



Shannon Lake West Concept Development Plan

NOTE: Shannon Lake West Concept Development Plan was adopted by Bylaw No. 1050-10 on March 13, 2006 into Westside Official Community Plan Bylaw No. 1050 as Appendix B-7 (and a summary included in Section 16); as a result, this August 22 -05 DRAFT #5 is a reference document only.

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Introduction

Purpose

The Regional District of Central Okanagan Board requires that Concept Development Plans be prepared for areas as identified in the Official Community Plan for that region. Concept Development Plans are diverse and the content depends on the specific area.

Areas are identified in the OCP as requiring Concept Development Plans for lands that development may have a significant effect on adjacent properties, the natural environment, or other unique considerations. The lands within the Concept Development Plan boundaries as identified in the OCP are to be planned as one complete unit.

The *Shannon Lake West Concept Development Plan* was prepared for the Regional District by lead consultant Protech Consulting Ltd. and several sub-consultants dealing with issues relating to land use, wildfire, environmental issues, transportation and historical features. The plan was prepared in consultation with Regional District of Central Okanagan staff, the landowners and neighboring residents.

This plan is to be used as a guide for future rezoning, subdivision and development of the Shannon Lake West area.



Location

The **Shannon Lake West** lands are located on the west side of Okanagan Lake approximately 12 kilometres south of the floating bridge. The Shannon Lake area is approximately 4 kilometres north of Westbank. See Figure 1.



Process

The landowners requested permission from the Regional District of Central Okanagan to prepare a Concept Development Plan in order to begin planning of development on the subject lands. A *Terms of Reference* was prepared by the Regional District and upon approval from the Regional Board, the Concept Development Planning process was started.

While led by Protech Consulting Ltd and their various sub-consultants, the plan was prepared together with the Regional District, various agencies and stakeholders as well as the surrounding neighborhood and the landowners. The process is funded by the landowner but under the administration and direction of the Regional District of Central Okanagan.

On May 18, 2005 a public information meeting was held at Shannon Lake Elementary School. There were approximately 45-55 attendees from the surrounding area. The

process of the Concept Development Plan was explained and an overview of the planning, environmental, wildfire and transportation issues was provided.

In general participants of the meeting were in acceptance of the proposed land uses presented. Some specific concerns related to water supply in the area and the ability of residents along Shannon Lake Road to connect to a new water supply and abandon their wells. James Moller of Lakeview Irrigation District advised attendees that water connections could be discussed directly with the land developer and that latecomer fees may be applied. Mr. Moller advised that water needs will be met by Lakeview Irrigation District even in the event of a 50 year drought situation.

Other queries related to the potential widening of Shannon Lake Road and whether or not this development would trigger such widening as well as access from the most north-easterly cul-de-sac in the Shannon Woods Development. All traffic queries were deferred to the Ward Consulting Traffic Impact Report which forms an appendix to this report.

Planning Context

Introduction

Concept Development Plans generally contain directives and policies relating to land use, transportation, density, parks and open space, school provisions and development guidelines. Concept Development Plans work toward the objectives and policies laid out in the OCP with a basis established that supports more detailed development policies outlined in the Concept Development Plan.

Context

This Concept Development Plan area is comprised of approximately 167.6 ha (414.1 acres) owned by various owners. The area is situated west of the City of Kelowna in Shannon Lake, adjacent to Westbank.

The surrounding land uses are as follows:

East: Shannon Lake Golf Course runs adjacent to the site at the northern half and residential and Shannon Lake at the southern half.

South: Westside Landfill, vacant lands, parks and recreation.

West: Low density single detached residential and undeveloped lands identified as Rural Resource in the Westside Official Community Plan and Crown lands.

North: Vacant Crown lands identified as Rural Resource in the Westside Official Community Plans.



D.L. 3793

Shannon Woods Neighborhood

View Looking West toward site

View looking SW toward site



ALR Lands



Landfill

View looking NE toward the site

Westside Official Community Plan (October 2004)

The Westside Official Community Plan Bylaw 1050 (October 18, 2004) *Future Land Use Map Schedule 'B'* designates the majority of the plan area as Low Density Single Detached Residential, Agriculture and a portion of the northwestern corner as Rural Resource.

The following are policies from the Westside OCP :

Rural Resource

- Rural Resource includes provincial forests and community watersheds and rural areas consisting of Crown Land and large rural lots with minimum services.
- Crown Lands within this designation will support resource industries such as cattle range, timber harvest and gravel extraction as well as outdoor recreation on large parcels.
- Private lands within this designation have environmental constraints to the provision of services such as community water and roads.
- In order to minimize road access and to protect resource and environmental values, large parcel sizes are encouraged (30 ha or larger).
- Amendments to the boundary of Rural Resource Areas may be considered based on expansion of community servicing areas and topography, but will be balanced against the loss of rural resource and landscape values.
- Provincial resource development activities will be supported in this designation subject to best management practices and compatibility with tenure holders and neighbouring land uses.

Low Density/Single Detached Residential

- This designation is intended for areas of community water and sewer service, supporting street oriented detached residential development with lot sizes of 700 square metres or larger.
- In order to ensure orderly future growth, subdivision of less than 4 hectares within this designation is not supported unless it is for single family detached and duplex housing or complimentary neighborhood service uses.

Objectives and Policies from the Westside Official Community Plan that were respected in preparation of this Concept Development Plan include the following:

Natural Environment

- Evaluate development and servicing proposals in consideration of the Sensitive Ecosystem Inventory of the Regional District of Central Okanagan and the Westside Aquatic Inventory (SHIM) of the Regional District of Central Okanagan as well as provincial Best Management Guidelines and publications.
- Conserve, enhance and promote the protection of wildlife corridors and ecosystem connectivity with interfacing Crown Lands.
- Maintain natural linkages and protect.
- Map and evaluate riparian areas, ravines and steep slopes on the Westside (completed in Shannon Lake West Plan boundary) as a whole to determine if there are areas that will likely become isolated ecosystems after development is complete. Explore alternatives to ensure interconnectedness between ecosystems. Road and utility corridors should be designed to minimize crossings that are narrow

and perpendicular to open space corridors, and that are elevated (e.g. bridges) to maintain connections through aquatic ecosystems.

- Encourage the use of native vegetation to reclaim disturbed sites.

Utilities

- Encourage that all urban land uses and all lots of less than 2 hectares in size connect to a community water system with fire flows and a community sewer system except for publicly owned services such as fire departments and public parks.
- Ensure the phasing and extension of services to new neighborhoods in a coordinated and sequential manner.
- Encourage the coordination and upgrade of all services to an urban standard to all lands except those designated “Rural Resource”, “Agriculture” and “Country Residential” within the plan area.

Parks and Recreation

- Require Neighborhood Plans for new neighborhoods to include the planning of parks, open space, pedestrian and linear corridors, and major recreation facilities. Such planning should include consideration of the Westside Parks and Recreation Master Plan, parks preplans, community and Regional District staff input.

Parks planning in the Shannon Lake West area was developed in coordination with Regional District Parks staff in conjunction with the Westside Parks and Recreation Master Plan.

- Within Neighborhood Plans and Study Area Plans, ensure the linkage of open space networks with parks, watercourses, and/or open spaces in adjacent neighborhoods so as to provide connectivity for rare plants and animals associated with the Okanagan Valley. Provide for an overall connectivity of open space and parkland on the Westside.
- Secure parkland and funding at the time of subdivision in accordance with the provincial regulations of Local Government Act regarding the requirement of 5% park dedication or funds in lieu of dedication.

Transportation Policies

- Ensure that one-time incremental road location and road standard decisions are supportive of an overall road system function (incorporating future local, collector, arterial and highway routes) and are not detrimental to future decision-making, or the overall road network. Where a decision appears to preclude or inhibit planned road options, the evaluation of the effect upon the overall system must be considered.
- Discourage the creation of low-density residential lots fronting the Major Road Network and the provision of multiple driveways onto the Major Road Network.
- Review (in consultation with the Ministry of Transportation), road design standards, particularly in hillside development areas where there is value in reducing the width of road excavation, and in agricultural areas where crop growing should be protected from adverse impact.

- Ensure the inclusion of designated routes for future transit service in new neighborhood plans.

Housing and Neighborhoods

- Support an increase in the variety of housing options and choices in existing neighborhoods provided they are sensitively integrated into the community.
- Ensure that growth will occur in a phased, efficient and logical way.
- Investigate and encourage a variety of housing options including varied tenure and forms of dwellings within each new neighborhood.

Agricultural

- Reduce the negative effects at the agricultural/urban interface.
- Support the Agricultural Land Commission Landscape Buffer Specifications for urban and residential uses next to the ALR.
- Require an Official Community Plan amendment to a designation other than "Agricultural" if land is excluded from the ALR in order for further development to occur.



Westside Parks & Recreation Master Plan (2000)

Policies identifying parkland and open space area needs for the Westside area are identified in the Regional District of Central Okanagan Westside Parks & Recreation Master Plan.

There are a variety of conditions on the Westside that affect the ability to establish and adhere to a rigid standard for park spaces:

- ◆ Topography
- ◆ Agricultural Land Reserve
- ◆ Views of Open Space
- ◆ Users aren't confined to jurisdictional boundaries
- ◆ Historic development patterns
- ◆ Private open space in multi-family developments
- ◆ Schools contribute to the inventory of park and open space
- ◆ Regional parks are used by Westside residents for their recreation and amenity value

There are several different classifications of parks identified in the Westside Parks and Recreation Master Plan, they include:

- ◆ Community Parks – passive functions to serve the entire community
- ◆ Athletic Parks – outdoor recreation facilities
- ◆ Neighborhood Parks – informal open space, passive recreation and amenities
- ◆ Waterfront Parks – to provide access to and use of Okanagan Lake
- ◆ Open Spaces – natural open space for environmental conservation
- ◆ Linear Parks – to provide off-road transportation linkages for pedestrians

The Shannon Lake West Concept Development Plan area will be required to provide a Neighborhood Park calculated at an allocation rate of 0.8 ha for every 1,000 people.

Hillside Development Guidelines (Westside OCP October 2004)

The Westside Official Community Plan outlines guidelines for hillside development. The hillside development principles are intended to respect the physical and environmental character of the hillside setting in which development is proposed. This Concept Development Plan respects the goals of the Hillside Development Guidelines.

- The form and character of roads and structures are to complement the terrain and features associated with the surrounding hillsides.
- Encourages cluster housing options that will retain larger amounts of open space, protect the natural environment and reduce grading and overall site disturbance.
- Road layouts and lot configurations will respond to the natural features and attributes of the site without compromising public safety. Unique lot configuration and shared driveways will be considered in order to minimize cuts and fills.

Specific methods of addressing and complying with the hillside development guidelines will be detailed for lands within the Shannon Lake West Concept Development Plan area at the Development Permit and/or subdivision stage.

Access

The major accesses to the site will be from two points on Shannon Lake Road, limited access from the Shannon Woods Development and one access from the west connecting in the future to the Smith Creek area.

School District #23

There are four schools, two elementary, Shannon Lake Elementary and Rose Valley Elementary, one middle, Constable Neil Bruce and one secondary school, Mount Boucherie Senior Secondary in close proximity to the site. All of these schools have currently reached capacity or are over capacity. School District #23 has requested a 100+ student addition for Shannon Lake Elementary in the current Capital Plan submission to the Ministry of Education.

School District #23 has advised that a school site in the plan study area will not be required. New schools will not be constructed until the existing schools are expanded and the vacant Westlake Road and Smith Creek future elementary school properties are developed.



Emergency and Medical Services

The plan area is approximately 4km from Westbank with many private practice general practitioners, dentists and optometrists. The City of Kelowna, a major municipality, is approximately 12km from the study area and has a full service hospital and the Cancer Centre for the Southern Interior. There is full 911 Service to the study area as well as the surrounding area.

There is an ambulance station in the Westbank Town Centre and as well as at the Westbank Fire Hall with less than 7 minute response time. Depending on traffic, travel time to Kelowna General Hospital, a full service medical centre, would be approximately 12 – 15 minutes.

Police service, a sub-detachment of the R.C.M.P. is located in Westbank and is manned 24 hours per day. The response time the plan area is estimated to be approximately 7 minutes.



Site Analysis

Introduction

The Shannon Lake West plan area can be best described as a large tract of land separated by two prominent hills, the “Hoyer” hill and another hill along the Hoyer/Paynter property boundary.

Topography

The subject lands range in topography from flat and gently sloping to steeper areas along the perimeter of the study area. There are some portions of steep defined rock and talus slopes.

Slopes on the site range from 0-15% to 30 –70% on portions of the smaller knolls and ultimately to 85% on the side hills along the northern and west boundaries. The property rises from 520m above sea level to 840m in the north. Dominant slopes are located along the western edge of the site forming part of Carrot Mountain and slope southeast, broken by a series of benches and ridgelines.

With the recent adoption of Hillside development guidelines and more innovative road cross sections and building setbacks, it is anticipated that additional lands within the 30% slope range may be developed with more detailed site analyses and a custom designed architectural approach toward housing clusters and development nodes.

The predominant soils area have severe limitations that restrict the range of crops due both to soil composition and site elevation, including micro climatic limitations including north winds. For these reasons, and the lack of a reliable source of irrigation water, any active tree fruits, vineyards, nor soil bound agriculture have been pursued. It should be

noted that soil cover is limited as the land is predominately a rock base, with numerous shallow bedrock outcroppings.

Currently the site is fenced with barbed wire and has sporadic trails from both all terrain vehicles and motor-cross bikes. The previously disturbed agricultural sites are currently infested by invasive weeds, such as knapweed.

Slope Analysis is shown on Figure 5



Zoning

The entire Shannon Lake West plan area is predominately zoned A-1 (Agricultural) under the Regional District Zoning Bylaw #871. The lands directly to the north are identified as RR Rural Reserve, to the south, a mix of R-1 (Single Detached Housing) and A-1 (Agricultural). Lands to the West and East are zoned a mix of A-1 (Agricultural) P-1 (Park and Open Space) and R-1 (Single Detached Housing). The minimum parcel size of the A-1 (Agricultural) zone is 4 ha (10 acres) with agricultural and agri-tourism uses as the approved land uses within the zone.

Rezoning of the subject lands would be necessary in order to facilitate any further development on the subject lands.

Current zoning is shown on Figure 2.

Agricultural Land Reserve (ALR)

A large portion of the study area lands are currently within the Agricultural Land Reserve. Under Resolution #610/92 a total exclusion was denied, however, exclusion of approximately 48 ha (118.6 acres) would be permitted under the following conditions by Resolution #254/97:

- 1) public roads be dedicated in the configuration shown on the drawing accompanying Resolution # 254/97;
- 2) an application for inclusion of lands in the ALR per the drawing accompanying Resolution #254/97 with fencing of the ALR lands in accordance with Schedule D.3 or D.5 along with a triple row of trespass-inhibiting shrubs;

- 3) a plan detailing the concurrent provision of water to the development area for residential consumption and the remaining ALR area for irrigation;
- 4) installation of a cattle pass under the northwestern road;
- 5) fencing of the common boundary with the Provincial Forest

Through the development of this Concept Development Plan area, water will be provided to the ALR land boundary for use for irrigation purposes.

The southwestern portion of the site totaling approximately 33.4ha (82.34 acres) remains within the Land Reserve.

The Agricultural Land Commission requires a partial Schedule A.3 buffer along the northwest ALR boundary with either retention of the natural vegetation and addition of the Trespass Inhibiting signs for the remainder of the northwest boundary (see Resolution No. 254/97). Further conditions of final exclusion are itemized in Resolution No. 254/97 identified in the ALC letter of July 17, 1997 to Andrew and Winnifred Hoyer.

At the time of writing this Concept Development Plan no plans were underway for specific agricultural uses on the lands remaining within the Agricultural Land Reserve.

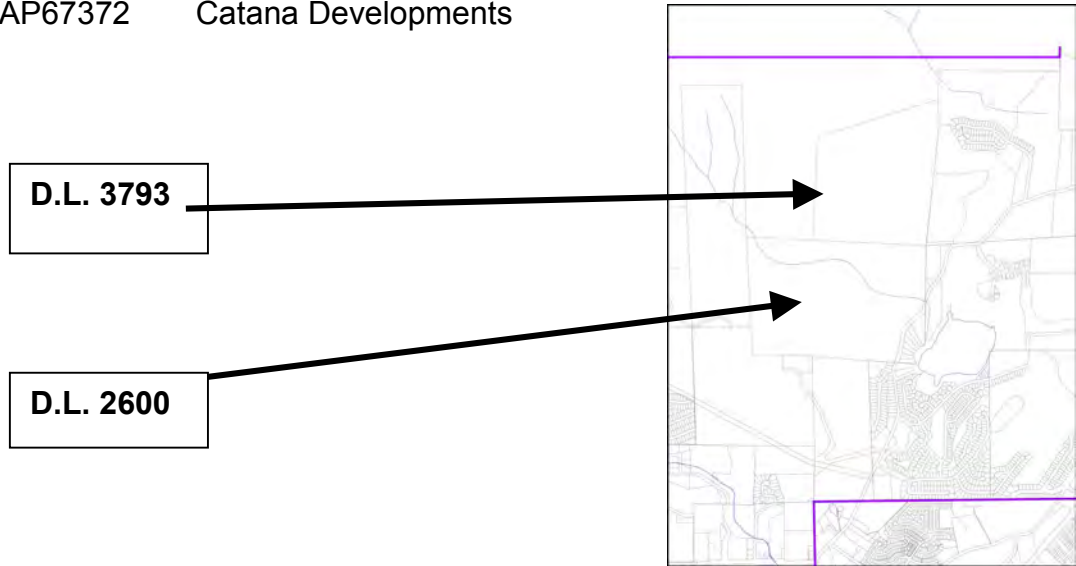
Existing Uses

The study area is currently undeveloped and vacant for the most part with the exception of a home site of 2.3 ha (5.68 acres) and a number of single family lots along Shannon Lake Road.

Ownership

The study area is comprised of seven separate parcels of land as shown on Figure 2. These parcels cover an area of approximately 164.31 ha (406 acres). Ownership of the parcels is shown below:

D.L. 3793	Winnifred Hoyer	66.70 ha (164.81 acres)
D.L. 2600	Winnifred Hoyer	88.35 ha (218.30 acres)
Lot A, Plan 23154	Barbara Marshall	2.60 ha (6.4 acres)
Lot B, Plan 23154	Roy Dawson	
Lot C, Plan 23154	Bauke Wiersema	2.25 ha (5.57 acres)
D.L. 2599	B.C. Hydro	1.0 ha (2.47 acres)
Lot A, Plan KAP67372	Catana Developments	



Planning Objectives

The unique valley and mountain setting of the Shannon Lake West Concept Development Plan area project allows for an easily identifiable physical natural setting only a few minutes from the Westbank Town Centre. The following general planning principles should be observed in the development of the Shannon Lake Concept Development Plan area:

- Acknowledge, respect and carefully integrate within the natural context, residential, recreational, institutional, and commercial facilities of which all residents will be proud.
- Minimize the impact of roads and infrastructure requirements through the implementation of the Regional District of Central Okanagan Hillside Development Policies.
- Design and building forms that compliment the natural landscape and character of the area will be encouraged.

Concept Development Plan Policies

The overall objective of the Shannon Lake West Concept Development Plan is to implement the policies of the Westside OCP.

The overall goals and objectives of a Concept Development Plan are to ensure for the orderly and timely provision of services and amenities to complement the evolution of a neighborhood that respects professional planning, landscape and engineering principles as well as Regional District policies as primarily expressed through the Official Community Plan in this instance, Westbank and Westside.

Agricultural Policies

- Support the development, improvement and expansion of agricultural activities.
- Ensure that neighboring urban land uses minimize negative impacts at the interface with agricultural land. This includes ensuring buffering in accordance with the Agricultural Land Commission guidelines are adhered to.
- Reduce the negative effects at the agricultural/urban interface.

Residential Land Use Policies

- Acknowledging the larger suburban lots and rural character of the surrounding lands, single family residential lots will maintain a variety of street frontages and lot depths.
- Sloped areas will be reviewed in context of the Hillside Development Guidelines and developed accordingly.

- Development is planned for predominately single and two- family residential with ability for cluster housing and multiple family areas if deemed feasible at time of development. Some development will be clustered in order to protect land difficult to develop.
- All development will connect to a community water and sewer system.
- Landscaping will be encouraged to be compatible with the natural environment of the surrounding area.
- The use of hillside development policies to minimize cut slopes, building footprints and road cross sections, thus lessening the public costs of street maintenance, storm management and pedestrian systems
- Encouraging a wide variety of cluster housing forms that will provide alternative housing for those residents that do not favor single family detached accommodations.



Open Space Planning Policies



- Protection of steep slopes is encouraged.
 - Actively promoting walking trails to interconnect neighborhoods, thus lessening demands of street sidewalks on all but collector roadways.
-
- Parkland to be provided in accordance with the Local Government Act in order to provide areas for recreation.
 - Minimizing building footprints, driveways and extensive landscaping in order to creatively integrate hillside cluster housing on sloped conditions.
 - Maximizing the amount of open space on the site as a passive and visual amenity and contrast to the built environment.



Servicing Infrastructure Policies

- All utilities and services are to be installed in accordance with Regional District of Central Okanagan Subdivision and Development Servicing Bylaw # 704.
- Utilize efficiencies of infrastructure design given the hillside elements of the site.
- Ensure all of the elements of servicing design will enable the efficient delivery of services to adjacent lands that will be developed in the future.
- 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 address road design and mitigate negative impacts to the area.
- The road network will be designed based on the primary function of the roads, with local roads being planned for site access.
- Cycle paths to be provided on all collector roadways.

Environmental Policies

- Environmentally Sensitive Areas as defined in the Environmental Report will be protected to the degree suggested in the report.
- ESA 1 areas to remain free of development unless otherwise approved by the Environmental Consultant, specifically collector road alignments
- Avoid designing trails and pathways in areas designated ESA 1 where possible

Land Use

The subject properties comprising the Shannon Lake West Concept Development Plan area have been ear-marked for residential development. The study area is planned for primarily single family residential with opportunities available for alternate housing forms including multiple family and cluster development. Open space forms a significant portion of the plan area.

Due to the close proximity of Westbank, there is little demand for commercial development in the study area.

The Westside Official Community Plan recognizes development in the plan area and requires preparation of a Concept Development Plan.

