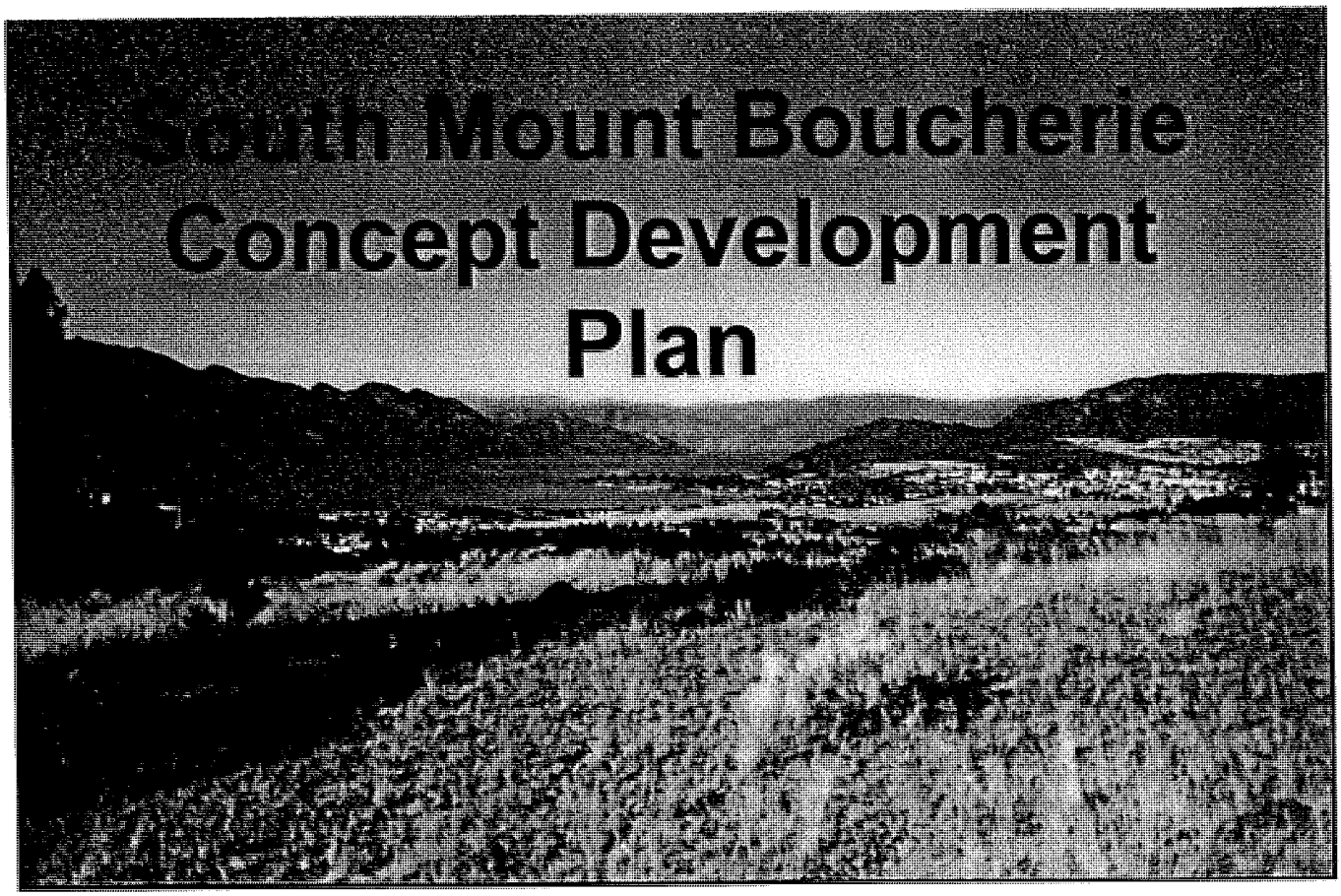
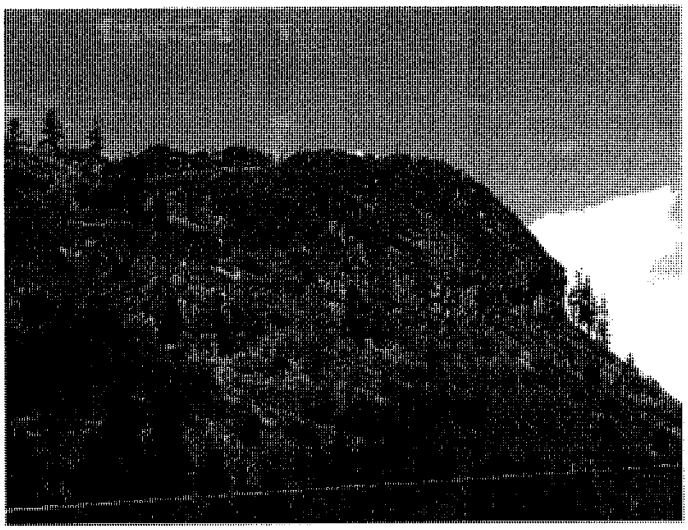



Prepared by:
PSC – Planning Solutions Consulting Inc.
Rock Glen Consulting Inc.
Protech Consultants Ltd.

June 2003

NOTE:
South Mount Boucherie Concept Development was adopted by Bylaw No. 1050-1 on April 11, 2005 into Westside Official Community Plan Bylaw No. 1050 as Appendix B-6 (no summary is included in Section 16); as a result, this June 2003 Plan is a reference document only.



# LIST OF FIGURES

# BACKGROUND AND INTRODUCTION

## Purpose

The Regional District of Central Okanagan guides its land use planning process by using a hierarchy of plans. This includes the Official Community Plan(s), neighbourhood plans and concept development plans.

A *Concept Development Plan (CDP)* is to be prepared by the Regional District and/or its consultants where the area has been identified by the Official Community Plan, is of significant magnitude or may affect adjacent properties, the natural environment, heritage sites, revitalization areas, or has other unique considerations. These lands are to be planned as a comprehensive unit.

This Plan, the *South Mount Boucherie Concept Development Plan* has been prepared by PSC – Planning Solutions Consulting Incorporated in consultation with the Regional District of Central Okanagan in consultation with District staff, the landowners and neighbouring residents.

As logical infill between the easterly, westerly and southerly neighborhoods, this plan offers potential for improving emergency access and much needed regional park access opportunities.

The Plan is intended to provide a future land use concept prepared in consideration of the area's topography and other environmental features, provision of roads and other infrastructure, retention of view corridors, integration with existing development, and the current policy framework established by the Regional District of Central Okanagan.

## Location

The site is situated west of the City of Kelowna in Lakeview Heights approximately 5 km from east of Westbank. See Figure 1a.

The site is bordered to the north by Mount Boucherie Regional Park and Crown Land. Directly to the west is East Boundary Road and to the west of that, I.R. #9. To the east and south there is single family residential development existing. See Figure 1b.

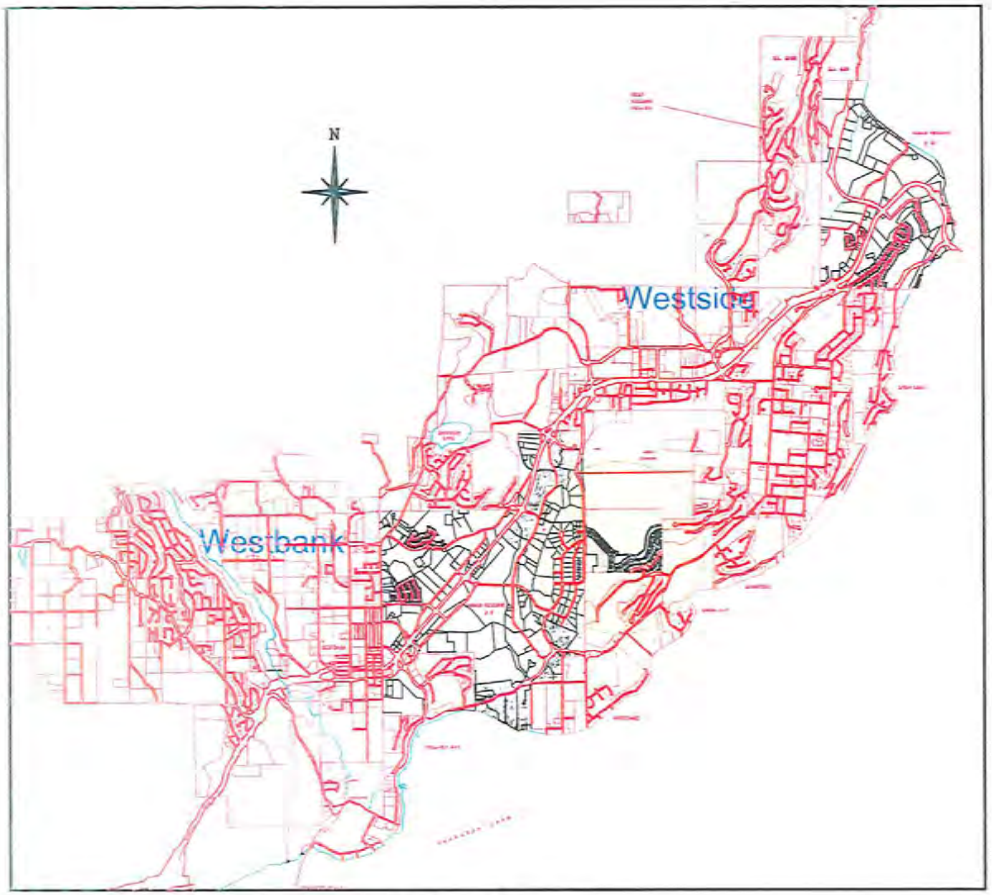
## The Process

The landowner initiated discussions with the Regional District with the intent of developing a plan for development of the study area lands. The Regional District staff prepared a *Terms of Reference* and upon Regional Board approval staff selected PSC – Planning Solutions Consulting Inc. to prepare the Concept Development Plan.

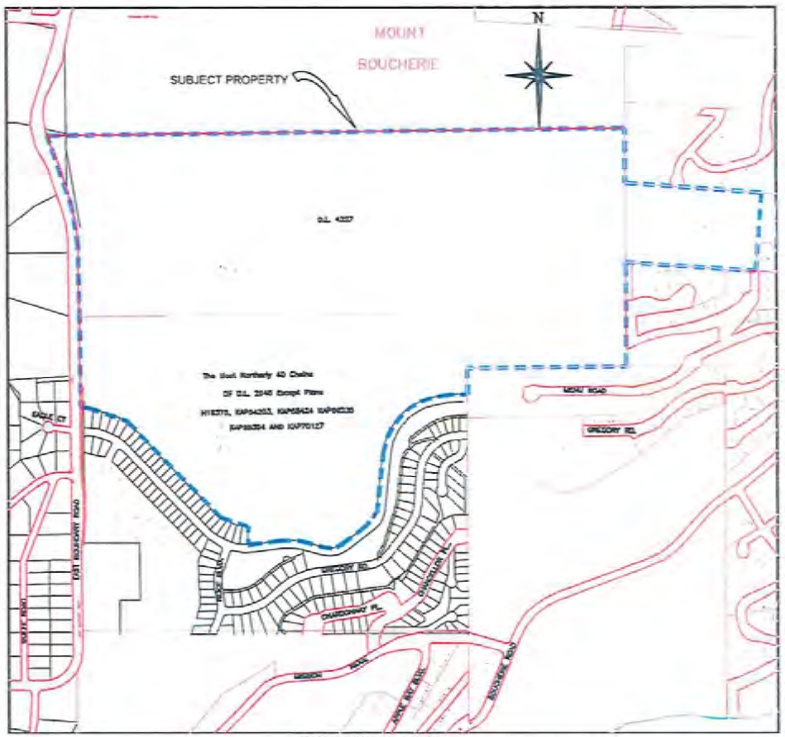
The Concept Development Plan is being prepared together by the Regional District, PSC – Planning Solutions, various agencies and stakeholders as well as the surrounding neighbourhood and the landowner. The process is being funded by the landowner but under the administration and direction of the Regional District of Central Okanagan.

On June 11, 2002 PSC met with Regional District staff and various outside agencies to review the Concept Development Plan area and discuss issues relating to the development area.

June 19th a public information meeting was held at the Mount Boucherie community Centre. There were approximately 140 attendees from the neighbourhood. The planning process was explained and an overview of the environmental issues was given with the floor then being opened up for a question and answer period. The general consensus was that development would occur on the property, however,




LOCATION PLAN




AREA DETAIL PLAN

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# South Mount Boucherie Concept Development Plan

Location

Figure 1a

size and type of development was a point of discussion. Major issues related to the current state of the roads surrounding the site, McCallum, Gregory, Menu, Vineyard and East Boundary and the lack of park and walkway maintenance. Approximately 120 exist surveys were handed out and 79 returned.

Questions in the exit survey related to ranking the importance of issues in the community, services that the public would like to see or are lacking in the area, acceptance of any commercial facilities, road improvements, park issues, preferred types of development, recreational issues and any desired conservation issues.

Nature and hiking trails along with types of land use stood out as the two issues felt most important by those who handed in completed surveys. Natural open space, hiking areas and parks and playgrounds were felt to be lacking in the area. Roughly 60% of the surveys indicated that the public felt they were lacking parks and playing areas in the neighbourhood. About half of the respondents indicated that they wished more trail connections to Mount Boucherie and more hiking trails in general.

Of those people who handed in surveys, just under half felt that sidewalks were the most important road improvement that was needed, new road surface and bike lanes were secondary.

Approximately 75% of the respondents indicated that they would not like any townhouse development in the Concept Development Plan area.

The consultants took into consideration the concerns and desires of those who attended and will be sensitive to those issues in preparing development options for the property.

On June 25, 2002 Westbank and Lakeview Heights Advisory Planning Commission's were met with to discuss the CDP area as well as the response from the Public at the open house June 19th. The joint meeting of the APC's discussed some of the frustrations felt on the Westside by not having an incorporated Municipality and thus not having enforcement controls on building design, yard maintenance, and overall quality of housing as available

in the City of Kelowna. Some concerns were expressed over the inability at this meeting to review alternative land use scenarios for the properties. It was acknowledged that traffic is a major issue but there were very few choices available and it may be necessary for a number of surrounding roadways to accept incremental increases in traffic.

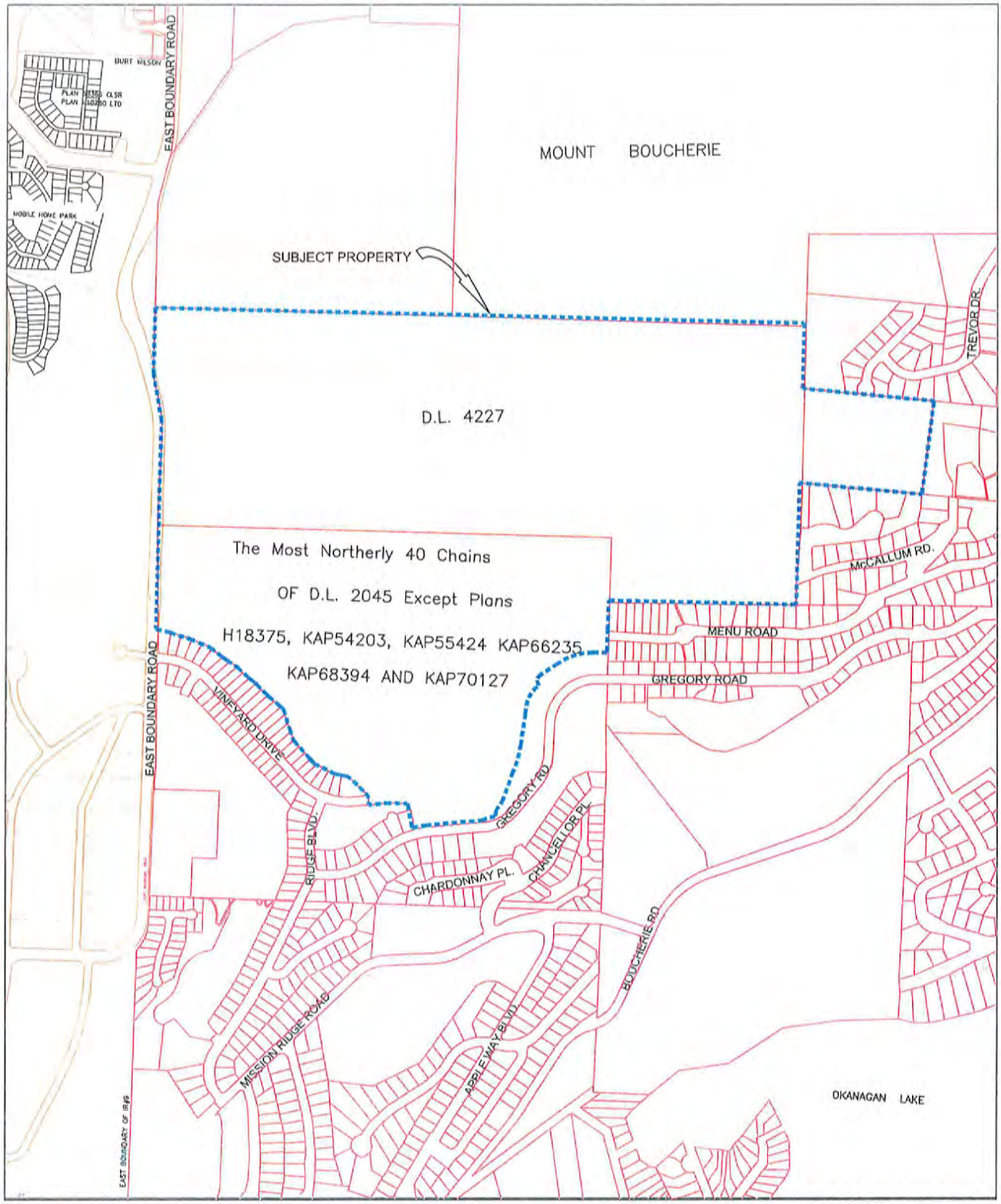
PSC and Regional District staff met with the Environmental Advisory Committee to discuss the Concept Development Plan on June 27, 2002. The Committee indicated its desire for protection of Environmentally Sensitive Areas, while realizing that some infringement would be necessary in order to protect more sensitive areas

After review of the public's issues and concerns, the consultant came back to the Public again November 28th. Approximately 76 people attended the meeting with 15 exit surveys returned immediately with roughly the same number coming in afterward.

Generally it appeared from the completed surveys that most people supported a similar development as what is currently existing in the neighbourhood, many supported a comprehensive development plan. Over half of the people who returned surveys felt that a unit count between 300 and 400 would be suitable. Over 80% of those who returned surveys felt that the roughly 50% of the land that would remain as open space would be a suitable amount. Majority of those attendees who submitted completed surveys indicated that they were supportive of Menu and McCallum Roads being used for emergency access only.

It appeared from the reactions at the public meeting and the comments on the exit surveys that the people in attendance were more so concerned about ensuring secondary suites were not permitted, access was dealt with responsibly, Menu and McCallum were not to be utilized as thoroughfares and that parks were identified and developed as part of this development. It was felt that people accepted development on the site and as long as it was done in a responsible manner, they did not object to it.

A final public meeting was held March 11th with approximately 60 people attending. The final plan was presented with focus on the land use counts and forms as well as the road issue. Approximately 35 surveys were returned with the biggest issue being single access into the development. Many respondents felt that either a connection to East Boundary Road be re-examined or opening of Menu and McCallum Roads for through traffic. Public comments related to Mission Hill Winery traffic being a major source of concern.




# South Mount Boucherie Neighbourhood Plan

## Plan Area

1:1200

Prepared by:
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200 – 1449 St. Paul Street Kelowna, B.C.

Figure 1b

0183–NP.dwg

# PLANNING CONTEXT

## Introduction

The overall objective of the Concept Development Plan is to address all aspects of development including, but not limited to, land use, roads, parks, trails, environmental issues and relationship to neighbouring areas, as well as to address and implement policies of the Official Community Plan.

Through policy statements made in the OCP and other Regional District planning documents, a basis has been established that supports more detailed development policies outlined in the concept development plan.

## Context

The site is situated west of the City of Kelowna in Lakeview Heights approximately 5 km east of Westbank adjacent to Mount Boucherie Regional Park.

The surrounding land uses are as follows:

**East:** Single Family residential subdivisions created in the mid-eighties to the present with many newly constructed homes. Menu Road, McCallum Road, Trevor Drive are all adjacent and lead to Boucherie Road further to the east.

**South:** Single Family residential subdivisions accessed by Vineyard Drive and further south, Mission Ridge subdivision. Southeast of the subject lands is the Mission Hill Estate Winery.

**West:** Large escarpment with a sharp drop off to East Boundary Road, a major route leading to Highway 97. Further West of East Boundary Road is I.R. #9 consisting of larger parcel single family homes.

**North:** Mount Boucherie Regional Park and Crown Lands. The Regional District currently has a Crown Land application under review to expand the Regional Park area.

## Lakeview Official Community Plan

The Lakeview Official Community Plan designates the plan area as requiring the preparation of a CDP. The Official Community Plan *Future Land Use Map* designates the plan area as being suitable for Low Density Residential. This designation provides for single detached homes, single detached with suite and duplex homes and those complementary secondary uses such as daycares, preschools and parks with are all integral parts of a neighborhood.

