hazards carry a degree of uncertainty and complexity which can limit the ability to accurately predict their level of associated risk. A variety of factors may influence a specific site's level of risk. Even with the most accurate data and modelling, it is impossible to know for certain when or how an event will occur. For coastal hazards, a wide-range of sea level rise scenarios and respective geographic impacts introduce uncertainty. For wildfires, factors such as lightning or human-caused actions such as illegal campfires or the negligent tossing of cigarette butts can increase risks and uncertainty. These uncertainties limited the ability to create DPA boundaries that represent the exact risk of each property to wildfire or coastal risks. While the maps (see *Exhibit 7 and Exhibit 12*) account for a number of factors in their development, they require further risk analysis prior to their use by the District.

Next Steps

The research findings, DPA parameters, and final recommendations presented in this report are intended to support the District's Planning Department in the implementation of two new DPAs for Wildfire hazardous conditions and Shoreline protection and hazardous conditions. Due to project constraints and limitations, the parameters of each DPA serve as recommendations for the District to follow when implementing these DPAs in the future.

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Appendix A
List of Interviews

EXHIBIT 16.
KEY INFORMANT INTERVIEWS

DATE	ATTENDEE, ORGANIZATION	CORRESPONDENCE	TOPICS DISCUSSED
Stakeholder engagement as part of understanding of key issues and concerns for the District			
Sept 25, 2018	Jim Bailey, David Hawkins, Stina Hanson, DWV	In-person	Project Initiation Meeting; identify project priorities; understand District issues, concerns, and opportunities
Nov 1, 2018	Randy Health and Dave Clark, Fire Department, DWV	In-person	Identify the challenges, risks, and concerns associated with wildfire and other natural emergencies in the District; understand role of public engagement in wildfire risk reduction
Nov 5, 2018	Jim Bailey, DWV	In-person	Site visit of areas vulnerable to sea-level rise and coastal hazards; District issues, concerns, and opportunities
Nov 8, 2018	Michelle McGuire, Maria Maddatu	In-person	Site visit of areas vulnerable to wildfire risk; environmental considerations of DPAs; internal review and approval of EDPAs
Nov 16, 2018	John Chapman and Fiona Dercole, NSEM	In-person	Identify types of natural hazards across the North Shore; coordinated response to natural hazards; communication and engagement principles
Jan 16, 2019	Randy Heath and Dave Clark, Fire Department, DWV	Teleconference	Existing fire prevention practices; communication and engagement requirements
Feb 14, 2019	Michelle McGuire, DWV	Teleconference	Existing EDPA process
Feb 15, 2019	Jesse Montgomery, Metro Vancouver	Teleconference	Insight on vulnerable areas to wildfire risk in Metro Vancouver and specific to the District; First-hand insight on 2018 Whyte Lake Fire

Stakeholder engagement as part of development of DPA content; internal review and approval process; communication and engagement			
Nov 15, 2018	Guy Exley, District of North Vancouver	Teleconference	Development of Wildfire DPA contents, boundaries, and internal process
Jan 14, 2019	Corey Davis, City of Kelowna	Teleconference	Wildfire DPA internal review and approval process
Jan 16, 2019	Michelle Baski, District of Maple Ridge	Email	Wildfire DPA internal review and approval process
Jan 17, 2019	Tiffany Khuu, City of Coquitlam	Email	Wildfire DPA internal review and approval process
Jan 23, 2019	Angela Danyluk, City of Vancouver	Teleconference	City of Vancouver sea level rise community engagement work and guiding principles
Feb 1, 2019	Andrew Hunsberger, City of Kelowna	Teleconference	Wildfire communication and engagement principles and lessons learned
Feb 5, 2019	Chris Osborne, Campbell River	Email	Shoreline DPA internal review and approval process
Feb 5, 2019	Paul Thompson, Regional District of Nanaimo	Email	Shoreline DPA internal review and approval process
Feb 7, 2019	Jason Youmans, Salt Spring Island Trust	Email	Shoreline DPA internal review and approval process
Feb 7, 2019	Fiona Dercole, NSEM	Teleconference	Wildfire communication and engagement principles and lessons learned
Feb 12, 2019	Ian Holl, Sechelt	Email	Shoreline DPA internal review and approval process
Feb 28, 2019	Julie Pavey, District of North Vancouver	Teleconference	Sea Level Rise Adaptation Strategy; DPA internal process