Land Use Concept

Residential

The Westside Official Community Plans for densities of approximately 10 – 20 units per hectare with the dominant housing form being single family detached residential. The Concept Development Plan suggests that majority of the housing will be detached single family with opportunities for cluster housing which allows for higher density or compact housing on smaller lots allowing for a range of types and affordability on the site. Potential proposed development areas are linked by connecting roads. . While the site is planned for predominately single family housing, in some areas capable of development, clustering the housing will allow for preservation of steeper slopes.

Land Use Plan Figure 8 demonstrates the proposed residential development areas consisting of 76.9 ha (190 acres). Approximately 33.4 ha (82.5 acres) are shown as ALR. These lands are and will remain, for the foreseeable future, within the Agricultural Land Reserve.

Consideration is being given to a variety of housing forms including single and two family, compact cluster housing and pockets of multiple family. Such forms will be determined based engineering opportunities and constraints.

As a result of increasing land and development costs (which put home ownership out of reach of many young families) and changing housing preferences with higher priorities placed on leisure activities the development will provide cluster housing choices. Hillside development clusters can be easily incorporated into the hillside condition with less impact upon the natural environment than conventional fee simple lots, yet at densities comparable and compatible with single family detached housing. The ability to integrate these housing forms is yet another attribute of the comprehensive development approach toward land use regulation in Shannon Lake West Concept Development Plan area.

Park Nodes

The Concept Development Plan currently plans for two neighborhood parks. Park one is located in the northwestern half of the plan area and is the larger of the two parks at an area of .89 ha (2.19 acres). The second neighborhood park is located to the west of the existing homesite and will be somewhat smaller than the northernmost park at .27 (.66 acres). Together these parks will total 1.16 ha (2.86 acres). In addition to these two parks an extensive combination of dedication and natural trails will exist in the plan area. A corridor running from the existing Shannon Lake residential area to the southeast of the concept plan area through the property to the northwest corner will form 3.9 ha (9.6 acres) of dedicated linear park.

Agriculture

This area of 33.4 ha (82.53 acres) is located in the southwestern corner of the plan area. It is within the ALR and to remain so. Through the development of this plan area, water will be brought to the boundary as a condition of exclusion of the remaining lands within the ALR.

The availability of irrigation to the property will allow for improved agricultural potential and at some point the site will need to be reviewed giving consideration to smaller agricultural operations and perhaps intensive agriculture. The landowner together with the Regional District can determine a suitable agricultural operation for the area given the availability of water, size of the parcel and proximity to urban development.

Home Site

This area is 2.3 ha (5.68 acres) and serves as the home site of the current landowners. No land use changes are planned or anticipated for this property.

Open Space

A large portion of the Concept Development Plan site is planned for Open Space. Approximately 50.4 ha (124.53 acres) is designated as open/green space. These areas were designated accordingly based on a number of factors including topography.

While there are pockets of flat and mildly sloping lands within the open space areas, they are predominately over 10% and upwards of 30% making residential and road development difficult. In addition, most of the open space areas, approximately 41.7 ha

(103 acres) are restricted from development as a result of the Environmental Assessment that was undertaken on the study area designated such areas as ESA 1.

It is anticipated that these areas will remain free from development but offer walking and hiking opportunities into, through and out of the development. Currently a number of natural trails weave their way from the northeastern corner of the plan area diagonally through to the southwest corner. This natural trail linkage provides an important link from the Shannon Woods development down to the Smith Creek Ranch area. It is planned that these trails will remain in their natural form and allow for the continued enjoyment of those who currently use them.

In addition to the existing natural trails, approximately 3.9 ha (9.63 acres) has been shown as a linear park trail system leading from the existing Shannon Lake residential areas located southeast of the plan area through the proposed new development to the open space/conservation areas.

Fine tuning of the trail locations and widths will be completed at the time of zoning and subdivision when final lot layouts are determined, however, area and location will remain in general accordance with the layouts shown in this plan document.

Parks and Open Space

Introduction

In consultation with RDCO park staff it was determined that the need for athletic and community park facilities were of low importance in the Shannon West CDP area due to the close proximity of the Smith Creek Wildhorse joint school and park site, the Kinsmen Athletic Park and the potential for the current landfill site to be decommissioned and developed as park.

RDCO park staff has recommended the park function be more towards neighborhood parks and linear trail systems. Figure 9 Sidewalks, Parks and Trails identifies two park locations and linear trail connections from the Shannon Lake Regional Park traversing through the site to an upper linear trail that runs southwest and northeast, connecting to the Shannon Woods neighborhood and upper Smith Creek neighborhood.

RDCO under Section 941 of the Local Government Act has the option of requiring 5% park dedication or cash in lieu. 5% of the Shannon West neighborhood development area 83.0 ha is 4.15 Ha (10.25 acres). The two neighborhood parks combined being approximately 1.16 Ha (2.86 acres) together with the 3.9 ha (9.63 acres) of the linear park will provide park area in excess of the required 5% dedication.

Park Classifications

Neighborhood Park

The Westside Parks and Master Plan (December 2000) recommends 0.8 ha neighborhood park for every 1000 people. In addition, the allocation of neighborhood parks should

reflect the character of the neighborhood and density of residential development. The Master Plan states that *“The location and distribution of neighborhood parks should be determined in part on the ability of a neighborhood resident to be within a 5 minute walk of a neighborhood park”*.

Linear Park

In addition to the existing natural trails, approximately 3.9 ha (9.63 acres) has been shown as a trail system leading from the existing Shannon Lake park areas located southeast of the plan area through the proposed new development to the open space/conservation areas. See Sidewalk, Parks and Trails plan – Figure 9

Open Space

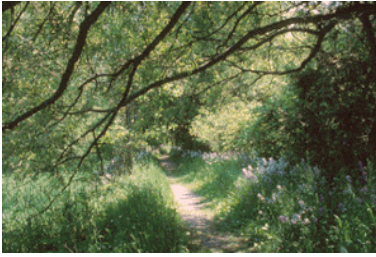
In addition to the park space, considerable areas within the study boundary will remain as Open Space. Lands where slopes are in excess of 30% or there are significant wildfire hazards or rock outcroppings will be left as open space. Open space in the plan area results in approximately 47.4 ha (117.12 acres).

Open space areas will be linked physically by either natural trails or pedestrian sidewalks to meet recreational hiking demands. These open spaces will be left in their natural state, subject to the provisions of the wildfire hazard assessment and the environmental recommendations.

Access to Crown Land which abuts the Study area will be specifically addressed at the time of subdivision through the Land Title Act requirement of Access to Lands Beyond.

Sidewalks, Parks and Trails are shown on Figure 9.

Open Space Planning Objectives



- Minimizing building footprints, driveways and extensive landscaping in order to creatively integrate hillside cluster housing on sloped conditions.

- Reducing the use of water consumption by utilization of xeriscape landscape conditions that complement the existing grassland condition.
- Development of a landscape manual to ensure that the form and character of maintained yards and open spaces utilize drought tolerant plant species and irrigation practices including possible limitations of open lawn areas.
- Using erosion control measures to minimize the potential impacts of construction upon the native landscape condition and immediate restoration of cut slopes through hydro-seeding programs with native grasses and wild flowers.
- Respecting the requirements of the Regional District of Central Okanagan Subdivision Servicing Bylaw to successfully integrate the surrounding open space system with this community.
- Maximizing the amount of open space on the site as a passive and visual amenity and contrast to the built environment.



Environmental, Geotechnical, Wildfire and Archaeology

Environmental

The study area lies within the Okanagan Valley in the rain shadow of the Coast and Cascade Mountains and contains some of the warmest and driest areas of the province. The study area is underlain with bedrock of the “Kitley Lake Formation”, soils comprised of this material are typically moderate to well drained, and medium textured.

Two intermittent water courses are found on the property and have been mapped under the Sensitive Habitat Inventory Mapping (SHIM) recently completed by the Regional District of the Westside. These two intermittent streams are most prominent as subsurface flows and would only be prevalent above ground during extreme rain events.

The subject lands are located in the Okanagan very dry hot Ponderosa Pine biogeoclimatic subzone variant (PPxh1) and Okanagan very dry hot Interior Douglas Fir biogeoclimatic subzone variant (IDFxh1).

Several Environmentally Sensitive Areas (ESAs) were found on the subject lands. These ESA's are shown and described in detail in the Environmental Report. The first type, ESA 1 demonstrates High Values and development should not occur within these areas unless mitigation promotes no net loss to the habitat. The second, ESA 2 demonstrates moderate values, if development is pursued in these areas portions of the habitat should be retained and integrated to maintain the contiguous nature of the landscape. The third type of ESA, ESA 3, states that impacts from development should be offset by habitat improvements in other natural areas found on the study area lands and the fourth and final type of ESA, ESA 4 is described as remaining areas deemed of no significant environmental value.

Figure 6 in the Environmental Assessment itemizes 11 Environmental Nodes. Specific recommendations for each of these nodes is identified on Page 23-24 of the attached Environmental Assessment.

The design of the Concept Development Plan area takes into consideration each of these 11 Environmental Nodes and complies with the requirements of these nodes.

Specifically, ESA 1 areas as identified on Figure 6 of the CDP are protected from impact completely with the exception of a small area where the proposed collector road connects with Shannon Lake Road. The location for this road was determined by both the Regional District and Agricultural Land Commission and felt to be integral for this development to tie in future development to the west of this subdivision. All roads within the development are sensitively designed in order to avoid degradation of ESA 1 areas.

The development has been planned to ensure that portions of habitat will be retained and integrated to maintain the contiguous nature of the landscape.

The following is an excerpt from the report regarding Environmental Nodes:

Environmental Nodes are designed where high values for Plant Communities and Wildlife groups (whether considered as individual groups or as a whole) coincide and were designated to address specific concerns where developmental conflicts may be anticipated in the ESA. Specific recommendations to these environmentally sensitive features within the subject property are addressed in the following as environmental nodes and correspond to figure 7 in the Environmental Report:

1. Overall rated as ESA 2 this node can be included for offsetting development in other ESA 2 areas as creating connectivity and contiguous areas between higher rated ESA areas and Shannon Lake. A minimum width recommended would be 30m.

2. Two nodes of varying ESA values found adjacent to Shannon Lake Road are banked wooded features. Preservation of these areas contributes to wildlife connectivity within the site and provides high visual value for the over all site from traffic along Shannon Lake Road.
3. Rated as ESA 2 this riparian area has been extensively fragmented historically and isolated currently by disturbed areas. It would be recommended this area be enhanced and efforts made to re-establish connectivity. Also, one of the few access points to the property is through this draw. It would be recommended if this area is lost to access corridors other areas can be enhanced and/or preserved in lieu.
4. This node has been established in prior Environmental Assessment development permit reporting as an integral part of the overall connectivity and preservation of forested sites of the Westside and should be maintained in this neighborhood concept plan.
5. Node five is at the upper most extent of a riparian feature found on the property and fragments a potential development node. This was most likely a natural connection to Johnson Spring area found further east on Shannon Lake Golf Course and now is separated by an eight foot chain link fence. We would support access through this area if enhancements and connectivity are undertaken elsewhere on the property.
6. A contiguous riparian feature found on the property and considered extremely sensitive in the Okanagan landscape is comprised of the cattail marsh and cottonwood community. We recommend buffering this feature with the proposed collector access, such as found in node 3 along the existing road. Also, across where proposed lots are adjacent to this feature a 7m buffer is recommended followed by a fence. Reconnection of the fragmented portions of this entire riparian area is desirable.
7. Heavily disturbed portions of the riparian community associated with nodes 5 and 6 are recommended access crossings for the proposed road network. These

crossing should be kept to a minimum and should also minimize the impact at the point of crossing with restoration of the riparian community in other portions of these nodes. As well include appropriate accommodation of reptile passage under the roads and between ESA areas.

8. This node is associated with a riparian crossing along the upper portion of the property. We recommend this proposed crossing be of minimal impact and mitigation measures incorporate appropriate reptile access.
9. Associated with the upper drainage of the Smith Creek Tributary, the proposed development concept has access through this node which we are recommending to minimize the access through this feature, and include preservation and enhancement to remaining areas of this feature, see node 11.
10. Found on the western property a portion of this proposed development node is within ESA1. We are recommending if development is pursued within this area lot density should be lower and include preservation and enhancement to remaining areas to provide “no net loss”; see node 11.
11. These nodes identify areas within the property which are suited to be recruited as enhancement areas for further preservation of natural features.

A full Environmental Site Assessment is attached as Appendix A.

Geotechnical

The property generally consists of coniferous trees and indigenous scrub brush and grasses. The soil conditions consist of a thin layer of organics, over either a layer of colluvium, talus and or glacial outwash sediments, all over bedrock. No evidence of any fill material was found anywhere on the property.

Numerous bedrock outcrops were noted on the site. The exposed bedrock is generally weathered and fractured. Slopes on the property range anywhere from 0% to 70% with the dominant slopes along the northern edge of the property sloping down from Carrot Mountain.

The permanent groundwater level is anticipated to be well below the existing ground surface, being near the level of Shannon Lake. Two intermittent water courses were noted on the property with the confluence of these two streams being a marsh wetland feature.

No obvious signs of landslides, slumps or other instability features were observed during the site review.

The only potential geotechnical hazards identified on the study area were the potential for rock fall hazards associated with the bedrock outcroppings and the steep slope areas.

Although rockfall hazards exist on the property, it is felt that only a small number of proposed residential lots would be impacted and that minor scaling, protective fencing and or soil/rock berms would provide protection against rockfall during development of the affected lots.

Specific recommendations are itemized in the Geotechnical Assessment attached to this document as Appendix B.

Wildlife Habitat

The diversity of ecosystems contained on the subject property and interconnections to surrounding landscapes supports a diverse range of wildlife species. Although only 36 species were identified during the site visits, it is well understood the potential of the habitat found on the property would support a variety of other species throughout the year.

Further discussion on wildlife can be reviewed in the Environmental Assessment – Appendix A.

Archaeological

An initial review of the Ministry of Sustainable Resource Management Remote Access to Archaeological Data (RAAD) does not indicate any significant archaeological sites in the Concept Development Plan area.

Initial feedback from the Province indicates that there are no concerns with the site.

There may however be a chance that the lot may contain previously unrecorded archaeological material that is protected under the Heritage Conservation Act. This would most likely be indicated by the presence of areas of dark stained soils containing conspicuous amounts of fire-stained or fire-broken rock, artifacts such as arrowheads and other stone tools, or even buried human remains. If such material is encountered during construction, it will be necessary to obtain a *Heritage Conservation Act* permit prior to further development.

Wildfire Hazard

The aspect of the property is predominately southeast however this varies around some of the small knolls that are located along the eastern portion of the property. Slopes range from 0-15% on three old agricultural fields, to 30-70% on portions of the small knolls, and over 85% on the side hills along the northern and western boundaries of the property.

Three old agricultural fields are presently covered in grasses and weeds. Ponderosa Pine regeneration and patchy brush is beginning to re-occupy the perimeters of these fields.

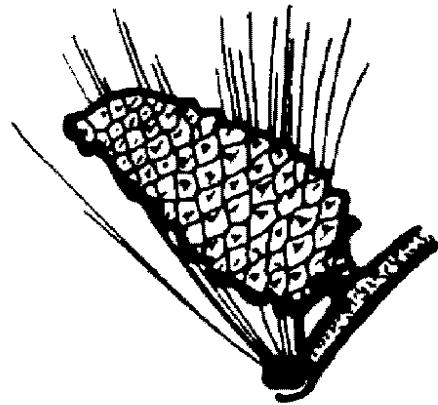
With the exception of a narrow band in the central-eastern portion of the property, the soils are generally well drained.

Fire history and agricultural clearing have left much of the property in the low to moderate range for wildfire hazard. These areas coincide with the development areas as they lie on the gentler slopes of the property.

In areas suitable for development, wildfire hazard will be reduced post-development through:

- ◆ Improved access
- ◆ Availability of water supply
- ◆ Brush and wild vegetation will be replaced with landscaping
- ◆ Public education will mitigate potential actions of residents that increase the risk of fire
- ◆ Built roads will act as fire breaks
- ◆ Development will result in reduced tree cover

Specific site review and hazard ratings as well as Recommendations can be reviewed in the Wildland/Urban Interface Assessment accompanying this report as Appendix C.



Considerations and Recommendations

Geotechnical

- Minor scaling, protective fencing and or soil / rock berms would provide protection against rock fall during development of the affected lots.
- To maintain the stability of homes constructed on rock outcrops, setbacks from the crest of the bedrock outcrops should be required.
- Blasted slopes in bedrock may be cut as steep as 0.25 (horizontal) to 1.0 (vertical).
- Blast rock fill slopes may be constructed as steep as 1.5 (horizontal) to 1.0 (vertical), using a facing of coarse angular blast rock material.
- All permanent soil fill and cut slopes should be no steeper than 2.0 (horizontal) to 1.0 (vertical). All permanent soil slopes should be re-vegetated to prevent erosion.
- Development on steep slopes, in excess of 30 percent, may potentially destabilize the natural slopes and would require a more detailed geotechnical assessment.
- All foundations be placed on either the undisturbed natural soil, sound bedrock, or engineered structural fill (i.e. avoid cut/fill transition pads, or footings half on bedrock and half on soil or fill).
- Foundations on engineered fill should be setback from the crest of a fill slope at the greater distance of either: 1) a distance of 3 metres, or; 2) a projected line of 2.0 (horizontal) to 1.0 (vertical) drawn up from the toe of the slope to the outside edge of the underside of the foundation.

- If it is required to raise the sub-grade beneath roadways or building lot areas, we recommend that structural fill material be used. Structural fill may consist of sound, un-weathered, blast rock fill material produced during excavation of the bedrock, or of any onsite or imported, clean, well graded sand and gravel material.
- Water collected from house down spouts, perimeter drains, patios, driveways, or other hard surfaces should not be allowed to accumulate against foundation walls or be concentrated and directed over slopes.
- The site layout should ensure that drainage is away from any proposed home. Minimum landscape gradients of 1.5 percent are recommended to reduce the risk of ponding in localized areas.
- Roof and perimeter drains can discharge into either the storm system (if acceptable), or the water may be allowed to disperse across the lot area (i.e. onto splash pads or into landscaped areas).

Environmental

- Minimize cut and fill slopes where possible utilize natural topography in the development design;
- Minimize the road construction, including crossing of gullies and natural corridors
- Designate “no disturb” areas prior to construction with flagging or temporary fencing;
- Hydro-seed disturbed sites shortly after construction, during appropriate times of the year to limit the potential for erosion and introduction of invasive weeds;

- Ensure construction activities are conducted at appropriate times of the year to avoid potential impacts to nesting and breeding wildlife;
- Habitat corridors should be incorporated into the development to provide access between significant ESAs and avoid fragmentation and alienation of habitat and species;
- Retain habitat trees where possible
- Replant and restore habitat areas only with native plant species;
- Works and water features should include comprehensive environmental monitor plans;
- Where possible design adequate buffers around ESAs
- Road crossings occurring on natural drainage or seepage sites will integrate measures to ensure the hydrological patterns are not altered to avoid impacts on riparian and wetland communities down slope.

Wildfire

- Fire hazard mitigation works will be required for those lots that are not entirely cleared. These areas can be more clearly defined once clearing limits are established for each lot.
- It should be the responsibility of the property owner to maintain his/her lot in a “fire safe” condition.

- Fire hazard mitigation works will be required for areas where residential development is not permitted, exceptions being those areas deemed too steep to safely carry out mitigation works or those areas where wildlife values take precedence.

Fire hazard mitigation works for these areas should include:

- Spacing all trees to at least 2 meters apart;
- Removing all clumps of immature coniferous trees (saplings less than 8 meters tall). Individual Ponderosa Pine saplings spaced at least 3 meters apart may remain;
- Pruning remaining trees to 2.5 meters above the ground to remove ladder fuels;
- Removing patchy heavy accumulations of fine and coarse woody debris; and
- Removing (or chipping and scattering) felled trees and pruning debris from the site.

Transportation

Road Network

The Shannon Lake West Concept Development Plan area is serviced by Shannon Lake Road which is designated as a “network road” in the OCP and by the Ministry of Transportation. Shannon Lake Road, a collector road, which runs south to downtown Westbank and east to Stevens Road in the Westside Industrial area and Bartley Road which connect to Okanagan Highway No. 97.

Shannon Lake Road provides two points of access into the future development areas of the plan. A previous study identified a road connection from the Smith Creek Ranch neighborhood through the Shannon West neighborhood to Shannon Lake Road. Either access points within the study area can provide for future connections.

Ward Consulting has reviewed both the connection possibilities as minor collectors only, however, the Regional District feels that in future development to the west of the plan area in the Smith Creek development will justify connection to one of these access roads and have deemed it a collector road. Right of way protection will occur in accordance with both the Regional District and Ministry of Transportation requirements.

Further more detailed traffic information is under separate cover from Ward Consulting Group.

Roads and their proposed classifications are shown on Figure 10.

Pedestrians

This plan recognizes the importance of pedestrian connections to and from the development area. Such areas connect adjacent neighborhoods, parkland and Crown land.

There are a variety of ways to ensure pedestrian connections are accommodated in developments. The Shannon Lake West Concept Development Plan aims to provide such connectivity both through open space trail opportunities and via constructed sidewalks through the development.

Transit

Currently transit exists along Shannon Lake Road which serves the existing area neighborhoods. Roads within the Shannon Lake West plan area will be designed to accommodate Transit if and when deemed necessary.

Servicing

Water

Water will be supplied by the Lakeview Irrigation District (L.I.D.). Application has been made to Lakeview Irrigation District and the Province of B.C. to have both D.L. 2600 and D.L. 3793 taken into the Lakeview Irrigation District boundaries. The 400 mm supply main on Shannon Lake Road will be extended to D.L. 2600 to service the areas lower than the 555 contour. The line will be looped through D.L. 2600 back down onto Shannon Lake Road and will be tied into Lakeview main on Shannon Lake Road which services the Shannon Lake subdivision.

The upper areas of D.L. 2600 and D.L. 3793 will be serviced from Shannon Woods Reservoir which is located at the 680 elevation. Joint discussions have taken place between the Lakeview Irrigation District and Westbank Irrigation District to interconnect through the development of D.L. 2600 and D.L. 3793 to the Smith Creek area.