The Regional Board's policies for Urban Environment that were respected in preparation of the Concept Development Plan are as follows:

- Residential growth will be guided to the growth areas outlined in the Community Plan.
- The predominate type of housing in hillside areas will be low density single/two family dwellings with an emphasis on clustering to preserve steeper slopes and environmentally sensitive areas.
- Emphasis will be placed on clear, cohesive circulation patterns for pedestrians and cyclists in new developments which link to open spaces, parks and natural areas.
- Residential development shall proceed in a logical and sequential manner, proceeding concurrently with the availability of required services.

- Special attention will be given to those new neighbourhoods and developments which abut existing development. Transition areas or zones will be identified to ensure that new and existing developments blend together in a sensitive manner.

The Regional Board's policies for Environmentally Sensitive Areas that were respected in preparation of the Concept Development Plan are as follows:

- Environmentally Sensitive Areas will be protected.
- All areas with slopes greater than 30% shall be designated as hazard lands and visually sensitive lands, and a no build, no disturb covenant applied as part of the zoning process, subdivision process, or building permit process.
- To ensure that all new development provides a storm water management plan to mitigate environmental impacts from storm runoff, erosion and sedimentation control.
- Wildfire hazard reports will be requested in forested areas on areas adjacent to forests.

The Regional Board's policies for Hillside Development that were respected in preparation of the Concept Development Plan are as follows:

- All areas with slopes greater than 30% shall be designated as hazard lands and visually sensitive lands, and a no build, no disturb covenant applied as part of the zoning process, subdivision process, or building permit process.
- The pattern of development will be responsive to the varied topography, taking advantage of views and surrounding natural landscape.

The Regional Board's policies for Transportation that were respected in preparation of the Concept Development Plan are as follows:

- Roadway improvement to accommodate new urban development will be constructed concurrently with development and will take into consideration the traffic impacts downstream through existing neighbourhoods.

Policies relating to servicing; water, sewer and storm drainage will be respected as in the Westbank Official Community Plan.

## Westbank Official Community Plan

The Westbank Official Community Plan designates the plan area as requiring the preparation of a CDP. The Official Community Plan *Future Land Use Map* designates the plan area as being suitable for Low Density Residential. This designation provides for single detached homes, single detached with suite and duplex homes and those complementary secondary uses such as daycares, preschools and parks with are all integral parts of a neighborhood.

The Regional Board's policies for Low Density Residential that were respected in preparation of the Concept Development Plan are as follows:

- Establish a maximum overall net density of 14 single-family units or 11 two family units (duplexes) per net hectare in the Low Density Residential designation.
- Consider changing the zoning bylaw to allow for applications for increases to 20 single family units per net hectare in order to allow smaller, more affordable parcels; or to allow slightly higher densities on part of the site, leaving other parts of the site undeveloped.
- Require all Low Density Residential development connect to a community water system and a community sewer system.

The Regional Board's policies for Environmentally Sensitive Areas that were respected in preparation of this plan are as follows:

- Development will not be permitted if it has a negative impact on Environmentally Sensitive Areas set out on the Open Space and Foreshore Map.
- Development will not be permitted on significant portions of habitat of endangered or threatened species.
- All areas with slopes of greater than 30% shall be considered as hazardous and visually sensitive lands and conservation land zoning or no-build, no-disturb covenant shall be applied at the time development is proposed.
- Incorporate where possible, Environmentally Sensitive Areas into a park, open space or trail corridor.

The Regional Board's policies for Parks and Open Space that were respected in preparation of this plan area as follows:

- The Major Open Space, Conservation Areas and Parks designation can apply to areas with natural features, aesthetic features, topography and open space considered of prime importance to the community, but not considered for future public parkland.
- When development occurs, obtain prime land for parkland.
- Ensure that linear parks, trails and pedestrian linkages connect existing and future parks, schools, crown land, and natural open space and allow for easy pedestrian access through residential areas.

The Regional Board's policies for Roads and Transportation that were respected in preparation of the plan are as follows:

- Develop a system of roads whereby all standards, including, but not limited to, roadway widths, spacing of intersections, access to adjoining land, alignment and acceptable grades are based on the function of the roads.

The Regional Board's policies for Servicing that were respected in preparation of the plan are as follows:

- Promote orderly, logical, economic growth and extension of water, sewer and drainage services.
- Require all developers to pay for all capital costs attributed to servicing their development.

## Access

The major access to the site is from Vineyard Drive via East Boundary Road. Emergency access through Menu and McCallum Road has been planned for.

## Schools

There are three elementary, one middle and one secondary school in close proximity to the site. Lakeview Elementary is located on Olalla Road and has a capacity of 300 full time students plus 40 kindergarten, Chief Tomat Elementary located on East Boundary Road and has a capacity of 270 full time students plus 40 kindergarten and Hudson Road Elementary School located on Hudson Road has a capacity of 275 full time students plus 80 kindergarten. Lakeview Elementary School is scheduled for closure in the 2003-2004 school year with the children being disbursed between Hudson Road Elementary and Chief Tomat Elementary. Constable Neil Bruce Middle School is located on Daimler Road and has a capacity of 750 students and Mount Boucherie Senior Secondary has a 925 student capacity.

## Emergency and Medical Services

The site is roughly 5 km from Westbank with a host of private practice physicians, dentists and optometrists. Approximately 8 km from the site is the City of Kelowna which has a full service hospital, Kelowna General Hospital and the Cancer Centre for the Southern Interior. There are many doctors, medical clinics, dentist and other medical practitioners also within the City of Kelowna. There is full 911 Service to the site and surrounding area.

Ambulances are stationed in the Westbank Town Centre and at the Westbank Firehall and should be able to provide a seven minute response time. The Kelowna General Hospital is 12 Kilometers from the subject lands via East Boundary Road and Highway 97. Depending upon traffic, travel time by ambulance to the Hospital is estimated to be 15 minutes. Police service, a sub-detachment of the R.C.M.P. is located in Westbank and is manned 24 hours a day. The response time to the subject land is estimated to be 5 minutes.

# SITE ANALYSIS

## Introduction

As previously it is important that planning fit within the context of the surrounding lands while considering the framework of existing plans. Features of the site including physical features, zoning and ownership are equally important to the planning.

## Existing Zoning

The northern half of parcel is currently zoned RU-1 and the southern half is zoned RU-2. The 5 ha to the east currently zoned RU-2. See Figure 2.

RU-1 (Rural) and RU-2 (Rural 2 ) is intended for Agricultural and associated uses as well as a number of other uses including saw mills and veterinary clinics. As the area is planned for future residential development in accordance with the Official Community Plans these zonings are no longer appropriate.

These existing zoning designations will require amendment as part of the development of the site.

## Topography and Natural Features

The site is situated on a rolling upland bench on the southern flank of Mount Boucherie. A prominent gully separates the steep cliffs of the mountain from the undulating and gently sloping terrain of the plan area.

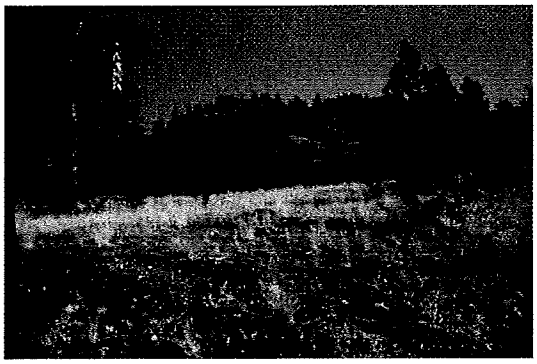
The main development area comprises rolling benchland wrapping around the south, west and north portions of the property. A wide, broad, gently to moderately steeply sloping

bowl opens to the east and southeast down from this benchland. Steeper slopes and bedrock cliffs flank the west, southwest and south edges of the benchland.
The drier portions of the site are host to various types of grass and vegetation. On the less dry sites Ponderosa pine is more prevalent. Throughout the site there are small depressions and swales existing, these areas are characteristic of seasonally increased soil moisture. In these areas brushy vegetation and Douglas fir are found.

The site ranges in slope from 0% to well over 35%. A slope analysis is attached. Slightly over 34 % of the lands are in excess of 30% slope. The remainder of the plan is on moderately sloping sites of less than 30%.

McDougall Creek is located to the west of East Boundary Road, traversing through First Nations land. The creek does not go through any portion of the study area. McDougall Creek is considered important to the community for the aquatic/terrestrial environment as well as for its water quality and is identified as an environmentally sensitive area. This development will not affect the fish habitat nor quality of McDougall Creek and will not produce any negative impacts on the creek.

Approximately 55 ha (136 acres) of the study area are considered developable. The areas identified as non-developable include the natural draws and steeper ridge-lines which are greater than 30% slopes. See Figure 3 and Figure 4a and 4b.



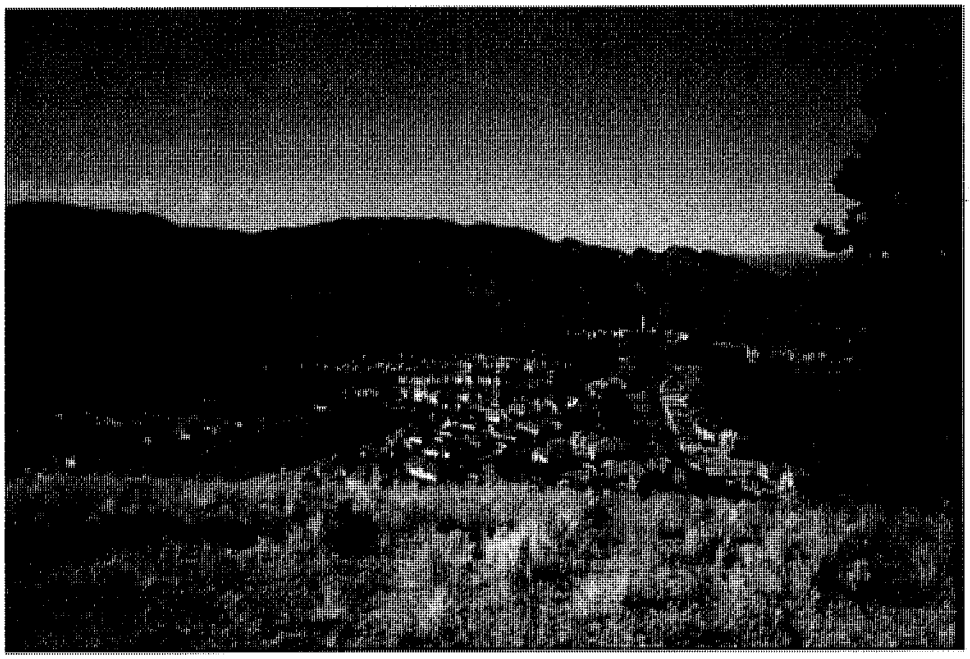
## Ownership

The study area is comprised of three separate parcels of land as shown on Figure 2. These parcels cover an area of approximately 120 ha (296.5 acres). Of this area Victor Projects owns approximately 115 ha (284 acres). Ownership of the parcels is shown below:

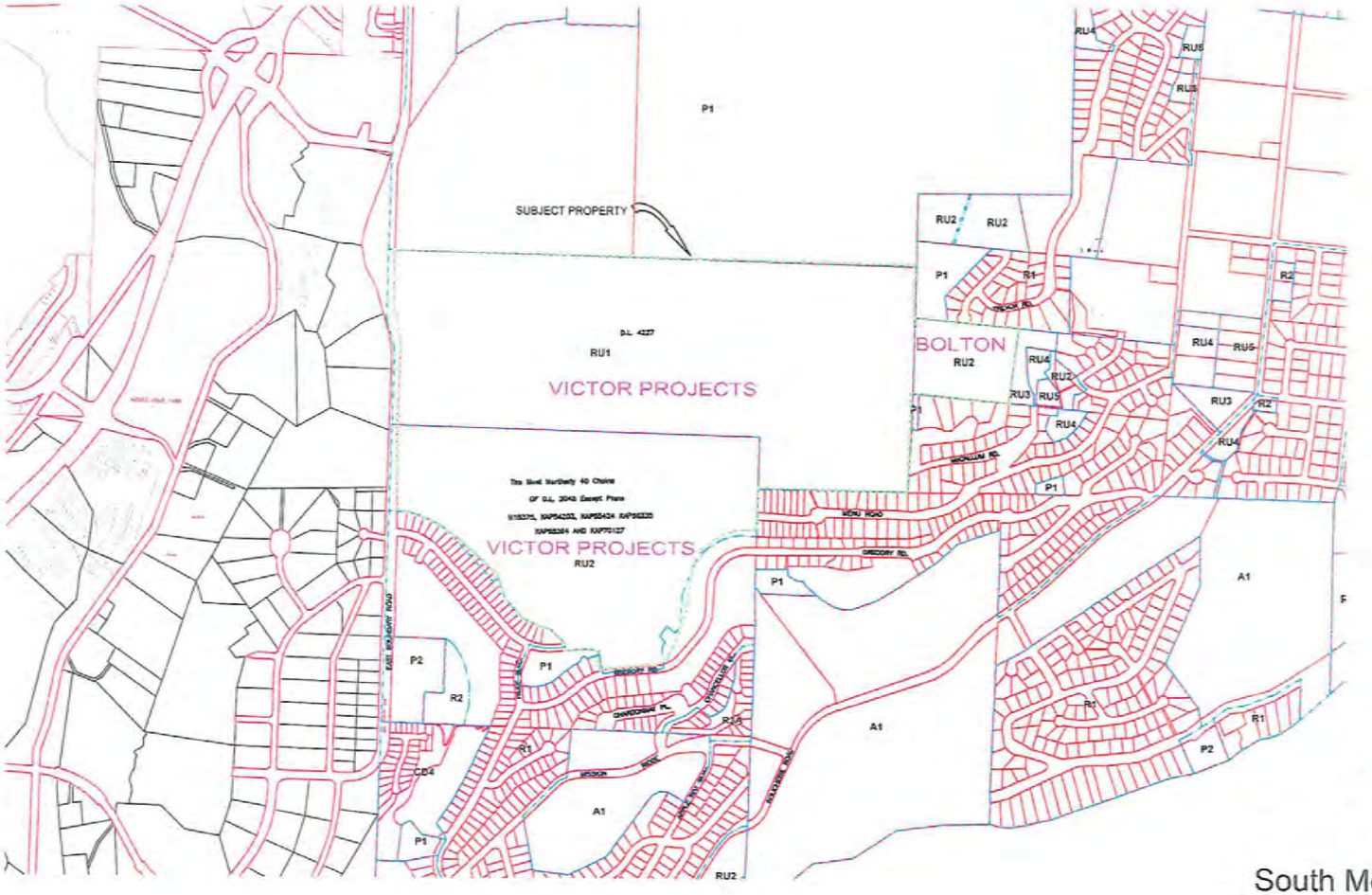
| | |
|---|---|
| Victor Projects | D.L. 4227, ODYD and the Most Northerly 40 Chains of D.L. 2045, except Plans, H18375, KAP54203, KAP55424, KAP66235, KAP68394 and KAP70127, ODYD |
| Bolton | Lot A, Plan KAP64963, ODYD. |

## Existing Uses

Currently the study area is vacant with the exception of a water reservoir situated at the southern most portion of the plan area. This reservoir is under separate legal plan.



View from South Mount Boucherie Plan Area Looking Southeast

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# South Mount Boucherie Neighbourhood Plan

## Ownership & Zoning

Figure 2

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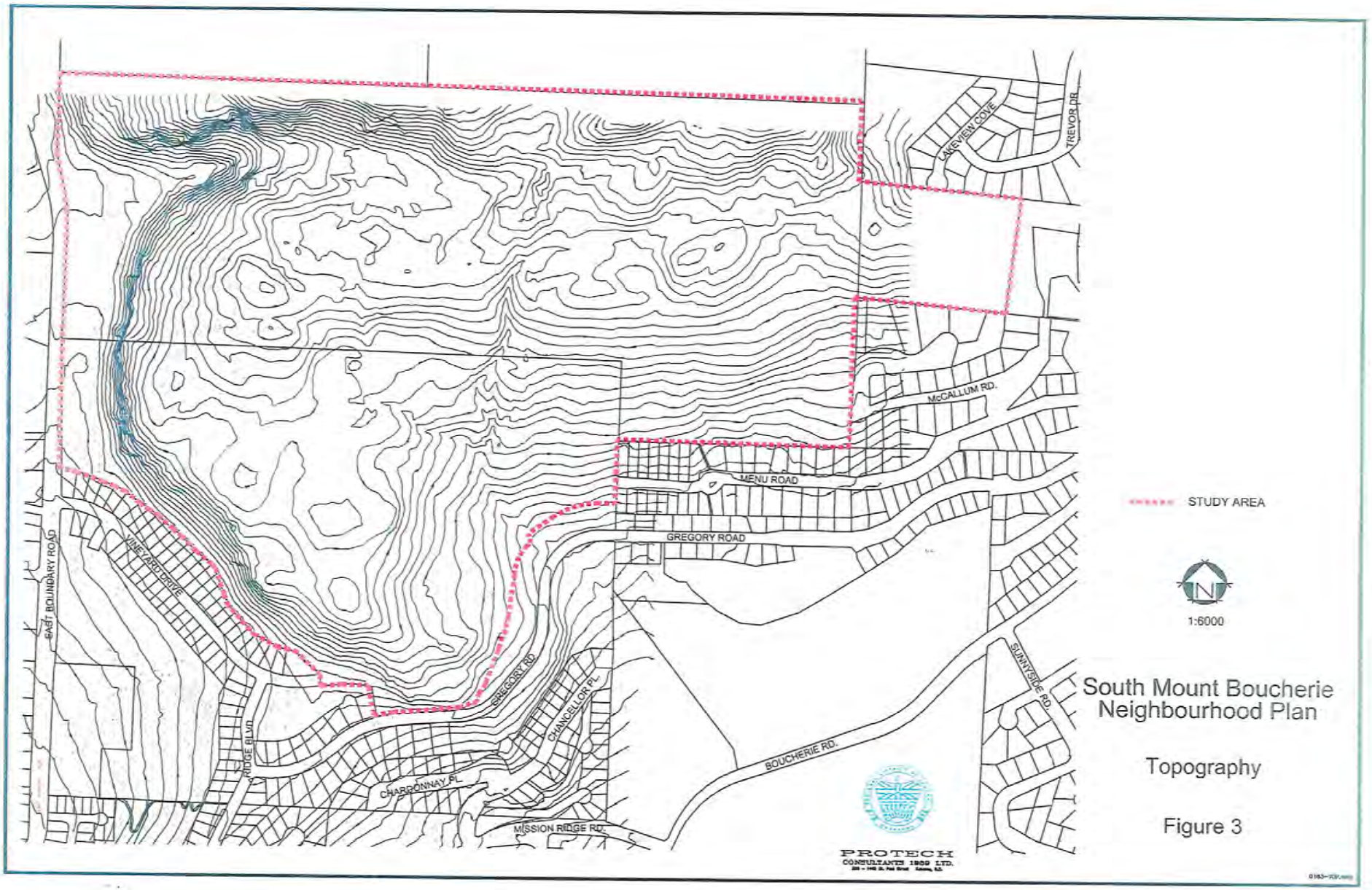
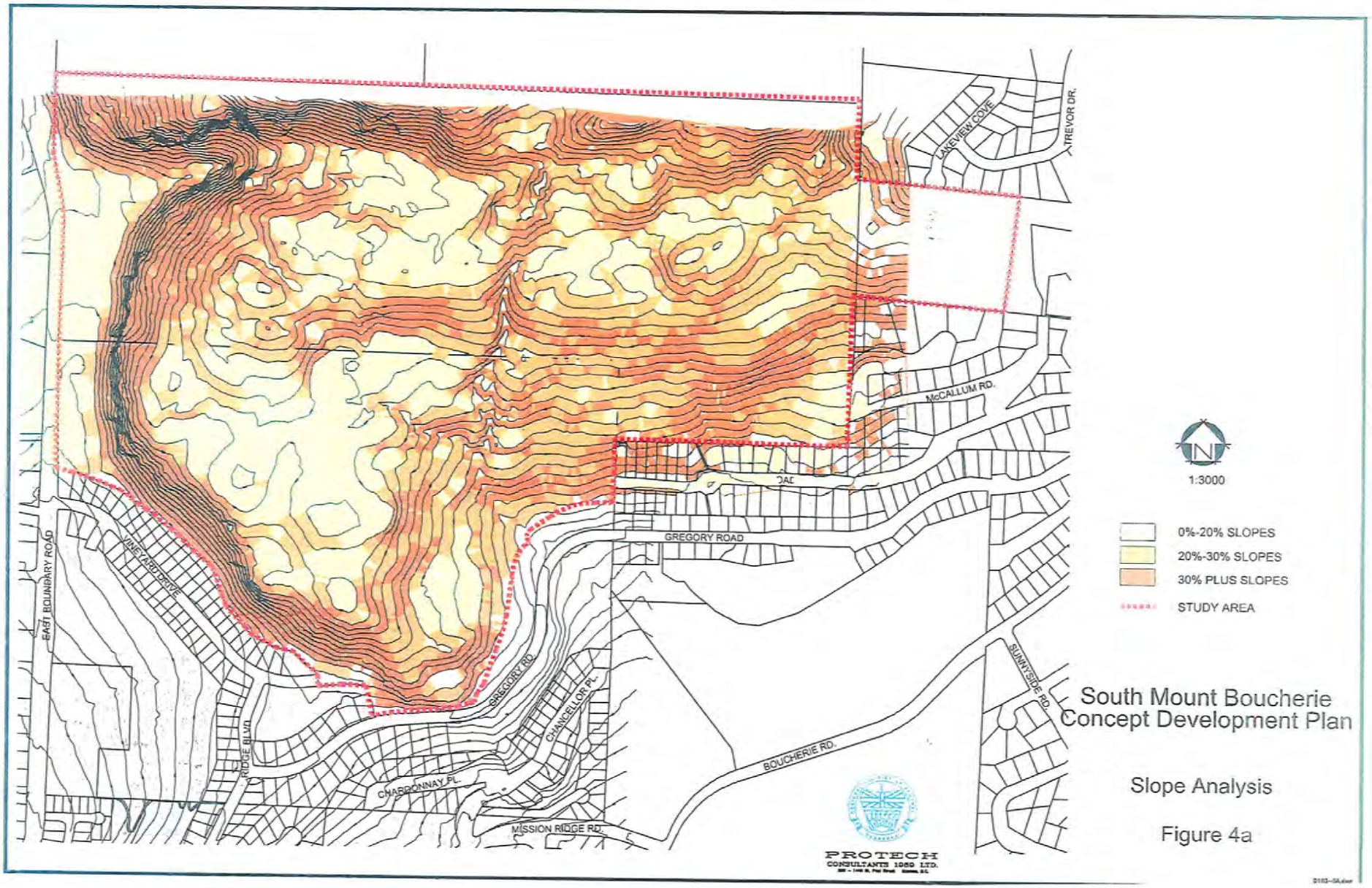
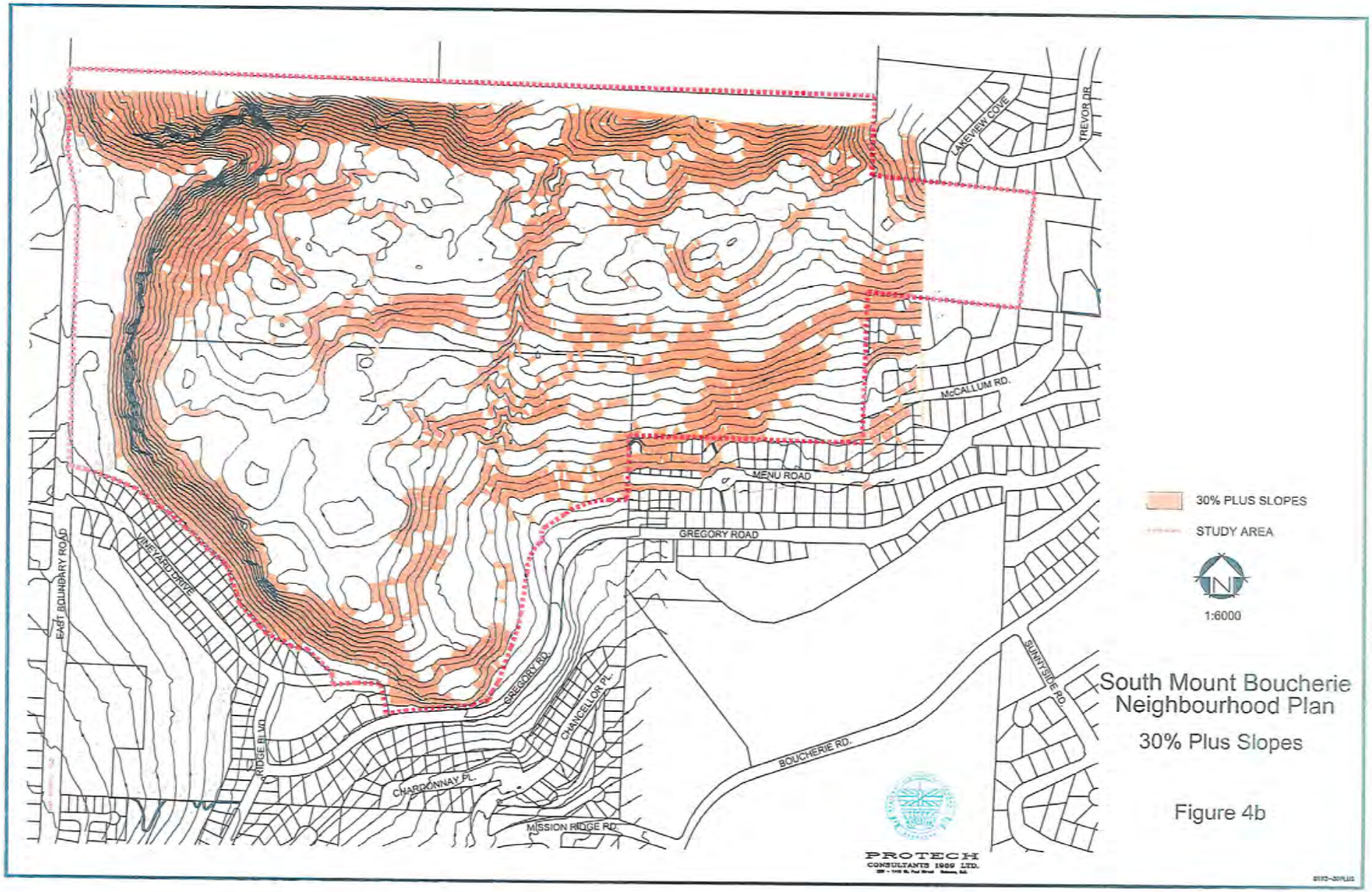

