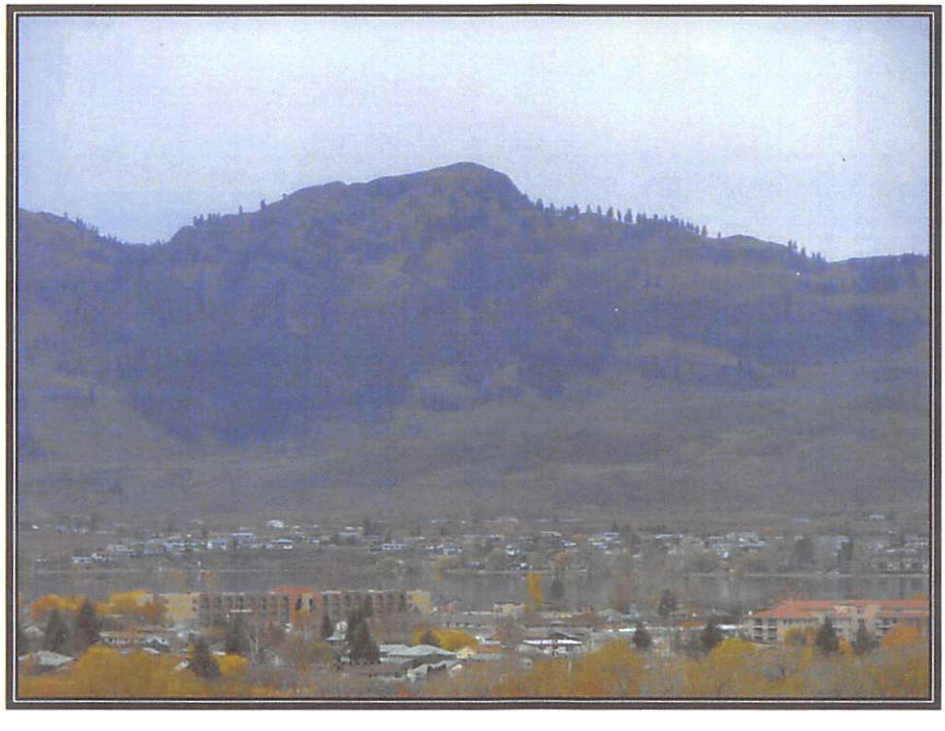
Town of Osoyoos

Kruger Mountain Preliminary Assessment

Final Report



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LIST OF ABBREVIATIONS

ALR	Agricultural Land Reserve
BC	British Columbia
BEC	Biogeoclimatic Ecosystem Classification
BG	Bunchgrass Biogeoclimatic Zone
CDC	Conservation Data Centre
cm	centimetre
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Department of Fisheries and Oceans
h	hot
IDF	Interior Douglas-fir Biogeoclimatic Zone
km	kilometre
m	mild
MSRM	Ministry of Sustainable Resource Management
MWLAP	Ministry of Water Land and Air Protection
OCP	Official Community Plan
PIF	Partners In Flight
PP	Ponderosa Pine Biogeoclimatic Zone
SARA	Species at Risk Act
SEI	Sensitive Ecosystem Inventory
x	very dry

1.0 INTRODUCTION

1.1 Study Context

The Town of Osoyoos is currently experiencing tremendous growth pressures as a result of both booming migration to the community and a shortage of available land for residential development. Since 1978, the town's population has doubled, going from 2,300 to its 2004 population of 4,600. This is equivalent to an average annual growth rate of 2.75 percent. Over the last decade, from 1994 to 2004, growth has also been steady, and Osoyoos has achieved an average annual growth rate of just over 2 percent. The area is known for its agriculture and tourism, and it is increasingly becoming a retirement destination. As a result, prospects for future growth are strong. However, there are increasing concerns about land availability to house the growing population base.

Osoyoos' existing built-up area is physically constrained by both Osoyoos Lake and surrounding lands contained within the Agricultural Land Reserve (ALR). A boundary extension study is currently underway to explore the possibility of extending the Town of Osoyoos' boundaries to four identifiable areas along Osoyoos Lake. Although much of these lands are contained within the ALR, the extension of Town servicing (especially sanitary sewer) to these areas will help to preserve lake quality, and there may also be opportunities to explore increased infill development. Nonetheless, if the integrity of the lands currently within the ALR is to be preserved, the Town of Osoyoos must then look at the possibilities of hillside development. As a result, the boundary extension study is also exploring the possibility of an extension to a fifth area, Kruger Mountain, which is located immediately to the west of the existing Town boundary.

When considering opportunities for growth and development in the Osoyoos area, the unique geography of the region must be taken into account. Located in the southern-most portion of the Okanagan Valley, the area is located in Canada's only biologically classified desert. This arid zone is the northern tip of the Sonora Desert, which extends from Mexico to Canada. Because the area lies in the rainshadow of the Cascade Mountains, it has a hot, sunny, and dry climate, with unique agricultural capabilities. The area is also one of the most ecologically diverse regions in Canada, and a significant portion of the region's biota is not found elsewhere in the country.

1.2 Study Overview

The Kruger Mountain study area is approximately 497 hectares (1,227 acres) in size, and it is located immediately west of the current Town of Osoyoos boundary, in Electoral Area "A" of the Regional District of Okanagan Similkameen (see Figure 1). This study is focused on providing a preliminary overview of the Kruger Mountain area in order to determine the feasibility of inclusion

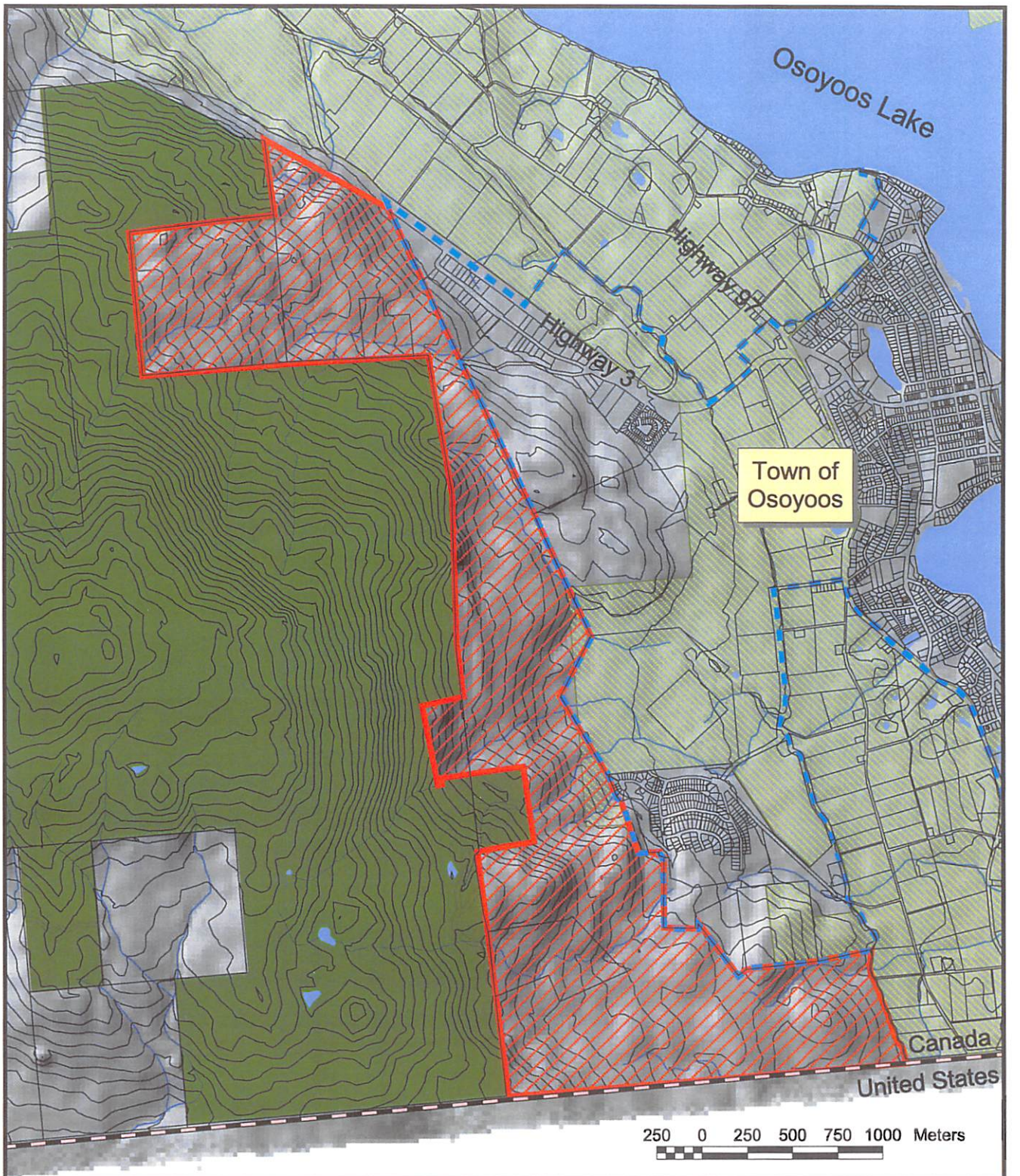
into the Town boundaries. While proposed boundary extensions to the four other areas along Osoyoos Lake involve land within the ALR, most of Kruger Mountain is not contained within the ALR. Hillside development in the Kruger Mountain area could alleviate some of the development pressures currently being experienced in Osoyoos. Nonetheless, there are a number of sensitivities that must be taken into account before Kruger Mountain land can be considered for boundary extension and urban development. Steep slopes, an archaeological site, mineral claims, environmentally sensitive areas, and rare ecosystems with species at risk are among the many constraints to development in the Kruger Mountain area.

This report provides an overview of the Kruger Mountain study area and delineates areas that may be suitable for development, based on preliminary analysis of existing study area conditions and constraints to development. Due to the preliminary nature of this assignment, research for the report uses existing available information, and no site visit or environmental impact assessment report was undertaken. Analysis of steep slopes was limited as 20 meter contours are the most detailed available at this time. In addition, much of the study area is identified as being environmentally sensitive. While this preliminary assessment maps out the presence of plant and wildlife species at risk based on available information, the full extent of areas that ought to be preserved in their natural state cannot be known without further on-the-ground analysis. Ultimately, further environmental impact assessment will be required on parcels under consideration for development.

1.3 Study Outline

This report has been organized into the following sections:

Section 1: Introduction
Section 2: Existing Study Area Conditions
Section 3: The Environmental Setting
Section 4: Preliminary Environmental Rating
Section 5: Development Potential
Section 6: Possible Components for Development Permit Guidelines
Section 7: Recommendations



Legend

- Study Area
- Municipal Boundary
- Federal Boundary
- Contours - 20m
- Parcels
- Lakes
- Creeks
- Parks / Protected Areas
- ALR

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Scale = 1: 30,000 | June 2005

Kruger Mountain Preliminary Assessment Figure 1 - Study Area

2.0 EXISTING STUDY AREA CONDITIONS

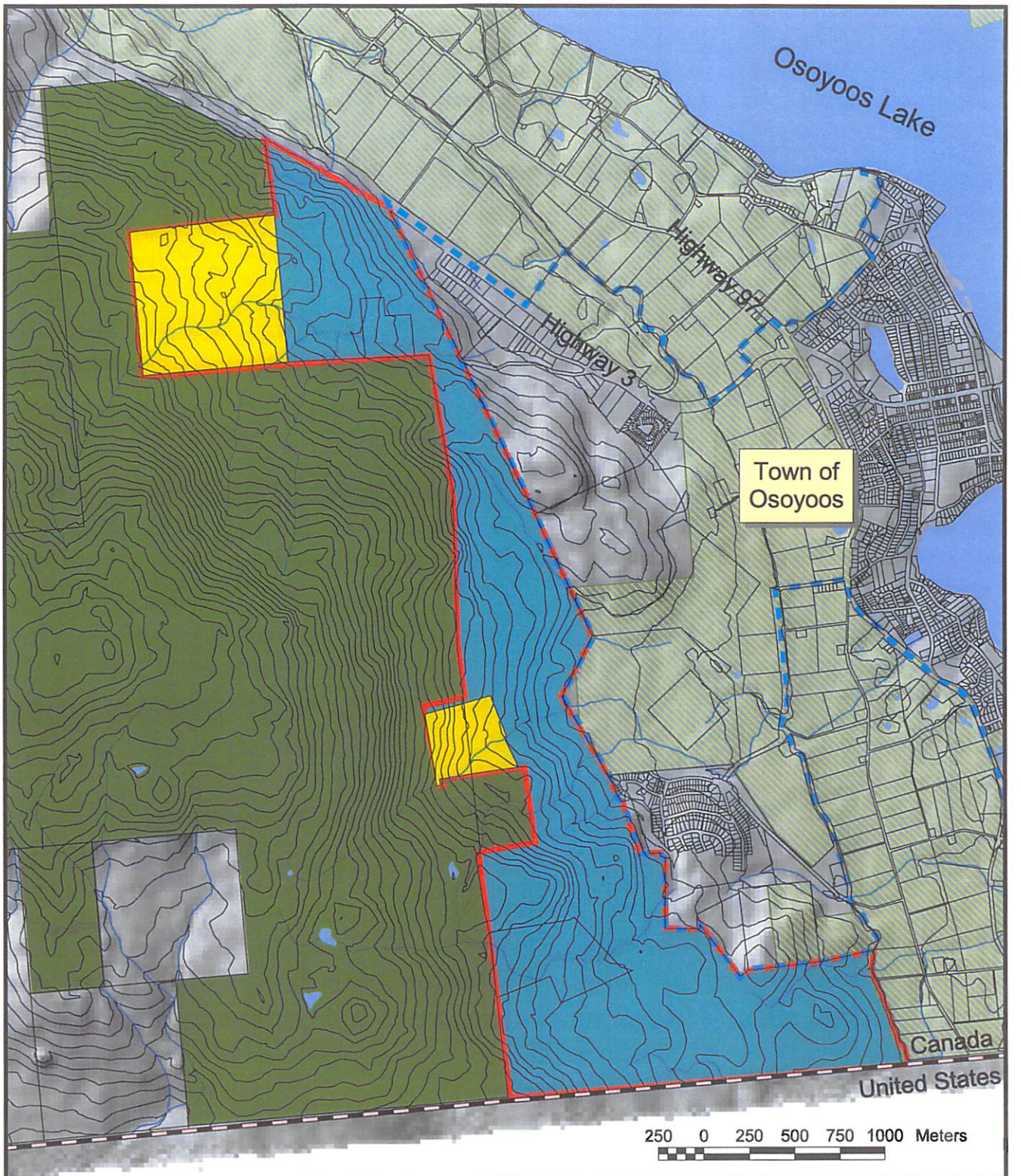
2.1 Current Land Use

Within the Kruger Mountain study area under consideration for boundary extension, all land is currently undeveloped. While most of the study area consists of provincial Crown land, there are also a few privately owned parcels (see Figure 2). Also located within the study area is a rifle range operated by the Osoyoos Rod and Gun Club. This rifle range is located above the Osoyoos industrial area, and is accessed by a gravel road. As well, the Strawberry Creek trail runs through the study area, running south from Strawberry Creek until it turns east out of the study area and enters the Desert Park subdivision. There is also reference to an abandoned mine in or near the study area.

According to the Osoyoos Rural Official Community Plan (see Figure 3), most of the study area is designated as a Resource Area (RA). The Resource Area designation is intended for large parcels of land, primarily 20 hectares or greater, and it includes both private and/or Crown land. Typical uses within this designation include forest land, grazing or range land, recreation areas, and resource extraction areas. In addition to the lands designated as a Resource Area, a parcel in the northwest portion of the study area is designated as Large Holdings (LH). This designation is for large parcels of land generally used for ranching, grazing, general resource management, outdoor recreation, fish and wildlife habitat, and other uses that fit with the character of the area. Typically, land within the Large Holdings designation is undeveloped, aside from limited utility and access corridors, and no more than one principle single detached dwelling per parcel.

2.2 Surrounding Land Uses

To the west of the study area, there is the South Okanagan Grasslands Protected Area, which is proposed to become a national park. To the south, there is the United States border, and to the east, there is the existing Town of Osoyoos boundary. Within the Town boundary, immediately east of the study area, there is the Desert Park subdivision, the Osoyoos golf course, land located within the agricultural land reserve, an industrial park, and currently undeveloped land that is available for future residential development. To the north, the study area extends to Highway 3. Across Highway 3, land is located within the agricultural land reserve.



