Phase 1 –Upper Glenrosa Area Plan

Summary & Recommendations

Appendices



Submitted to:

Darin Schaal, MCIP, RPP, Planner
City of West Kelowna
2760 Cameron Road
West Kelowna, BC V1Z 2T6

Golder Associates | Sustainable Communities

320-256 Wallace Street
Nanaimo, BC V9R 5B3
T: 250.754.5651
F: 250.754.1990

with:

Boulevard Transportation
a division of Watt Consulting Group

#8-2483 Main Street
West Kelowna, BC V4T 2E8
T: 778-313-1014

WATT Consulting Group

#310, 3016 – 5th Avenue NE
Calgary, AB T2A 6K4
T: 403-273-9001
Toll Free: 1-866-557-5713

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Appendices

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B: Public Consultation 1 Summary

C: Draft Scenario Maps & Summaries

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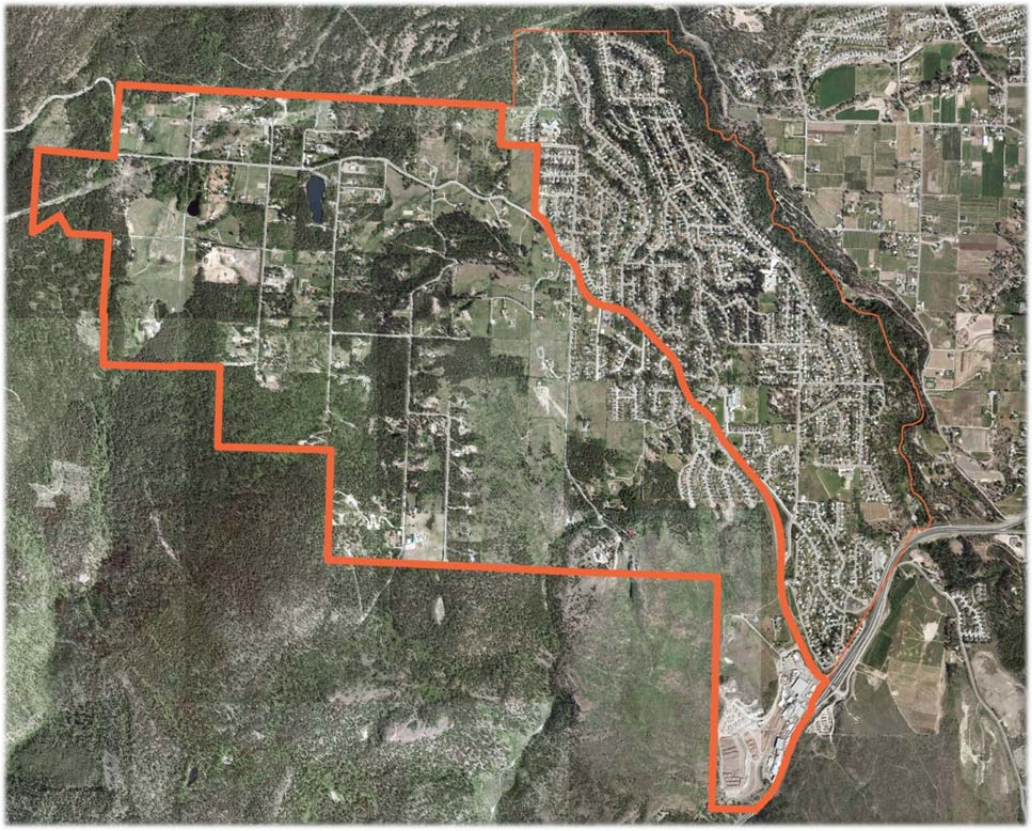
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APPENDIX A
Technical Memo 1

TECHNICAL MEMO

February 23, 2015

PHASE 1 UPPER GLENROSA AREA PLAN



Background Review & Area Analysis

Submitted by:
Golder Associates Ltd. with sub consultants:
Boulevard Transportation, a division of Watt Consulting Group
Watt Consulting Group

Submitted to:
Darin Schaal, MCIP, RPP, Planner
West Kelowna
2760 Cameron Road, West Kelowna, BC V1Z 2T6

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Golder Associates | Sustainable Communities

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Engineering Background Technical Memo

1.0 OVERVIEW

In May 2011, Council heard an appeal from Upper Glenrosa residents to consider developing an Area Plan for Upper Glenrosa. This appeal centered on the lack of potable water in the area and a request to look at whether bringing community water and other services to the neighbourhood was feasible and desirable. In 2014, Council identified the Phase 1 Upper Glenrosa Area Plan as an operational task to examine future land use and long term solutions to address the lack of/cost of servicing, and review transportation needs, including access/egress issues during emergency situations in Upper Glenrosa.

This technical memorandum and mapping package provides an initial review for the Upper Glenrosa Planning Area and marks Step 1 of the area planning process. This information is intended for internal discussion and provides the basis to develop public consultation materials for the first Open House, and subsequent draft planning options for the area.

Depending on public input received during Open House #1, a decision will be made whether to proceed with further planning for the area. If planning proceeds, draft planning options will be completed in Step 2 of this process with West Kelowna's Technical Committee and incorporate initial input from community and stakeholders obtained in Open House #1. Draft planning options will test future land use and address key issues such as long term solutions for lack of/cost of servicing and transportation needs (notably egress issues during emergency situations) in Upper Glenrosa. Should the land use, development and servicing options not be supported, the transportation component of the project will move forward for further assessment.

2.0 LOCATION

Upper Glenrosa Planning Area covers a geographical area just over six square kilometers and is located at the western entrance to West Kelowna accessible from Highway 97 along Glenrosa Road. The majority of Upper Glenrosa is surrounded by Crown Provincial land to the north, west, and south; currently, this land is under tenure as Westbank First Nation Community Forest. East of Glenrosa Road is the Lower Glenrosa Area, comprised mainly of established single-family homes. While the focus of this study is the Upper Glenrosa Area, it will consider the integration of land uses, servicing and transportation between the two areas.

Refer to Figure 1: Glenrosa Planning Area

3.0 NEIGHBOURHOOD PROFILE

There are 165 land parcels in the Upper Glenrosa Planning Area with an estimated 350 residents. The majority of homes are single-family detached residences on larger lots ranging from 2 ha to 4 ha (5 to 10 acres). Much of the community profile falls within the 45 and older age group and many residents are anticipated to reach retirement age within the next 5 to 10 years[1]. Anecdotal information suggests the demographic profile of the area is beginning to shift and new development is occurring. This trend is expected to continue as existing residents look to downsize, sell and/or relocate to other areas.

[1] Anecdotal information based on conversation with the Glenrosa Residents Association.

Within the greater Glenrosa Neighbourhood there are four schools, five churches, a community centre and a fire hall that also serve the Upper Glenrosa Area.[2] Westbank Centre is the nearest commercial and entertainment area and is accessible by car from Highway 97. Other nearby amenities include: a network of internal and external trails linking to the adjacent Community Forest, Glen Canyon Regional Park (to the east), Crystal Mountain Ski Resort (to the north) and Okanagan Lake waterfront area (to the south).

4.0 GEOTECHNICAL CONSIDERATIONS

A desktop review of potential geotechnical hazards and considerations was completed to support preliminary planning. It is recommended that a field survey should be conducted to corroborate areas where geotechnical hazards were identified during the desktop review, during more detailed planning phases of the Upper Glenrosa Area.

Refer to Figure 2: Preliminary Overview of Hydrogeological and Geotechnical Conditions

4.1 Rockfall/Rolling Rock Hazards

Potential rockfall/rolling rock hazards could exist below the areas where bedrock has been identified as shown on **Figure 2**. The potential for this type of hazard is greatest below natural rock faces or man-made bedrock cuts. These areas will require further investigation to confirm this as hazard areas. If confirmed, development below these areas should be avoided. Should development occur in a confirmed area, rockfall/rolling rock mitigation measures should be implemented, such as design and construction of rockfall barrier or installation of a rockfall protection mesh.

4.2 Steep Slopes

Development/construction on slopes greater than 30 degrees (measured from horizontal) would likely require site grading that would include cut and fill. Situations such as this would require a detailed geotechnical investigation and construction supervision to be undertaken to ensure the development area, as well as areas above are not subject to instability. See **Section 5.1** for further information on the topography of the Planning Area.

4.3 Landslide

As shown on **Figure 2**, one area within the Phase 1 Upper Glenrosa Area was identified as a possible old slide, observed from aerial photograph review. Further investigation of this area is required to confirm this is the case.

[2] Ibid.

5.0 HYDROLOGICAL CONSIDERATIONS

A desktop review of existing hydrological features in the Upper Glenrosa Planning Area was concurrently completed with the geotechnical review to identify potential hydrological opportunities and limitations to future development. Further detailed investigation is required to fill data gaps prior to development including:

- A detailed assessment of the potential for groundwater seepage for future growth/development areas identified;
- Detailed groundwater assessments, including, but not limited to: a comprehensive groundwater availability assessment for future growth/development areas, and groundwater protection planning for existing groundwater well users; and/or,
- Storm water disposal operational assessment to evaluate the efficacy of current storm water disposal systems in the Planning Area and to assess the feasibility of storm water disposal in future growth/development areas.

Refer to Figure 2: Preliminary Overview of Hydrogeological and Geotechnical Conditions

5.1 Topography

Topographic elevations range from approximately 925 meters above sea level (masl) at the southwest corner and 835 masl at the northwest corner, to 580 masl along the east-central boundary, to 500 masl at the southeast corner. The northwest portion plateaus at an elevation of approximately 775 masl, while the remainder of the Planning Area generally slopes to the east-northeast, towards Powers Creek, at a gradient of up to approximately 0.25 m/m. Steep gradients (up to 0.25 m/m) are present near the Gates Road area. Overall the planning Area is suitable for increased density and development. Areas with higher gradients may be best designated for parks and natural areas/corridors.

5.2 Hydrology

Three small ponds, including Glenrosa Pond, are located in the west portion and Law Creek including three of its tributaries are present in the northwest corner of the Planning Area. The Law Creek water system drains south, away from the Planning Area, towards Okanagan Lake. Three tributaries of Powers Creek are present in the north and central portions of the Planning Area; these tributaries drain to the north and/or east, towards Power Creek. Tributaries in the Planning Area are reportedly ephemeral. Any additional subdivision and development within the area will need to consider appropriate watercourse setbacks. More significant waterbodies may be opportunities for park spaces and natural conservations areas.

5.3 Surficial Geology

The surficial geology of the Planning Area generally comprises a blanket of glacial till (Tb; continuous till) overlying bedrock (Okulistch, 2013). In some areas along the south side of the Planning Area, the glacial till is described as a veneer (Tv; discontinuous till). Soils described on well records and in

previous reports prepared by Golder for portions of the Planning Area indicate that soil deposits typically consist of a mixed and interlayered sequence of clay, sand and gravel and/or glacial till. Well records suggest that soils range in thickness from <1 m to approximately 67 m (with an average thickness of 8 m). Possible land use implications may exist and would depend on a number of factors, including slope, actual soil type, soil thickness (for instance, bedrock may need to be blasted to level lot, depending on where proposed development is), whether effluent disposal will be in-ground (where clay or thin soil zone present, in-ground effluent disposal likely not feasible), etc. These aspects may need to be considered in greater detail and appropriate policy applied where restrictions exist.

5.4 Bedrock Geology

Bedrock in the Planning Area generally consists of fine clastic sedimentary rocks (mudstone, siltstone, shale) of the Kettle River and Springbrook Formations, with undivided volcanic rocks of the Marron, Kettle River, Springbrook, Marama and Skaha Formations in the southwest and southeast corners of the Planning Area (BC WRA). Geological mapping suggests that bedrock outcrops are present in the southeast corner of the Planning Area (Okulistch, 2013).

5.5 Hydrogeology – Existing Water Wells

Of the 116 registered water wells, 110 are reportedly completed in bedrock; while 6 are reportedly completed in unconsolidated deposits above the bedrock. The Planning Area aquifer is a bedrock aquifer (Number 304), and is classified as “IIB”, having moderate demand, low productivity and moderate vulnerability to surface contamination. Well records indicate that bedrock wells were drilled to depths ranging between 55 and 236 m below ground surface (mbgs) (average depth of 116 mbgs). An assessment of water bearing fractures (orientation, extents) was beyond the scope of this overview. Insufficient information (i.e., screen depths, water levels) was provided in the well records to allow for any comments with respect to a water bearing zone in the unconsolidated deposits.