Appendix B
Case Studies Reviewed

EXHIBIT 17.
MUNCIPALITIES AND DPAs REVIEWED

	MUNICIPALITY	PLAN AND/OR BYLAW DEFINING DEVELOPMENT PERMIT AREAS AND GUIDELINES	DATE OF LAST UPDATE
1	City of Campbell River, BC	OCP Schedule "B" Bylaw 3475, DPA 9 - Foreshore Development	2012
2	City of Coquitlam, BC	Citywide OCP Part 4	2017
3	City of Kelowna, BC	City of Kelowna OCP 13.1	2016
4	District of Maple Ridge, BC	OCP Amending Bylaw No. 7101-2014	2014
5	District of North Vancouver, BC	OCP Bylaw 7934: amendment to Bylaw 7900	2011
6	District of Sechelt, BC	OCP Bylaw No. 492, DPA 3 - Marine, Foreshore and Shoreline Areas	2010
7	Regional District of Nanaimo, BC	Electoral Area 'H' OCP Section 8, DPA 4 – Marine Coast	2017
8	Resort Municipality of Whistler, BC	OCP Chapter 13 - Wildfire Protection	2018
9	Salt Spring Island, BC	OCP Bylaw No. 434, E.3 DPA 3 - Shoreline	2008, 2015

EXHIBIT 18.
RELEVANCE OF WILDFIRE DPAs

	High Property Values and Risk of destruction/property loss	Topography, climate or geographical proximity	Access and evacuation constraints, fire management capacity	Coordination of emergency response and guidelines across North Shore
City of Coquitlam	✓	✓		
City of Kelowna	✓		✓	
District of Maple Ridge	✓	✓	✓	
District of North Vancouver	✓	✓	✓	✓
Resort Municipality of Whistler	✓	✓	✓	

EXHIBIT 19.
RELEVANCE OF SHORELINE DPAs

	Risk of destruction/property loss from coastal hazards	Topography, climate or geographical proximity	Ecological assets considerations	Compatibility with best practice guidelines (*Green Shores*)
City of Campbell River	✓	✓		
District of Sechelt	✓	✓	✓	✓
Regional District of Nanaimo	✓		✓	
Salt Spring Island	✓	✓	✓	

Appendix C
Structured Decision-Making Process

The SDM process includes six steps that are used in complex decision-making contexts. These steps are detailed below.

Step 1. Clarify the decision context

Involves defining the problem being addressed and why, as well as identifying the stakeholders and how they should be involved or considered in the decision-making process.

As stated by municipal planning staff at the District, the implementation of the Wildfire DPA and Shoreline DPA will affect redevelopment of existing properties as well as any new development that included in the proposed area.

In a multi-stakeholder decision context, it is crucial to understand how stakeholder interests align or compete with one another. Stakeholders we have identified in this project include local government, emergency responders, developers, homeowners, current residents, insurance agencies, and environmental stewardship groups. As presented in the Interim Report (December 2018), these stakeholders all hold varied but intersecting roles and interests. The main priorities identified across all stakeholder groups are public safety, protection of structures, and protection and conservation of ecological assets. These priorities helped define the objectives of each DPA.

Step 2. Define objectives and evaluation criteria

Involves defining "what matters" about the decision and becomes the framework for comparing options.

The objectives of each DPA were developed based on information gathered through stakeholder engagement with District staff and through a comparative analysis of the objectives presented in the case studies.

The objectives of the Wildfire DPA are to:

1. Prevent personal injury;
2. Protect structures from damage and property loss; and
3. Conserve or protect natural environment and ecological assets.

The objectives of the Shoreline DPA are to:

1. Reduce the impact of coastal hazards, such as sea-level rise, storms and flooding on shoreline properties;
2. Avoid the expansion of shoreline hardening measures;
3. Minimize shoreline erosion;
4. Preserve and enhance the visual, ecological, and habitat assets of the shoreline; and
5. Maintain safe public access to recreational areas along the shoreline.

Steps 3 and 4. Develop options and estimate consequences

Requires developing a range of options to address the objectives developed and the performance of each option to be estimated in terms of the evaluation criteria developed in Step 2.