Legend

- Study Area
- Crown Land
- Private Land
- Municipal Boundary
- Federal Boundary
- Contours - 20m
- Creeks
- Parks / Protected Areas
- ALR
- Parcels
- Lakes

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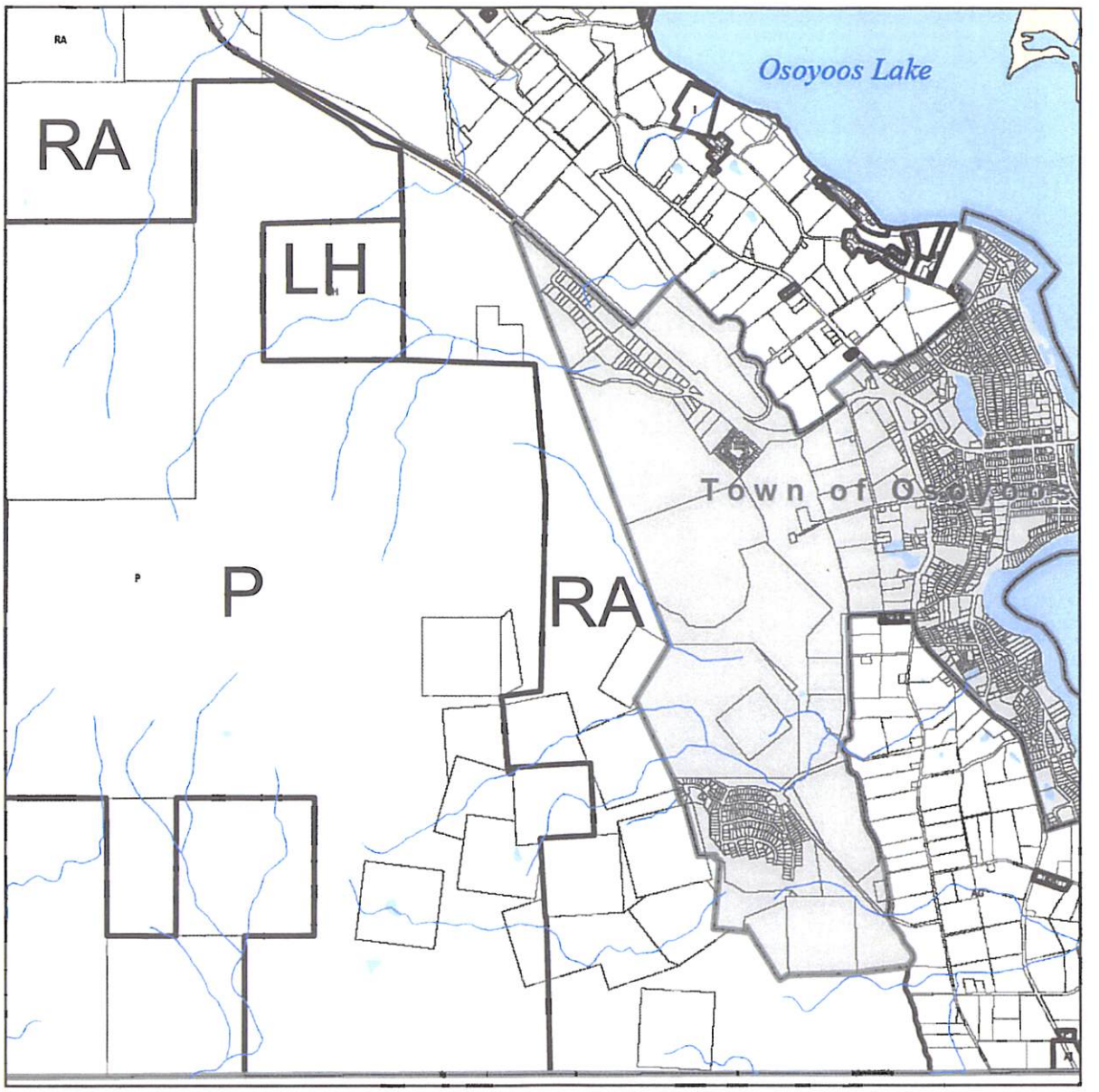
Kruger Mountain Preliminary Assessment Figure 2 - Ownership

Figure 3: Osoyoos Rural Official Community Plan Schedule B.1 – Land Use Designations



LEGEND
RA = Resource Area
LH = Large Holdings
P = Parks

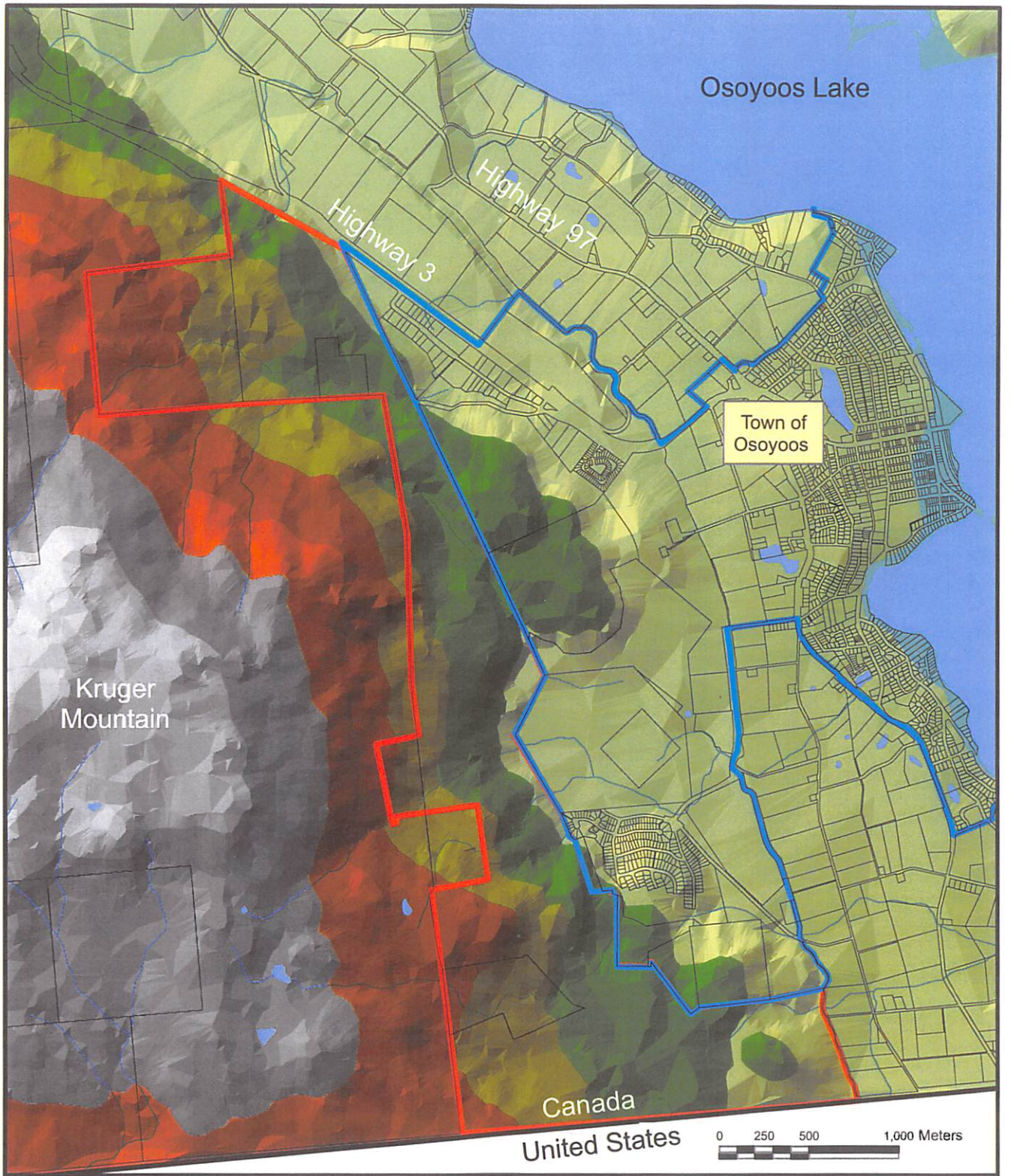
2.3 Agricultural Land Reserve

The provincial agricultural land reserve (ALR) extends into a small portion of the study area alongside the current Town of Osoyoos boundary, as shown in Figure 1. The ALR designation preserves land for agricultural uses. Should subdivision be proposed on ALR lands to accommodate residential development, an application will be required to exclude the subject properties from the ALR.

2.4 Topographic Conditions

The study area is located near the base of Kruger Mountain and is generally characterized by slopes located at the base of Kruger Mountain. Elevation ranges are between about 360 and 700 metres above sea level, as shown in Figure 4. There are some pockets of gentle terrain (less than 10% slope), but much of the area consists of slopes between 10 and 30 percent with some areas exceeding 30% slope, as shown in Figure 5. Generally, development on gradients between 10 to 30 percent is considered "hillside development", accommodating single detached dwellings and cluster development. In general, areas with gradients in excess of 30 percent should be avoided when considering potential development areas.

In addition to steep slopes, potential development is constrained by several streams and watercourses within the study area, including Strawberry Creek. These are described further in Section 3 of this study. To preserve fish habitat, development near streams should avoid riparian areas of between 15 and 30 metres from the natural boundary of a stream or the top of bank.



Legend

Elevation

1200 - 1600 | 1000 - 1200 | 800 - 1000 | 700 - 800 | 600 - 700 | 500 - 600 | 400 - 500 | 280 - 400 | 280

Kruger Mountain Study Area

- Kruger Mountain Study Area
- Municipal Boundary
- Federal Boundary
- Parcels

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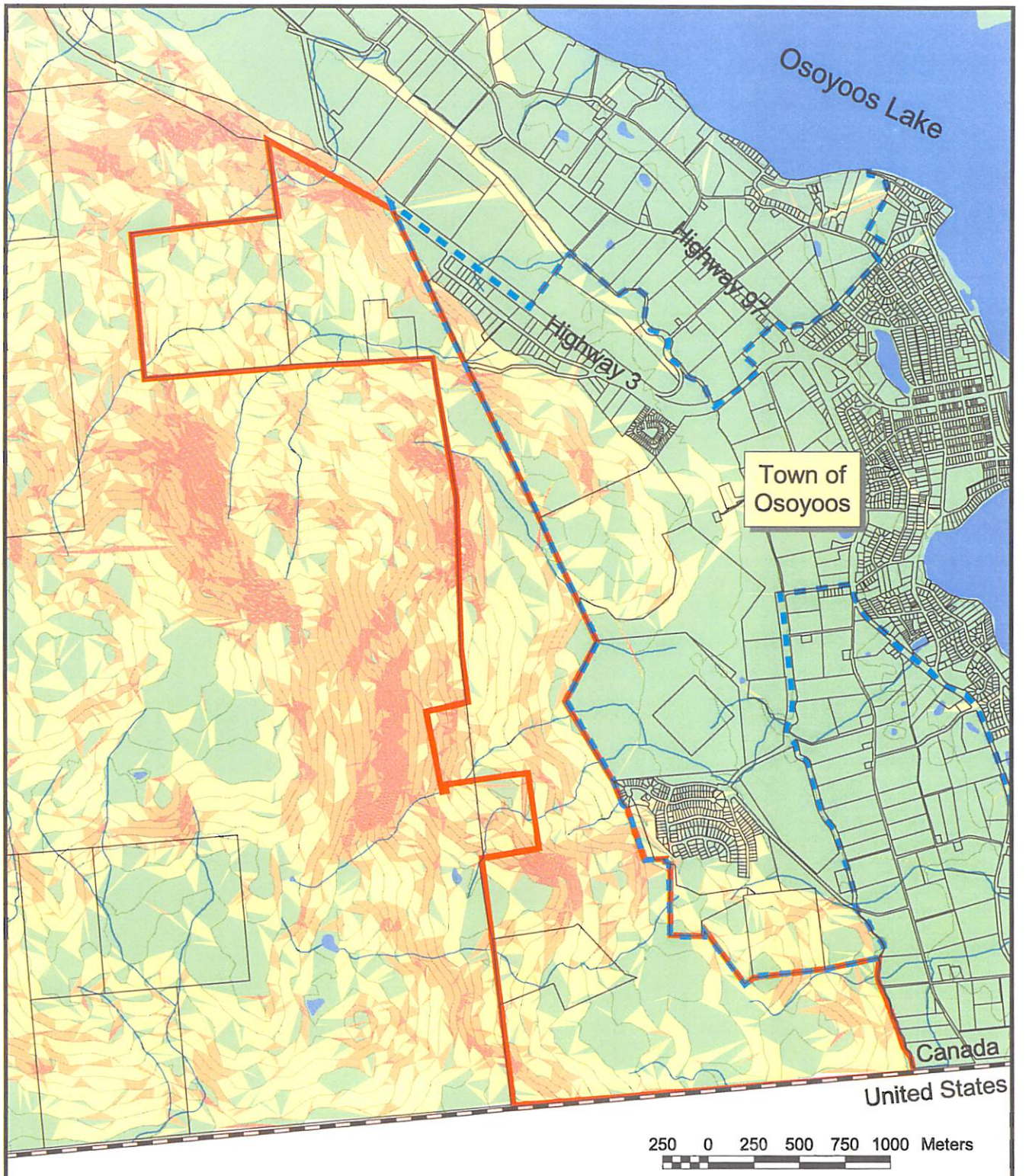
Kruger Mountain
Preliminary Assessment
Figure 4 - Contour



Legend

- Parcels
- Municiple Boundary
- Federal Boundary
- Kruger Mountain Study Area
- Contours - 20m
- Lakes
- Creeks

Slope Analysis

- 0 - 10%
- 10-30%
- 20 - 30%
- +30%

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Kruger Mountain Preliminary Assessment Figure 5 - Slope Map

2.5 Existing Infrastructure

2.5.1 Water

The Town of Osoyoos water system extends near the study area in two locations.

In the Strawberry Creek area, water infrastructure currently extends to 115th Street, just to the east of the Kruger Mountain study area (see Figure 6). Properties in this area are serviced by a 250mm water line, and storage capacity is provided at a reservoir located just off of Strawberry Creek Road, at an elevation of 400 meters.

In the Desert Park area, water infrastructure currently extends west to the extent of the subdivision, at Fairwinds Drive and Pinehurst Place, just to the east of the Kruger Mountain study area (see Figure 7). Most properties in this area are serviced by 200mm water lines, and storage capacity is provided by the Dividend Ridge Reservoir, which is located just inside the study area on the south end of Fairwinds Drive, at an elevation of 452 meters.

Any development occurring in the study area would likely require an additional reservoir at a higher elevation, in order to provide adequate domestic and fire flow water pressure.

2.5.2 Sewer

The Town of Osoyoos sewer system extends near the study area in two locations.

In the Strawberry Creek area, sewer infrastructure currently extends to 115th Street, just to the east of the Kruger Mountain study area (see Figure 8). Most sewer lines in this area are 250mm in diameter.

In the Desert Park area, sewer infrastructure currently extends west to the extent of the subdivision, at Fairwinds Drive and Pinehurst Place, just to the east of the Kruger Mountain study area (see Figure 9). Sewer lines within this subdivision are 200mm in diameter, which is generally the minimum pipe size of a trunk sewer main.

Any development occurring in the study area would likely be serviced through a gravity sewer main. However, detailed analysis would be required to ensure that the downstream sewer trunk mains were adequately sized to handle the additional flow.