Seven springs are located in the Planning Area; surface water licences for these springs indicate that water is/was utilized for domestic or irrigation purposes. A detailed review of the source of the springs and of each surface water licence was beyond the scope of this overview.

Water levels reported on the well records, where available, indicate that water levels ranged from 0.3 to 91 mbgs (with an average depth of 29 mbgs). A total of 6 well records reported “artesian” and/or “flowing artesian” conditions. Five of these wells are located along the east side of the Planning Area; one is located along the south side of the Planning Area. The Ministry of Environment (MOE) operates an observation well (Observation Well 411) at 3470 Gill Road. According to Ms. Nicole Pyett, Regional Hydrogeologist at MOE, only limited manual water level measurements are presently available for this well, and water quality has been not yet been assessed. Based on approximate groundwater elevations reported for the Planning Area, the inferred direction of groundwater flow in bedrock fractures is generally to the northeast.

Estimated yields provided on 103 well records for bedrock wells indicate that well yields across the Planning Area ranged from 0.3 USgpm (0.001 m^3/min) to 130 USgpm (0.5 m^3/min) with an average of 8 USgpm

(0.03m^3/min). A summary of the distribution of estimated well yields is provided in **Figure A** below. Approximately 63% of the wells reported estimated well yields of less than 5 USgpm (0.02m^3/min). Only 2 wells reported estimated well yields greater than 50 USgpm (0.2 m^3/min) (one at 75 USgpm (0.3 m^3/min), the other at 130 USgpm (0.5 m^3/min)).

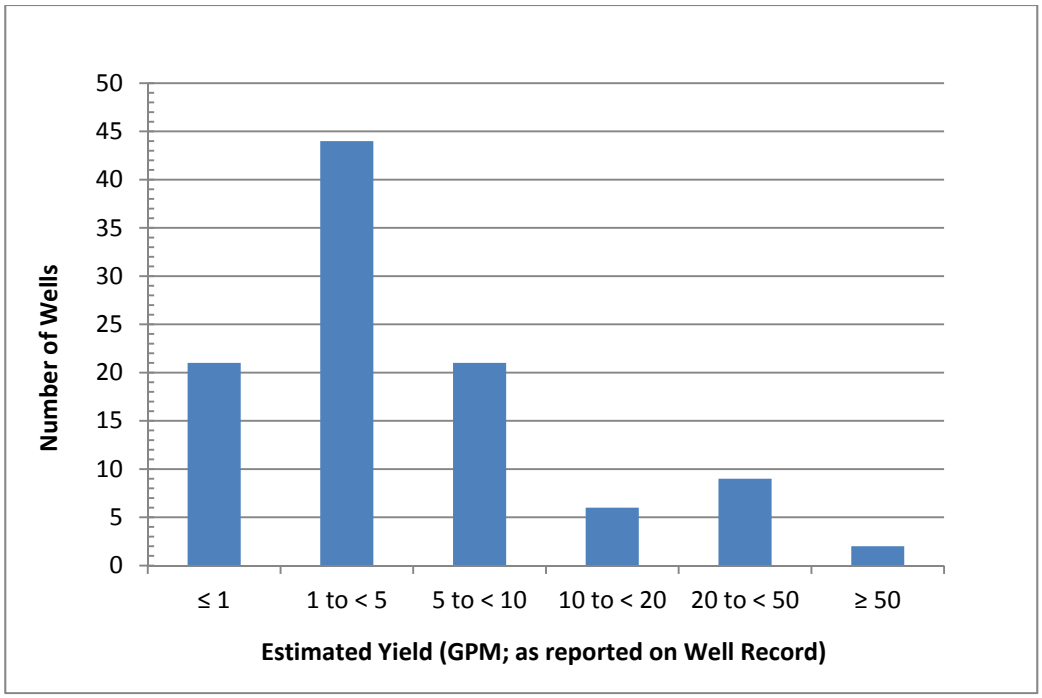


Figure A: Summary of estimated well yields reported for bedrock wells in the Planning Area

Collected data indicates an inconsistent variability of water yields obtained from resident wells and that many residents have to reach deeper to locate a water source. Wells as a water source for residents is currently difficult and use of well water as a primary water source may not be feasible for additional development within the area.

6.0 SENSITIVE ECOSYSTEMS ASSESSMENT

A desktop sensitive ecosystems assessment was conducted for planning purposes to identify potential areas where sensitive ecosystems could be affected by development. This involved compilation of:

- The most recent and updated GIS mapping data and reporting of the Sensitive Ecosystem Inventory (SEI) studies covering the Upper Glenrosa Area. This includes:
  - The SEI conducted for the Central Okanagan (2000-2001) (Iverson and Cadrin 2003), and
  - The 2009 update for the Central Okanagan (Haney and Iverson 2009).

  Locations of sensitive ecosystems, Sensitive Ecosystem Rankings, and Conservation Zones within the Site were identified as part of these SEI projects;

- GIS mapping data for West Kelowna Aquatic Ecosystem and Terrestrial Ecosystem Development Permit Areas (DWK 2011a);
- Fish occurrence records and stream habitat information for the Site (RDCO 2002; BC MOE 2015); and
- GIS mapping files of occurrence records for wildlife and plant species of management concern within the Site (i.e., designated as red- or blue-listed in BC, or federally listed as special concern, threatened, or endangered).

Data gaps and future projects to evaluate and establish environmental sensitivities that should be addressed in future phases of the Upper Glenrosa Area Planning process include:

- Completion of TEM / SEI mapping of the entire Upper Glenrosa Area (currently missing mapping of 54% of the total land area), and update to the previously mapped portion (which was based on 2005 aerial imagery);
- Consideration of West Kelowna's Aquatic DP area mapping for watercourses and waterbodies for establishment of prioritized Conservation Zones through updated SEI, particularly along the riparian corridors of Law and Powers creek tributaries. This is in addition to the protection afforded by designation of an Aquatic DP area. None of the riparian corridors within the Planning Area were considered to be Conservation Zones as part of the SEI completed in the area, which did not take into consideration the inherent value of headwater streams, their connectivity to Rainbow Trout and Kokanee spawning habitat, and their future potential for provision of wildlife corridor habitat, regardless of current disturbance levels;Detailed field survey(s) to assess the sensitivity of ecosystems identified through TEM/SEI desktop study, including surveys for wildlife and/or plant species of management concern that may occur in undeveloped or under-developed areas; and,
- Establish delineation of larger-scale Environmentally Sensitive Areas (ESAs), consistent with what was established for the Lower Glenrosa Neighbourhood Plan (PACE No date), and in keeping with West Kelowna's guidance.

As part of future neighbourhood planning, it is recommended that development be directed away from areas containing sensitive ecosystems, to areas assessed as not sensitive. Sensitive ecosystem areas that have been identified through previous study and through future studies will encompass a number of ecosystem types and will include:

- Areas determined to contain red- or blue-listed ecological communities;
- Areas assessed through TEM/SEI as being high and moderate SER and Conservation Areas;
- Riparian corridors (designated as DWK Aquatic DP areas);
- West Kelowna Terrestrial Ecosystem DP areas; and
- Areas delineated as ESA-1 or 2 (i.e., High or Moderate sensitivity) as part of future ground-based surveys.

If sensitive ecosystems cannot be avoided, West Kelowna should consider development of a habitat banking system (i.e., offsetting) to direct future habitat compensation requirements. This will be particularly useful as a planning tool if mitigation and compensation is not achievable within the land parcel to be developed. For

example, off-Planning Area compensation could be directed towards riparian enhancement of headwater tributaries of Law and Powers Creeks. This is in keeping with the recently developed provincial policy and guidance on environmental mitigation procedures (BC MOE 2014).

Refer to Figure 3: TEM, SEI Classes and Aquatic Habitat Features

6.1.1 Biogeoclimatic Zone

Based on data available on iMapBC 2.0 (Province of BC 2015), the Upper Glenrosa Planning Area occurs within three Biogeoclimatic (BGC) zones, from lowest to highest elevation: the Ponderosa Pine (PP) Very Dry Hot subzone (PPxh1), Interior Douglas-fir (IDF) Very Dry Hot subzone (IDFxh1), and IDF Dry Cool subzone (IDFdk2) (Province of BC 2013).

6.1.2 Identified Sensitive Ecosystems

The process of Terrestrial Ecosystem Mapping (TEM) provides a more detailed ecological characterization than BGC zone mapping, but is still relatively general compared to what is determined based on detailed site inventory. A TEM and Sensitive Ecosystem Inventory (SEI) project was conducted throughout the Central Okanagan in 2001 and 2009 (Iverson and Cadrin 2003; Haney and Iverson 2009). The initial 2001 project conducted by Iverson and Cadrin delineated TEM polygons (ecosystem units) based on bioterrain mapping using 1994 aerial photos at 1:15 000 scale. In the 2009 update, Haney and Iverson updated the TEM polygons using 2005 aerial photos at a scale of 1:10 000. To date, 46% of the Upper Glenrosa Planning Area, the eastern half has had TEM completed; TEM mapping has not been completed for the western half of the site.

Following updated TEM analysis, the updated SEI process involved classification of each map unit / decile as a sensitive, important, or non-sensitive ecosystem. The SEI method uses additional criteria than just the ecological community when determining the sensitivity of an ecosystem, and generalizes groups of ecosystems with similar ecological sensitivity (i.e., environmental specificity, susceptibility to hydrological changes, soil erosion, spread of invasive plants and sensitivity to human disturbance), ecosystem processes, conservation status and wildlife habitat values (BC MOE 2006).

Within the eastern half of Planning Area, available TEM/SEI mapping has determined there is a total area of 28.5 ha (4.4% of the Planning Area's total area) comprised of sensitive ecosystems. The remaining mapped area (324 ha, or almost 50% of the Planning Area's total area) is not sensitive, and is comprised of non-sensitive immature forest stands, cultivated fields, urban / suburban and rural land use, road surfaces, and exposed soil. It should be noted the orthophotography base shown on Figures 3 and 4 is from 2012 and the TEM/SEI conducted in 2009 was based on 2005 aerial imagery. As a result, the TEM/SEI units assigned to specific polygons may not reflect what is present now (or in 2012), if site alterations have occurred. For example, the Glenrosa fire in 2009 would have changed some features, particularly in the southeast portion of the Site, and the classifications would likely be different if based on more current imagery.

Based on preliminary visual interpretation of 2012 orthophotography of the remaining un-mapped portion of the Planning Area (western half), it appears that another approximately 25% of the Planning Area's total area is most likely not sensitive (cultivated fields, rural land use, road surfaces), with the remaining un-mapped areas

(approximately 21% of the total Planning Area) comprised of potentially sensitive Douglas-fir and Ponderosa pine dominated coniferous woodlands, riparian ecosystem areas surrounding watercourses (i.e., the undisturbed riparian corridor segments of Law Creek and Powers Creek tributaries), broadleaf woodlands, and wetlands (i.e., large ponds). More detailed map interpretation and ground-based surveys are required to confirm actual presence of sensitive ecosystems in the Planning Area.

The majority of area mapped as sensitive ecosystems as part of the TEM/SEI project (26.5 ha, or 4.1% of total Upper Glenrosa Area), is coniferous woodland. These areas are located primarily toward the south end of the Planning Area, and have connection to the Mount Drought area. There are additional areas of coniferous woodland at the northeast corner, and middle of the Planning Area (See **Figure 3**). Smaller areas of sensitive ecosystems are made up of sparsely vegetated (0.7 ha), riparian (0.6 ha), wetland (0.4 ha) and grassland or disturbed grassland (0.3 ha) habitat. The two sparsely vegetated areas are within polygons that also contain coniferous woodland ecosystems at a higher decile (therefore not shown on **Figure 3**), and are located at the south end of the Planning Area. The two riparian areas are also on the south edge of the Planning Area (**Figure 3**). One of the wetland areas is visible on **Figure 3** (largest decile), and is on the south edge of the Planning Area, with the other two smaller wetland areas located within polygons also containing riparian habitat (visible on **Figure 3**). The one small area containing grassland habitat is within another polygon containing coniferous woodland, on the southeast edge of the Planning Area.

