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Coquitlam

For Committee

February 17, 2015
Our File: 13-6480-20/02-12/1
Doc #: 1888694.v1

To: City Manager
From: General Manager Planning and Development

Subject: **Northwest Burke Vision – Project Update**

For: **Council-in-Committee**

Recommendation:

That Council-in-Committee receive the report of the General Manager Planning and Development, entitled "Northwest Burke Vision – Project Update" dated February 17, 2015 and the attached 'Northwest Burke Vision – Constraints and Opportunities Report' for information and feedback prior to initiating public consultation regarding the 'Constraints and Opportunities Report'.

Report Purpose:

This report summarizes the Northwest Burke Vision constraints and opportunities analysis for Council's information and feedback. The constraints and opportunities analysis is background research that will provide guidance for developing land use, access and utility serving concepts for the Northwest Burke Vision area.

Strategic Goal:

This report supports the strategic goals of strengthening neighbourhoods and achieving excellence in governance.

Executive Summary:

The Northwest Burke Vision (the Vision) is a 2015 Business Plan 'A' priority for the Planning and Development Department, and once complete, the Vision will provide a high-level land use and servicing concept and a phasing plan that will provide general guidance for the study area for future planning and development over the long term (30+ years). A key deliverable for Phase 1 of the Vision process is the Constraints and Opportunities Report, which identifies the physical and environmental constraints for the Vision area plus sets out key opportunities based on an initial, high level landscape assessment to assist in the future planning of this area of Burke Mountain. Following Council feedback on the constraints and opportunities assessment, staff will consult with the Project Advisory Group, the Property Owners Group, and the general public, and report back to Council on input received.

PWS

Background:

Northwest Burke Vision Development Process

The City of Coquitlam is planning for potential future growth in one of the last significant 'greenfield' areas in Coquitlam, referred to as the Northwest Burke Vision (NBV) area. On February 24, 2014, Council endorsed a planning process and directed staff to prepare a Vision for the Northwest Burke area which encompasses nearly 400 hectares of largely undeveloped lands on Burke Mountain in northeast Coquitlam (Attachment 1, Location Map).

Similar to the Transit-Oriented Development Strategy (TDS), the Vision is intended to be an overarching policy document that guides further land use planning (e.g., a neighbourhood plan and Official Community Plan amendments) over the next 30 years and beyond in a measured and systematic manner. The objectives of the Vision are to identify generalized land uses (including a preliminary consideration of the related, necessary public facilities), access and utility servicing concepts, as well as a high-level phasing plan to guide the timing of future planning and development.

The Vision is being prepared through a three-phase process:

Phase 1: the development of a high-level understanding of the area's topographical, geotechnical and environmental constraints and opportunities;

Phase 2: using the results of Phase 1, identification of potential land use, related public facility needs, access and utility servicing ideas and options; and

Phase 3: the synthesis of the technical outcomes and public feedback gathered during Phases 1 and 2 into a draft Vision document.

The Vision project is currently in Phase 1 of the process. Following Council feedback and direction, Phase 1 is intended to conclude with public consultation events scheduled for late March/early April 2015.

Public Consultation

Each phase of the visioning process includes holding public consultations with four specific groups: the Property Owners Group (POG), the Project Advisory Group (PAG), committees/external agencies and the general public. As well, input and feedback from the broader public will be gathered through public information sessions. At the conclusion of each phase, the public consultation feedback will be reported back to Council.

Background: cont'd/

Public Consultation cont'd/

To date, public consultation through Phase 1has included the following:

Workshops:

- A workshop with the Property Owners Group on June 7, 2014 to discuss the project scope, schedule and any initial ideas and aspirations (27 owners attended, representing 90% of the privately held land); and
- City staff participation and input to a Pinecone Burke Provincial Park Management Plan workshop (November 6, 2014).

Meetings:

- A meeting with the Project Advisory Group on June 26, 2014 to discuss the project scope, schedule and any initial considerations (members include the Burke Mountain Naturalists, Northeast Ratepayers, School District #43 and Urban Development Institute). A site tour of the NBV area was also conducted in August;
- Meeting with and attending several of the Coquitlam River Watershed Roundtable workshops; and
- Meeting with the City's Sustainability and Environmental Advisory Committee.

Discussion/Analysis:

The Northwest Burke Vision – Constraints and Opportunities Report ('C&O Report') is the key deliverable of Phase 1 (Attachment 2). The purpose of the report is to set out the physical and environmental constraints for potential, future urban development and to identify key opportunities provided by the landscape, such as view potential and green space areas. The C&O Report is a 'foundational piece' that will provide direction to the land use, access and utility servicing ideas and options that will be analyzed as part of Phase 2.

Structure of the C&O Report

The report is structured in two parts. Part one provides a contextual introduction to the NBV area, defines the purpose of the report and explains the assessment approach undertaken. Part two provides an overview and discussion of the constraints and opportunities related to eleven Sub Areas.

Assessment Approach

In order to gain an understanding of the constraints and opportunities of the NBV area, eleven geographical Sub Areas were identified as defined by land features such as topography and watercourses (Attachment 2, page 9). The assessment approach used to analyze the environmental characteristics of each Sub Area included:

- Slope conditions;
- Projected debris flows and debris runout areas;
- Floodplain areas;
- Rivers, streams and riparian areas; and
- Wildlife and species at risk.

Discussion/Analysis: cont'd/

Public Consultation cont'd/

This assessment was conducted through advanced geographical information systems (GIS) analysis, technical desk top reviews, and very preliminary field work. The review is high-level, relying on existing data sources.

Key Findings

At a high level, the C&O analysis reveals that there is roughly 380 hectares of land in the Vision Area and of this, approximately 102 (low range) to 144 (high range) hectares is potentially developable, with the remaining lands due to various factors and challenges, recommended to be left in a natural state. Each of the Sub Areas has a distinct set of constraints and opportunities that will need to be considered for the next phase preparation of generalized land use and access and utility servicing concepts for the Vision area. Further analysis and refinement of the development potential in the Vision area will occur in Phase 2, which may result in refinements to the projected developable land area range. The key findings of the C&O assessment are highlighted below.

Key Constraints

Slopes

- Although much of the Vision area is characterized by steep terrain, particular Sub Areas (SS1, SS2, and sections of 'A', 'E' and 'F') contain exceedingly steep and unstable slopes, defined as slopes that exceed 24 degrees (45%) which are prone to landslide events;
- In accordance with Coquitlam's Zoning Bylaw, development is not to be located on such steep and unstable slopes because these, as well as lands above them (on the 'crest'), are potentially disposed to bank failure, leading to debris runout areas forming at the bottom ('toe') of the slopes. This poses challenges to future development along both the top and bottom of these steep and unstable slopes; and
- The Zoning Bylaw also requires setbacks at the top and bottom of steep slope areas (i.e., greater than 20 degrees), but these may not fully address the degree of slope instability and extent of debris runout in some areas. Future geotechnical assessment will therefore be required as part of future neighbourhood planning and site development.

Discussion/Analysis: cont'd/

Key Findings cont'd/

Key Constraints cont'd/

River and Streams

- The Coquitlam River and numerous streams have been identified within the study area, using existing high-resolution mapping and other environmental data. Based on this initial, high-level review and consistent with the Riparian Areas Regulation (RAR) in the City's Zoning Bylaw, a preliminary 'setback' or streamside protection and enhancement areas (SPEA), for overview planning purposes, has been identified by the environmental consultant and is measured at 30 metres from the top-of-bank for the Coquitlam River and 15 metres for all other streams; and
- The ultimate watercourse setbacks in the Vision area would be determined as part of future neighbourhood and site development planning, as per the RAR, following more detailed environmental data collection and analysis and a field assessment by a qualified environmental professional (QEP), who would determine the final SPEA.

Utilities

- The routing of utility services will be challenging in the NBV area given the steep terrain, presence of some unstable slopes, and the location of the Coquitlam River and numerous other streams; and
- Portions of the Vision area are outside the Greater Vancouver Sewerage and Drainage District. In addition, portions of study area are outside the current water pressure zone (i.e., above the 320 metre elevation).

Access

- It will be difficult to provide transportation network layouts with road gradients that comply with the City's bylaw standards (a maximum 12% grade for Collector and Local streets) in certain portions of Sub Areas with steep terrain (Sub Areas C, D, E, F and G); and
- Even in cases where there are some smaller, potential development pockets, road access may be difficult given challenging surrounding terrain. In such cases, there may be implications for development costs.

Key Opportunities

Slopes

- The mature forest cover across portions of the study area provide environments for natural area preservation and outdoor recreation and contribute to slope stabilization along the steep slopes of Sub Areas SS1 and SS2; and
- Nearly all of the Sub Areas in the eastern portion of the Vision area have good south-facing view potential.

Discussion/Analysis: cont'd/

Key Findings cont'd/

Key Opportunities cont'd/

River and Streams

- Key watercourses in the Vision area include the Coquitlam River, one of the largest and most significant rivers in the region, as well as numerous streams; and
- A future SPEA along the Coquitlam River and the many streams provide key opportunities to contribute to the aesthetic and ecological character of the area.

Utilities

- Development can incorporate rainwater management features to properly sustain water quality and the rate of runoff in nearby streams.

Access

- Lands in several of the Sub Areas are adjacent to Pinecone Burke Provincial Park and may provide potential opportunities to improve park access and the integration and connection of hiking and off-road cycling trail networks.

Next Steps:

Phase 1 – Public Consultation

Following Council's feedback and direction, the C&O Report will be presented in late March / early April 2015 at a:

- Meeting with the Project Advisory Group;
- Workshop with the Property Owners Group; and
- Public Open House (referred to as a 'Community Information Session').

Staff will also continue discussions with the Coquitlam River Watershed Roundtable and the Ministry of Environment, which is currently preparing a Management Plan for the Pinecone Burke Provincial Park, along with other key groups.

Phase 2 – Ideas and Options

Using the results of Phase 1, Phase 2 will focus on the drafting of land use, general community facility, access and utility servicing ideas and options that build upon the constraints and opportunities assessment, and will also be further supplemented by a housing market study, a financial feasibility analysis and other technical studies, such as a wildfire risk assessment. Once a draft of that material is prepared, staff will report back to Council on the outcomes of the ideas and options and, pending feedback and direction, will conduct Phase 2 public consultation events with the POG, the PAG, committees/external agencies and the general public.

Financial Implications:

The NBV is identified as a key part of the Planning and Development Department's 2015 work plan resourced within existing budgets.

Conclusion:

The Vision, a key 2015 Business Plan priority, will provide a high-level land use and servicing concept and a phasing plan that will guide future planning and development over 30+ years. The C&O assessment, a key deliverable for Phase 1 of the Vision process, provides a foundation for the preparation of land use (including a preliminary consideration of related, necessary public facilities), access and utility servicing concepts in Phase 2. This assessment determined that there is approximately 102 (low range) to 144 (high range) hectares of potentially developable land in the Vision area. Further analysis and refinement of the development potential in the Vision area will occur in Phase 2, which may result in refinements to the developable range.

J.L. McIntyre, MCIP, RPP

RN/ms

Attachments:

1. Northwest Burke Location Map (Doc# 1916278)
2. Northwest Burke Vision – Constraints & Opportunities Report (Doc# 1916280)

This report was prepared by Russell Nelson, Community Planner, Kasia Biegun, Planner I, and reviewed by Steve Gauley, Acting Manager Community Planning.

Northwest Burke Vision

Opportunities and Constraints

Council-in-Committee | March 2, 2015

Doc#1918965 v2

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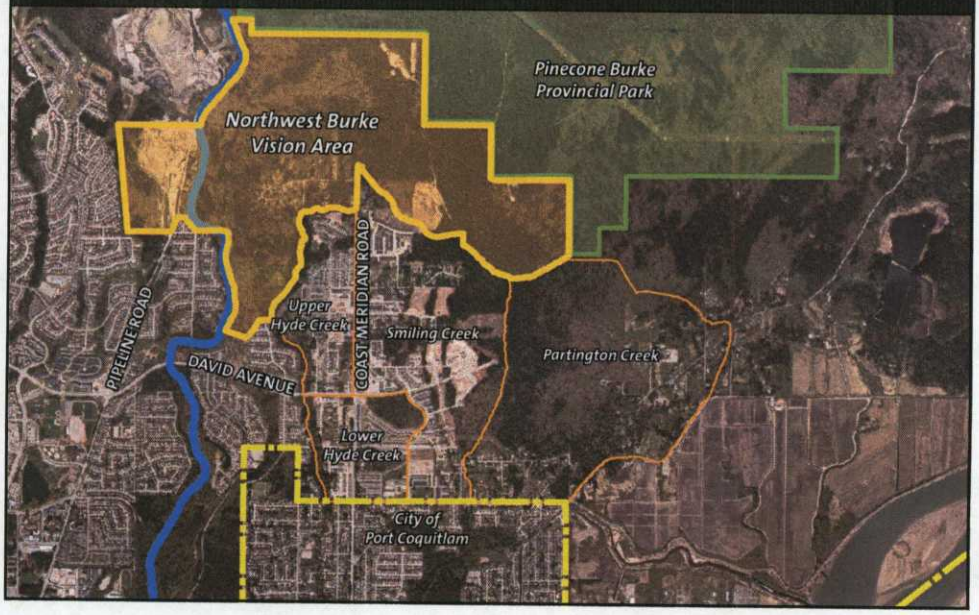
Northwest Burke Vision Area



Purpose & Objectives

To develop a vision for the Northwest Burke Area that will guide future planning and development.

Objectives

- Generalized land uses
- Access
- Utility servicing concepts
- Identify environmentally sensitive areas
- High-level phasing plan
- Broad identification of needed public facilities

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Process & Consultation

Phase 1

- Context and background research
- Public consultation (PAG, POG & Info Session #1)

Phase 2

- Ideas and options
- Public consultation (PAG, POG & Info Session #2)

Phase 3

- Final draft vision
- Public consultation (PAG, POG & Info Session #3)

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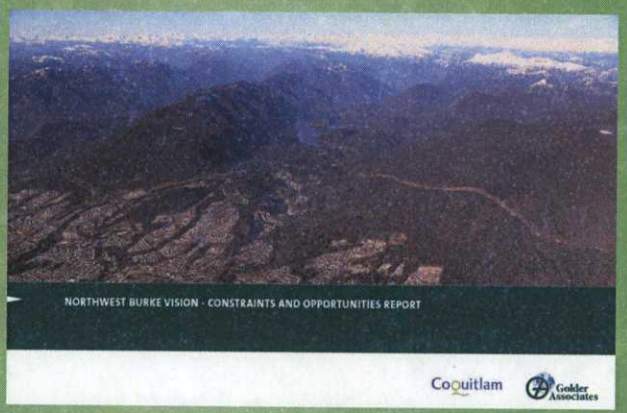
Constraints & Opportunities Report

Report provides technical foundation for:

Land use planning

Utility servicing

Access analysis



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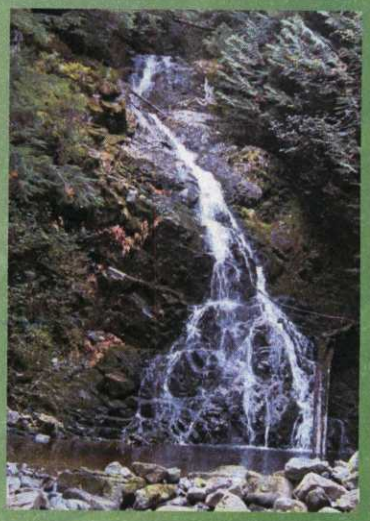
Approach

High-level analyses of:

- Slope conditions
- Debris flow and debris runout areas
- Floodplain areas
- Watercourses
- Forested areas
- Wildlife and species at risk



Approach – con't

Analyses conducted using:

- Technical desk top reviews
- Geographical information systems (GIS) analyses
- Very preliminary field work
- LiDAR (high resolution mapping technology)
- Existing Provincial & City data sources

Further analyses will be required at the Neighbourhood Plan/ development application stages

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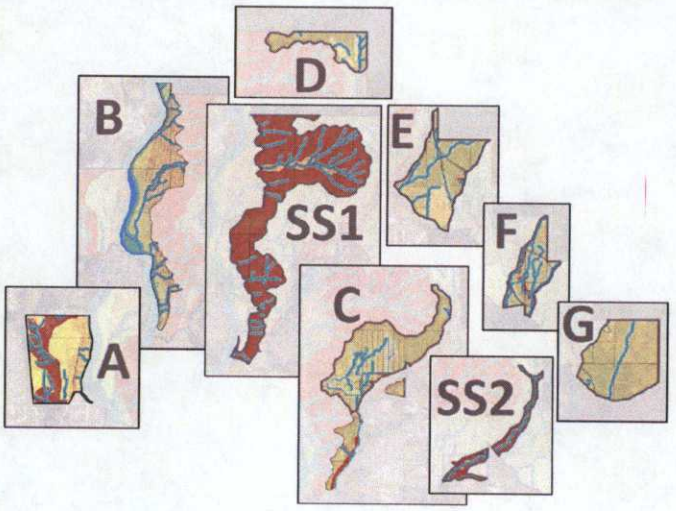
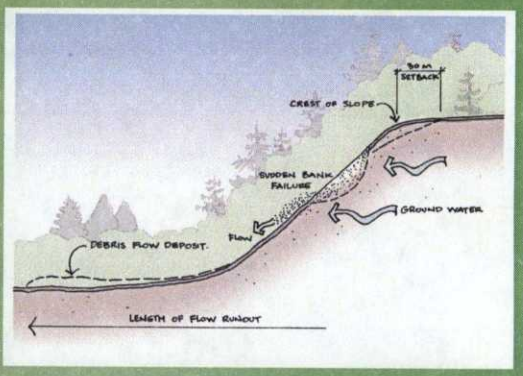
Sub Areas



Key Findings: Constraints

Slopes

- Steep and unstable slopes > 24 degrees (45%) (SS1, SS2, A, E & F)
- These slopes prone to bank failure
- Require setback for slopes > 20 degrees to address debris runout areas (A, B, SS1 & SS2)



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Key Findings: Opportunities

Slopes

- Natural area preservation
- Outdoor recreation
- Good south-facing view potential

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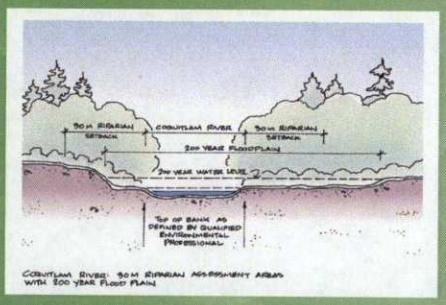
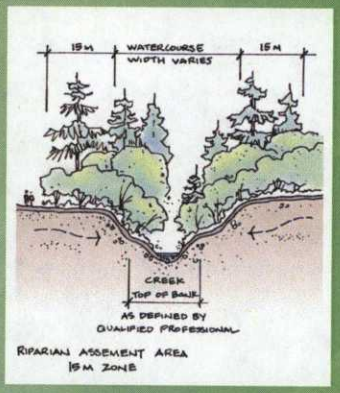
Key Findings: Constraints (con't)

River and Streams

- 30 meter SPEA setback (Coquitlam River)
- 15 meter SPEA setback (All other streams)





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Key Findings: Opportunities (con't)

River and Streams

- Provides opportunities to contribute to **aesthetics** and **ecological character**

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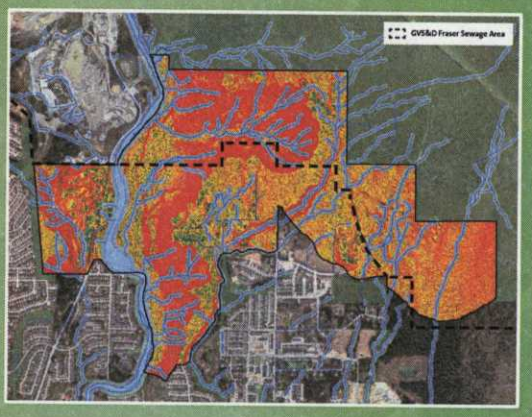
Key Findings: Constraints (con't)

Utilities

- Challenging due to steep grades, unstable slopes and numerous watercourses
- Northern portions of Sub Areas D,E,F & G outside GV Sewerage and Drainage District



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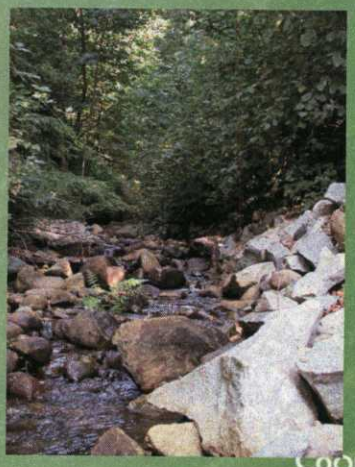
Key Findings: Opportunities (con't)

Utilities

- Incorporate rainwater management to:
  - Sustain water quality
  - Sustain rate of runoff