EXHIBIT 20.
WILDFIRE DPA MAPPING OPTIONS

	Minimize personal injury	Minimize risk of damage to structures and property loss	Minimize risk and spread of wildfires	Maximize visual, ecological, and habitat assets
Status Quo Do not implement Wildfire Hazardous Conditions DPA	1	2	1	5
Option 1 Guidelines apply to properties directly adjacent to wildfire interface	3	4	3	5
Option 2 Guidelines apply to properties within 200 meters of wildfire interface	5	5	5	3
Option 3 Guidelines are written to apply to 2 zones: 1) high risk area 2) moderate risk	4	4	4	4

EXHIBIT 21.
SHORELINE DPA MAPPING OPTIONS

	Minimize impact of coastal hazards	Minimize shoreline erosion	Maximize visual, ecological, and habitat assets	Maximize safe public access to recreational areas
Status Quo Do not implement Shoreline DPA	1.5	2	2	2
Option 1 10 m upland of the present natural boundary	2	3	2	2.5
Option 2 Applies to all land and water areas extending 15 metres upland of the HHMW to 15 metres below low tide	3	4	3.5	3.5
Option 3 Applies to all lands 30 metres upland from the present natural boundary	4.5	5	4.5	4

Step 5. Evaluate trade-offs and select

Requires evaluating preferences for each option case study to select which option should be adopted.

Each option meets the Wildfire DPA objectives to a varying degree. Option 1 applies to the fewest number properties and would maximize the visual, ecological, and habitat assets of the forest to the greatest extent. Option 2 applies a standard set of guidelines to the largest number properties and would minimize personal injury, the risk of damage to properties, and the risk of spread of wildfires to the greatest extent. Option 3 applies to the same number of properties as Option 2 but applies the guidelines based on high or moderate risk and balances all four evaluation criteria.

With a larger Shoreline DPA boundary, there is potentially less flexibility & space on a property to make alterations. A homeowner may have limited aesthetic adjustments (e.g., expanding an outdoor deck, removing trees). Additionally, a homeowner might have to raise their home (thus affecting neighbours' views). Whereas with a smaller setback, there would be more leeway on the property, as well as fewer properties covered by the DPA overall. Long-term protection of property, ecological assets, and shoreline erosion prevention are another area where there are potential trade-offs. With a larger DPA boundary, it is more likely that ecological assets will be protected from structures and activities on a property or their spillover effects. More homes might be required to undertake redevelopment procedures that encourage "Green Shores" principles; thus, shoreline softening is more likely to occur and over time.

Based on the SDM process, the content and guidelines for each DPA are written based on the area identified in option 3 as these options are seen to meet the objectives.

Step 6. Implement and monitor

Requires identifying mechanisms for implementation and monitoring of the decision.

Beyond the scope of this project.

Appendix D
Key Research Findings

There are four main components of a complete DPA: to identify hazards and determine the boundaries accordingly; to develop building, landscaping, and site considerations that mitigate climate risks; a review and approval process for development permit applications; and communication and engagement materials to communicate how each DPA impacts stakeholders like homeowners and developers.

Hazard Mapping

Current efforts are underway in the District to identify wildfire and coastal risks. With varying terrain types and sea level projections across the coast, complex factors involved in the fate and trajectory of wildfires, and limited mapping resources, the proposed DPA boundary areas do not convey the true extent of risk in the District.

It was found that all Wildfire DPAs analysed were developed following the completion of a CWPP. In order to develop more accurate boundaries for the DPA maps, a risk assessment of both the coastal and wildfire hazards in the District is strongly advised.

Building, landscaping, and site consideration guidelines

It was found through interviews with municipalities that building, landscaping, and site consideration guidelines should be developed in consultation with a QP and municipal planners. Such collaboration will ensure that the guidelines accurately reflect wildfire and coastal risks that were identified following the completion of a risk assessment.

Interview findings suggest that the DNV Wildfire DPA is considered to be well developed, and a model of 'best practice' for other municipalities developing DPAs in the region. Keeping in mind that wildfires know no jurisdictional boundaries, it is important that the building design and landscaping requirements for the District's Wildfire DPA be somewhat aligned with those of DNV. This will also ensure consistency for emergency responders coordinating efforts across the North Shore.

While many Wildfire DP guidelines references *FireSmart* principles, it is important to keep in mind that *FireSmart* principles were developed in the context of an interior B.C. and Alberta climate. Consequently, some of the guidelines such as landscaping requirements may not be best practice in the context of coastal B.C. At the same time, there are no fire-related building codes developed for a coastal climate, and *FireSmart* remains the Canada-wide standard.

Internal review and approval process

Each DP application has unique site characteristics and QP findings, so the internal review and approval process should be referred to the appropriate departments as required. In various interviews, municipal planners noted that requiring both an assessment report at the time of application and a post-construction report prior to being granted occupancy help ensure that the original planned development is consistent with the final built project.