6.1.3 Identified Rare Ecological Communities

Within the sensitive coniferous woodland, riparian, and grassland areas there are ecological communities that are also considered to be rare in the Province of BC. Red-listing of an ecological community by the BC Conservation Data Centre (BC CDC) means it is considered extirpated, endangered, or threatened in BC. Blue-listing means the ecological community is considered to be of special concern in the province, and is at-risk, but not currently extirpated, endangered, or threatened. Within the Planning Area, these provincially-listed ecological communities include two blue-listed forested ecosystems (Douglas-fir – Ponderosa Pine – Bluebunch Wheatgrass – Pinegrass and Ponderosa Pine - Red three-awn), one red-listed forested ecosystem (Ponderosa Pine - Bluebunch Wheatgrass - Rough Fescue), one red-listed riparian ecosystem (Douglas-fir – Water Birch – Douglas Maple), and one blue-listed grassland ecosystem (Bluebunch Wheatgrass – Balsamroot).

In terms of legal protection provided to red- or blue-listed ecosystems in BC, there is limited legislated status unless the ecosystems are demonstrated to provide habitat for wildlife species listed under the federal *Migratory Birds Convention Act* (Government of Canada 1994) or in some special cases, the *Species at Risk Act* (Government of Canada 2002). Wetlands and riparian ecosystems can be protected under the BC *Water Act* (Government of BC 1996), during approvals for development activities in and around water when a Section 9 *Water Act* permit is required, and under the provincial Riparian Areas Regulation (RAR) of the *Fish Protection Act* (Government of BC 2004). They are also afforded protection if they are within areas mapped as an Aquatic Ecosystem or Sensitive Terrestrial Ecosystem Development Permit Area by West Kelowna.

6.1.4 Sensitive Ecosystem Ranking (SER)

As part of the 2009 updated SEI process, Haney and Iverson also conducted conservation analysis. The scores were based on a combined calculation which considered two factors: the SEI value (from 0 to 10) for each map unit (ecological communities) which considers the relative rarity, sensitivity and general importance to wildlife and the current condition, and also the wildlife habitat values, which consider the presence of important habitat requirements for 10 rare species that occur in the Okanagan. These species included amphibians (Great Basin spadefoot; *Spea intermontana*), reptiles (painted turtle; *Chrysemys picta* pop. 2, western rattlesnake; *Crotalus oreganus* and gopher snake; *Pituophis catenifer deserticola*), birds (Lewis' woodpecker; *Melanerpes lewis*, flammulated owl; *Psiloscops flammeolus*, western screech-owl; *Megascops kennicottii macfarlanei* and yellow-breasted chat; *Icteria virens*) and mammals (American badger; *Taxidea taxus* and California bighorn sheep; *Ovis canadensis*) (Haney and Iverson, 2009). Wildlife habitat ratings were based on habitat requirements that were either general (e.g., nesting and foraging) or important for specific life stages (e.g., egg-laying or breeding). The SEI values were then combined with the wildlife species at risk habitat values, with a two to one weighting of ecosystems to wildlife, to determine the overall conservation value of the ecosystem. This process was completed individually for each of the up to three ecosystem components within each TEM polygon, with the highest conservation value given to the entire polygon.

Within the areas of the Planning Area that have been mapped, the majority of the area has been ranked as SER3[3]. There are three small polygons mapped as SER1 on the south edge of the Planning Area. These are located around two ponds near Gates Road, and on the upstream end of Hardy Slough (See **Figure 4**). There are four SER2 polygons also on the south edge of the Planning Area, and one on the north edge of the Planning Area (See **Figure 4**). The ranking of SER2 considers that even anthropogenically modified landscapes can still provide habitat values.

To protect sensitive ecosystems, West Kelowna has delineated Sensitive Terrestrial Ecosystem Development Permit (DP) Areas, and there are a number of Terrestrial DP Areas within the Planning Area. However, portions of the Planning Area affected by the 2009 Glenrosa fire may have current conditions different than what was present in 2005 (which was the basis for SEI and Terrestrial DP designation). As a result, the SER and Terrestrial DP designations may require updating, based on current conditions.

Refer to Figure 4: Sensitive Ecosystem Ranking and Conservation Zones

[3] **SER1** areas contain ecosystems with **high** conservation value (scores of 7 to10) that are locally and provincially significant and critically important to rare wildlife species;

SER2 areas contain ecosystems with **medium** conservation value (scores of 3 to 6.9) with ecosystem rarity and sensitivity and rare wildlife species value considered to be of moderate ecological importance; and,

SER3 areas contain ecosystems with **low** conservation value (scores of 0 to 2.9) that are considered to have little or no inherent ecological value or wildlife habitat importance.

6.1.5 Identified Conservation Zones

Following calculation of conservation values and production of a conservation values map, the updated SEI also delineated Conservation Zones based on the size, concentration and connectivity of high value areas (Haney and Iverson 2009). The conservative process used by Haney and Iverson was designed to capture the highest conservation values of each polygon. Priority conservation areas were classified as Core Conservation Areas, Buffers, Wildlife Corridors, and Other Important Conservation areas.

Within the areas of the Planning Area that have been mapped, a Wildlife Corridor has been delineated extending from near the mainstem of Powers Creek, north (upstream) of the Planning Area, continuing southward, and joining a large area delineated as a Core Conservation Area, along an east-facing slope. The Core Conservation Area extends south of the Planning Area, and is buffered on its perimeter by a Core Conservation Buffer (See **Figure 4**). Based on visual examination of orthophotography and topography, it is not immediately apparent why the Wildlife Corridor was established in this location, as it is not along any obvious riparian corridors or valley features, and crosses a number of roads and rural properties with cultivated fields. The Core Conservation Area covers the Mount Drought area which provides known habitat for mule deer (*Odocoileus hemionus*) (Gyug 1994; 1999) and potential habitat for California bighorn sheep (Stelfox 1993; Gyug 1994).

Refer to Figure 4: Sensitive Ecosystem Ranking and Conservation Zones

6.1.6 Plant and Animal Species of Management Concern

A geographical query of iMapBC 2.0 found no occurrence record for plant or animal species of management concern within the Planning Area (Province of BC 2015). This does not mean these species are not potentially present in the Planning Area, it just means that surveys and inventory work conducted to-date within the area has not resulted in observation records that have been provided to the provincial government. Further study may be required prior to future development of the Upper Glenrosa Area.

6.1.7 Aquatic Habitats

The Planning Area contains two primary aquatic habitat areas, within two watersheds. Law Creek (watershed code: 310-742200-03600) is a 6.8 km long, 2nd order tributary of Trepanier Creek that ultimately drains to Okanagan Lake. There are no fish records available for Law Creek or its three tributaries located within the Planning Area (BC MOE 2015); however Trepanier Creek is a known Kokanee (*Oncorhynchus nerka*) spawning habitat area, and also contains Rainbow Trout (*O. mykiss*) (BC MOE 2015). A fish habitat assessment for Law Creek conducted further downstream of the Planning Area determined there is a gradient barrier (i.e., > 20% slope), which constitutes an obstruction to upstream fish passage (Trumbley 1997).

Powers Creek (watershed code: 310-766700) is a 29.4 km long, 4th order, fish bearing tributary of Okanagan Lake with four tributaries within the Planning Area (BC MOE 2015). There are no fish records for the tributaries within the Planning Area; however the Powers Creek mainstem (outside of the Planning Area), contains areas of Kokanee and Rainbow Trout spawning habitat (BC MOE 2015). There have been a number of instream enhancement projects conducted in the past in Powers Creek, including removal (blasting) of a rock chute barrier to fish passage in 1999, addition of approximately 40 cubic yards of gravel for Kokanee spawning enhancement in 1992, cleaning of spawning gravel in 1993, and installation of a fishway to improve Kokanee

and Rainbow Trout passage. The Kokanee spawning habitat in Powers Creek is considered extremely important and Powers Creek is considered one of the two major Rainbow Trout spawning areas in the Okanagan.

The riparian (terrestrial) habitat surrounding these streams and tributaries has the potential to serve as wildlife corridors, if they are in an undisturbed state. According to the TEM/SEI mapping conducted within the lower half of the Planning Area, the authors determined that the anthropogenic disturbances to the Powers Creek tributaries within the Planning Area were at a level that reduced the ecological value to low (i.e., none of the Powers Creek riparian corridors within the Planning Area have been assigned moderate or high SER value, or are considered to be a Conservation Zone or Wildlife Corridor). The Law Creek riparian corridors were not within the area mapped for TEM/SEI.

Sensitive Habitat Inventory and Mapping (SHIM) was conducted on streams within the Regional District of Central Okanagan (RDCO) by District staff in 2001 and 2002 (RDCO 2002). Streams and other aquatic habitat features (i.e., ponds) mapped as part of the SHIM project were incorporated into Aquatic Ecosystem DP areas within West Kelowna (DWK 2011a). These mapped Aquatic DP areas have been established "*for the protection of watercourses such as streams, ponds, and wetlands and the critical habitat and biodiversity in their riparian areas*" (DWK no date). The objectives of creating the Aquatic DP areas were to broadly protect, restore, and enhance aquatic ecosystems, protect vital fish and wildlife features and functions (including habitat, travel corridors and refuge and breeding areas), to implement RAR for protection of fish habitat, and to protect water quality and quantity (DWK 2011b). The Aquatic DP areas generally incorporate 30 m assessment area to the watercourses and waterbodies (i.e., ponds) regardless of current habitat conditions. These buffers should be maintained where future development is considered.

Within the Planning Area, the entire lengths of all Law Creek and Powers Creek tributaries, and the large pond features, are designated as Aquatic DP areas by West Kelowna, although the SHIM characterization of these watercourses are as generally ephemeral and undefined, or ditched, with little remaining natural riparian vegetation or current ecological value as a wildlife corridor, critical habitat, or area with high biodiversity (RDCO 2002). The designation of Aquatic DP area considers the inherent value of these aquatic features and the need to protect and enhance them for protection of fish, provision of wildlife corridors and habitat, as well as water quality and quantity. The mainstem of Powers Creek (which is not within the Planning Area boundaries) and Trepanier Creek (which is downstream of Law Creek and the Planning Area boundaries) provide valuable salmonid spawning habitat which is protected under the federal *Fisheries Act* (Government of Canada 1985) and provincial *Water Act* (Government of BC 1996). Upstream disturbances to the headwater tributaries of these salmonid systems should therefore be avoided, with habitat enhancement and restoration prioritized to protect fish and water quality.

7.0 CURRENT PLANNING CONTEXT

7.1 Official Community Plan

The vision and guiding principles outlined in the Official Community Plan (OCP) establish objectives and policies that direct future land use and servicing decisions for West Kelowna. These should be used to guide the development of the Upper Glenrosa Area Plan. In addition, the OCP emphasizes sustainability, sustainable growth and the importance of distinct neighbourhoods within West Kelowna. The following sections review these policies and implications for development in the area.

Refer to Figure 5: Current Planning Context

7.1.1 Growth Management Designation

Within the OCP, the Growth Management Designation (GMD) identifies growth priority areas and their broad attributes and characteristics according to the Community Vision. The Upper Glenrosa Area contains three Growth Management Designations. These include:

1. Rural Reserve
2. Neighbourhood
3. Neighbourhood Centre

Each designation is described briefly below and reflects the general intent of the designation. Specific policies for each are found within the OCP.

The majority of the Planning Area is designated as “Rural Reserve” which is outlined as, “West Kelowna's rural edge that defines the extent of settlement areas and preserves rural resources.” This designation intentionally maintains lands in rural use for their intrinsic and/or natural resource values, including delineation of settlement areas, protection of landscape scale conservation objectives, and preservation of watersheds. The OCP specifically outlines a need to consider development within already serviced areas for efficiencies in infrastructure. It also suggests within the next 5 to 10 years, no new additional greenfield areas in Rural Reserve lands are expected to be required to meet the growth needs of the community. As well, subdivision in the Rural Reserve is not supported under current OCP policy, except where zoning amendments are not required and minimum parcel sizes within the designation can be met.