Sanitary Sewer

The Westside area is serviced by 3 main trunk systems; East side trunk, the Glenrosa trunk and the Westbank trunk. The Westbank trunk services the town centre into which the Shannon Lake trunk discharges.

A comprehensive review has been completed to determine the capacities of these two trunks. The review compiled the peak flow capacity based on a peaking factor of 4. The analysis did not include infiltration as the total collection area is unknown. Based on the analysis the Shannon lake trunk at upper reaches can service a population of 4100 people. The capacity at Reece Road is 13,000 people and at Apollo 17,000 people.

Based on the analysis the trunk main to the plant has a capacity to service the Shannon West area as the projected population is 1,650 people. In the event the land currently within the Agricultural Land Reserve developed, that number would rise to a total of 2,400 people.

Specific design and main capacities will be dealt with at time of subdivision.

Groundwater Conditions

Henderson Environmental Consulting Ltd. carried out a preliminary groundwater investigation in the areas that were identified as water courses on the Provincial Shim Mapping. The two ravines in the plan area showed evidence of surface runoff in the areas indicated. Test pits 1, 2 and 3 in the area of the southwestern ravine revealed minor surface seepage; test pit 8 had no seepage. The balance of test pits 4, 5, 6 and 7 had no evidence of seepage.

A hydrology study will be undertaken at each phase of subdivision to determine downstream impacts as well as recommending methods for storm water management.

Shallow Utilities

Service to the area is available through

Electrical	-	B.C. Hydro
Telephone	-	Telus
Cable TV	-	Shaw Cable
Gas	-	Terasen Gas

It is proposed that all servicing will be installed underground.

All design and installation of the shallow utilities will be carried out to the standards and requirements of each utility company.

Fire Protection

Fire protection for all areas of the proposed development will be provided for through the proposed water system. Mains will be adequately sized in order to meet the flow requirements of the Westbank Irrigation District and the Regional District. Positioning of fire hydrants will be determined in consultation with the fire department at the time of subdivision.

Specific issues relating to wildfire are addressed in the attached Wildfire Hazard Assessment Report.

Implementation

Introduction

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 will require amendment in order to reflect the guidelines and recommendations of 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

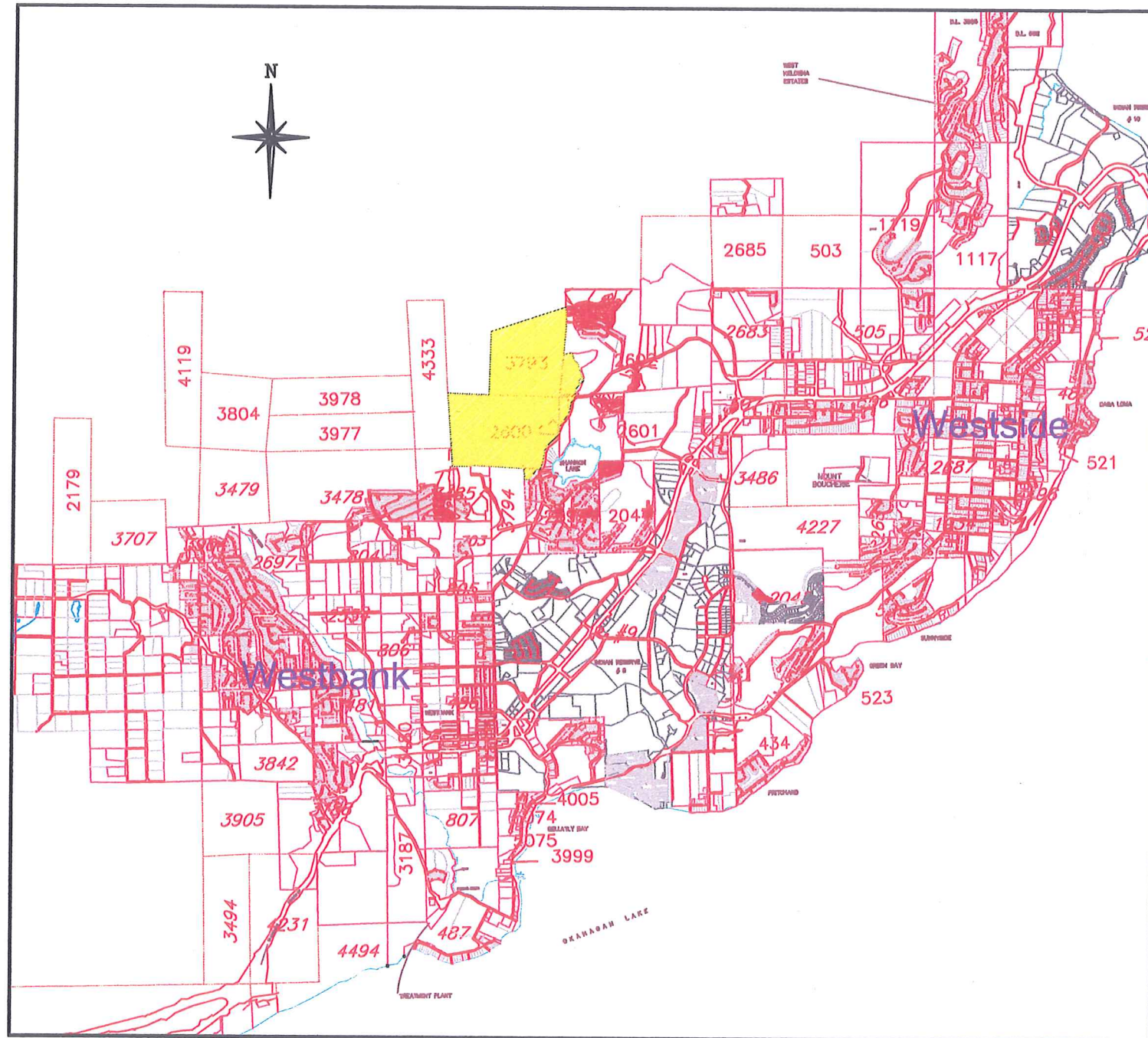
Applications for rezoning will be required in order for development to occur. Some areas can be regulated through the use of existing zones in the *Regional District of Central Okanagan Zoning Bylaw No. 871*, and in other areas it may be more appropriate to use a site-specific comprehensive development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

Subdivision

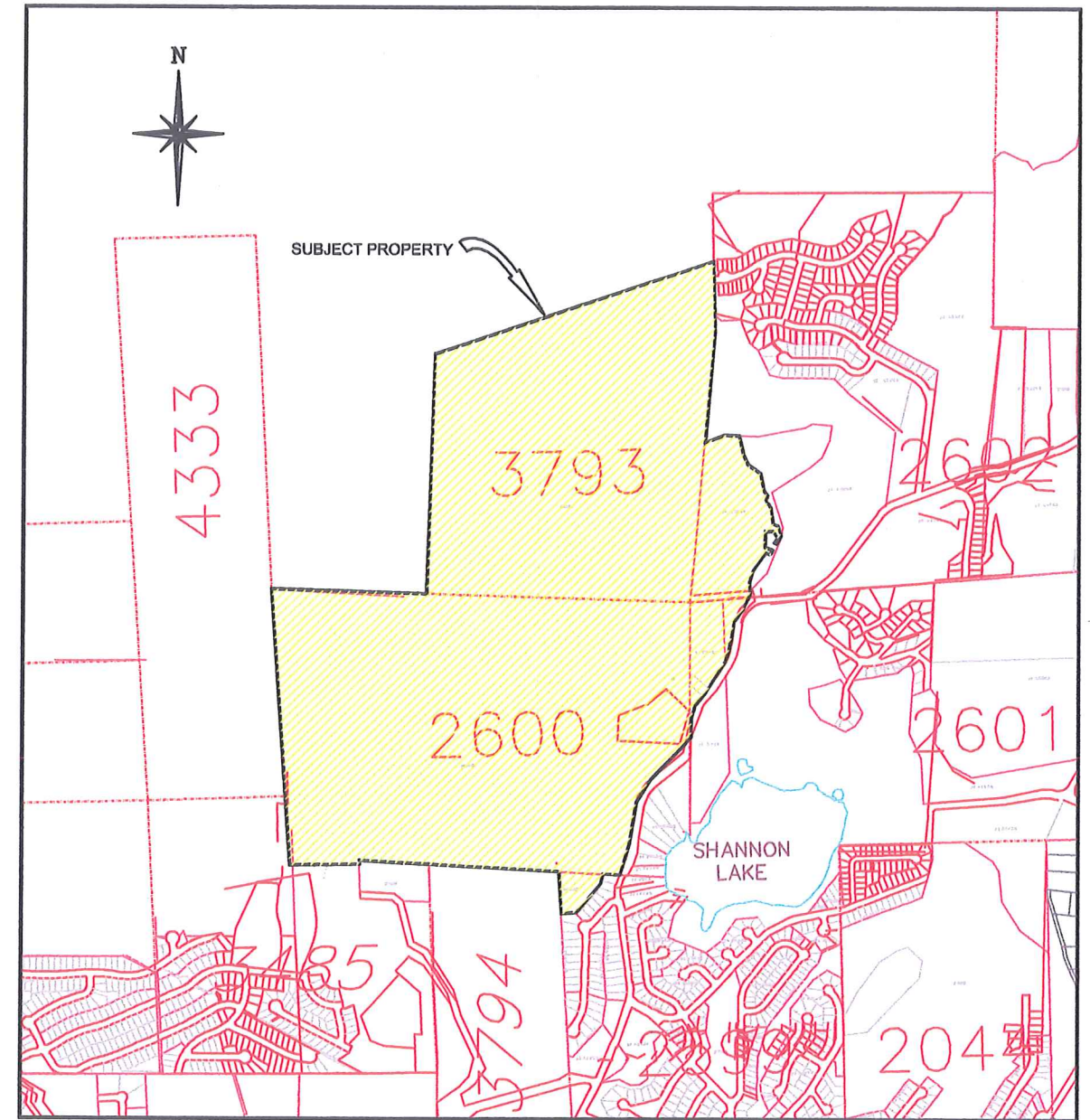
Subdivision applications will be required as the owners proceed with the development plans. The subdivision process will allow the Regional District, Ministry of Transportation and other affected agencies the opportunity to require specific technical requirements including road construction requirements 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.



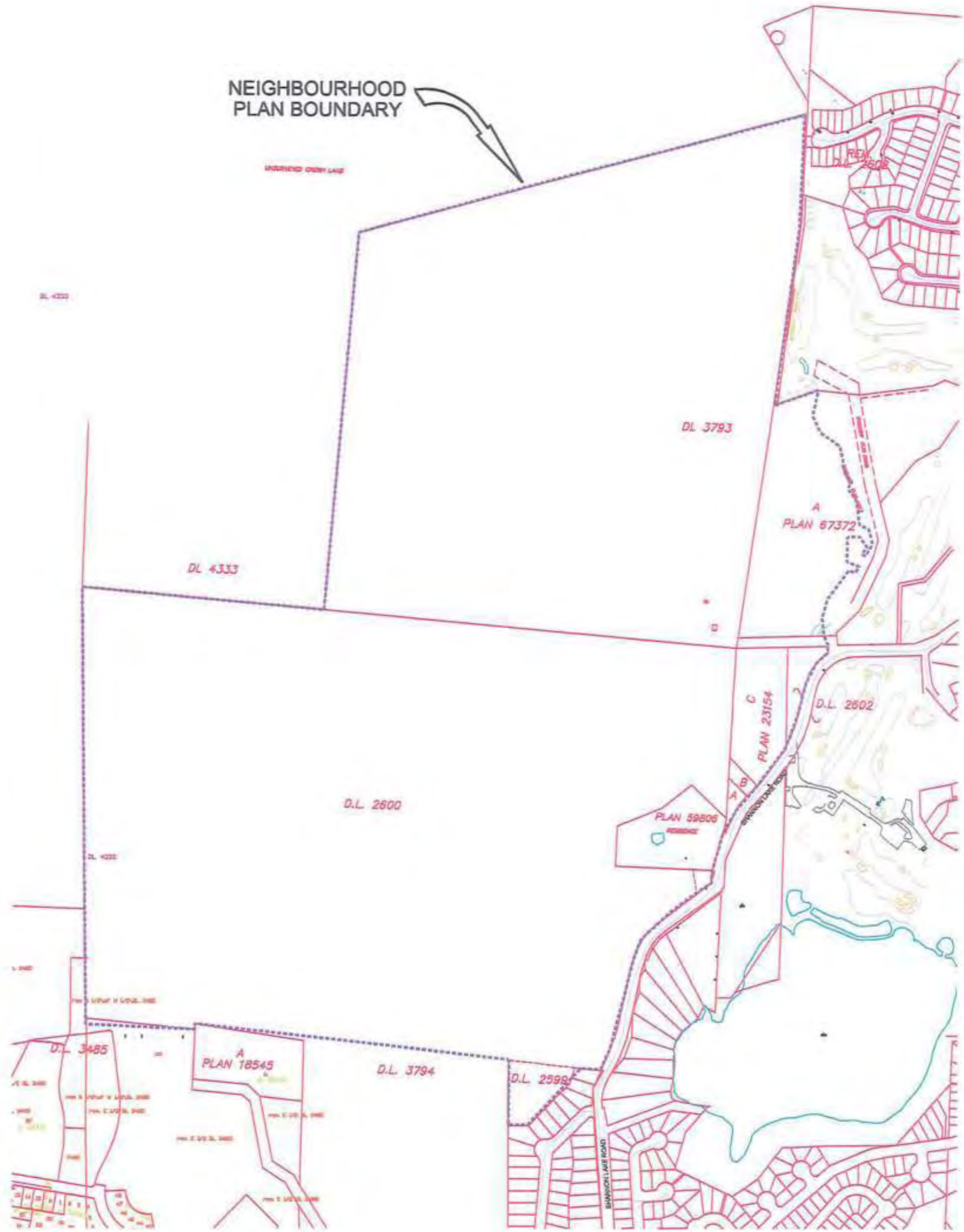
LOCATION PLAN
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AREA DETAIL PLAN
n/a

Shannon Lake West
Location / Context Plan

NEIGHBOURHOOD
PLAN BOUNDARY



1:7500

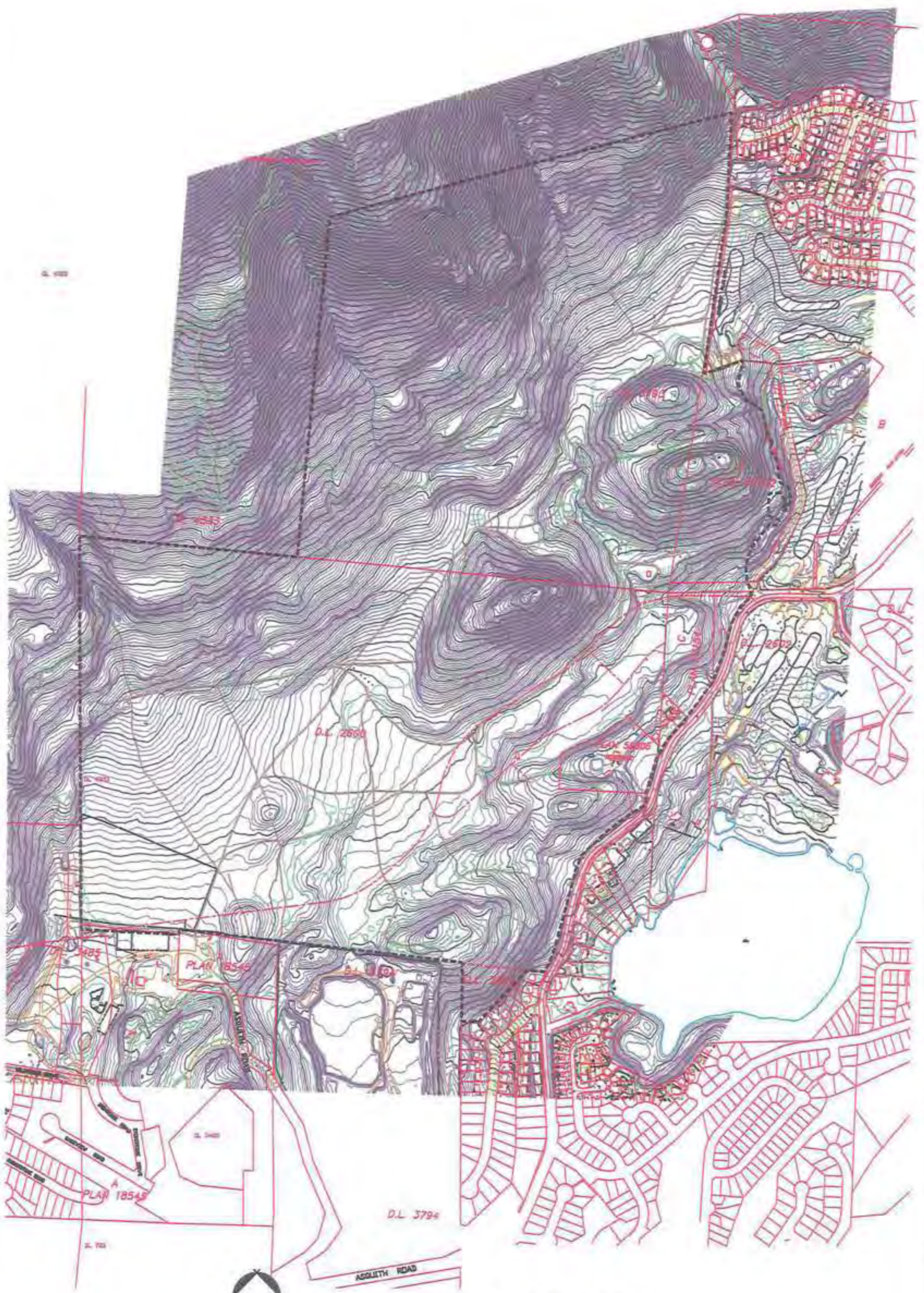
SHANNON LAKE WEST NEIGHBOURHOOD PLAN

BOUNDARY PLAN

PROTECH
CONSULTANTS LTD.
200-1448 St. Paul Street Kelowna, B.C.
PHONE 850-1771
FAX 850-1884

Fig. 3

Drawing No.: 0472-80Y

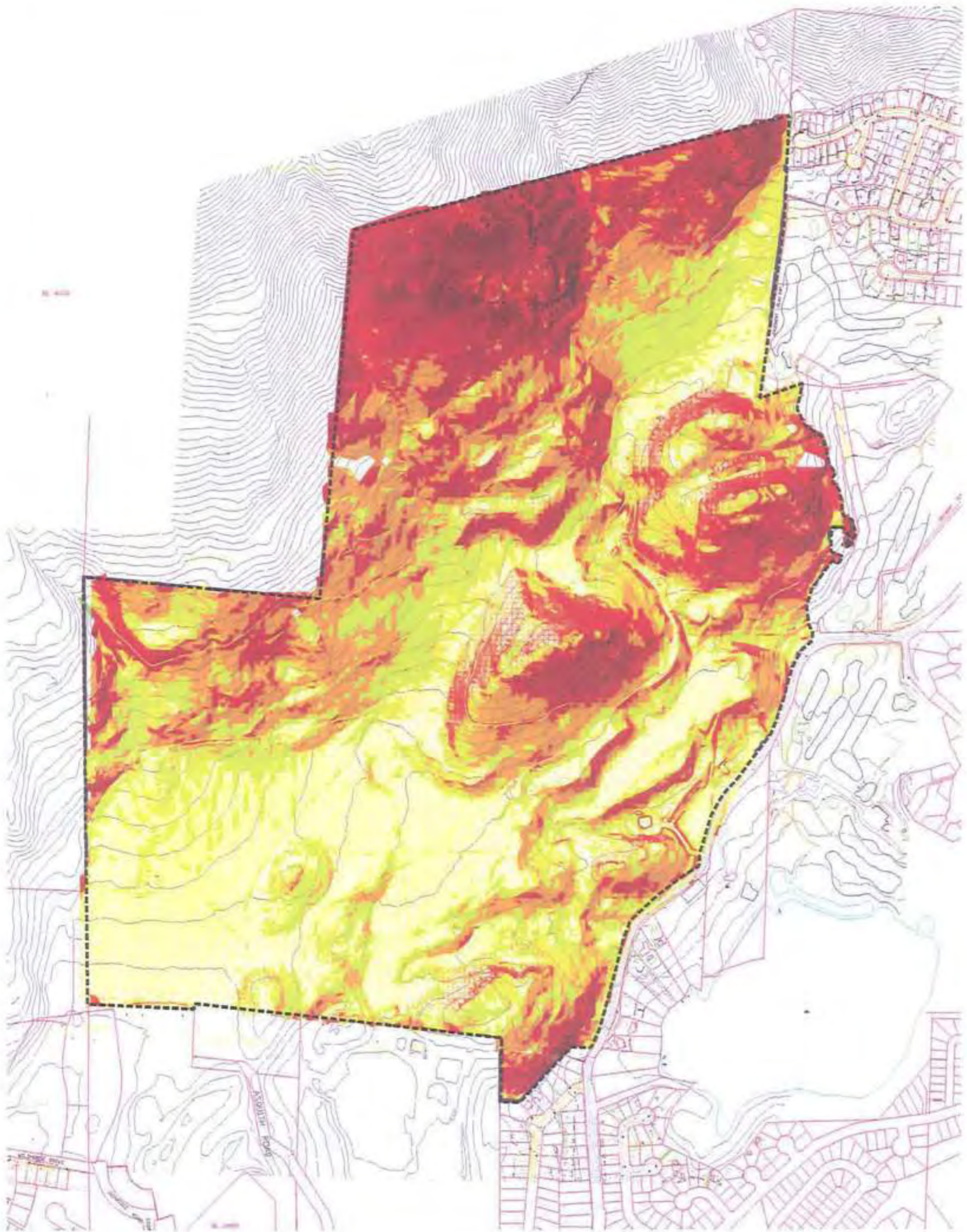


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 CONSULTANTS 1998 LTD.
 200-1440 St. Paul Street Kelowna, B.C.
 PHONE 800-1771
 FAX 800-1994