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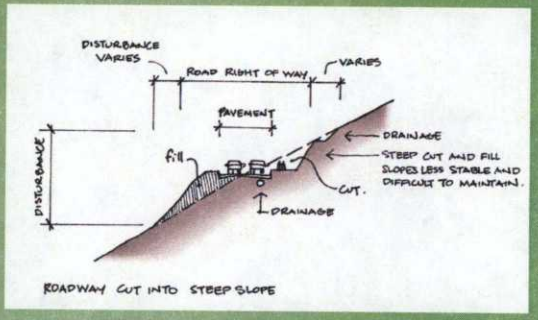
Key Findings: Constraints (con't)

Access

- Steep slopes make network layouts and road gradients challenging (C, D, E, F, G, SS1 & SS2)



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Key Findings: Opportunities (con't)

Access

- Improve access to Pinecone Burke Provincial Park

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Summary

Majority of Sub Areas have some potential for future neighbourhood development

NBV Total Land Area
379 ha (937 ac)

NBV Land Area (Minus SS1-SS2)
274 ha (676 ac)

NBV Non-Constrained LOW 102 ha (252 ac)

NBV Non-Constrained HIGH 144 ha (356 ac)

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Next Steps

Public Consultation (Phase 1) - March/April 2015

- Project Advisory Group meeting
- Property Owners Group workshop
- Community Information Session

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Next Steps

Ideas & Options (Phase 2)

- Constraints and opportunities serves as a foundation
- Develop concepts: land use, access & servicing
- Housing market & financial feasibility analyses

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Thank you

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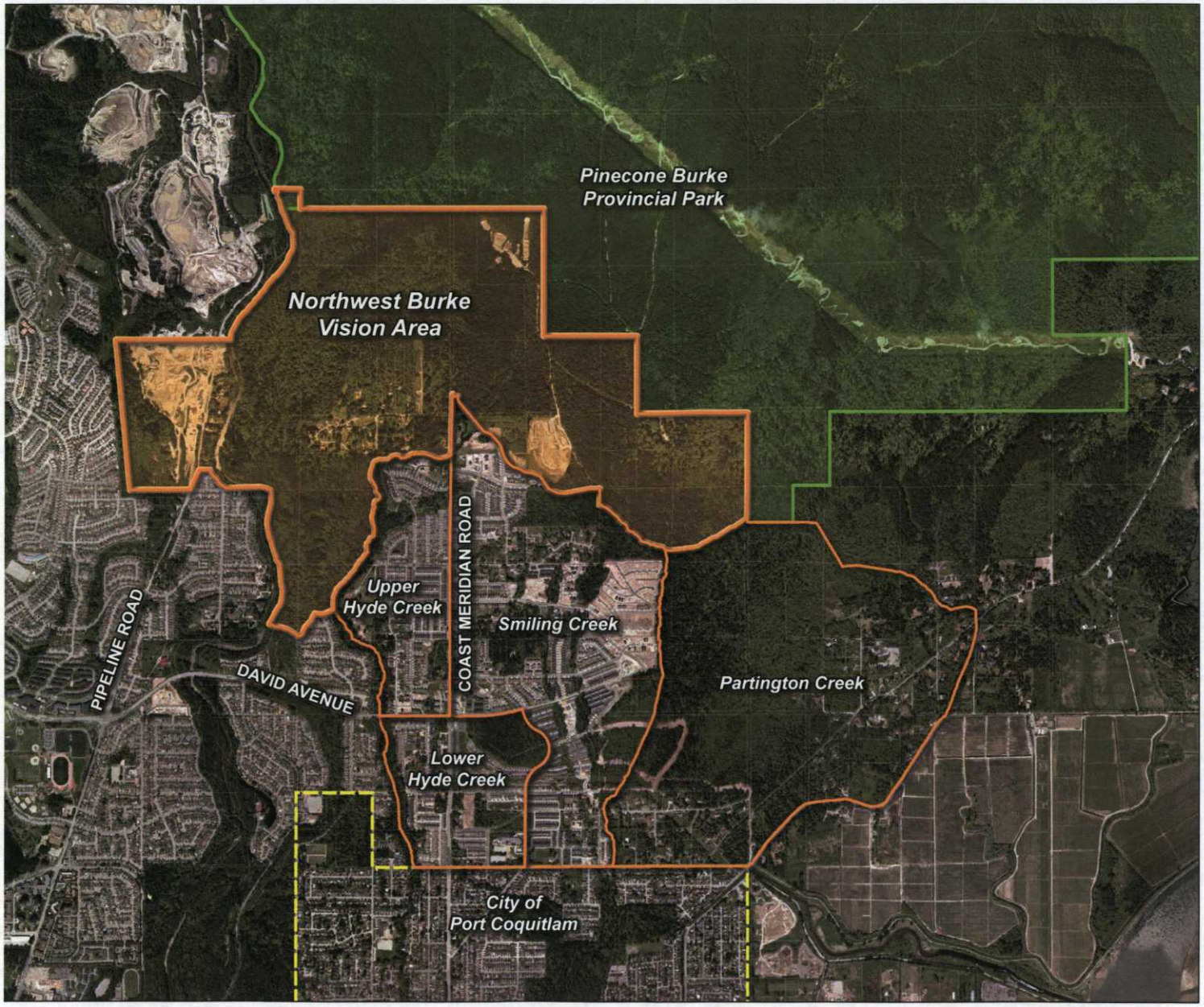

NORTHWEST BURKE VISION

LOCATION MAP

0 200 400 600 800 1,000
Metres

Map Date: Feb 13, 2015
Prepared By: Planning & Development
Source: City of Coquitlam - OCP GIS layer

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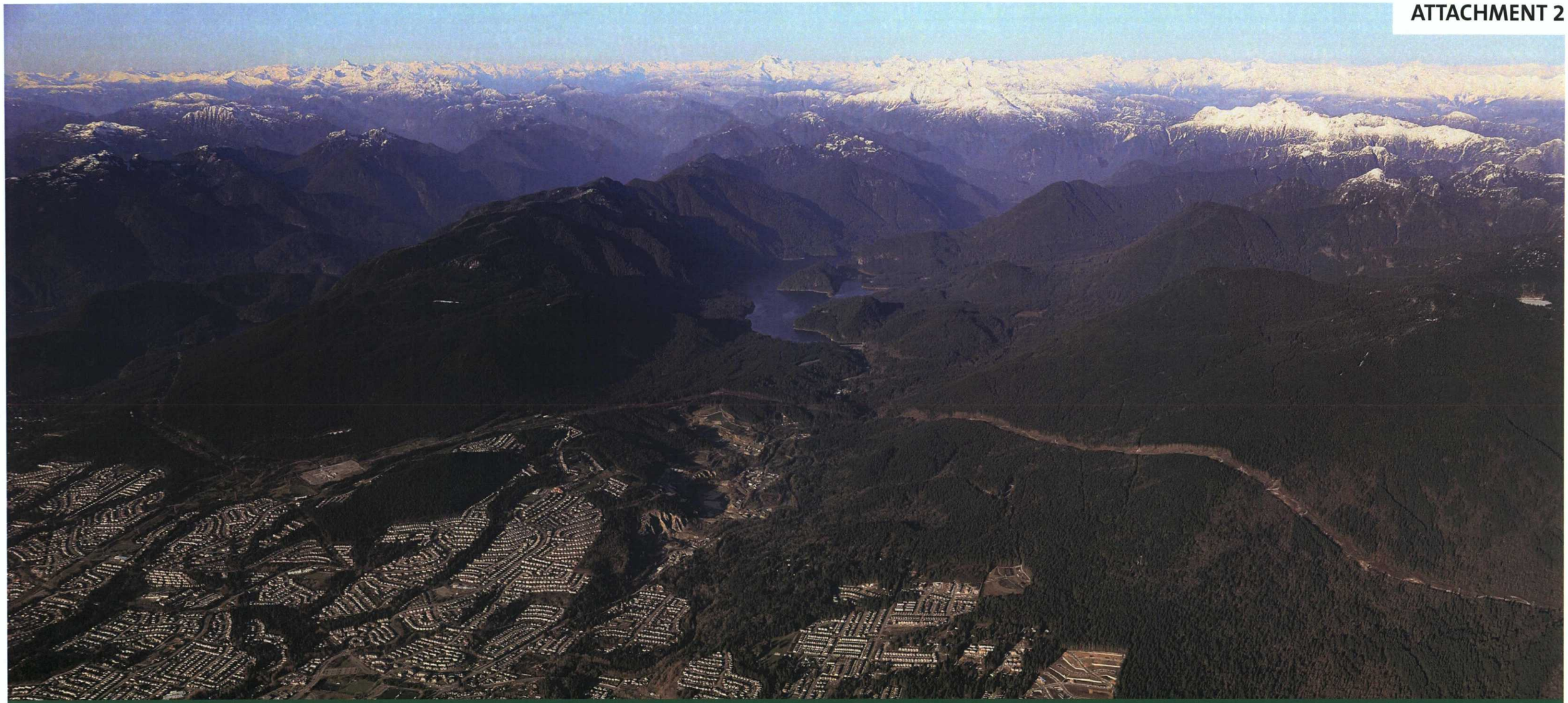
ATTACHMENT 1

ATTACHMENT 2



NORTHWEST BURKE VISION - CONSTRAINTS AND OPPORTUNITIES REPORT

FEBRUARY 17, 2015

Coquitlam

Golder Associates

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Figure 18: Sub Area SS2 28

Figure 19: Northwest Burke Vision: Constraints and Opportunities 30

Figure 1: Northwest Burke Vision Area

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1.0 CONSTRAINTS AND OPPORTUNITIES

1.1 INTRODUCTION

The City of Coquitlam is planning for potential future growth in one of the last significant 'greenfield' area within the City of Coquitlam. Coquitlam is preparing a policy document, that will be referred to as the Northwest Burke Vision, in a multi-phase process for this greenfield area, located on the northwest flanking area of Burke Mountain and adjacent lands along the Coquitlam River.

The Northwest Burke Vision is intended to be a Council policy document that guides further detailed land use planning (e.g., neighbourhood plans) and future Official Community Plan amendments over the next 30 years and beyond in a measured and logical manner. The Northwest Burke Vision will include a high-level land use, access, and servicing concept, as well as a phasing plan to guide the timing of future planning, development and other implementation measures in the Vision area.

The Northwest Burke Vision is being prepared in a three-phase planning process. Phase 1 of the Vision process has focused on developing a high-level understanding of the areas topographical, bio-physical and environmental constraints and opportunities. Phase 2 of the Vision will involve exploring and identifing potential land use, access and servicing ideas. The final Phase 3 will synthesize the technical outcomes and public input and feedback gathered during Phases 1 and 2 into a draft Vision document.

1.2 LOCATION

The Northwest Burke Vision area consists of nearly 400 ha of largely undeveloped lands on Burke Mountain in northeast Coquitlam. The Vision area is located within the boundaries of the Coquitlam River watershed, is home to one of the largest and most significant rivers in the Metro Vancouver Region (the Coquitlam River) and forms part of the traditional territory of the Kwikwetlem First Nation.

The Vision area, as illustrated in Figure 1 (previous page), is located directly north of the Upper Hyde, Smiling Creek and Partington Creek Neighbourhoods and south of Pinecone Burke Provincial Park. The Northwest Burke Vision area also includes the Riverwalk lands along the eastern edge of the Coquitlam River and the southern portion of the existing gravel extraction areas along Pipeline Road and west of the Coquitlam River.

The predominant physical characteristic of the Vision area is that of heavily forested steep slopes with numerous streams, some of which are known to provide an important contribution to fish habitat. There are several flatter areas in the valley flanking the Coquitlam River. The Coquitlam River divides a portion of the Northwest Burke Vision area, separating the active quarry lands along Pipeline Road from the eastern portions of the Vision area, which rise to an elevation of nearly 400 metres up the slopes of Burke Mountain.

neighbourhood planning and site development. Recent work completed by the City on floodplain mapping of the Coquitlam River has been incorporated into the bio-physical assessment. Preliminary work on identifying what impact these factors could have on the extension and provision of utilities and the establishment of a road network is also included.

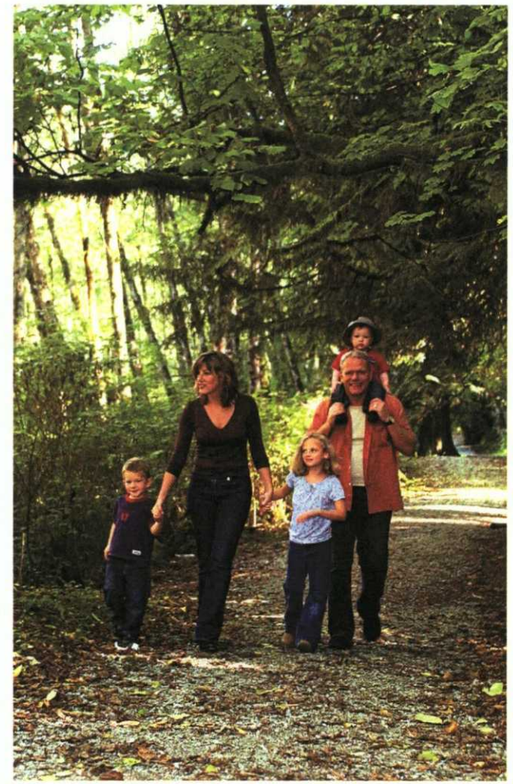
To provide a framework for the Constraints and Opportunities process, the Northwest Burke Vision area was partitioned into eleven distinct Sub Areas based on their topographic and environmental characteristics, such as watercourses, slope and stability, stability and wildfire risk. Each of the Sub Areas has a distinct set of constraints and opportunities that need to be considered for the development of the Northwest Burke Vision.

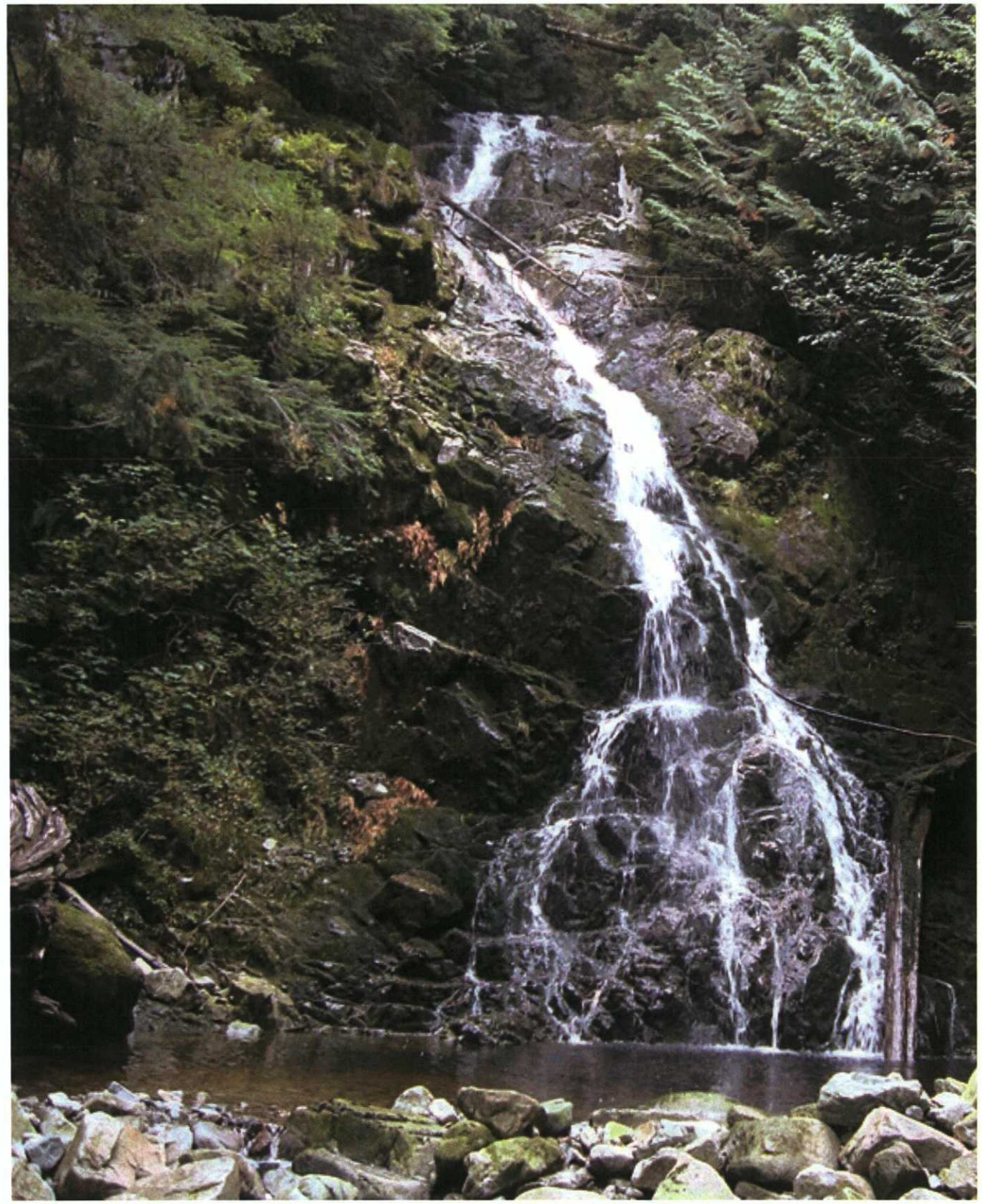
1.3 REPORT

This Constraints and Opportunities Report is part of Phase 1 of the Northwest Burke Vision planning process and provides a technical foundation for land use planning, utility servicing and access analysis. This Constraints and Opportunities Report is also to be used as a tool for discussion of subsequent phases of the Northwest Burke Vision planning process.

The purpose of this report is to set out the physical and environmental constraints on urban development for the Northwest Burke Vision area and to identify key opportunities provided by the landscape, such as view potential, access, practical gradients, forest character, and the like. The working premise is the land will tell us what is possible in terms of future developable areas, servicing and access opportunities.

A review of the environmental characteristics including topography, tree cover, species at risk, watercourses and riparian areas, slope stability and wildfire risk was conducted through advanced geographic information systems (GIS) analysis, technical desk top reviews, and very preliminary field work. The review is high level, relying on existing data sources provided by the City and readily available from provincial records. Detailed geotechnical and hydrological investigations are not part of the scope of analysis, but will be required with future Official Community Plan amendments,





1.4 ASSESSMENT APPROACH & TERMINOLOGY DEFINITIONS

In order to gain an understanding of the constraints and opportunities for the Northwest Burke Vison area, an assessment of the environmental characteristics of the area was undertaken. The assessment methodology included analyses of:

- slope conditions
- debris flows and debris runout areas
- floodplain areas
- rivers, streams and riparian areas
- forested and vegetation areas, and
- wildlife and species at risk

This assessment was conducted through advanced GIS analysis, technical desk top reviews and limited field work. The approach taken for this constraints and opportunities analyses is elaborated on below.

Slopes

One of the defining features of the Northwest Burke Vision area is steep terrain. As illustrated in Figure 2 (Opposite - page 3) and Figure 3 (Next - page 4), some of these steep areas include slopes that exceed 20 degrees (36 percent); slopes where buildings cannot be located under provisions of Section 519(3)(a)in the City of Coquitlam Zoning Bylaw No. 3000 (1996).

Unstable slopes for the Northwest Burke Vision area are defined as land with a slope typically greater than 24 degrees (45 percent) with active or inherent instability (i.e., areas prone to debris flows, landslides, gullying, soil creep, etc.). Unstable slopes have been site-specifically defined, in combination with standard slope stability criteria, using a terrain analysis approach. Geoscientists, geomorphologists and terrain specialists reviewed relevant surficial geology, terrain stability, soils, bedrock, and other applicable data (reports, maps, data sets) and incorporated the information into the assessment. The terrain analysis also involved the use of existing imagery, including high quality satellite orthophotographs, coupled with LiDAR (a high-resolution mapping technology) to discern surficial material types and geomorphological processes. The synthesis of these various data sets and professional judgment and interpretation by geoscientists, geomorphologists and terrain specialists were used to identify areas of unstable slopes.

The **Crest of Slope** is the change or 'break' in gradient from steeply sloped to gently sloped at the top (crest) of a steep slope. The **Toe of Slope** is the change or 'break' in gradient from steeply sloped to gently sloped bottom (toe) of a steep slope. While detailed geotechnical analysis is required to determine appropriate setback distance from the slope break, for the purposes of constraints mapping, a standard setback of 30 meters was applied from the crest (top) of a steep slope as a precaution against a bank failure that would see material within this zone moving or releasing and travelling downslope. A specific setback for the toe (bottom) of a steep slope was not identified for the purposes of constraints mapping, as most were identified with more notable debris runout areas (see next subsection, page 5). Ultimately, setbacks for crest and toe of steep slope areas will be governed by the the provisions of Section 519(3)(a) in the City of Coquitlam Zoning Bylaw No. 3000 (1996).

Development on unstable slopes is extremely challenging and is typically not feasible as it carries risk of damage to life and property. Also, transportation and other utility infrastructure that supports development is equally challenging and costly across such slopes. For example, as illustrated in Figure 4 (Page 5), large 'cut' and 'fill' is often required in steep sloping areas in order to accommodate road and utility rights of way. An explanation of slope contours is presented in Figure 5 (Page 5). Unstable Slopes and Crest of Slope areas are identified on a series of Sub Area maps in Section 2.0 of this Report.