The south east area adjacent to Glenrosa Road is identified as “Neighbourhood”. This is described as follows: “The residential fabric of the community to provide a diversity of living options.” The intent is to preserve the character of existing neighbourhoods, but allow for the development of a variety of housing choice and encouraging a more ‘complete community’ in these areas.

A Neighbourhood Centre is also identified in this south east area. The centre is designated to accommodate small local service commercial node (such as small market grocery, personal services, daycare, etc.) within a 10-minute walk for the majority of homes in the Neighbourhood Areas and in support of transit access, associated with multiple family housing (intensive residential).

Should future land use change and/or additional development occur, consideration of growth management designations outlined in the OCP is necessary under the OCP’s General Objectives and Policies for Growth Management and to meet specific policies for each designation that occurs within the Planning Area. Based on the current OCP, housing intensity and provision for smaller, locally focused commercial services should be focused within the designated ‘Neighbourhood Centre’ area, allowance and opportunities for increased housing diversity or infill should be focused within existing ‘Neighbourhood’ areas, and limited land use changes or development types within what is now, the ‘Rural Reserve’ area should be considered to maintain the character and objectives of that designation and lessen greenfield development and efficiencies of infrastructure for West Kelowna.

7.1.2 Land Use Designations

Current land use designations in Upper Glenrosa are shown in Table 1.

Table 1: Current Land Use Designations in Upper Glenrosa Area

Current Land Use Designation	Area (sq.km)*	Percent of Total Area in Upper Glenrosa	Accounts for Total Land Use Area within West Kelowna**	Policy Notes within each Land Use Designation
Rural Residential	5.0	79%	73%	• does not support zoning amendments to permit future subdivisions within the Rural Reserve Growth Management Designation and/or outside the Rural Reserve Boundary • encourages sensitive infill development • encourages good design and built form for new development that is pedestrian friendly and transit supportive • encourages and supports a diversity of housing options • suggests to locate higher density forms of housing near corridors, or in neighbourhood centre nodes
Single Family Residential	0.7	11%	5%	
Low Density Multiple Family	0.03	1%	2%	
Parks & Natural Areas	0.08	1%	1%	• policy supports a well-connected park and trail system with a diversity of park types • provision for 5% or cash in lieu at time of subdivision or DCC for purchase of park spaces • policy seeks to protect and conserve ~20% of natural and sensitive areas • requires sufficient open space is provided to offset an increased densities where new development occurs • the area plan must specify parks, open space, pedestrian and linear corridors and major recreation facilities • At time of subdivision or zoning amendment the OCP requires a Statutory Right of Way (SRW) for public access where trails are included in a Greenways and Greenbelt Plan, or adjacent to creek corridors or as otherwise identified (in addition to, and outside, any riparian management area requirements)
Agricultural	0.2	3%	2%	• Applications to the Agricultural Land Commission to remove lands from the ALR will not be supported except in extraordinary circumstances where such exclusion would otherwise be consistent with the goals, objectives and other policies of the OCP.
Institutional	0.01	<1%	1%	• Area Plans must consider future school sites
Industrial	0.26	4%	15%	• Discourage non-industrial land uses in the area of Gorman Bros. Mill that would lead to long-term conflict with the operation of the mill. A buffer area, including at minimum landscaping, fencing and the consideration of specific land uses, should be established for any proposed non-industrial development in this vicinity.

Commercial	0.01	<1%	2%	• Support form and character enhancement of the existing small Neighbourhood Centres in Glenrosa
Total Area	6.29			

* Upper Glenrosa Planning Area only

** Calculated using land use designation areas indicated in DWK OCP

The Upper Glenrosa Area does not have local commercial, institutional and formal park areas, although this is not unusual as it is a rural area with a low housing density. Located at the edge of West Kelowna, it offers greenspace and natural area opportunities within adjacent Crown Lands. Should the area see an increase in development, additional commercial could be supported and consideration for an increase in amenities (local parks, schools, etc.) would be required.

The Upper Glenrosa Area currently accounts for 73% of West Kelowna's rural residential land use. Should this area develop with greater density, availability of rural residential land use in the community could significantly decrease (depending on the type of development allowed). With this, the OCP's residential policies do not support zoning amendments to permit future subdivisions within the Rural Reserve Growth Management Designation and/or outside the Rural Reserve Boundary.

As a primarily rural single family residential area, the range of housing options in Upper Glenrosa is limited and due to the rural nature, transportation is nearly exclusively by personal vehicle. Currently, it is a challenge for residents to "age in place" and this typically results in the need to relocate should people require alternate housing options to rural single family. Given that the demographic of this area is aging, an increase in housing options may be of development interest to the community to allow existing residents interested in downsizing or moving to older adult-oriented housing to remain in the neighbourhood.

7.1.3 Economic Sustainability Policies and Commercial Policies

Should future development occur within the Upper Glenrosa Area, built form, style and character (i.e., the "look and feel") will need to consider the larger Glenrosa neighbourhood and seek to further develop its own unique identity as a community through land use allocation, lot size, design guidelines and/or other means.

More specifically, there are four policies within the OCP that directly refer to the Glenrosa and/or Upper Glenrosa Areas. These policies are classified as Economic Sustainability Policies and Commercial Policies. The four policies are stated below.

- *Avoid any changes in land uses in the area of Gorman Bros. Mill on Highway 97 in Glenrosa that would lead to long-term conflict with the smooth operation of the mill.*
- *Support form and character enhancement of the existing small Neighbourhood Centre at Glenrosa by allowing limited commercial and service use that supports the local neighbourhood.*
- *Consider the establishment of new Neighbourhood Centres only as part of broader area planning processes.*
- *Avoid zoning that would result in commercial or tourist accommodation uses on Crown or private lands abutting the road between Upper Glenrosa area and Crystal Mountain Resort.*

7.2 Zoning

The Upper Glenrosa area is currently zoned “rural residential” this includes zoning for small, medium and large parcels with lot sizes ranging from 5 to 10 acres. Additional zoning within the area includes “country residential” and “rural resource”. The cumulative purpose of these zones is to facilitate rural, agricultural, and residential land use in the neighbourhood.[4]

7.3 Development Permit Areas

The Upper Glenrosa area contains areas that fall within the following development permit areas:

- Sensitive Aquatic and Terrestrial Development Permit Areas
- Hillside and Wildfire Interface Development Permit Areas

See sections 5.0 and 6.0 for additional information related to these areas.

8.0 TRANSPORTATION NETWORK

The Upper Glenrosa Neighbourhood is accessed via Glenrosa Road, an arterial road constructed to a rural standard. Glenrosa Road extends from the Highway 97 interchange to the Crystal Mountain Ski Resort (beyond the DWK Municipal Boundary). The north end of Glenrosa Road also connects to forestry roads behind Carrot Mountain and Mount Hayman that provide a circuitous connection to Traders Cove / Westside Road. An additional access near the Highway 97 interchange is provided at Lower Glenrosa Road, which connects the Glenrosa neighbourhood to Westbank Centre.

The neighbourhood is predominantly large-lot with rural road standards and limited connectivity to the west and standard single-family residential closer to south end of Glenrosa Road. Aside from automobile travel, the area is known for horseback. The neighbourhood has limited access and egress, no cycling facilities, limited and disconnected pedestrian infrastructure, and transit services do not extend into the Upper Glenrosa Neighbourhood.

Refer to Figure 6: Transportation Overview

8.1 Glenrosa Road

Glenrosa Road is classified as an arterial road. The existing construction of Glenrosa Road has deficiencies in vertical curvature, horizontal curvature, and cross-section design that affect sight lines, vehicle operations, and safety of motor vehicles and vulnerable road users. Posted speeds along Glenrosa Road are 50km/h with operating (85th percentile) speeds of 72km/h south of Morningside Drive and 67km/h north of McIver Road. The intersection of McIver Road is known to have poor sightlines, no sidewalks, and an unsafe pedestrian crossing.

[4] District of West Kelowna (2014). Zoning Bylaw No. 0154

8.2 Neighbourhood Access and Egress

During the 2009 wildfires, over 4,500 homes in the Glenrosa Neighbourhood were evacuated. The limited access / egress for the neighbourhood has since been a critical concern for residents. West Kelowna's Transportation Master Plan identifies potential connections to increase access/egress. The following section elaborates on the connection routes and illustrates alternatives. These routes include:

- a connection to Trepanier (in the RDCO);
- a bridge over Glen Canyon / Powers Creek;
- an emergency egress connection to Highway 97 or Highway 97C; and
- connect Glenrosa Road and Smith Creek Road to a future New Connector Route to the north

The Transportation Master Plan identifies the potential for a Ministry New Connector Route north of the community that could provide a connection between Smith Creek and Glenrosa as well as a connection to a potential future Peachland bypass. The Ministry is currently conducting the Central Okanagan Planning Study looking at potential routes for a future second crossing of Okanagan Lake. The study commenced in the fall of 2014 and has a three-year duration. This could greatly influence access / egress to the Upper Glenrosa neighbourhood if the study recommends an alignment similar to the New Connector Route. If a route similar to the New Connector Route is provided then upgrades to Glenrosa Road and Smith Creek Road are required to connect. It is also anticipated that the New Connector Route would connect to Trepanier in the RDCO.

Refer to Figure 7: Transportation Access Options

8.2.1 Trepanier Connection

The Trepanier Road connection would provide a link from Glenrosa Road to Trepanier Road or MacKinnon Road in the RDCO. The Trepanier Road connection could potentially be made from Glenrosa Road around Mt Law to connect to Trepanier Road (see Option B, Figure 7). The MacKinnon connection would be made in between Mt Law and Mt Drought (see Option A, Figure 7). The constructability of these routes and potential for development along them are challenged by the terrain and environmentally sensitive areas.

8.2.2 Glen Canyon / Powers Creek Connection

The Glen Canyon / Powers Creek connection would incorporate a two-lane bridge to connect Smith Creek to Glenrosa. This option would provide needed additional access to both neighbourhoods and eliminate trips between the two neighbourhoods via Highway 97. As such, a change in travel patterns may direct more traffic through the Glenrosa and Smith Creek neighbourhoods. Densifying Upper Glenrosa land use would further impact these roads by adding additional vehicle trips.

Potential connections may be made from:

- Webber Road to the Powers Creek Water Treatment Access: This would involve upgrading the existing access road to an urban standard (see Option D, Figure 7).

- Webber Road to Glencoe Road or Shetler Drive: Providing access from Webber Road is likely undesirable from the neighbourhood as the east ridge (facing Glen Canyon) is currently fully developed with single-family residential (see Option C, Figure 7).
- Glenrosa Road to Smith Creek Road: This would connect as an arterial link or connection to the New Connector Route. This option would have the least impact to neighbourhood roads (see New Connector Route, Figure 7).

8.2.3 Highway Emergency Egress

The Highway Emergency Egress would require a new road to connect an emergency only route to Highway 97 south of the Gorman Brother's Lumber Mill (see Option F, Figure 7) or Highway 97C along Mount Drought (see Option E, Figure 7). These options would not provide full-time access or a connection to the Smith Creek neighbourhood. Due to the close proximity of the Highway 97 / Highway 97C and Highway 97 / Glenrosa Road interchanges full-time access would likely not be granted by the Ministry. West Kelowna's Fire Department typically has concerns with emergency access only routes and additional discussion regarding this option for egress is required.

8.2.4 Evaluation of Alternatives

Alternatives should be evaluated for benefits versus costs considering the following:

- overall lifecycle cost of alternatives
- cost sharing opportunities with other agencies
- utility (how will it get used) and development potential
- impacts on existing roads / neighbourhoods

The New Connector Route would be a Ministry facility. The benefit to this is that the direct costs would be made by the Ministry and West Kelowna would then tie-in. This option would provide a connection west of Glenrosa (Trepanier) and connect to Smith Creek. Going forward, the results of the Central Okanagan Planning Study will greatly influence the access and egress alternatives.

8.3 Existing Multi-Modal Profile

This section describes the existing transportation infrastructure for alternate modes. Recommendations made are in consideration that the neighbourhood will be densified.