Figure 6: Strawberry Creek Water Infrastructure

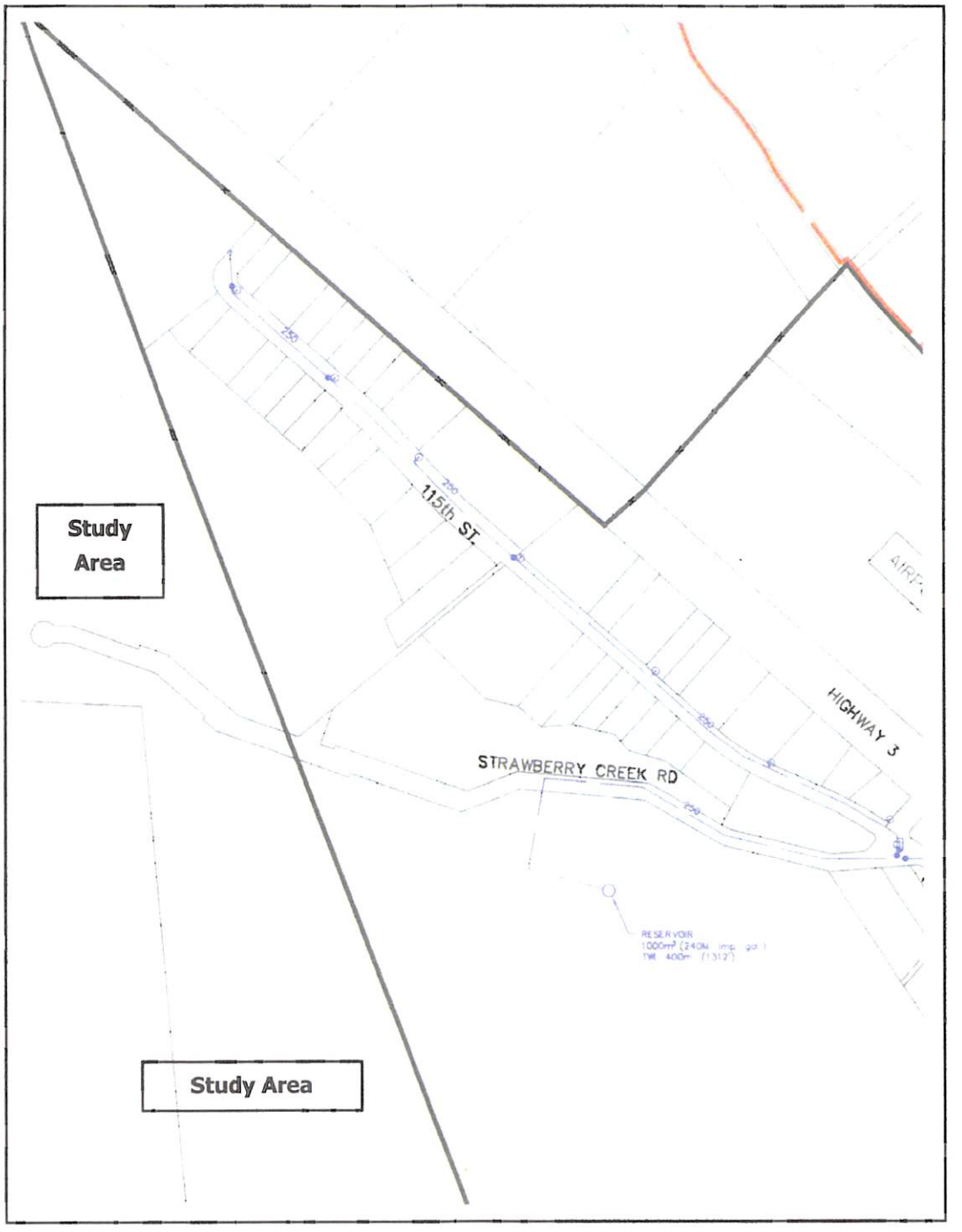


Figure 7: Desert Park Water Infrastructure

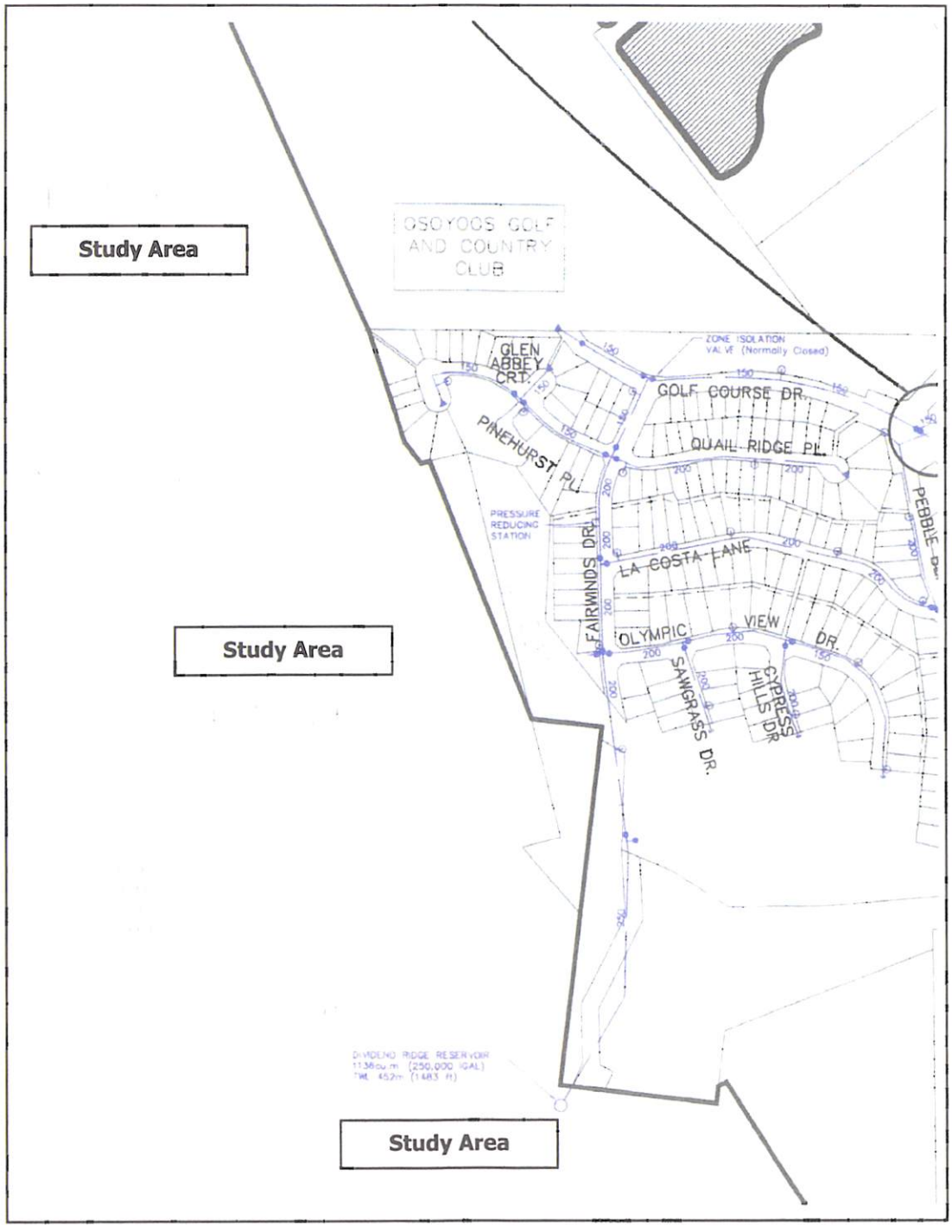


Figure 8: Strawberry Creek Sewer Infrastructure

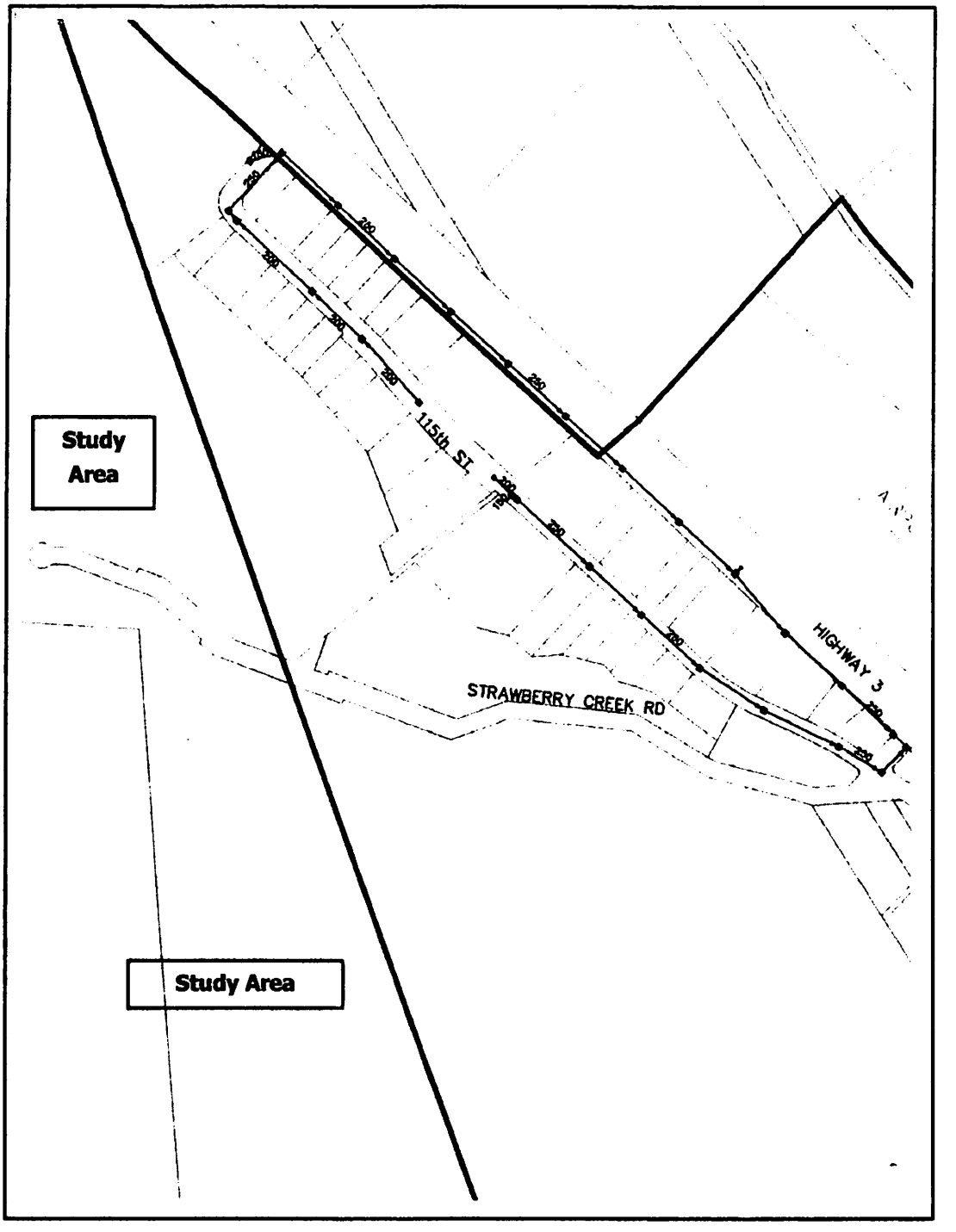
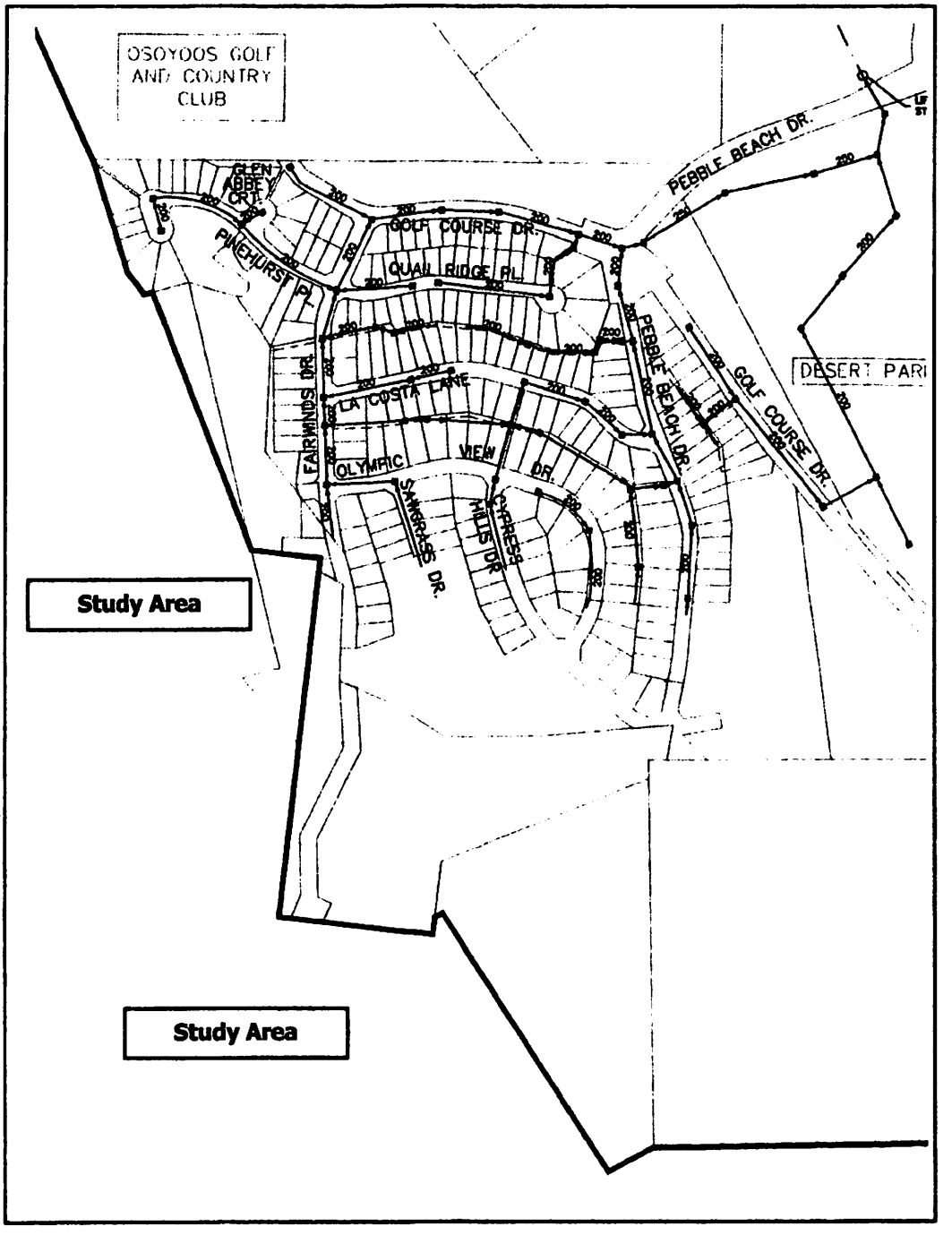


Figure 9: Desert Park Sewer Infrastructure



2.5.3 Roads and Trails

Strawberry Creek Road, a gravel road, currently extends into the northern part of the study area, providing access to the Osoyoos Rod and Gun Club. There are no other roads within the study area. In addition, the Strawberry Creek Trail is a non-vehicular trail located within the study area, running south from Strawberry Creek until it turns east out of the study area and enters the Desert Park subdivision. Access to the study area in the south could be provided by extending Fairwinds Drive, a paved local road within the Desert Park subdivision.

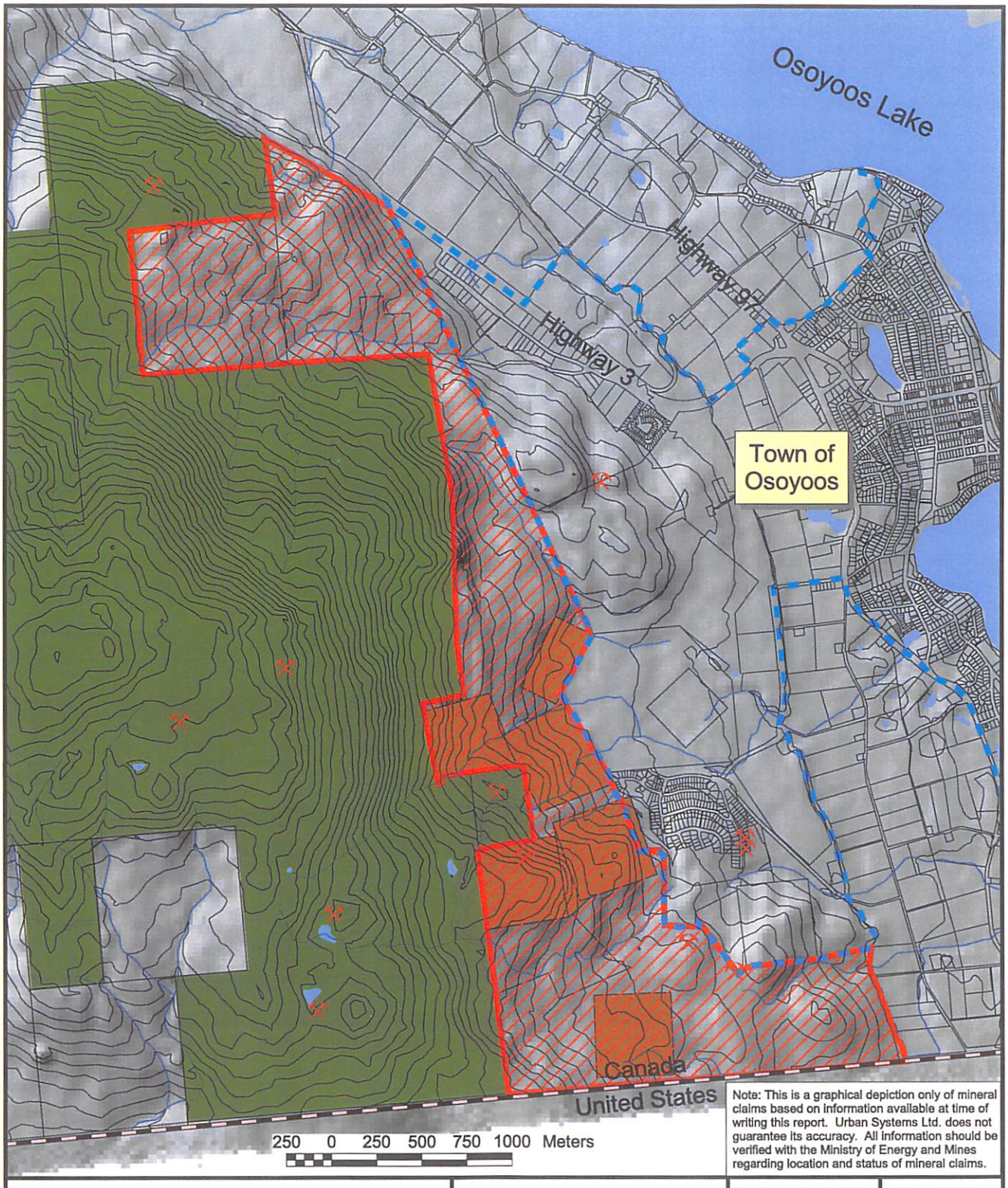
2.6 Archaeological Sites

An archaeological site has been identified within the study area on the south side of Strawberry Creek, just above the confluence of Strawberry Creek and its highest mapped tributary. Information on the exact type and location of this archaeological type, included in Appendix A, is protected under the *Heritage Conservation Act*. Should development sites be considered in the Kruger Mountain Area, the provincial Archaeology and Registry Services Branch, Ministry of Sustainable Resource Management should be consulted to ensure that development will not impact this archaeological site.

2.7 Mining Issues

Within the study area, there are a number of folios with Crown granted mineral claims on them (see Figure 10). These folios are all located on Crown land in the southern half of the study area. Should any of these lands be considered for development, normal procedure would be to first obtain a quit claim of the subsurface rights. As this procedure was not followed with development above Desert Park in the 1990s, there were considerable legal difficulties. As a result, care should be taken to exercise due diligence with respect to any potential development on or near areas subject to mineral claims.

Under the common law, a use limited to mineral extraction cannot be regulated by zoning, as it is not a use of land in the zoning sense. This creates further challenges for any potential residential development on or near lands subject to mineral claims. If residential development were to occur on parcels adjacent to land that is subject to a mineral claim, the Town and residents would need to be aware that mineral exploration on those lands with claims could legally occur at any time. Thus, development throughout the southern half of the study area would not be without risk, unless a quit claim of subsurface rights could be obtained for virtually all mineral claims in the area.



Note: This is a graphical depiction only of mineral claims based on information available at time of writing this report. Urban Systems Ltd. does not guarantee its accuracy. All information should be verified with the Ministry of Energy and Mines regarding location and status of mineral claims.

Legend

- Study Area
- Municipal Boundary
- Federal Boundary
- Contours - 20m
- Parcels with Mineral Claim(s)
- Other Mineral Claim(s)
- Lakes
- Creeks
- Parks / Protected Areas

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Kruger Mountain Preliminary Assessment Figure 10 - Mineral Claims

2.8 The Environmental Planning Framework

The Kruger Mountain study area contains sensitive ecosystems that are home to a number of species at risk. In addition, the study area contains a number of watercourses. This section discusses the environmental planning framework that is currently in place to deal with these issues, while Section 3.0 analyzes the environmental condition of the study area in greater detail.

2.8.1 Rural OCP Environmentally Sensitive Development Permit Area

Virtually all of the study area is currently part of the Osoyoos Rural OCP Environmentally Sensitive Development Permit Area (see map in Appendix C). This development permit area is comprised of important habitat areas for wildlife habitat and plant communities, as well as fish habitat leave areas, which include all watercourses and adjacent lands. Information on important habitat areas is drawn from the *Habitat Atlas for Wildlife at Risk* and the *Electoral Area 'A' Sensitive Ecosystem Inventory.*

The objective of the Environmentally Sensitive Development Permit Area is to minimize the impact of development on the South Okanagan's unique natural environment, particularly as there has been a decline in the region's fish and wildlife populations, generally attributable to habitat loss. The Osoyoos Rural OCP identifies the South Okanagan Valley as a critical region for maintaining a healthy, viable population of a number of endangered and threatened species.