LAKEVIEW COVE
TREVOR PL.
McCALLUM RD.
MENU ROAD
GREGORY ROAD
EAST BOUNDARY ROAD
VINEYARD DRIVE
RIDGE BLVD.
GREGORY RD.
CHANCELLOR PL.
CHARDONNAY PL.
MISSION RIDGE RD.
BOUCHERIE RD.
SUNNYSIDE RD.
STUDY AREA
N
1:6000
South Mount Boucherie Neighbourhood Plan
Topography
Figure 3
PROTECH
CONSULTANTS 1990 LTD.


LAKEVIEW COVE
TREVOR DR.
McCALLUM RD.
GREGORY ROAD
EAST BOUNDARY ROAD
VINEYARD DRIVE
RIDGE BLVD
GREGORY RD.
CHANCELLOR PL.
CHARDONNAY PL.
MISSION RIDGE RD.
BOUCHERIE RD.
SUNNYSIDE RD.
N
1:3000
0%-20% SLOPES
20%-30% SLOPES
30% PLUS SLOPES
STUDY AREA
South Mount Boucherie
Concept Development Plan
Slope Analysis
Figure 4a
PROTECH
CONSULTANTS 1980 LTD.


LAKEVIEW COVE
TREVOR DR.
McCALLUM RD.
MENU ROAD
GREGORY ROAD
EAST BOUNDARY ROAD
VINEYARD DRIVE
RIDGE BLVD.
GREGORY RD.
CHANCELLOR PL.
CHARDONNAY PL.
MISSION RIDGE RD.
BOUCHERIE RD.
SUNNYSIDE RD.
30% PLUS SLOPES
STUDY AREA
N
1:6000
South Mount Boucherie Neighbourhood Plan
30% Plus Slopes
Figure 4b
PROTECH
CONSULTANTS 1989 LTD.

# POLICIES

## Overall Objective

The purpose of the Concept Development Plan is to implement the policies of the Official Community Plan. The following policies incorporate OCP Objectives.

## Land Use Policies

The Concept Development Plan policies for land use are as follows:

- the predominate type of housing will be low density single and two family dwellings on slopes up to 30%
- development will proceed in a logical manner where services are available
- all development will connect to a community water system and a community sewer system
- housing types will be considered that will have a logical blend with existing communities

## Open Space Policies

The Concept Development Plan policies for open space are as follows:

- steep slopes will be protected in their natural space for passive recreation and trails
- parkland will be provided in several locations in order to provide areas for recreation
- the open space system will be linked in a continuous system in all areas possible where not disturbing Environmentally Sensitive Areas

## Environmental Policies

The Concept Development Plan policies for environmental issues are as follows:

- Environmentally Sensitive Areas will be protected
- Environmentally sensitive areas identified as ESA 1 will be protected by a physical barrier of a fence
- slopes in excess of 30% will be protected by a s.219 covenant

These policies are elaborated on in further detail in the Environmental DP Guidelines section.

## Utilities Policies

The Concept Development Plan policies for utility issues are as follows:

- development will be staged with the economical extension of infrastructure
- all development will connect to a community water system and a community sewer system

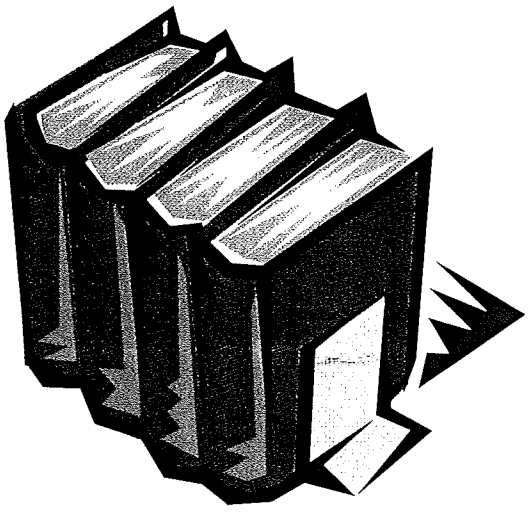
## Transportation Policies

- through the subdivision process, the developer will work with the Ministry of Transportation to adequately address road design to mitigate negative impacts to the area
- the road network will be designed based on the function of the roads, with local roads being planned for site access
- flexibility for transit will be provided, including any areas for bus stops that are identified by the local authorities

## Implementation Policies

The Concept Development Plan policies for Implementation are as follows:

- the development will proceed in a staged manner through a rezoning and subdivision approval process
- urban design guidelines will be implemented through the development permit process



# LAND USE

## Introduction

The main goal of the Concept Development Plan Land Use Policies is to provide a planned residential community. The community will be predominately single family residential with opportunities available for alternate housing forms such as multiple family and cluster development. Open space is an important part of this community as well as accessibility to Mount Boucherie Regional Park.

## Land Use Concept

The residential concept proposed in the Concept Development Plan evolved from various considerations. Some of these considerations included:

- Physical site considerations, topography and drainage
- Context of surrounding land use and character
- Policy guidelines established in both the Westbank and Lakeview OCP's
- Desire to meet current urban design objectives
- Satisfaction of the adjacent land owners and public at large
- Need to address the desires of the property owners

These considerations, along with input from the public at various meetings and from the regulatory agencies have lead to the development of the land use concept shown in Figure 5.

The generalized land use plan provided in this document identifies a number of development nodes, parks and open space areas and environmentally sensitive areas that are to be more closely examined through individual applications for rezoning and subdivision for each node.

1. **Residential Component** – both the Westbank and Lakeview Official Community Plans envisage approximate densities of 10-20 units per hectare on the site with the predominate housing form being single detached housing. The CDP suggests that the majority of housing will be a single family residential form with opportunities in each development node for higher density cluster housing or compact housing to allow for smaller more affordable lots. There will be opportunity for multiple family dwellings in two of the nodes in accordance with the densities and development regulations prescribed in the R3A zone. It is projected that a maximum of 500 units could be built on this site. Cluster housing would be utilized in order to preserve steeper sloped areas.

   There are nine development nodes identified in the study area. Each of these nodes is of varying size and topography, but all are generally under 30% slopes. There is an area located below Node "I" shown in cross hatched purple shading. In this area there are some 30% slopes and some areas less than 30% slopes. Some better survey definition is required. At the time of rezoning the location of the 30% slopes will be refined and the actual development nodes and open space delineated. This is a siting refinement and the number of units for the development overall would be unaffected.

   There is approximately an 80% component of single family and a 20% component of multi-family in the study area. There is some flexibility in housing forms however, specific maximum percentages of each housing type have been identified in each development node. Lot frontages will be in compliance with Zoning Bylaw for each applicable zone.

2. **Open Space** - Of paramount importance in this planning assignment is the highest value neighboring residents place upon a continuous pedestrian circulation network, which may be achieved through a combination of sidewalks and nature trails.

   Above all, this plan retains areas of where majority of the land has 30% slopes in their natural state after methods for reducing the fire hazard have been completed, specifically, disposal of any dead standing trees. These lands will provide the appearance of vast open areas within the study area.

   A trail system will be provided as show on Figure 6. This trail system will allow for circulation to and from the subdivision as well as within and leading to Mount Boucherie Regional Park. The trail system will be constructed in accordance with the Subdivision and Development Servicing Bylaw. A determination of the actual standards and widths of the trails, whether along sidewalks or otherwise, will be made at the time of each subdivision application depending upon the specific location of the trail.

3. **Parks** – Based on the maximum build out of the study area a wide range of parks and open space will need to be available. There are currently four park areas within 500 m of the study area with the most prominent one being Mount Boucherie Regional Park. The Regional District is currently the applicant of a Crown Land application to acquire further lands to the northeast of the site directly adjacent to Mount Boucherie in order to increase the area of the Regional Park. The subject lands will provide additional parks and open space for the immediate and surrounding community.

   Parks will be provided in accordance with *Section 941* of the *Local Government Act* and will range from open space to active parks in compliance with the classifications described in the *Westside Parks and Recreation Master Plan.*

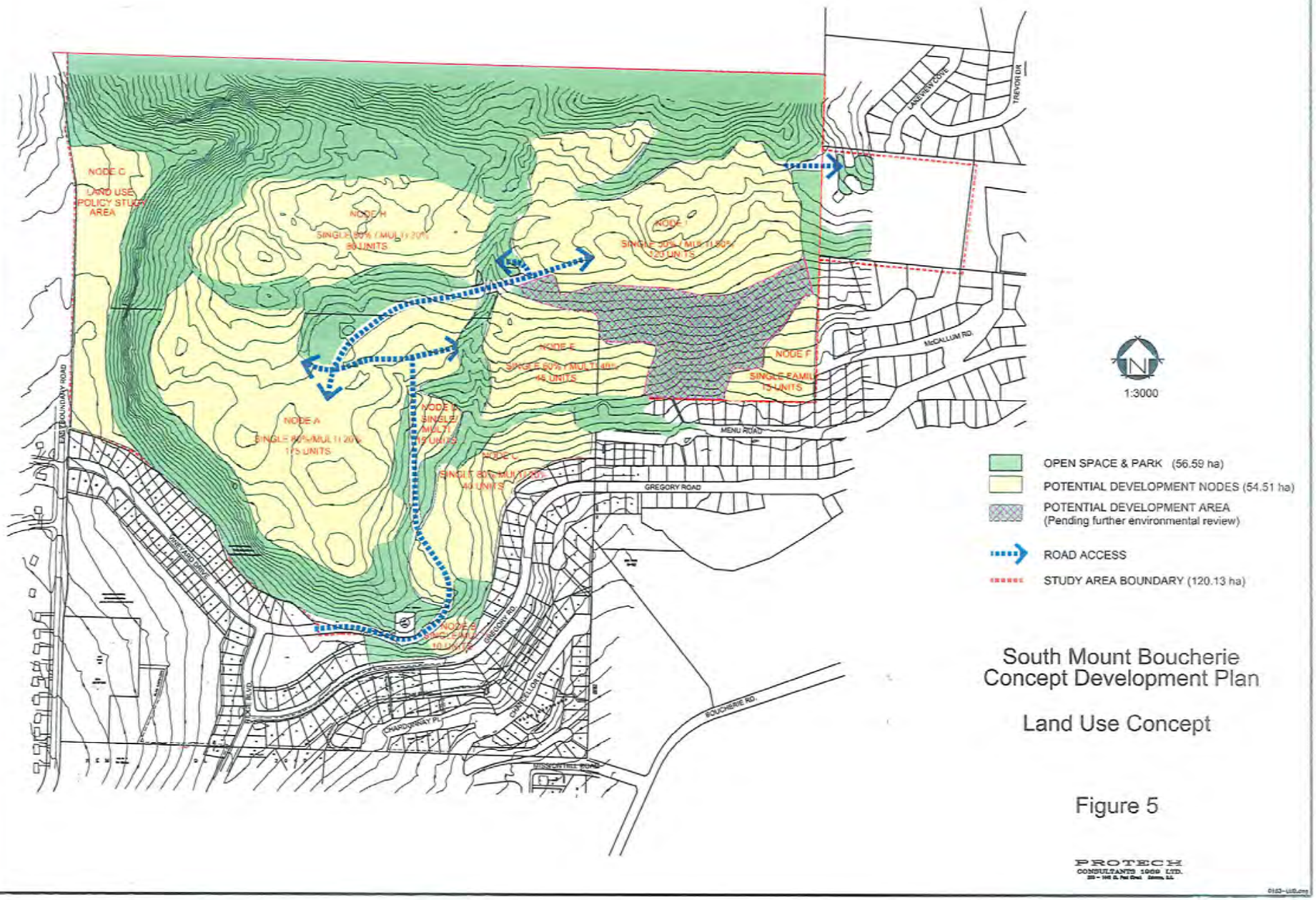
   Specific park areas and sizes are discussed in greater detail in the Parks and Open Space section.

The area of lands flanking East Boundary Road at the southwestern boundary of the South Mount Boucherie Concept Development Plan area not be allocated a land use at this time but studied further as the neighborhood is further developed.

The allocation of a land use for the subject lands along this arterial roadway have yet to be determined, although they possess attributes for a range of residential and potentially service commercial/storage activities. Given that these lands would be developed in the last stages of this neighborhood, there may be unforeseen needs that the landowner may be able to provide that are not evident at this time. Consequently, it is proposed this area be identified as a Land Use Policy Study Area for further evaluation in the latter stages of development of the South Mount Boucherie Concept Development Plan area.

## Residential Development Guidelines

a. The maximum development yield shall not exceed 10 dwelling units per developable hectare.
b. Minimum frontage and setbacks shall be in accordance with the R1, RC1 and R3A as described in the *Regional District of Central Okanagan Zoning Bylaw #871* pertaining to that particular development node.
c. The overall study area as identified in this plan will not exceed 500 dwelling units and will be in compliance with the housing form percentage identified in this plan.




# South Mount Boucherie Concept Development Plan

## Land Use Concept

Figure 5

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# PARKS AND OPEN SPACE

## Introduction

The site is within close proximity to many recreational services including, but not limited to the Mount Boucherie Community Complex which offers skating and hockey rink facilities as well as rooms for meetings and other functions. The Johnson-Bentley Memorial Aquatic Centre offers a variety of programs and aquatic facilities to Westside residents. The City of Kelowna offers full recreational and cultural opportunities to Westside residents as well.

There are approximately four park areas within 500 m of the study area. The most prominent of these parks is Mount Boucherie Regional Park. The Regional District is currently the applicant of a Crown Land application to acquire further lands to the northeast of the site, directly adjacent to Mount Boucherie in order to increase the area of the Regional Park. The subject lands will provide additional parks and open space for the immediate and surrounding community.

The South Mount Boucherie Concept Development Plan plans for a wealth of park and open space area. With the *Westside Parks and Recreation Master Plan* as a guide, the following figures show the parks and open space planned for the development. The proposed parks and open space plan is subject to final approval by the Regional District and can be amended in accordance with their feedback.

As the population in the new South Mount Boucherie neighbourhood is projected at approximately 1000 to 1200 people a wide range of parks and open space will need to be made available. Parks will be provided in accordance with Section 941 of the Local Government Act and will range from open space to active parks in compliance with the classifications described in the *Westside Parks and Recreation Master Plan.*

The general locations identified for the open space and parklands have been shown on each of the land use options presented and will cater to a wide range of resident needs. These locations also take into account the Mount Boucherie Regional Park and the adjacent Crown lands which are both popular for hikers and nature lovers.

Approximately 57 hectares, translating into 51% of the site area, is being allocated for various forms of passive and active recreational uses far in excess of the 5% prescribed in the *Local Government Act*. Approximately 49.5% of the site will be assigned as Open Space which will have a variety of functions including ecological conservation, environmental stewardship, management of hazardous areas (e.g. steep slopes) and view protection. Natural open spaces include those areas of public land in a relatively natural condition that provide the above functions but are not classified as one of the other types of park spaces. This leaves roughly 1.5% of the site as Active Parks which falls short of the Section 941 requirements. These shortfalls can be addressed through options such as "cash-in-lieu". The open space being allocated on the site addresses the need for preservation and enhancement of wildlife habitat and songbird population along with the natural flora of the subject properties as identified in the environmental assessment carried out as part of this plan.

Attention will be given to ensuring that no development residential, parks or otherwise will impact on the environmentally sensitive areas within the South Mount Boucherie Concept Development Plan area. The Environmental Assessment for the South Mount Boucherie Concept Development Plan states the following:

> "No development or roads in areas designated as ESA 1. Recreation facilities should be kept to a minimum (Class B and C trails only, no buildings or playgrounds). Interpretive signage would help ensure that visitors have minimal impact on the environment".