Refer to Figure 8: Existing Pedestrian Facilities

8.3.1 Pedestrian Facilities

Pedestrian facilities in the Upper Glenrosa Area are limited. **Figure 8** shows the existing sidewalk infrastructure and nearby schools and community centres with circles illustrating 5- and 10-minute walking trips. The walking

circles extend across Glenrosa Road into the Upper Glenrosa Area indicating areas with high potential for walking to/from schools but without a connected sidewalk network.

Some segments of the east side of Glenrosa Road have one-side sidewalk from Walnut Glen Drive to Glen Abbey Place and McGinnis Road to Gates Road. The Morningside Road, Yorkton Road subdivision, which is one of the only areas that provides an urban cross-section (curb and gutter) in Glenrosa, has one-sided sidewalk. The proposed Salco development will connect to these streets south of the development and to the Webber Road / Glenrosa Road intersection.

There is a limited network of off-road trails in the Upper Glenrosa Area. If development occurs, there will be opportunities for linear park connections and recreational trail connections that can be integrated with parks to provide nodes for recreation. This will encourage active transportation, recreation, and provide a higher degree of connectivity for pedestrian travel within the neighbourhood.

There are traffic calming initiatives currently underway in the Glenrosa Neighbourhood that will improve safety for pedestrians including:

- adding asphalt curbing to separate some shoulders for pedestrian travel, and;
- a special crosswalk improvement to Glenrosa Road at McIver, subject to future intersection improvements (unknown timeline).

However, these planned improvements are mostly focused on areas outside of the Upper Glenrosa Planning Area.

For future planning and development of the Upper Glenrosa Area, providing a walkable neighbourhood should consider the following aspects:

- Network connectivity of sidewalks and off-road pathways to key activity centres (i.e. schools, community centres, commercial centres, and so on). This includes improving connections to the existing Glenrosa Neighourhood.
- Ensuring accessibility infrastructure design including curb drop design, suitable sidewalk and trail grades (vertical and cross grades), and enhanced crossing treatments where warranted.
- Minimize the distance of pedestrian crossing where applicable. This may include the use of curb bulbs, median refuges, and other traffic calming elements that will reduce pedestrian exposure to the roadway and enhance the pedestrian environment.
- Linear trail connection through the neighbourhood (as applicable).

8.3.2 Bicycling Facilities

There are no bicycle facilities in the Upper Glenrosa Area, however a small number of cyclists have been observed on Glenrosa Road. Important cycling trips can be generated by schools, commercial properties, and within the neighbourhood. Future plans to include bike lanes on Glenrosa Road may encourage cycling commuting to and from the neighbourhood.

While standard road cross-sections will guide the types of cycling facilities, the following aspects of road design and maintenance as they pertain to cycling should be considered:

- Steep grades or moderately steep grades over long distances may warrant the provision of bicycle climbing lanes (wider bike lanes to give a cyclist space to sway).
- Maintenance for removal of debris from the shoulder / bike lane.
- Supporting signage and pavement markings for designated bicycle routes.
- End use facilities such as bike parking at key trip generators (commercial, office, institutions, parks, and so on).
- Network connectivity to other cycling routes and off-road trails.

8.3.3 Transit Facilities

Existing transit service is provided by the 21 – Glenrosa route along Glenrosa Road and the areas to the east of Glenrosa Road. The route is shown in **Figure 8.** Route 21 provides service to Westbank Centre and transfers to the 97 – Okanagan route with rapid bus service to the City of Kelowna. Weekday peak service frequency is approximately one trip every 30 minutes, with a total of 22 trips per day. Service operates on Saturday and Sunday with reduced frequency.

Glenrosa Road is identified in the *Central Okanagan Transit Future Plan*[5] as a part of the "Frequent Transit Network" that will experience convenient, reliable, and frequent service (15 minutes or better). If transit service into the Upper Glenrosa Area were considered, the following should occur:

- Create an interconnected road network so transit may loop through the neighbourhood. The existing segmented network would likely not be cost effective to operate. Appropriate density in residential dwellings would be needed to support frequent service (i.e. 15-minute service or better during peak hours).
- Provide sidewalk and pathway connections to bus stops.
- Bus stops should generally be designed as at-curb facilities (i.e. no bus bay), but consideration may be given to bus bays where warranted[6].
- Add bus stop amenities including, but not limited to: benches, shelters, route information, trash receptacles, bike parking, and light (for safety and security).

8.3.4 Parking Facilities

Area land uses are primarily single-family homes with parking in driveways and garages. Parking demand is generally met on-site.

[5] http://bctransit.com/kelowna/transit-future/central-okanagan-transit-future-plan

[6] Consideration should be given to BC Transit's *Infrastructure Design Guidelines*, available at: http://bctransit.com/servlet/documents/1403640670226

Consideration should be given to the following parking management approaches as the land uses and development form for Upper Glenrosa are established:

- Specific parking supply rates suitable for all non-single family residential land uses (possibly different from Zoning requirements).
- Appropriate road widths to accommodate on-street parking, if desired. Alternatively, small on-street parking "pockets" may be defined.
- Shared public parking supplies where commercial and multi-family residential land uses are nearby.
- Appropriate public parking restrictions (user, time) in areas of mixed land use and/or higher density.

9.0 SERVICING & INFRASTRUCTURE

An overview of existing servicing in Upper Glenrosa is provided in **Figure 9.**

Refer to Figure 9: Existing Glenrosa Service Area

9.1 Water System Overview

Potable water in the Glenrosa neighbourhood is supplied from the Powers Creek Water Treatment Plant. The 8,000 m^3 reservoir at the plant supplies the Westbank Service Area, in which Glenrosa forms a part. The system serves approximately 5,325 people (~1,775 households) and a number of community/institutional buildings within the entire Glenrosa neighbourhood. Additionally, the Coventry Crescent pump station is equipped with three 100 hp vertical turbine pumps to provide pressure boost; and a reservoir on Glenrosa Road provides 500,000 gallon (1,893 m^3) of storage. There is full hydrant coverage within the current Glenrosa service boundary. The Glenrosa area straddles four pressure zones. The existing water distribution network is shown in **Figure 10**.

According to an August 6, 2010 Council Report, 165 existing homes in the Upper Glenrosa Area are unserviced. A pumping deficiency in the Lower Glenrosa area requires pump station upgrades which is currently being upgraded with a fourth pump.

Refer to Figure 10: Existing Glenrosa Water System

9.1.1 System Capacity

This OCP change may ultimately change the long term demands of the Powers Creek Treatment Plant and may change timing of storage expansion as WID PZ 583 is recommended in the 10-20 year capital plan.

The 2014 Water Utility Master Plan (Master Plan) completed by AECOM has identified a storage shortfall of 1,111 m^3 in PZ 673 and PZ 640. It has also noted in the report that PZ 583, which is partly within Glenrosa, is part of a larger groups of zones that collectively has a storage shortfall of 3,932 m^3.

Design for additional storage to accommodate the Salco and Glen Eagles Developments, as well as the 20 year growth in PZ 673 and PZ 640 are in the 2015 budget, with construction to be considered in the 2016 budget in accordance to the 10-year plan.

It is assumed that the pumping shortfall outlined in the same council report is being addressed with the current upgrade at the Coventry Crescent pump station.

The Master Plan has also identified three areas of watermain upgrade in the Glenrosa neighbourhood. These involve upsizing the watermains in Weber Road; Glenrosa Industrial Area; and McIver/Gorman Road to provide adequate flow.

9.1.2 Service Potential

In order to address the current storage shortfall and expand the distribution network into the unserviced homes in the higher elevations of Upper Glenrosa, it would be necessary to provide additional reservoir storage and additional pumping capabilities. This would involve expanding the existing reservoir and pump house, or acquiring new site(s) for these facilities.

Three potential tie-in locations have been identified (Figure 9) to expand the distribution system where it may provide opportunity for system looping. The Westbank Irrigation District has installed a 400mm main between Glenrosa Road and McIver Road as part of the plan to service Upper Glenrosa.

The 2010 council report provided a preliminary cost estimate for a conceptual design to extend water servicing to the existing unserviced parcels. This includes the pump house upgrade; additional pump house and reservoirs; supply trunk line; and distribution mains to service 165 homes in Upper Glenrosa. Further study should be done to determine the locations for future reservoirs and booster stations. The estimated cost is in the neighbourhood of $15,500,000. It is considered that these estimates, which are based on a 2006 review and concepts only, reasonably reflect current costs. This works out to about $94,000 per household. This cost per household would be expected to decrease if development densities increase in the area which would increase servicing efficiency.

9.2 Sanitary System Overview

The Glenrosa neighbourhood is serviced collectively by the Glenrosa sanitary gravity trunk line along Glenrosa Road. The line turns east at Glen Abbey Place and runs southeast towards Highway 97. Once the line crosses the highway it runs along Gellatly Road South until it reaches the tie-in point with the Regional District of Central Okanagan (RDCO) West Bank trunk line south of the Canyon Ridge community. Following approximately 231 m of the RDCO 750mm diameter gravity line, effluent reaches Westside Regional Wastewater Treatment Plant for treatment. The Glenrosa trunk line was first constructed in the early 1990s and almost all the pipes are PVC, with a few Perma Loc IV pipe sections. The line measures just under 5 km from Gates Road to the RDCO line tie-in as shown in **Figure 11**.

There are two lift stations in operation in the Glenrosa neighbourhood. Both the Glengary and Inverness lift stations service approximately 215 homes east of the trunk line. It is not expected new development in Upper Glenrosa west of the trunk line would contribute flow to these two lift stations.

The Glenrosa trunk line serves approximately 5,910 people (approximately 1,970 homes) in the area. This includes two communities south of Highway 97 and also a number of community/institutional buildings. Approximately 260 homes in Upper Glenrosa west of the trunk line are already serviced, leaving approximately 170 unserviced homes.

Refer to Figure 11: Sanitary Expansion Opportunities and Restrictions

9.2.1 System Capacity

Currently the total effluent peak flow rate (including infiltration) discharged from the trunk line is approximately 102 litres per second (L/s). Based on the West Kelowna sanitary system design criteria, analysis shows the existing trunk line is under capacity to service the connected homes in Glenrosa. It also has the capacity to connect 170 unserviced homes in Upper Glenrosa, which would add approximately 6.7 L/s peak dry flow rate.

Four sections of the trunk lines have been identified to have available capacity of less than 100 L/s. This is based on design criteria of the peak hour design flow at 75% of the full pipe capacity. The section near the Weber Road Community Centre contains two pipe sections that have the lowest available capacity at 44 L/s and 46 L/s (Section 1 in **Figure 11**). This is well capable of servicing the additional 170 homes mentioned above.

The other three sections have available capacities of 71 L/s; 95 L/s and 97 L/s respectively matched to the Sections 2 through 4 shown in **Figure 11**. It is worth mentioning that the trunk line outfall has available capacity of 108 L/s. Whether these sections would be a limited factor for future trunk system depends where the tie-in locations would be. Without contributing flow data from other areas of the region, it has not been confirmed what capacity is available in the RDCO West Bank Trunk Line and at the wastewater treatment plant.

To provide more accurate estimate that reflects actual flow, we recommend implementing flow monitoring at strategic points. Further study can be done by modelling the entire system based on actual flow patterns for pre- and post-development scenarios.

9.2.2 Service Potential

Based on the lowest available capacity of 44 L/s mentioned above, and an estimated density of 30 people per hectare single family zoning, this would equate to an additional peak flow rate (including infiltration) from about 1,100 single family homes or 3,300 people in the Upper Glenrosa Area. This means the existing trunk line may handle flow from additional 1,100 homes in Upper Glenrosa Area.

At least three potential tie-in locations have been identified for system extension in the Upper Glenrosa Area (**Figure 11**). This includes extending the trunk line at Glenrosa Road/Gates Road in the West and South directions, and also from the existing stub near Glenrosa Road at Highway 97.

The topography in Upper Glenrosa slopes generally towards east and north, which suggests new development should occur first from lower elevations in the east and north towards the higher elevations to facilitate gravity flow.