Proposed development within the Osoyoos Rural OCP Environmentally Sensitive Development Permit Area can only occur upon completion and acceptance of an Environmental Impact Assessment Report. This development permit area also contains a number of other stipulations that are intended to protect the unique ecosystems. Listed in full in Appendix C, these include requirements to dedicate natural watercourses to the Crown, to keep leave areas free of development and in a natural state, and to incorporate park, trail, wildlife and fish corridors as necessary to provide continuity between important habitat and leave areas.

2.8.2 Land Act Reserves

Land Act Reserves are established by the province to withhold Crown land from disposition. Currently, most Crown land within the Kruger Mountain area is within Land Act Reserves, for the purpose of wildlife habitat and environmental conservation. Based on information in the Province's South Okanagan Valley Crown Land Review, the Ministry of Water, Land and Air Protection has plans to determine whether site-specific areas require higher levels of protection, particularly as the Land Review identifies the presence of rare species at risk. Nonetheless, the Province also recognizes that this may be an important expansion area for the Town of Osoyoos.

If Crown lands are to be disposed of for development, it is likely that the Province will seek assurances that the Town of Osoyoos has a management plan in place to ensure that development will be compatible with high environmental values of the area.

2.8.3 South Okanagan Wildlife Management Area

Towards the northern end of the study area, the South Okanagan Valley Crown Land Review recommends one Crown parcel for inclusion in the South Okanagan Wildlife Management Area. Inclusion in the Wildlife Management Area does not make this a "protected area," like the South Okanagan Grasslands to the west of the study area. Nonetheless, the Wildlife Management Area designation makes this an area where conservation and the management of wildlife, fish and their habitats is the priority land use.

3.0 THE ENVIRONMENTAL SETTING

3.1 Kruger Mountain's Environmental Value

It is apparent that much of the Kruger Mountain area has a very high environmental value, with sensitive ecosystems and a number of species at risk. Indicators of the study area's high environmental value include the following:

- A national park is proposed for surrounding lands to the west, with conceptual boundaries to be developed in early 2006. Parks Canada has indicated that it would make sense to incorporate a gateway to the park near the Town of Osoyoos, and would like to be consulted as the municipality continues its planning for Kruger Mountain;
- The Osoyoos Rural OCP designates virtually all of the study area as part of an Environmentally Sensitive Development Permit Area, based on information from the *Habitat Atlas for Wildlife at Risk* and the *Electoral Area 'A' Sensitive Ecosystem Inventory;*
- The Province's South Okanagan Valley Crown Land Review identifies the presence of rare species at risk and notes high environmental values throughout the study area; and,
- The Province is considering placing a parcel of Crown land within the South Okanagan Wildlife Management Area, for the purpose of conservation and the priority management of fish, wildlife, and their habitats.

To highlight the high environmental value of the study area, this section provides an overview of ecoregion and ecosystem classifications, species at risk, and water and fisheries resources. This information is used to highlight the areas within the study area that have the greatest environmental value, and it also reveals areas that may be more appropriate for development due to lower environmental value. As much as possible, existing information has been used to more specifically locate sensitive areas and identify less-sensitive areas that may be more appropriate for development. Nonetheless, the full extent of areas that ought to be preserved in their natural state cannot be known without further on-the-ground analysis. Ultimately, further environmental impact assessment will be required on parcels under consideration for development.

3.2 Ecoregion and Ecosystem Classifications

3.2.1 Ecoregion Classification

In 1988 and 1990, Demarchi *et al.,* developed an ecoregion classification system for British Columbia to provide a systematic view of the broad geographic relationships of the Province. This work was based upon macroclimatic processes and topography. Following that hierarchical system from the broadest divisions to the smaller, Table 1 outlines the Ecoregion Classification for the Osoyoos area.

Table 1 – Ecoregion Classification of the Kruger Mountain Expansion Area

Classification	Description	Kruger Mountain Classification
Ecodomain	An area of broad climatic uniformity	Dry
Ecodivision	An area of broad climatic and physiographic uniformity	Semi-arid Steppe Highlands
Ecoprovince	An area with consistent climate or oceanography, relief and plate tectonics	Southern Interior
Ecoregion	An area with major physiographic and minor macroclimatic or oceanographic variation	Okanagan Highland
Ecosection	An area with minor physiographic and macroclimatic or oceanographic variation	Southern Okanagan Basin

3.2.2 Biogeoclimatic Zones

The Biogeoclimatic Ecosystem Classification (BEC) is a hierarchical system that uses climate, soil and characteristic vegetation to group ecosystems at various levels, including regionally, locally and chronologically. BEC provides a framework for fundamental knowledge of landscape ecology, and thus a sound basis for ecosystem management, research and decision-making. The Kruger Mountain expansion area is found in the Bunchgrass very dry, hot (BGxh) and the Ponderosa Pine very dry, hot (PPxh) subzones (see Figure 11).

Bunchgrass Zone (BG)

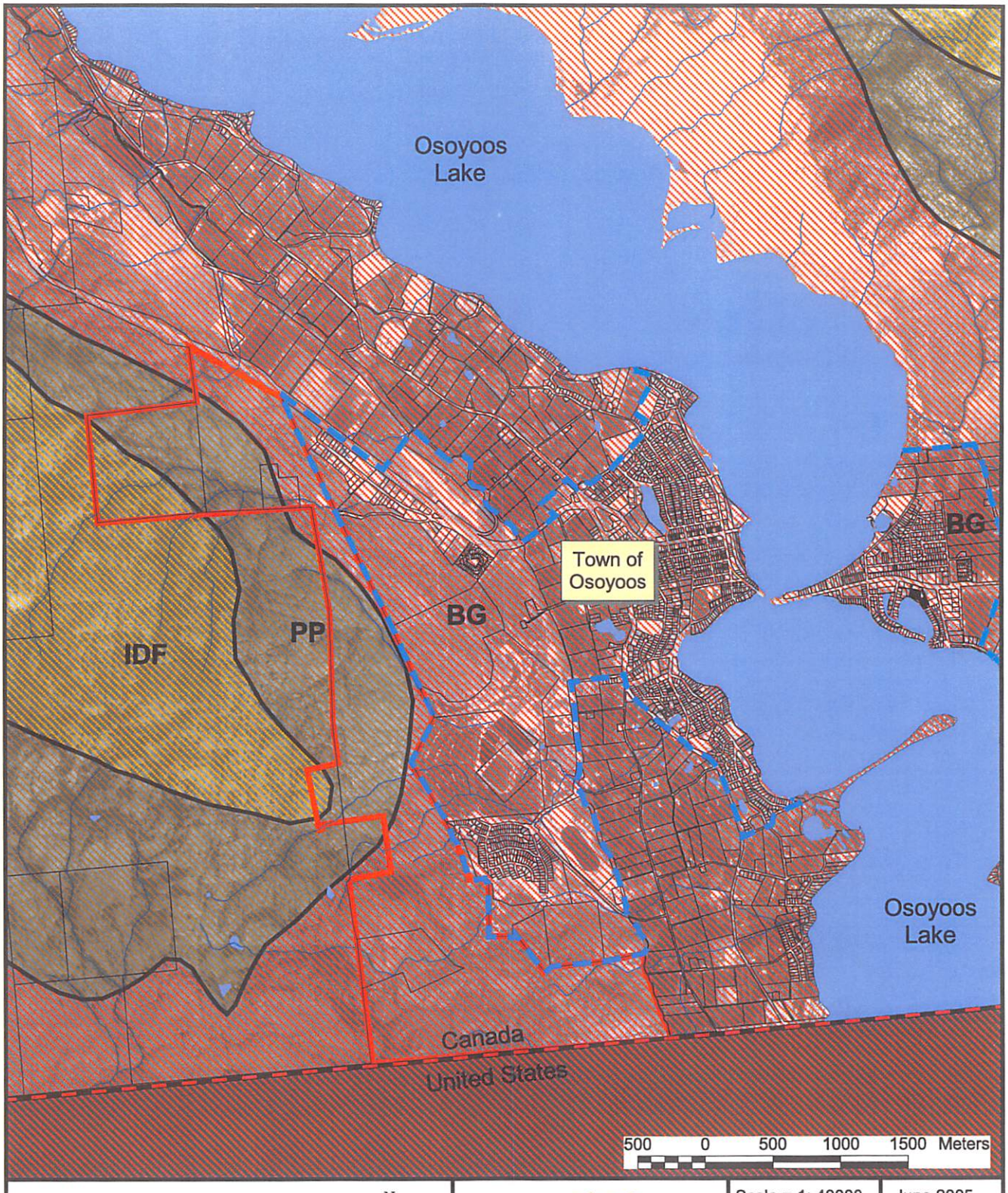
The BG zone is located in the lower elevations of the major southern interior valleys of British Columbia. This zone is comprised mainly of grasslands in elevations up to 900 metres and occupies some of BC's warmest and driest areas. Summer temperatures range from warm to hot, and winters are moderately cold. Precipitation is low with peak periods occurring in early winter, and again in June. The peak snowpack is rarely above 50 cm, and many sites are without snow for most of the winter. The grasslands are characterized by widely spaced bunchgrasses (approximately 60%), including approximately 10 to 15% shrubs and a well-developed cryptogram crust (25 to 35%). Species include bluebunch wheatgrass, Sandberg's bluegrass, yarrow, large-fruited desert-parsley, big sagebrush and rabbitbrush. On the drier sites, with sandy, nutrient-poor soils, vegetation often includes needle and thread grass, sand dropseed and antelope brush. Ponderosa pine and Douglas-fir are often found on steep rocky slopes, on outwash plains and colluvial fans, and in moist draws.

Ponderosa Pine Zone (PP)

The Ponderosa pine zone occurs at low elevations along the very dry valleys of the southern Interior Plateau of BC. This zone is usually found at elevations between the Bunchgrass Zone and the Interior Douglas-fir Zone (IDF). The PP zone is the driest and warmest (in the summer) forested zone in the Province. The summers are very warm with cool winters having light snow cover. The hot dry summers result in large moisture deficits during the growing season. The PP landscape is dominated by ponderosa pine stands which are open and park-like. The understory is dominated by grasses such as bluebunch wheatgrass and fescue species. Other vegetation includes big sagebrush, rabbitbrush, timber milk-vetch, arrow-leaved balsamroot and yarrow.

Interior Douglas-fir Zone (IDF)

The Interior Douglas-fir zone dominates the low- to mid-elevation landscape of the south-central interior of British Columbia. It occupies rolling and valley terrain of the southern Interior Plateau and southern Rocky Mountain Trench and fingers into the lee side of the Coast Mountains. In the Osoyoos area, it occurs above the PP zone. The IDF has a continental climate characterized by warm, dry summers and cool winters providing a fairly long growing season. Mean annual precipitation ranges from 200 to 750 mm, of which 20 to 50% falls as snow. Substantial growing season deficits are common and frost can occur at any time of year. Open to closed, mature forests consisting largely of Douglas-fir cover much of the IDF. Ponderosa pine occurs at lower elevations and, on drier sites, persists as a climax species. Lodgepole pine is more widespread at higher elevations where it is a common successional species particularly after a fire. Edaphic and topographic conditions and fire history has led to the development of large grassland communities in parts of the IDF. Other vegetation of the IDF includes pussytoes, tall Oregon-grape, pinegrass and soopolallie.



Legend

- Study Area
- Parcels
- Municipal Boundary
- Federal Bndry
- Creeks
- Lakes

Biogeoclimatic Zones

- BG - Bunchgrass
- PP - Ponderosa Pine
- IDF - Interior Douglas-Fir

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Kruger Mountain
Preliminary Assessment
Figure 11 -
Biogeoclimatic Map

3.3 Species at Risk

3.3.1 Overview

The grassland and shrub-steppe habitats of the South Okanagan, which encompass the study area, cover only 0.3% of the Province and are under threat from conversion to agricultural lands as well as urban and industrial development. About one third of BC's rare or endangered species inhabit this region. Appendix B indicates all rare animals (including invertebrates) and plant species that could occur in the area based upon the Habitat Atlas for Wildlife at Risk in the South Okanagan area, the CDC and the Species at Risk public registry. It should be noted that this list includes species which may be present in the study area depending upon the presence of their specific habitat requirements. The CDC has mapped occurrences of the Great Basin spadefoot, the Brewer's sparrow and the badger in the vicinity of the study area. There are five additional records in the study area which are data protected by the CDC and will not be disclosed in this report.

Federal and Provincial Government Agencies are working to identify and ensure the protection of species at risk in Canada. On the Federal level, endangered species and their habitat are protected under the *Species at Risk Act* (SARA) which became fully enforced in June 2004. This legislation applies to species found on Federal lands (i.e. Indian Reserves, National Parks etc.), as well as to migratory birds and anadromous fish, wherever they are found. SARA applies to all species that are included on the list of wildlife species at risk, established as Schedule 1 of the Act.

On Provincial crown land, Provincial laws and regulations apply (e.g. the *Wildlife Act*). In British Columbia, the Ministry of Sustainable Resource Management's Conservation Data Centre (CDC) tracks and categorizes species according to their conservation status in BC. The CDC assigns the Provincial "rank" for species. Ranking is the process of assigning a risk of extinction "score" (including extirpation, which is extinction at a local scale) to each species. The purpose is to identify the species most at risk, as well as to establish baseline ranks. Conservation programs use species ranks as one of a variety of criteria when developing conservation priorities.

In order to simplify interpretation of species ranks in BC, three lists have been created: Red, Blue and Yellow. The Red List includes species that have been legally designated as endangered or threatened under the *Wildlife Act*, are extirpated, or are candidates for such designation. The Blue List includes species not immediately threatened, but of concern because of characteristics that make them particularly sensitive to human activities or natural events. The Yellow List includes all species not included on the Red and Blue Lists.

The Public Registry for the Federal Species at Risk Act was searched and CDC records were reviewed in order to determine the likelihood of rare plants and animals occurring within the Kruger Mountain expansion area. In addition, the Habitat Atlas for Wildlife at Risk in the South Okanagan was reviewed and email discussions were held with CDC botanist, Jenifer Penny. The scope of this study did not include ground surveys, which should be conducted to confirm the presence or absence of any rare plants or wildlife.

3.3.2 Rare Plant Species and Communities

A list of rare plant species in the study area was created by reviewing available published reports and books, searching the Provincial Conservation Data Centre database and the Species at Risk public registry and interviewing knowledgeable Provincial ministry staff. No field surveys were undertaken at this phase of the study. The list of potential rare plant species is included in Appendix B.

Following the methodology used to determine the potential presence of rare plant species outlined above, a list of 22 potential Red or Blue Listed plant communities was generated for the associated BEC zones (and specific general ecosystems) in the study area. These plant communities are afforded no protection under Federal legislation. The list of potential rare plant communities is also included in Appendix B.

3.3.3 Rare Wildlife Species

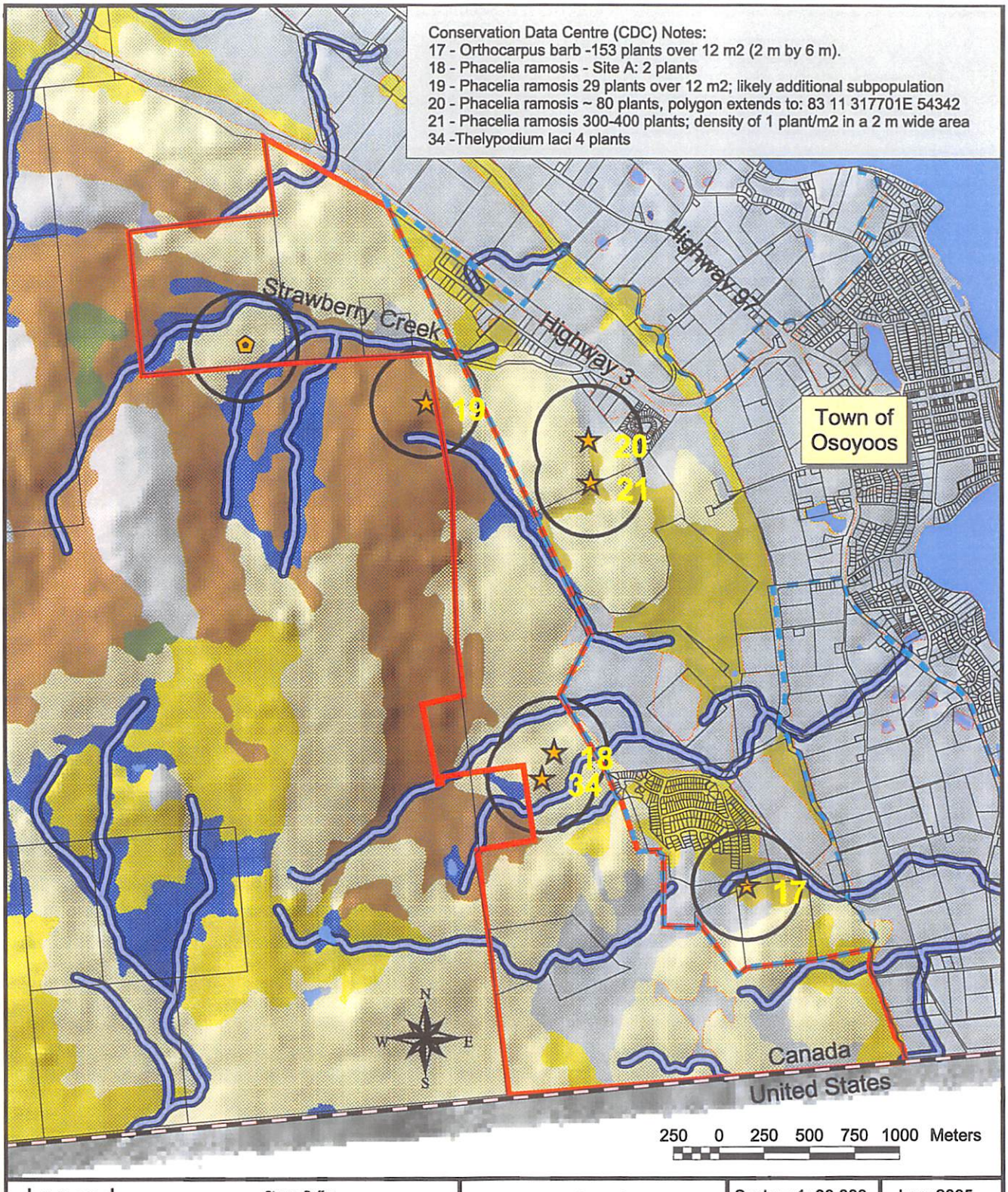
Due to the unique mosaic of grassland, shrub-steppe, open forest and moist and wet ecosystems, the bunchgrass and Ponderosa Pine Zones support a remarkable diversity of wildlife. Species include a great variety of birds, reptiles, amphibians, and small mammals, as well as over-wintering habitat for larger mammals such as bighorn sheep and mule deer. All ecosystems in the zone provide habitat for many invertebrates such as insects and spiders, including some that occur nowhere else in the Province. The list of potential rare wildlife species is included in Appendix B.