**SHANNON LAKE WEST
 NEIGHBOURHOOD PLAN
 TOPOGRAPHY/PHYSICAL FEATURES**

Fig. 4

2000-01-02-02



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

SHANNON LAKE WEST
NEIGHBOURHOOD PLAN

SLOPE ANALYSIS

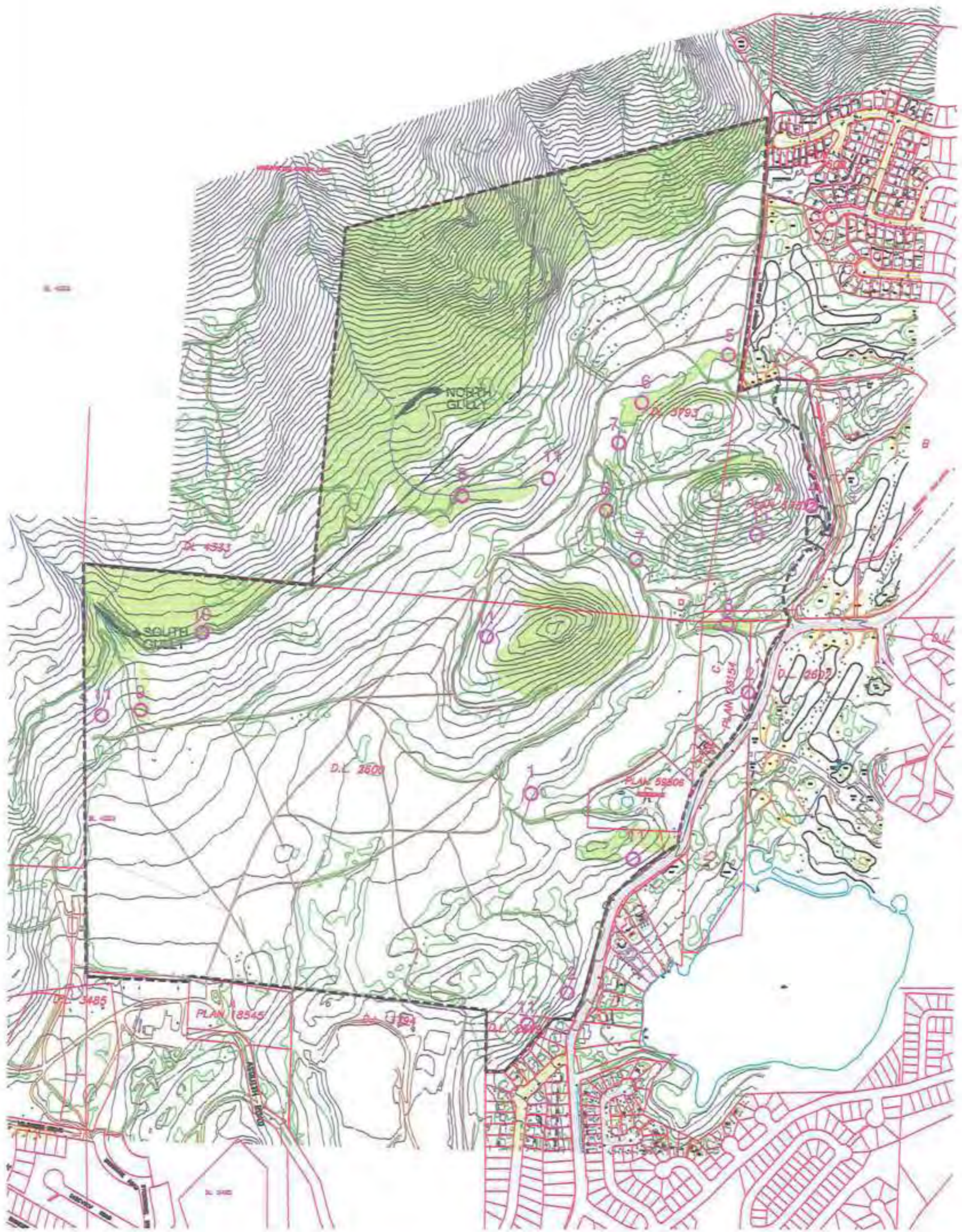


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PHONE 860-1771
FAX 860-1004

Fig. 5

Drawn by: MCH2-51



 ENVIRONMENTAL SENSITIVE AREAS

 ENVIRONMENTAL NODES



1:7,500

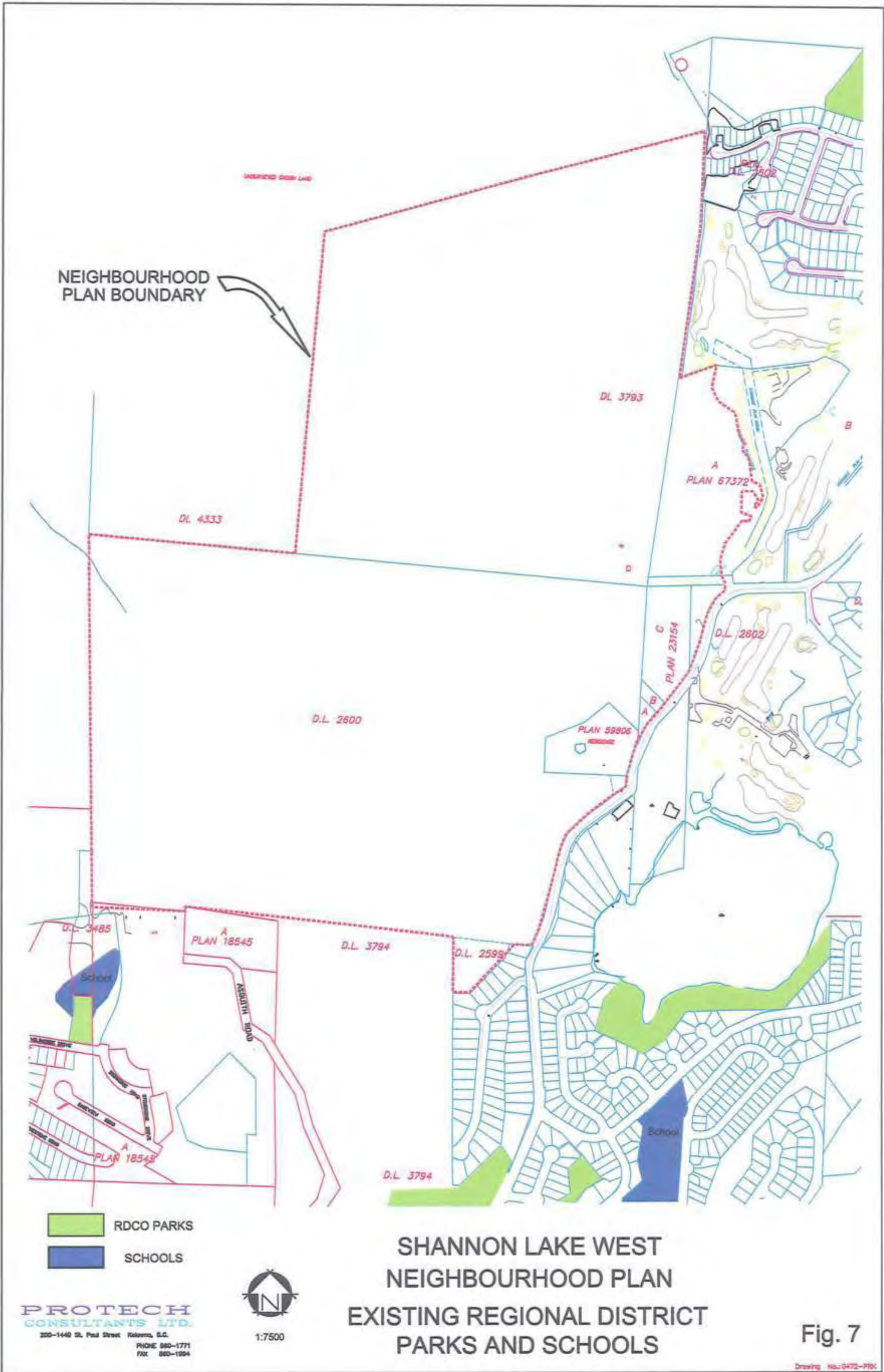
SHANNON LAKE WEST NEIGHBOURHOOD PLAN

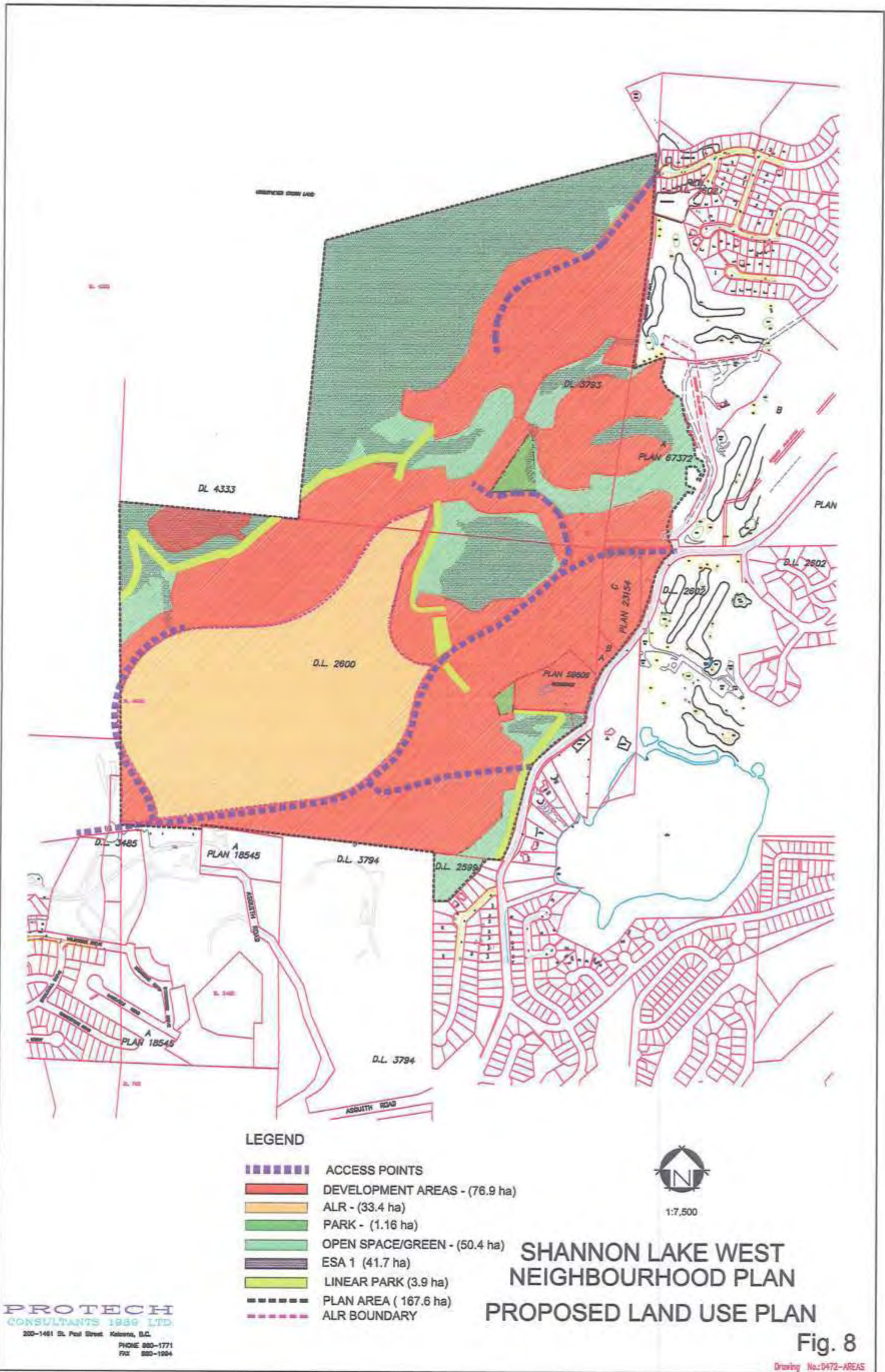
ENVIRONMENTAL SENSITIVE AREAS #1 & ENVIRONMENTAL NODES






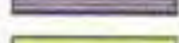



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FAX 250-1094

Fig. 6

Scale 1:7,500





- LEGEND**
-  ACCESS POINTS
 -  DEVELOPMENT AREAS - (76.9 ha)
 -  ALR - (33.4 ha)
 -  PARK - (1.16 ha)
 -  OPEN SPACE/GREEN - (50.4 ha)
 -  ESA 1 (41.7 ha)
 -  LINEAR PARK (3.9 ha)
 -  PLAN AREA (167.6 ha)
 -  ALR BOUNDARY



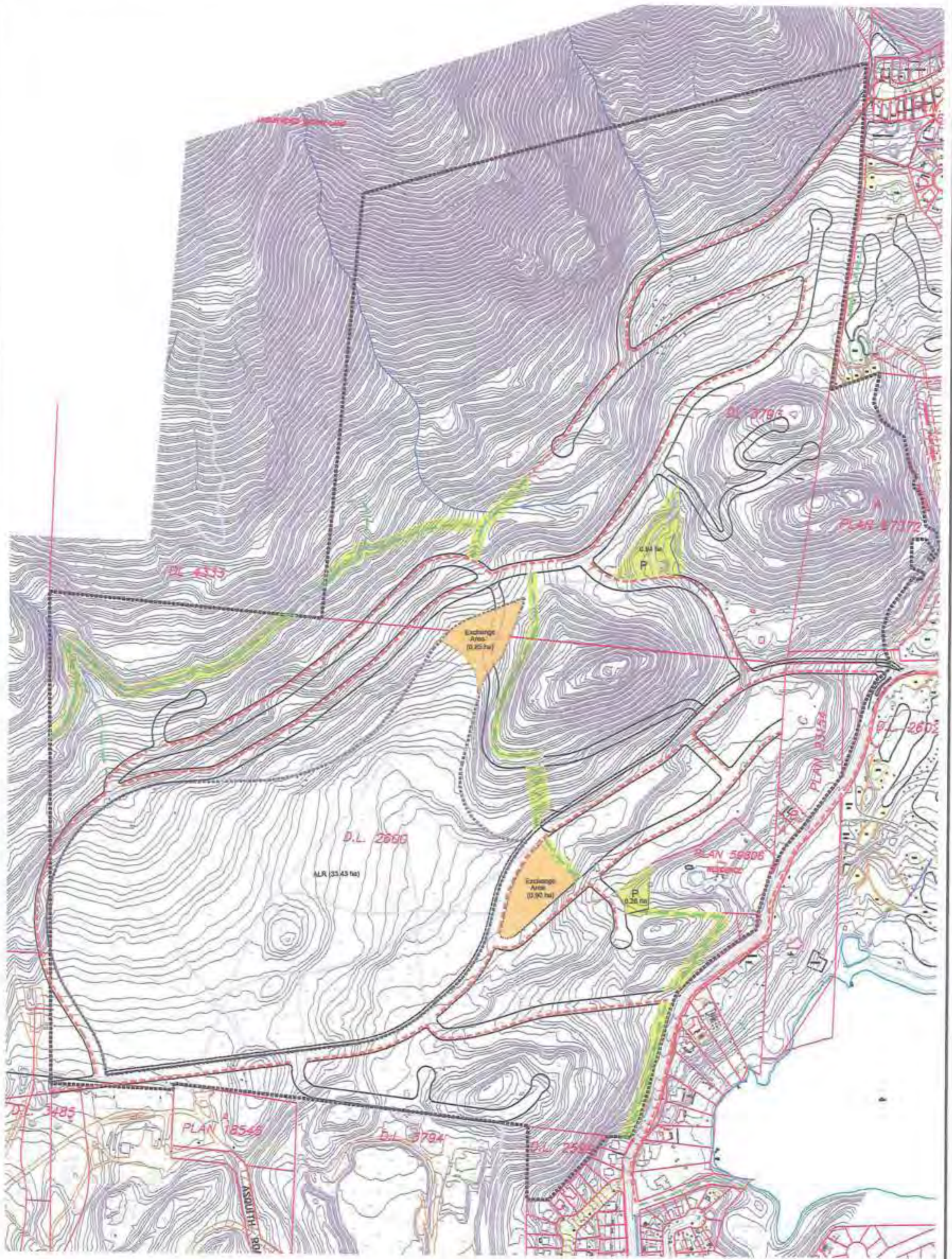
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**SHANNON LAKE WEST
NEIGHBOURHOOD PLAN
PROPOSED LAND USE PLAN**

Fig. 8

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Drawing No: D472-AREAS



-  FUTURE SIDEWALKS
-  PARK AREA - TRAILS (4.62 ha)
-  NEIGHBOURHOOD PARKS (0.92 ha)







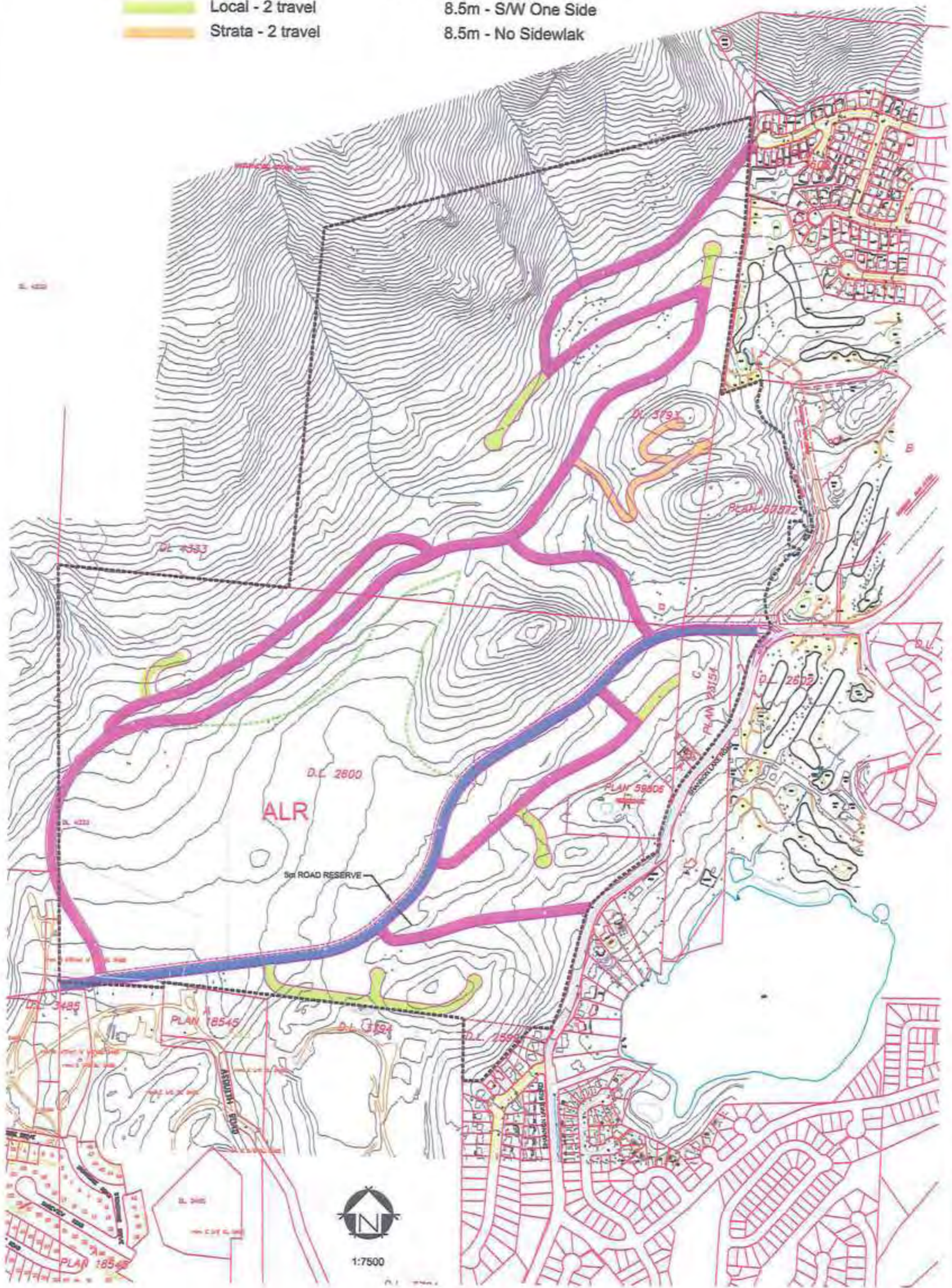
1:2000

SHANNON LAKE WEST
SIDEWALKS, PARKS AND TRAILS

Fig. 9

LEGEND

- | | | |
|---|----------------------------------|------------------------|
|  | Collector - 2 travel - 2 parking | 12.3m - S/W Both Sides |
|  | Local - 2 travel - 1 parking | 10.1m - S/W One Side |
|  | Local - 2 travel | 8.5m - S/W One Side |
|  | Strata - 2 travel | 8.5m - No Sidewlak |



**SHANNON LAKE WEST
NEIGHBOURHOOD PLAN
PROPOSED ROAD NETWORK/CLASSIFICATION** Fig. 10

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FAX 880-1084

Drawing No.: 0472-RDS

**Shannon Lake West
(Hoyer Property)
Neighborhood Plan
Environmental Assessment**

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August 18, 2005



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1.0 INTRODUCTION

This report has been prepared for Protech Consultants Ltd the lead consultant in the Shannon Lake West Neighborhood Plan, also been identified and known to local residents as the Hoyer property. Outlined in the Westbank Official Community Plan Bylaw No. 686, 1998 a Neighbourhood Plan is intended to address specific land use issues and provide a framework to guide development.

The emphasis of this report is to identify environmental values and assess impacts, propose re-mediation and mitigation for the property located in Westbank (Figure 1): District Lot 3793, Osoyoos Division of Yale Land District, District Lot 2600, Osoyoos Division of Yale Land District. The property is situated within the Westbank Official Community plan (Bylaw No. 686, 1998), and Environmentally Sensitive Development Permit Area which we will refer to as the Hoyer property. A large part (38ha and 22%) of the property is currently in the Agricultural Land Reserve. The entire Hoyer Property, and most of the Shannon Lake West Neighbourhood Plan area, has been designated a Level 2 Environmentally Sensitive Area (ESA) Development Permit Area, as shown in Schedule H of the Westbank Official Community Plan Bylaw No. 686, 1998. The prominent hills and rock outcrops within the area have been further delineated in Schedule H as Level 1 ESA Development Permit Areas.

The Westbank OCP states the objectives for these ESA areas are to protect them from degradation, development and other negative impacts, and to encourage rehabilitation, restoration, and enhancement of ESAs that have been subject to negative impacts in the past, as well as to prevent development on areas subject to hazardous conditions. The Westbank OCP then spells out 29 policies by which this might be achieved.