It is estimated that about 14 km of sewer mains would be necessary to service the existing 170 homes in Upper Glenrosa. The estimated cost is about $5,000,000, and works out to about $29,500 per household. This cost per

household would be expected to decrease if development densities in the area increase which would increase servicing efficiency.

Refer to Figure 11: Sanitary Expansion Opportunities and Restrictions

9.3 Storm System Overview

The existing stormwater system for the Glenrosa Watershed basin is described in detail in the "District of West Kelowna Master Drainage Plan" (MDP) prepared by RSB Engineering, October 25, 2011. Section 3 of the report lists seven projects in the Lower Glenrosa Neighbourhood that were required to address current deficiencies in the existing stormwater system. The majority of the existing stormwater system is a network of roadside ditches and culverts along with some small detention areas. The newer developed areas west of Glenrosa Road have been constructed with curbs and a piped storm system that ties into the existing network of roadside ditches and culverts. The runoff from the Glenrosa watershed basin ultimately discharges into Powers Creek.

9.3.1 Service Potential

Based on the assumption that these projects were completed the MDP listed five future areas of development within the Glenrosa watershed basin. These five areas included a 5.6 ha area north of Canary Drive, a 10.1 ha area south of Ranch Road, a 3.6 ha area south of Gorman Road, a 25.4 ha area south of Morningside Drive and a 2.1 ha area south of Inverness Road. The MDP provides stormwater design recommendations for these five areas including the allowable release rates and estimated stormwater storage requirements.

Other than the seven projects identified in the MDP, there is no current stormwater deficiency identified in the Upper Glenrosa Area. There is no new construction cost required to maintain the status quo.

If additional future development is planned further modeling and an update to the MDP would be required. If neighbourhood land uses change from rural to urban, it could significantly increase stormwater flow, impacting the existing storm system. Analysis of potential urban development areas will be necessary to identify future upgrades to the existing stormwater system as well as any future stormwater infrastructure or facilities, such as storage areas and downstream corridor upgrades, that will be required to meet the runoff quality and quantity requirements for West Kelowna.

10.0 LIMITATIONS

The technical memorandum was prepared for the exclusive use of West Kelowna, and was prepared for the purposes of satisfying the requirements of West Kelowna RFP No. 2014 10 P348, Phase 1 – Upper Glenrosa Area Plan. The information in this technical memo is based on an overview-level desk-top review of available data and information for the Planning Area. Golder has relied in good faith on information provided by others and does not accept responsibility of any deficiency, misstatements or inaccuracies contained in the technical memorandum as a result of omissions, misinterpretation and/or fraudulent acts of the persons interviewed or contacted, or errors or omissions in the reviewed documentation.

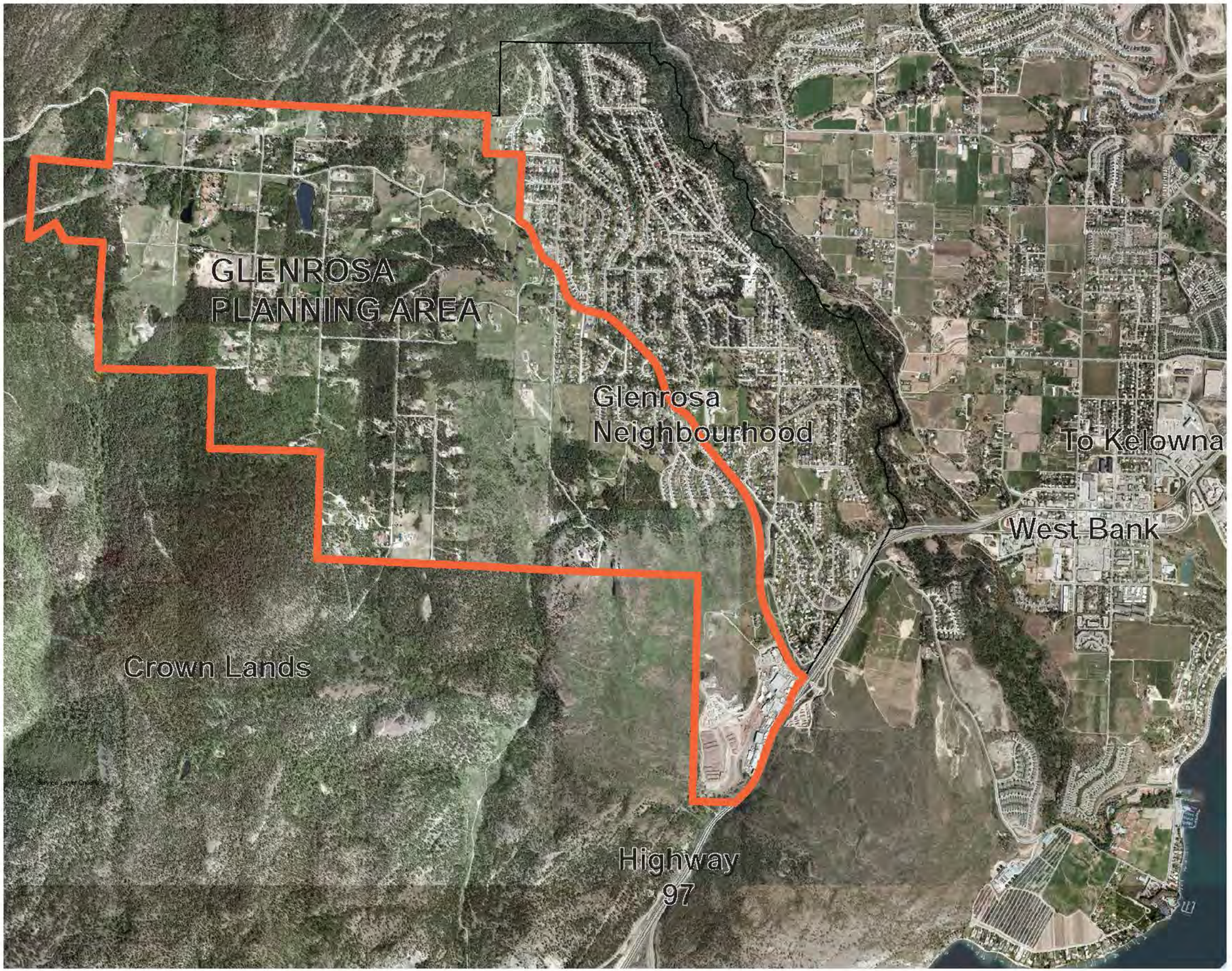
Any use which a third party makes of this technical memorandum, or any reliance on, or decisions to be made based of it, are the responsibilities of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken, based on this technical memorandum.

The services performed as described in this technical memorandum were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

11.0 CLOSURE

We trust the information contained in this report meets your present requirements. If you have any questions or concerns regarding the information provided above, please contact the undersigned.

APPENDIX A: MAP FIGURES



DRAFT

0 500 1,000

1:20,000 METRES

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
GLENROSA PLANNING AREA

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	PA
PREPARED	DL
REVIEWED	####
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

0 25mm

LEGEND

- UPPER GLENROSA AREA
- GLENROSA AREA

SURFICIAL DEPOSIT

- Af - ALLUVIAL FAN SEDIMENTS
- Ca - SCREE DEPOSIT
- Go - SUBAERIAL PROGLACIAL OUTWASH FAN SEDIMENTS
- Gx - ICE CONTACT SEDIMENTS
- La - DEEP WATER SEDIMENTS
- O - ORGANIC
- R - BEDROCK
- Tb - CONTINUOUS TILL COVER (BLANKET)
- Tv - DISCONTINUOUS TILL COVER (VENEER)

- POTENTIAL ROCKFALL / ROLLING ROCK HAZARD
- GROUNDWATER AQUIFER
- CADASTRAL PARCEL
- WATERBODY
- WATERCOURSE
- WATER LINE
- SANITARY SEWER LINE
- STORMWATER PIPE
- CONTOUR (10m)
- INFERRED DIRECTION OF GROUNDWATER FLOW IN BEDROCK FRACTURES
- GROUNDWATER WELL
- SPRING POINT OF DIVERSION
- POSSIBLE OLD ROCKSLIDE

DRAFT

0 500 1,000

1:20,000 METRES

NOTE(S)
1. STORMWATER PIPES ARE INCOMPLETE AND HAVE NOT BEEN VERIFIED FOR CORRECTNESS.

REFERENCE(S)
1. SURFICIAL GEOLOGY FROM GEOLOGICAL SURVEY OF CANADA.
2. POTENTIAL ROCKFALLS AND ROLLING ROCK HAZARDS FROM GOLDER ASSOCIATES LTD.
3. STORMWATER PIPES, WATER LINES, SANITARY SEWER LINES, CADASTRAL PARCELS, AND CONTOURS FROM DISTRICT OF WEST KELOWNA.
4. SPRING POINT OF DIVERSION FROM B.C. MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS.
5. WATERCOURSES FROM RDCO, 2001-2003.
6. WATERBODIES FROM IHS.
7. GROUNDWATER WELLS FROM BC MINISTRY OF ENVIRONMENT.
8. HILLSHADE PREPARED BY DDD, DERIVED FROM THE DIGITAL ELEVATION MODEL SUPPLIED BY GEOBASE.
9. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
PRELIMINARY OVERVIEW OF HYDROGEOLOGICAL AND GEOTECHNICAL CONDITIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	PA
PREPARED	DL
REVIEWED	####
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

PATH: N:\Client\District_of_West_Kelowna\Upper_Glenrosa\09_PROJECT\1416015_W Kelowna_Glenrosa\02_PRODUCTION\Phase1\WP\08\report\1416015_GEOTECH_HYDRO_Figure_3_Surficial_Geology_and_Hydrogeology.mxd

LEGEND

BASE DATA
- UPPER GLENROSA AREA
- GLENROSA AREA
- WATERBODY (1:50,000)
- WATERCOURSE (1:20,000)

TEM/SEI DATA (HANEY AND IVERSON 2009)
- TEM POLYGON (LABELLED WITH LARGEST DECILE UNIT)

SENSITIVE SEI CLASSES
(POLYGON CONTAINING ANY 3 DECILES WITH SENSITIVE CLASS)
- CONIFEROUS WOODLAND (WD)
- RIPARIAN (RI)
- SPARSELY VEGETATED (SV)
- WETLAND (WN)

SHIM DATA (RDCO 2002)
- TOP OF BANK
- CULVERT
- DISCHARGE
- EROSION
- MODIFICATION
- OBSTRUCTION

FISH OBSERVATION RECORDS (MOE 2014)
- FISH OBSERVATION

DWK DEVELOPMENT PERMIT AREAS (DWK 2014)
- AQUATIC
- TERRESTRIAL

DRAFT

0 500 1,000
1:20,000 METRES

REFERENCE(S)
1. LOCATIONS OF SHIM FEATURES (CULVERTS, DISCHARGE, EROSION, FISH OBSERVATIONS, MODIFICATIONS, OBSTRUCTIONS, TOP OF BANKS) AND WATERCOURSES FROM RDCO, 2002.
2. TEM/SEI FROM HANEY AND IVERSON, 2009.
3. AQUATIC AND TERRESTRIAL DEVELOPMENT PERMIT AREAS FROM DISTRICT OF WEST KELOWNA, 2014.
4. WATERBODIES FROM IHS.
5. ORTHO IMAGERY FROM DISTRICT OF WEST KELOWNA, OCTOBER 2012.
6. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
TEM, SEI CLASSES AND AQUATIC HABITAT FEATURES