The purpose of requiring the risk assessment report at the time of application is to ensure that the proposed development follows the requirements of the Hazardous Condition development permit, and that the proposed work has a low to moderate risk rating prior to the approval of the development project. The purpose of the post-construction report is to improve inter-departmental communication throughout the entire development process and ultimately, to ensure that occupancy is not permitted until the development project has been completed to the recommendations of the initial Assessment Report.

Where a DP application is in an area of two or more overlapping DPAs, it was found to be best practice to require a coordinated assessment strategy to address the multiple hazards together.

Communication and engagement

Literature and interview findings suggest that homeowners may be hesitant to adopt building design and landscaping measures for several reasons:

- They may experience cognitive dissonance, in which they become psychologically discomforted by the idea that wildfires and coastal hazards could threaten their own life safety and property
- They may not think it is their responsibility
- They may think that prevention measures would not make a difference
- They may assume that prevention measures are too time-consuming or costly
- They may be resistant to imposed requirements that dictate building design and landscaping to their homes

To address these barriers, it is important to communicate that mitigative actions can help make a difference in the homeowner's community. Further, as DPAs cannot enforce mitigative measures unless the development project triggers the DPA, there should be an emphasis on voluntary measures that homeowners may consider beyond those required in the DPA.

The framing and delivery of climate change messages have been shown to have a tremendous impact on the ability and willingness of residents to process, accept and act on climate change (Barisky 2015). Any communications and engagement program for climate change related topics should consider the following four principles:

1. **Connecting to Shared Values.** Effective climate change conversations appeal to shared values. This can be accomplished by knowing target audiences and connecting to their values such as preparedness, prevention, and responsibility.
2. **Local, Relevant, Observable Impacts.** Climate change conversations must be grounded in local, relevant, and observable impacts. As such, public engagement needs to address the question, what does this mean for me? Visualizing impacts such as previous wildfire events in the District and highlighting personal experiences where preventative measures like building design and landscaping has helped mitigate hazards, vulnerabilities, and risks.
3. **Focus on Solutions.** Clearly state the benefits of action and focus on solutions. Effective communication that focuses on solutions and builds confidence in the public that climate change can be addresses. This requires framing the discussion around practical and achievable actions and developing an ongoing connection to homeowners through different channels of communications such as neighbourhood meetings, brochures, door hangers, personalized assessments by the Fire Department, etc.
4. **Give Community Members Meaningful Roles.** The community must have an opportunity to take on a meaningful role. It is important to hold conversations around actionable ideas that people can adopt in their everyday lives, both individually and within their communities. When action is framed as a group challenge, it makes these actions more achievable.

Additionally, collaboration in communication and engagement programs with surrounding municipalities such as the District and City of North Vancouver was considered to be beneficial. It is able to emphasize key successes from a neighbouring DPA that provides further support and impetus to the importance of a Wildfire and Shoreline DPA in West Vancouver.

Additional Findings

Coordination with other municipalities and the Province

It was found that addressing wildfire and coastal risks cannot be done by the District alone. Some effort should be made to work closely with Metro Vancouver and the Province to identify, document, and address hazards such as fuel types within the District's boundary and neighbourhoods. Fuel treatment programs, for example, may need to be coordinated with the provincial government and other local governments in Metro Vancouver based on jurisdiction.

As the North Shore's population continues to grow and more homes are developed in or around heavily forested areas, the risk of wildfires increases. This risk can threaten personal safety and property damage or loss. Ultimately, fires know no geographical nor jurisdictional boundaries, so coordinated efforts across the North Shore allow for better maintenance and allocation of emergency supplies and responders. Interviews with staff at NSEM and emergency responders at the District, emphasize the need to provide continuity between the guidelines developed for the Wildfire DPA in the District and DNV.

Appendix E
Wildfire and Shoreline DPA Brochures

The following brochures were developed with the intent to provide residents undergoing development projects on their properties with an overview of the purpose of each DPA, high-level guidelines, and the permitting process.

See following spreads.

What is a Wildfire DPA?

The Official Community Plan calls for the creation of development permit areas (DPAs) to protect the District from natural hazards like wildfire risk.

The District has experienced wildfires like the Whyte Lake Fire in August 2018 that caused closures of trails and air quality advisories. With more frequent summer droughts and an increasing number of hot days, wildfire risk is real and can impact our forested areas and neighbourhoods.

A Wildfire DPA is adopted as a means of reducing the risk of fire spreading in a community. It includes the forests at risk of wildfire and the adjacent properties when undergoing redevelopment projects. The guidelines regulate building materials like roofing, exterior walls and decking as well as the type and location of landscaping around homes that are most vulnerable to fire.