## Parks Classifications

Parks within the South Mount Boucherie Concept Development Plan area will fall into two categories, *Active Parks* and *Open Space.*

As per the Westside Parks and Recreation Master Plan, the Open Space areas have the following function:

> *Natural open spaces have a variety of functions, including ecological conservation, environmental stewardship, management of hazardous areas (e.g. steep slopes) and view protection. Natural open spaces include those areas of public land in a relatively natural condition that provide the above functions but are not classified as one of the other types of parks spaces.*

Steep slopes will be protected in their natural state for passive recreation and trails.

The open space system will be linked into a system which connects surrounding parks and hiking opportunities. Trail opportunities between development nodes will exist in order to provide continuity between neighborhoods. Pedestrian traffic will circulate via sidewalks along local roads or through a trail system. The trails will be built to a standard that is required by the *Subdivision and Development Servicing Bylaw.*

Active Park areas fall into three classifications – Neighbourhood Parks, Community Parks and Linear Parks and have a combination of the following functions:

> *Community Parks support passive functions that serve the entire community. Examples of these functions include urban plazas, institutional/cultural/historical facilities, places of community identity/gathering, beautification initiatives, public cemeteries and public tourist attractions.*

> *Neighbourhood Parks – Informal open space, playgrounds, passive recreation amenities and sportsfields (though generally only singular and of a lower standard*

*than community parks facilities) to serve a specific neighbourhood. In higher density neighbourhoods the level of service and intensity of park development should, pending neighbourhood consultation, be higher than in lower density neighbourhoods. Smaller school sites can function as a neighbourhood park provided adequate facilities are in place and there is a joint-use agreement.*

*Linear Parks – Primary function is to provide off-road transportation linkages for pedestrians, cyclists and/or equestrians. Linear parks generally include developed and usable trails and pathways on public land, utility rights-of-way or road rights-of-way closed to vehicle access. Linear parks generally do not include sidewalks along developed roads or trails and paths in other types of parks and open spaces.*

## Proposed Parks

**Lookout Point.** This park will be between 0.05 and 0.075 hectares (0.12 – 0.19 acres) in size. The lookout point will encompass seating and interpretive signage looking east to west across Okanagan Lake and the Mission Hill area. Viewing will be accessible to the public during parks hours by a walkway to an elevation that will mitigate noise/view pollution to adjacent homeowners. The existing vegetation and terrain will be retained.

**Community Park.** This park will be approximately 1.0 hectare (2.47 acres) in size. The park will have passive functions that serve the entire community and staging/trailhead opportunities to access Mount Boucherie Regional Park. Trailhead facilities will include parking for between 8 and 10 cars, signage and interpretive information.

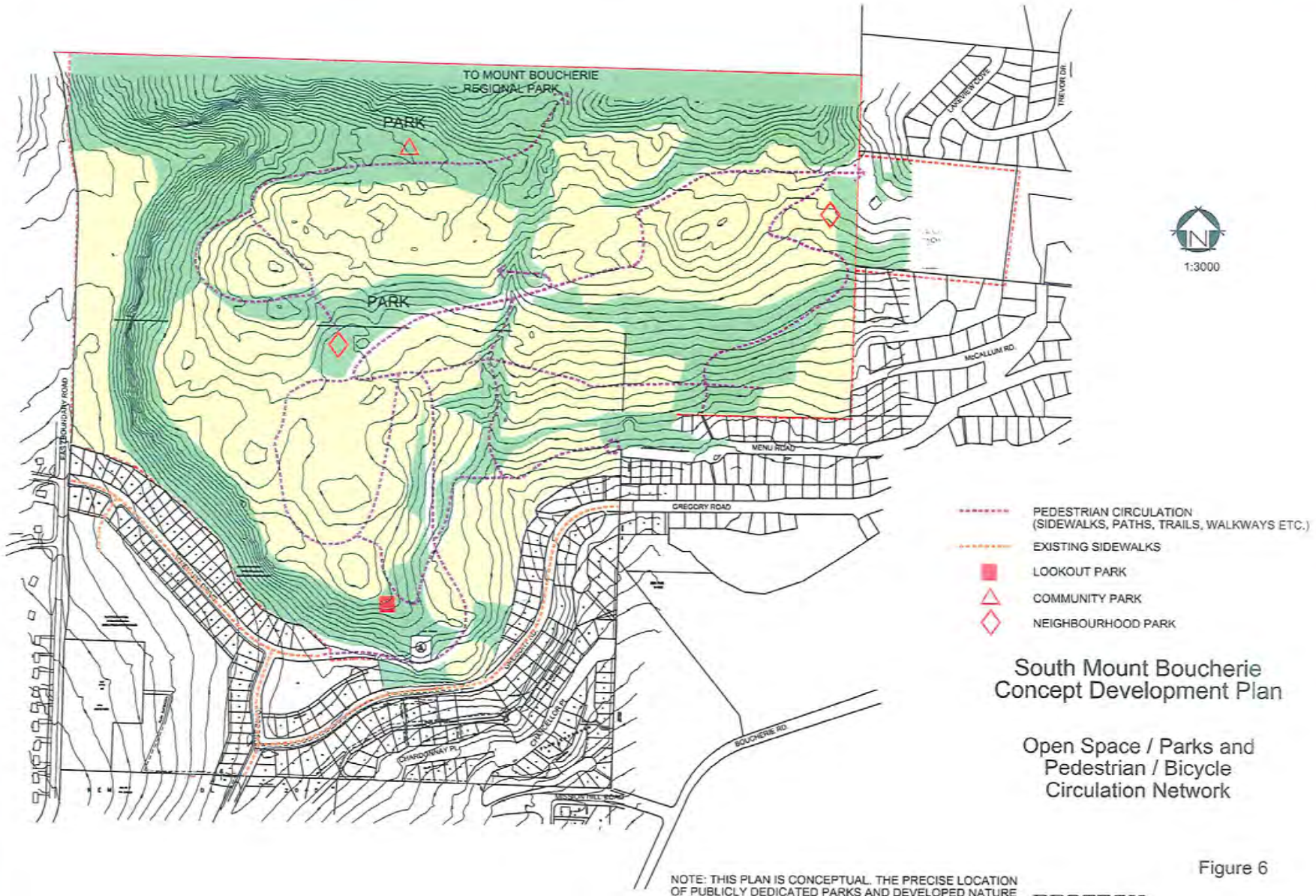
**Neighbourhood Park.** There will be two neighborhood parks within the development. Each of these parks will be a minimum of 0.2 hectares (0.49 acres) in size. These parks can be informal open space, playgrounds, passive recreational amenities and sports fields. These parks would be proposed for playgrounds with benches.

**Viewpoint Park.** This area will be located near the escarpment with access by either a trail or walkway from the public road. The purpose of this park is for a local area viewpoint rather than a destination park. Park design will need to incorporate consideration for rockfall hazard, wildfire hazard and interface with the neighboring residential uses.

**Linear Connection.** A linear connection of approximately 0.05 hectares (0.12 acres) will be provided from the Eain Lamont Park to the area proposed as the extension to the Mount Boucherie Regional Park.

The park locations shown on this plan are generally accurate, however, once a road and lot layout are determined their exact location can be finalized. As parks construction is partially determined by topography, road and lot locations as well as utility issues, specific designs have not been determined. At the time of subdivision, the property owner shall negotiate with the RDCO Parks and Recreation Department to determine the location, size, configuration and access to each proposed park spaces as per Section 941 of the Local Government Act. All proposed park spaces require servicing with utilities by the property owner as per the RDCO Subdivision and Development Servicing Bylaw. It should be ensured that each park area will maintain as much of the natural features such as existing wildlife and vegetation as possible and that four seasons access will be available.

Proposed park areas, open space and trails are shown on Figure 6.




# South Mount Boucherie Concept Development Plan

## Open Space / Parks and Pedestrian / Bicycle Circulation Network

Figure 6

NOTE: THIS PLAN IS CONCEPTUAL. THE PRECISE LOCATION OF PUBLICLY DEDICATED PARKS AND DEVELOPED NATURE TRAILS WILL BE FINALIZED AT EACH DEVELOPMENT STAGE.

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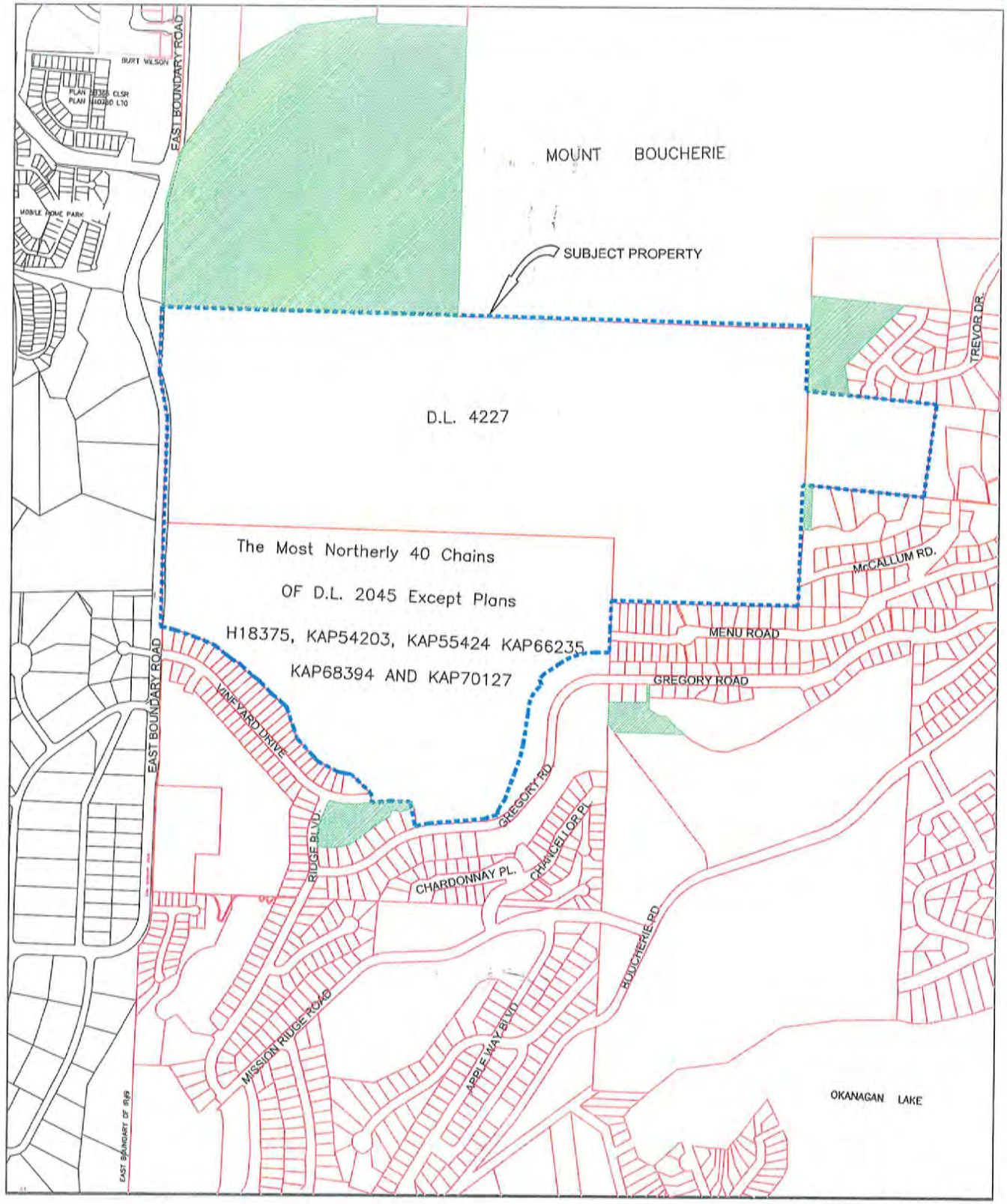


# South Mount Boucherie Neighbourhood Plan

## Surrounding Area Parks

## Figure 6b

Park

1:1200

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# ENVIRONMENT, GEOTECHNICAL, WILDFIRE HAZARD and ARCHAEOLOGICAL ASSESSMENTS

## Environmental

The study area is largely forested, interspersed with grassland and rocky habitats. Despite roads, past logging, and all-terrain traffic, the vegetation is in remarkable condition. The presence and dominance of rough fescue is a good indicator of this.

Mount Boucherie itself lies within the Northern Okanagan Basin eco-section. The property is primarily composed of the Okanagan variant of the very hot and dry Ponderosa Pine (PPxh1) bio-geoclimatic sub-zone, with the Interior Douglas Fir (IDFxh1) bio-geoclimatic unit along the upper, northern edge.

Aspect, plant species and subtle moisture receiving/drainage areas provide a range of Site Series. The sites series found on the development area varied from 03 (very dry) Big Sage Blue-bunch Wheat-grass to 06 (mesic or wetter site conditions) Douglas-fir – Ponderosa Pine Snowberry and Pine-grass.

On the very dry sites, blue-bunch wheat-grass, fescues, balsamroot and big sage dominate the vegetation. Ponderosa pine is found in dispersed areas in single trees and small clumps. Shallow soils overlie bedrock in these areas and therefore limit soil moisture and have resulted in plant species that are drought resistant and have root systems capable of accessing water on even the driest sites.

On less dry sites, Ponderosa pine is more prevalent. Within this site series, small depressions and swale like channels exist. These areas exhibit site characteristics that indicate increased soil moisture seasonally. As result, an increase in brushy vegetation was found and Douglas-fir is growing.

The wetter site series is typically located in the gully/draw area below the steep rock cliff to the north of the property. These areas have dense thickets of shrubs and include Douglas-fir, Ponderosa pine and Trembling Aspen in the overstory.

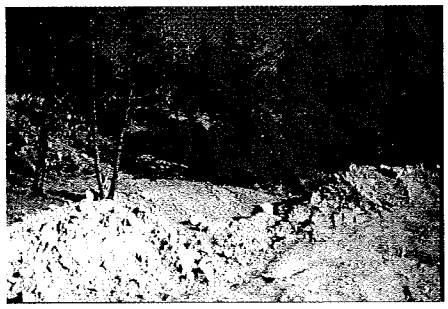
The area is the last major block of undeveloped and relatively natural land within the developed areas of Westbank and Lakeview Heights (Gyug, 2001). Subsequently, Mount Boucherie is largely isolated from other natural landscapes. The nearest valuable habitat is the riparian streamside along McDougall Creek. It is separated from the Mount Boucherie uplands by only East Boundary Road along some stretches. Many of the upland wildlife are dependent on this rich riparian habitat.

There were three ESA areas identified on the subject lands. These ESA areas are shown on Figure 7. The first type (ESA 1) is extremely important and prone to impacts from development. The second type (ESA 2) contains important wildlife corridors, including some riparian habitat, and should be maintained, although roads can bisect its route but nor run along it. The third type (ESA 3) is important but could remain a functioning ecosystem if development has a small footprint and future residents are encouraged to be environmentally sensitive. The remainder of the property has wildlife and habitat values but could be considered expendable for development.

A full Environmental Site Assessment is attached as Appendix A.

## Geotechnical

Topography is the main constraint imposed on development by the local terrain. The soils and bedrock units make conventional residential development feasible. The shallow bedrock over most of the area will require ripping or blasting in some areas to shape building sites, construct roads and install utilities.



A relatively steep gulley traverses through the center of the property running north and south, numerous site visits presented no evidence of water on the site.

The site slopes range from 0% to well over 35%. Approximately 34% of the lands are over 30% slopes. The remainder of the land has predominately less than 30% slopes.

There is no evidence of hazardous areas with respect to flood, erosion prone areas or unstable slopes. There are no geotechnical concerns precluding residential development on the subject property.

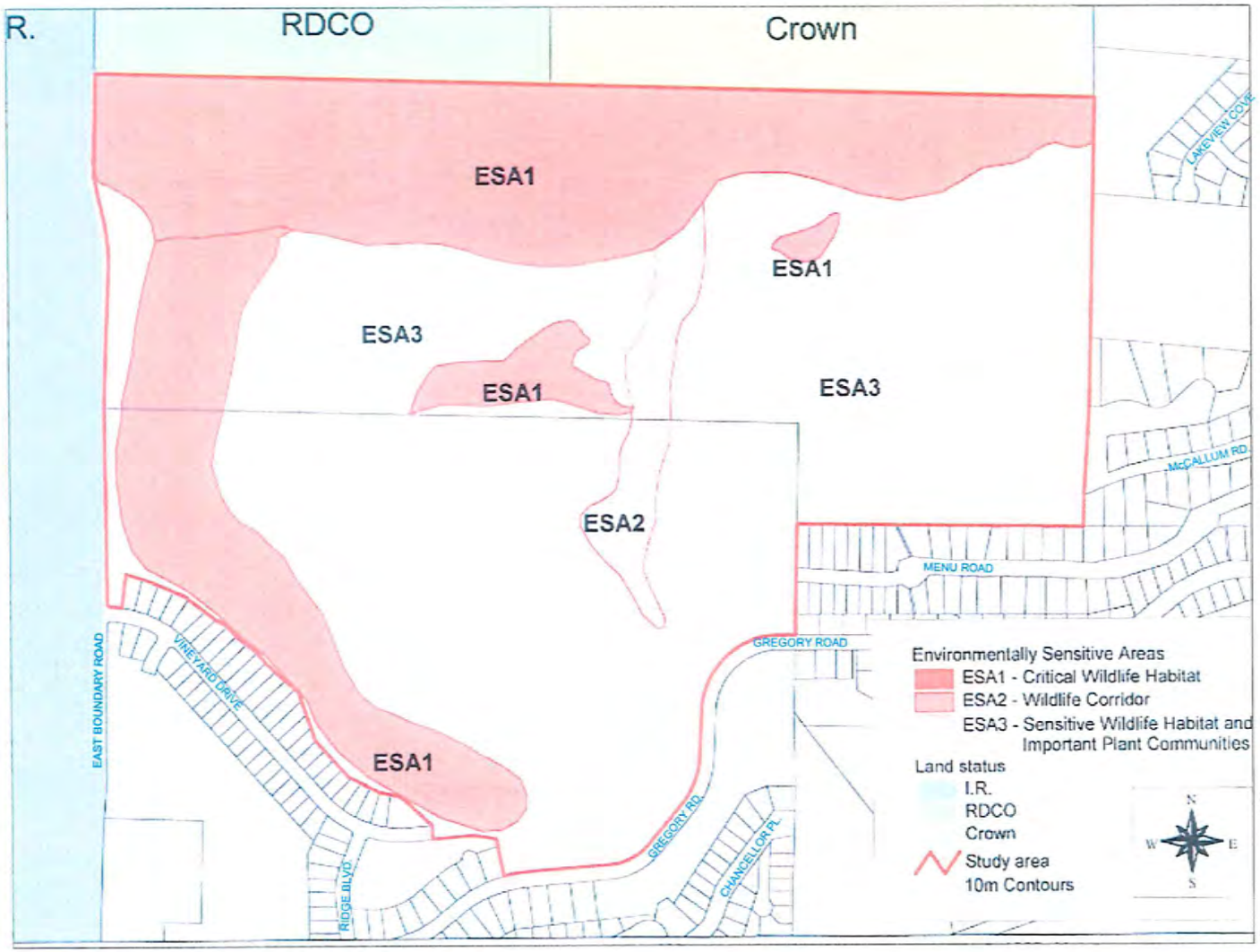
A full Geotechnical Assessment is attached as Appendix B.

## Wildlife Habitat

Mount Boucherie hosts some important plant and animals communities. Despite the relative isolation from other natural areas, wildlife species at risk and rare plant communities persist. Species at risk, such as Pacific Rattlesnakes, Racers, Western Harvest Mice, Prairie Falcons and probably some bat species, inhabit the study area. In addition, rare plant communities are thought to be present. These critical wildlife habitats and important plant communities have been amalgamated to form three types of Environmentally Sensitive Areas.

The first type (ESA1) is extremely important and prone to impacts from development. The second type (ESA2) contains important wildlife corridors, including some riparian habitat, and should be maintained, although roads can bisect its route but not run along it. The third type (ESA3) is important but could remain a functioning ecosystem if development has a small footprint and future residents are encouraged to be environmentally sensitive.

The remainder of the property has wildlife and habitat values but could be considered expendable for development.




STUDY AREA

N

1:6000

# South Mount Boucherie Neighbourhood Plan

## Environmentally Sensitive Areas

Figure 7

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## Wildfire Hazard

The field assessment completed on this parcel of land returned moderate to extreme hazard ratings in the areas where future homes are planned. The gully area also received an extreme hazard rating. These ratings are based upon current fuel loading and potential ladder fuels found on the site.

The assessed hazard ratings of moderate on this property meet the requirements of the Central Okanagan Regional District (CORD). The high and extreme hazard rating areas that are found both surrounding the area, as well as dispersed throughout the planned development will require a covenant to reduce these ratings to a moderate or low level as required by CORD (where construction is planned). Figure 1 in the Wildfire document indicates the extreme hazard areas as shaded in red hatching.

The high and extreme rating for the area where development is proposed requires further works to be completed. These works are recommended in the best interest of future and current property owners.

The recommendations in the report are not intended to prevent wildfires, but only to reduce the risks of a wildfire. The Central Okanagan Regional District has indicated that it intends to permit recreational use of the parkland areas within the proposed development and in the adjacent forested lands. A fire started by human activity that spreads throughout the forested would not be considered a wildfire, in the context of the report.

A full Wildfire Hazard Assessment accompanies the Concept Development Plan as Appendix C.