The extent of the subject property is approximately 170 hectares and is located in the Shannon Lake West Neighborhood. The subject property lies to the north - west of Shannon Lake, surrounded by residential community along the eastern portions, and Shannon Lake Golf Course to the east of the property. Asquith Road Landfill is adjacent along the southern property extent and natural features are found along the northern and western portions of the property.

Makonis Consulting (Makonis), I.C. Ramsay & Associates (Ramsay) were retained by Protech Consultants Ltd to complete an Environmental Assessment on the property as per Policy 11 of the Westbank OCP (Section 13.4., 1998). Further consultation included Okanagan Wildlife Consulting directing specifics toward wildlife habitat and values occurring in the area. The following report describes the environmental values within the development site, identifies impacts resulting from the proposed development, and subsequently provides impact mitigation and remedial recommendations. An assessment of hazardous conditions will not be the subject of this assessment.

1.1 OBJECTIVES

Based on the review of the property, the scope of the proposed concept development plan, and the Regional District of Central Okanagan requirements, the objectives of this assessment are to:

1. Identify the physical and biological aspects of the subject property, and determine the existence and extent of any Environmentally Sensitive Areas to refine the OCP generalized maps of ESA areas with refined ecosystem mapping.
2. Identify environmental impacts to streams, vegetation and plant communities, and to wildlife as a result of the potential future developments.
3. Provide recommendations for impact mitigation during construction and residential occupation as per the policies of the Westbank OCP.

2.0 ENVIRONMENTAL INVENTORY

We completed this environmental inventory, and conducted a review of current information pertaining to the subject property and surrounding areas, including a review of photos and reports. Late edition digital orthophotographs were interpreted against the surrounding landscape, existing ecosystem inventories and subsequent site visits were conducted to confirm and identify plant communities and recent changes. We followed standard Provincial protocols and standards for sampling methodology according to Describing Ecosystems in the Field (RIC 1998), Rare Ecosystem Mapping (RIC 1999) and Terrestrial Ecosystem Mapping (RIC 1998). Vegetation and ecosystem delineation was completed by John Grods of Makonis Consulting and wildlife inventory and assessments were undertaken by Les Gyug of Okanagan Wildlife Consulting.

The unique ecosystem of the Okanagan Valley within Canada originates from the most northerly extent of the Dry Ecodomain extending from Mexico north to Canada. The commonly recognized climates are arid desert and semiarid steppe within the Great Basin from Mexico to Canada. The subject area is represented as Semi-Arid Steppe Highland Ecodivision occurring on the leeward side of the Coast and Cascade mountains. Winters are cold and the summers are warm to hot. Coniferous tree species in the upper valleys and basins are typically Ponderosa pine or Douglas-fir; while the lower Okanagan valley is typically vegetated with Bluebunch wheatgrass and sage. Generally, this is a region of relatively low relief characterized by rolling hills. Large portions of the Thompson Plateau, for example, undulate only a few hundred feet over wide areas.

The Hoyer property is a contiguous natural feature with the higher elevation forests of the Thompson Plateau and represents a significant corridor feature for the Westside.

2.1 PHYSICAL RESOURCES

2.1.1 Topography

The Hoyer property is approximately 170 hectares consisting of gentle to steeply sloped tills and portions of steeply defined rock and talus slopes. It is situated between Shannon Lake Golf Course to the east, natural features to the north and west. The property rises from 520m above sea level in the south-east, to an elevation of 840m in the north. Dominant

slopes are found along the western edge associated with Carrot Mountain and slope south-east, broken by a series of benches, scarps and ridgelines. Slopes found within the development area ranged from 0 % to greater than 70%. Two prominent hills are associated with the property, one referred to as the Hoyer hill rises to an elevation of 630m, while the second hill is shared with the adjoining property to the east is associated with the Paynter property, rises 625m in elevation.

A significant portion of the property has been cultivated in the past and now lies fallow. The areas of focus for proposed development are situated on these lower portions of the property below 630m. The main access to the future development property is proposed from the south of the property from Shannon Lake Road.

2.1.2 Climate

The development area lies within the Okanagan Valley in the rain shadow of the Coast and Cascade Mountains, and contains some of the warmest and driest areas of the province. The Okanagan is characterized as a continental climate of long warm dry growing seasons, and cool winters with moderate snowfall (Lloyd et al. 1990). Air moving into the area generally loses most of its moisture on the west facing slopes of the coastal mountains. There are occasional eruptions of hot dry air from the Great Basin extending from Mexico to Canada to the south, which in the summer, bring clear skies and very warm temperatures; similar to the weather conditions that the region experienced this past summer, 2003. In winter and early spring there are frequent outbreaks of cold, dense, arctic air for there is no effective barrier in the north.

Warmest temperatures of the area recorded in July and August with an average a daily range of 12 to 17 °C. Daily temperatures may drop below zero for five months of the year, with coldest average daily minimum temperatures of -9.5 °C occurring in January. Precipitation predominantly falls as rain with highest rainfalls generally occurring in the growing season months of May, June, July, August and September. The yearly average precipitation for this area is 400 mm. Rainfalls range from a high of 245 mm in the growing season to a low of 150 mm in winter as snowfall. Heaviest snowfalls are in December and January with average yearly depths of 130 cm, contributing as much as 15 - 40% of available precipitation in some years. Frosts are common in this area throughout May and then again in late fall (Meidinger and Pojar 1991; Lloyd et al. 1990).

2.1.3 Surface Geology

The development area lies within the Okanagan Valley and, therefore, is underlain with bedrock of the "Kitley Lake Formation" which formed some 50 million years ago, extending as a finger east of Rose Valley Lake fault terminating at Bear Creek Area (Roed, 1995). This formation consists of massive trachyte and trachyandesite lava flows of light coloured finely grained igneous rock (Roed, 1995). This bedrock, which forms the soil parent materials, is comprised of alkali feldspars and is generally moderate to nutrient rich due to the abundance of basic elements found in the minerals (Luttmerding et al, 1990). Soils comprised of this material are typically moderate to well drained, and medium textured.

Re-worked by the most recent glaciation's processes, some 10,000 years ago, the bedrock is smoothed by the advance and retreat of the "Fraser Glacier lobe" along the Okanagan Valley in a north – south direction (Roed, 1995). Resulting in gentler slope conditions found

on the property where deep pockets of morainal and glacial fluvial tills have accumulated since deglaciation.

2.1.4 Hydrology

Three intermittent water courses are found on the property and have been mapped under the Sensitive Habitat Inventory Mapping (SHIM), recently completed by RDCO for the Westside. Where definable areas of the water course for these features could not be identified on the ground, SHIM protocols revert to photo interpreted Terrestrial Resource Inventory Mapping, or TRIM, (1:20,000) blue line features derived in the 1970's with little or no ground truthing.

Two intermittent streams found in the northern portions of the property are most prominent as subsurface flows and only would be prevalent above ground during extreme deposition events. They originate from gullied draws on Carrot Mountain and the directions of these features are lost as they come into the lower sloped areas of the property. We believe the confluence of these two intermittent streams is a prominent marsh wetland situated mid property and returns subsurface as it drains toward Shannon Lake.

The third intermittent stream is found straddling the southern portion of the property and is also most prominent as subsurface flow. Similar to the situation described above, the drainage pattern of this feature is lost once it exits the steeper slopes of Carrot Mountain and is believed to drain into Smith Creek to the south.

Other catchments areas of the property would be in the form of atmospheric deposition, rapidly becoming subsurface runoff prior to reaching any creeks or lakes. Site drainage will flow into existing catchments entering Smith Creek or Shannon Lake. Shannon Lake is approximately 200 meters to the south-east of the subject property and reportedly contains bass and perch and is surrounded by RDCO park, landowners and the Shannon Lake Golf Course.

2.2 BIOLOGICAL RESOURCES

2.2.1 Flora

Background

Climate, topography and surface geology impact the site hydrology, which in turn influences the biological resources on site. This ecological principle is fundamental in most Ecological Landscape Classifications. Our vegetation assessment utilizes the "Biogeoclimatic Ecosystem Classification" (BEC), and is used extensively throughout British Columbia to report and describe terrestrial ecosystems. This ecological classification system enables biologists, foresters, resource managers, planners and the other stakeholders to use a common framework and currency for exchanging fundamental knowledge. In the BEC system, climate is the most significant determinant of ecosystems; influencing the soil characteristic, which in turn influence the climax vegetation composition and structure. More about this classification system can be obtained from the following website:

<http://www.for.gov.bc.ca/hre/becweb/aboutbec/aboutbec-system-veg.htm>

The subject property is located in the Okanagan very dry hot Ponderosa Pine biogeoclimatic subzone variant (PPxh1) and Okanagan very dry hot Interior Douglas-fir biogeoclimatic subzone variant (IDFxh1), occurring at lower elevations along the bottom of the Okanagan Valley (Meidinger and Pojar 1991). The area is characterized as one of the warmest and driest forested variants for this subzone in British Columbia, due to its' southerly latitude (Lloyd et al 1990), and the pronounced rain shadow.

Ecosystems of the PPxh1 classification system are a result of the distinct "sub-climatic" plant association for a site consisting of the unique sequence of bioterrain and climate conditions under the influence of repetitive fires, also known as fire adaptive ecosystems. Natural vegetation communities typical of this subzone have adapted to frequent fires (<10 year intervals) as an important and necessary ecological precursor for the "park-like" mosaic of forest and grasslands. Natural vegetation climax, or old growth, conditions of Douglas-fir forests are almost never achieved under natural settings within the Okanagan and remain in a "sub-climatic" ecological position.

A complete list of current provincial ecosystems, including anthropogenic, sparsely and non-vegetated ecosystems can be found on the MSRM website:

<http://srmwww.gov.bc.ca/risc/pubs/teecolo/index.htm>

Since the early part of the century, fire suppression has been a major factor in changes to the landscape in the central Okanagan (Iverson and Cadrin 2003, Makonis 2004). This suppression has allowed the natural "*sub-climatic*" conditions to gradually succumb to Douglas-fir dominated forests with higher biomass. Fires that have resulted have been catastrophic in ecosystem stand and structure, (Mt Boucherie fire of the late 1980's and the Okanagan Mountain Park Fire, 2003) due to the increased build up of fine and coarse woody debris and inclusion of shrubs. As well, ecosystems under continued suppression face the threat of encroachment by other invading species, including noxious weeds. Other less apparent consequences of fire reduction in fire adaptive ecosystems have been a dramatic decrease in biodiversity; including many red and blue listed species, change in soil processes and dynamics and overall decline in ecosystem health (Makonis 2004).

In British Columbia, resource managers have advocated Terrestrial Ecosystem Mapping (TEM) as a means to establish natural resource baseline inventories for planning and managing purposes. The emphasis of these ecological inventories and mapping initiatives was to not only capture a baseline of existing ecosystems, but also to lay the precursors for a host of interpretive products such as the Sensitive Ecosystem Inventory, Wildlife Habitat Inventories and other planning activities. Furthermore, these databases are to be used by stakeholders to provide guidance for the public, private sectors and all levels of government regarding conservation and management at meaningful scales.

Reporting inventories for the subject property followed these general provincial guidelines, so the Regional District of Central Okanagan can not only evaluate the merits of this project within its own jurisdiction, but across a regional and provincial context. Further TEM inventory descriptions and methods can be referred to:

<http://srmwww.gov.bc.ca/ecology/tem/index.html>.

General Features

Subject property covers approximately 170 hectares and photo interpretation and site visitations established baseline TEM polygons, representing ecosystems found across the entire property. Each plant association, or ecosystem, has a listing of potential species used in assisting identification of ecosystems when in the field; although proper identification of an ecosystem is based on the actual site features based predominantly soil characteristics reflective of the climatic influences (Lloyd et al 1990).

Our field assessment followed provincial methodology for data collection of ecosystems outlined in Field Manual for Describing Terrestrial Ecosystems (RIC 1998), also referred to as the DEIF manual, and "Ground Inspection Forms" (GIF), used frequently in inventory mapping and ecological assessments.

In general, plants encountered on existing natural features of the Hoyer property were typical given the dry rock and forested conditions of the area. The following section summarizes the ecosystems found:

Okanagan very dry hot Ponderosa Pine biogeoclimatic subzone variant (PPxh1)

- PPxh1 **PW** / 01: Ponderosa pine – Bluebunch wheatgrass – Idaho Fescue

This natural forested ecosystem was vegetated with mature Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsug menziesii* var. *glauca*) in the overstorey. Shrub layer species included saskatoon (*Amelanchier alnifolia*), common snowberry (*Symphoricarpos albus*), birch-leaved spirea (*Spiraea betulifolia*) and nootka rose (*Rosa nutkana*). Herbs present in this ecosystem included pinegrass (*Calamagrostis rubescens*), arrow-leaved balsam root (*Balsamorhiza sagittata*), cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*), Poa spp., Idaho fescue (*Festuca idahoensis*), lemon weed (*Lithospermum ruderale*), and junegrass (*Koeleria macrantha*). Limited amounts of *Dicranum* spp. were present as the moss layer.

These natural features are found along the lower, toe – slope positions of the property and represent a large component of the remaining contiguous forest. Covering an estimated 27.6 hectares of the 170 hectare property, or 18% the extent of this ecosystem provides high value for ecosystem connectivity.

- PPxh1 **PC** / 04: Ponderosa pine – Bluebunch wheatgrass – Cheatgrass

This natural forested ecosystem was restricted to the lower and mid slopes of the subject property. These portions of property were vegetated with mature Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsug menziesii* var. *glauca*) in the overstorey. The open shrub under story contained snowberry (*Symphoricarpos albus*), tall oregon-grape (*Mahonia aquifolium*), saskatoon (*Amelanchier alnifolia*), blue elderberry (*Sambucus caerulea*), prickly rose (*Rosa acicularis*), red osier dogwood (*Cornus stolonifera*) and sumac (*Rhus glabra*). The herb layer were components of blue bunch wheatgrass (*Agropyron spicatum*), arrow leaved balsamroot (*Balsamorhiza sagittata*), timber milk vetch (*Astragalus miser*), lemonweed (*Lithospermum ruderale*), cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*), sticky cinquefoil (*Potentilla glandulosa*), silverleaf phacelia (*Phacelia hastata*),

toadflax (*Lineria genistifolia*), pasture sage (*Artemisia frigida*), fern leaved desert parsley (*Lomatium dissectum*), and diffuse knapweed (*Centaurea diffusa*).

Typically associated with the lower slope position of the property this ecosystem covers an estimated 26 hectares (17%) of the property, also providing high connectivity values.

- PPxh1 **PT** / 02: Ponderosa pine – Red Three Awn

Vegetation found on these sites was mature Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsug menziesii* var. *glauca*) in the overstorey. The tall shrub under story contained snowberry (*Symphoricarpos albus*), tall oregon-grape (*Mahonia aquifolium*), saskatoon (*Amelanchier alnifolia*), sumac (*Rhus glabra*) and prickly rose (*Rosa acicularis*). The herb layer was components of blue bunch wheatgrass (*Agropyron spicatum*), arrow leaved balsamroot (*Balsamorhiza sagittata*), timber milk vetch (*Astragalus miser*), cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*), sticky cinquefoil (*Potentilla glandulosa*), silverleaf phacelia (*Phacelia hastata*), pasture sage (*Artemisia frigida*), fern leaved desert parsley (*Lomatium dissectum*), and diffuse knapweed (*Centaurea diffusa*).

Found on shallow erodible soils on the south facing slopes or along the crest of the prominent hills these contribute to the overall connectivity of the site and are considered fragile in the RDCO - SEI by Iverson and Cadrin (2003), described below. These natural features cover an estimated 2.5 hectares (1.6%).

- PPxh1 **DM** / 08: Douglas-fir – Water Birch – Douglas Maple

These ecosystems were vegetated with mature Cottonwood (*Populus balsamifera*), Aspen (*Populus tremuloides*) and Douglas-fir (*Pseudotsug menziesii* var. *glauca*) in the overstorey. The tall shrub under story contained Douglas maple (*Acer glabrum*), Water birch (*Betula occidentalis*), Scouler's willow (*Salix scouleriana*), choke cherry (*Prunus virginiana*), snowberry (*Symphoricarpos albus*), tall oregon-grape (*Mahonia aquifolium*), Saskatoon (*Amelanchier alnifolia*), blue elderberry (*Sambucus caerulea*), prickly rose (*Rosa acicularis*), red osier dogwood (*Cornus stolonifera*) and sumac (*Rhus glabra*). The herb layer were components of northern bedstraw (*Galium boreale*), pinegrass (*Calamagrostis rubescens*), burdock (*Arcticum lappa*), tumble weed mustard (*Sismbrium altissimum*), Idaho fescue (*Festuca idahoensis*) and yarrow (*Achillea millefolium*).

This natural deciduous forested ecosystem is considered fragile and endangered in the Okanagan. These features are higher than average, relative for the area, in biodiversity and species composition, as well provide important habitat for a number of wildlife species. Also serve to buffer as a catchment area for the water which sustains these features and larger rain events. Water from catchments, previously mentioned; converge on these features typically as subsurface flows. The extent of this area is an estimated 1.18 hectares, or 0.75%. This feature contributes significantly to the overall connectivity to the property.

- PPxh1 **PF** / 05: Ponderosa pine – Bluebunch wheatgrass – Rough Fescue

This forested ecosystem was found to exist on two areas and was associated with cold air drainage or cooler aspects. The main forested canopy consisted of Interior Douglas-fir

(*Pseudotsug menziesii* var. *glauca*) and ponderosa pine (*Pinus Ponderosa*). Saskatoon (*Amelanchier alnifolia*) and snowberry (*Symphoricarpos albus*), nootka rose (*Rosa nutkana*), birch-leaved spirea (*Spiraea betulifolia*), and tall oregon grape (*Mahonia aquilifolium*) were present in the shrub layer. Pinegrass (*Calamagrostis rubescens*), arrow-leaved balsam root (*Balsamorhiza sagittata*), cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*), Poa spp., Idaho fescue (*Festuca idahoensis*), and lemon weed (*Lithospermum ruderales*) were present in these areas.

Found in the northern reaches of the property associated with the steeper sloped areas this natural forested ecosystem is an estimated 2.5 hectares, or 1.6% of the entire property.

- PPxh1 **AS** / 00: Aspen – Snowberry – Kentucky bluegrass

This aspen copse was found at the toe slope position associated with upslope drainage which is prominent as subsurface seepage. The forested component was Aspen (*Populus tremuloides*) with an open understorey comprised of snowberry (*Symphoricarpos albus*), nootka rose (*Rosa nutkana*) and tall oregon grape (*Mahonia aquilifolium*). The herb layer was also sparse and contained rattlesnake plantain (*Goodyera oblongifolia*), Pinegrass (*Calamagrostis rubescens*), yarrow (*Achillea millefolium*), star flowered false solomon's seal (*Smilacina stellata*) and Yellow hedysarum (*Hedysarum sulphurescens*).

Found mid-section in the property these features are an estimated 1.0 hectare in size. Although the overall biodiversity of this site is not considered high, typically these features provide specialized habitat for many wildlife species.

- PPxh1 **SB** / 00: Bluebunch wheatgrass – Balsamroot

This ecosystem was sparsely vegetated with mature Ponderosa pine in the overstorey. The tall shrub under story contained snowberry (*Symphoricarpos albus*), saskatoon (*Amelanchier alnifolia*), and sumac (*Rhus glabra*). The herb layer were components of blue bunch wheatgrass (*Agropyron spicatum*), arrow leaved balsamroot (*Balsamorhiza sagittata*), timber milk vetch (*Astragalus miser*), cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*), sticky cinquefoil (*Potentilla glandulosa*), silverleaf phacelia (*Phacelia hastata*), pasture sage (*Artemisia frigida*), fern leaved desert parsley (*Lomatium dissectum*), diffuse knapweed (*Centaurea diffusa*), Yellow Salsify (*Tragopogon dubius*), brittle prickly pear cactus (*Opuntia fragilis*), Thread-Leaved Phacelia (*Phacelia linearis*), Spreading Dogbane (*Apocynum androsaemifolium*), Bitterroot (*Lewisia rediviva*), snow buckwheat (*Eriogonum niveum*), Indian wheat (*Plantago patagonica*), silky lupine (*Lupinus serceus*), Idaho fescue (*Festuca idahoensis*), and mariposa lily (*Calochortus macrocarpus*).

This seemingly sparsely vegetated community provides high biodiversity values throughout the Okanagan, as well high habitat value for many wildlife species, including many rare or endangered species. This natural feature is an estimated 3.6 hectares or 2% of the entire property and is considered endangered in the Okanagan due to the fragility of these ecosystems.

- PPxh1 **CT** / 00: Cattail Marsh

One wetland on the property was identified as marsh ecosystem where the site is permanently or seasonal inundated by subsurface flows. Plant assemblage is typically monofloristic in response to higher than typical nutrient availability found and consists of the following: Cattail (*Typha latifolia*) as the dominant species within the wetland with other minor species incursions were field mint (*Mentha arvensis*), large-leaved avens (*Geum macrophyllum*), Canada thistle (*Cirsium arvense*), prickly lettuce (*Lactuca serriola*), and carex sp (difficult to identify without perigynium present).

This ecosystem is considered high in conservation values, providing habitat for many important species found on the property and potential to the area, as well serving as the catchment area for the confluence of the two known watercourses on the property before entering Shannon Lake. Wetlands perform important ecological and hydrological functions that link diverse interactions among biotic and abiotic components to filter water, alleviate flood events, groundwater recharge, create habitat to mention a few. This feature is an estimated 0.16 hectares.

- PPxh1 **CL** / 00: Cliff

This ecosystem is found along the upper portions of the two prominent hills on the property, these ecosystems are not described in detail at provincial scales in ecosystem classification and inventories; they are common features within the landscape and contribute considerably to the overall value of habitat when considered at larger planning scales, such as the OCP. This rock feature is comprised of a series of ledges and steep faces where fissures and openings in the rock provide spaces for animals such as bats and reptiles. Plants found along the ledges are ponderosa pine, mock orange, snowberry, round leaved alumroot (*Heuchera cylindrical*), and Oregon woodsia (*Woodsia oregano*) are a few notables to mention.