3.4 Water and Fisheries Resources

There are several streams and drainage channels within the study area that are mapped on Provincial mapping sources. For the purposes of this report, "stream" is defined as a watercourse, whether it usually contains water or not. No field surveys were conducted to determine presence of water or riparian vegetation. Strawberry Creek is one named stream within the study boundary. The Department of Fisheries and Oceans (DFO) and British Columbia Fisheries classifies Strawberry Creek as a second order stream. It originates west of Osoyoos and flows 4.5 km to its outfall at Osoyoos Lake. There are no fisheries values identified for this stream.

3.5 Summary of Environmental Values

Based on the foregoing, it is clear that this area of the province contains significant environmental values, both terrestrial and aquatic. A number of high-level studies have been undertaken in the South Okanagan region, and the preliminary data has been compiled in the following map (Figure 12). Although the number of formally documented and mapped red and blue listed species within the study area is limited, the potential for species at risk in this area is quite certainly high. A recent study undertaken by Land and Water BC and the Ministry of Water, Land and Air Protection noted that the study area contained the occurrence of 15 red listed and 13 blue listed species. It is therefore imperative that any potential development within the study area proceed with due care with a detailed environmental assessment being required prior to development approval.



Legend

- Study Area
- Municipal Boundary
- Federal Boundary
- Contours - 20m
- Parcels
- Lakes
- Creeks
- Parks / Protected Areas
- ALR
- Conservation Data Centre Inventory (2003) - see notes
- Archaeological Site

Stream Buffer
- 15 metres
- 30 metres

Sensitive Ecosystem Inventory
- Antelope-brush Steppe
- Riparian
- Not SEI
- Wetland
- Sparsly vegetated
- Mature Forest
- Old Forest
- Grassland
- Woodland
- Sagebrush Steppe
- No Data

OSOYOOS

URBANSYSTEMS. 0552.0035.01

Scale = 1: 30,000 | June 2005

Kruger Mountain Preliminary Assessment Figure 12 - Summary of Environmental Values

4.0 PRELIMINARY ENVIRONMENTAL RATING

As demonstrated in the previous sections of this report, development within the study area is constrained by a number of significant environmental factors. These include the following:

- Agricultural Land Reserve;
- Steep slopes;
- An archaeological site;
- Mineral claims; and,
- Environmentally sensitive areas, including both sensitive habitat areas with species at risk, and watercourses.

There are significant barriers to development when land is within the Agricultural Land Reserve or is subject to mineral claims. Other constraints also effectively limit development when they are present. No development ought to occur on lands with slopes in excess of 30 percent, and no development ought to occur on or near the archaeological site. Additionally, all watercourses should be adequately buffered, and development should avoid the most environmentally sensitive areas, particularly if species at risk are present.

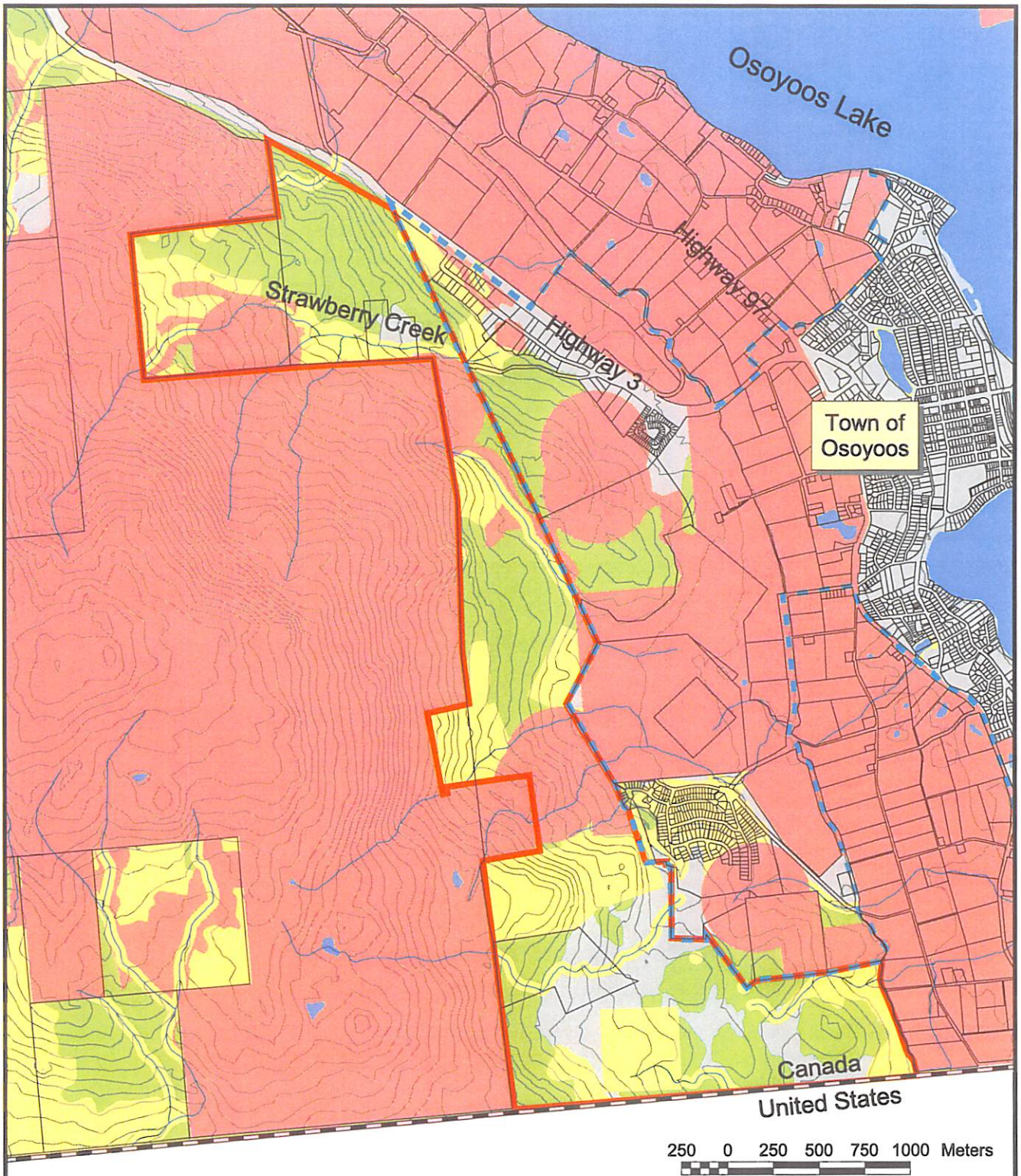
At this preliminary level, the environmental values within the study area can be categorized based on the following components, as depicted in Figure 13:

- High – contains one or more of the following factors:
  - Steep slopes in excess of 30 percent.
  - Within the Agricultural Land Reserve (ALR).
  - An archaeological site.
  - Red or blue listed species, or any other Species at Risk.
  - A fish bearing stream, as defined by the Fisheries Act.
  - Identified in the Sensitive Ecosystem Inventory in the following categories: antelope brush steppe, riparian, mature forest, old forest, or grassland.

- Moderate – contains one or more of the following factors:
  - Slopes between 10 and 30 percent.
  - A stream which may not be fish bearing, but could be connected to a fish bearing stream.
  - Identified in the Sensitive Ecosystem Inventory in the following categories: wetland, woodland, or sagebrush steppe.

- Low – contains one or more of the following:
  - Slopes less than 10 percent.
  - Identified in the Sensitive Ecosystem Inventory as sparsely vegetated.

Figure 13 does not identify categories of slope, as it could not be appropriately represented along with the other environmental values. This development constraint is identified in Figure 14.



Legend

- Study Area
- Municipal Boundary
- Federal Boundary
- Parcels

Preliminary Environmental Rating

- High
- Moderate
- Low
- Not SEI / No Data

- Contours - 20m
- Lakes
- Creeks

N W E S

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URBANSYSTEMS. 0552.0035.01

Scale = 1: 30,000 | June 2005

Kruger Mountain Preliminary Assessment Figure 13 - Preliminary Environmental Rating

5.0 DEVELOPMENT POTENTIAL

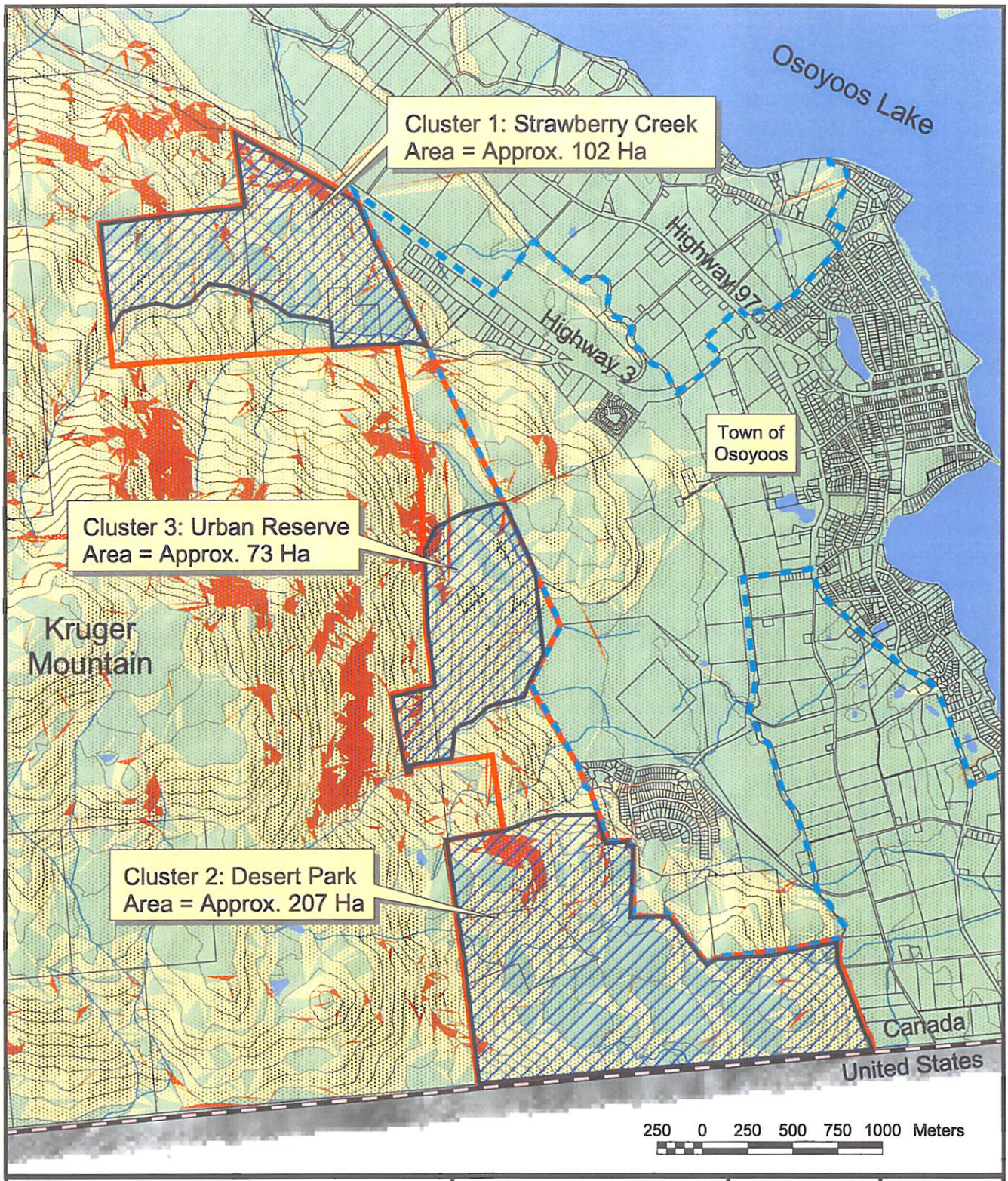
5.1 Potential Development Clusters

Given the environmental sensitivities in the Kruger Mountain Study area, it is recommended that development take place in clusters, to maximize the retention of greenspace and environmentally sensitive habitat. Lots should be smaller and consolidated in clusters, in order to reduce broader environmental impacts and avoid fragmenting wildlife habitat. Furthermore, clusters should be designed to retain important ecosystem functions. As the study area is located within one of Canada's most unique geographical regions, any development should be a model of smart growth and ecologically sensitive neighbourhood planning.

There are a number of specific opportunities for environmental mitigation. These opportunities include:

1. identifying core areas to protect within the Kruger Mountain expansion area and choosing future development sites which will avoid those areas;
2. enhancing and preserving corridors and buffer areas around protected areas;
3. preventing fragmentation of environmentally sensitive areas or critical habitat;
4. minimizing areas to be cleared and integrating wildlife habitat concerns into the expansion planning process;
5. avoiding wetlands and riparian areas;
6. implementing sediment control measures when working near streams or wetland areas;
7. maintaining natural drainage/infiltration patterns for stormwater;
8. avoiding clearing within the bird breeding, nesting and fledging period;
9. minimizing the duration of construction;
10. re-vegetating with native species;
11. implementing contingency and emergency response plans;
12. retaining and protecting wildlife trees, wherever possible; and,
13. increasing public awareness of wildlife species at risk and their habitat needs.

At this stage, three potential areas for development clusters have been identified (see Figure 14). These locations were chosen by reviewing the constraints to development and ruling out non-buildable areas to in turn determine areas that may have potential for development. Within each identified cluster, development is further constrained by lands which are between 10 and 30 percent slope (moderate constraint) and greater than 30 percent slope (high constraint), as depicted in Figure 14.



Legend

- Study Area
- Municipal Boundary
- Federal Boundary
- Contours (20m)
- Potential Development Cluster
- Creeks

Slope Analysis

- 10 - 20%
- 20 - 30%
- +30%

OSOYOOS

N W E S

URBANSYSTEMS. 0552.0035.01

Scale = 1: 30,000 | June 2005

Kruger Mountain Preliminary Assessment
Figure 14 - Potential Development Clusters

5.1.1 Cluster 1: Strawberry Creek Area

The Strawberry Creek area has been identified as one area for a potential development cluster, and is approximately 102 hectares in size, with about 6.8 ha situated on lands greater than 30% slope. Located at the north end of the study area, this area could be accessed through either the Strawberry Creek Road or another road that could extend south from Highway 3. Development could potentially take place generally to the north of Strawberry Creek, on Crown land parcels identified as parcels 68.2 and 72.1, and/or the parcel of privately held land at the westernmost portion of the study area. This potential development cluster has been limited to the north side of Strawberry Creek to avoid the archaeological feature and other environmentally sensitive areas south of the creek.

5.1.2 Cluster 2: Desert Park Area

This potential development cluster is approximately 207 hectares in size, with about 8.9 ha situated on lands greater than 30%. All of the lands west of the Desert Park subdivision are currently Crown land, located within the Land Act Reserve. Nonetheless, there may be opportunities for limited hillside development in this area. A logical site for a potential development cluster has been identified to the southwest of the Desert Park subdivision. This would require extending Fairwinds Drive to the south, to provide access to land beyond the steep slopes immediately adjacent to the existing subdivision. Although the development cluster has been extended south to the United States border and west to the proposed national park, consideration should be given to a significant buffer away from these areas respectively.

5.1.3 Cluster 3: Future Urban Reserve

This potential development cluster is approximately 73 hectares in size, with about 3.9 ha situated on lands greater than 30% slope. It is located adjacent to lands designated "Future Development" in the current Town of Osoyoos OCP. It is not contiguous with any existing development within the municipality, and therefore it will likely be some time in the future before these lands can be considered for development.

Clearly, the entire area identified in each cluster may not be developable. Specific locations within each cluster should be determined based on further environmental analysis. The appropriateness of these areas for potential development clusters should be confirmed in cooperation with the Ministry of Water, Land and Air Protection as well as Land and Water BC. It should be noted that both Cluster 2 and Cluster 3 are situated within a Crown land parcel identified as parcel 79 in the South Okanagan Valley Crown Land Review. Although the locations are not specifically recorded, within the parcel the following occurrences are noted:

- 15 red listed and 13 blue listed species
- 3 rare invertebrate species including 2 species of scorpion
- brewer's sparrow
- badger
- antelope brush

Prior to any development occurring within Cluster 2 and 3, it is highly recommended that a detailed environmental review be undertaken, including multiple field visits, to accurately inventory and identify the flora and fauna within the area. This may be undertaken by the province and/or the Town of Osoyoos in advance of any development proposals, or as part of a development application process.

5.2 Infrastructure Requirements

Should development be considered in the potential clusters described above, servicing to the sites will be necessary and a number of infrastructure extensions and improvements will be required.

For Cluster 1 – Strawberry Creek area, water and sewer lines will need to be extended up Strawberry Creek Road, in addition to improving the road itself. In order to provide domestic water pressures and maintain adequate fire flow capacity, it is likely that another reservoir will need to be constructed near the potential development sites. As the elevation in this cluster ranges from 400 to 700 metres, development may be limited due to high elevation.

For Cluster 2 – Desert Park area, water and sewer lines will need to be extended alongside a Fairwinds Drive extension and/or other road development. The development cluster identified ranges in elevation between 320 and 600 metres. Depending on the limitations of the current Dividend Ridge Reservoir (1,136 m^3 at 452m elevation), another reservoir may need to be constructed within this development cluster to ensure adequate fire flow capacity and domestic pressures. In addition, there is a possibility that downstream water and sewer main upgrades may be required in the Desert Park subdivision.