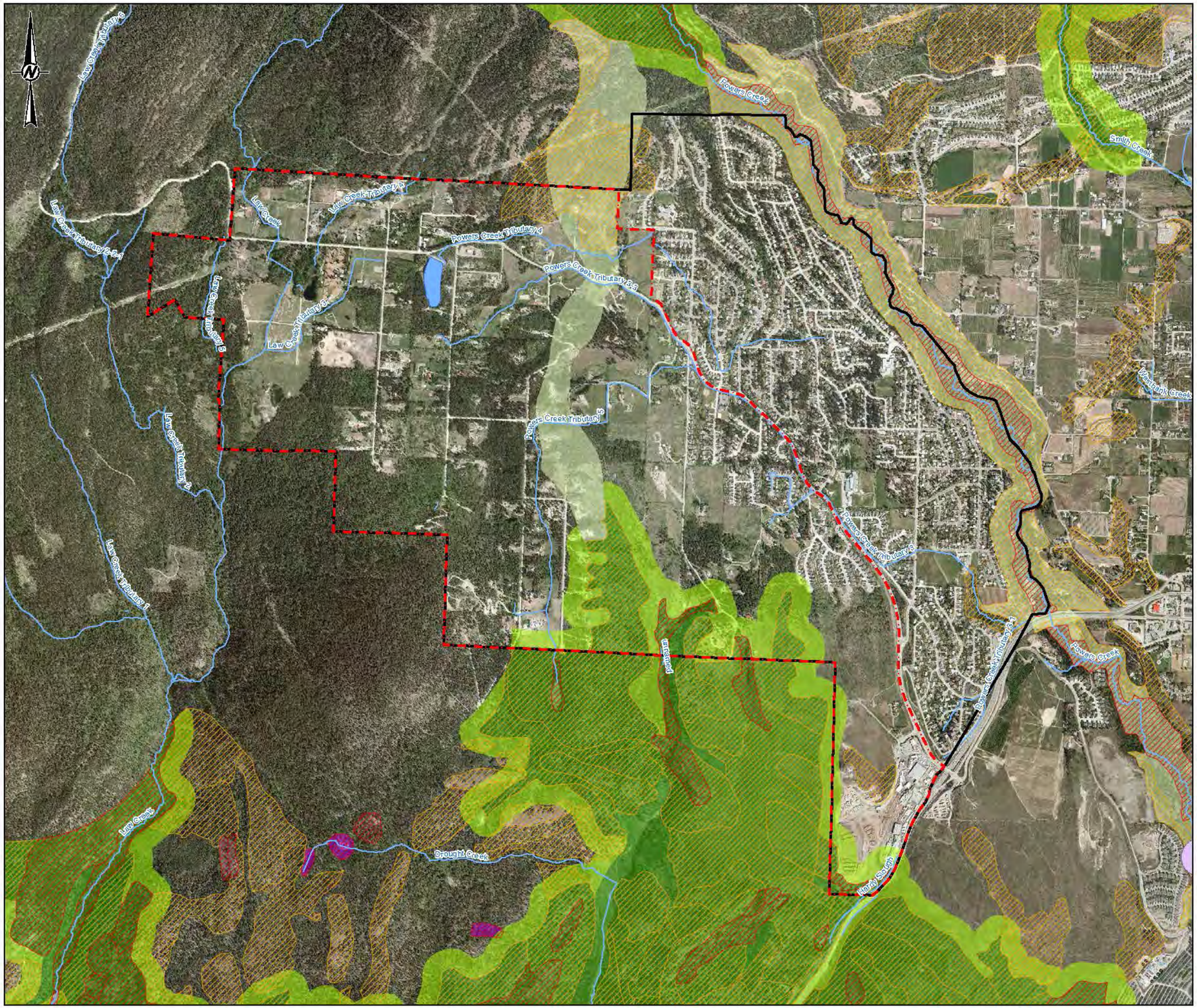
CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	LMH
PREPARED	DL
REVIEWED	DJA
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

PATH: N:\Client\District_of_West_Kelowna\Projects\Glenrosa\09_PROJECT\TS\1416015_WKelowna_Glenrosa\02_PRODUCTION\Phase1\WK\04report\1416015_TERRESTRIAL_figure_1_TEM_wrd_Watercourses.mxd



LEGEND

BASE DATA
- UPPER GLENROSA AREA
- GLENROSA AREA
- WATERBODY (1:50,000 SCALE)
- WATERCOURSE (1:20,000 SCALE)

SEI DATA (HANEY AND IVERSON 2009)

CONSERVATION ZONES
- CORE CONSERVATION AREA
- CORE CONSERVATION BUFFER
- WILDLIFE CORRIDOR
- OTHER IMPORTANT CONSERVATION AREA

SENSITIVE ECOSYSTEM RANKING (SER)
- HIGH
- MODERATE

DRAFT

0 500 1,000
1:20,000 METRES

NOTE(S)
1. REMAINDER OF MAPPED AREA THAT IS NOT DESIGNATED AS A MODERATE OR HIGH SENSITIVE ECOSYSTEM RANKING IS RANKED LOW.

REFERENCE(S)
1. SENSITIVE ECOSYSTEM CLASSES AND CONSERVATION ZONES FROM HANEY AND IVERSON, 2009.
2. WATERCOURSES FROM RDCO, 2002.
3. WATERBODIES FROM IHS.
4. ORTHO IMAGERY FROM DISTRICT OF WEST KELOWNA, OCTOBER 2012.
5. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SENSITIVE ECOSYSTEM RANKING AND CONSERVATION ZONES

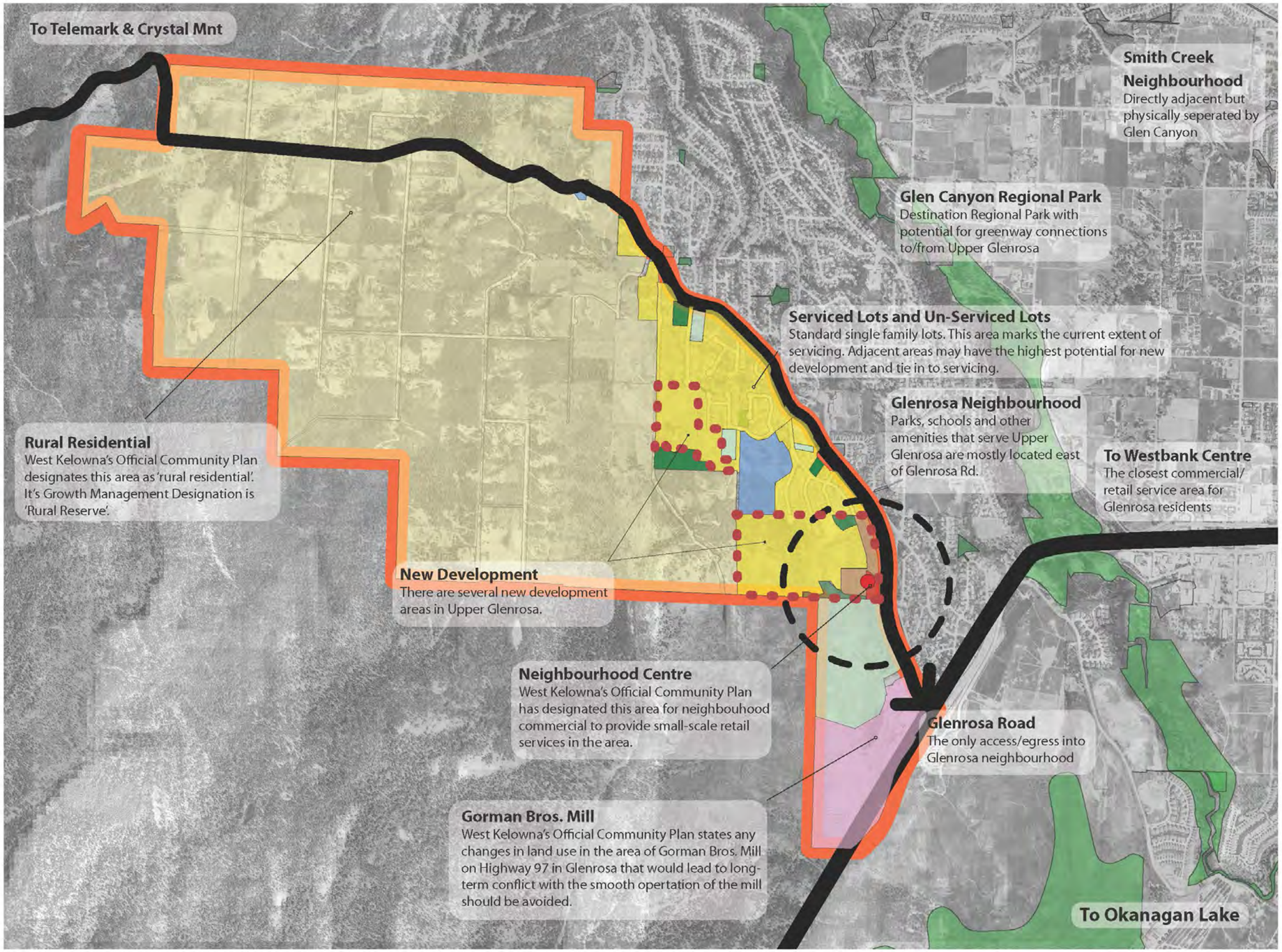
CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	LMH
PREPARED	DL
REVIEWED	DJA
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	4

PATH: N:\Clients\District_of_West_Kelowna\Upper_Glenrosa\99_PROJECTS\1416015_WKelowna_GlenrosaAO\2_PRODUCTION\Phase1\MXD\Report\1416015_TERRESTRIAL_Figure_2_SER_and_Conservation_Zones.mxd

© THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B



LEGEND

- Planning Area Boundary
- Rural Residential
- Single Family Residentiial
- Parks and Natural Areas
- Regional Parks (Greenbelts)
- Agricultural
- Schools and Institutional
- Low Density Multi-family
- Commercial
- Proposed Neighbourhood Centre (local shops and services)

DRAFT

0 500 1,000

1:20,000 METRES

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
PLANNING CONTEXT

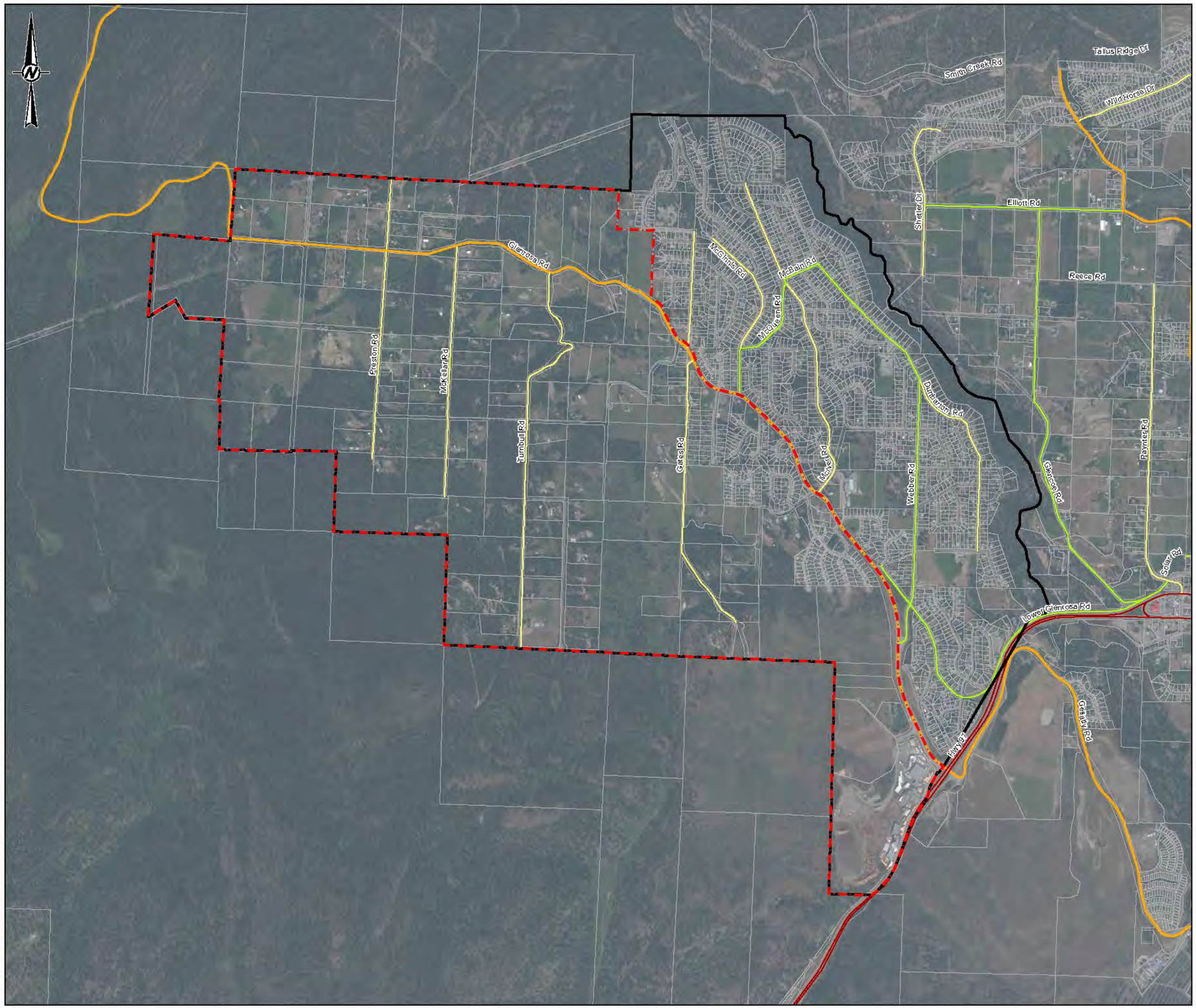
CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	AW
PREPARED	AW
REVIEWED	JZ
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