These features on the property are found on the upper north facing slopes of the two prominent hills, covering and estimated 0.22 hectares. Providing critical habitat for many wildlife species the thermal retention of the rock provides warmth in the cooler seasons and cooler areas during the hot summer months.

- PPxh1 **RO** / 00: Rock

Also found in the upper sections of the property these areas are typically described provincially as areas having less than 10% vegetation cover and are a very prominent habitat features in the Okanagan where the undulating rock is contains pockets of soils for plant establishment. These microhabitat conditions are important for many species of wildlife to provide areas for foraging and denning sites within close proximity. Plants found within the exposed rocky conditions are selaginella (*Selaginella densa*), sidewalk moss, (*Tortula ruralis*), cheatgrass (*Bromus tectorum*), and Oregon woodsia (*Woodsia oregano*). Deeper soil conditions between the rock resemble other described ecosystems such as PPxh1 PT / 02: Ponderosa pine – Red Three Awn, PPxh1 SB / 00: Bluebunch wheatgrass – Balsamroot.

- PPxh1 **SO** / 00: Saskatoon – Mock orange talus

This talus ecosystem is also described at provincial scales as rock outfall typically below steep slopes where accumulations of the rock debris are found. Within the Okanagan there are often two conditions of this ecosystem, one is what has been often thought of as the barren rock debris field, most often associated with warmer exposed aspects. The second condition, as found on this site, is what has been described further with the recent ecosystem inventories as Saskatoon – Mock orange talus. Common on cooler slopes where moisture is not quickly lost through exposure and minimal soils are developed in pockets between the blocks of rock as arid Okanagan plants take advantage of this moisture availability.

Found on the subject property along the cooler north aspect at the toe slope position below the steeper rock faces this ecosystem provides significant habitat conditions for wildlife. Plants found on this site are Douglas-fir, ponderosa pine, mock orange, snowberry, Saskatoon, Oregon grape (*Mahonia aquifolium*), Red stemmed feather moss (*Pleurozium schreberi*), and Electrified cat's tail (*Rhydiadelphus triquetrus*).

- PPxh1 **CF** / 00: Cultivated Field

Although, these ecosystems are not described in detail at provincial scales in ecosystem classification and inventories, they are common features within the urban - rural interfaces and can contribute considerably to the overall land base when considered at larger planning scales, such as the OCP. These sites were spread along the lower elevations of the property and have been fallow for some time and the vegetation is mainly invasive weed species.

These features were once open forested sites that contributed significantly to the overall health of the Okanagan's ecosystems. Now they serve as minor habitat for some smaller mammals and contain a significant amount of invasive weeds, thus decreasing the overall health of adjacent natural ecosystems.

Okanagan very dry hot Interior Douglas-fir biogeoclimatic subzone variant (IDFhx1)

- IDFhx1 **DP** / 01: Douglas fir Ponderosa pine – Pinegrass

The main forested canopy of this ecosystem consisted of Interior Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) and ponderosa pine (*Pinus Ponderosa*). Saskatoon (*Amelanchier alnifolia*) and snowberry (*Symphoricarpos albus*), birch-leaved spirea (*Spiraea betulifolia*), and tall oregon grape (*Mahonia aquifolium*) were present in the shrub layer. Pinegrass (*Calamagrostis rubescens*), arrow-leaved balsam root (*Balsamorhiza sagittata*), cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*) and Idaho fescue (*Festuca idahoensis*) were present in these areas.

- IDFxh1 **DW** / 03: Douglas fir Ponderosa pine – Bluebunch wheatgrass – Pinegrass

This natural forested ecosystem was vegetated with mature Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsug menziesii* var. *glauca*) in the overstorey. Shrub layer species included sparse amounts of saskatoon (*Amelanchier alnifolia*) and snowberry (*Symphoricarpos albus*). Herbs present in this ecosystem included pinegrass (*Calamagrostis rubescens*), arrow-leaved balsam root (*Balsamohiza sagittata*), cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*), Idaho fescue (*Festuca idahoensis*), and junegrass (*Koeleria macrantha*).

- IDFxh1 **PB**/ 02: Douglas fir Ponderosa pine – Bluebunch wheatgrass – Balsamroot

This ecosystem was vegetated with mature Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsug menziesii* var. *glauca*) in the overstorey. Shrub layer included saskatoon (*Amelanchier alnifolia*), snowberry (*Symphoricarpos albus*), and birch-leaved spirea (*Spiraea betulifolia*). Herbs present in this ecosystem included pinegrass (*Calamagrostis rubescens*), arrow-leaved balsam root (*Balsamohiza sagittata*), cheatgrass (*Bromus tectorum*) and yarrow (*Achillea millefolium*).

- IDFxh1 **RO** / 00: Rock

Typically described provincially as areas having less than 10% vegetation cover are a very prominent habitat features in the Okanagan where the undulating rock is contains pockets of soils for plant establishment. These microhabitat conditions are important for many species of wildlife to provide areas for foraging and denning sites within close proximity. Plants found within the exposed rocky conditions are selaginella (*Selaginella densa*), sidewalk moss, (*Tortula ruralis*), cheatgrass (*Bromus tectorum*), and Oregon woodsia (*Woodsia oregano*).

- IDFxh1 **PF** / 05: Douglas fir Ponderosa pine – Pinegrass – Idaho Fescue

The main forested canopy consisted of Interior Douglas-fir (*Pseudotsug menziesii* var. *glauca*) and ponderosa pine (*Pinus Ponderosa*). Saskatoon (*Amelanchier alnifolia*) and snowberry (*Symphoricarpos albus*), birch-leaved spirea (*Spiraea betulifolia*), and tall oregon grape (*Mahonia aquilifolium*) were present in the shrub layer. Pinegrass (*Calamagrostis rubescens*), arrow-leaved balsam root (*Balsamohiza sagittata*), cheatgrass (*Bromus tectorum*) and yarrow (*Achillea millefolium*) were present in these areas.

- IDFxh1 **SB** / 00: Bluebunch wheatgrass – Balsamroot

These upper portions of property were sparsely vegetated with mature Ponderosa pine in the overstorey. The tall shrub under story contained snowberry (*Symphoricarpos albus*), saskatoon (*Amelanchier alnifolia*), and sumac (*Rhus glabra*). The herb layer were

components of blue bunch wheatgrass (*Agropyron spicatum*), arrow leaved balsamroot (*Balsamorhiza sagittata*), timber milk vetch (*Astragalus miser*), cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*), sticky cinquefoil (*Potentilla glandulosa*), silverleaf phacelia (*Phacelia hastata*), pasture sage (*Artemisia frigida*), Yellow Salsify (*Tragopogon dubius*), Thread-Leaved Phacelia (*Phacelia linearis*), Spreading Dogbane (*Apocynum androsaemifolium*), snow buckwheat (*Eriogonum niveum*), silky lupine (*Lupinus serceus*) and Idaho fescue (*Festuca idahoensis*).

Specific Features

British Columbia Conservation Data Center (CDC) is an extension of Ministry of Sustainable Resource Management (MSRM) and is the provincial coordinator of tracking rare and endangered species (native plants, animals, and natural plant communities) in British Columbia on provincial, national and international levels. Ranking of these rare elements (native plants, animals, and natural plant communities) is mandated by the international organization of Nature Conservancy which the CDC is an associate member of this international organization. For a complete overview refer to:

<http://srmwww.gov.bc.ca/cdc/index.htm>

The CDC defines British Columbia's most vulnerable species in hopes of preserving the biodiversity of the province. In this effort the CDC has compiled a rare plant list for the Okanagan Pentiction Forest District, which identifies 137 rare or endangered vascular plant species. In general, occurrence of rare plant species is usually found associated with extremes in ecosystem conditions, such as wetlands and rock outcroppings. Of these 137 species, only a small portion would occur on sites similar to the subject property. Although, most of these species identified are restricted to the southern Okanagan Valley, all species were taken into account during our site investigations.

Our site assessment did not reveal any vascular plant species occurring on this CDC species list for the Pentiction Forest District. However, the timing of our investigation and intensity required of a rare species inventory would not preclude the potential occurrence of these species at some other point during the growing season (This would apply to all plant species).

The CDC identifies 31 communities in the forest district, only a smaller portion of these communities would occur within the PPxh1 or IDFxh1. Our site assessment found the plant communities of the subject property would be described as common for the area and not considered rare or endangered in a regional context.

2.2.2 Fauna

The Central Okanagan is home to many species of reptiles, birds, mammals and other wildlife, making this one of the most richly diverse areas in British Columbia. This is reflective of the equally diverse ecosystems found within the area as the most northern extent of the Great Basin shrub – steppe habitat. Many of the species associated with the Great Basin shrub – steppe habitat, are listed as rare or endangered in British Columbia due to declines in local habitats and general populations throughout the Great Basin. A major factor contributing to this decline in part has been due to historical fire suppression of the fire adapted ecosystems within the Okanagan Valley (Makonis 2004).

In British Columbia, TEM mapping is used as an effective wildlife habitat tool for inventory purposes to land use planning and resource management. Resource managers and planners recognize the need for consideration of wildlife habitat in planning for ecological and socio-economic values. Although TEM mapping and wildlife models are conducted at map scales too coarse for site specific needs, the advantage comes from the potential to identify areas of concern. Central Okanagan Regional District has recently adopted this new strategy to verify and revise the mapping for updating maps to monitor the efficacy of planning and adaptive management.

The tree canopy was scanned for raptor nests and the ground for "whitewash," or prey remains. Snags were investigated for nesting cavities of woodpeckers. All tracks and sign were examined to determine the species in question and season of use. Ungulate sign includes pellets, shed or snagged hair, cast antlers, trails, bedding sites, wallows, browsing, grazing, cambium feeding, antler rubbing, soil/vegetation scrapes, and mineral licks.

The diversity of ecosystems found on the subject property is capable of supporting an equally diverse range of wildlife. The incursion of domesticated animals (dogs, cats, and others) into the surrounding areas in the past several decades has limited the presence of several species. Further anthropogenic (human-influenced) effects over the last century have also contributed to the placement of some species to the endangered list.

The site was inspected by a wildlife biologist, Les Gyug of Okanagan Wildlife Consulting, on 4 separate days from August 17 to 22, 2004, for a total of 11 hours on site. Any wildlife species observed were noted. Prominent wildlife trees and/or snags were investigated for nesting cavities or raptor nests. The tree canopy was scanned for raptor nests and the ground for "whitewash," or prey remains, but because of the size of the property not every tree could be examined. All tracks and sign noted were examined to determine the species in question and season of use. In addition to site visits, the Central Okanagan TEM was used to assess the site use of the 10 wildlife species for which habitat models were prepared within that project. All provincially Red- and Blue-listed species were assessed for possible occurrence in the plan area.

Birds

Overall, the bird communities in the plan area reflect the variety of habitats: old fields, coniferous forest, shrub areas and deciduous riparian stands (Table 1). Cavity-nesting birds appeared to make particular use of the larger aspens in the riparian areas for nesting holes. The birch trees in these areas could also develop into useable nesting trees for many cavity-nesting birds. Other nest holes were observed in older or dead standing trees that were on rock outcrops. These appeared to be some of the few such nesting trees that were not cut down or knocked down during the original round of logging in the area many years ago.

Table 1. Birds observed on Shannon Lake West Neighbourhood Plan Area, August 17-22, 2004 (listed in phylogenetic order).

Species	Comments
Mallard	14 in small pond on August 17; 6 on August 18.
Turkey Vulture	1 soaring near landfill site.
Ring-necked Pheasant	flushed from dense grasses and shrubs near pond
California Quail	throughout

Mourning Dove	throughout
Great-horned Owl	daytime roost in dense birch/aspen riparian forest near east side of property
Common Nighthawk	over old fields—may use open rock ridges and outcrops for nesting/rearing
Hairy Woodpecker	throughout wooded areas but highest use seen at Polygon 53 feeding on dead Ponderosa Pines and in adjacent aspen stand on decadent (but small) aspens
Northern Flicker	throughout wooded areas
Western Wood-Pewee	coniferous forests
Clark's Nutcracker	in mature ponderosa pine trees
Black-billed Magpie	throughout
Common Raven	throughout, used as roosting area for feeding at landfill
Mountain Chickadee	in coniferous forests throughout
Red-breasted Nuthatch	in continuous coniferous forests
White-breasted Nuthatch	in older veteran tree coniferous patch on hillside
Pygmy Nuthatch	in ponderosa pine forests throughout
House Wren	in shrub patch at edge of field
Golden-crowned Kinglet	in dense mature Douglas-fir forests in gullies
American Robin	throughout
Spotted Towhee	in shrub stands at edge of fields
Chipping Sparrow	in immature aspen stands and field interface
Vesper Sparrow	in old fields
Dark-eyed Junco	only one seen but common throughout Westside area
House Finch	in coniferous stands, common throughout Westside area
Red Crossbill	one flock in coniferous stands

*None of these species are Red- or Blue-Listed in B.C.

The Shannon Lake West area was inspected after the breeding season, and after many migratory birds would have left the area. The birds detected on the site during the August inspection period were mostly permanent resident birds, or at least species that would be found in the general Westside area throughout the year, with only a few exceptions, e.g., Common Nighthawk and Western Wood-Pewee that are migratory and leave later than other migratory species. In the breeding season (May and June), the number of species of birds expected on the plan area might be expected to double or triple. Birds expected on the site in the breeding season include a variety of birds inhabiting habitat available on the site including birds of fields (e.g., Western Meadowlark, Savannah Sparrow), birds of coniferous forest (e.g., Yellow-rumped Warbler), birds of shrub fields (e.g. MacGillivray's Warbler) and birds of deciduous stands (e.g., Warbling Vireo).

There have been reports of Red-tailed Hawks on the property in the past (Deborah Greaves, pers. comm.; Don Guild, pers. comm.) and there may be a Red-tailed Hawk nest in the area based on their descriptions of Red-tailed Hawk behaviour. Finding a raptor nest near or on the property would require surveys during the nesting season of May and June. It is not known if the single Great Horned Owl observed roosting on the site nested within the neighbourhood plan area.

No provincially Red- and Blue-listed species of birds are known to nest on or very near the property. However, the amount of information on breeding birds on the site and in the area is very limited, and there is the possibility of some on the site, in particular the Flammulated Owl. The nearest they have been reported to the site is McDougall Rim, where 6 were heard in one evening (MWLAP, Okanagan Region Wildlife database). The Central Okanagan TEM habitat model for Flammulated Owl indicated there would be high quality feeding habitat on the Douglas-fir/Ponderosa Pine steep hillsides at the northwest side of the property (Figure 3, also see TEM section). It is possible there are Flammulated Owls in

the coniferous forests of the property or on the steeper hillsides just above the property to the northwest. These should be surveyed in the spring (May) to determine if Flammulated Owls are present. There were only a few possible nesting sites (old Northern Flicker nest holes in trees) scattered over the site but there is the possibility that some of these may be used by Flammulated Owls.

Mammals

The following observations were made on the site between August 17 and 22, 2004.

1. Coyotes were heard on the site, tracks were common, and one old den site was found in an aspen grove with deep soils (Polygon 60). Coyotes are commonly seen or heard in the general area.
2. Black Bear scats found in all areas of site but particularly in dense riparian areas and the gullies that bears probably use as daytime resting sites.
3. One Cougar track found (Polygon 32) that was probably made since last major rainfall 2 weeks previous to site visit.
4. Deer pellets and tracks abundant throughout site. Pellet groups most abundant on open ridge tops and small benches on open hillsides. The general area receives moderate to heavy use by deer in all seasons, but relatively more use in the winter than in the summer. Mule deer habitat was modeled in the TEM and is considered again later.
5. Yellow-bellied Chipmunks were seen and heard at several places on site.
6. Red Squirrels were seen and heard at several places on site.
7. Bat droppings seen on the floor of the one old shed on the site. Bats had been using the space between the central beams of the shed for roosting. The central beam was made of side-by-side 2x6's which had warped and split apart about 2-3 cm in some places, forming a good crevice for bat roosting.
8. Northern Pocket Gopher mounds were common in all areas of the site with deep soils, i.e., principally in the old fields, but also occasionally in forested areas in small patches that had deep sandy or loamy soils.
9. No American Badger sign was seen. The principal prey of badgers, Yellow-bellied Marmots, and Columbian Ground Squirrels, may also occur on the property, but appeared to have already gone into hibernation by mid-August. However, no Columbian Ground Squirrel holes were seen, so they are probably absent, or at least very uncommon, if present.

Other mammals that may be on site but which were not directly surveyed include the smaller rodents (mice and voles) and shrews. The Western Harvest Mouse occurs most abundantly in old fields (Tom Sullivan, unpublished data) in the Summerland area with average densities of about 4/ha. This species is provincially Blue-listed and COSEWIC-listed as Special Concern. It has been found only once in the Westbank area (Environmental Site Assessment for South Mount Boucherie Concept Development Plan, Rock Glen Consulting Ltd, 2002), but could very well be present on the Shannon Lake West site given that there have never been any surveys for this species in the Westbank/Westside area (Nagorsen,

D.W. 1995. Status of the Western Harvest Mouse in British Columbia. Ministry of Environment, Lands and Parks, Wildlife Working Report WR-71), and the old field habitat is abundant in the plan area.

The Western Harvest Mouse was not one of the species whose habitat was modeled by the Central Okanagan TEM and has not been modeled in the South Okanagan Conservation Plan either. However, the recent extensive and intensive data collected on this species by Tom Sullivan in the Summerland area now provides the basis to construct a habitat model for this species. A simple model of its potential distribution on the Westside was applied to the Central Okanagan TEM where High rated habitat was in old fields and dense natural grasslands, Low in sagebrush sites and conventional orchards and None in all other habitats. The tabulated habitat figures are presented in the TEM Wildlife section below.

Amphibians and Reptiles

No amphibians were seen on site. The only possible breeding site is the small waterhole constructed on the site but no amphibians were seen in a search of this site. This site should be checked for breeding amphibians next spring (May). Great Basin Spadefoot Toads may breed even in such tiny sites, although there are no confirmed records for the area in general, but then no surveys for breeding amphibians have been undertaken in the area.

No snakes were seen on the field visits, but during the heat of the summer, most snakes will become nocturnal, rather than being daytime active. No hibernacula were found on a cursory search of most of the two isolated rock knobs in the plan area. Some hibernacula may exist in other rocky areas on site, particularly on the major slopes at the northwest side of the plan area. The Pacific Rattlesnakes at a known hibernacula behind the current Shannon Woods subdivision to the northeast of plan area were exterminated many years ago and no other hibernacula were known in this area (Geoff Paynter, pers. comm. to J. Grods).

Voles, mice, pocket gophers and ground-nesting/shrub-nesting birds that are probably abundant in the old field and shrub habitats probably provide abundant food source for gopher snakes and racers which are probably resident on and near the site for all or part of the year. The wet shrub areas (riparian) and the adjacent fields and woodlands probably provide good year-round habitat for the Rubber Boa, which are probably present in the plan area and do not hibernate in communal dens. The Northern Alligator Lizard might be expected to be found on the site given that it is found in similar types of fractured volcanic rock and Ponderosa Pine forest in West Kelowna Estates and on Mount Boucherie.

Central Okanagan TEM Modeled Species

The species modeled in the Central Okanagan TEM were: Painted Turtle, Western Rattlesnake, Gopher Snake, Flammulated Owl, Western Screech-Owl macfarlanei subspecies, Lewis' Woodpecker, Townsend's Big-eared Bat, Badger, Mule Deer and California Bighorn Sheep. The proportion of the Westside TEM-mapped as High or Moderate suitability habitat for each species was tabulated and compared to the Shannon Lake West area. The Shannon Lake West area (156.2 ha) was 0.9% of the entire TEM-mapped area (19698.79 ha). Therefore any species with a higher than average (>0.9%)

percentage of High or Moderate suitability habitat in the Shannon Lake West area compared to the amount of High or Moderate habitat on the entire Westside TEM area were considered to be significant wildlife for this plan area. The extent to which the percentage is above the average, indicates the relative importance of the species in the Shannon Lake West area.

Table 2. Wildlife Habitat Modeling of High and Moderately suitable habitat for the 10 modeled species for the Westside Terrestrial Ecosystem Inventory (TEM) area compared to the Shannon Lake West Neighbourhood Plan (SLWNP) area. Western Harvest Mouse was modeled and added to the list for this SNWLP assessment, August 2004.

Wildlife Rating Code ¹	Species	Area (ha) Habitat in SLWNP area		% of Westside habitat in SLWNP area ²	
		High	High and Moderate	High	High and Moderate
BFLOW_FDLI	Flammulated Owl	23.3	33.9	1.7	0.4
BFLOW_STRE	"	0	0	0	0
BLEWO_STRE	Lewis's Woodpecker	0	3.3	0	0.2
BWSOW_FDRE	Western Screech-Owl	0	1.3	0	0.2
BWSOW_STRE	"	0	0	0	0
MCOTO_FDLIG	Townsend's Big-eared Bat	0	99.0	0	0.7
MCOTO_STLIG	"	0	10.8	0	0.3
MODHE_FDLIG	Mule Deer	58.5	154.2	7.3	0.9
MODHE_FDLIW	"	58.5	154.2	4.1	0.9
MODHE_SHLIG	"	0	53.9	0	0.4
MODHE_SHLIW	"	0	53.9	0	0.3
MODHE_THLIG	"	5.2	105.2	2.1	0.7
MOVCA_FDLIG	Bighorn Sheep	52.9	123.1	14.9	2.0
MOVCA_FDLIW	"	52.9	123.1		2.8
MOVCA_SHLIG	"	0	15.3	0	1.2
MOVCA_SHLIW	"	0	15.3	0	2.0
MOVCA_SHRE	"	0	0.2	0	0.4
MTATA_LIA	American Badger	0	8.0	0	0.7
MTATA_LIG	"	0	94.4	0	2.0
MREME_LIG	Western Harvest Mouse ³	39.7	47.2	15.4	4.8
RCHPI_LIA	Painted Turtle	0	0	0	0
RCHPI_STRE	"	0	31.1	0	2.8
RCROR_LIS	Pacific Rattlesnake	56.8	111.2	4.1	1.4
RCROR_STLI	"	10.7	22.6	2.4	0.9
RPICA_LIS	Gopher Snake	55.7	164.8	5.4	1.1
RPICA_STRE	"	0	41.4	0	1.4

¹FD = Feeding, LI = Living, ST= Security/Thermal, SH = Security Habitat, TH = Thermal Habitat, G= Growing Season, S = Summer, W=Winter, RE= Reproductive Season, A= All Seasons.