It was noted previously that Cluster 3 is currently not adjacent to any existing development, and therefore extension of infrastructure mains would likely be in the longer term, once development extends into the area within the Town of Osoyoos designated as "Future Development".

All of the potential infrastructure upgrades identified above would be driven by future development, either constructed directly by the developer or funded through contributions to

Development Cost Charges. There would be little if any financial impact faced by the Town for capital improvements to service new development, save for normal upgrades to replace aging infrastructure.

6.3 Wildfire Hazard Development Permit Area

Given the study area's susceptibility to wildfires, it is recommended that a Wildfire Hazard Development Permit Area be created. A list of potential requirements for inclusion in a Wildfire Hazard Development Permit Area is included in Appendix D.

6.4 Hillside Development Permit Area

Many BC communities have Hillside Development Permit Areas. Given the relatively steep topography within the Kruger Mountain study area, it is recommended that a Hillside Development Permit Area be created to cover all land with gradients in excess of 10 percent. The purpose of such a development permit area would be to ensure slope stability and retain as much of the natural gradient as possible.

6.5 Kruger Mountain Residential Development Permit Area

As potential development sites on Kruger Mountain are on the hillside overlooking Osoyoos, it is important to ensure that the form and character of development does not scar the hillside. To protect the integrity of the views towards Kruger Mountain from the Osoyoos, it is recommended that a development permit area be created to ensure that the visual quality of the hillside are preserved, as much as possible, through the development process.

7.0 RECOMMENDATIONS

This preliminary assessment of the Kruger Mountain area has identified a number of environmental values, topographic constraints, and other infrastructure requirements which need to be carefully considered prior to any potential development within the study area. However, if these are taken into consideration, a few potential development clusters have been identified in the study area, making this area a favourable consideration for boundary extension by the Town. Based on this preliminary assessment, there are two general recommendations for consideration in conjunction with the potential boundary extension.

First, **it is recommended that a detailed environmental inventory and assessment be undertaken for the study area.** As the environmental assessment in this report was largely a desktop study based on available information, further work needs to be undertaken to complete a detailed environmental survey of the Kruger Mountain study area. In cooperation with provincial and federal agencies, habitat areas should be identified in greater detail to ensure that there are in fact reasonable opportunities for cluster development in certain study area locations. Detailed site inventories should be completed for the following:

1. populations of special wildlife and species at risk and their habitat; and,
2. streams, wetlands, draws and drainage channels;

Second, **it is recommended that a detailed neighbourhood planning process should be undertaken for the potential development clusters identified in this study.** This planning process should confirm the location, type, and quantity of residential development, while also dealing with transportation, infrastructure, and environmental issues. This planning process may be undertaken by the Town of Osoyoos, a potential developer, or provincial agencies through a jointly-funded study (e.g. Land and Water BC in association with the Ministry of Water, Land and Air Protection). The neighbourhood planning process should draw from the following guidelines:

1. Environmental Best Management Practices for Urban and Land Development in British Columbia
2. Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia
3. Best Management Practices Guidebook for Raptors in British Columbia, Guidelines for Integrating Raptor Conservation with Urban and Rural Developments
4. Standards and Best Practices for Instream Works
5. Stormwater Planning: A Guidebook for British Columbia

APPENDIX A

Archaeological Site Information

Resource Management Report

Borden Number: DgQv-10
Protected by Legislation: YES

Map Reference:

GIS Populated					Historic Source				
Latitude	Longitude	UTM Easting	UTM Northing	UTM Zone	Latitude	Longitude	UTM Easting	UTM Northing	UTM Zone
49 2'17"	-119 31'5"	316010	5434789	11	490230	1193200			

Map Sheet Number	Spatial Accuracy
082E.003	1:50k
082E/04	1:50k

Site Location:

Location

Description	Site Access
JUST ABOVE THE OSOYOOS RIFLE RANGE AT THE CONFLUENCE OF TWO CREEKS - NOT SHOWN ON THE LARGE MAP. - (ONE IS KNOWN LOCALLY AS STRAWBERRY CREEK.) SITE IS ON SMALL KNOLL BESIDE DRIED SMALL LAKE WHERE THE CREEKS JOIN.	

Street Address:

Street Number	Street Name	City	Postal Code

Site Dimensions:

Length (m)	Width (m)	Site Area
0	0	

Tenure/Reserves:

Jurisdiction	Tenure/Reserves Type	Description	Tenure Remarks
GIS LandDistricts		SDYD	
GIS Municipalities		Okanagan-Similkameen, Subd. B	
GIS RegionalDistrict		Okanagan-Similkameen	

Note: Fields without data are not displayed.

Resource Management Report

Site Typology:

Class	Type	Sub Type	Descriptor
PRECONTACT	Other Feature	Cultural Depressior	Function Unassigned

Feature Description Table

Feature #	Length	Width	Dia.	Depth	DBS from	DBS To	Shape	Orientation	Berm/Rim	Colour

Feature Remarks

Class	Type	Sub Type	Descriptor
PRECONTACT	Subsistence Feature	Cultural Depressior	Cache Pit

Cultural Depression
Feature Description Table

Feature #	Length	Width	Dia.	Depth	DBS from	DBS To	Shape	Orientation	Berm/Rim	Colour
02	0	0	0	0						

Feature Remarks

Class	Type	Sub Type	Descriptor
PRECONTACT	Habitation Feature	Cultural Depressior	Housepit

Cultural Depression
Feature Description Table

Feature #	Length	Width	Dia.	Depth	DBS from	DBS To	Shape	Orientation	Berm/Rim	Colour
01	0	0	0	0			Circular			

Feature Remarks

Resource Management Report

Site Visit:

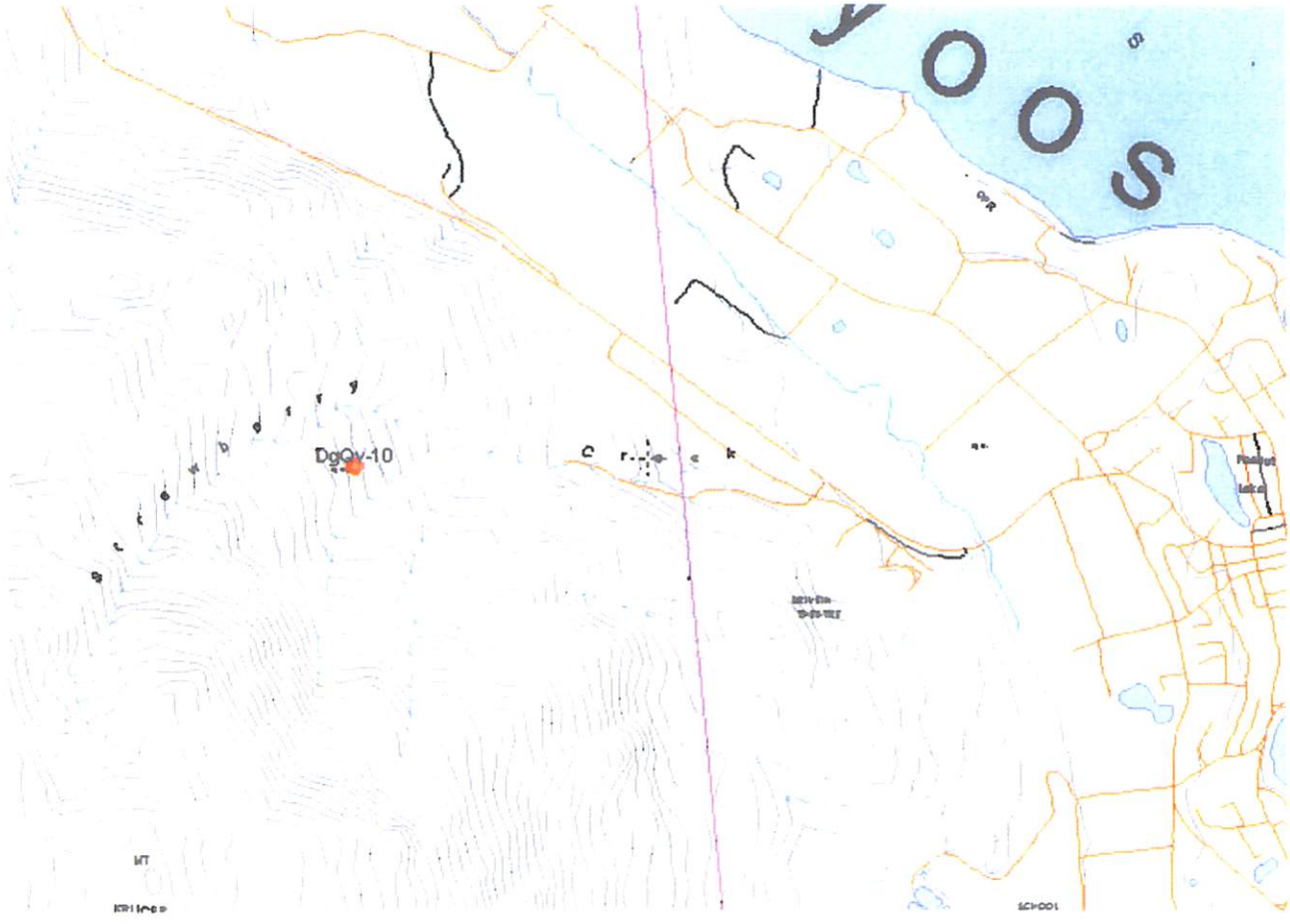
Type	Date of Visit	Affiliation	Permit	Permit Type	Issuing Agency	Permit Holder
Recording	10/Oct/1973	ASAB	1973 24	Pre-1995	Arch	Roberts, G.W. (Gerry)

Remarks
ONE OF THE HOUSEPIT DEPRESSIONS IS OVAL IN SHAPE.

Project Description
Preliminary Report to the Archaeological Sites Advisory Board, Inkameep Archaeology Project

Remarks:

Date	Remarks
	ONE OF THE HOUSEPIT DEPRESSIONS IS OVAL IN SHAPE.



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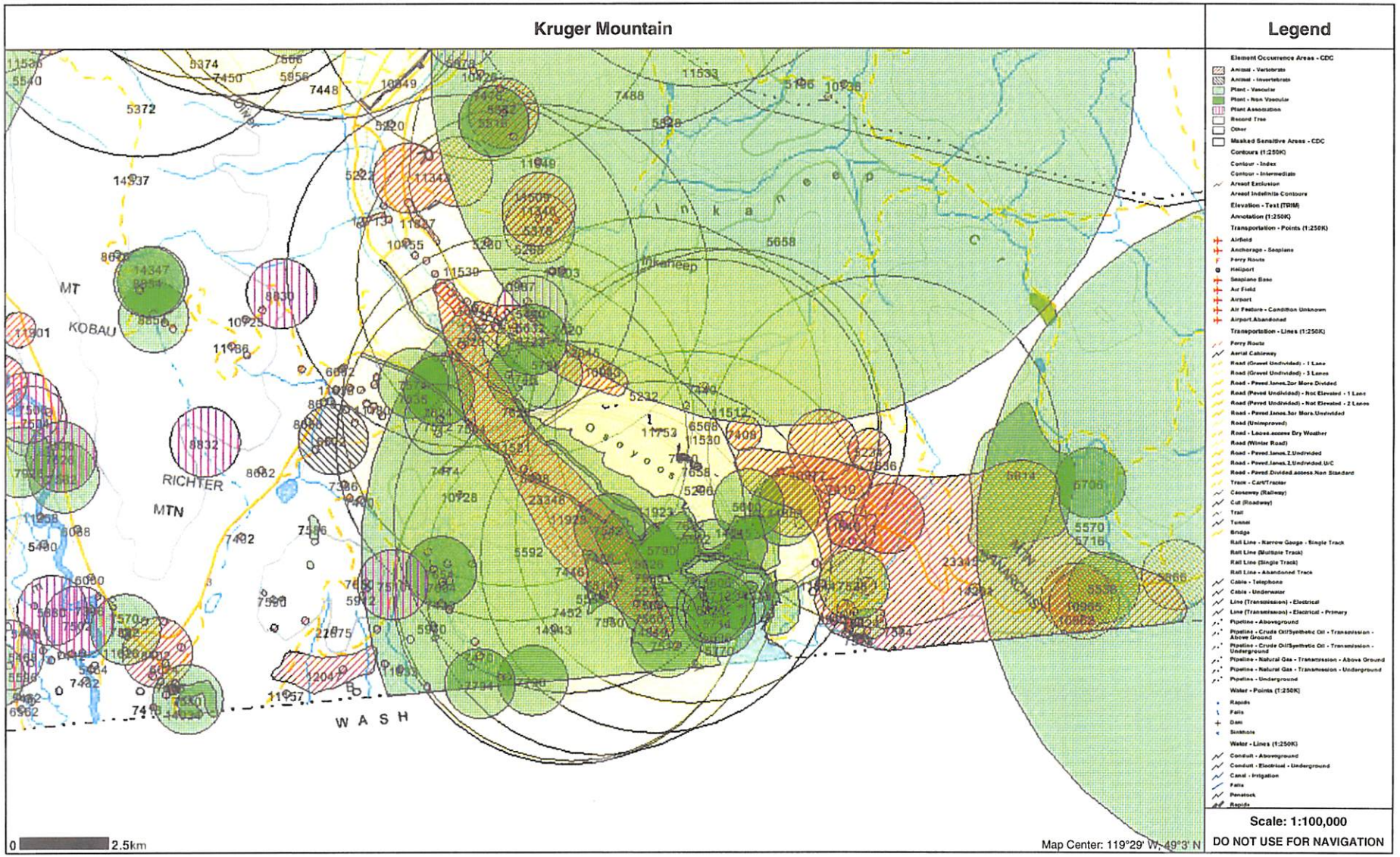
APPENDIX B

Rare Plant and Wildlife Species


Kruger Mountain
Legend
Element Occurrence Areas - CDC
Animal - Vertebrate
Animal - Invertebrate
Plant - Vascular
Plant - Non Vascular
Plant Association
Record Tree
Other
Masked Sensitive Areas - CDC
Contours (1:250K)
Contour - Index
Contour - Intermediate
Areas of Exclusion
Areas of Indefinite Contours
Elevation - Text (TRIM)
Annotation (1:250K)
Transportation - Points (1:250K)
Airfield
Anchorage - Seaplane
Ferry Route
Heliport
Seaplane Base
Air Field
Airport
Air Feature - Condition Unknown
Airport.Abandoned
Transportation - Lines (1:250K)
Ferry Route
Aerial Cableway
Road (Gravel Undivided) - 1 Lane
Road (Gravel Undivided) - 3 Lanes
Road - Paved.lanes.2or More Divided
Road (Paved Undivided) - Not Elevated - 1 Lane
Road (Paved Undivided) - Not Elevated - 2 Lanes
Road - Paved.lanes.3or More.Undivided
Road (Unimproved)
Road - Loose.access Dry Weather
Road (Winter Road)
Road - Paved.lanes.2.Undivided
Road - Paved.lanes.2.Undivided.U/C
Road - Paved.Divided.access.Non Standard
Track - Cart/Tractor
Causeway (Railway)
Cut (Roadway)
Trail
Tunnel
Bridge
Rail Line - Narrow Gauge - Single Track
Rail Line (Multiple Track)
Rail Line (Single Track)
Rail Line - Abandoned Track
Cable - Telephone
Cable - Underwater
Line (Transmission) - Electrical
Line (Transmission) - Electrical - Primary
Pipeline - Aboveground
Pipeline - Crude Oil/Synthetic Oil - Transmission - Above Ground
Pipeline - Crude Oil/Synthetic Oil - Transmission - Underground
Pipeline - Natural Gas - Transmission - Above Ground
Pipeline - Natural Gas - Transmission - Underground
Pipeline - Underground
Water - Points (1:250K)
Rapids
Falls
Dam
Sinkhole
Water - Lines (1:250K)
Conduit - Aboveground
Conduit - Electrical - Underground
Canal - Irrigation
Falls
Penstock
Rapids
Scale: 1:100,000
DO NOT USE FOR NAVIGATION
MT
KOBAU
RICHTER
MTN
WASH
Inkaneep
Osoyoos
0
2.5km
Map Center: 119°29' W, 49°3' N

The CDC has documented and mapped 14 occurrences of rare plants and one plant community within the study area, as outlined below.

	Rare Element	BEC Zone - Habitat Type	Provincial Status
Plants			
1	Threadstalk milk vetch	BGxh	Blue List
2	The Dalles milk-vetch	BGxh on west side of Osoyoos Lake PPxh on disturbed gravel roadside	Red List
3	Obscure cryptantha	PPxh at base of calcareous cliff in sagebrush/Douglas-fir community	Red List
4	Cushion fleabane	BGxh on west side of Osoyoos Lake, 1.6 km south of Osoyoos and on rock exposure	Blue List
5	Scarlet gaura	BGxh	Red List
6	Shy gilia	BGxh on hot, dry sand bank facing south	Red List
7	Western stickseed	PPxh on dry, rocky hillside on sagebrush dominated slopes	Red List
8	Prairie pepper-grass	BGxh on dry roadside	Red List
9	Northern linanthus	PPxh on dry, open ground in sagebrush/Douglas-fir hills.	Blue List
10	Branched phacelia	BGxh on calcareous cliff base in open Douglas-fir/ponderosa pine community	Red List
11	Scarlet globe-mallow	BGxh	Red List
12	Munroe's globe-mallow	BGxh	Red List
13	Thick-leaved thelypody	PPxh at the base of a limestone cliff on talus slope	Blue List
14	Blue vervain	BGxh found in an abandoned farmyard	Red List
Plant Communities			
1	Ponderosa pine/smooth sumac	PPxh about 200 m west of the Osoyoos golf course just below alimestone cliff	Red List

In addition to the one rare plant community confirmed within the study area, there are a number of other rare plant communities that may be contained within the study area, as they are found in the South Okanagan and are associated with the general ecosystems found in the study area. These rare plant communities are listed, below.