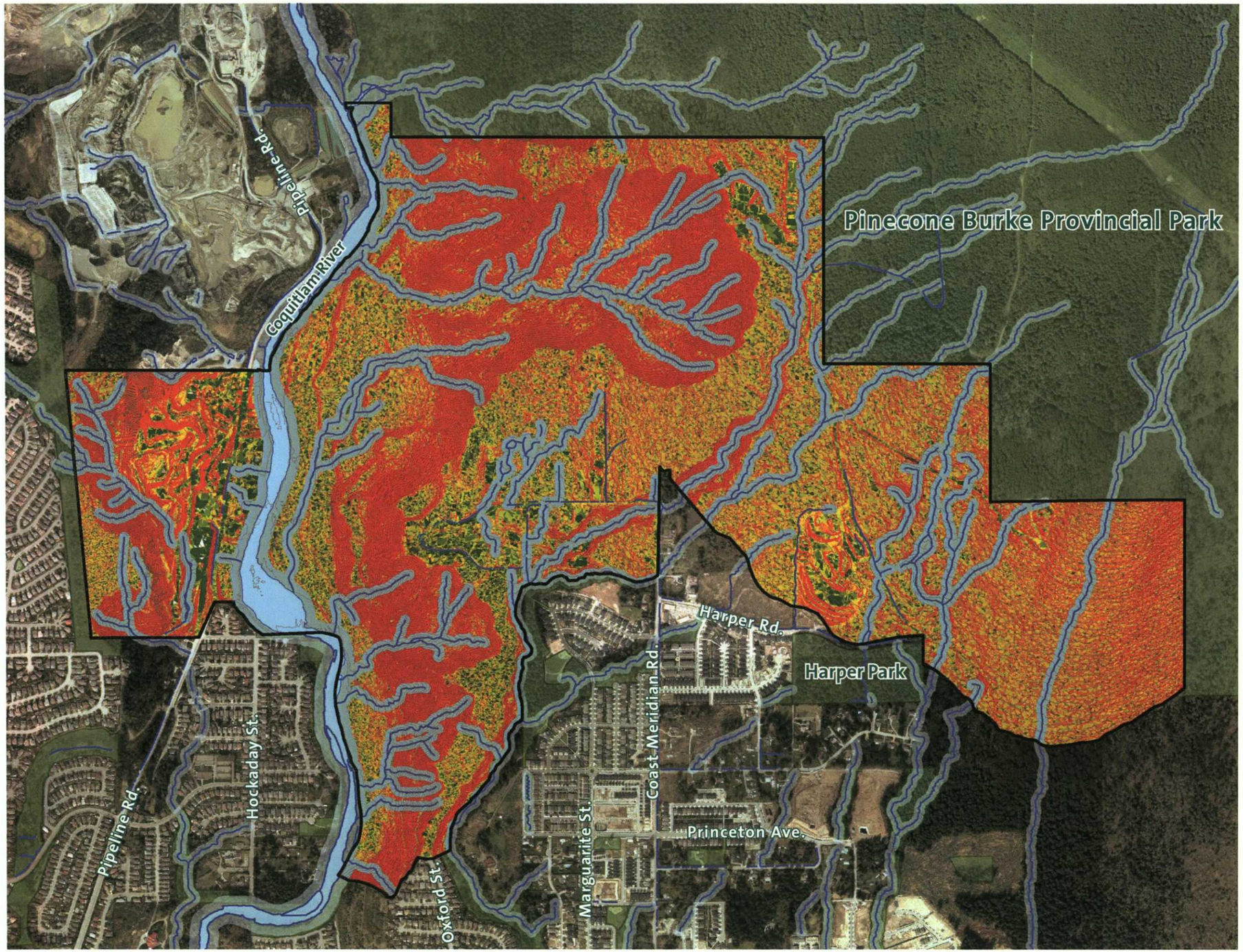


Figure 2: Slope Analysis

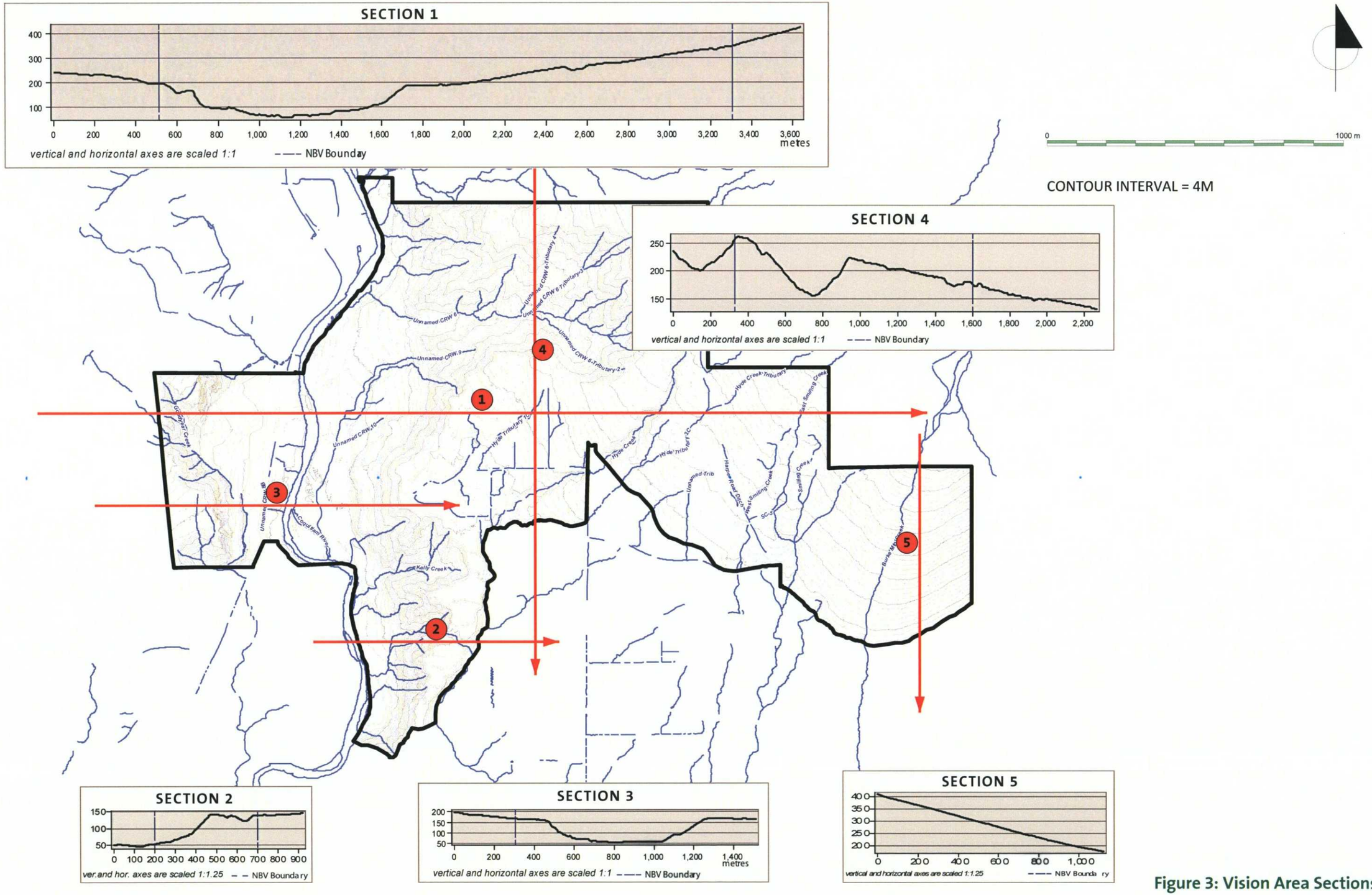


Figure 3: Vision Area Sections

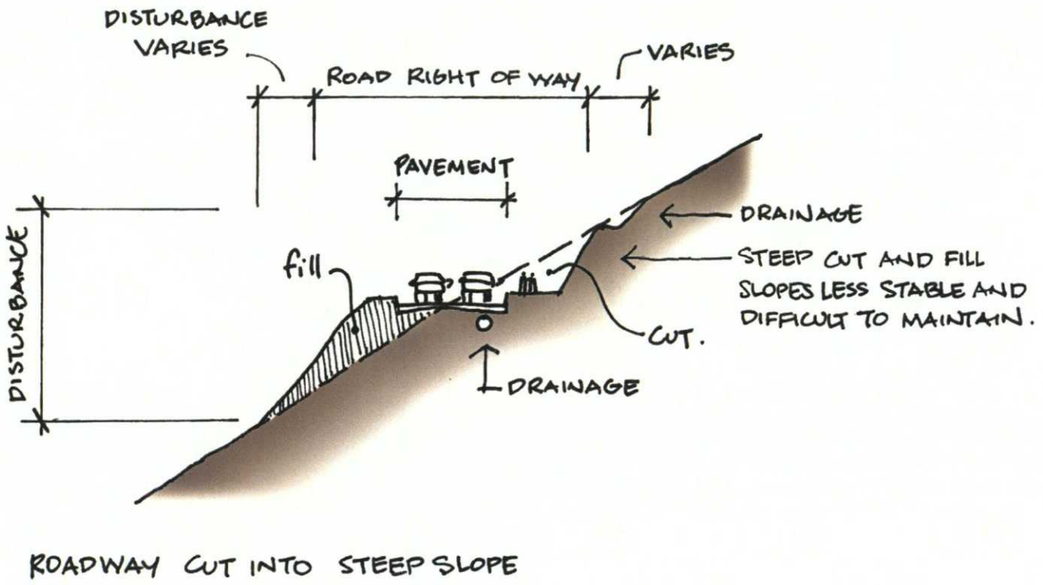


Figure 4: Technical Challenges for Roads on Steep Slopes

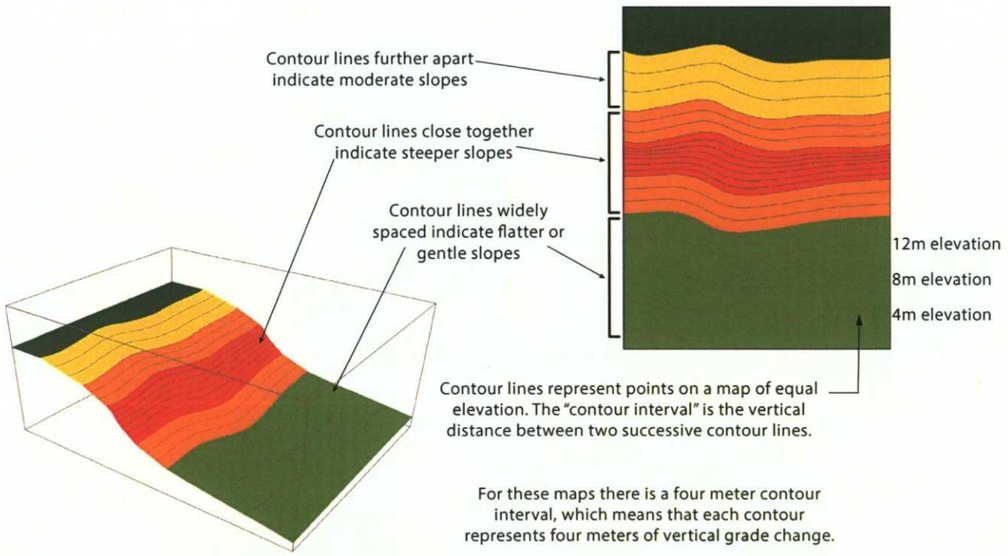


Figure 5: Contours Explained

Debris Flows and Debris Runout Area

Debris flows happen when water saturated masses of soil and rock rush down mountain sides, funnel into stream channels, and leave behind thick muddy deposits. Debris flows can be very destructive. Reaching speeds of 10 meters per second (30 km/hr), a debris flow will denude vegetation, destroy life, buildings and property, and clog watercourses that can contribute to flooding. Debris flows typically contain high water content and can flow much like a fast moving stream until coming to rest. Water then dissipates, leaving behind soil particles and sediments in rigid form.

Debris flow modeling is complex engineering that considers sediment and soil particle size distribution, friction, gravity, ground water movement, precipitation, slope steepness, earthquakes, and other factors. The **debris runout area**, as defined by geomorphologists, terrain specialists and according to industry standards, has been mapped to indicate where material from a slope failure or debris flow event may travel before coming to rest on the terrain downslope of a steep area. Typically, debris flows occur on slopes that are greater than 25 degrees (47%). The debris runout areas, as illustrated in Figure 6 below, represents the distance from the toe of slope and is estimated from observed/interpreted landscape features (e.g., landslide debris, hummocky ground, debris fans, soil types), the slope of the terrain downslope of the steep area, and the likelihood that the material is drawn in and transported (entrained) by water.

As part of proposed infrastructure, development and site planning, field and detailed assessment of upslope instability hazards will need to be undertaken for areas predisposed to debris flow events. Relevant guidelines of the Association of Professional Engineers and Geoscientist of British Columbia should be followed. Debris Runout Zones have identified on a series of Sub Area maps in Section 2.0 of this Report.

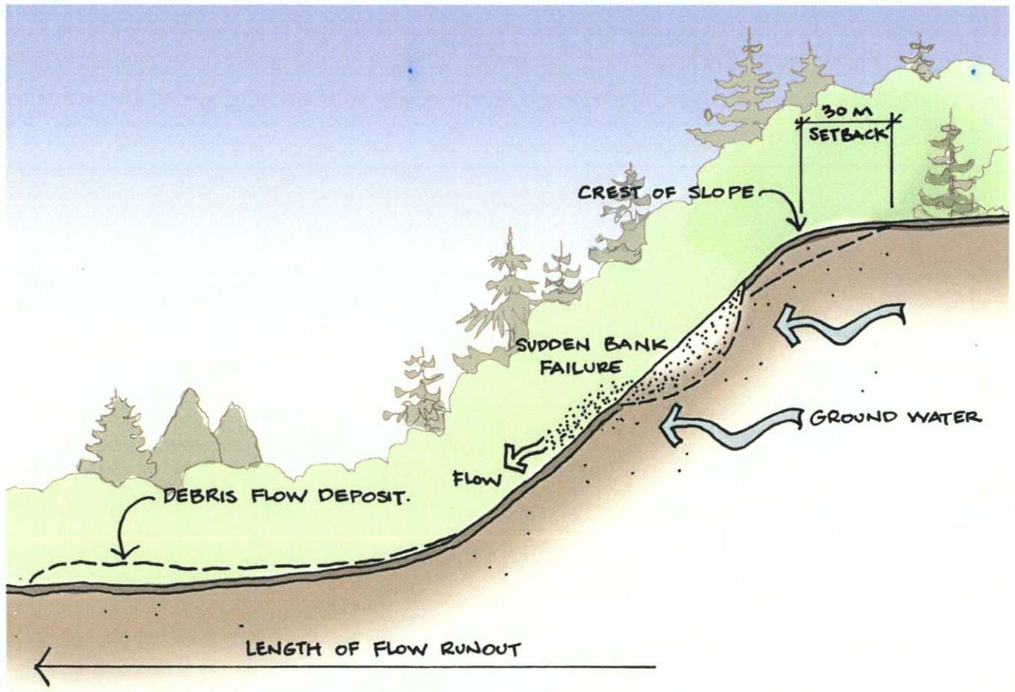


Figure 6: Debris Flows and Runout Area

Floodplain

Floodplain areas are derived from recent 2014 mapping completed for the City of Coquitlam by Kerr Wood Leidal Associates Ltd, September 2014. This recent mapping included a review of the relevant provincial guidelines to determine the most up-to-date criteria relating to floodplain mapping. The three main documents outlining floodplain mapping procedures are:

- Flood Hazard Area Land Use Management Guidelines (Ministry of Water, Land, and Air Protection, May 2004)
- Coastal Floodplain Mapping - Guidelines and Specifications (MFLNRO, 2011)
- Professional Practice Guidelines - Legislated Flood Assessments in a Changing Climate in BC (APEGBC, 2012)

The mapped floodplain area is based on a 200 year return period, meaning the peak flows contributing to flood levels that happen statistically once every 200 years (or a yearly probability of 0.005) and is a recognized standard for managing development. The floodplain mapping accounts for potential increased flows in the Coquitlam River due to projected climate change by 10% and 20% for Year 2100 and Year 2200 time horizons; a best management practice.

Within the Northwest Burke Vision study area, the floodplain often occurs within the 30 metre streamside protection and enhancement area (SPEA). However, in some areas the floodplain occurs outside of the SPEA. Unmitigated floodplain areas of the Coquitlam River currently are not recommended for development. While development in a floodplain is possible it requires additional costs and/or mitigation measures for human safety and property protection.

Figure 7 below illustrates the relationship between the Coquitlam River normal full bank condition and its associated SPEA and floodplain areas. Floodplain areas are identified on Sub Area A and Sub Area B maps in Section 2.0 of this Report.

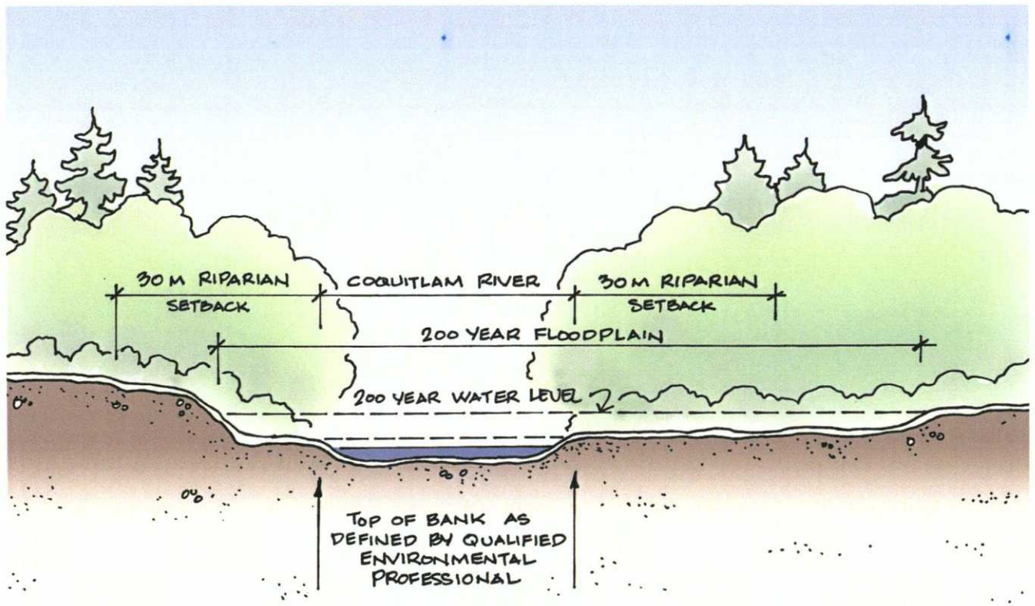


Figure 7: 30 Metre Streamside Protection Area with 200 Year Floodplain

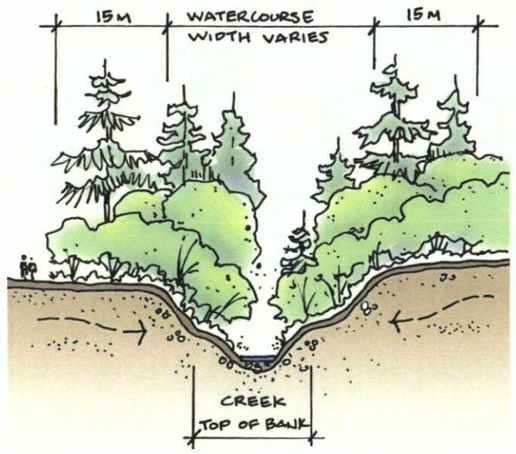
Rivers, Streams and Streamside Protection and Enhancement Areas (SPEA)

Watercourses and land within a certain distance of watercourses are protected by federal and provincial legislation through the Fish Protection Act and the Riparian Areas Regulation (RAR). It calls on local governments to protect riparian areas during residential, commercial, and industrial development by ensuring that a Qualified Environmental Professional (QEP) conducts a science-based assessment of proposed activities.

The purpose of the Regulation is to protect the many and varied features, functions and conditions that are vital for maintaining stream health and productivity, including:

- Sources of large organic debris, such as fallen trees and tree roots;
- Areas for stream channel migration;
- Vegetative cover to help moderate water temperature;
- Provision of food, nutrients and organic matter to the stream;
- Stream bank stabilization; and
- Buffers for streams for excessive silt and surface run-off pollution.

The RAR identifies an area called a Riparian Assessment Area (RAA), which in the Vision area context is typically measured at 30 metres from the high water mark of the Coquitlam River and 15 metres for other streams.



If a proposed new development is either wholly, or partially, within the RAA, the development applicant has a choice of applying the Simple or the Detailed Assessment Methods for the determination of Streamside Protection and Enhancement Areas (SPEAs), inside of which development is not permitted.

The final setback would be determined on an area-by-area basis following field assessments by a qualified environmental professional (QEP) and a streamside protection and enhancement area (SPEA) would be established. Figure 8 illustrates the relationship between stream, top of bank, and the assessment area setbacks. Watercourses and related streamside protection and enhancement areas are identified on a series of Sub Area maps in Section 2.0 of this Report.