²Species with higher than average percentage (>0.9%) of habitat within the SLWNP area than in the Westside area are in bold.

³The Western Harvest Mouse was modeled and added to the list for this SNWLP assessment, August 2004.

The TEM modeling predicted the habitat on the Shannon Lake West plan area is considered relatively more important on that site than on the Westside in general for seven of the 10 species modeled. The possible occurrence of Flammulated Owl has already been discussed under the Birds section.

The site is also relatively more important to Mule Deer given the suburbanization of other areas and the relatively heavy reliance on this type of area, particularly in the winter. This type of area is ideal for Mule Deer with its interspersed of different types of habitat, the sum of which is required for successful winter range, rather than individual parts that are disconnected. There are steep and rocky areas of escape habitat, open rock knobs that are typical bedding sites on sunny winter days where they gain heat from the sun, dense thickets of Douglas-fir and/or Ponderosa Pine that form bedding sites on windy days, old fields that contain an abundance of potential winter grass and forb forage, and natural open parkland slopes that contain Bluebunch Wheatgrass for winter and spring feeding.

The plan area is predicted to be relatively highly important for snakes (see Figure 4), although, as previously discussed, rattlesnakes were exterminated in the area at the only known rattlesnake hibernacula and have not appeared to repopulated the area in any great numbers since then. The site is also predicted to be relatively of high importance on the Westside for Western Harvest Mice based on the new modeling (see Figure 5).

While the site is predicted to be important to Bighorn Sheep, no Bighorn Sheep have been seen in the Westbank area for many years, and this is not considered currently to be an important wildlife species of the area. Similarly, the area might potentially be used by Badgers given the old field habitats that may contain significant numbers of potential prey, but no badgers have been reported on the Westside for many years. While there may be some importance for Painted Turtles, the single pond in the plan area is not suitable for Painted Turtles.

2.2.3 Wildlife Environmentally Sensitive Areas

To develop a wildlife sensitivity rating for the Hoyer Property, the area was rated for five species and/or species groups, based on the most important wildlife needs that are likely to be met on site, both now and in the future. These included:

- Flammulated Owl habitat suitability
- Mule Deer winter habitat suitability,
- Snake habitat suitability,
- Western Harvest Mouse habitat suitability, and
- a Breeding Bird habitat rating.

Each of these groups was rated from 1 (highest) to 4 (little to no value). The Flammulated Owl ratings were the previously discussed Central Okanagan TEM habitats. The Mule Deer rating was based a summation of winter values for each polygon for winter feeding (shrub and/or bunchgrass habitats), security (coniferous forest) or thermal (open sunny ridges and slopes) as modeled using the polygons from this project to which were applied the Central Okanagan TEM ratings. The snake habitat suitability was the maximum value (from 1 to 100) for a given polygon based on the feeding and nesting/hibernating habitat suitability determined from the Central Okanagan TEM models for Western Rattlesnakes and for Gopher Snakes. The Western Harvest Mouse rating was based on the model developed

here for application to the Central Okanagan TEM. The Breeding Bird rating was based on a subjective assessment of the diversity, number of birds and uniqueness of this type of habitat in the Westbank area. This rating included field observations of cavity-nest availability (old and large wildlife trees, and snags with wildlife sign) on site.

The rating from 1 to 4 of each of these five groups was summed, and this sum used to derive the Wildlife ESA rating from High (1), Moderate (2), Low (3) and Little or No Value (4). However, these simplified ratings need to be treated with caution, since some species may require sites that might not be rated High overall.

2.2.3 Wildlife & Habitat Summary

The diversity of ecosystems contained on the subject property and interconnections to surrounding landscapes supports a diverse range plant and wildlife species. Although only wildlife 36 species were identified during the site visits, it is well understood the potential of the habitat found on the property would support a variety of other species throughout the year. The species here are supported by a diversity of wetlands, riparian, rock, talus, grasslands, and forest types throughout the surrounding landscape where the proximity of these ecosystems allow many wildlife species to survive climatic extremes (i.e. avoidance of summer and winter temperatures), forage, provide shelter and denning.

The result of the surveys produced significance ratings for Environmentally Sensitive Areas (ESA) and is an amalgamation of wildlife habitat and vegetation community ratings identified separately within the property. The resulting Environmentally Sensitive Areas represented in these categories contribute high habitat and conservation values, relatively unmodified, ecologically fragile or recognized as rare in the provincial landscape (Iverson and Cadrin 2003). These significance ratings are ranked as:

ESA – 1:	High Values
ESA – 2:	Moderate Values
ESA – 3:	Low Values

ESA were identified on the Hoyer property of varying significance ratings, figure 5.

Nineteen of the 61 polygons on the Hoyer property were delineated as ESA – 1 and contained significant vegetation and wildlife characteristics representing a diverse range of sensitive habitat. These features cover an estimated 22.9 hectares of the property and contribute significantly to the overall connectivity of the habitat and ecosystems. Development should not occur within these areas unless mitigation promotes no net loss to the habitat.

24 polygon delineations of ESA – 2, or moderate significance were found on the Hoyer property and contribute toward the overall diversity and contiguous nature of the surrounding natural features, covering an estimated 52 hectares. If development is pursued in these areas portions of the habitat should retained and integrated to maintain the contiguous nature of the landscape. Some loss to these ESA can be offset by habitat improvements to the remaining natural areas found on property.

Eleven ESA – 3 polygons were delineated along the lower portions of the property as low significance representing disturbed forested habitats covering an estimated 20 hectares. These areas contribute to the diversity to the landscape, although based on the condition and adjacency of each habitat the significant function within the landscape is limited. If development is pursued in these areas the impacts should be offset by habitat improvements in other natural areas found on property.

The remaining portion of Hoyer property contains wildlife and habitat values that are not as significant as those listed above and consideration should be given to maintain wildlife corridors and habitat buffers.

3.0 POTENTIAL IMPACTS

It will not be possible to retain all High-value Wildlife ESA since they occur throughout the site. They need to be integrated into the Plant Community ESA to develop an overall environmentally sensitive site plan. This would include the identification of **Environmental Nodes** where high values for Plant Communities and Wildlife groups (whether considered as individual groups or as a whole) coincide to address concerns where developmental conflicts maybe anticipated in the ESA. The large-scale development of what is currently a relatively natural area into urban areas will impact the wildlife currently residing in, or using this area. This will result from loss of habitat, as well as disturbances that will limit the usefulness of remaining habitat from people and their pets. If development is accepted as a given, then it remains to mitigate the losses of habitat so that the most significant and useful pieces of habitat remain for the most significant species.

3.1 HABITAT IMPACTS

The conceptual development proposal plans for extensive urban housing development at the lower elevations of the property. Development of any sort will break up the natural setting of ecosystems contained within the Shannon Lake West area. The impacts of most concern would be fragmentation, disruption of the natural disturbance regime, encroachment of invasive species, edge effects, and changes of hydrological patterns (Iverson and Cadrin 2003). The ecosystem inventory associated with this study and provides the proponent and design team an overall understanding of the sensitive ecosystems of the area and how to address specific points in the planning of the development at an early stage. Where impacts into sensitive sites cannot be avoided or some development has been proposed for Environmentally Sensitive Areas, impacts could be mitigated by restoration and enhancement in other ecosystems. Further specifics are addressed in the following sections.

3.2 *Wildlife Impacts*

The suburban development of any portion of land currently in a relatively natural state is likely to have large impacts on the wildlife using the land. It is always a challenge to keep these impacts to a minimum, and to protect the most significant or valued portions of them within a suburban setting. Part of that challenge is retaining the wildlife values of those natural areas that are kept within and adjacent to the development. The plan area is adjacent to undeveloped Crown Land giving this area a better chance at retaining wildlife values than other increasingly-isolated areas. Of primary importance will be maintaining stepping-stone habitat (see ESA-1 areas below) within the development both as movement

corridors for wildlife and as that will also function as wildlife habitat themselves. These corridors need to maintain connectivity to other habitats including Shannon Lake Regional Park, future parks in the Shannon Lake East neighbourhood, and the areas to the southwest of the property. Additional set-asides that function as wildlife movement corridors, but not necessarily as habitat for a wide-variety of species, or areas to be managed in a wildlife-friendly manner, will be an integral part of retaining the wildlife values of the plan area, and the adjacent areas that will otherwise be isolated from undeveloped Crown land by this plan area, if developed.

Wherever possible, the project design should avoid impacts to the most sensitive areas (ESA-1 areas) and to significant ecosystem components such as den sites, veteran trees, raptor nests (should any be discovered on the plan area) and designated wildlife corridors.

One of the best tools for maintaining wildlife values will be encouraging the pride of public ownership and stewardship of the valuable remaining open spaces within the plan area. The adjacent land owners as well as others resident in the area will need to feel, and to see, that these areas have some value other than a "natural" extension of the backyards of those residing next to these areas. Public use of these areas needs to be well defined during final stages of development to best manage them for both human use (trail corridors or walkways, particular as unpaved, minimal impact trails) and for wildlife use. Trails are important to keep people on certain areas so that more sensitive areas do not get trampled. When people regularly use these as walkways they will also appreciate the value of these areas as open space and will not be as likely to abuse them.

Encouraging stewardship of people's own private yards in a manner conducive to wildlife where these are adjacent to natural areas, wildlife corridors, or indeed, throughout the entire plan area since no lot will be far from undeveloped Crown land, will help these same people value the wildlife that may use the natural areas that occur within and adjacent to the development. Publications that could be made available to private land holders within the development include the Naturescape B.C. publication from the Stewardship Series (Campbell et al. 1995) which encourages planting and maintaining backyard wildlife habitat. The Naturescape Southern Interior Kit includes this publication as well as native plant and animal booklets and resource booklets. Other publications available that outline the values of habitat to wildlife in the dry forests of the southern interior include the Stewardship Options handbook of the Stewardship Series (Penn 1996), and several Wildlife Tree publications including Steeger et al. (undated) as well as pamphlets available from B.C. Ministry of Water, Land and Air Protection on sensitive species or habitats.

Within these open spaces, some of the more important features to retain will be rocky areas as hibernacula and refugia for snakes (Gopher Snakes and Racers). Large trees should be allowed to remain for cavity-nesting birds, raptors, bats and other creatures. Dense smaller trees could be thinned out to reduce fire hazard while still retaining the larger trees, or a number of medium-sized trees that will someday become larger trees that will be suitable for wildlife use.

Domestic pets can be hazardous to maintenance of local wildlife, and the larger predators in the area may also be hazardous to small pets. Domestic cats that are allowed to roam will take a large toll on ground-nesting birds and other small wildlife in these open spaces, and can cause disturbances to the wildlife in other backyards that have been made attractive to birds or other wildlife. New owners should be made aware of the detriment that cats can be to all manner of small wildlife when roaming free and should be encouraged to keep cats

indoors. Free-roaming dogs will also impact Mule Deer populations, and may interact in a negative fashion with the Cougars, Coyotes and Black Bears that currently are found in the plan area.

3.3 Cumulative Impacts

The conceptual development of the Shannon Lake West plan is to construct residential lots along the lower elevations of the property. The currently proposed development is estimated to result in a loss of natural habitat of approximately 67% of the 156.2 hectare site, or 106 hectares. The remaining 33% or 50 hectares will remain as natural features.

Site investigations confirmed the current proposed development will encroach on the sensitive habitat designated as ESA – 1, or high values. This is associated with the current road alignment and potential lots over the wetland and riparian ecosystems. It is advisable to realign the road and lots to accommodate these features, since they not only provide valuable biological and hydrologic functions, but are important for green space networks and high scenic values.

Some loss of habitat will also occur within areas designated as ESA – 2 and ESA – 3. Most of this is constrained to the lower portions of the property where prior disturbance has occurred. Consideration should be given to provide significant green space networks to serve as wildlife corridors, preserve ecosystem connectivity, and high scenic values associated with neighborhoods.

4.0 RECOMMENDATIONS

A portion of the subject property has been designated as a sensitive habitat, and as such, we have made recommendations to:

- Identify and protect these sites from degradation, prevent development in non-disturbed areas, and protect the remaining natural features of the site from other negative impacts; and
- Recommend rehabilitation, restoration, and enhancement opportunities.

Further considerations and recommendations were also given to the entire subject property within context of the natural features in the surrounding areas as within the Best Management Practices. General recommendations are as follows:

- Development should not occur in ESA – 1 designated areas and buffer zones should be integrated into the development plans to maintain the feature. Development should not occur within these areas unless mitigation promotes no net loss to the habitat (typically with a 3 : 1 replacement).
- Integration of “green space networks” associated with ESA – 2 designated areas to serve as wildlife corridors, preserve ecosystem connectivity, and high scenic values associated with neighborhoods. If development is pursued in these areas, portions of the habitat should be retained and integrated to maintain the contiguous nature of the landscape.

- Trails and pathways should be carefully designed and constructed to avoid impacts to ESA – 1 designated areas. If development is pursued in these areas the impacts should be offset by habitat improvements in other natural areas found on property.

Other general recommendations to development for the Shannon Lake West area are as follows:

1. Minimize cut and fill slopes where possible utilize natural topography in the development design;
2. Minimize the road construction, including crossing of gullies and natural corridors, as well;
 - *Integrate reptile and amphibian habitat where roads may bisect and maintain significant travel corridors between them; and*
 - *Follow natural topography of the terrain;*
3. Designate no disturb areas prior to construction with flagging or temporary fencing;
4. Hydro-seed disturb sites shortly after construction, during appropriate times of the year, to limit the potential of erosion and introduction of invasive weeds;
5. Ensure construction activities are conducted during appropriate times of the year to avoid potential impacts to nesting and breeding wildlife;
6. Trails and recreational amenities should be designed and constructed to avoid ESA where possible;
7. Habitat corridors should be incorporated into the development to provide access between significant Environmental Sensitive Areas and avoid fragmentation and alienation of habitat and species. These features also provides higher aesthetic values within the development;
8. Retain Habitat Trees where possible as part of the overall development design (*As not to supercede forest health issues, fire hazard mitigation or public safety*);
9. Replant and restore habitat areas only with native plant species. Much of this material can be obtained from the site prior to site grading;
10. Works around water features should include comprehensive Environmental Monitor Plans;
11. Where possible design adequate buffers around environmentally sensitive areas to maintain the integrity of the habitat and avoid edge effect.
12. Road crossings occurring on natural drainage or seepage sites will integrate measures to ensure the hydrological patterns are not altered to avoid impacts on riparian and wetland communities down slope;

Environmental Nodes are designed where high values for Plant Communities and Wildlife groups (whether considered as individual groups or as a whole) coincide and were designated to address specific concerns where developmental conflicts may be anticipated in the ESA. Specific recommendations to these environmentally sensitive features within the subject property are addressed in the following as environmental nodes and correspond to figure 7:

1. Overall rated as ESA 2 this node can be included for offsetting development in other ESA 2 areas as creating connectivity and contiguous areas between higher rated ESA areas and Shannon Lake. A minimum width recommended would be 30m.

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2. Two nodes of varying ESA values found adjacent to Shannon Lake Road are banked wooded features. Preservation of these areas contributes to wildlife connectivity within the site and provides high visual value for the over all site from traffic along Shannon Lake Road.
 3. Rated as ESA 2 this riparian area has been extensively fragmented historically and isolated currently by disturbed areas. It would be recommended this area be enhanced and efforts made to re-establish connectivity. Also, one of the few access points to the property is through this draw. It would be recommended if this area is lost to access corridors other areas can be enhanced and/or preserved in lieu.
 4. This node has been established in prior Environmental Assessment development permit reporting as an integral part of the overall connectivity and preservation of forested sites of the Westside and should be maintained in this neighborhood concept plan.
 5. Node five is at the upper most extent of a riparian feature found on the property and fragments a potential development node. This was most likely a natural connection to Johnson Spring area found further east on Shannon Lake Golf Course and now is separated by an eight foot chain link fence. We would support access through this area if enhancements and connectivity are undertaken elsewhere on the property.
 6. A contiguous riparian feature found on the property and considered extremely sensitive in the Okanagan landscape is comprised of the cattail marsh and cottonwood community. We recommend buffering this feature with the proposed collector access, such as found in node 3 along the existing road. Also, across where proposed lots are adjacent to this feature a 7m buffer is recommended followed by a fence. Reconnection of the fragmented portions of this entire riparian area is desirable.
 7. Heavily disturbed portions of the riparian community associated with nodes 5 and 6 are recommended access crossings for the proposed road network. These crossing should be kept to a minimum and should also minimize the impact at the point of crossing with restoration of the riparian community in other portions of these nodes. As well include appropriate accommodation of reptile passage under the roads and between ESA areas.
 8. This node is associated with a riparian crossing along the upper portion of the property. We recommend this proposed crossing be of minimal impact and mitigation measures incorporate appropriate reptile access.
 9. Associated with the upper drainage of the Smith Creek Tributary, the proposed development concept has access through this node which we are recommending to minimize the access through this feature, and include preservation and enhancement to remaining areas of this feature, see node 11.
 10. Found on the western property a portion of this proposed development node is within ESA1. We are recommending if development is pursued within this area lot density should be lower and include preservation and enhancement to remaining areas to provide "no net loss"; see node 11.
 11. These nodes identify areas within the property which are suited to be recruited as enhancement areas for further preservation of natural features.

5.0 COMPLIANCE AND MONITORING

An environmental monitor (EM) should be retained for the duration of the proposed development to periodically inspect the compliance with the recommendations presented in this report. We recommend that the EM complete at least one site visit every 1-2 weeks during site grading and landscaping activities and periodically (i.e. 1 per month during each phase of construction) during the development adjacent with the ESA – 1 designated areas. The monitor will maintain a log of all construction and mitigation activities, provide timely advice, attend all major project meetings and communicate regularly with agencies and project parties.

6.0 CONCLUSION

With implementation of recommendations the proposed development is not expected to impact the existing or surrounding habitats. Preservation and enhancements of habitat will only serve to preserve to the current biodiversity and increase the potential habitat for a number of common and rare species. We have provided numerous recommendations that should help guide an environmentally responsive development and ensure that potential detrimental impacts to the natural environment will be mitigated.

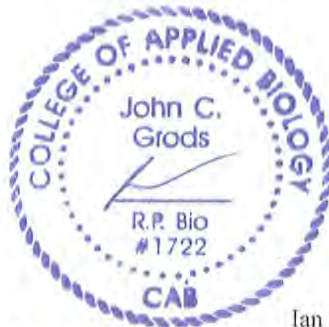
We would like to thank Les Gyug of Okanagan Wildlife Consulting for his invaluable assistance on the wildlife aspects of this project.

7.0 CLOSURE

This report incorporates and is subject to best management practices. If you have any questions or comments, please contact the undersigned at your convenience.

Respectfully Submitted,

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8.0 REFERENCES

- Anon. 1999. *Manual for Describing Terrestrial Ecosystems in the Field*. BC Ministry of Forests, Research Br., Victoria, BC. (handbook, paginated by section).
- Campbell, S., S. Pincott and L. Granger. 1995. *Naturescape British Columbia: Caring for Wildlife Habitat at Home*. Stewardship Series. British Columbia Ministry of Environment, Lands and Parks, Victoria, B.C.
- Iverson, K and C. Cadrin. 2003. *Sensitive Ecosystem Inventory: Central Okanagan 2000-2001*. Volume 1: methodology, ecological descriptions, results and conservation tools. Tech. Rep. Series No. 399. Environmental Conservation Branch, Pacific and Yukon Region, Canadian Wildlife Service, Delta, BC.
- Lloyd, D, K. Angove, G. Hope and C. Thompson. 1990. *A guide to site identification and interpretation for the Kamloops Forest Region*. B.C. Min. of Forests, Victoria, B.C.
- Meidinger, D. and J. Pojar (compilers). 1991. *Ecosystems of British Columbia*. Special Report Ser. 6, Ministry of Forests, Victoria, BC.
- Penn, B. 1996. *Stewardship options for private landowners in British Columbia*. Stewardship Series. Issued by Government of Canada and Province of British Columbia. (Outlines wildlife and habitat values that can be maintained, enhanced or preserved in Dry Interior Forests of B.C.)
- Resources Inventory Committee. 1998. *Standards for Terrestrial Ecosystems Mapping in British Columbia*. Ecosystems Working Group of the Terrestrial Ecosystems Task Force, Victoria, B.C.
- Resources Inventory Committee (RIC). 1999. *Methods and standards for rare ecosystem mapping in British Columbia*. Ministry of Environment, Lands and Parks, Victoria, BC.
- Steeger, C., M. Machmer and E. Walters. Undated. *Ecology and management of woodpeckers and wildlife trees in British Columbia*. Environment Canada.