	Rare Element	General Ecosystem	Provincial Status
1	Water birch - red-osier dogwood	Wetland/riparian area	Red List
2	Big sagebrush – bluebunch wheatgrass	Grassland/shrub-steppe	Red List
3	Ponderosa pine – smooth sumac	Coniferous forest	Red List
4	Hairy water-clover – American bulrush	Weland/riparian area	Red List
5	Big sagebrush – bluebunch wheatgrass – balsamroot	Grassland/shrub-steppe	Red List
6	Ponderosa pine – Black cottonwood / Poison Ivy	Wetland/riparian	Red List
7	Vasey's big sagebrush – pinegrass	Grassland/shrub-steppe	Red List
8	Black cottonwood – water birch	Wetland/riparian area	Red List
9	Threetip sagebrush/bluebunch wheatgrass-balsamroot	Grassland/shrub-steppe	Red List
10	Bluebunch wheatgrass - junegrass	Grassland/shrub-steppe	Red List
11	Bluebunch wheatgrass - Pasquflower	Grassland/shrub-steppe	Red List
12	Idaho fescue - bluebunch wheatgrass	Grassland/shrub-steppe	Red List
13	Trembling aspen/snowberry/Kentucky Bluegrass	Grassland/shrub-steppe	Red List
14	Antelope brush/needle-and-thread grass	Grassland/shrub-steppe	Red List
15	Spreading needlegrass	Grassland/shrub-steppe	Red List
16	Big sage/needle-and-thread grass	Grassland/shrub-steppe	Blue List
17	Common juniper/bluebunch wheatgrass	Coniferous forest	Blue List
18	Bluebunch wheatgrass/balsamroot	Grassland/shrub-steppe	Blue List
19	Ponderosa pine/red three-awn	Coniferous forest	Blue List
20	Prairie rose/Idaho fescue	Grassland/shrub-steppe	Blue List
21	Ponderosa pine/bluebunch wheatgrass-rough fescue	Coniferous forest	Blue List
22	Ponderosa pine/bluebunch wheatgrass-Idaho fescue	Coniferous forest	Blue List

There are a number of rare wildlife species that may be contained within the study area, as they are found in the South Okanagan and are associated with the general ecosystems found in the study area. These rare wildlife species are listed, below.

The CDC has documented and mapped 14 occurrences of rare plants and one plant community within the study area, as outlined below.

	Rare Element	BEC Zone - Habitat Type	Provincial Status
Plants			
1	Threadstalk milk vetch	BGxh	Blue List
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4	Cushion fleabane	BGxh on west side of Osoyoos Lake, 1.6 km south of Osoyoos and on rock exposure	Blue List
5	Scarlet gaura	BGxh	Red List
6	Shy gilia	BGxh on hot, dry sand bank facing south	Red List
7	Western stickseed	PPxh on dry, rocky hillside on sagebrush dominated slopes	Red List
8	Prairie pepper-grass	BGxh on dry roadside	Red List
9	Northern linanthus	PPxh on dry, open ground in sagebrush/Douglas-fir hills.	Blue List
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11	Scarlet globe-mallow	BGxh	Red List
12	Munroe's globe-mallow	BGxh	Red List
13	Thick-leaved thelypody	PPxh at the base of a limestone cliff on talus slope	Blue List
14	Blue vervain	BGxh found in an abandoned farmyard	Red List
Plant Communities			
1	Ponderosa pine/smooth sumac	PPxh about 200 m west of the Osoyoos golf course just below alimestone cliff	Red List

In addition to the one rare plant community confirmed within the study area, there are a number of other rare plant communities that may be contained within the study area, as they are found in the South Okanagan and are associated with the general ecosystems found in the study area. These rare plant communities are listed, below.

	Rare Element	General Ecosystem	Provincial Status
1	Water birch - red-osier dogwood	Wetland/riparian area	Red List
2	Big sagebrush – bluebunch wheatgrass	Grassland/shrub-steppe	Red List
3	Ponderosa pine – smooth sumac	Coniferous forest	Red List
4	Hairy water-clover – American bulrush	Weland/riparian area	Red List
5	Big sagebrush – bluebunch wheatgrass – balsamroot	Grassland/shrub-steppe	Red List
6	Ponderosa pine – Black cottonwood / Poison Ivy	Wetland/riparian	Red List
7	Vasey's big sagebrush – pinegrass	Grassland/shrub-steppe	Red List
8	Black cottonwood – water birch	Wetland/riparian area	Red List
9	Threetip sagebrush/bluebunch wheatgrass-balsamroot	Grassland/shrub-steppe	Red List
10	Bluebunch wheatgrass - junegrass	Grassland/shrub-steppe	Red List
11	Bluebunch wheatgrass - Pasquflower	Grassland/shrub-steppe	Red List
12	Idaho fescue - bluebunch wheatgrass	Grassland/shrub-steppe	Red List
13	Trembling aspen/snowberry/Kentucky Bluegrass	Grassland/shrub-steppe	Red List
14	Antelope brush/needle-and-thread grass	Grassland/shrub-steppe	Red List
15	Spreading needlegrass	Grassland/shrub-steppe	Red List
16	Big sage/needle-and-thread grass	Grassland/shrub-steppe	Blue List
17	Common juniper/bluebunch wheatgrass	Coniferous forest	Blue List
18	Bluebunch wheatgrass/balsamroot	Grassland/shrub-steppe	Blue List
19	Ponderosa pine/red three-awn	Coniferous forest	Blue List
20	Prairie rose/Idaho fescue	Grassland/shrub-steppe	Blue List
21	Ponderosa pine/bluebunch wheatgrass-rough fescue	Coniferous forest	Blue List
22	Ponderosa pine/bluebunch wheatgrass-Idaho fescue	Coniferous forest	Blue List

There are a number of rare wildlife species that may be contained within the study area, as they are found in the South Okanagan and are associated with the general ecosystems found in the study area. These rare wildlife species are listed, below.

Rare Element		General Ecosystem	Specific Habitats	Provincial Status	Federal Status
Amphibians					
1	Tiger salamander *Ambystoma tigrinum*	Wetlands	Ponds and small lakes	Red List	Schedule 1
2	Northern leopard frog *Rana pipiens*	Wetlands	Marshes	Red List	Schedule 1
3	Great Basin spadefoot *Spea intermontana*	Grasslands/ Wetlands	Dry grasslands and small ponds	Blue List	Schedule 1
Reptiles					
1	Pigmy short-horned lizard *Phrynosoma douglassii*	Grassland	Dry, sandy grassland	Red List	Schedule 1
2	Night snake *Hypsiglena torquata*	Grassland	Talus, rock outcrops	Red List	Schedule 1
3	Painted turtle *Chrysemys picta*	Wetlands	Small ponds	Blue List	None
4	Rubber boa *Charina bottae*	Forest/Grassland	Primarily open forests	Yellow List	Schedule 1
8	Yellow-bellied racer *Coluber constrictor*	Cliffs/Grasslands/ Forest	Grasslands, rock outcrops, open forest	Blue List	None
9	Gopher snake *Pituophis melanoleucus deserticola*	Cliffs/Grasslands/ Forest	Grasslands, shrub-steppe, open ponderosa pine forests	Blue List	None
10	Western rattlesnake *Crotalus viridis*	Cliffs/Grassland/ Forest	Talus, rock outcrops, grasslands, open forest	Blue List	None
Invertebrates					
1	Vivid dancer	Wetland/Riparian area	___	Red List	None
2	Mormon metalmark	Grassland/shrub-steppe	___	Blue List	Schedule 1
3	Behr's hairstreak	Grassland/shrub-steppe	___	Blue List	Schedule 1
4	Sooty gossamer wing	Grassland/shrub-steppe	___	Blue List	None
Birds					
1	Western grebe *Aechmophorus occidentalis*	Wetlands	Marshy lakes	Red List	None
2	Western white pelican *Pelecanus*	Wetlands	Shallow lakes	Red List	None

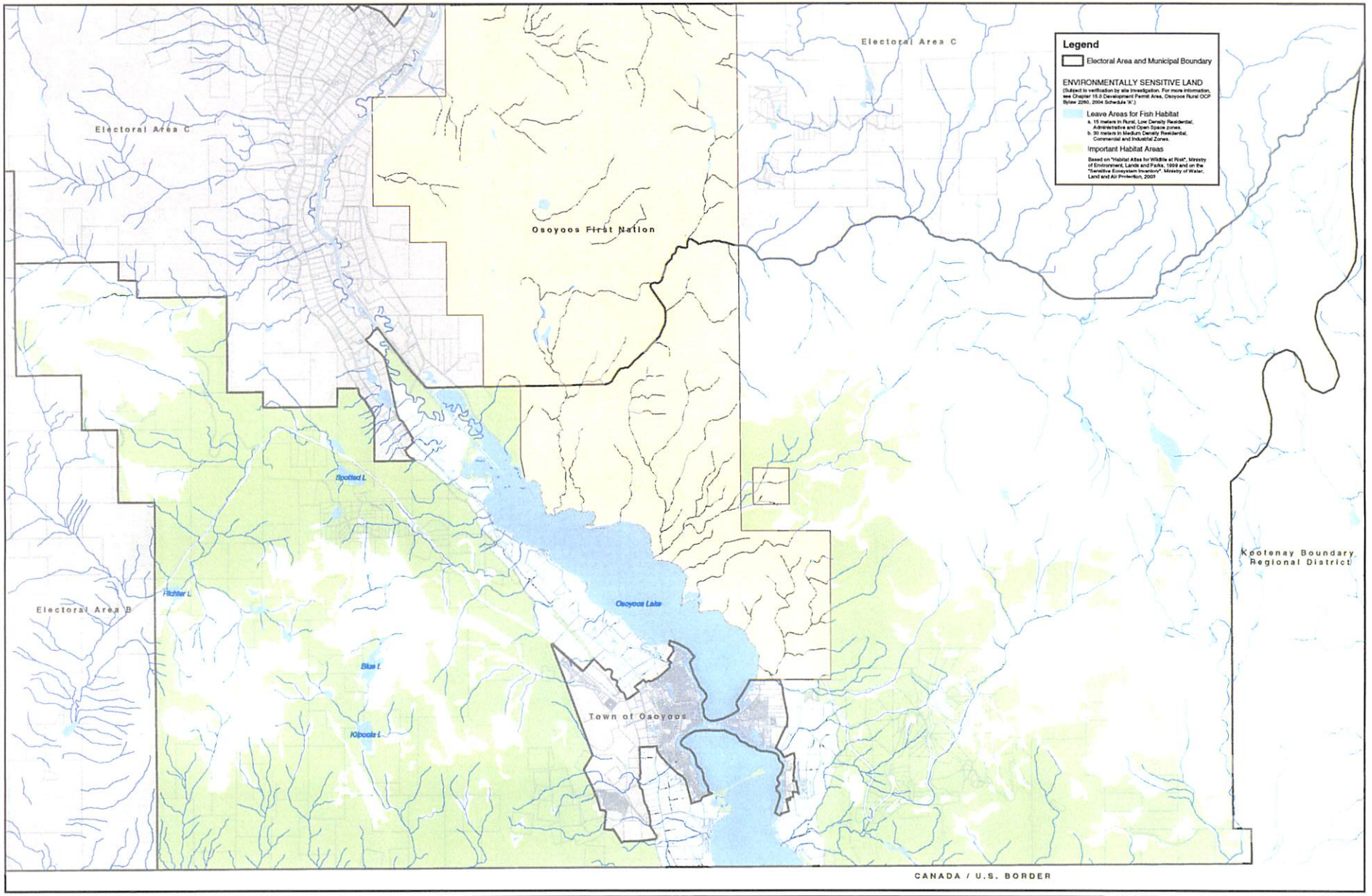
	erythrorhynchus				
3	Swainson's hawk *Buteo swainsonii*	Grasslands	Dry grasslands	Red List	None
4	Ferruginous hawk *Buteo regalis*	Grasslands	Dry grasslands	Red List	None
5	Peregrine falcon (anatum) *Falco peregrinus*	Cliffs/wetlands	Nests on cliffs, forages over wetlands	Red List	Schedule 1
6	Prairie falcon *Falco mexicanus*	Cliffs/grassland	Dry grassland, cliffs	Red List	None
7	Western screech-owl *Otus kennicotti macfarlanei*	Riparian	Riparian woodlands in open forest	Red List	Schedule 1
8	Burrowing owl *Athene cunicularia*	Grassland	Dry grasslands	Red List	Schedule 1
9	White-headed woodpecker *Picoides albolarvatus*	Forest	Mature and old-growth ponderosa pine forests	Red List	Schedule 1
10	Sage thrasher *Oreoscoptes montanus*	Grassland	Sagebrush shrub-steppe	Red List	Schedule 1
11	Yellow-breasted chat *Icteria virens*	Riparian	Riparian thickets	Red List	Schedule 1
12	Brewer's sparrow *Spizella b. breweri*	Grassland	Sagebrush shrub-steppe	Red List	None
13	Grasshopper sparrow *Ammodramus savannarum*	Grassland	Bunchgrass rangelands	Red List	None
14	Lark sparrow *Chondestes grammucus*	Grassland	Antelope brush	Red List	None
15	American Bittern *Botaurus lentiginosus*	Wetlands	Cattail/bulrush marshes	Blue List	None
16	Great Blue Heron *Ardea herodias*	Wetlands	Wetlands, nests in riparian woodland	Blue List	None
17	Sharp-tailed Grouse *Tympanuchus phasianellus*	Grassland	Dry grasslands	Yellow List	None
18	Sandhill Crane *Grus canadensis*	Wetlands	Marshes	Blue List	None
19	American Avocet *Recurvirostra americana*	Wetlands	Alkali ponds	Red List	None
20	Long-billed Curlew *Numenius americanus*	Grassland	Dry grassland, moist pastures	Blue List	Schedule 1
21	California Gull *Larus californius*	Wetlands	Lakeshores	Blue List	None
22	Barn Owl *Tyto alba*	Grassland	Moist pastures, dry grasslands	Blue List	Schedule 1
23	Flammulated Owl *Otus flammeolus*	Forests	Ponderosa Pine/ Douglas-fir forests	Blue List	Schedule 1

24	White-throated Swift *Aeronautes saxatilis*	Cliffs/Grassland	Large cliffs in open habitats	Blue List	None
25	Lewis's Woodpeckerer *Melanerpes lewis*	Grasslands/ Forests/Riparian	Large trees in open grasslands	Blue List	Schedule 1
26	Williamson's Sapsucker *Sphyrapicus t. thyroideus*	Forests	Mature western larch forests	Blue List	None
27	Gray Flycatcher *Empidonax wrightii*	Forests	Dry, open, ponderosa pine forests	Blue List	None
28	Canyon Wren *Catherpes mexicanus*	Cliffs	Large rock cliffs and talus	Blue List	None
29	Bobolink *Dolichonyx oryzivorus*	Grassland	Moist pastures and hayfields	Blue List	None
Mammals					
1	Pallid Bat *Antrozous pallidus*	Cliffs/Grassland	Dry grasslands, rock outcrops and cliffs	Red List	Schedule 1
2	Western Red Bat *Lasiurus blossevilli*	Riparian	Large standsof old cottonwoods	Red List	None
3	White-tailed Jackrabbit *Lepus townsendi*	Grassland	Dry grasslands and shrub-steppe	Red List	None
4	Badger *Taxidea taxus*	Grasslands	Grasslands and open forests	Red List	Schedule 1
5	Fringed Myotis *Myotis thysanodes*	Grassland/ Riparian		Blue List	None
6	W. Small-footed Myotis *Myotis ciliolabrum*	Cliffs/Grassland	Roosts in and forages near cliffs and talus slopes in arid grassland	Blue List	None
7	Spotted Bat *Euderma maculatum*	Cliffs/Riparian/ Forests	Roosts on large cliffs; forages over moist pastures and open pine forests	Blue List	None
8	Townsend's Big-eared Bat *Corynorhinus townsendii*	Forests	Mature old growth Douglas-fir forests	Blue List	None
9	Nuttall's Cottontail *Sylvilagus nuttallii*	Grassland/ Forests	Dry grasslands and open ponderosa pine forests	Blue List	None
10	W. Harvest Mouse *Reithrodontomys megalotis*	Grassland	Shrubby thickets in dry grasslands	Blue List	None
11	Great Basin Pocket Mouse *Perognathus parvus*	Grassland	Bunchgrass and shrub-steppe habitats	Blue List	None
12	Cascade Groundsquirrel *Spermophilus saturatus*	Forests	Open montane and subalpine forests	Yellow List	None
13	Wolverine *Gulo gulo luscus*	Forests	Higher elevations	Blue List	None

14	Fisher *Martes pennanti*	Forests	Higher elevations; old growth	Red List	None
15	Badger *Taxidea taxus*	Grassland	Grasslands and open forests	Red List	None
16	California Bighorn Sheep *Ovis Canadensis californianus*	Cliffs, Grassland	Grasslands for forage, cliffs for escape	Blue List	None

APPENDIX C

Sample Environmentally Sensitive Development Permit Guidelines (Taken from Osoyoos Rural Official Community Plan Bylaw 2260, 2004)



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RURAL OSOYOOS OCP

ENVIROMENTALLY SENSITIVE DEVELOPMENT PERMIT AREAS

SCHEDULE D

15.0 DEVELOPMENT PERMIT AREA

15.1 Background

The Official Community Plan may designate development permit areas under the authority of the Local Government Act, and applicable provisions of the Community Charter. Unless otherwise specified, a development permit must be approved by the Regional Board prior to any development or subdivision of land within a designated development permit area. The purpose of acquiring a development permit is to ensure certain requirements are addressed towards the protection, restoration and preservation of the natural environment.

15.2 Environmentally Sensitive Development Permit (ESDP) Area

15.2.1 Category

The Environmentally Sensitive Development Permit Area is designated under Section 919.1(1)(a) of the Local Government Act, and applicable provisions of the Community Charter for the protection of the natural environment, its ecosystems and biological diversity.