Wildfire DPAs have been adopted in surrounding municipalities like the District of North Vancouver.

CONTACT INFORMATION

Background information and the detailed DPA guidelines, exemptions, and maps are available on the District website at:

https://westvancouver.ca/home-building-property/development-applications/other-development/development-permits

Planning & Development Services
750 17th Street
West Vancouver BC
V7V 3T3

604-925-7040

WILDFIRE DEVELOPMENT PERMIT AREA

Helping homeowners adopt fire smart building and landscaping in West Vancouver

ABOUT

The Wildfire DPA is established to:

1. Prevent personal injury

2. Protect structures from damage and property loss

3. Conserve or protect the natural environment and ecological assets

The following is an overview of the guidelines to reduce risk to homes in the Wildfire DPA.

1. Fire resistive materials should be used for roofs, decks, porches, and exterior walls.

2. Eaves and vents should be screened and spark arrestors should be installed on chimneys.

3. Windows with tempered or double-glazed glass.

4. Landscaping, particularly within 10 meters of the main structure, should be designed and maintained to minimize debris.

5. Ladder fuels on trees within 30 meters of your home should be thinned.

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PERMITTING PROCESS

1. If your property is included within one or more DPAs, discuss your proposed work with District staff early in the process. The proposed work may require an assessment by a Qualified Professional (QP) detailing how the project mitigates risk.

2. If more than one DPA is involved, you may be required to appoint a lead professional to coordinate the process.

3. The QP assessment process will identify the most appropriate fire mitigation measures for your home and property.

4. District staff will review the application in accordance with the DPA guidelines.

5. Following the completion of the development project, the submission of a post-construction report is required prior to occupancy. This report ensures that all necessary wildfire mitigation measures are complete.

SHORELINE DEVELOPMENT PERMIT AREA

What is a Shoreline DPA?

The Official Community Plan calls for the creation of development permit areas (DPAs) to protect the District from natural hazards like sea-level rise, storm surge, and coastal flooding.

The District's shorelines contain highly valued ecological assets, such as habitats sensitive to human impact on natural shoreline processes. Accordingly, they must be managed to avoid potential negative impact of development. They are particularly sensitive to human activities that disrupt sediment processes, such as seawalls or upland development that is poorly sited, including vegetation clearing for yard areas. Guidelines are intended to bring the shoreline up to current best practice standards.

The Shoreline DPA includes the low-lying areas at risk from coastal hazards and in need of shoreline protection. The DPA applies to existing development undergoing construction projects, but the guidelines strongly recommend that all construction, land alterations, and renovations within the Shoreline DPA adopt mitigative measures.