8.0 APPENDIX

Appendix A. Maps

- Figure 1. Shannon Lake West (Hoyer) Neighbourhood Plan Area
- Figure 2. Shannon Lake West Ecosystems
- Figure 3. Suitability of Flammulated Owl in the Westside
- Figure 4. Suitability of Gopher Snake in the Westside
- Figure 5. Suitability of Western Harvest Mouse in the Westside
- Figure 6. Shannon Lake West Environmentally Sensitive Areas
- Figure 7. Shannon Lake West Environmental Nodes

Appendix B. Professional Resumes

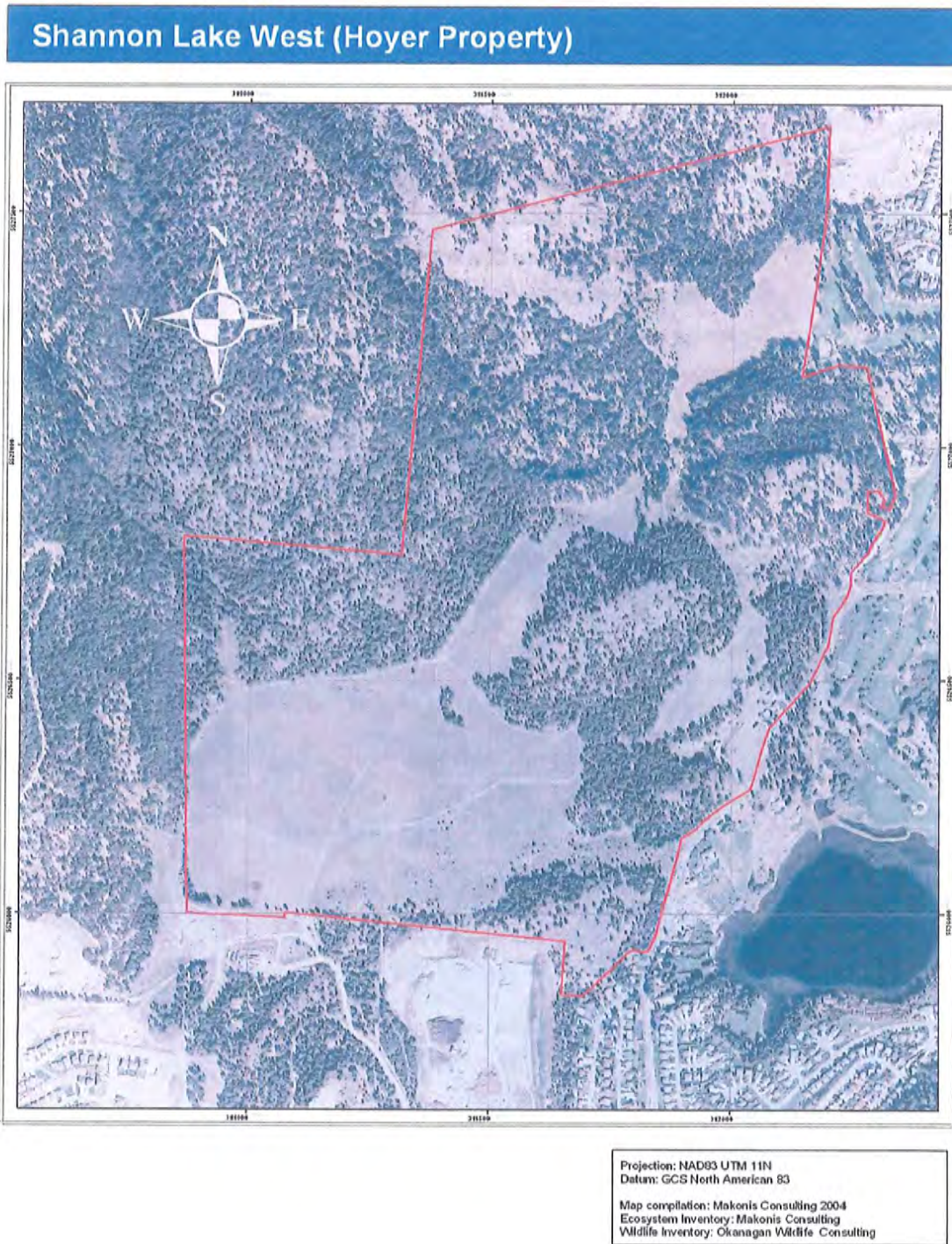


Figure 1. Shannon Lake Neighbourhood Plan Area assessed for this report, 2004

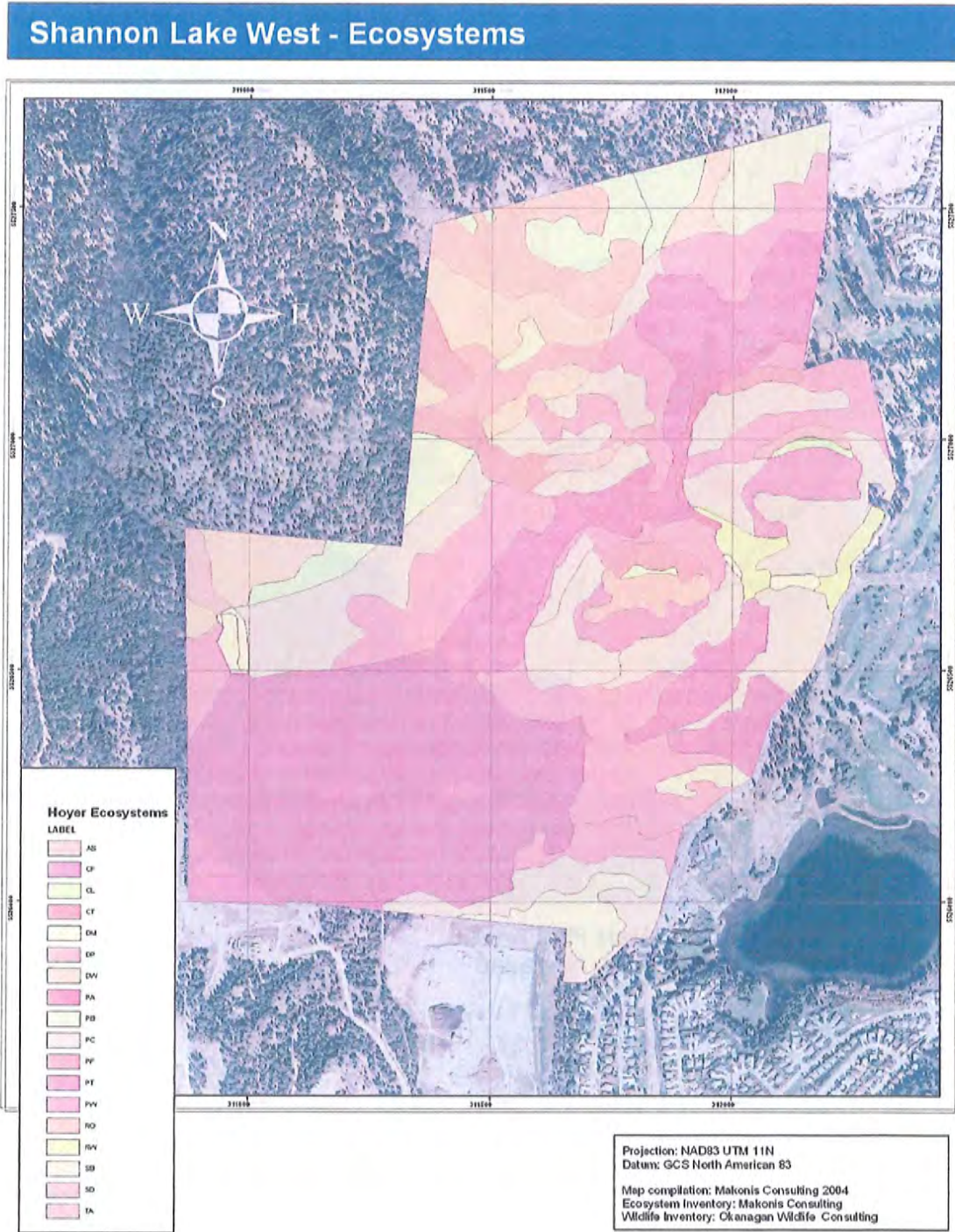


Figure 2. Ecosystems in the Shannon Lake Neighbourhood Plan Area compiled for this report, 2004

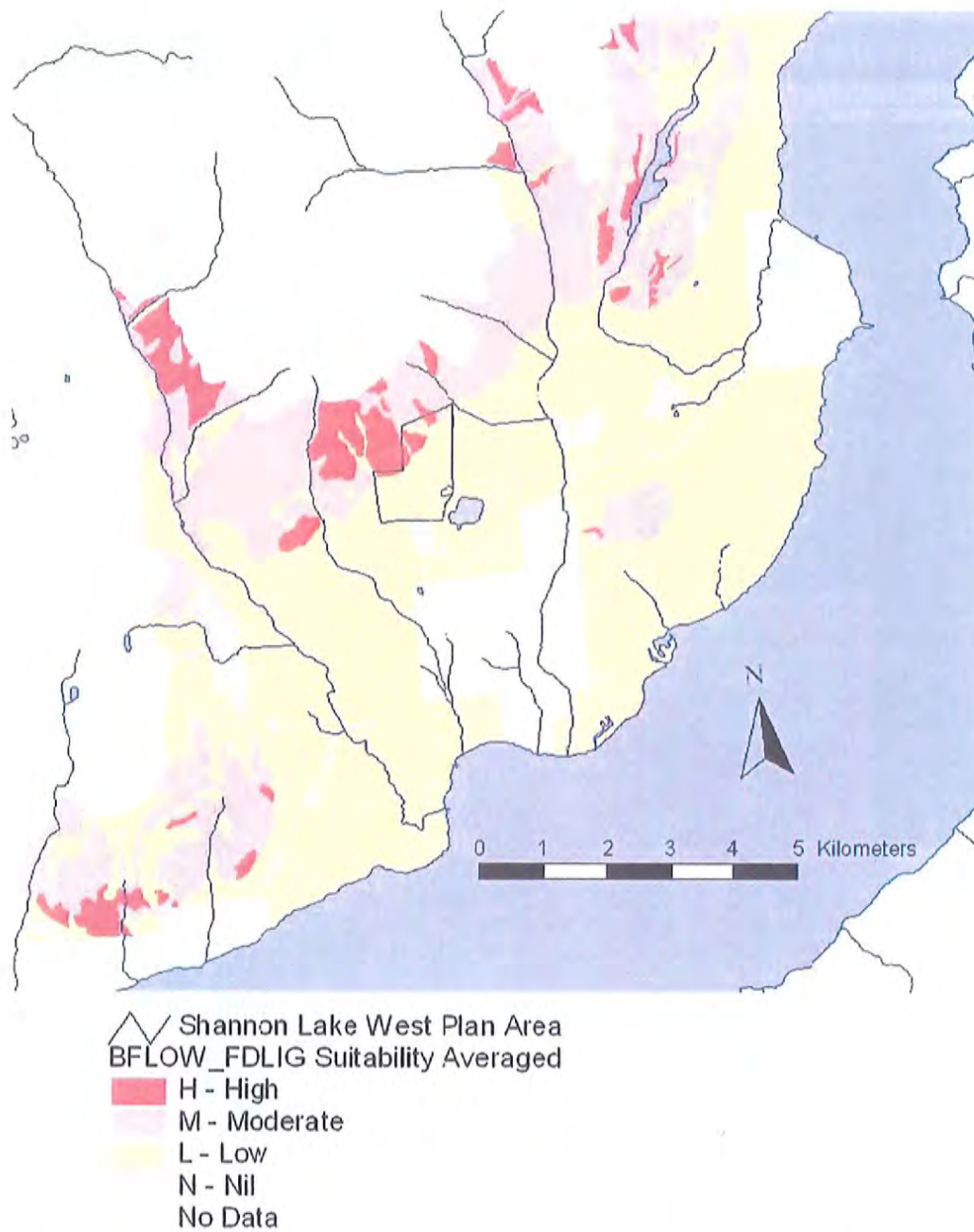


Figure 3. Central Okanagan TEM habitat suitability for Flammulated Owl in the Westbank and Lakeview Heights area, 2003.

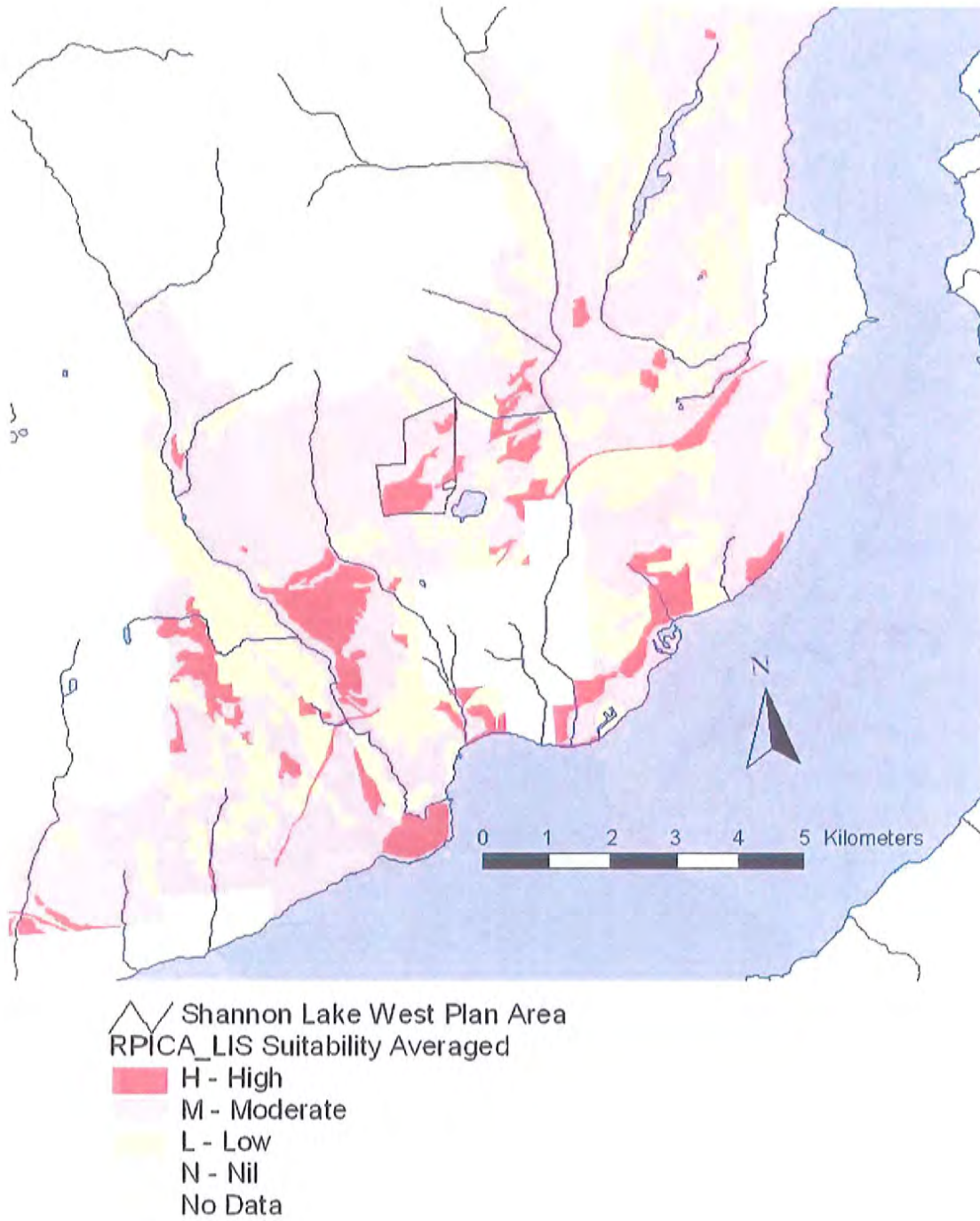


Figure 4. Central Okanagan TEM habitat suitability for Gopher Snake in the Westbank and Lakeview Heights area, 2003.

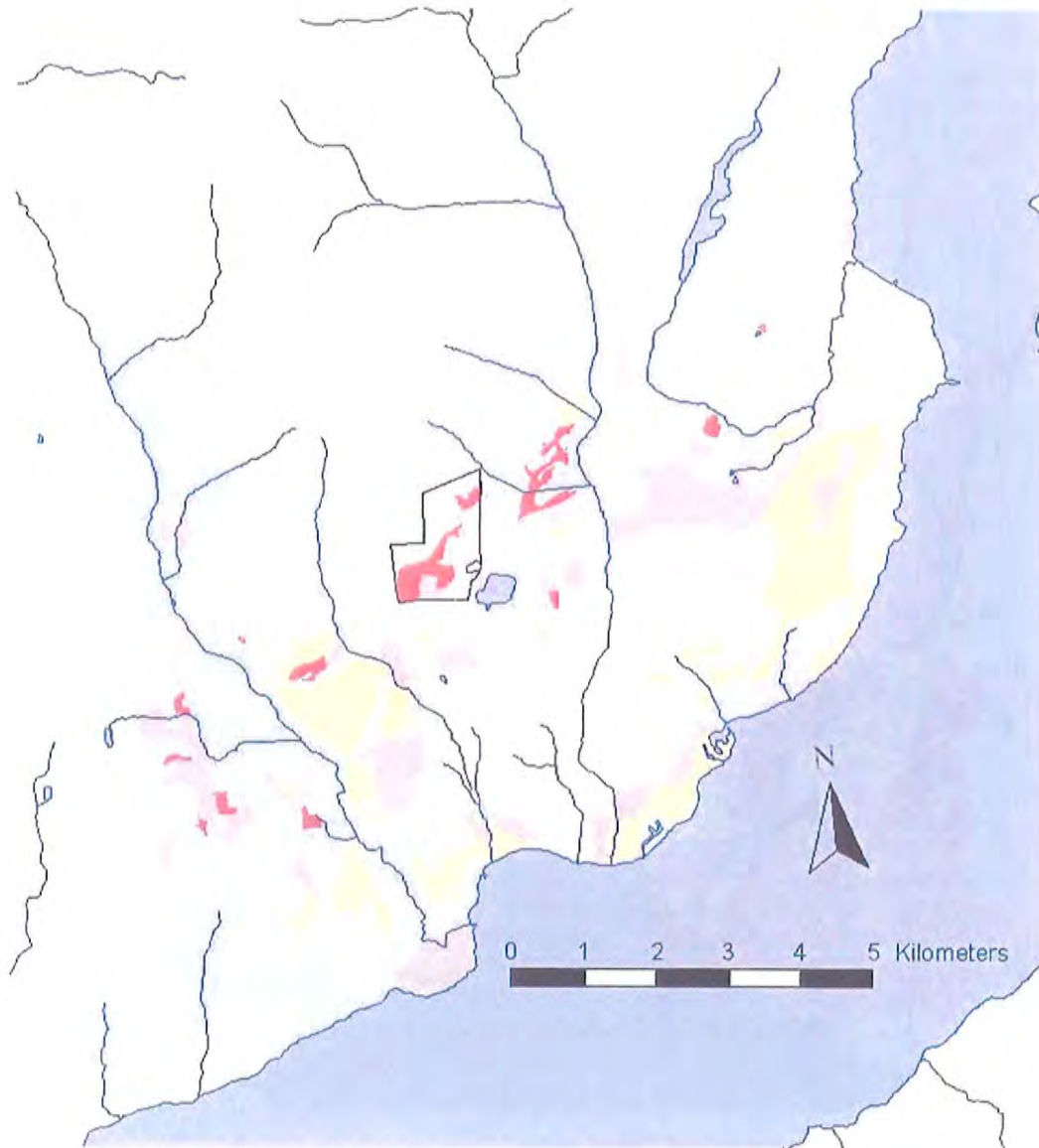


Figure 5. Central Okanagan TEM habitat suitability for Western Harvest Mouse in the Westbank and Lakeview Heights area based on newly-developed habitat model for this report, 2004.

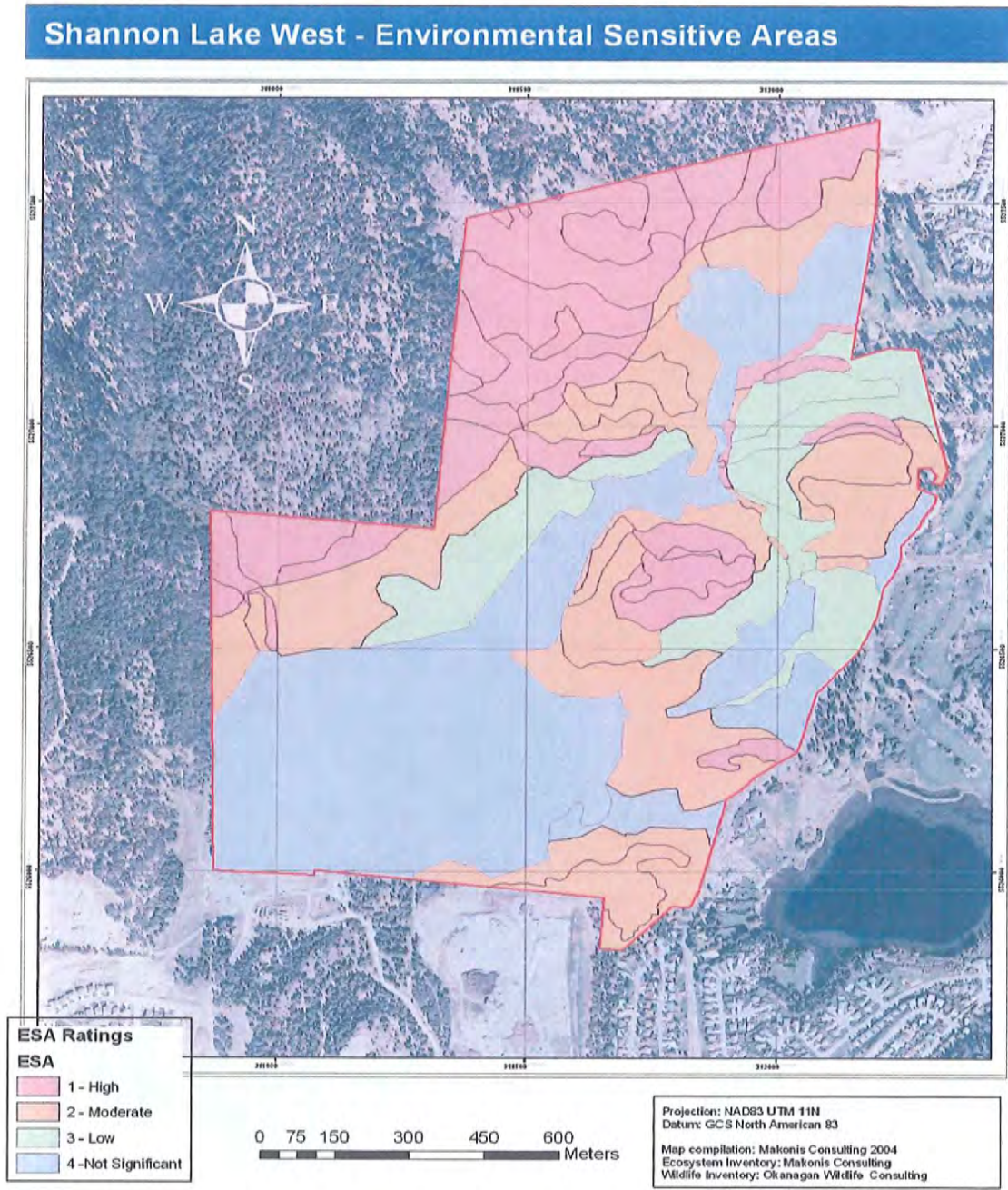


Figure 6. Environmental Sensitive Areas in the Shannon Lake Neighbourhood Plan Area compiled for this report, 2004.



Figure 7. Environmental Nodes in the Shannon Lake Neighbourhood Plan Area compiled for this report, 2004.