15.2.2 Area

The Environmentally Sensitive Development Permit (ESDP) Area is comprised of:

1. **important habitat areas** for wildlife habitat and plant communities, included in the '*Habitat Atlas for Wildlife at Risk, South Okanagan & Lower Similkameen*', Ministry of Environment, Lands and Parks, 1999, and in the '*Electoral Area 'A' Sensitive Ecosystem Inventory*', Ministry of Water, Land and Air Protection, 2003, and identified in Schedule 'D'; and

2. **leave areas** for fish habitat, which include all watercourses and adjacent land in:

    a. Rural and Low Density Residential designations, and Administrative and Open Space designations;
        i) within 15 metres (49.2 feet) from the natural boundary of the watercourse, and,
        ii) within 15 metres from the top of the bank where a bank is within 15 metres of the natural boundary of the watercourse, or in

    b. Medium Density Residential, Commercial and Industrial designations;
        i) within 30 metres (98.4 feet) from the natural boundary of the watercourse, and,
        ii) within 30 metres from the top of the bank where a bank is within 15 metres of the natural boundary of the watercourse,

    and identified in Schedule 'D'. Refer to Figure 2 for illustration of leave areas.

'Natural boundary' means a visible high watermark of any lake, river, watercourse or other body of water where the presence and action of the water are so common and usual and so long continued in all ordinary years as to mark upon the soil of the bed of the lake, river, stream or other body of water a character distinct from that of the banks thereof, in respect to vegetation, as well as in respect to the nature of the soil itself.

'Top of bank' means a point at which the upward ground level becomes less than one vertical to four horizontal, and refers to the crest of the bank or bluff where the slope clearly changes into the natural upland bench.

'Watercourse' means any natural or constructed depression with well-defined banks and a bed 0.6 metres or more below the surrounding land, serving to give direction to a current of water at least six months of the year or having a drainage area of two square kilometres or more upstream of the point of consideration, or as required by a designated official of the province;

15.2.3 Justification

The primary objective of this development permit area designation is to minimize the impact of development on the natural environment. The natural environment provides essential habitat and corridors for fish, birds and other wildlife. It also acts as a natural water storage, drainage and purifying system. Vegetation adjacent to watercourses needs to remain in a largely undisturbed state in order to maintain a healthy environment. The maintenance of adjacent lands in an undisturbed state also helps to protect private property from flooding or land loss due to watercourse erosion.

There is a general decline in fish and wildlife populations in the South Okanagan that is directly attributable to habitat loss. The major contributors to increasing habitat losses are increasing agriculture, urbanization, water use, forestry and expansion of alien species (i.e., weeds). The South Okanagan Valley is identified as a critical region for maintaining a healthy, viable population of a number of endangered and threatened species. Work has been done to identify habitats supporting endangered wildlife species.

The impact of development on the natural environment can be minimized by carefully examining the proposed development and taking appropriate measures in relation to the environmentally sensitive land. Schedule 'D', Environmentally Sensitive Development Permit Area, is comprised of important habitat (areas for red-listed species and important habitat included in the '*Habitat Atlas for Wildlife at Risk, South Okanagan & Lower Similkameen*', Ministry of Environment, Lands and Parks, 1999, and in the '*Electoral Area 'A' Sensitive Ecosystem Inventory*', Ministry of Water, Land and Air Protection, 2003), and leave areas and their watercourses to form the basis for the boundaries of the environmentally sensitive land.

15.2.4 Determining whether development falls within the ESDP Area

To confirm whether a proposed development is within land identified as environmentally sensitive in the ESDP Area for which a development permit application is required, locate the following:

a. the development in relation to the important habitat areas, identified in Schedule 'D', and/or

b. the development in relation to the leave area, which includes watercourses and adjacent land within 15 metres for land designated or proposed to be designated Rural or Low Density Residential, or 30 metres for land designated or proposed to be designated Medium Density Residential, Commercial or Industrial, and identified in Schedule 'D'.

Unless the proposed development is clearly outside environmentally sensitive land in the ESDP Area the location of the development shall be determined accurately by survey in relation to the ESDP Area to determine whether a development permit application is required.

15.2.5 Guidelines

A development permit is required, except where specified under Exemptions Section 15.2.6, for development on lands identified as environmentally sensitive within the Environmentally Sensitive Development Permit (ESDP) Area. Where not exempted, development requiring a development permit includes:

a. subdivision,

b. any activity carried out in the process of preparing a site or erecting structures, including (i) grading, removal, deposit or moving of soil, construction of a new building, or alteration or expansion of an existing building, (ii) paving, (iii) installation of drainage or underground services, or (iv) removal of vegetation important to wildlife or fish habitat as determined by a professional biologist.

Development shall be in accordance with the following guidelines:

1. The Regional Board will consider approval of the development permit based on the recommendations of an Environmental Impact Assessment (EIA) Report the applicant has the option of having prepared to assist in facilitating the approval process, or from the Ministry of Water, Land and Air Protection, Department of Fisheries and Oceans, and/or the Technical Environmental Advisory Committee of the Regional Board. The EIA report, prepared by a qualified professional biologist, would identify how the proposed development will affect the environment, and recommend measures to reduce any negative impacts.

2. Incorporation of park, trail and wildlife and fish corridors to provide continuity between important habitat and leave areas will be encouraged by the Regional Board.

3. Where it is not practical to preserve important habitat areas, the recommendations of the Ministry of Water, Land and Air Protection, the Department of Fisheries and Oceans, and/or the Technical Environmental Advisory Committee of the Regional Board in the context of the EIA Report will be considered. Options may include development modifications, enhancement opportunities, dedicating or restoring comparable habitat area elsewhere.

4. Dedication to Crown of the natural watercourse, in accordance with the Local Government Act, and applicable provisions of the Community Charter.

5. Leave areas, except where a variance to the development permit is approved by the Regional Board, shall be maintained free of development and in a natural state.

6. Where a variance to the development permit in the form of an encroachment into the leave area is proposed, recommendations of the Ministry of Water, Land and Air Protection, the Department of Fisheries and Oceans, and/or a Technical Environmental Advisory Committee of the Regional Board in the context of the EIA Report will be considered.

7. Where development is considered in important habitat areas or leave areas, and in addition to Guideline 4, the Regional District may use the following methods to direct development away from the environmentally sensitive area:

    a. bare land strata to allow flexibility in conserving the feature or area;
    b. comprehensive development zones, density averaging or other methods to achieve this purpose;
    c. development variance permits to vary conditions other than use or density; and/or
    d. voluntary stewardship such as contracts, leases or trust to protect the feature or area.

15.2.6 Exemptions

A development permit is not required for development within land identified as environmentally sensitive in the Environmentally Sensitive Development Permit (ESDP) Area for:

1. the construction, alteration, expansion, repair, demolition or maintenance of one single detached dwelling and accessory buildings related to that dwelling outside of leave areas, and any related grading, removal, deposit or moving of soil, outside of leave areas;

2. the construction, alteration, addition, repair, demolition and maintenance of farm buildings, outside of leave areas;

3. the construction of a driveway and utilities outside of leave areas affecting an area less than 500 sq.m. (5,382 sq.ft.);

4. the construction and repair of fences;

5. a subdivision, if the smallest parcel resulting from subdivision is 20 hectares (49.4 acres) or greater, or if the subdivision will create only two parcels;

6. confirmed absence of important habitat as per the '*Habitat Atlas for Wildlife at Risk, South Okanagan & Lower Similkameen*', Ministry of Environment, Lands and Parks, 1999, or the '*Electoral Area 'A' Sensitive Ecosystem Inventory*', Ministry of Water, Land and Air Protection, 2003 by a professional biologist;

7. an area where the applicant can demonstrate that the conditions of the ESDP Area have already been satisfied, or a development permit for the same area has already been issued in the past and the conditions in the development permit have all been met, or the conditions addressed in the previous development permit will not be affected; and

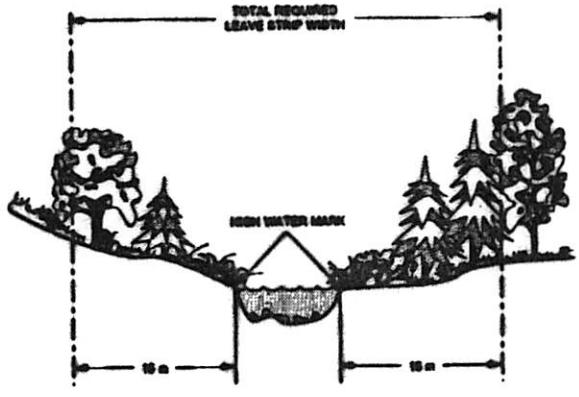
8. any development on a parcel, upon Board approval, of the recommendation of the Ministry of Water, Land and Air Protection, Department of Fisheries and Oceans, and/or the Technical Environmental Advisory Committee of the Regional Board.

FIGURE 2 LEAVE AREAS for Rural or Low Density Residential Designations

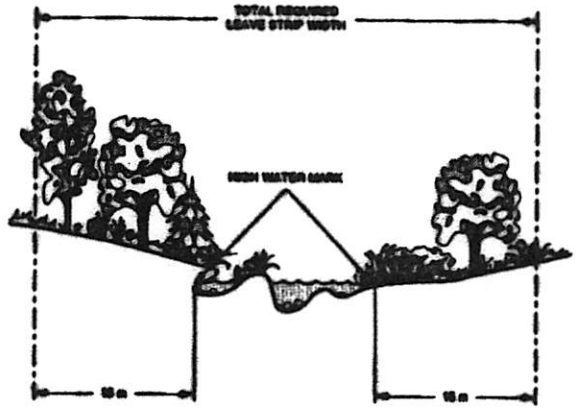
Note that setbacks are different for Medium Density Residential, Commercial and Industrial designations

Source: British Columbia Ministry of Environment, Lands and Parks and the Federal Fisheries and Oceans joint publication, *Land Development Guidelines for the Protection of Aquatic Habitat, 1999*

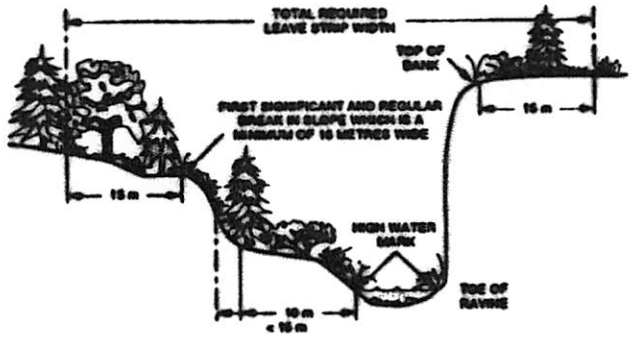
minimum leave area for a well-defined high water mark



minimum leave area for a poorly-defined high water mark



minimum leave area for a ravine or steep-sloped banks



APPENDIX D

Potential Requirements for Inclusion in a Wildfire Hazard Development Permit Area

Potential requirements for inclusion in a Wildfire Hazard Development Permit Area include the following:

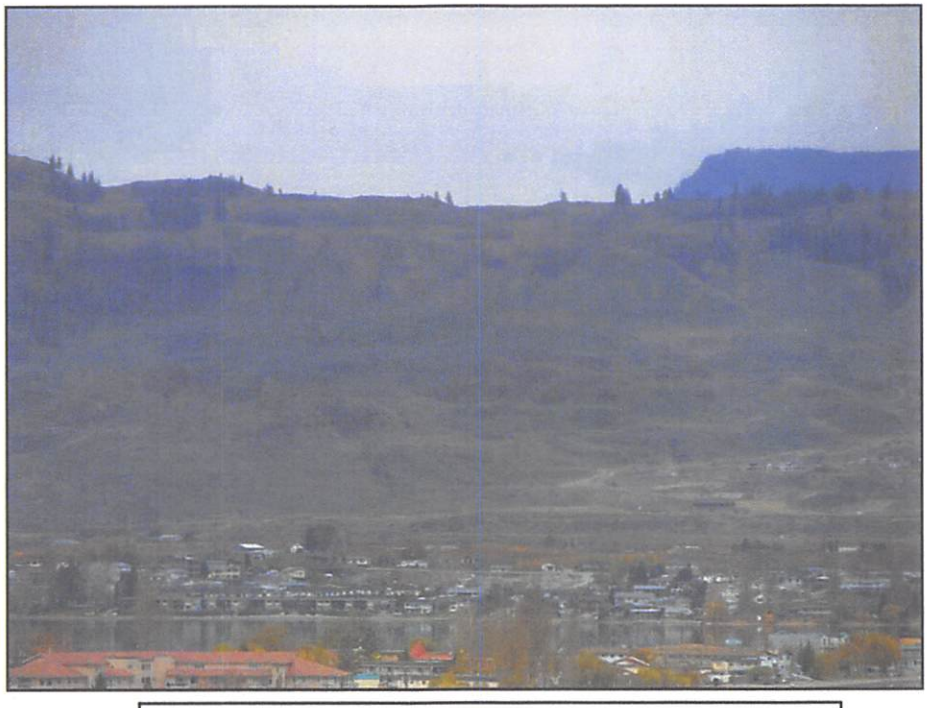
- A requirement that developers undertake a fire hazard risk assessment;
- A requirement that developers provide a fire hazard mitigation strategy, to include the following as deemed necessary:
    - incorporating fuel breaks adjacent to or on the residential subdivisions;
    - establishing zones around potential structures and homes which are clear of debris, highly combustible material or trees;
    - utilizing fireproofing techniques and fireproof materials in building design;
    - designing roads that provide evacuation routes and facilitate movement of fire fighting equipment;
    - ensuring all roads are named and signed;
    - ensuring availability of water supply facilities adequate for fire suppression;
    - ensuring the provision of access to local water sources, lakes and watercourses as part of access requirements;
    - implementing setbacks, interfacing fire protection standards, and building material standards pursuant to the Ministry of Forest's publication *The Beware and Prepare Community Planner - Working towards a fire safe community;* and
    - establishing a building setback of 30 metres abutting Crown land.

APPENDIX E

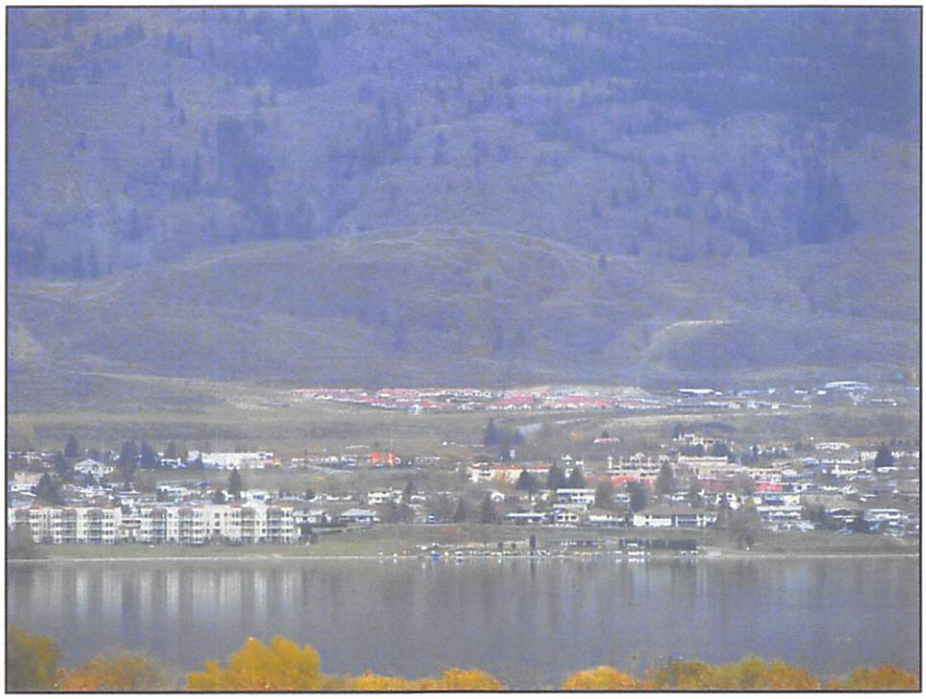
Site Photos



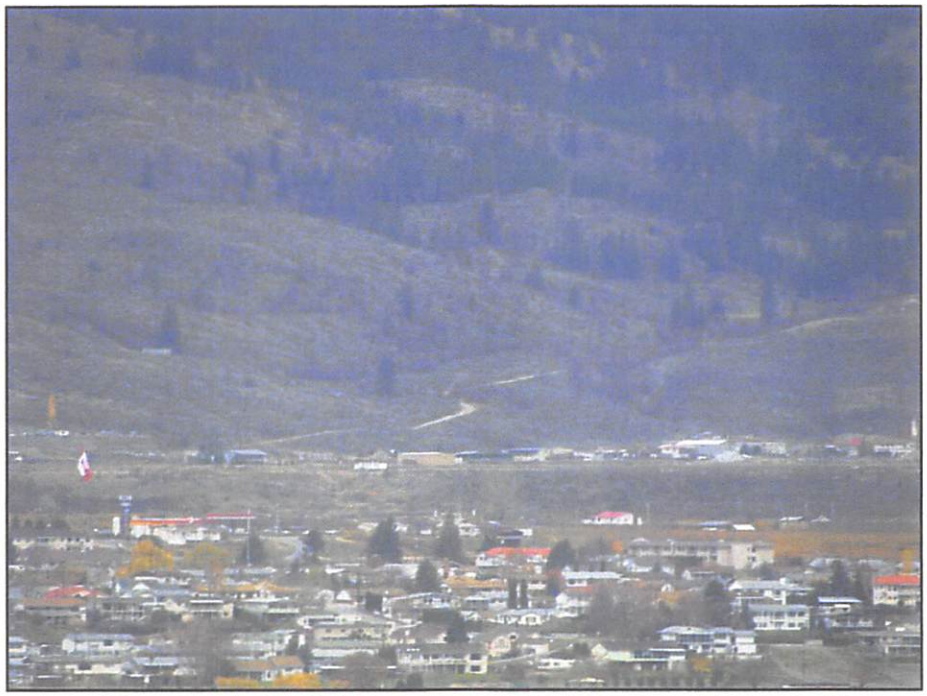
View of the Study Area from the East, above Desert Park



View of the Study Area from the East, above 115th Street



View of the Study Area from the East, above Meadowlark Drive



View of the Study Area from the East, above Industrial Park



View of Strawberry Creek Road within Study Area, looking Southeast



View of the Osoyoos Rod and Gun Club (Wildlife Federation) within Study Area