Qualification

The watercourses and associated streamside protection and enhancement areas (SPEA) setback that are identified on the maps of this Constraints and Opportunities Report have been shown at a watershed-level (i.e., not site-level). The mapped information presented herein is based on the Riparian Areas Regulation (Simple Assessment methodology) provisions under Section 523(5) in the City of Coquitlam Zoning Bylaw No. 3000 (1996) as amended. The 30 metre setback shown on the Coquitlam River has been applied from the estimated top of bank location derived through a more detailed floodplain assessment recently completed. For the purposes of this Report, setbacks of 2 metres for drainage ditches and 15 metres for all other streams have been applied from the centre lines of the remaining watercourses due to the absence of information related to the top of bank locations.The information presented on the maps may not reflect the exact location of all watercourses, and other unknown watercourses may not yet be identified. These watercourse setback map layers are a work in progress and will be undergoing updates as new information becomes available.

Figure 8: 15 Metre Streamside Protection and Enhancement Area

Forested Area and Wildfire Risk

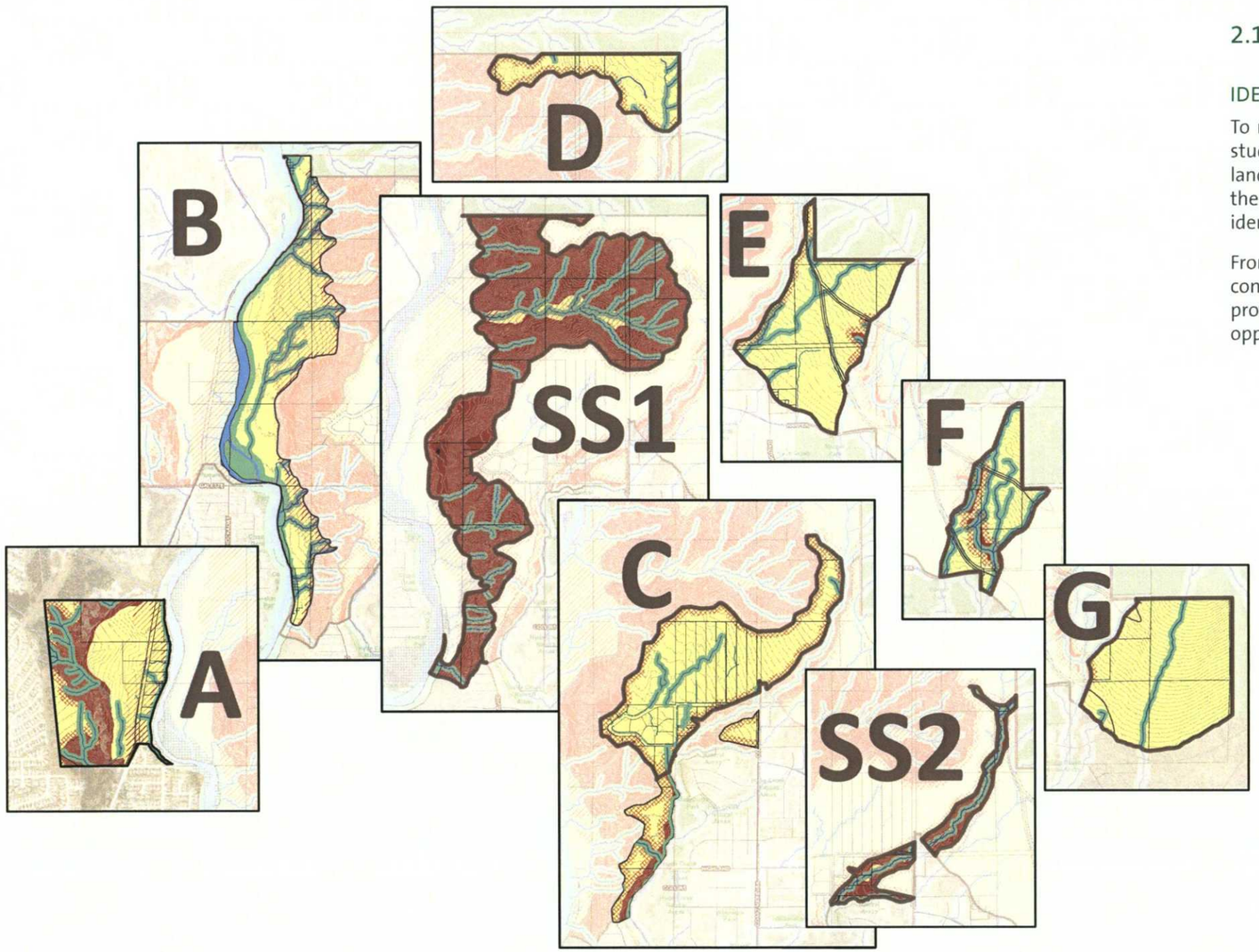
The general topography and vegetation surrounding and within new residential neighbourhoods can influence the intensity, spread rates and spread direction of a wildfire. In general, fire will spread with wind direction on flat ground, uphill during the day and downhill during the night. Slope and wind can positively and negatively influence each other and modify the direction of fire spread and rate of spread, dependent upon the steepness and aspect of the slope and speed and direction of the wind.

Generally, as wind increases, the fire spread rate will increase in the direction the wind is blowing to and as slope increases, so will the uphill spread of the fire. Steeper slopes increase downhill radiant heat and downhill fire spread from rolling debris. Terrain features that create a narrowing effect, such as ravines and saddles, can create sudden and significant increases in spread rate and fire intensity.

Since topography and wind patterns cannot be altered, mitigation and prevention measures consist of setbacks, vegetation control, building separation and building design and construction features. To further addess this condition, a wildfire report is currently being prepared and will be part of Phase 2 of the Vision process.

Wildlife

No records of species at risk (SAR) were identified in the immediate Northwest Burke Vision area. From the records for adjacent areas to the south, it appears that there is some potential for several wildlife and plant species at risk to occur in the Vision area. It should be noted that not all records have been officially updated to the British Columbia Conservation Data Centre database (http://www.env.gov.bc.ca/cdc/) and that some level of area-by-area surveys and assessment may be necessary prior to any changes to the natural landscape. Due to protected Pinecone Burke Provincial Park to the north and numerous riparian areas throughout the Northwest Burke Vision area that could potentially provide wildlife corridors, some wildlife/human conflicts could be expected in future development areas. Bear Aware and similar programs to manage these potential conflicts in other parts of Coquitlam would also need to apply to future development within the Northwest Burke Vision area.



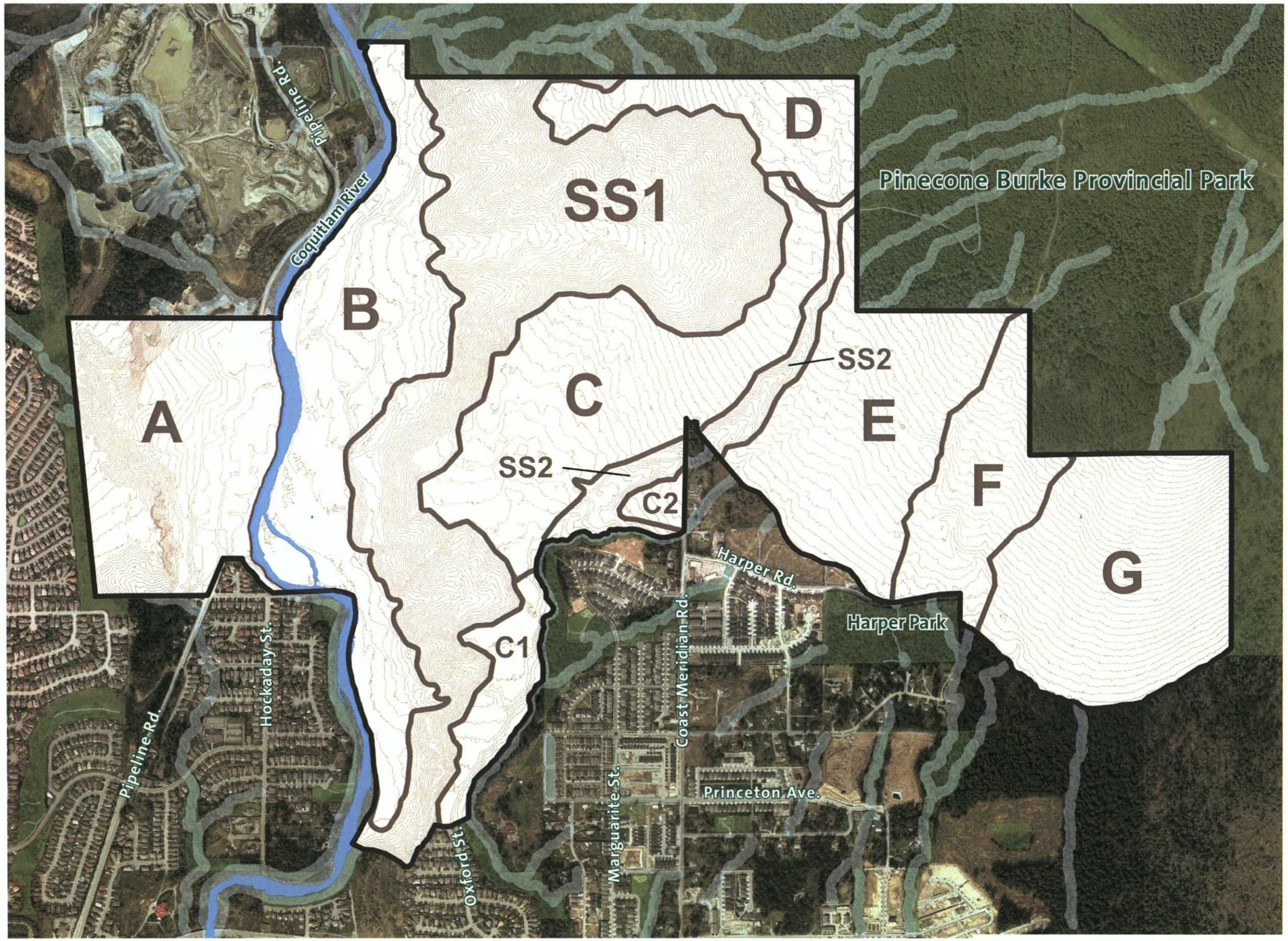
2.0 SUB AREAS

2.1 METHODOLOGY

IDENTIFICATION OF SUB AREAS

To more specifically address constraints and opportunities in the Northwest Burke Vision study area, eleven geographic Sub Areas were identified as defined by shared topography, land features or watercourses. Each Sub Area is highlighted in the illustration to the left, while the locations of Sub Areas, in the context of the larger Northwest Burke Vision Area, are identified in Figure 9.

From the study area review, a Sub Area Evaluation Framework was created to record constraints and opportunities specific to each Sub Area. An enlarged map of each Sub Area is provided in Figures 10 to 18 with summary tables detailing specific constraints and opportunities for each Sub Area.



KEY

4m Interval Contours

Figure 9: Sub Area Context Map

A SUB AREA A - CONSTRAINTS AND OPPORTUNITIES

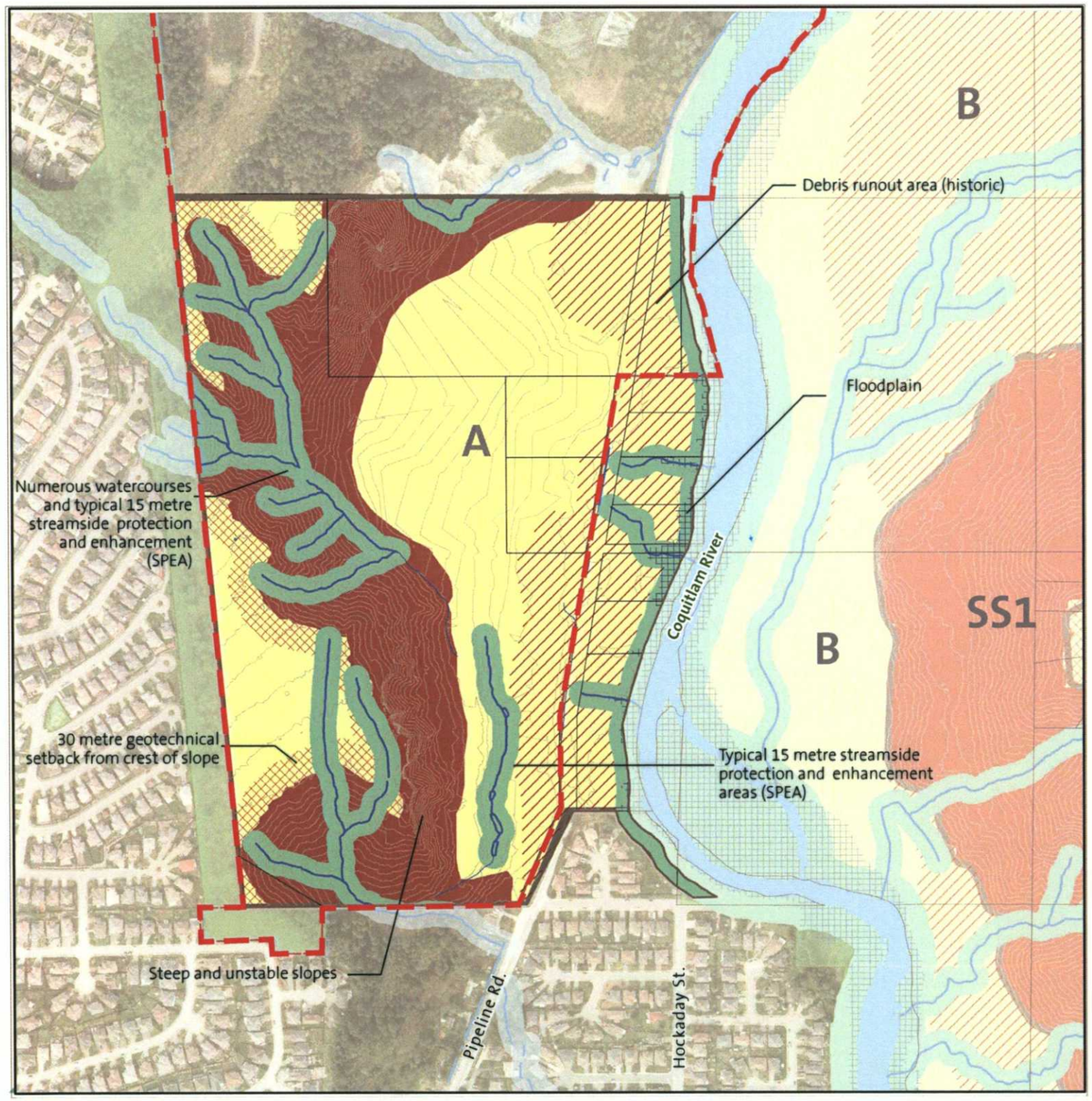
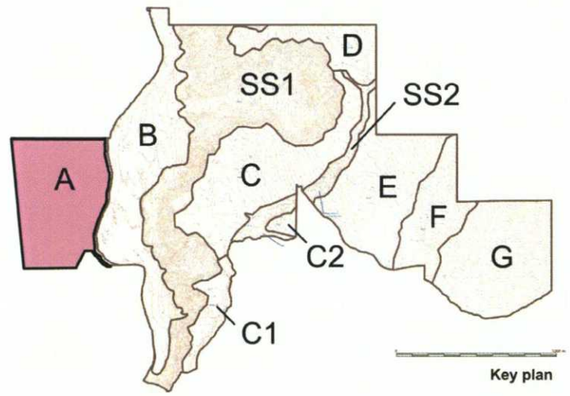


Figure 10: Sub Area A

KEY

- Steep and Unstable Slopes
- 30m setback from Crest of Slope
- Debris Runout Area
- Watercourse with SPEA
- Coquitlam River with SPEA
- Coquitlam River Floodplain
- Potential Non-constrained Area
- 4m Interval Contours
- Urban Containment Boundary
- Drainage Ditch

NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area A	43	11%	4 to 14	9% to 32%



SUB AREA A - CONSTRAINTS AND OPPORTUNITIES

GENERAL CHARACTERIZATION

Sub Area A is bound by the Coquitlam River to the east, an active gravel quarry to the north, and existing urban residential neighbourhoods to the south and west. The Sub Area is characterized by an active gravel quarry on the west side of Pipeline Road and several suburban residences along the Coquitlam River. The quarry is classified as a mine under provincial regulations and is subject to reclamation requirements of the Mine Closure Act. This portion of the Sub Area is located outside the Urban Containment Boundary but is within the Greater Vancouver Sewerage District.

The western portion of Sub Area A has a series of steep slope escarpments, as a result of the deeply cut (incised) stream tributaries of Hockaday and Goodyear Creeks, that flow south and east toward Coquitlam River, as well as the results of the excavation from the active gravel quarry operations. These steep slopes are classified as unstable and with debris run out potential. There is a large historic debris runout area along the Coquitlam River, extending on either side of Pipeline Road. This debris run out area existed before excavation activities at the gravel quarry and has been identified as a soil condition requiring further analysis prior to site development.

EVALUATION

Issues	Constraints / Opportunities	Sub Area A
Slope and Aspect	**Constraints**	• Unstable slope conditions requiring mitigation • High ridge to the west will block afternoon sun to lower elevations of the site (eastern portions), especially in winter season with low sun angle
	Opportunities	• Good solar aspect to the southeast and south • Large area with potential for terracing
Geotechnical Stability and Runout	**Constraints**	• Historic and uncertain debris runout conditions • Urban development will require mitigation for geotechnical and unstable slope conditions
	Opportunities	• Mine reclamation measures and future development may address unstable slope and historic debris runout conditions
Vegetation	**Constraints**	• Adjacent steep slopes and geotechnical setbacks may require additional tree protection for slope stabilization
	Opportunities	• Quarry closure efforts can be directed towards long-term site rehabilitation • Existing mature vegetation at the top of ridge (west) and along the Coquitlam River (east)
Riparian	**Constraints**	• Some streamside protection areas at higher elevations in western portion of site. Some historic drainage and sediment deposition issues • 30 metre streamside protection setback from the natural boundary of the Coquitlam River and 15 metre streamside protection setback for all other watercourses
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams and the Coquitlam River
Stormwater	**Constraints**	• Watercourses flowing south through the ravine may require rainwater management measures depending on quarry closure
	Opportunities	• Application of rainwater management measures through development could reduce impacts to the Coquitlam River
Floodplain	**Constraints**	• Some small areas within the Coquitlam River floodplain may require avoidance or mitigation for any potential new development • Building Flood Construction Levels (FCL) need to be respected, and mitigation requires protection measures with related expense and aesthetic challenges. (e.g., dikes and berms)
	Opportunities	• Only a small portion of the Sub Area is within the Coquitlam River floodplain
Access	**Constraints**	• Noise, dust, truck traffic disturbance from adjacent quarry activities to the north will be an irritant to residents • Steep slopes and Coquitlam River limit network connectivity to surrounding neighbourhoods and sub-area
	Opportunities	• Quarry closure efforts could be directed towards the development of roads and services • Approximately 2.7 km to Evergreen Line terminus station, at essentially level gradient. This represents approximately 40 minute walk or 10-15 minute cycling for a person of average ability • Close proximity to existing road (Pipeline Road) • Potential connectivity across Coquitlam River to expand road network • Possible integration with the City's Master Trail Plan
View Potential, Spatial Quality, and Character	**Constraints**	• Ridge to the west cuts off some views and solar access
	Opportunities	• Good view potential for taller buildings • high ridge allows taller buildings below without view impact to Westwood Plateau residents
Water (Utilities)	**Constraints**	• Locating utilities in some areas could be challenging due to steep grades and watercourses
	Opportunities	• Existing infrastructure in vicinity of area to the west
Sanitary (Utilities)	**Constraints**	• Locating utilities in some areas could be challenging due to steep grades and watercourses
	Opportunities	• Existing infrastructure downstream that can be tied into
Stormwater (Utilities)	**Constraints**	• Increase in impervious area could impact natural flow regime • Locating utilities in some areas could be challenging due to steep grades and watercourses
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses

B SUB AREA B - CONSTRAINTS AND OPPORTUNITIES

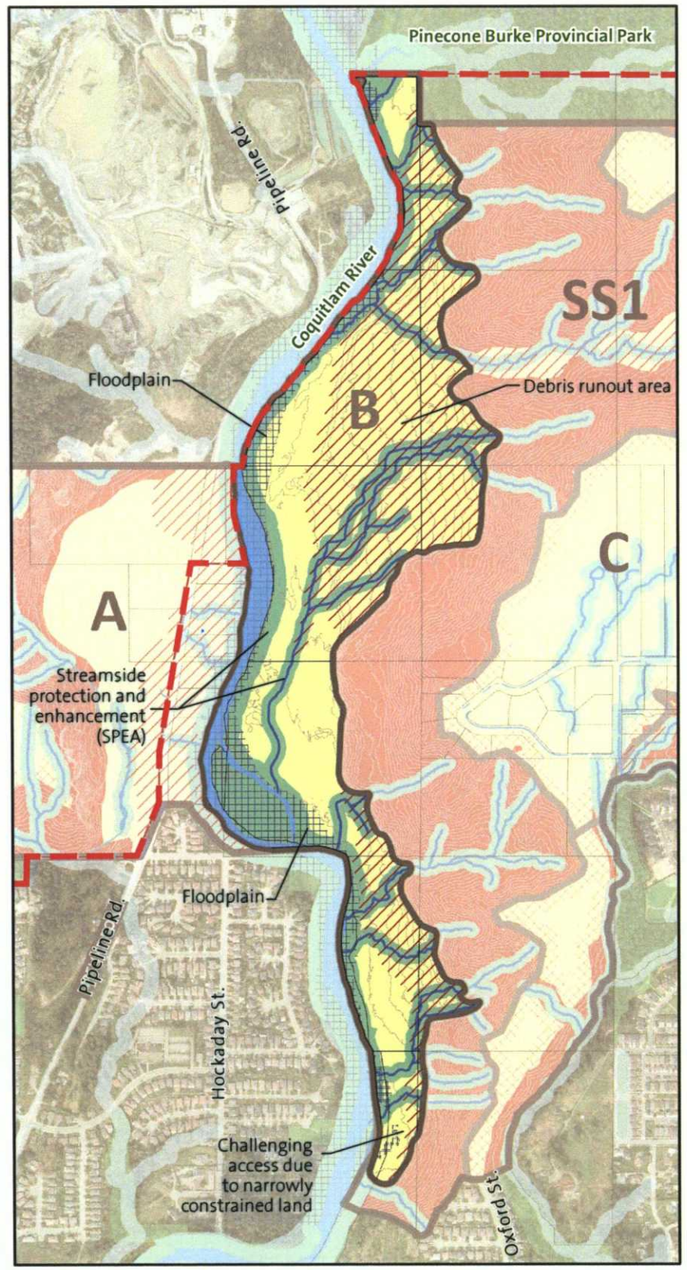
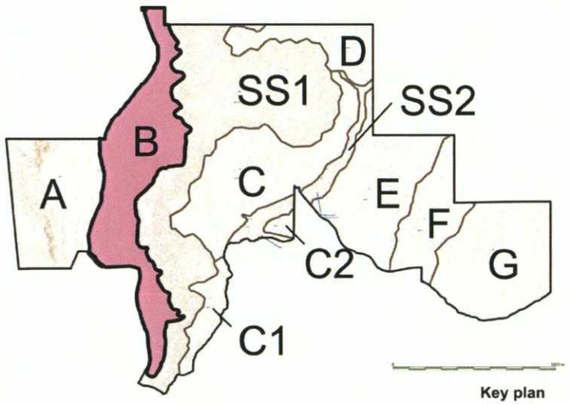


Figure 11: Sub Area B

KEY

- Steep and Unstable Slopes
- 30m setback from Crest of Slope
- Debris Runout Area
- Watercourse with SPEA
- Coquitlam River with SPEA
- Coquitlam River Floodplain
- Potential Non-constrained Area
- 4m Interval Contours
- Urban Containment Boundary
- Drainage Ditch

NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area B	53	14%	8 to 16	14% to 30%



SUB AREA B - CONSTRAINTS AND OPPORTUNITIES

GENERAL CHARACTERIZATION

Sub Area B is a relatively isolated natural area that is bound by the Coquitlam River to the west and a series of steep slope escarpments to the east. The area contains a number of deeply cut (incised) watercourses that flow from the east through the Sub Area to the Coquitlam River. There are large historic debris runout zones along the base of the steep slopes and it is uncertain to the degree to which these lands remain subject to slope failure.

To the west of the Sub Area B is the Coquitlam River with 30 meter riparian assessment zone. There are some areas within the Coquitlam River floodplain that will provide constraints to any potential land use, although much of the floodplain occurs within the 30 metre streamside protection and enhancement area (SPEA) setback. The southern extension of Sub Area B is tightly constrained by steep gradients with unstable soils to the east, and riparian areas to the west. Access into Sub Area B is challenging.

EVALUATION

Issues	Constraints / Opportunities	Sub Area B
Slope and Aspect	**Constraints**	• Linear north/south area at the toe of high escarpement with steep and unstable slopes • Escarpment will block sunlight from the east and southeast, especially during winter months
	Opportunities	• Relatively flat terrain below the escarpment
Geotechnical Stability and Runout	**Constraints**	• Considerable debris run out hazard areas • Debris flows can block creek and tributary watercourses and create flooding potential
	Opportunities	• Debris Flow mitigations such as pits and/or berms can be applied to protect potential development areas
Vegetation	**Constraints**	• Mature tree canopy in the steep-sloped,forested escarpment to the east (Sub Area SS1) and neighbouring Pinecone Burke Provincial park along the northern boundary could pose a wildfire risk to adjacent future development
	Opportunities	• Some of the oldest forests in the Vision area are located in the southwest portion of the Sub Area. Streamside areas typically have healthy, mature vegetation
Riparian	**Constraints**	• 30 metre SPEA setback from the natural boundary of the Coquitlam River and 15 metre SPEA setback for all other watercourses
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams and the Coquitlam River
Floodplain	**Constraints**	• Some small areas within the Coquitlam River floodplain may require avoidance or mitigation for any potential new development • Building Flood Construction Levels (FCL) need to be respected, and mitigation requires protection measures with related expense and aesthetic challenges. (e.g., dikes and berms)
	Opportunities	• Relatively small portions of the Sub Area impacted by the floodplain
Access	**Constraints**	• Limited network connectivity to surrounding Sub Areas or existing road network due to steep slopes and the Coquitlam River; a bridge crossing over the Coquitlam River would require DFO authorization and compensation • Some adjacent areas include steep slopes. Road network layouts and gradients will need to be assessed for compliance with Subdivision Bylaw requirement standards prior to confirming development or land use opportunities
	Opportunities	• Road gradients through much of the Sub Area are generally level • Potential road connections across Coquitlam River or down the escarpment to the east could expand road network connections • Possible integration with the City's Master Trail Plan • Potential to provide improved access to the Pinecone Burke Provincial Park including the retention of existing trails to the park through the Sub Area
View Potential, Spatial Quality, and Character	**Constraints**	• Limited view potential with lower elevations and steep slopes to the east • Southern portion of the site will be shady, moist and cool
	Opportunities	• Preservation of streamside protection areas, slope vegetation and proximity to the Coquitlam River will provide a unique forested character and provide close proximity to outdoor recreation • Very good park and trails potential, especially at the edge of the Coquitlam River riparian areas
Water (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, streams and the Coquitlam River
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, streams and the Coquitlam River
Stormwater (Utilities)	**Opportunities**	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses

C SUB AREAS C, C1 & C2 - CONSTRAINTS AND OPPORTUNITIES

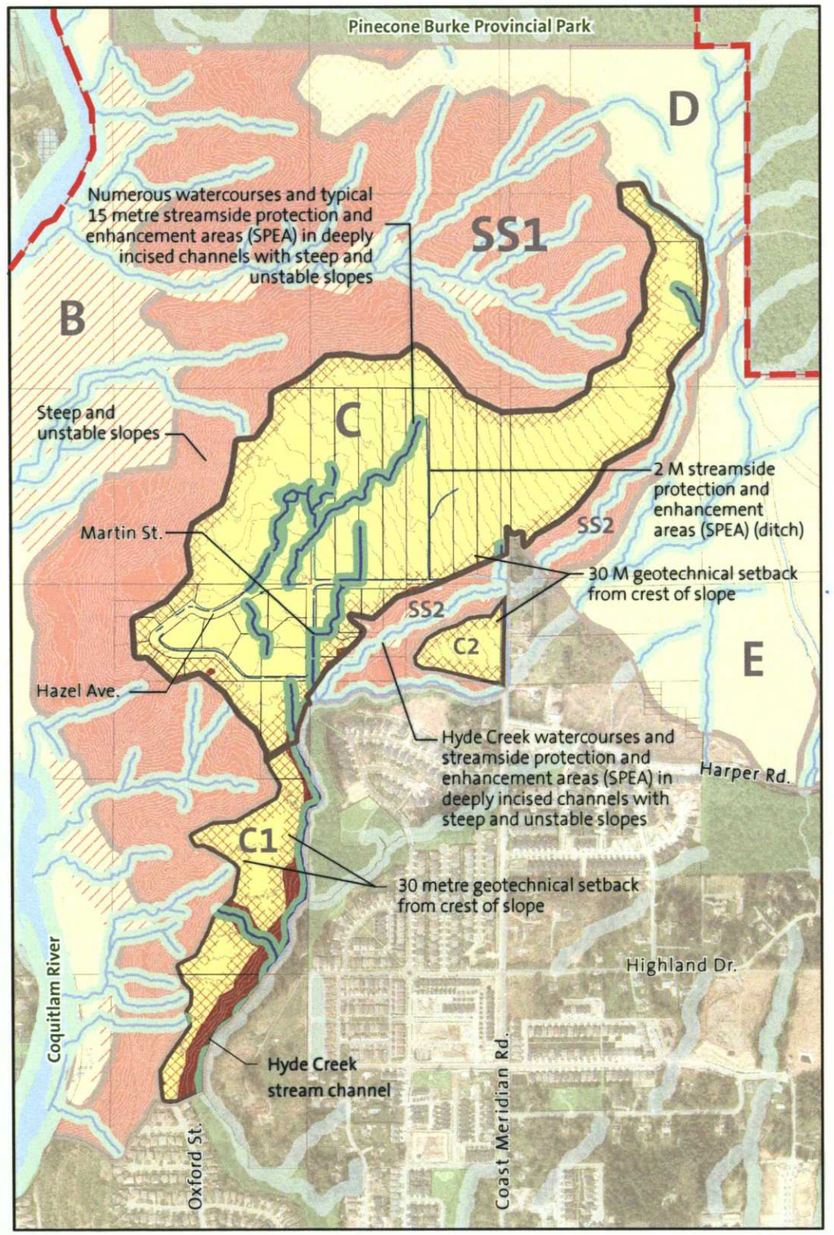
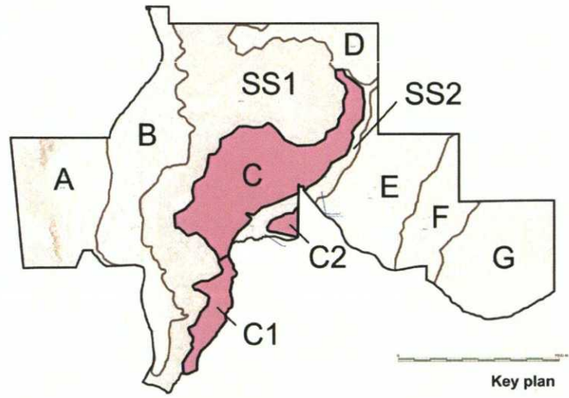


Figure 12: Sub Areas C, C1 & C2

KEY

- Steep and Unstable Slopes
- 30m setback from Crest of Slope
- Debris Runout Area
- Watercourse with SPEA
- Coquitlam River with SPEA
- Coquitlam River Floodplain
- Potential Non-constrained Area
- 4m Interval Contours
- Urban Containment Boundary
- Drainage Ditch

NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area C, C1 & C2	58	15%	28 to 30	49% to 52%



SUB AREA C - CONSTRAINTS AND OPPORTUNITIES

GENERAL CHARACTERIZATION

Sub Area C is characterized by relatively unconstrained forested land with somewhat manageable gradients, with an elevation change of approximately 150 metres from the south to the north. It is bounded to the west by the steep-sloped escarpment of Sub Area SS1 and steep and unstable slopes of a watercourse ravine of Sub Area SS2. There is some existing suburban, single family development on the southern portion of Sub Area C, in the vicinity of Hazel and Coy Avenues and Martin Street.

The central portion of the Sub Area C is home to two important Hyde Creek tributaries, which are a significant source of food and nutrient value to downstream fish habitat and populations. Additionally, there are several ditches classified as minor watercourses with limited ecological values, to which a 2 metre setback has been applied. Also, from the crest of the steep-sloped escarpment (Sub Area SS1) and the top of incised channel (Sub Area SS2), for this analysis a 30 metre setback has been applied as a precaution against bank failure. Further geotechnical investigation within this Sub Area is necessary prior to development.

EVALUATION

Issues	Constraints / Opportunities	Sub Area C
Slope and Aspect	**Constraints**	• Sections of steep slope to the north east that will influence road networks and development configurations
	Opportunities	• Relatively gentle gradients on the southern portion • Desirable southern orientation for most of the area
Geotechnical Stability and Runout	**Constraints**	• Close proximity to unstable slopes requires 30 metre setback from crest of slope
	Opportunities	• General stability with little to no runout potential
Vegetation	**Constraints**	• Mature tree canopy in the steep-sloped,forested escarpment to the west (Sub Area SS1) could pose a wildfire risk to adjacent future development • Adjacent Steep slopes and geotechnical setbacks may require additional tree protection for slope stabilization
	Opportunities	• Mostly forested with mixed deciduous/conifers
Riparian	**Constraints**	• 15 metre streamside areas (SPEA) setback for all watercourses
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams
Access	**Constraints**	• Limited width in northern portion to develop local network • Some portions of the Sub Area include steeper slopes upward of 7 to 11+ degrees (12-20+%). Road network layouts and gradients will need to be assessed for compliance with Subdivision Bylaw requirement standards prior to confirming development or land use opportunities
	Opportunities	• Close proximity to existing roads and adjacent neighourhoods (Hazel Avenue & Coast Meridian Road) • Moderate road gradients anticipated for the sourthern portion of the area • Possible integration with the City's Master Trail Plan
View Potential, Spatial Quality, and Character	**Constraints**	• Narrow development area in the north could be challenging to develop
	Opportunities	• Good view potential, especially to the south and southwest
Water (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west, deeply cut ravine to the east, and some streams
	Opportunities	• Existing infrastructure in the vicinity of Sub Area to the south
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west, deeply cut ravine to the east, and some streams
	Opportunities	• Existing infrastructure downstream of Sub Area that can be tied into
Stormwater (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west, deeply cut ravine to the east, and some streams
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses

SUB AREA C1 - CONSTRAINTS AND OPPORTUNITIES

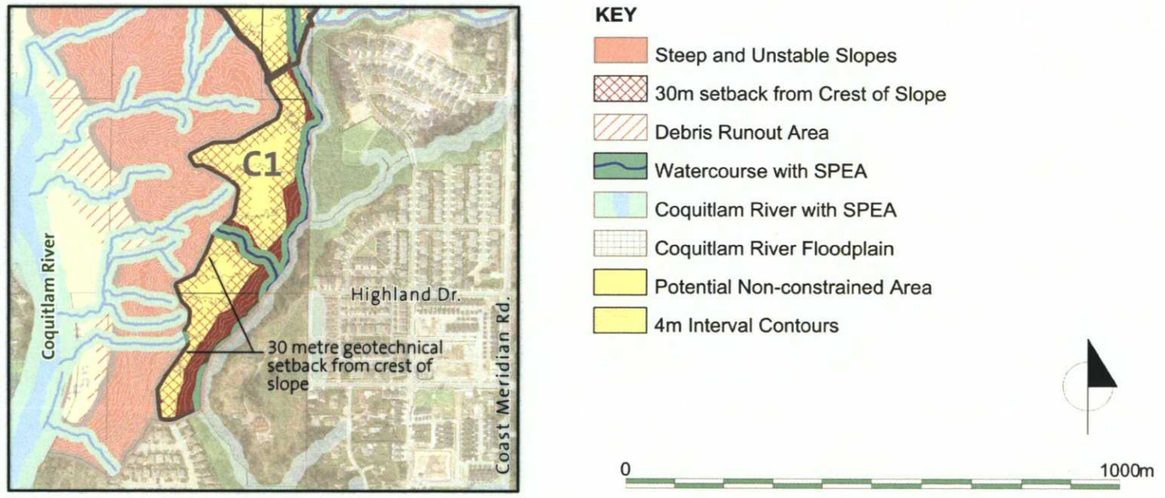
GENERAL CHARACTERIZATION

Sub Area C1 is characterized by generally a north-south narrow strip of land with level gradients bounded by the top of the steep-sloped escarpment to the west, and steep embankment to Hyde Creek to the east. The Sub Area is bisected by a deep ravine and tributary stream running approximately southeast into Hyde Creek.

Since the crest of the steep-sloped escarpment (Sub Area SS1) and top of incised channel are close to each other, for this analysis a 30 metre setback has been applied as a precaution against bank failure. Further geotechnical investigation is necessary prior to development.

EVALUATION

Issues	Constraints / Opportunities	Sub Area C1
Slope and Aspect	**Constraints**	• Mature vegetation on adjacent slopes will create shade except for midday sun
	Opportunities	• Relatively level north/south
Geotechnical Stability and Runout	**Constraints**	• Close proximity to unstable slope requires 30 metre setback from crest of slope
	Opportunities	• General stability with little to no runout potential
Vegetation	**Constraints**	• Mature tree canopy in the steep-sloped,forested escarpment to the west (Sub Area SS1) could pose a wildfire risk to adjacent future development • Adjacent Steep slopes and geotechnical setbacks may require additional tree protection for slope stabilization
	Opportunities	• Mature Vegetation on embankments in adjacent streamside protection areas to the east and west
Riparian	**Constraints**	• 15 metre streamside areas (SPEA) setback for all watercourses
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams
Access	**Constraints**	• Limited width in Sub Area to develop local road network
	Opportunities	• Close proximity to existing road network (Oxford Street) • Provides suitable grades for added network connections between Sub Areas; The Oxford Street extension is already part of existing planned road network • Possible integration with the City's Master Trail Plan
View Potential, Spatial Quality, and Character	**Constraints**	• Mature vegetation on adjacent slopes will impede views
	Opportunities	• Good view potential, especially to the south
Water (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west, deeply cut ravine to the east, and some streams
	Opportunities	• Existing infrastructure in the vicinity of Sub Area to the south
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west, deeply cut ravine to the east, and some streams
	Opportunities	• Existing infrastructure downstream of Sub Area that can be tied into
Stormwater (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west, deeply cut ravine to the east, and some streams
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses



Refer to Figure 12 (Pg. 14) for full Sub Area C context map

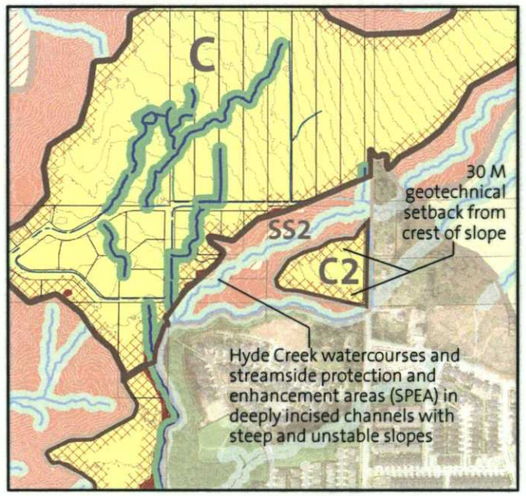
SUB AREA C2 - CONSTRAINTS AND OPPORTUNITIES

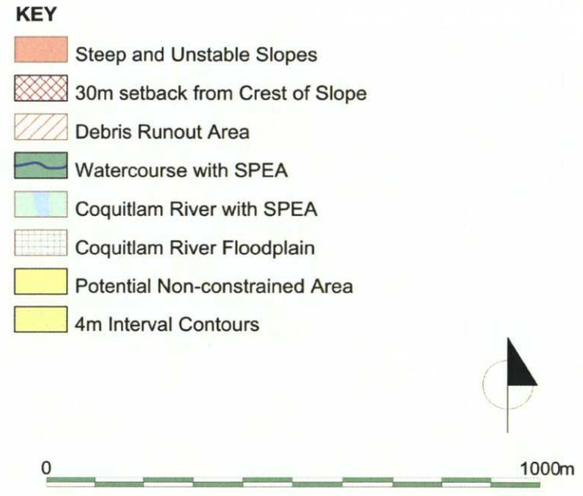
GENERAL CHARACTERIZATION

Sub Area C2 is small fragmented, isolated area by Hyde Creek to the north and its Tributary 2 to the south. The Sub Area is presently occupied with suburban, single family development with access from Coast Meridian Road on the east. Since the crest of the steep slopes is close to the deeply-cut ravine stream channels, for this analysis a 30 metre setback has been applied as a precaution against ravine bank failure. Further geotechnical investigation is necessary prior to development.