## Archaeological

On the basis of field observations, it was determined that this area of the mountain has low archaeological potential. The potential reducing factors include land altering activities associated with the construction of a water tower and access road on the south and east sides of the property, and additional disturbances resulting from other trail and road construction. The absence of water in more recent pre-contact times, and shallow soils are other potential reducing criteria. Furthermore, there are a number of documented significant archaeological sites close to this development including village sites, and it is probable that most activities which took place on Mount Boucherie were accessed from these locations.

The southern portion of Mount Boucherie may have additional aboriginal cultural values which would best be identified by the Westbank First Nations.

It is recommended that there are no further archaeological concerns in the location of the South Mount Boucherie Concept Development Plan. This site does not possess any cultural or heritage features with the exception of its close proximity to the Mount Boucherie Regional Park and Crown lands.

The Archaeological Assessment accompanies the Concept Development Plan as Appendix D.

# Considerations and Recommendations

## Geotechnical

1. Consideration should be given to ensuring natural vegetation is left on the slopes whenever possible.
2. Steep slopes (30% +) on the south, southwest and northwest portions of the site require setbacks for safe residential development. The stable nature of these bedrock slopes is appropriate for a minimum 15m setback from the slope crests. These can be enforced through s.219 covenants.
3. The prominent gulley located in the interior of the development will require setbacks of a minimum 7 metres.

## Environmental

1. A no build, no disturb restrictive covenants registered on ESA 1 to ensure no development or roads are constructed in this area.
2. A restrictive covenant be registered to restrict development to road construction in the areas identified as ESA 2.

## Wildfire

1. A wildfire hazard covenant should be placed on the property. A copy of the recommendations in the Wildfire Hazard Assessment should be a schedule of the covenant to ensure adequate protection.

# TRANSPORTATION

## Introduction

The major transportation route in the area is Highway 97 which leads to both Westbank and Kelowna. Leading to Highway 97 is East Boundary Road to the west of the site and Boucherie Road to the East of the site. The road network is under the jurisdiction of the Ministry of Highways. There are three roads that provide access to the remainder of D.L. 2045.

East Boundary Road fronts onto the westerly boundary of the lower portion of the remainder of D.L. 2045 and D.L. 4227. Due to the steep topography and environmentally sensitive nature of the area providing access from East Boundary Road to the upper area of D.L. 2045 and D.L. 4227 is not feasible. An engineering evaluation of the proposed connection was undertaken in order to give the access alternative fair evaluation.

The evaluation of the road design was based on the minimum standards acceptable to the Ministry of Transportation, the road authority in this area. Based on these design parameters there would be approximately 86000$m^3$ of rock cut and 27000$m^3$ of fill. Based on the slope of over 45% in some areas, visible cuts of 12m would be required. The costs for this short stretch of road which be in excess of 2.3 million dollars.

Despite the exorbitant costs of this road, perhaps the most important issue is the construction through undoubtedly the most environmentally sensitive location in the entire study area. The Environmental Consultant reviewed the possibility of a road connection in that location and advised that it would be his strongest recommendation that it was not constructed as it would desiccate the environmental features of this location and the cost on the environment would far outweigh the benefits of a road in this location.

## Road Network

Currently Vineyard Drive is the main access point to both D.L. 2045 and D.L. 4227. Vineyard Drive provides direct access to East Boundary Road which in turn provides direct access north to Highway 97 and south to Boucherie Road. Vineyard Drive also connects with Ridge Boulevard which further connects to both Gregory Road and Mission Hill Drive. These roads provide access to Boucherie Road.

Menu and McCallum Roads were investigated for alternate access, however, it was found that these roads were constructed in the 1970's and 1980's and were not designed for additional traffic. They lack proper width, sidewalks and streetlighting which would be mandatory if additional traffic were to be permitted to utilize them on a day to day basis. It was felt through extensive review that these two roads would be utilized for emergency access only to ensure the safety of their current residents.

Menu Road is a local Road that ends at the easterly boundary of D.L. 2045. Menu Road will terminate as it does not in a residential cul-de-sac with the installation of bollards to allow for access of emergency vehicles only and not through traffic. Vineyard Drive provides the shortest route to schools and shopping for the existing Menu Road neighborhood.

McCallum Road is similar to Menu Road in that it is a local road that ends at the east boundary of D.L. 4227. McCallum Road, as Menu Road will be constructed to permit access of emergency vehicles only with the installation of bollards. Emergency road egress at the northwestern corner of the study area is an important issue and will need to be resolved at the time of subdivision and in accordance with the RDCO Subdivision and Development Servicing Bylaw requirements for emergency access.

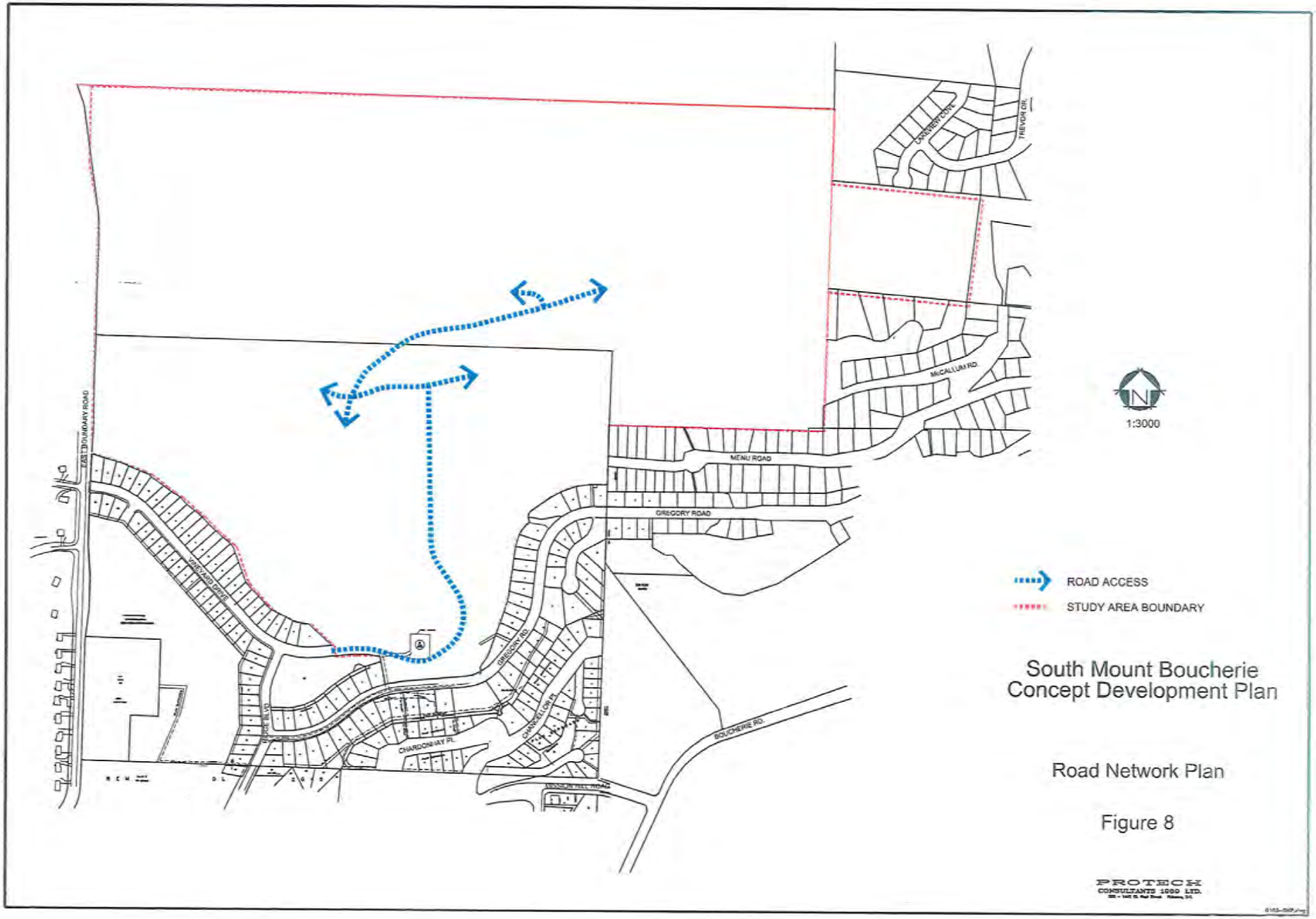
The terrain in the vicinity of the development is very rugged. While it would be desirable, from a convenient routing perspective, to have a second link to East Boundary Road

towards the northwest corner of the site, this is obviously impossible and therefore not worthy of further consideration. Similarly a link from Menu Road to Gregory Road to the south would also be desirable since this would provide a second access route out to Boucherie Road, however, not only is this area between these two roads already developed but topography again prohibits such a link. Another potential access route is to the northeast, ideally to Lakeview Cove Place. It is noted however that there is a parcel of land prohibiting such a link to be made. Furthermore, it is doubtful that those who have bought homes on Lakeview Cove Place would be very happy to have their quiet road suddenly linked to a development with a significant number of homes. It is noted that the south end of this road was terminated in a cul-de-sac indicating that further continuation was not planned.

The Traffic Impact Assessment results did not identify off-site works as being an issue, with the exception of a right turn lane at Vineyard Drive and East Boundary Road once traffic warrants. It is however felt that consideration be given to off-site works in the area in order to alleviate neighbourhood concerns regarding sidewalks and proper road widths. Off-site contributions could be directed to Gregory Road for widening and the addition of sidewalks to Boucherie Road. For sidewalks on one side at 1.5m in width and asphalt widening of approximately 2m, it would cost roughly $500,000 for a 1086m length based on a calculation of $450/lineal metre.

The major local road alignments are shown on Figure 8. The alignments shown are conceptual, however, based on topography there is little flexibility with the overall layout. Refinement of the alignments both horizontal and vertical as well as the intersections will be finalized at the rezoning and subdivision stage taking into account Ministry of Transportation and RDCO standards and bylaw requirements

Local roads within the development will be constructed in accordance with the *Regional District of Central Okanagan Subdivision and Development Servicing Bylaw* including sidewalks and bike paths where required by bylaw.




South Mount Boucherie
Concept Development Plan

Road Network Plan

Figure 8

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CONSULTANTS 1990 LTD.

It will be necessary within the development area for roadways to cross the natural gulley that runs through the property. This gulley has been identified as an ESA and has specific mitigation practices in order to maintain its integrity. Road crossings will be permitted, however, housing will not. Any road construction will need to be done in an environmentally sensitive manner in a way that respects the existing condition and places minimal strain on its integrity and through a development permit process, require that an Registered Professional. Biologist, review the road engineering plans prior to approval construction to ensure they meet the environmental considerations of ESA 2.

The road standards will be refined at the subdivision stage as detailed road layouts are designed. Reduced standards may be considered in order to reduce the impact on the natural landscape.

## Pedestrians

Currently there exists sidewalk along a portion of Gregory Road at the south end of the proposed development. There are sidewalks leading to the school and along Vineyard Drive. There is a lack of sidewalk along the eastern half of Gregory Road to Boucherie Road and it is suggested above that off-site contributions could go toward installation of sidewalks and road widening in this location.

Within the study area as well as access to lands beyond the study area, pedestrians will be accommodated through a system of trails, walkways and sidewalks along the roads as shown on Figure 6. Walking trails are proposed to be within the Open Space areas where not restricted by Environmentally Sensitive Areas or Wildfire Hazard concerns.

## Transit

Currently there are no transit routes running on East Boundary Road but there is on Highway 97 and Boucherie Road. In the KelTrans 2016 report prepared by B.C. Transit in 1997, there were no new transit routes identified for the East Boundary Road area. There was, however, increased frequency for the existing services on these roads.

At the subdivision stage, when transit needs are better defined, it may be desirable to provide public bus pullouts if deemed necessary.

# SERVICING

## Sanitary Sewer

In the late 1980's, Victor Projects, owner of D.L. 2045 and D.L. 4227 and two other landowners provided the funding to construct a major sanitary sewer trunk line known as the Boucherie Trunk to service the Mission Hills and Boucherie areas. In the mid 90's Victor Projects again funded the East Boundary Sanitary Sewer Trunk which also services a portion of D.L. 2045.

These trunk mains have been designed and constructed with large excess capacities to not only service D.L. 2045 and D.L. 4227, but also the Lakeview, West Kelowna, Casa Loma and IR #10 areas.

These mains feed to a state of the art treatment facility that was built by the Regional District in the1980's. The treatment plant has been designed to be expanded in cells. The expansion costs are paid for through development cost charges for each unit developed.

## Drainage

The Regional District has undertaken through its Consultants, Urban Systems, a Master Drainage Plan for the Westside. Based on this plan, and a more detailed storm analysis, Mission Hills Winery and Victor Projects funded the design and construction of a large storm drainage system for those lands draining southeast.

The system has been designed and constructed to provide a piped drainage system that includes the easterly drainage basins of D.L. 2045 and D.L. 4227. In conjunction with the drainage system, storm detention basins will be constructed to slow the flows and release at a pre-development rate while ensuring that the RDCO requirements for quality and quantity are met.

The westerly drainage basins for D.L. 2045 will consist of a partial pipe and partial open ditch system that will follow East Boundary Road to McDougall Creek. A supplementary stormwater management plan to the Westside Master Drainage Plan was completed which identifies the areas required to be upgraded. Some of these works are presently underway as part of the urbanizing East Boundary Road. The balance of drainage works will be completed as development proceeds in accordance with Regional District and Provincial requirements.

The westerly part of D.L. 4227 is in a separate drainage basin which will not require a storm system as there will be very little if any development in this basin. The basin presently discharges to the west and north along East Boundary to McDougall Creek.

## Water

D.L. 2045 and D.L. 4227 will be serviced by Sunny Side Utilities, a public Water Utility which services the Boucherie/Sunnyside area. The utility is maintained and operated by the Lakeview Irrigation District.

Sunnyside Utilities water supply is Okanagan Lake. Lake water is collected through a deep water intake which is chlorinated and pumped up to a balancing reservoir and booster station at Menu Road with a TWL 475m. The water is then pumped to an upper storage reservoir of 1500 cm at the 588m elevation which is located on D.L. 4227. This reservoir will provide water to the 560 contour which basically services all the land within D.L. 2045 and a small portion of D.L. 4227.

To provide service to the land above the 560 contour the following works will have to be completed:

- upgrading of the Okanagan Lake pump station.
- additional balancing storage at its Menu Road booster station.

- new booster station at the 588 reservoir.
- a new pump main to a new storage reservoir at the 637 elevation.

The upgrading of the lake pumping capacity, Menu Road balancing storage, and the new booster station and storage reservoir will be undertaken on a pre-determined stage bases as development proceeds and will be paid for by the developer as needed.

## Fire Protection

Fire protection is supplied by the Westside Fire Protection District with fire halls in the Westbank, Lakeview Heights, West Kelowna and Glenrosa areas. These halls are manned by a chief, deputy chief and a large volunteer brigade.

The Westbank hall is the main response center and is 5 km with a seven minute response time. Backup will be provided from the Lakeview hall which also provides a seven minute response time.

The Concept Development Plan area will be designed to provide fire hydrants at 100m spacing and fire flows of 60 l/s with a storage capacity of 2 hours in accordance with the *Subdivision and Development Servicing Bylaw.*

## Shallow Utilities

Shallow utility services such as hydro, gas, telephone and cable can easily be provided to the study area.

# GUIDELINES

## Introduction

As both the Westbank and Lakeview OCP's designate certain types of development as requiring development permits, prior to subdivision or development a developer permit must be approved and issued by the Regional Board in accordance with the *Local Government Act.*

This section contains guidelines for a development permit process and other guidelines that landowners, the Regional District, the Ministry of Transportation and others may wish to consider as part of the planning for the Concept Development Plan area.

The Regional District may determine to implement the following using the tools they consider most appropriate such as development permits, zoning bylaw, subdivision and development bylaw, etc.

## Environmentally Sensitive Area and Open Space Guidelines

The following are Development Permit Guidelines for preservation of, and development near, Environmentally Sensitive Areas and Open Spaces. It should be noted that these recommendations are guidelines, and specific prescriptions will be required to provide on-site direction when development plans have been prepared.

Environmentally sensitive areas will be identified more definitively at the time of rezoning at which time a Registered Biologist will identify specific areas. More definitive setbacks will be defined at that time.

Based on site visits, and sensitive ecosystems identified from Terrestrial Ecosystem Mapping, Environmentally Sensitive Areas (ESA) have been designated, with three

recommended levels of protection. These ESA are intended to preserve vital, contiguous areas of each of the sensitive ecosystem types.

Specific recommendations for ESAs and general guidelines for development include:

1. A no development buffer should be developed for ESA, ensuring that developments are situated as far away from ESA boundaries as feasible. Generally, this should be at least 20 meters in width.
2. No development or roads in areas designated as ESA1. Recreation facilities should be kept to a minimum (Class B and C trails only, no buildings or playgrounds). Interpretive signage would help ensure that visitors have minimal impact on the environment.
3. No residential development in areas designated as ESA2. Roads may bisect the ESA if necessary, but the amount of disturbance should be kept to a minimum. A physical delineation of the boundaries of this area may be required to reduce encroachment from adjacent developments.
4. Only low impact, low density development should occur in ESA3. Incorporate environmental design into the development plans for this area. High quality natural habitat should be identified for protection in neighbourhood plans, and habitat features (e.g. wildlife trees, rock outcrops) should be retained whenever possible. Clearing and grading should be kept to the smallest area possible, for both roads and yards, with natural vegetation retained whenever possible. Avoid sidecasting excavated materials. Retain large diameter trees.
5. An environmental consultant should be available to advise planners and construction crews on mitigating options, including the protection of areas of good condition natural habitats worked into the neighbourhood plans in ESA3s.
6. Weed control in areas surrounding all construction activities.

7. A low enclosure barrier could be constructed to delineate the extent of development and random recreation, as well as provide a barrier to some species of wildlife, such as snakes, from entering the developed area.

8. All open space slopes shown on the land use plan that are steeper than 30% will remain in their natural state primarily for the protection of the sensitive ecosystems and the passive enjoyment and interpretation of the natural environment.

9. Retention of the natural vegetation in these retained natural areas shall be required with the exceptions of alterations required by either the wildfire hazard covenant to reduce any wildfire risk, or by the improvement of existing trail systems.

10. Infrastructure and facilities that allow public access and passive recreational uses are generally encouraged provided that they are planned in such a way that public safety is ensured, landowners are not disturbed and that there are no significant impacts on the areas ecological features and functions. There is a conflict with allowing recreational use in areas where wildfire potential exists. Namely, the gully area and lands adjacent to Mount Boucherie.

11. The recommendations in the Mount Boucherie Fire Hazard Assessment report shall be followed. Gates will be required at trailheads and to permit access for fire fighting equipment and crews.

12. There are considerable limits to the recreational opportunities in ESA 1. Essentially the existing trail system will be used to protect unstable slopes and sensitive ecosystems. A recreational development plan is needed that incorporates the appropriate environmental protection.

13. No residential development shall be permitted in ESA 2. Further, no residential dwellings, accessory buildings, surface drainages, nor storage of materials shall be permitted within 7 metres of the top of bank adjacent to the ESA 2 zone. The location of the "top of bank" shall be flagged by a professional engineer prior to subdivision and construction approval. During construction activity, snow fencing shall be installed along the top of bank in order to delineate the area and prevent disturbance and trespass.

14. Construction of road crossings within ESA 2 shall be done in accordance with the following requirements:

- Road crossings of the ESA 2 gully area shall be restricted to the minimum number necessary to allow reasonable and safe access to the development lands east and west of the gully. Safe access includes allowing for alternative egress in the event of wildfire .

- Crossings shall be designed to provide the required road grades while limiting the height and volume of fills within the gully. In this regard, it should be possible to design approach road alignments that reduce the distances between adjacent road crossings by constructing roads across the gully sideslopes so that crossing fill elevations are reduced.

- Road crossings through the ESA 2 gully shall be constructed with rock fill slopes at approximately 1.5H:1V and incorporate drainage culverts with minimum diameters of 600 mm. This diameter of culvert will provide adequate capacity for stormwater flows while preventing access to the curious. Environmental concerns do not require a larger diameter passage through the road embankments provided that the height and volume of these fills are limited as much as possible.

15. Fencing is not required where public open space abuts Crown Land. This will permit and promote the continuity of open space and access to Crown Lands and Regional Parks.

16. Portions of the ESA 3 zone, including such features as rock outcrops, wildlife trees, etc., are considered to be environmentally sensitive. Buildings and structures shall not be located in these areas of the site. These areas shall be defined by a professional biologist when the lot boundaries are identified

17. Where disturbance of an ESA is unavoidable in order to construct or repair road, water, sewer, drainage, gas, underground wiring or other infrastructure, soil conservation measures such as silt fencing, matting and trapping shall be used. The disturbed areas shall then be replanted with natural vegetation immediately

after the construction or repair is complete. A professional biologist shall be retained to provide site-specific recommendations prior to, and during construction.

18. Areas to be preserved free of development shall be temporarily fenced, or otherwise protected from damage, prior to development of the site, with care taken to include the root system of trees within the fenced areas.

19. Any temporary fencing shall be collapsible to the extent necessary to allow immediate access for fire and other emergency vehicles. All "temporary" fencing shall be removed as soon as feasible following construction.