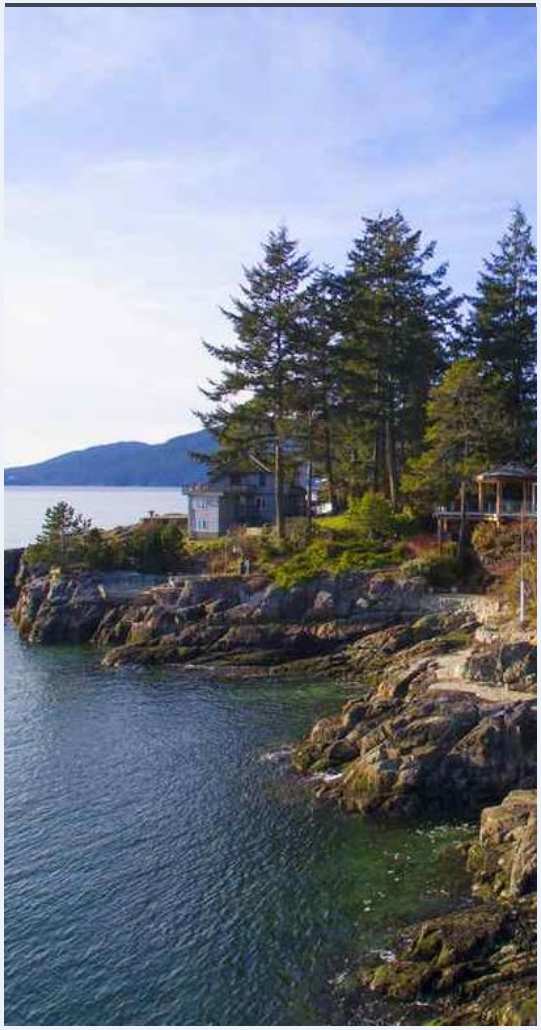
CONTACT INFORMATION

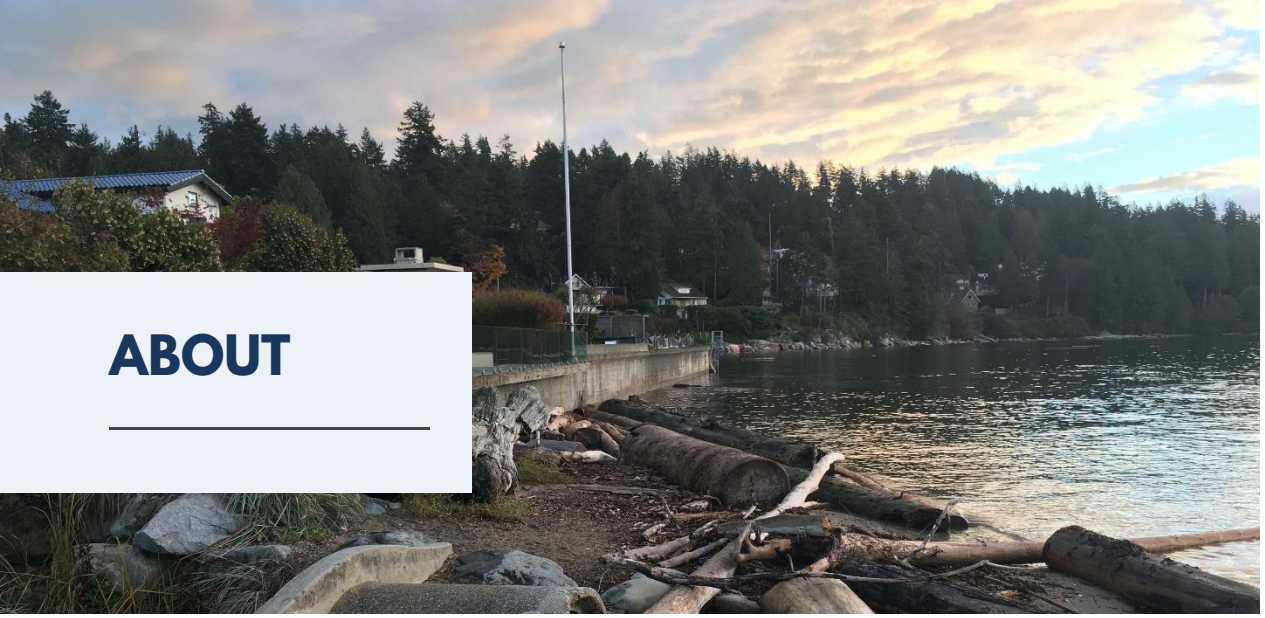
Background information and the detailed DPA guidelines, exemptions, and maps are available on the District website at:

https://westvancouver.ca/home-building-property/development-applications/other-development/development-permits

Planning & Development Services
750 17th Street
West Vancouver BC
V7V 3T3

604-925-7040





ABOUT

The Shoreline DPA is established to:

1. Reduce the impact of coastal hazards, such as sea-level rise, storms, and flooding on shoreline properties

2. Avoid the expansion of shoreline hardening measures

3. Minimize shoreline erosion

4. Preserve and enhance the visual, ecological, and habitat assets of the shoreline

5. Maintain safe public access to recreational areas along the shoreline

The following is an overview of the guidelines to reduce risk to homes in the Wildfire DPA.

1. Permanent structures should be located as far away from the shoreline.

2. Building design and construction should be generally consistent with the recommendations put forth in the Green Shores Guidelines.

3. Habitable structures should meet minimum height requirements put forth in the provincial regulations for Flood Construction Levels.

4. Landscaping: a vegetation assessment and retention/restoration plan may be required from a Qualified Professional.

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PERMITTING PROCESS

1. If your property is included within one or more DPAs, discuss your proposed work with District staff early in the process. The proposed work may require an assessment by a Qualified Professional (QP) detailing how the project mitigates risk.

2. If more than one DPA is involved, you may be required to appoint a lead professional to coordinate the process.

3. The QP assessment process will identify the most appropriate environmental impact and hazard mitigation measures for your home and property.

4. District staff will review the application in accordance with the DPA guidelines.

5. Following the completion of the development project, the submission of a post-construction report is required prior to occupancy. This report ensures that all necessary wildfire mitigation measures are complete.