EVALUATION

Issues	Constraints / Opportunities	Sub Area C2
Slope and Aspect	**Constraints**	• Moderate to steep gradients
	Opportunities	• A small area that is open to the street (east)
Geotechnical Stability and Runout	**Constraints**	• Close proximity to unstable slopes requires 30 metre setback from crest of slope
	Opportunities	• Central portion of the site appears stable with little to no runout potential
Vegetation	**Constraints**	• Mature tree canopy in the steep-sloped,forested ravines surrounding the area could pose a wildfire risk to adjacent future development • Adjacent Steep slopes and geotechnical setbacks may require additional tree protection for slope stabilization
	Opportunities	• Mature vegetation on embankments in adjacent riparian areas to the east and west
Riparian	**Constraints**	• 15 metre streamside areas (SPEA) setback required for all watercourses
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams
Access	**Constraints**	• Only one access point possible via Coast Meridian Road
	Opportunities	• Close proximity to an existing road (Coast Meridian Road) • Moderate distance to existing bus routes • Possible integration with the City's Master Trail Plan
View Potential, Spatial Quality, and Character	**Constraints**	• Mature vegetation will create abundant shade
	Opportunities	• Good view potential, especially to the south • Mature vegetation in riparian areas provides high aesthetic values, forest character
Water (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped and deeply cut ravines to the north, south and west, and some streams
	Opportunities	• Existing infrastructure in the vicinity of Sub Area to the southwest
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped and deeply cut ravines to the north, south and west, and some streams
	Opportunities	• Existing infrastructure downstream of Sub Area that can be tied into
Stormwater (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped and deeply cut ravines to the north, south and west, and some streams
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses





Refer to Figure 12 (Pg. 14) for full Sub Area C context map

D SUB AREA D - CONSTRAINTS AND OPPORTUNITIES

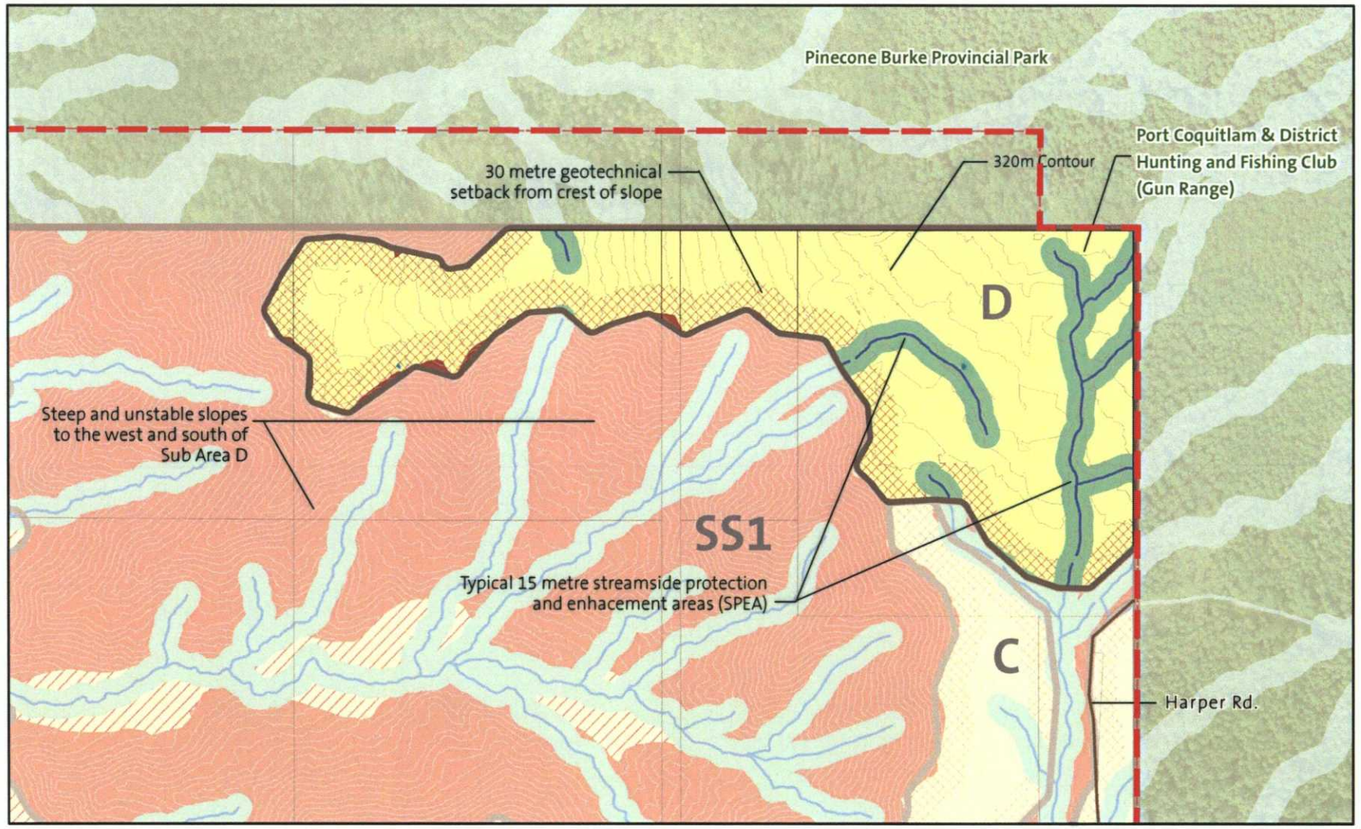
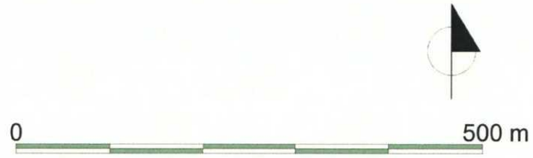


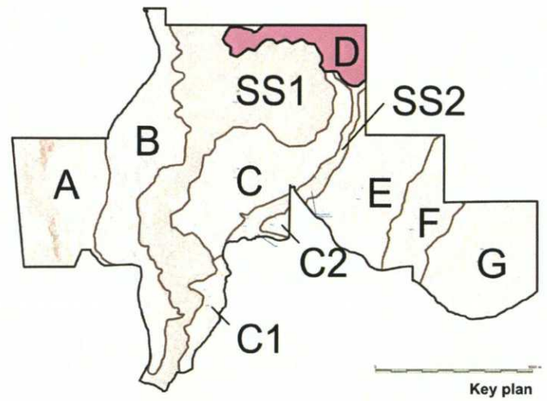
Figure 13: Sub Area D



KEY

- Steep and Unstable Slopes
- 30m setback from Crest of Slope
- Debris Runout Area
- Watercourse with SPEA
- Potential Non-constrained Area
- 4m Interval Contours
- Urban Containment Boundary
- Drainage Ditch

NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area D	17	4%	6 to 9	34% to 56%



SUB AREA D - CONSTRAINTS AND OPPORTUNITIES

GENERAL CHARACTERIZATION

Sub Area D is characterized by high elevation of approximately 360m in the upper northeast corner, to 290m in the extreme western portion of the site. Gradients east to west may be challenging for roadways and development and the site is relatively inaccessible due to the escarpment to the south and west, and Pritchett Creek tributary to the north. The Sub Area is further constrained by a watercourse to the east and a deeply-cut ravine stream to the south.

Currently the area is accessed by Harper Road, and the Port Coquitlam & District Hunting and Fishing Club operates out of the northeast portion of the Sub Area. Noise could become an increasing issue as development occurs in the area. The entire Sub Area is currently beyond the Greater Vancouver Sewerage and Drainage District, Fraser Sewerage Area.

EVALUATION

Issues	Constraints / Opportunities	Sub Area D
Slope and Aspect	**Constraints**	• Moderate to steep areas in the western portion • Exposed to prevailing south west winds
	Opportunities	• North eastern portion is large area with manageable gradients • Desireable southwest facing slopes with good sun access
Geotechnical Stability and Runout	**Constraints**	• Close proximity to unstable slopes requiring 30 metre setback from crest of slopes • Unknown potential for soil contamination from Gun Club
	Opportunities	• General stability with little to no runout potential in northeast quadrant of Sub Area D
Vegetation	**Constraints**	• Mature tree canopy in the steep-sloped,forested escarpment to the west and south (Sub Area SS1) and neighbouring Pinecone Burke Provincial park along the northern boundary could pose a wildfire risk to adjacent future development. Exposure to prevailing winds could escalate wildfire risk • Adjacent Steep slopes and geotechnical setbacks may require additional tree protection for slope stabilization
	Opportunities	• Surrounded by mature forests
Riparian	**Constraints**	• 15 metre streamside areas (SPEA) setback for all watercourses
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams
Access	**Constraints**	• Some portions of the Sub Area include steeper slopes upward of 8+ degrees (14+%). Road network layouts and gradients will need to be assessed for compliance with Subdivision Bylaw requirement standards prior to confirming development or land use opportunities. • Limited width of west portion of Sub Area to develop local road network
	Opportunities	• Existing road connection to a portion of the Sub Area via Harper Road • Possible integration with the City's Master Trail Plan • Potential to provide improved access to the Pinecone Burke Provincial Park including the retention of existing trails to the park through the Sub Area
View Potential, Spatial Quality, and Character	**Constraints**	• Cleared areas will be exposed to prevailing winds
	Opportunities	• Good view potential from upper reaches • Surrounded by mature forests with high ecological and aesthetic values
Water (Utilities)	**Constraints**	• Entire Sub Area is outside of the Greater Vancouver Sewerage & Drainage District, Fraser Sewerage Area • The northeast portion of the Sub Area is above the 320 metre elevation and water service is currently not available above this elevation • Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west and south, some streams and distance from existing infrastructure
	Opportunities	• Existing infrastructure in the vicinity of Sub Area to the south
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west and south, some streams and distance from existing infrastructure • The western portion of the Sub Area may require pumping
	Opportunities	• Existing infrastructure downstream of Sub Area that can be tied into
Stormwater (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the west and south and some streams
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses

E SUB AREA E - CONSTRAINTS AND OPPORTUNITIES

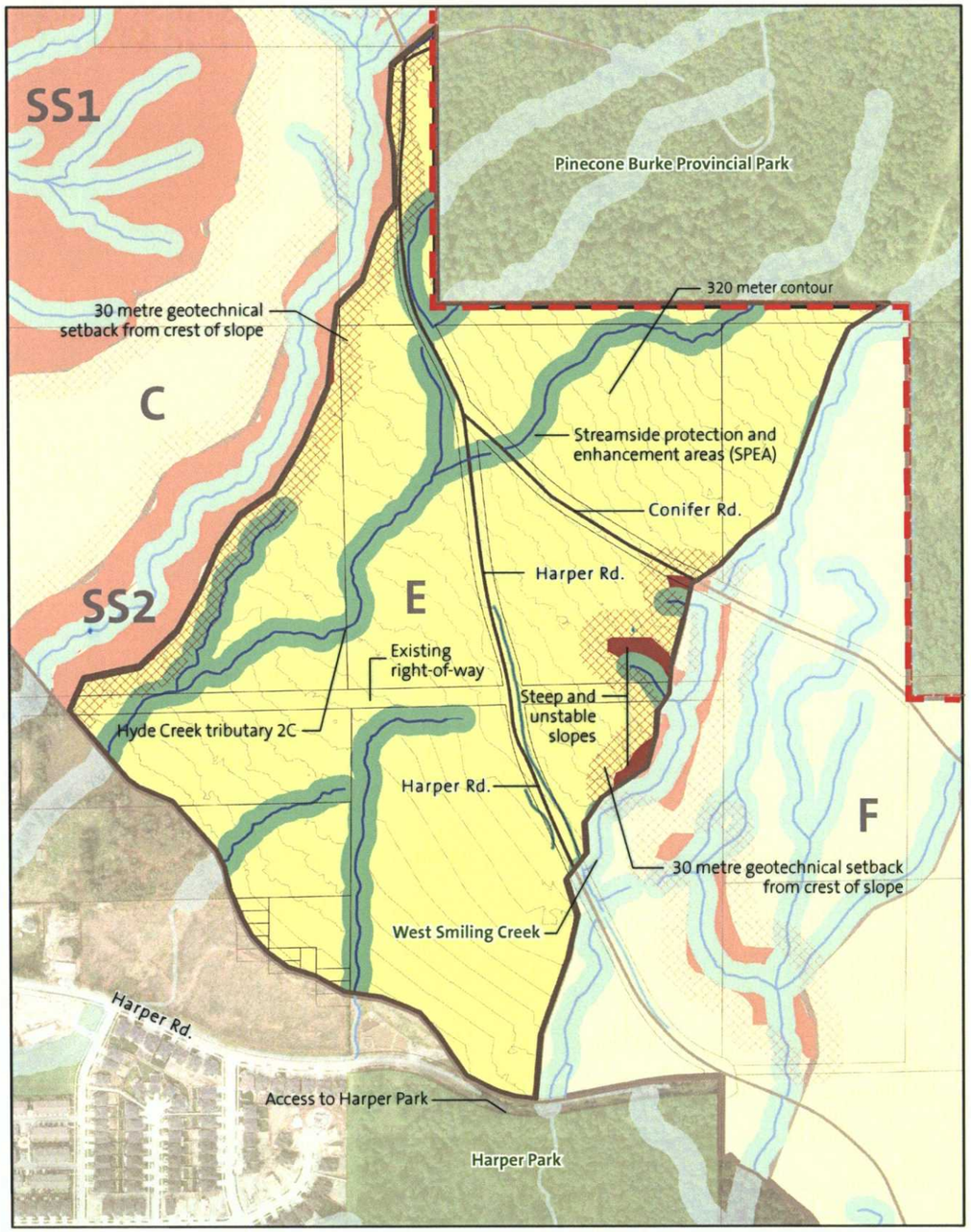
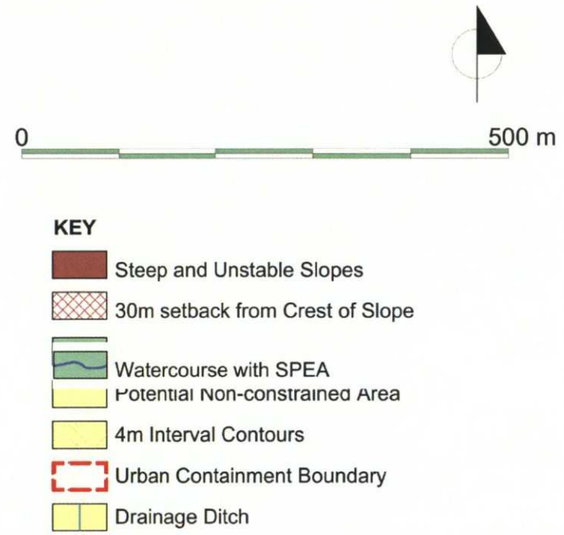
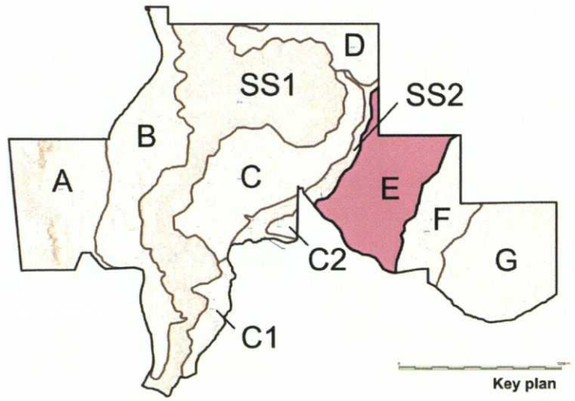


Figure 14: Sub Area E



NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area E	39	10%	22 to 27	56% to 68%



SUB AREA E - CONSTRAINTS AND OPPORTUNITIES

GENERAL CHARACTERIZATION

Sub Area E is characterized by a fairly uniform slope, averaging approximately 9 degrees (15%) and rising from southwest to the northeast. Two roads exist in the Sub Area, Harper Road and Conifer Drive, which provides access to nearly all of Sub Area E. The upper portions of the Sub Area reaches 375 metre elevation, which tends to accumulate snow that can persist in the winter months.

An important Hyde Creek tributary watercourse runs roughly perpendicular to the contour and isolates the western portion of the Sub Area between the tributary and the Hyde Creek deeply cut (incised) ravine watercourse to the north. The West Smiling Creek and incised channel forms the south eastern boundary of the Sub Area. The entire Sub Area is currently beyond the Greater Vancouver Sewerage and Drainage District, Fraser Sewerage Area.

EVALUATION

Issues	Constraints / Opportunities	Sub Area E
Slope and Aspect	**Constraints**	• Majority of the Sub Area is moderate to steep • Small portion of unstable slope to the east in West Smiling Creek channel
	Opportunities	• Relatively low gradient slopes to the south • Desirable southwest aspect for sun access late morning through late afternoon
Geotechnical Stability and Runout	**Constraints**	• Close proximity to unstable slopes requires 30 metre setback from crest of slopes
	Opportunities	• General stability with little to no debris runout potential
Vegetation	**Constraints**	• Mature tree canopy in the steep-sloped,forested ravine to the west (Sub Area SS2) and neighbouring Pinecone Burke Provincial park along the northern boundary could pose a wildfire risk to adjacent future development. • Adjacent Steep slopes and geotechnical setbacks may require additional tree protection for slope stabilization
	Opportunities	• Mature vegetation in riparian areas provides environmental habitat and aesthetic value
Riparian	**Constraints**	• 15 metre streamside areas (SPEA) setback for all watercourses
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams (West Smiling and Hyde Creek tributaries)
Access	**Constraints**	• Stream crossings may present challenges to road network development • Some portions of the Sub Area include steeper slopes upward of 9+ degrees (15+%). Road network layouts and gradients will need to be assessed for compliance with Subdivision Bylaw requirement standards prior to confirming development or land use opportunities. • High elevations could have implications for snow and ice management
	Opportunities	• Close proximity to existing roads (Harper Road and Conifer Drive) • Existing Harper Road alignment generally within City standards for road gradients • Possible integration with the City's Master Trail Plan • Potential to provide improved access to the Pinecone Burke Provincial Park including the retention of existing trails to the park through the Sub Area
View Potential, Spatial Quality, and Character	**Constraints**	• Mature vegetation in riparian areas to the east (Sub Area F) will impede views
	Opportunities	• Good view potential to the southwest
Water (Utilities)	**Constraints**	• Entire Sub Area is outside of the Greater Vancouver Sewerage & Drainage District, Fraser Sewerage Area • The northeast portion of the Sub Area is above the 320 metre elevation and water service is currently not available above this elevation • Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the northwest and some streams
	Opportunities	• Existing infrastructure in the vicinity of Sub Area to the south
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the northwest and some streams
	Opportunities	• Existing infrastructure downstream of Sub Area that can be tied into
Stormwater (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, steep-sloped escarpment to the northwest and some streams
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses

F SUB AREA F - CONSTRAINTS AND OPPORTUNITIES

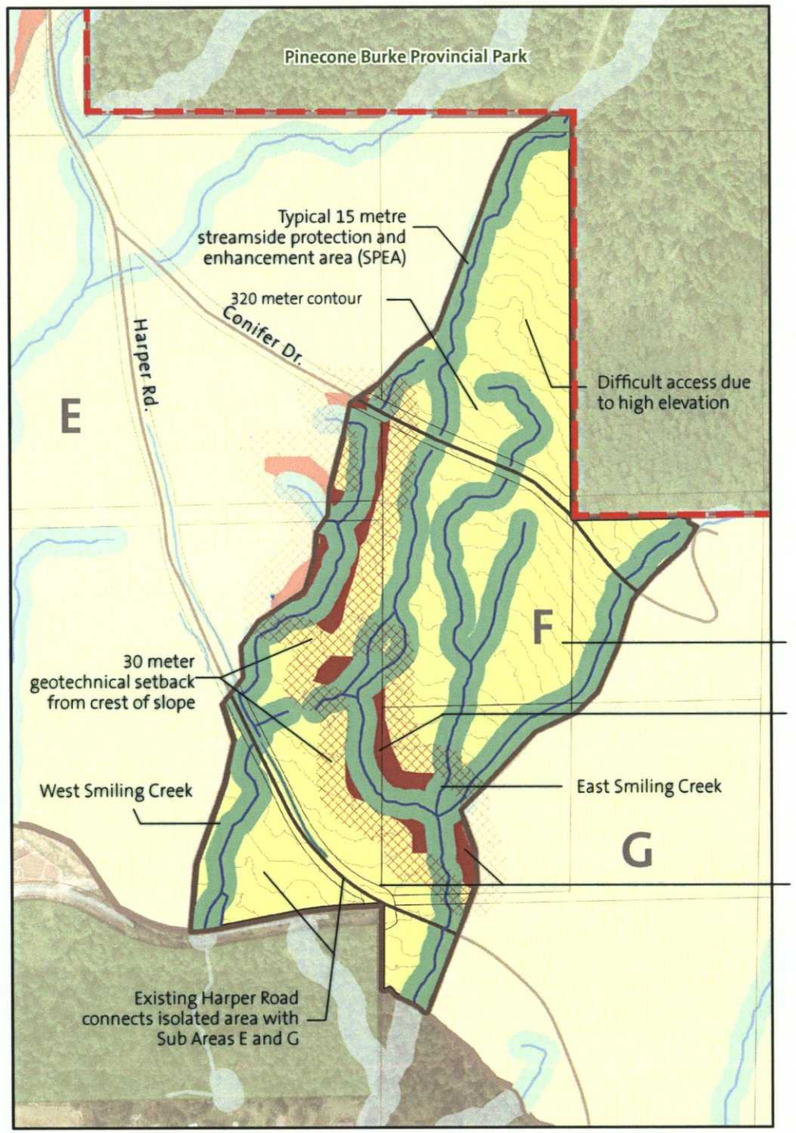
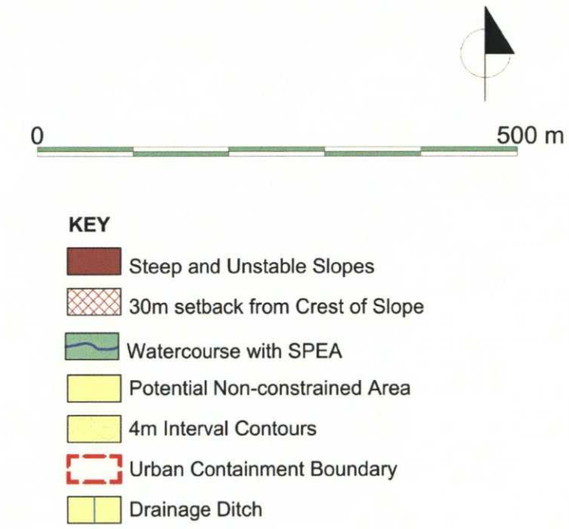
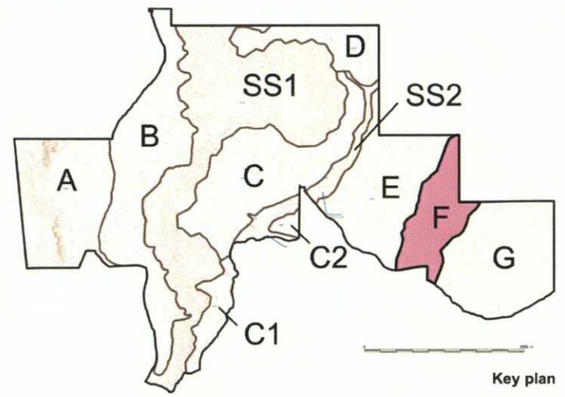


Figure 15: Sub Area F



NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area F	21	6%	2 to 6	10% to 30%



SUB AREA F - CONSTRAINTS AND OPPORTUNITIES

GENERAL CHARACTERIZATION

Sub Area F is characterized by the Smiling Creek flowing generally north to south and by a cluster of several tributaries that fragment potential development areas. East and West Smiling tributaries exhibit steep slopes and deeply incised channels sufficient to require a 30 metre setback at the top of the slope as a precaution against bank failure. The upper reaches of the Sub Area reaches above 370 metre elevation, which has freezing conditions and tends to accumulate snow that can persist in the winter months.