In addition to the ESA Development Permit Guidelines, the developer should be encouraged to implement the following suggestions:

- Development and implementation of an educational and stewardship program for all of the neighbourhoods in the development area, and most particularly for adjacent property owners who could be advised of the abutting environmentally sensitive conditions prior to home construction. This program would include guidelines for environmentally sensitive site development and landscaping.
- Site sensitive approaches should be undertaken in the development of ESA 3 portions of the area, including minimizing building footprints, minimizing lawn areas in favour of retaining natural forest and grassland settings, landscaping using xeriscaping techniques and plantings and flagging of mature trees in advance of building and road construction. Such strategies could also include increasing parcel sizes to limit residential densities in environmentally sensitive areas.

## General Development Guidelines

1. The maximum development yield of the subject lands shall not exceed 10 dwelling units per developable hectare.
2. No vehicular access be provided from the study area to Menu and McCallum Roads. At the entrance to these roads, bollards be installed to prevent vehicular access on a regular basis but still allow for emergency access in the event of wildfire.
3. The form and character of the development be in keeping with the adjacent neighbourhood.
4. The height or shape of any building shall not cause interference with the locally or regionally significant views.
5. Landscaping should feature drought tolerant and suitable plant species for residential homesites including minimal lawn areas that consume more water.

## Multiple Family Housing Development Guidelines

1. Units should be designed to maintain a residential character and be in keeping with the surrounding neighbourhood.
2. In areas of hillside conditions, buildings should be positioned and stepped to compliment the hillside.
3. Multiple-family units situated near single-family side yards should be particularly sensitive to issues of privacy/overlook over adjacent properties. Consideration should be given to greater setbacks above the ground floor, special landscaping measures, and/or orienting living areas away from neighbours.
4. The apparent scale of multiple-family development should be reduced through architectural design and detailing.
5. Establish residential scale through articulation of the building facade, e.g. projections, recesses, solids and voids; and by including house-like elements, such as chimneys and multi-paned windows.

6. Consider the use of roofs as key elements to help "break up" multiple-family buildings so they may adopt a form, scale, and rhythm sympathetic to single-family neighbours.
7. Where the adjacent neighbourhood is a single-family neighbourhood, front yard landscaping features should be used to create a sense of transition between neighbourhoods that face each other across a street. Appropriate features might include (but would not be limited to): roofed pedestrian entry portals; trellises; and small entry courts edged with ornamental trees, shrubs, and plants.
8. Semi-private open spaces should be clearly defined from public spaces for the exclusive use of building/complex occupants through the use of changes in grade, low walls or fences, planting, or siting within the confines of the building.
9. On-site lighting should be designed to provide for safe use of building entrances and pedestrian walkways after dark. Night-time lighting should be low-level and located to avoid glare into residential units.
10. Multiple Family Dwellings shall not exceed 30 dwelling units per hectare and shall be in keeping with all the regulations of the R3A zone as described in the *Regional District of Central Okanagan Zoning Bylaw #871.*

# IMPLEMENTATION

## Introduction

As this is the second layer of a comprehensive development planning process, there are a number of steps yet to be followed in order for development to occur on the site. These steps will permit the Regional Board, other government and servicing agencies and the public to provide further input.

## Official Community Plan

The Official Community Plans may be updated to reflect guidelines or recommendations from this Concept Development Plan.

The plan will, along with other policies and bylaws, be important input to any changes to be made to bylaws and any future decisions in the area.

## Rezoning

Applications for rezoning will be required in order for development to occur. Some areas can be regulated through the use of existing zones in the *Regional District of Central Okanagan Zoning Bylaw No. 871*, and in other areas it may be more appropriate to use a site-specific comprehensive development zone that will ensure that the proposed development conforms to the policies and guidelines of this document.

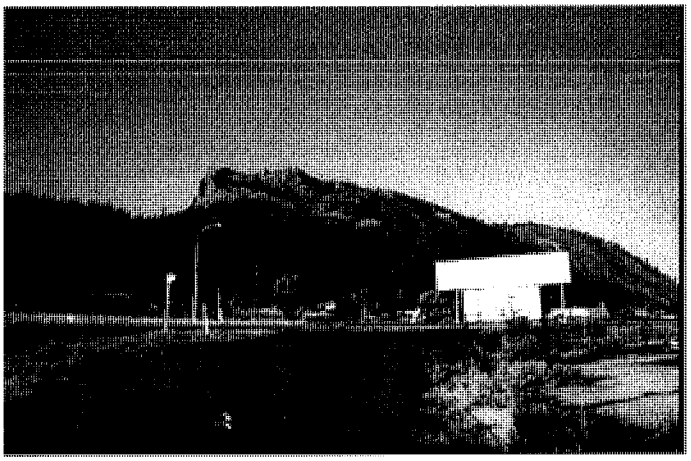
## Subdivision

Subdivision applications will be required as the owners proceed with the development plans. The subdivision process will allow the Regional District, Ministry of Transportation

and other affected agencies the opportunity to require specific technical requirements including road construction requirements and other servicing issues.

## Development Permits

The plan sets out development permit guidelines for both general development as well as for Environmentally Sensitive Areas. These guidelines will assist the approval authorities in ensuring the development conforms with the Regional District requirements.



# ENVIRONMENTAL SITE ASSESSMENT

FOR

# South Mount Boucherie Concept Development Plan

Prepared for: Planning Solutions Ltd.
Kelowna, British Columbia

Prepared By:

RGC

Rock Glen Consulting Ltd.

Okanangan Falls, British Columbia
February 5, 2003

## Executive Summary

The South Mount Boucherie neighbourhood is situated on a rolling upland bench on the southern flank of Mount Boucherie. A prominent gully separates the steep cliffs of the "Mountain" from the undulating and gently sloping terrain of the South Mount Boucherie area.

The main development area comprises undulating benchland wrapping around the south, west and north portions of the property. A wide, broad, gently to moderately steeply sloping bowl opens to the east and southeast down from this benchland. Steeper slopes and bedrock cliffs flank the west, southwest and south edges of the benchland.

Glaciation has rounded the shape of the upland areas and plucked materials from the sides of the mountain to create gently sloping terrain in the eastern portions of the development area and steeper terrain on the western side. The steeper slopes have varying amounts of plucked boulders and recent talus at their base.

The volcanic rocks underlying the site are sufficiently permeable to allow relatively rapid infiltration of precipitation and snowmelt. Infiltration and local runoff leads to low amounts of retained moisture within sediments in the area.

The bedrock units range from soft and friable (technical term *"rotten rock"*) to hard and resistant. Surficial soils have sufficient coarse fragment contents to be only moderately erodible.

Topography is the main constraint imposed on development by the local terrain. The soils and bedrock units make conventional residential development feasible. The shallow bedrock over most of the area increases the costs of this development by requiring ripping or blasting in some areas to shape building sites, construct roads and install utilities.

Mount Boucherie hosts some important plant and animals communities. Despite the relative isolation from other natural areas, wildlife species at risk and rare plant communities persist.

Species at risk, such as Pacific Rattlesnakes, Racers, Western Harvest Mice, Prairie Falcons and probably some bat species, inhabit the study area. In addition, rare plant communities are thought to be present. These critical wildlife habitats and important plant communities have been amalgamated to form three types of Environmentally Sensitive Areas.

The first type (ESA1) is extremely important and prone to impacts from development. The second type (ESA2) contains important wildlife corridors, including some riparian habitat, and should be maintained, although roads can bisect its route but not run along it. The third type (ESA3) is important but could remain a functioning ecosystem if development has a small footprint and future residents are encouraged to be

environmentally sensitive. The remainder of the property has wildlife and habitat values but could be considered expendable for development.

Specific recommendations for ESAs and general guidelines for development include:

1. A no development buffer should be developed for ESA, ensuring that developments are situated as far away from ESA boundaries as feasible. Generally, this should be at least 20 meters in width.

2. No development or roads in areas designated as ESA1. Recreation facilities should be kept to a minimum (Class B and C trails only, no buildings or playgrounds). Interpretive signage would help ensure that visitors have minimal impact on the environment.

3. No residential development in areas designated as ESA2. Roads may bisect the ESA if necessary, but the amount of disturbance should be kept to a minimum. A physical delineation of the boundaries of this area may be required to reduce encroachment from adjacent developments.

4. Only low impact*, low density** development should occur in ESA3. Incorporate environmental design into the development plans for this area. High quality natural habitat should be identified for protection in neighbourhood plans, and habitat features (e.g. wildlife trees, rock outcrops) should be retained whenever possible. Clearing and grading should be kept to the smallest area possible, for both roads and yards, with natural vegetation retained whenever possible. Avoid sidecasting excavated materials. Retain large diameter trees.

5. An environmental consultant should be available to advise planners and construction crews on mitigating options, including the protection of areas of good condition natural habitats worked into the neighbourhood plans in ESA3s.

6. Weed control in areas surrounding all construction activities.

7. A low enclosure barrier could be constructed in the buffer between ESAs and the developed areas to delineate the extent of development and contain motorized vehicle traffic. This may also provide a barrier to some species of wildlife, such as snakes, from entering the developed area.

* "Low Impact" includes leaving as much natural or only lightly disturbed areas as possible within a neighbourhood. For example, while underbrush and small diameter trees may be thinned and trees limbed, larger trees and the ground vegetation would not be disturbed. Gardens and lawn areas would be kept small or absent. Natural, indigenous plant species would be encouraged for any planting. Fences design should permit the movement of large wildlife through an area.

** "Low Density" areas retain about half of the area in an undisturbed condition. The remaining consists of roads, houses and yards. This does not preclude cluster developments in portions of the area

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## Introduction

A neighbourhood plan is being prepared for the South Mount Boucherie area in Lakeview Heights. The Central Okanagan Regional District (CORD) is responsible for this work. CORD has retained Planning Solutions Consulting Inc. (PSC) for this planning process.

In response to a request for proposal from Kim McKechnie of PSC, Rock Glen Consulting Ltd. (RGC) submitted a proposal to complete the environmental work for this planning exercise.

This report presents the results of our environmental investigations and provides general recommendations to assist in the planning process.

## Scope of Work

RGC completed the following tasks for this environmental assessment study:

- Completed field surveys to identify wildlife habitat and ecosystems present within the plan area.
- Mapped forest cover and vegetation types.
- Identified environmentally sensitive areas.
- Prepared maps, using base maps provided by Protech Engineering, showing the identified vegetation/forest covers, environmentally sensitive areas, wildlife corridors, etc.
- Evaluated the expected environmental impacts of the proposed development, and prepared general mitigative measures recommendations.

## Biophysical Setting

Mount Boucherie lies within the Northern Okanagan Basin ecosection. The property is primarily composed of the Okanagan variant of the very hot and dry Ponderosa Pine (PPxh1) biogeoclimatic subzone, with the Interior Douglas Fir (IDFxh1) biogeoclimatic unit along the upper, northern edge (Figure 1).

**Biophysical**

The science that deals with the application of physics to biological processes and phenomena.

Aspect, plant species and subtle moisture receiving/drainage areas provide a range of Site Series. The sites series found on the development area varied from 03 (very dry) Big Sage Bluebunch Wheatgrass to 06 (mesic or wetter site conditions) Douglas-fir – Ponderosa Pine Snowberry and Pinegrass.

On the very dry sites, bluebunch wheatgrass, fescues, balsamroot and big sage dominate the vegetation. Ponderosa pine is found in dispersed areas in single trees and small clumps. Shallow soils overlie bedrock in these areas and therefore limit soil moisture and have resulted in plant species that are drought resistant and have root systems capable of accessing water on even the driest sites.

On less dry sites, Pondersosa pine is more prevalent. Within this site series, small depressions and swale like channels exist. These areas exhibit site characteristics that indicate increased soil moisture seasonally. As result, an increase in brushy vegetation was found and Douglas-fir is growing.

The wetter site series is typically located in the gully/draw area below the steep rock cliff to the north of the property. These areas have dense thickets of shrubs and include Douglas-fir, Ponderosa pine and Trembling Aspen in the overstory.

The area is the last major block of undeveloped and relatively natural land within the developed areas of Westbank and Lakeview Heights (Gyug 2001). Consequently, Mount Boucherie is largely isolated from other natural landscapes. The nearest valuable habitat is the riparian streamside along McDougall Creek. It is separated from the Mount Boucherie uplands by only East Boundary Road along some stretches. Many of the upland wildlife are dependent on this rich riparian habitat.

## *Wildlife*

The 29 species of wildlife observed on the site, during three brief site visits, are listed in Table 1. Red- and Blue-listed species observed include Prairie Falcon, Western Harvest Mouse (remains found), White-throated Swift, Racer and Pacific Rattlesnake.

Figure 1: Racer

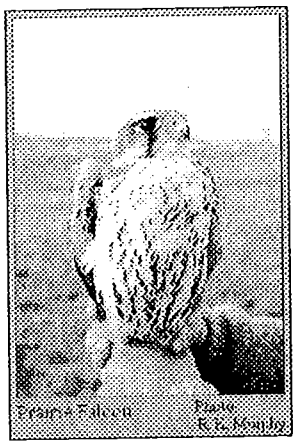


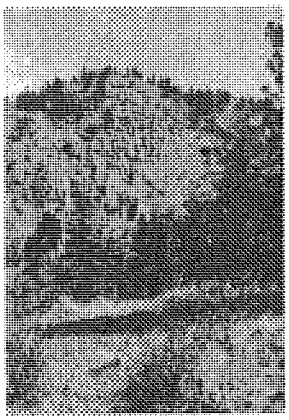
Table 1 - Wildlife species observed in the study area.

| | Common Name | Scientific Name | Status |
|---|---|---|---|
| Reptiles | | | |
| | Racer | *Coluber constrictor* | B |
| | Pacific Rattlesnake | *Crotalus oreganus* | B |
| Birds | | | |
| | American Kestrel | *Falco sparverius* | Y |
| | American Robin | *Turdus migratorius* | Y |
| | Black-capped Chickadee | *Parus atricapillus* | Y |
| | Brewer's Blackbird | *Euphagus cyanocephalus* | Y |
| | Calliope Hummingbird | *Stellula calliope* | Y |
| | California Quail | *Callipepla californica* | Y |
| | Clarke's Nutcracker | *Nucifraga columbiana* | Y |
| | Common Raven | *Corvus corax* | Y |
| | Hermit Thrush | *Catharus guttatus* | Y |
| | Mourning Dove | *Zenaida macroura* | Y |
| | Northern Flicker | *Colaptes auratus* | Y |
| | Prairie Falcon | *Falco mexicanus* | R |
| | Red-breasted Nuthatch | *Sitta canadensis* | Y |
| | Ring-necked Pheasant | *Phasianus colchicus* | Y |
| | Red-tailed Hawk | *Buteo jamaicensis* | Y |
| | Violet-green Swallow | *Tachycineta thalassina* | Y |
| | White-throated Swift | *Aeronautes saxatalis* | B |
| Mammals | | | |
| | Coyote | *Canis latrans* | Y |
| | Porcupine | *Erethizon dorsatum* | Y |
| | Yellow-bellied Marmot | *Marmota flaviventris* | Y |
| | Bushy-tailed Woodrat | *Neotoma cinerea* | Y |
| | Western Harvest Mouse | *Reithrodontomys megalotis* | B |
| | Yellow-pine Chipmunk | *Tamias amoenus* | Y |
| | Northern Pocket Gopher | *Thomomys talpoides* | Y |
| | unknown bat | *Myotis sp??* | ? |
| | unknown rodent | *?* | ? |

The most abundant birds over the course of the year appear to be those reliant on pine seeds, such as finches and nutcrackers, or wildlife trees, such as woodpeckers and nuthatches (Gyug 2001). Much of the area also has good deer winter range, but appears to be under-utilized, largely due to surrounding development and lack of water sources.

One of the important features of the site is that it still hosts the Blue-listed Racers and Pacific Rattlesnakes. It was thought that preceding development had caused the loss of the Pacific Rattlesnake (Gyug 2001). These populations of snakes are extremely important as they provide one of the last links between snake populations in the north and south Okanagan. Proposed developments have the potential to further contribute to the declines of these species if mitigation actions are not pursued.

The Blue-listed Western Harvest Mouse was found at the base of a raptor feeding perch along the bluffs on the property. It is likely that the mouse was capture near the perch, on the property. The Western Harvest Mouse is considered very rare, particularly north of the South Okanagan (Nagorsen 1992). Habitat loss due to development and ongoing mortality from domestic cats could significantly impact this species.



## Vegetation

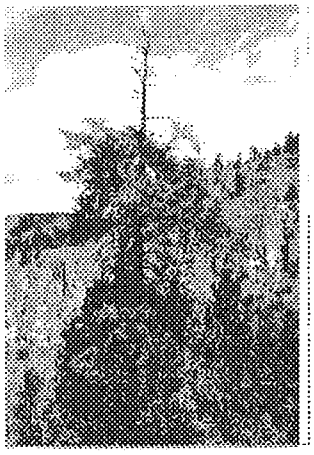
The plant communities were varied as the habitat ranged from very hot, steep slopes to lush riparian draws. The plant community was well developed, representing late seral stages throughout much of the property. The fescue grasslands/ponderosa parklands were impacted by road development and some weed invasion but were otherwise intact.

Evidence of past logging and fire was apparent, and much of the ponderosa pine forest is in structural stage 5 (young forest), although the more open forest types tend to contain more larger, mature trees.

The riparian draw was largely intact except where the powerline accesses the cellular transmission tower. This line could be removed if servicing could be accessed from any potential residential developments.

A complete list of plants observed on-site is included in Table 2.

## Forest Health



During the walkthrough of the planned subdivision, several forest health issues were noted including Douglas fir Mistletoe and leader defoliation that is typical of eastern spruce budworm and/or Douglas fir Tussock moth. The mistletoe tends to reduce the health and vigour of Douglas fir and typically results in stem deformities and large swellings along branch and main stems. The defoliators remove new needles from the trees. Tree showing signs of defoliator insects will have young, recent shoots void of needles. In severe cases, the tops of trees or entire trees may die off.

The primary concern for these forest health issues is to manage the risk of spreading disease or insects, with fire hazard issues resulting from fuel loading and with the removal of large trees that present wildlife tree opportunities. Currently, the risk of spread is relatively low, while the fire hazards on the site ranged from moderate to extreme.

Table 2 - Plant species observed in the study area.

| | Common Name | Scientific Name |
|---|---|---|
| Trees | | |
| | pondersosa pine | *Pinus ponderosa* |
| | Douglas fir | *Pseudotsuga menziesii* |
| | trembling aspen | *Populus tremuloides* |
| | water birch | *Betula occidentalis* |
| | Douglas maple | *Acer glabrum* |
| | red-osier dogwood | *Cornus stolonifera* |
| | saskatoon | *Amelanchier alnifolia* |
| Shrubs | | |
| | wild rose | *Rosa sp.* |
| | smooth sumac | *Rhus glabra* |
| | tall Oregon grape | *Mahonia aquifolium* |
| | common rabbit brush | *Chrysothamnus nauseosus* |
| | big sagebrush | *Artemisia tridentata* |
| | pasture sage | *Atremisia frigida* |
| | snow buckwheat | *Erigonum niveum* |
| | parsnip-flowered buckwheat | *Erigonum heracloides* |
| | waxy (squaw) currant | *Ribes cereum* |
| | common snowberry | *Symphoricarpos albus* |
| | spreading dogbane | *Apocynum androsaemifolium* |
| Herbs | | |
| | arrowleaf balsamroot | *Balsamorhiza sagittata* |
| | fern-leaved desert-parsley | *Lomatium dissectum* |
| | bitterroot | *Lewisia rediviva* |
| | yarrow | *Achillea millefolium* |
| | lemonweed | *Lithospermum ruderale* |
| | ocean spray | *Holodiscus discolor* |
| | pendant-pod locoweed | *Oxytropis deflexa* |
| | upland larkspur | *Delphinium nuttallianum* |
| | shaggy daisy | *Erigeron pumilus* |
| | shrubby penstemon | *Penstemon fruticosus* |
| | scarlet gilia | *Ipomopsis aggregata* |
| | brittle prickly-pear cactus | *Opuntia fragilis* |
| | Holboell's rockcress | *Arabis holboellii* |
| | fireweed | *Epilobium angustifolium* |
| | bluebunch wheatgrass | *Elymus spicatus* |
| | rough fescue | *Festuca campestris* |
| | Junegrass | *Koeleria macrantha* |
| | pinegrass | *Calamagrostis rubescens* |
| | selaginella | *Selaginella sp.* |
| Weeds | | |
| | Loesel's tumble-mustard | *Sisymbrium loeselii* |
| | diffuse knapweed | *Centaurea diffusa* |
| | cheatgrass (downy brome) | *Bromus tectorum* |
| | bulbous bluegrass | *Poa bulbosa* |
| | horseweed | *Conyza canadensis* |
| | yellow salsify | *Tragopogon dubius* |
| | sulphur cinquefoil | *Potentilla recta* |
| | annual fleabane | *Erigeron annuus* |

## *Sensitive Ecosystems*

The study area is largely forested, interspersed with grassland and rocky habitats. Despite roads, past logging, and all-terrain traffic, the vegetation is in remarkable condition. The presence and dominance of rough fescue is a good indicator of this.

Terrestrial ecosystem mapping (TEM) of the area was prepared by Iverson *et al.* (2001) for the Central Okanagan Regional District (Figure 1). Descriptions of the Ecosystem Units are provided in Appendix I. The polygons are based on terrain features. The descriptions represent climax ecosystems that occur within the terrain feature. Up to three ecosystems can be identified within each polygon.

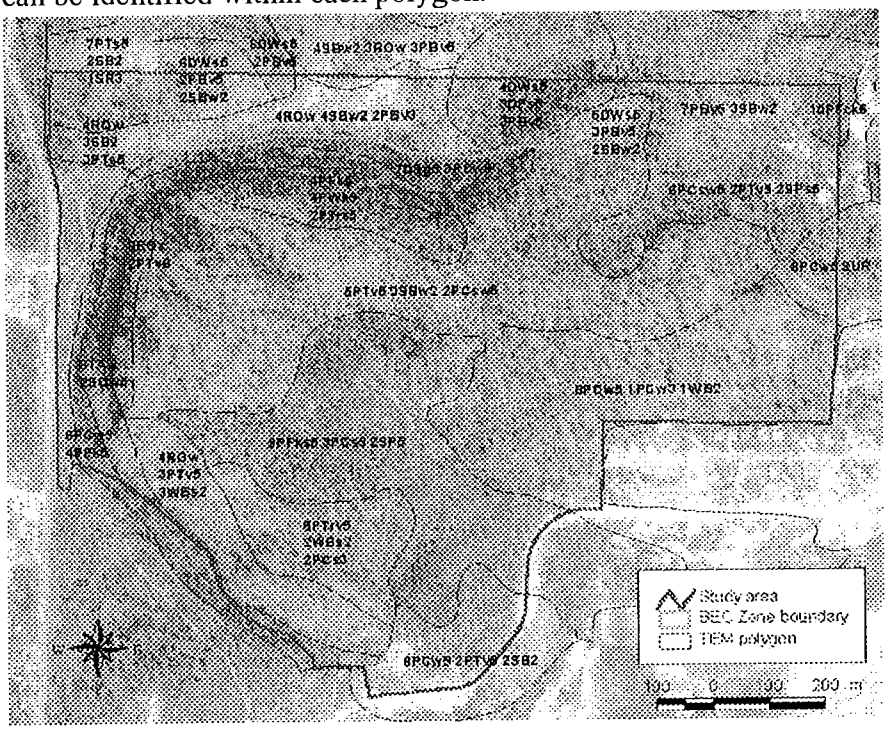



**Figure 2 - Terrestrial Ecosystem Mapping of the Mt. Boucherie Study Area**

Terrestrial Ecosystem Mapping was used to identify sensitive ecosystems occurring in the study area (Table 3). Each sensitive ecosystem is described and its value for wildlife discussed in the following text.

Table 3 - Sensitive Ecosystems of the study area.

| Ecosystem Type | Ecosystem Units * | Habitat Values |
|---|---|---|
| Riparian Forest | DS | Thick cover for riparian birds, high foraging values for birds, bats, and ungulates |
| Open Forest | DW, PB, PC, PT, PW | Mature and dead pine provide nesting opportunities, grassland understorey provide ground nesting opportunities |
| Grassland | WB, SB, (PB) | Forage for snakes, small mammals and ungulates; ground nesting birds |
| Rocky Habitat | RO, TA, SO, (SB, PB) | Snake dens, bat roosts, raptor nests, ungulate escape terrain |

* Appendix I provides descriptions of ecosystem units; ecosystem units in bold have the potential to contain rare plant communities (see previous section).

## Riparian Forest

A riparian forest ecosystem (DS: FdPy – Snowberry - Spirea), consisting of ponderosa pine, Douglas-fir, trembling aspen and water birch, occurs in the gully in the northwest portion of the study area.

Birds were most diverse and abundant in this ecosystem unit, largely due to the diversity of habitat structure for nesting and cover, and the abundance of forage. It is suspected that bats use the ravine for foraging, due to high insect abundance. The ravine likely provides summer cover for Racers and Western Rattlesnakes, escaping the heat and foraging on the abundance of small mammals.

## Open Forest

Five different open forest ecosystems are present in the study area. Three ponderosa pine forest types occur in the PPxh1: PC (Py – Bluebunch wheatgrass – Cheatgrass), PT (Py - Red three-awn), and PW (Py – Bluebunch wheatgrass – Idaho fescue). Two mixed pine and Douglas-fir forests occur in the IDFxh1: DW (FdPy – Bluebunch wheatgrass – Pinegrass), and PB (FdPy – Bluebunch wheatgrass – Balsamroot).

Wildlife values are largely tied to the large live and dead ponderosa pine in these areas. Nesting, especially in standing dead pine is an important feature of this habitat type. Course debris of wood and rock serve as important cover features for ground dwelling wildlife such as snakes, lizards, small mammals, and many invertebrate species. Mature bunchgrasses, including rough fescue and bluebunch wheatgrass provide nesting cover for many bird species. Shrubs are important forage for deer.

## Grassland

Two grassland ecosystems occur in the study area. WB (Bluebunch wheatgrass – Balsamroot) occurs with shallows soils in the southwestern portion of the property, and as a deep-soiled unit in the southeastern

portion. SB (Selaginella – Bluebunch wheatgrass rock outcrop) is a shallow-soiled, steep, and rugged grassland occurring along most of the northern edge of the property, in the IDFxh1. The open forest unit PB can be considered a grassland habitat as well, as it consists of very open forest with scattered trees.

These steep, warm grasslands are critical for ungulates during heavy snowfalls. During the summer, animals are scarce. Those that tolerate the heat are hummingbirds and foraging White-throated Swifts. Snakes and ground-dwelling invertebrates seek shelter under rocks and in burrows. Egg laying by reptiles is common in these habitats.

### Rocky Habitats

Rocky ecosystems include RO (Rock Outcrop), TA (Talus), and SO (Saskatoon – Mock orange Talus), as well as portions of the rugged grassland (SB) and open forest (PB) units. The interspersed rock outcroppings are generally smaller and lack much vertical throughout the study area.

The exposed rock outcrops and the talus that they accumulate at their bases are critical wildlife habitats for many wildlife species. The thermal retention of rock, and the deep cover provided by fissures, flakes and talus, are essential attributes for escaping winter and rearing young. Bats, cliff nesting birds (raptors, swifts, swallows, wrens), and reptiles are the most common to require these attributes. The rock outcroppings at Mt. Boucherie demonstrated all these requirements and subsequently hosted much of this wildlife diversity.

## *Rare Plant Communities*

TEM Ecosystem Units correlate to BEC site series. Based on the site series in which Rare Natural Plant Communities may occur, many of the polygons in the study area have the potential to contain red or blue-listed plant communities (Figure 2). These communities are listed in Table 4.

**Table 4 - Rare Plant Communities potentially occurring in the study area.**

| *Scientific name* | Common name | BEC Unit(s) | Corresponding EU in Study Area | Prov Rank[1] | Prov List | Succ Status[2] | Struct Stage[3] |
|---|---|---|---|---|---|---|---|
| *Artemisia tripartita / Elymus spicatus - Balsamorhiza sagittata* | Threetip sagebrush / bluebunch wheatgrass - balsamroot | PPxh1/00 | WB | S1Q | Interim Red | DC | 3 |
| *Pinus ponderosa / Aristida longiseta* | Ponderosa pine / red three-awn | BGxh1/04 BGxh2/03 PPxh1/02 | PT | S3 | Blue | DC | 7 |
| *Pinus ponderosa / Elymus spicatus - Festuca idahoensis* | Ponderosa pine / bluebunch wheatgrass - Idaho fescue | PPxh1/01 | PW | S3 | Blue | DC | 7 |

[1] Provincial Rank: S1Q = Critically imperilled (especially susceptible to extirpation or extinction), but taxonomic status is not clear or in question
S3 = Vulnerable (susceptible to extirpation or extinction)

[2] Successional Status: CD = Disclimax (oldest possible expression of an ecosystem given a natural disturbance regime which arrests succession so that climatic climax is never achieved, including periodic surface fires)

[3] Structural Stage: 3 = Shrub / herb
7 = Old forest

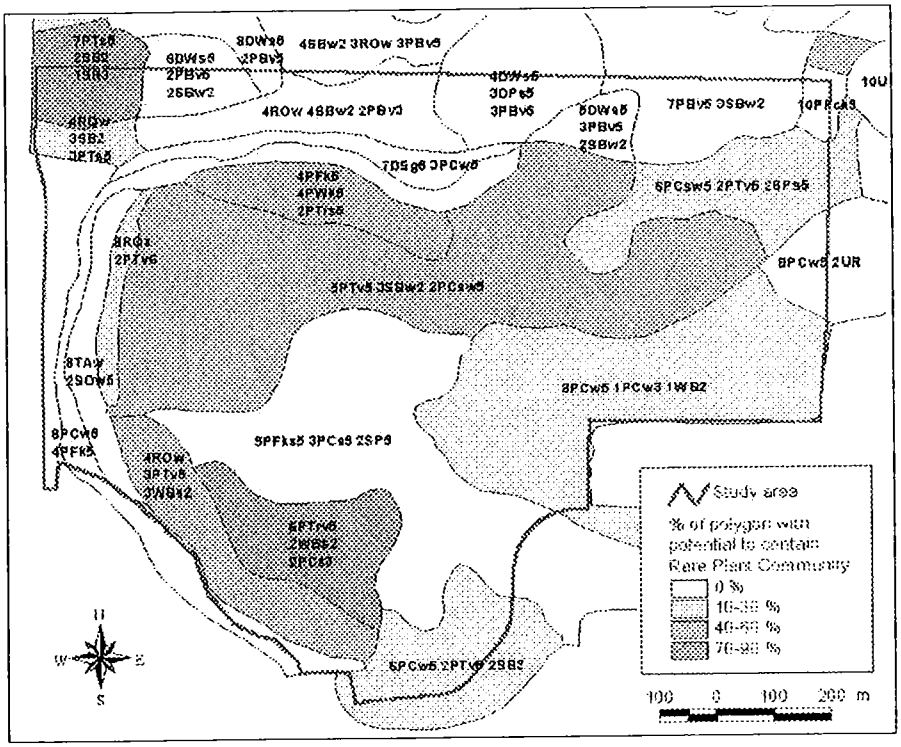



**Figure 3 - Potential for Rare Plant Communities, based on TEM**

## Wildlife and Habitat Summary

Mount Boucherie hosts some important plant and animals communities. Despite the relative isolation from other natural areas, wildlife species at risk and rare plant communities persist. Species at risk, such as Pacific Rattlesnakes, Racers, Western Harvest Mice, Prairie Falcons and probably some bat species, inhabit the study area. In addition, rare plant communities are thought to be present. These critical wildlife habitats and important plant communities have been amalgamated to form three types of Environmentally Sensitive Areas.

The first type (ESA1) is extremely important and prone to impacts from development. The second type (ESA2) contains important wildlife corridors, including some riparian habitat, and should be maintained, although roads can bisect its route but not run along it. The third type (ESA3) is important but could remain a functioning ecosystem if development has a small footprint and future residents are encouraged to be environmentally sensitive. The remainder of the property has wildlife and habitat values but it is anticipated that the proposed development will not have significant, direct impacts to important habitats.

## Recommendations

Based on site visits, and sensitive ecosystems identified from Terrestrial Ecosystem Mapping, Environmentally Sensitive Areas (ESA) have been designated, with three recommended levels of protection (Figure 3). These ESA are intended to preserve vital, contiguous areas of each of the sensitive ecosystem types.

Specific recommendations for ESAs and general guidelines for development include:

1. A no development buffer should be developed for ESA, ensuring that developments are situated as far away from ESA boundaries as feasible. Generally, this should be at least 20 meters in width.
2. No development or roads in areas designated as ESA1. Recreation facilities should be kept to a minimum (Class B and C trails only, no buildings or playgrounds). Interpretive signage would help ensure that visitors have minimal impact on the environment.
3. No residential development in areas designated as ESA2. Roads may bisect the ESA if necessary, but the amount of disturbance should be kept to a minimum. A physical delineation of the boundaries of this area may be required to reduce encroachment from adjacent developments.

4. Only low impact, low density development should occur in ESA3. Incorporate environmental design into the development plans for this area. High quality natural habitat should be identified for protection in neighbourhood plans, and habitat features (e.g. wildlife trees, rock outcrops) should be retained whenever possible. Clearing and grading should be kept to the smallest area possible, for both roads and yards, with natural vegetation retained whenever possible. Avoid sidecasting excavated materials. Retain large diameter trees.

5. An environmental consultant should be available to advise planners and construction crews on mitigating options, including the protection of areas of good condition natural habitats worked into the neighbourhood plans in ESA3s.

6. Weed control in areas surrounding all construction activities.

7. A low enclosure barrier could be constructed to delineate the extent of development and random recreation, as well as provide a barrier to some species of wildlife, such as snakes, from entering the developed area.

* "Low Impact" includes leaving as much natural or only lightly disturbed areas as possible within a neighbourhood. For example, while underbrush and small diameter trees may be thinned and trees limbed, larger trees and the ground vegetation would not be disturbed. Gardens and lawn areas would be kept small or absent. Natural, indigenous plant species would be encouraged for any planting. Fences design should permit the movement of large wildlife through an area.

** "Low Density" areas retain about half of the area in an undisturbed condition. The remaining consists of roads, houses and yards. This does not preclude cluster developments in portions of the area

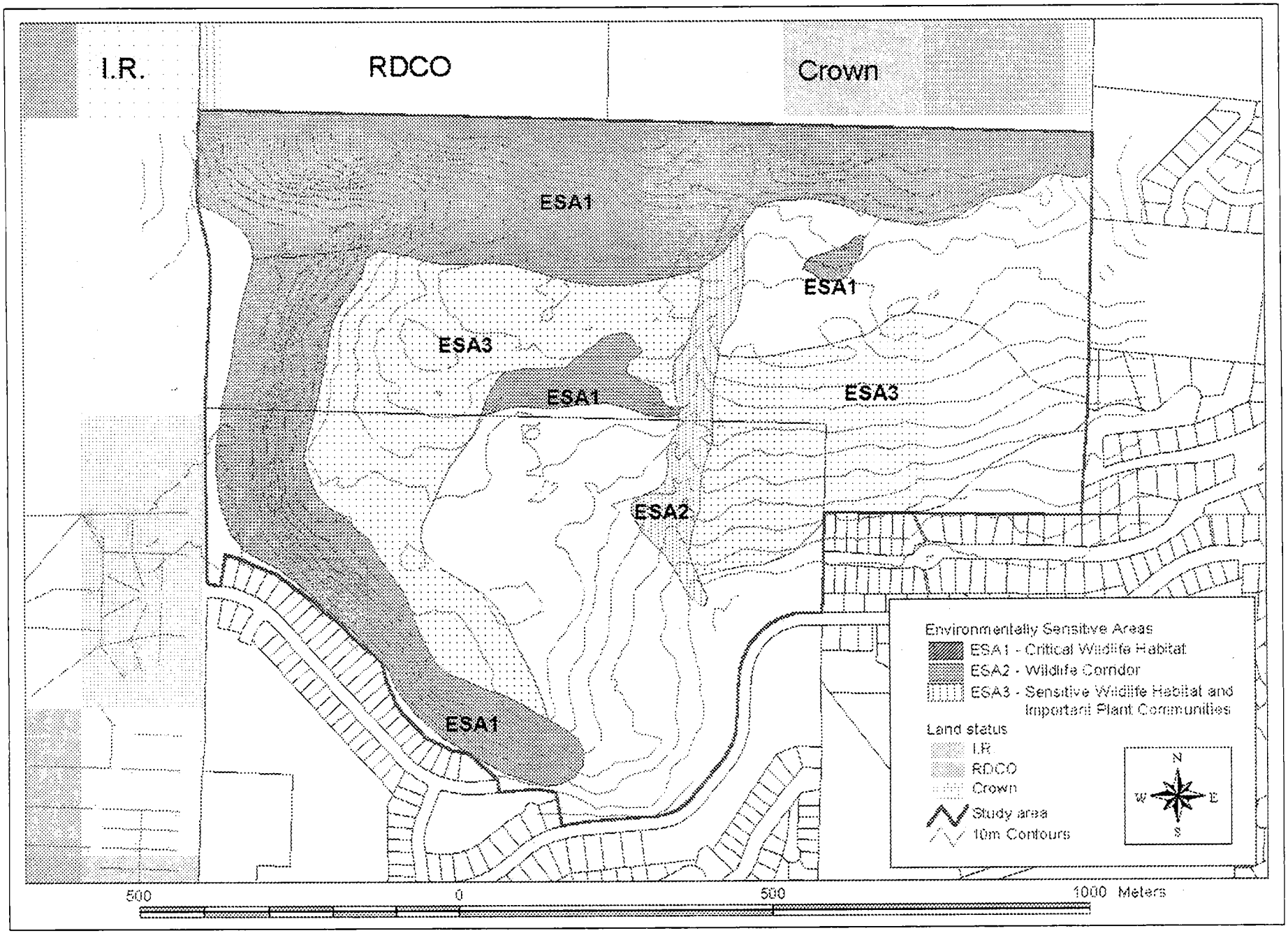



Figure 4 - Environmentally Sensitive Areas

## *Limitations and Closure*

This report has been prepared for the exclusive use of the Prime Investments Corp. following generally accepted environmental assessment practices. No other warranty expressed or implied is intended.

The findings presented in this report are based upon a review of available public records and documents as well as a visual assessment of site conditions and interviews with persons knowledgeable of site conditions.

We trust that the information contained in this report meets your requirements. Please contact the undersigned if you have any questions or require more information regarding any aspect of these investigations.

Yours truly,

Paul Glen, P. Eng.
Rock Glen Consulting Ltd.

Mike Sarell, R.P.Bio.
Ophiuchus Consulting

## References

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# APPENDIX 1

## ECOSYSTEM UNITS OF THE STUDY AREA

## Appendix 1: Ecosystem Units of the study area

| | | | |
|---|---|---|---|
| **DS** | FdPy – Snowberry – Spirea | PPxh1 | DSg |
| | This riparian forest type is commonly associated with gently sloping sites that are receiving some moisture, with deep, medium textured soils. It occurs as a gully unit in the northern portion of the study area. These forests typically have moderately closed Douglas-fir overstories with trembling aspen. The very shrubby understories are dominated by snowberry with some Oregon-grape, birch-leaved spirea, and saskatoon. Often there is scattered pinegrass and/or Kentucky bluegrass with some heart-leaved arnica and other scattered forbs. There is a minimal moss layer with scattered patches of ragged mosses. | | |
| **DW** | FdPy – Bluebunch wheatgrass - Pinegrass | IDFxh1 | DWs |
| | This forest ecosystem occurs on moderate to steep warm aspects with medium textured soils. Both deep and shallow soiled units occur, along the northern edge of the study area. Mixed ponderosa pine – Douglas-fir forests are open and dominated by bunchgrasses, particularly bluebunch wheatgrass with scattered forbs (mostly balsamroot). Rough fescue commonly occurs, in contrast with the Idaho fescue that more commonly occurs on these sites further south in the Okanagan. Mosses and lichens are scattered and uncommon. | | |
| **PB** | FdPy – Bluebunch wheatgrass – Balsamroot | IDFxh1 | PBv |
| | This forest ecosystem occurs on warm aspects with medium-textured very shallow soils, commonly associated with bedrock outcrops. It occurs along most of the northern boundary of the study area. Forests are very open with scattered large trees, often growing in bedrock fractures. The understory is variable depending on soil depth with more vegetation occurring on deeper soil pockets. Scattered shrubs and bunchgrasses (bluebunch wheatgrass and rough fescue) dominate the understory. A lichen and moss crust may be present on undisturbed sites. | | |
| **PC** | Py – Bluebunch wheatgrass – Cheatgrass | PPxh1 | PCs, PCsw, PCw |
| | This forest type typically occurs on gentle slopes with deep, medium textured soils. In the study area, it occurs with moderate to steep warm aspects and/or shallow soils. Forests are open and dominated by bunchgrasses, particularly bluebunch wheatgrass with scattered forbs. Rough fescue commonly occurs, in contrast with the Idaho fescue that more commonly occurs on these sites in the South Okanagan. Mosses and lichens are scattered and uncommon. | | |
| **PF** | Py – Bluebunch wheatgrass – Rough fescue | PPxh1 | PFck, PFk, PFks |
| | This forest type occurs on cool aspects with medium textured soils. Both deep and shallow soiled units occur in the study area. The overstory is moderately closed, although historically frequent surface fires would have kept these stands very open. Understories are usually a mixture of bluebunch wheatgrass, rough fescue, and pinegrass with scattered shrubs, forbs and mosses. In contrast with sites further south in the Okanagan, rough fescue is more common here than Idaho fescue. | | |
| **PT** | Py – Red three-awn | PPxh1 | PTrs, PTrv, PTs, PTv |
| | This forest type occurs on warm aspects with shallow or very shallow, coarse-textured soils. It is also found on ridge crests where the soils are extremely shallow. Forests are very open with scattered large trees, often growing in bedrock fractures. The understory is variable depending on soil depth with more vegetation occurring on deeper soil pockets. Scattered shrubs and bunchgrasses (bluebunch wheatgrass and rough fescue) dominate the understory. A lichen and moss crust may be present on undisturbed sites. | | |

| | | | |
|---|---|---|---|
| **PW** | Py – Bluebunch wheatgrass – Idaho fescue | PPxh1 | PWk |
| | This forest ecosystem occurs on cool aspect slopes with deep, medium-textured soils. The overstory is generally open and dominated by ponderosa pine. Historically these sites would have been kept extremely open by frequent low-severity surface fires. Saskatoon, bluebunch wheatgrass, rough fescue and arrow-leaved balsamroot are common in the understory. This ecosystem type has a very limited distribution within the Central Okanagan, as it has been heavily impacted through urban growth and development. | | |
| **RO** | Rock Outcrop | PPxh1 / IDFxh1 | ROw, ROz |
| | These are areas of exposed bedrock with less than 10% vegetation cover. On sites with fractured bedrock, some plants may be growing out of rock cracks. | | |
| **SB** | Selaginella – Bluebunch wheatgrass rock outcrop | PPxh1 / IDFxh1 | SB, SBw |
| | This grassland ecosystem occurs on gentle or warm aspect slopes with very shallow soils, commonly on bedrock outcrops. The bedrock is generally low relief and unfractured. Selaginella and rusty steppe moss with some grasses and forbs dominate these sites. Shrubs are quite uncommon. This unit is commonly scattered as small sites in a forested matrix. | | |
| **SO** | Saskatoon – Mock orange Talus | PPxh1 | SOw |
| | This ecosystem occurs on warm steep slopes with deep, coarse textured soils. It is commonly associated with steep, blocky talus slopes with minimal soil in pockets between blocks. Scattered trees (Douglas-fir, ponderosa pine and/or aspen) and scattered shrubs (mock orange, snowberry, ocean spray) grow in soil pockets between blocks. Often cliff ferns and scattered grasses are found growing in soil pockets. | | |
| **SP** | FdPy – Snowberry - Pinegrass | PPxh1 | SP, SPs |
| | This forest type is commonly associated with gentle lower slopes that are receiving some subsurface moisture, with deep, medium textured soils. It occurs also as a shallow-soiled draw in the northeastern portion of the property. Forests are moderately closed with mixed Douglas-fir and ponderosa pine overstories, although historically they would have been quite open, as fire would have been a frequent disturbance. Because of fire exclusion, most sites have become ingrown with higher densities of smaller stems. Ponderosa pine is more abundant than fir in the deeper-soiled unit (SP). The understory is dominated by snowberry and pinegrass. Rough fescue is quite common and Idaho fescue is quite uncommon on these sites relative to those further south. | | |
| **TA** | Talus | PPxh1 | TAw |
| | Steep colluvial deposits of angular rock fragments that result from rockfall. These sites have less than 10% vegetation cover. | | |
| **WB** | Bluebunch wheatgrass – Balsamroot | PPxh1 | WB, WBs |
| | This grassland ecosystem occurs on warm aspects with medium-textured soils. Occurs in the southern portion of the study area, with both deep and shallow soiled units. Often surface soils are actively ravelling. Bluebunch wheatgrass and balsamroot dominate these sites. Bunchgrasses are more widely spaced than on more gentle slopes. | | |