Harper Road provides access to a smaller unconstrained potential development site at the south part of the Sub Area, while Conifer Drive crosses several tributaries over the northern portion. The northernmost portion of the Sub Area is more likely to be accessed from the upper reaches of the adjacent Sub Area E, but would require a stream crossing and environmental agency authorization. Nearly all of the Sub Area is currently beyond the Greater Vancouver Sewerage and Drainage District, Fraser Sewerage Area.

EVALUATION

Issues	Constraints / Opportunities	Sub Area F
Slope and Aspect	**Constraints**	• Moderate to steep, with deeply cut creek channels • Portion of unstable slope to the west and the south
	Opportunities	• Desirable southwest aspect for sun access late morning through late afternoon • Interesting and varied topography
Geotechnical Stability and Runout	**Constraints**	• Unstable slopes in the vicinity of the deeply cut stream channels, 30m geotechnical setbacks required
	Opportunities	• Although steep and unstable slopes in creek vicinity, no debris runout hazard identified
Vegetation	**Constraints**	• Mature tree canopy in the steep-sloped,forested streamside protection areas and neighbouring Pinecone Burke Provincial park along the northern boundary could pose a wildfire risk to adjacent future development. • Adjacent Steep slopes and geotechnical setbacks may require additional tree protection for slope stabilization
	Opportunities	• Mature vegetation will be conserved through the streamside protection areas and Pinecone Burke Provincial Park, lending ecological and aesthic value • Tree canopy will provide shade during hot summer months
Riparian	**Constraints**	• 15 metre streamside areas (SPEA) setback for all watercourses • Many watercourses with streamside protection areas fragments potential development areas
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams
Access	**Constraints**	• Sub Area has relatively Steep slopes. Road network layouts and gradients will need to be assessed for compliance with Subdivision Bylaw requirement standards prior to confirming development or land use opportunities • Creek crossings and streamside protection areas could limit local road development and network • High elevations could have implications for snow and ice management
	Opportunities	• Close proximity to existing roads (Harper Road and Conifer Drive) • Possible integration with the City's Master Trail Plan • Potential to provide improved access to the Pinecone Burke Provincial Park including the retention of existing trails to the park through the Sub Area
View Potential, Spatial Quality, and Character	**Constraints**	• May be considered by some to be shady and cool in winter months
	Opportunities	• Good view potential but impeded by mature riparian vegetation • Forest character, with shade and flowing creeks
Water (Utilities)	**Constraints**	• Virtually all of the Sub Area is north and outside of the Greater Vancouver Sewerage & Drainage District, Fraser Sewerage Area • The north portion of the Sub Area is above the 320 metre elevation and water service is not available above this elevation • Locating utilities could be challenging due to steep grades, deeply-cut ravines and many streams
	Opportunities	• Existing infrastructure in the vicinity of Sub Area to the south
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, deeply-cut ravines and many streams
	Opportunities	• Existing infrastructure downstream of Sub Area that can be tied into
Stormwater (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, deeply-cut ravines and many streams
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses

G SUB AREA G - CONSTRAINTS AND OPPORTUNITIES

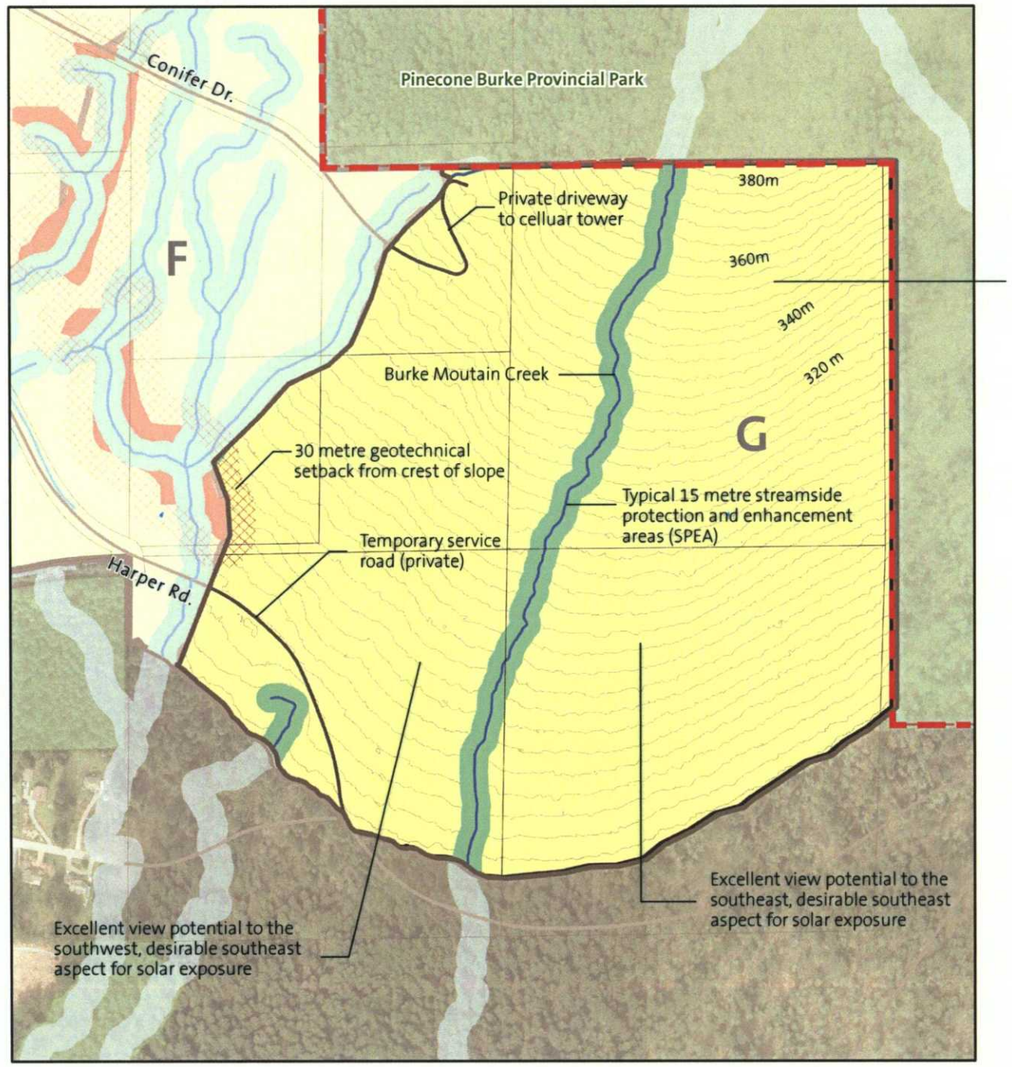
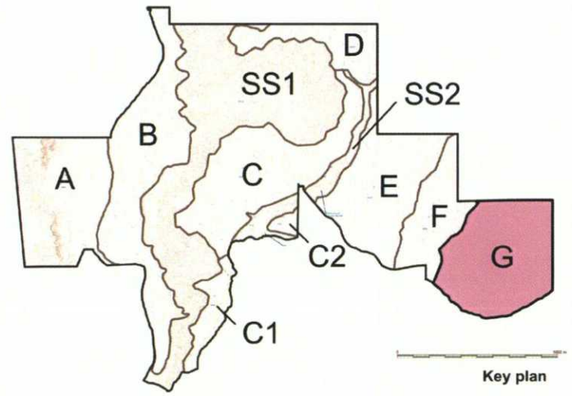


Figure 16: Sub Area G

KEY

- Steep and Unstable Slopes
- 30m setback from Crest of Slope
- Watercourse with SPEA
- Potential Non-constrained Area
- 4m Interval Contours
- Urban Containment Boundary
- Drainage Ditch

NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area G	43	11%	32 to 38	75% to 88%



SUB AREA G - CONSTRAINTS AND OPPORTUNITIES

GENERAL CHARACTERIZATION

Sub Area G is characterized as a large tract of forested hillside land, bisected by Burke Mountain Creek, which runs perpendicular to the contours just to the west of the mountain ridge and watershed boundary. Although exhibiting relatively few constraints, the Sub Area has significant slopes ranging from 19 degrees (34%) at the northeast, to 14 degrees (25%) in the lower portions of the southwest quadrant.

Elevations range from approximately 240 metres to nearly 400 metres, which has freezing and snow implications in the winter. Virtually all of the Sub Area is currently beyond the Greater Vancouver Sewerage and Drainage District, Fraser Sewerage Area.

EVALUATION

Issues	Constraints / Opportunities	Sub Area G
Slope and Aspect	**Constraints**	• Some very steep slopes creates challenges for access and construction • Pedestrian and cycling will be difficult to achieve at higher elevations
	Opportunities	• Moderate to steep slopes with desireable south east to south and southwest solar aspect
Geotechnical Stability and Runout	**Constraints**	• Provincial Park and natural areas could introduce wildlife/human conflicts • Development will make preserving existing vegetation difficult. There may be tree windfirm/damage issues with relatively narrow strip of forest grown riparian vegetation on Burke Mountain Creek exposed to high winds on the ridge
	Opportunities	• General stability with little to no runout potential
Vegetation	**Constraints**	• Mature tree canopy in the neighbouring Pinecone Burke Provincial park along the northern boundary and in streamside protection areas could pose a wildfire risk to adjacent future development • Adjacent Steep slopes and geotechnical setbacks may require additional tree protection for slope stabilization
	Opportunities	• Pinecone Burke Provincial Park at the northern boundary provides forested edge
Riparian	**Constraints**	• Relatively narrow riparian strip on ridge may require expanded tree protection or vegetation management
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams
Access	**Constraints**	• Sub Area is subject to Steep slopes. Road network layouts and gradients will need to be assessed for compliance with Subdivision Bylaw requirement standards prior to confirming development or land use opportunities • Creek crossings and riparian areas may limit road network development • High elevations could have implications for snow and ice management
	Opportunities	• Regular contours may accommodate patterned local road development similar to areas planned to the south in Partington Creek • Potential to provide improved access to the Pinecone Burke Provincial Park including the retention of existing trails to the park through the Sub Area • Possible integration with the City's Master Trail Plan
View Potential, Spatial Quality, and Character	**Constraints**	• Development on steeper slopes will make preserving existing vegetation difficult due to extensive grading requirements. Large tracts of removed tree canopy will make new development very visible from outside the study area
	Opportunities	• Good view potential
Water (Utilities)	**Constraints**	• The north portion of the Sub Area is above the 320 metre elevation and water service is not available above this elevation • Locating utilities could be challenging due to steep grades and Burke Mountain Creek
	Opportunities	• Potentially limited watercourses and no unstable, steep slopes to contend with
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades and Burke Mountain Creek • Virtually all of the Sub Area is north and outside of the Greater Vancouver Sewerage & Drainage District, Fraser Sewerage Area • Extension of services into Partington Creek neighbourhood will have to preceed to provide a suitable tie-in point to serve this Sub Area
	Opportunities	• Potentially limited watercourses and no unstable, steep slopes to contend with
Stormwater (Utilities)	**Constraints**	• Some infrastructure downstream to west of watercourse. Need to confirm available capacity. Some existing infrastructure further down hillside on east side of watercourse.
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses

SS1

SUB AREA SS1 - CONSTRAINTS AND OPPORTUNITIES

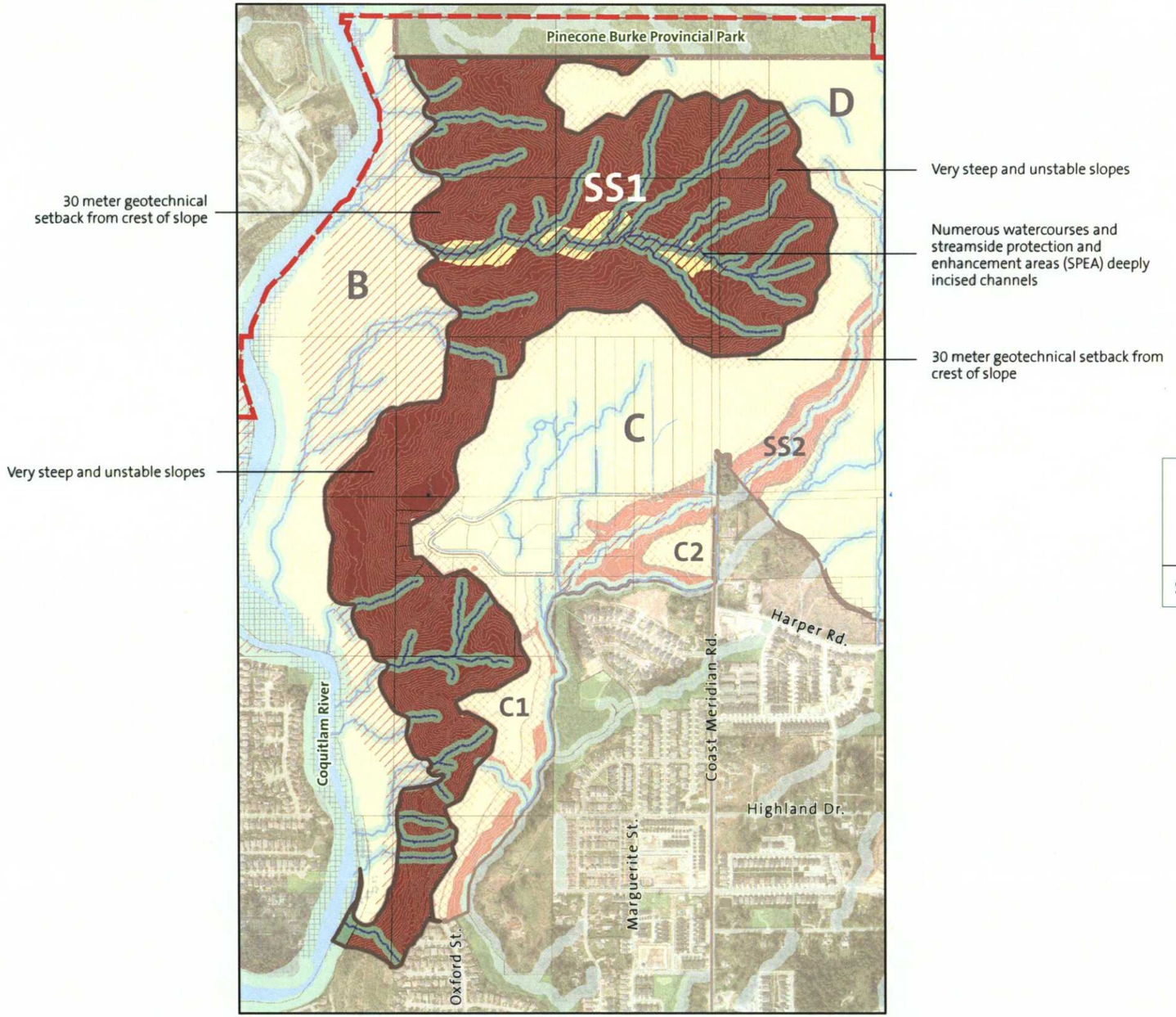
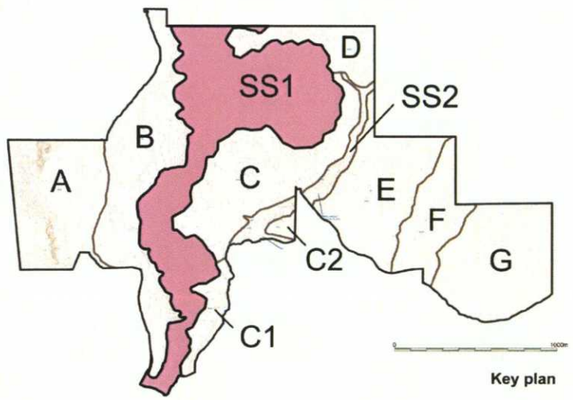


Figure 17: Sub Area SS1

KEY

- Steep and Unstable Slopes
- 30m setback from Crest of Slope
- Debris Runout Area
- Watercourse with SPEA
- Coquitlam River with SPEA
- Coquitlam River Floodplain
- Potential Non-constrained Area
- 4m Interval Contours
- Urban Containment Boundary
- Drainage Ditch

NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area SS1	94	25%	0 to 4	0% to 4%



SUB AREA SS1 - CONSTRAINTS AND OPPORTUNITIES

GENERAL CHARACTERIZATION

Sub Area SS1 is characterized by steep, unstable slopes defined as slopes greater than 24 degrees (45%) with active or inherent instability, posing a risk of debris flows and runout, which is a threat to life and property. A 30 metre geotechnical setback from crest of slope has been applied due to risk of bank failure. Geotechnical conditions, with steep terrain, pose significant challenges to transportation access and the siting of other infrastructure.

A comprehensive drainage basin is located in the northern reaches with a dozen or so deeply cut (incised) watercourses draining into the Coquitlam River. Typically, there is about 100 metre in elevation change from the toe of the steep slope to the top of steep slope in the southern portion of the Sub Area, while in the northern portion of the Sub Area there is nearly 200 metre elevation change. The northern portion of the area is outside the Greater Vancouver Sewerage and Drainage District, Fraser Sewerage Area.