# Geological Hazard Assessment

# for

# South Mount Boucherie

# Concept Development Plan

*Prepared for*

**Planning Solutions Consulting Inc.**
**Kelowna, B.C.**

*Submitted by*:
ROCK GLEN CONSULTING LTD.
Okanagan Falls, BC

File: RGC 0044

November 16, 2002

# EXECUTIVE SUMMARY

A neighbourhood plan is being prepared for the South Mount Boucherie area in Lakeview Heights. The Central Okanagan Regional District (CORD) is responsible for this work. CORD has retained Planning Solutions Consulting Inc. (PSC) for this planning process. This report presents the results of a geological hazard assessment of the subject property in order to meet the requirements of the Central Okanagan Regional District for the development of a neighbourhood plan for the property.

Topography is the main constraint imposed on development by the local terrain. The soils and bedrock units make conventional residential development feasible. The shallow bedrock over most of the area will require ripping or blasting in some areas to shape building sites, construct roads and install utilities.

Shallow bedrock with often relatively thin soil cover predominates in the project area. Slopes within the Mount Boucherie plan area are generally stable. Slope stability hazards within the project area are low to moderate.

Steep slopes on the south, southwest and northwest portions of the site require setbacks for safe residential development. The stable nature of these bedrock slopes is appropriate for a minimum 15 m setback from the slope crests.

A prominent gully on the interior of the development with steep but relatively low slopes will require a minimum 7 m setback.

Shallow, rocky soils over relatively shallow bedrock creates a low to moderate erosion hazard throughout the proposed development area. Existing erosion on steeper slopes within the study area shows a strong tendency to self-armouring.

There are no perennial streams crossing the subject property. The majority of site surface runoff is generated within the local site area. The groundwater table is expected to be below depths of 4 to 5 m throughout the site area.

There are no geotechnical concerns precluding residential development on the subject property. Site soils are suitable for the support of typical one and two storey residences following the requirements of the BC Building Code. The presence of some moderately steep to very steep slopes, gullies, and other terrain throughout the proposed subdivision impose some constraints on the locations and types of residential development. Site-specific geotechnical engineering input may be required on some lots to ensure that the presently stable condition of slopes in the area is maintained.

Soil and groundwater conditions on the site impose some construction constraints on utility installations and roadway construction.

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## LIST OF FIGURES

# 1.0 INTRODUCTION

## 1.1 General

A neighbourhood plan is being prepared for the South Mount Boucherie area in Lakeview Heights. The Central Okanagan Regional District (CORD) is responsible for this work. CORD has retained Planning Solutions Consulting Inc. (PSC) for this planning process.

In response to a request for proposal from Kim McKechnie of PSC, Rock Glen Consulting Ltd. (RGC) submitted a proposal to complete environmental, geological and wildfire hazard assessments for this planning exercise.

This report presents the results of our geological investigations and provides general recommendations to assist in the planning process.

## 1.2 Site Location and Surrounding Land Use

The subject property is located in the Mount Boucherie area of Lakeview Heights, overlooking Okanagan Lake, the City of Kelowna, and Westbank. The site is bordered by a sub-division to the southeast and southwest, Central Okanagan Regional District (CORD) parkland and by Mount Boucherie in the north. The approximately 100 ha site, has a mainly southwest exposure, with rolling hills and slopes varying between 0% and 45%.

Figure 1, on the following page, is a plan of the Mount Boucherie site.

## 1.3 Scope of Work

RGC completed the following tasks for this geological assessment study:

- Reviewed topographic and geological maps/reports for the area.
- Completed field surveys to become familiar with local site topographic and soils conditions.
- Assessed geologic hazards on the property.
- Prepared recommendations respecting identified geological hazards (including slope stability, erosion potential, etc.) to guide residential development planning.
- Participated in site walkover with Planning Solutions and the CORD to discuss development issues including road and house site locations, parks, etc.

*Mount Boucherie Site Plan Figure 1*

# 2.0 SITE PHYSICAL CHARACTERISTICS

## 2.1 Site Physiography

The South Mount Boucherie "neighbourhood" is situated on a rolling upland bench on the southern flank of Mount Boucherie. A prominent gully separates the steep cliffs of the "Mountain" from the undulating and gently sloping terrain of the South Mount Boucherie "neighbourhood".

The study area is largely forested, interspersed with grassland and rocky terrain. The main development area comprises undulating benchland wrapping around the south, west and north portions of the property. A wide, broad, gently to moderately steeply sloping bowl opens to the east and southeast down from this benchland. Steeper slopes and bedrock cliffs flank the west, southwest and south edges of the benchland.

There are no perennial streams crossing the subject property. There is a prominent gully running roughly east to west along the north edge of the property.

Groundwater levels are expected to range to greater than 5 m below ground throughout much of the property. Locally shallower groundwater is present seasonally and in depression and gully areas.

## 2.2 Description of Site Soils and Bedrock

The local topography is the result of ice flowing across the area from the east-northeast to the west-southwest. As the ice flowed upslope, it ground down the rough edges of the terrain and plastered thin till layers into local bedrock depressions. As the ice passed over the western edge of the area, it pulled great chunks of rock out of the terrain creating the steep sided slopes on the western side of the area.

Water flowing off of the melting ice eroded most of the till, and deposited minor amounts of sand and gravel in local drainage courses. Depressions in the bedrock surface were infilled with till, sands and fine-grained sediments deposited from the melting ice. These depressions now function as local receiving areas for sediments washed in from the surrounding terrain. They act to trap moisture and support a diverse variety of native plants, reptiles and small mammals.

Volcanic rocks ranging in age from 20 to 40 million years old provide the underlying structure of the area. Fine-grained, resistant dacite flows cap Mount Boucherie. Volcanic breccias and pyroclastic rocks underlie the benchland and bowl areas of the development.

Glaciation has rounded the shape of the upland areas and plucked materials from the sides of the mountain to create gently sloping terrain in the eastern portions of the development area and steeper terrain on the western side. The steeper slopes have varying amounts of plucked boulders and recent talus at their base.

The volcanic rocks underlying the site are sufficiently permeable to allow relatively rapid infiltration of precipitation and snowmelt. Infiltration and local runoff leads to low amounts of retained moisture within sediments in the area.

The bedrock units range from soft and friable (technical term *"rotten rock"*) to hard and resistant. Surficial soils have sufficient coarse fragment contents to be only moderately erodable.

## 3.0 GEOTECHNICAL SITE DEVELOPMENT CONSIDERATIONS

RGC has assessed geotechnical conditions on the proposed subdivision site based upon a review of available information and collection of data in the field.

Houses in the proposed subdivision will be constructed predominantly in sands and gravels. These soils are suitable for the support of typical one and two storey residences following the requirements of the BC Building Code. Each new house will require foundation drainage systems as specified in Part 9 of the BC Building code.

Bedrock is expected to be present in many basement excavations. If large boulders, or shallow bedrock, are encountered in house foundation excavations, a qualified geotechnical engineer should be consulted to confirm that footing and foundation drainage designs are appropriate.

Natural slopes in the area are presently stable. There are, however, some constraints to site development resulting from locally steep slopes (>30%). In addition, some of the sandy/silty soils are moderately erodable and may require erosion protection measures depending upon the specific grading plan for individual lots. Sloping sites may require some form of retaining structures and/or fill placement to allow construction of driveways into house building sites.

The following points summarize geotechnical findings for this property:

1. Native soils and bedrock are generally suitable for the support of residential housing units construction in compliance with Section 9 of the BC Building Code.

2. Native soils are generally stable, and represent negligible slope stability and collapse potential concerns. Permanent cutslopes in soil should be no steeper than 2H:1V. Bedrock cutslopes may be cut vertically.

3. Site soils are suitable for site grading and landscaping use. Erosion hazards are low to moderate. However, these soils should be protected from surface water runoff. In this regard, wherever possible, natural vegetation shall be left on the slopes. Any areas disturbed by construction should be landscaped and re-vegetated as soon as possible once construction is completed.

4. Steep slopes on the south, southwest and northwest portions of the site require setbacks for safe residential development. The stable nature of these bedrock slopes is appropriate for a minimum 15 m setback from the slope crests. A prominent gully on

the interior of the development with steep but relatively low slopes will require a minimum 7 m setback.

5. The local soils are moderately well drained. The groundwater table is expected to be below depths of 4 to 5 m throughout the site area. Foundation drainage systems, frost protection and soil gas control measures shall be implemented in compliance with Section 9 of the BC Building Code. Deviation from Code specifications for individual lot foundation designs will require a site-specific assessment by a qualified geotechnical engineer.

6. Native soils are generally suitable for the construction and operation of on-site rock pits or dry wells for the disposal of water from foundation and roof drainage systems constructed in compliance with Section 9 of the BC Building Code. In accordance with the BC Building Code (Section 9.14.5.3-2), rock pits and dry wells shall be located at least 5 m away from building foundations and situated so that drainage is away from the building. This drainage should not be directed onto adjacent lots. Rock pit and dry well setbacks of at least 15 m from steeper slopes shall be observed.

7. Soil and bedrock conditions on the property impose some constraints on construction of utility installations and roadway construction. Utilities will be excavated into either native silty gravels or compacted fill. Water and sewer line burial depths, bedding and backfill requirements shall be as specified by building codes and local bylaws. All roads shall be constructed on native soils or compacted fill materials proof-rolled and compacted, as required, to provide a stable subgrade.

## 4.0 CONCLUSIONS

Topography is the main constraint imposed on development by the local terrain. The soils and bedrock units make conventional residential development feasible. The shallow bedrock over most of the area will require ripping or blasting in some areas to shape building sites, construct roads and install utilities.

Slopes within the Mount Boucherie plan area are generally stable. Slope stability hazards within the project area are low to moderate.

There are no geotechnical concerns precluding residential development on the subject property. Site soils are suitable for the support of typical one and two storey residences following the requirements of the BC Building Code. The presence of some moderately steep to very steep slopes, gullies, and other terrain features throughout the proposed development impose some constraints on the locations and types of residential construction. Site-specific geotechnical engineering input may be required on some lots to ensure that the presently stable condition of slopes in the area is maintained.

Steep slopes on the south, southwest and northwest portions of the site require setbacks for safe residential development. The stable nature of these bedrock slopes is appropriate for a minimum 15 m setback from the slope crests. A prominent gully on the interior of the development with steep, but relatively low slopes, will require a minimum 7 m setback.

## 5.0 CLOSURE

This report has been prepared for the exclusive use of Planning Solutions and the Central Okanagan Regional District with respect to geological considerations for development of a neighbourhood plan for the South Mount Boucherie area in Lakeview Heights. The work was completed in accordance with generally accepted engineering practice. No other warranty, expressed or implied, is made.

RGC has assessed geological conditions on the proposed subdivision site based upon a review of available information and a field assessment of site conditions.

This office should be contacted immediately if soil and groundwater conditions different from those described in this report are encountered. RGC will assess the impact of any changed conditions and present appropriate recommendations for site development and construction, as required.

We trust that the report will meet your requirements. Rock Glen Consulting Ltd. would be pleased to provide additional information regarding this work, or to answer any questions that you may have.

Yours truly,

Paul Glen, P.Eng.
Geotechnical Engineer
Rock Glen Consulting Ltd.

# WILDLAND/URBAN INTERFACE ASSESSMENT REPORT

## LEGAL DESCRIPTION:

Mount Boucherie/Lakeview Heights

## REGISTERED OWNERS:

Victor Properties

## PROPERTY DESCRIPTION:

The parcel of property is located in the Mount Boucherie area of Lakeview Heights, overlooking Okanagan Lake, the City of Kelowna, and Westbank. The Property is bordered by a sub-division to the southeast and southwest, Central Okanagan Regional District (CORD) parkland and by Mount Boucherie in the north. This approximately 100 ha area has a mainly southwest exposure, with rolling hills and slopes varying between 0% and 45%.

The ground cover in this area is varied from sparse vegetation (lichens, grasses) over rock to coniferous tree canopies with dense understory brush. As a result, the fire hazard assessment ratings for the area are also varied.

Typically, the understory is comprised of native grasses and a variety of low-lying shrubs scattered throughout. The overstory is comprised of both mature and immature ponderosa pine and Douglas fir, and is found in patches throughout the property. There is one gully to the North running in a southwest direction. This gullied area has a higher density of shrubs, and coniferous trees, as well as a greater concentration of coarse woody debris and ladder fuels. Please refer to Appendix I (Map of Property) and Appendix II (Photos of Property).

## METHODOLOGY:

The field assessment for this report took place on June 23, 2002, by Mr. Kevin Barnett, AScT Forestry of Barnett & Assoc. forestry Services Ltd. (BAF) and Mr. Wayne Wasiliew, R.P.F., of Wasiliew & Assoc.

Wildfire hazard assessment plots (consistent with the rural interface fire hazard assessment form) were distributed throughout the area to accurately represent the different timber and vegetation types, and their relative fuel loading characteristics. The plots were completed in accordance with Ministry of Forests standards for the Kamloops Forest Region. Copies of the Rural Interface Fire Hazard Assessment sheets for each plot can be found in Appendix III.

To compliment the field assessment sheets, numerous photos were also taken. The photos provide visual confirmation of existing site conditions. The photos can be found in Appendix II.

## HAZARD ASSESSMENT:

The field assessment completed on this parcel of land returned moderate to extreme hazard ratings in the areas where future homes are planned. The gully area also received an extreme hazard rating. These ratings are based upon current fuel loading and potential ladder fuels found on the site.

Extreme hazards ratings were given to the areas where ladder fuels and coarse woody debris were abundant. Fuel modification will be required in areas where high and extreme ratings were given. It is understood that much of the forested landscape in the development area will be modified during construction. However, this assessment was conducted to review current existing conditions and to provide recommendations to reduce wildfire hazard risk. Areas with high and extreme fire hazard ratings will require a covenant to insure that wildfire hazard ratings are reduced to a moderate or low rating, as deemed by CORD.

In addition, there is a good likelihood that in the case of a fire on the property, due to aspect and connectivity, the fire could easily spread to the top of Mount Boucherie. Homes that are constructed in the areas adjacent to forested woodlands (i.e. the gully and the base of Mount Boucherie) should be given additional fire hazard protection, as it is unlikely that fuel modification within the park areas to the north will be applied.

The factors that lower the hazard ratings to moderate and high where residential development is planned are the absence of debris, and a less dense canopy (of mature trees) to fuel a potential fire. Additionally, the construction of subdivision roads, fires hydrants, the creation of defendable space and the removal of trees adjacent to planned homes will significantly reduce the amount of available fuels.

The fire characteristics in the area where new construction is planned are typically fast burning low fires that have the potential to ignite ladder fuels present in the ponderosa pine and Douglas fir, and due to connectivity, spread rapidly to adjacent areas. Providing a non-combustible buffer and defendable space adjacent to buildings and following the recommendations below will help to reduce impacts from a wildfire.

## RECOMMENDATIONS:

The assessed hazard ratings of moderate on this property meet the requirements of the Central Okanagan Regional District (CORD). The high and extreme hazard rating areas that are found both surrounding the area, as well as dispersed throughout the planned development will require a covenant to reduce these ratings to a moderate or low level as required by CORD (where construction is planned). Figure 1 indicates the extreme hazard areas as shaded in red hatching.

The high and extreme rating for the area where development is proposed requires further works to be completed. These works are recommended in the best interest of future and current property owners.

The recommended works for the entire area in the current state are as follows:

- Prune all coniferous trees to a height of 3 m above the ground within 30 of areas where development is planned.
- Fall and dispose of any dead standing trees in the area along with current deadfall and high concentrations of coarse woody debris.
- Provide access to the gully in the North, to help combat potential fires in the future, as the gully area rates as the highest hazard.
- Ensure that there are secondary escape routes.
- Develop a fire management plan for the adjacent Park and Regional District Land.

The recommendations for new developments on the area are as follows:

- Add additional sources of water to accommodate the fire fighting needs of future residential development.
- Ensure adequate emergency vehicle access to proposed developments (gently sloped roads, wide enough curves to accommodate large vehicles).
- Locate proposed homes on lots to provide for a 10 m non-combustible buffer (Fire Safe Landscaping).
- Choose fire safe materials for exterior walls, roofing, etc.
- Have screens placed over soffits, attics, and enclose decks.
- Place spark arrestors over wood burning chimneys.
- No trees within 5 m of a chimney.
- Stack/ pile combustible materials away from the home and defendable space.
- Avoid accumulating flammable debris/materials on residential property.
- Make any future fences out of a non-combustible material. Wood fences are prime conductors for moving a fire from one area to another. Untreated wood decks, and wooden outbuildings should also be avoided.
- Maintain low to moderate fuel load levels in planned park areas.
- Clean up and dispose of combustible building materials as soon as new construction is complete.
- Establish fire safe landscaping as soon as possible.
- Ensure that fuel reduction measures are maintained.

The maintenance of low to moderate fuel load levels in planned park areas is necessary as pine needles, limbs and smalls shrubs will provide for quick ignition and potential man-made or wildfires that will have direct connectivity to homes.

The recommendations for the transition areas where development will connect with polygons identified, as high or extreme hazard must have the following additional measures completed:

- Locate proposed homes to allow for a 20 m non-combustible fire buffer.
- Fencing between properties, and along the buffer will be prohibited unless a continuous access route can be maintained.
- Fuel modification (Fire Break) will be required within the forested zones adjacent to the 20 m buffer. This modification will include the area 30 m into the high or extreme hazard zone (increased by 5 m increments for each 10% increase in slope to a maximum of 50 m). Trees in the fire break will be pruned to 3 m in height and singletrees will be removed to eliminate canopy connectivity. In addition, any dead standing or dead and down trees must be removed from the fire break. Pruned materials and cut tree stems will also be hauled away.

Additional information on fire safe planning has been attached in Appendix IV, where excerpts from chapters two and five of the Thompson Okanagan Inter-Agency Interface Committee Interface Manual have been included.

The recommendations in this report are not intended to prevent wildfires, but only to reduce the risks of a wildfire. The Central Okanagan Regional District has indicated that it intends to permit recreational use of the parkland areas within the proposed development and in the adjacent forested lands. A fire started by human activity that spreads throughout the forested would not be considered a wildfire, in the context of this report.

A copy of this report has been delivered to the property owners. This report has been developed to identify the current wildfire risk. It is the owners' responsibility to maintain a fire safe residence. No other warranty is expressed or implied.

We trust that the information contain within this report is sufficient to meet your needs.