EVALUATION

Issue	Constraints / Opportunities	Sub Area SS1
Slope and Aspect	**Constraints**	• Steep and unstable slopes creates access and development challenges • Steep slopes can contribute to erosion and deposition as part of a natural process
	Opportunities	• Interesting and varied topography defines and encloses the Coquitlam River valley
Geotechnical Stability and Runout	**Constraints**	• Unstable slopes with debris flow potential pose significant risk and can pose considerable expense and limitations to development; requires further detailed geotechnical study
	Opportunities	• Significant ecological area with forested slopes, watercourses and riparian areas with high aesthetic value provides preservation opportunity
Vegetation	**Constraints**	• Mature tree canopy in the forested escarpment could pose a wildfire risk to adjacent future development • tree retention and enhancement maybe required for slope stabilization
	Opportunities	• Steep and unstable slopes will benefit from mature tree cover and intact root zones, adding ecological and aesthetic value
Riparian	**Constraints**	• Steep and unstable slopes throughout the Sub Area may require expanded tree protection or vegetation management
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams
Access	**Constraints**	• Steep slopes and geotechnical conditions along the escarpment, run the length of the Vision area through to David Avenue. This presents a number of challenges for road connections between adjacent Sub Areas to the east and west
	Opportunities	• Potential to provide improved access to the Pinecone Burke Provincial Park including the retention of existing trails to the park through the Sub Area • Possible integration with the City's Master Trail Plan
View Potential, Spatial Quality, and Character	**Constraints**	• Mature vegetation will impede views from Sub Area C
	Opportunities	• Very high quality environmental area with mature, forested character and many watercourses, some with falls. The entire Sub Area could be a unique environmental feature within Northwest Burke Vision area • Potential to preserve as a natural area
Water (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, instability and many streams
	Opportunities	• Existing infrastructure in the vicinity of Sub Area to the south
Sanitary (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, instability and many streams
Stormwater (Utilities)	**Constraints**	• Locating utilities could be challenging due to steep grades, instability and many streams
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses

SS2

SUB AREA SS2 - CONSTRAINTS AND OPPORTUNITIES

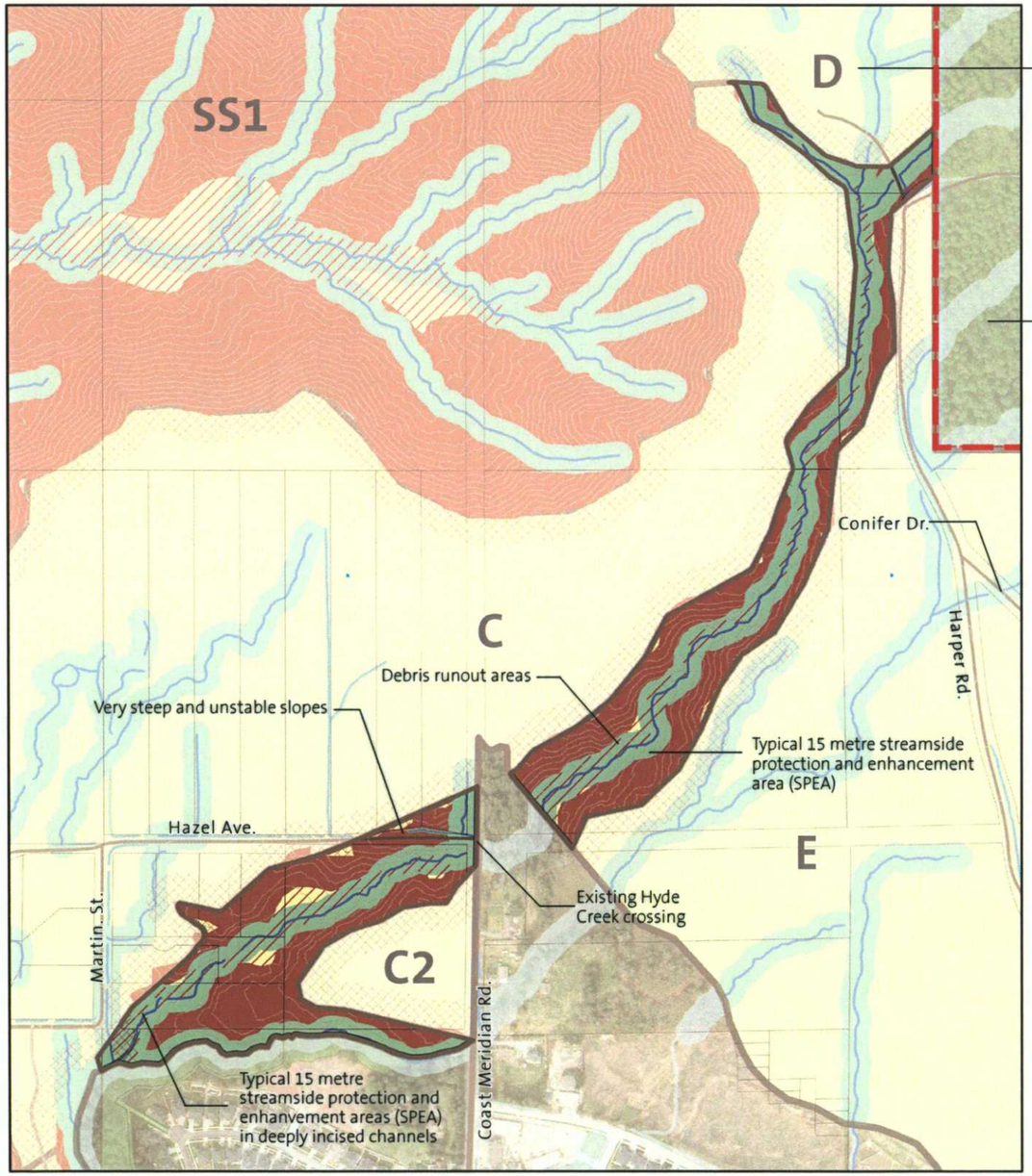
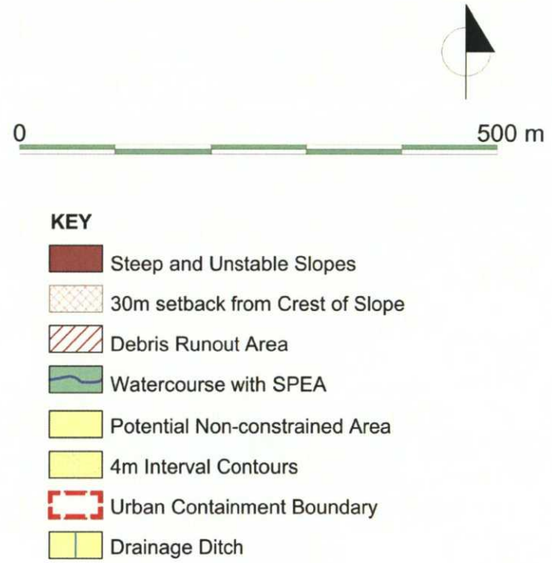
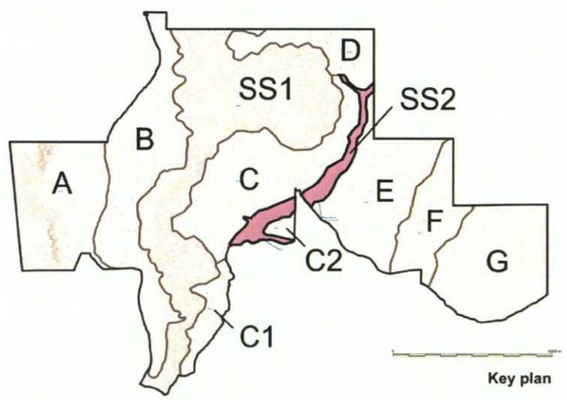


Figure 18: Sub Area SS2



NBV Area 379 ha	Land Area		Estimated Non-Constrained Area	
	Hectares	% or NBV	Hectares (Low to High Range)	Percent of Area (Low to High Range)
Sub Area SS2	11	3%	0 to 0	0%



SUB AREA SS2 - CONSTRAINTS AND OPPORTUNITIES

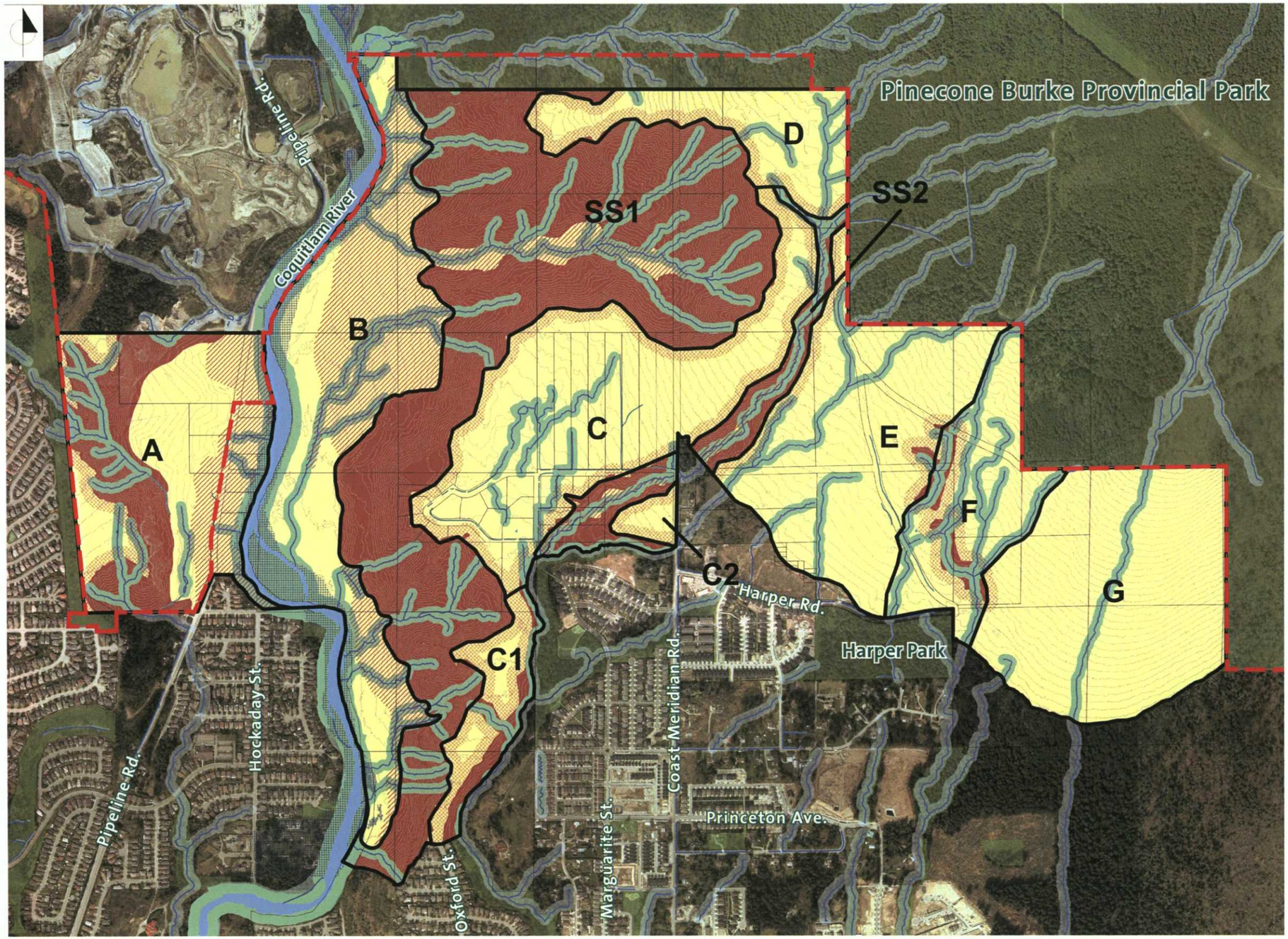
GENERAL CHARACTERIZATION

Similar to Sub Area SS1, Sub Area SS2 is characterized by steep slopes and deeply incised Hyde Creek watercourse. Also, there is the debris runout hazard potential in this ravine area, and a 30 metre setback from crest of slope has been applied as a precaution against bank failure. The steep and unstable slopes have mature tree cover.

Due to the topographical and geotechnical characteristics, the Sub Area presents a dividing barrier between Sub Areas C and E.

EVALUATION

Issue	Constraints / Opportunities	Sub Area SS2
Slope and Aspect	**Constraints**	• Steep and unstable slopes pose difficulties to access and development
	Opportunities	
Geotechnical Stability and Runout	**Constraints**	• Unstable slopes require 30 metre geotechnical setback from crest of slope • Debris flow and run out potential into watercourse
	Opportunities	
Vegetation	**Constraints**	• Mature tree canopy in the forested ravine could pose a wildfire risk to adjacent future development
	Opportunities	• Riparian areas and geotechnical conditions will likely result in significant conservation of mature vegetation
Riparian	**Constraints**	• Steep ravine conditions of the Sub Area may require expanded tree protection or vegetation management
	Opportunities	• Streamside protection and enhancement areas (SPEA) can have a positive contribution toward neighbourhood character and support the environmental health of streams
Access	**Constraints**	• Slopes and geotechnical conditions will limit crossing options, potentially adding significant expense
	Opportunities	• Existing crossings at Coast Meridian and Hazel provide access to Sub Area C • Possible integration with the City's Master Trail Plan
View Potential, Spatial Quality, and Character	**Constraints**	• Mature vegetation can impede views to the south from Sub Area C
	Opportunities	• Mature vegetation provides forest character and helps to spatially define Sub Areas C and E. The entire Sub Area could be a unique environmental feature within Northwest Burke Vision area • Potential to preserve as a natural area
Water (Utilities)	**Constraints**	• Additional infrastructure will be expensive
	Opportunities	• Existing infrastructure in the vicinity of Sub Area to the south
Sanitary (Utilities)	**Constraints**	• Servicing due to steep grades may be challenging
	Opportunities	• Existing infrastructure downstream of Sub Area that can be tied into
Stormwater (Utilities)	**Constraints**	• Potential challenges with alignments due to watercourses
	Opportunities	• Stormwater servicing strategy can support the protection of natural watercourses by controlling the rate and volume of runoff discharged. Development can incorporate rainwater management features (rain gardens, infiltration trenches, pervious pavement, etc.) to support water quality and baseflow in nearby watercourses



KEY

- Steep and Unstable Slopes
- 30 Metre Setback from Crest of Slope
- Debris Runout Area
- Watercourse with SPEA
- Coquitlam River With SPEA
- Coquitlam River Floodplain
- Potential Non-Constrained Areas
- 4 Metre Interval Contours
- Urban Containment Boundary
- Drainage Ditch

Figure 19: Northwest Burke Vision: Constraints and Opportunities

4.0 SUMMARY & CONCLUSION

Figure 19 consolidates the Sub Areas to show their relationships as it applies to the constraints and opportunities identified through this Phase 1 analysis. This includes identifying lands that are fully constrained, partially constrained and non-constrained.

The findings of this analysis will provide a foundation for Phase II of the Northwest Burke Vision, which will involve exploring and identifying potential land use, access and servicing ideas.

3.0 LIST OF REFERENCES

Reports and Studies

Armstrong, J.E. and S.R. Hicock. 1980a. Surficial geology, New Westminster, British Columbia. Geological Survey of Canada. Map 1484A.

Armstrong, J.E. and S.R. Hicock. 1980b. Surficial geology, New Westminster, British Columbia. Geological Survey of Canada. Map 1486A.

Aplin and Martin Consultants Limited. 1998. River Walk on the Coquitlam: Geotechnical Package. Report prepared for The Landview Group.

Associated Engineering (B.C.) Limited. 2004. Hyde Creek Integrated Watershed Management Plan. Report prepared for City of Coquitlam and City of Port Coquitlam. Burnaby, BC.

Catherine Berris Associates Inc. 1995. Northwest Coquitlam Environmental Assessment. Report prepared for City of Coquitlam. Vancouver, BC.

City of Coquitlam Engineering Department. 1997. Preliminary Geotechnical Risk Identification in Northeast Coquitlam. Report prepared for City of Coquitlam. Coquitlam, BC.

Church M., and J.M. Ryder. 2010. Physiography of British Columbia. In: Compendium of Forest Hydrology and Geomorphology in British Columbia. B.C. Ministry of Forests and Range. Victoria, B.C.

Clague, J.J. 1994. Quaternary stratigraphy and history of south-coastal British Columbia. In: Monger J.W.H. (ed.), Geology and Geological Hazards of the Vancouver Region, Southwestern British Columbia. Geological Survey of Canada. Bulletin 481: 181-192.

Hungr et al, (2013); Varnes classification of landslides types, an update. Draft document presented to the Joint Technical Committee for Natural Slopes and Landslides, as a subset of International Society of Rock Mechanics.

Hungr, O., S.G. Evans, M.J. Bovis and J.N. Hutchinson. 2001. A Review of the Classification of Landslides of the Flow Type. Environmental and Engineering Geoscience. Vol. 4, 3: 221-238.

Luttmerding, H.A. 1980. Soils of the Langley-Vancouver Map Area, Volume 1: Soil Mosaics and Legend, Lower Fraser Valley. Compiled by the British Columbia Soil Survey, Ministry of Environment, Lands and Parks. Report 15. RAB Bulletin 18. Mapsheets 37, 38, and 39. 1:25 000 scale.

Luttmerding, H.A. 1980. Soils of the Langley-Vancouver Map Area, Volume 2: Description of Soils. Compiled by the British Columbia Soil Survey, Ministry of Environment, Lands and Parks. Report 15. RAB Bulletin 18. Mapsheets 2, 3, 8, and 9. 1:25 000 scale.

Massey, N.W.D., D.G. MacIntyre, P.J. Desjardins and R.T. Cooney. 2005. Digital Map of British Columbia: Tile NM10 Southwest B.C. B.C. Ministry of Energy and Mines. GeoFile 2005-3. Available at: http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/GeoFiles/Pages/2005-3.aspx

Quadra Planning Consultants Limited. 2003. Lower Coquitlam River Watershed Atlas. Report prepared for Coquitlam River Watershed Society and City of Coquitlam. Coquitlam, BC.

Standards and Guidelines

APEGBC (Association of Professional Engineers and Geoscientists). 2012. Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC. Version 1.1. Commissioned by the BC Ministry of Forests, Lands, and Natural Resource Operations. Available at: https://www.apeg.bc.ca/getmedia/18e44281-fb4b-410a-96e9-cb3ea74683c3/APEGBC-Legislated-Flood-Assessments.pdf.aspx

APEGBC. 2010. Guidelines for Legislated Landslide Assessments for Proposed Residential Development in British Columbia. Available at: https://www.apeg.bc.ca/getmedia/5d8f3362-7ba7-4cf4-a5b6-e8252b2ed76c/APEGBC-Guidelines-for-Legislated-Landslide-Assessments.pdf.aspx

APEGBC and ABCFP (Association of BC Forest Professionals). 2008. Guidelines for Management of Terrain Stability in the Forest Sector. Available at: http://www.abcfp.ca/regulating_the_profession/documents/Management_Terrain_Stability.pdf

APEGBC (DEGIFS). 2002. A User's Guide to Terrain Stability Mapping in British Columbia. Prepared by J.M. Ryder and Associates Terrain Analysis Inc.

Day, J.H. (Editor) 1983. The Canadian Soil Information System (CanSIS) Manual for Describing Soils in the Field. Prepared by Agriculture Canada Expert Committee on Soil Survey. Agriculture Canada, Ottawa, ON.

Howes, D.E. and E. Kenk. 1997. Terrain Classification System for British Columbia. Version 2. Recreational and Fisheries Branch, Ministry of Environment and Surveys and Resource Mapping Branch, Ministry of Crown Lands Province of British Columbia. Victoria, BC.

Luttmerding, H., D.A. Demarchi, E.C. Lea, D.V. Meidinger and T. Vold. 1998 (Revised). Field Manual for Describing Terrestrial Ecosystems. MELP Manual 11. BC Ministry of Environment, Lands and Parks and BC Ministry of Forests. Victoria, BC.

Ministry of Environment. 2010. Terrestrial Ecosystems Information Guidelines for Developing a Project Plan. Version 1. Prepared by Ecosystem Information Section, Ecosystem Branch for the Land Base Investment Program, Forest Investment Account. 11 p.

Ministry of Environment. 2010. Field Manual for Describing Terrestrial Ecosystems. 2nd edition. Prepared by B.C. Ministry of Environment and B.C. Ministry of Forests, Research Branch. Published 2010. Available online at: http://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh25-2.htm

Resource Inventory Committee (RIC). 2010. Quality assurance Guidelines Terrain Stability Mapping (TSM). Draft. Prepared by Ministry of Environment, Environmental Stewardship Division, Ecosystem Information Section. Submitted March 2010. 354 p.

Ministry of Environment. 2007. A Landslide Classification and Inventory System for British Columbia with Digital Data Capture Standards. Draft 1. 60 p.

Ministry of Water, Land and Air Protection.2004.; Flood Hazard Area Land Use Management Guidelines. Province of British Columbia. Available at: http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/guidelines-2011.pdf

Ministry of Forests). 2001. Best management practices handbook: Hillslope restoration in British Columbia.Res. Ten. & Eng. Br., B.C. Min. For., Watershed Restoration Program Victoria, B.C.

Ministry of Forests, Lands and Natural Resource Operations (formerly Ministry of Forests). 1999. Mapping and assessing terrain stability guidebook (Forest practices code) Rev. ed. Includes bibliographical references: p. ISBN 0-7726-3893-4.

Ministry of Forests, Lands and Natural Resource Operations (from Resources Information Standards Committee (RISC)). 2010. Terrestrial Ecosystem Information Digital Data Submission Standard –Draft for Field Testing Database and GIS Data Standards. Ministry of Environment Ecosystems Branch. 183 p.

RISC. 1998. Standard for Terrestrial Ecosystem Mapping in British Columbia. Prepared by Ecosystems Working Group, Terrestrial Ecosystems Task Force, and Resource Inventory Committee. Submitted May 1998. Available at: http://www.ilmb.gov.bc.ca/risc/pubs/teecolo/tem/indextem.htm.

Resoucre Information Committee (RIC). 1998. Standard for Digital Terrain Data Capture in British Columbia. Terrain Technical Standard and Database Manual. Version 1. Prepared by Terrain Data Working Committee, Surficial Geology Task Group, and Earth Science Task Force. Submitted June 1998. 111 p.

RISC. 1996. Guidelines and Standards to Terrain Mapping in British Columbia. Surficial Geology Task Group, Earth Sciences Task Force, British Columbia. 131 p.

RISC. 1995. Soil Inventory Methods for British Columbia. Available at: http://www.ilmb.gov.bc.ca/risc/pubs/teecolo/soil/index.htm.

Soil Classification Working Group. 1998. Canadian System of Soil Classification, 3rd Edition. Reearch Branch, Agriculture and Agri-Food Canada. Ottawa, ON.