PATH: N:\Clients\District_of_West_Kelowna\Upper Glenrosa\09_PROJECTS\1416015_WestKelowna_GlenrosaNO2_PRODUCTION\Phase1\MXD\Report\1416015_TERRESTRIAL_Figure_2_SEA_and_Conservation_Zones.mxd



LEGEND

- UPPER GLENROSA
- GLENROSA
- CADASTRAL PARCEL
- ARTERIAL ROAD
- MAJOR COLLECTOR
- MINOR COLLECTOR
- HIGHWAY

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCE(S)

1. CADASTRAL PARCELS AND ROADS FROM DISTRICT OF WEST KELOWNA.
2. HIGHWAYS FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
3. IMAGERY COPYRIGHT © [20120728] ESRI AND ITS LICENSORS. SOURCE: DIGITALGLOBE. USED UNDER LICENSE, ALL RIGHTS RESERVED.
4. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
TRANSPORTATION

CONSULTANT
Golder Associates

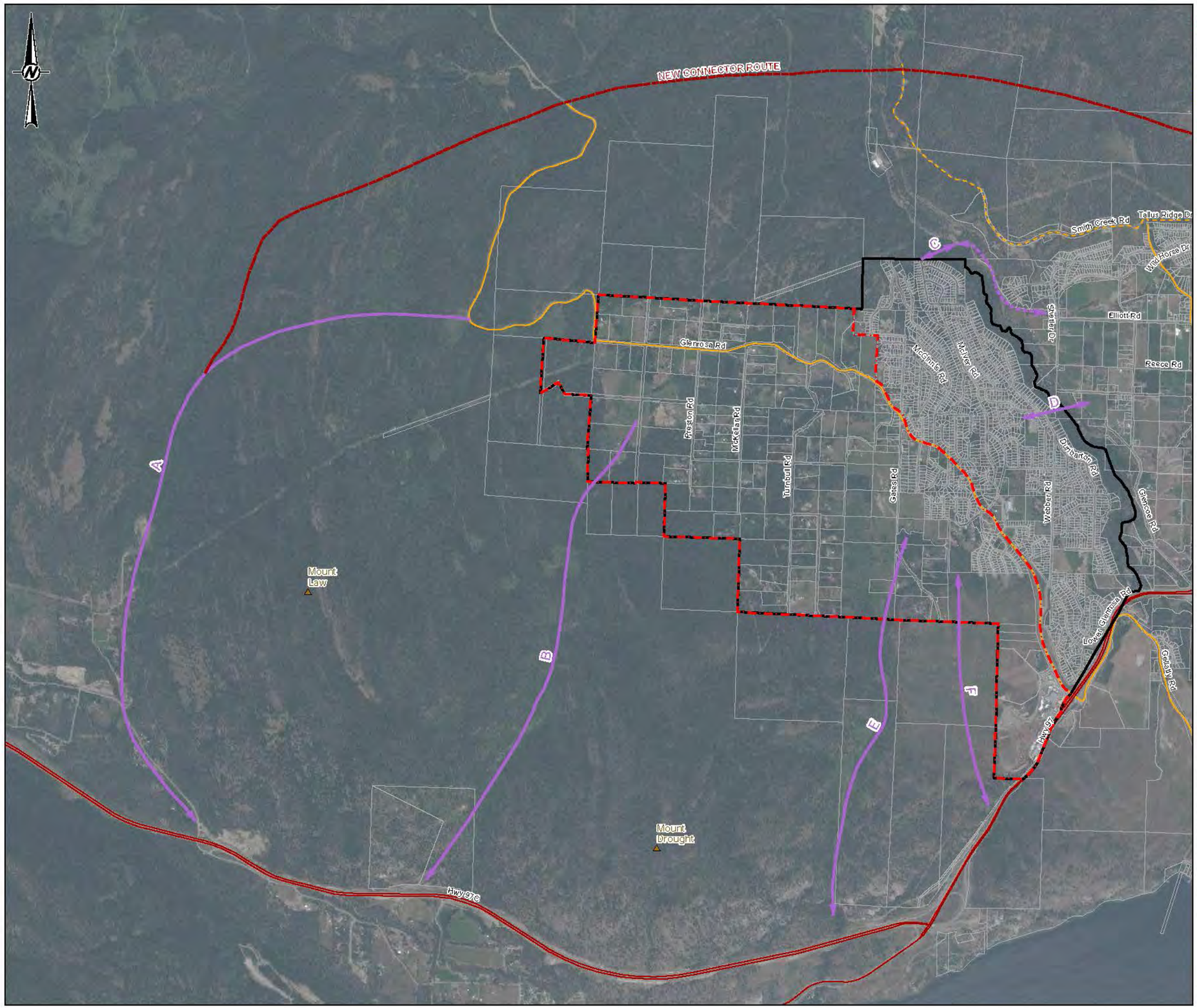
YYYY-MM-DD	2015-03-09
DESIGNED	TB
PREPARED	DL
REVIEWED	####
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: N:\Clients\District_of_West_Kelowna\Upper Glenrosa\99_PROJECT\1416015_W Kelowna_Glenrosa\02_PRODUCTION\Phase1\MXD\Report\1416015_TRANSPORTATION_Figure_3_Transportation.mxd



LEGEND

- UPPER GLENROSA
- GLENROSA
- CADASTRAL PARCEL
- PROPOSED ACCESS ROUTE
- ARTERIAL ROAD
- FUTURE ARTERIAL ROAD
- HIGHWAY
- NEW CONNECTOR ROUTE
- MOUNTAIN

DRAFT

0 1,000 2,000

1:30,000 METRES

REFERENCE(S)

1. PROPOSED ACCESS ROUTES AND NEW CONNECTOR ROUTE FROM BOULEVARD TRANSPORTATION.
2. CADASTRAL PARCELS AND ROADS FROM DISTRICT OF WEST KELOWNA.
3. HIGHWAYS FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
4. IMAGERY COPYRIGHT © [20120728] ESRI AND ITS LICENSORS. SOURCE: DIGITALGLOBE. USED UNDER LICENSE, ALL RIGHTS RESERVED.
5. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
ACCESS OPTIONS

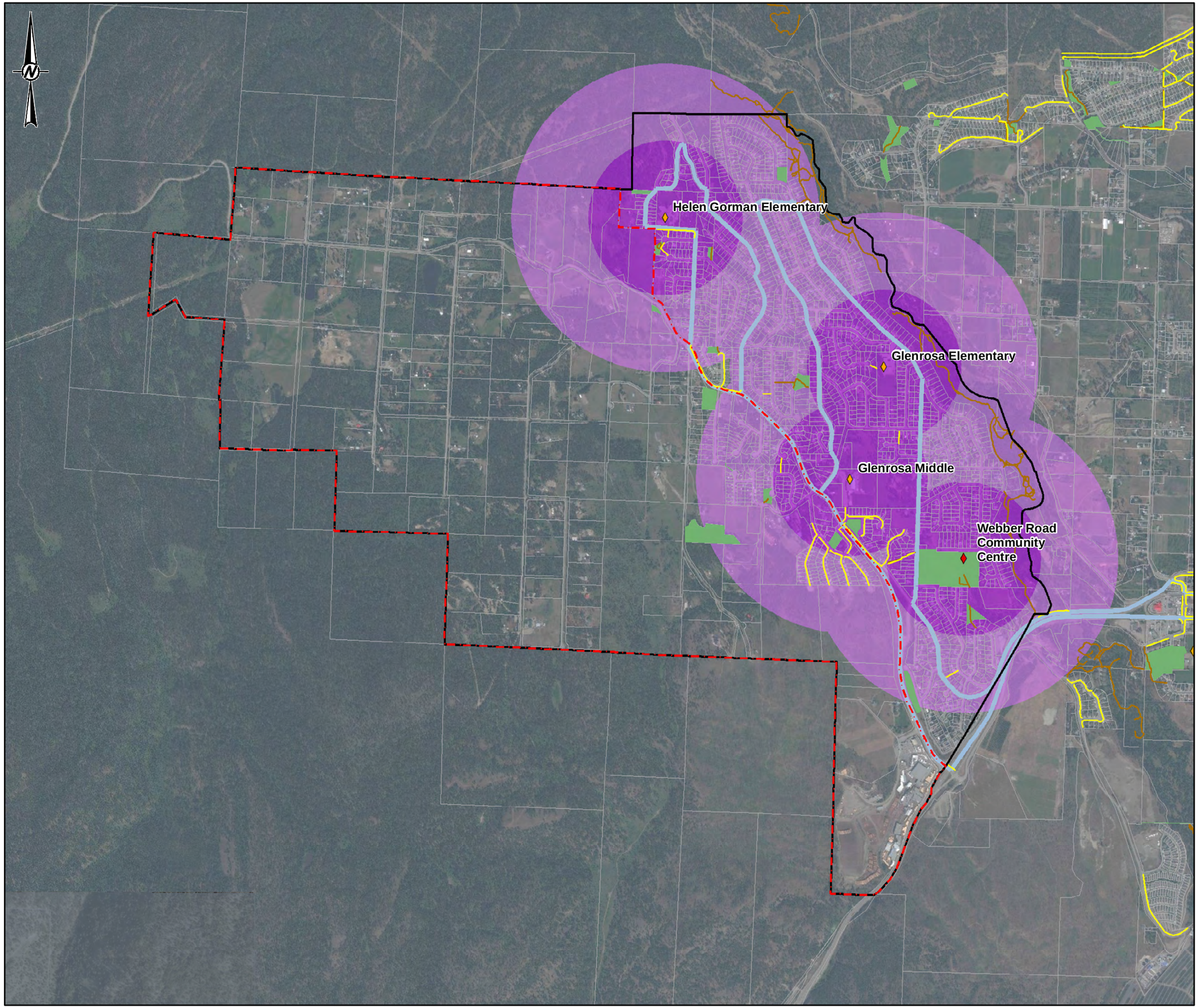
CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	TB
PREPARED	DL
REVIEWED	####
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

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LEGEND

- UPPER GLENROSA
- GLENROSA
- CADASTRAL PARCEL
- PARK
- 5-MINUTE WALKING DISTANCE
- 10-MINUTE WALKING DISTANCE
- EXISTING SIDEWALK
- TRAIL (PUBLIC)
- BUS ROUTE 21
- COMMUNITY CENTRE
- SCHOOL

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCE(S)

1. EXISTING SIDEWALKS FROM BOULEVARD TRANSPORTATION (JUNE 2014).
2. SCHOOLS, COMMUNITY CENTRES, TRAILS, PARKS AND BASE DATA FROM DISTRICT OF WEST KELOWNA.
3. IMAGERY COPYRIGHT © [20120728] ESRI AND ITS LICENSORS. SOURCE: DIGITALGLOBE. USED UNDER LICENSE, ALL RIGHTS RESERVED.
4. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT

DISTRICT OF WEST KELOWNA

PROJECT

UPPER GLENROSA AREA PLAN

TITLE

EXISTING PEDESTRIAN FACILITIES

CONSULTANT

Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	TB
PREPARED	DL
REVIEWED	####
APPROVED	####

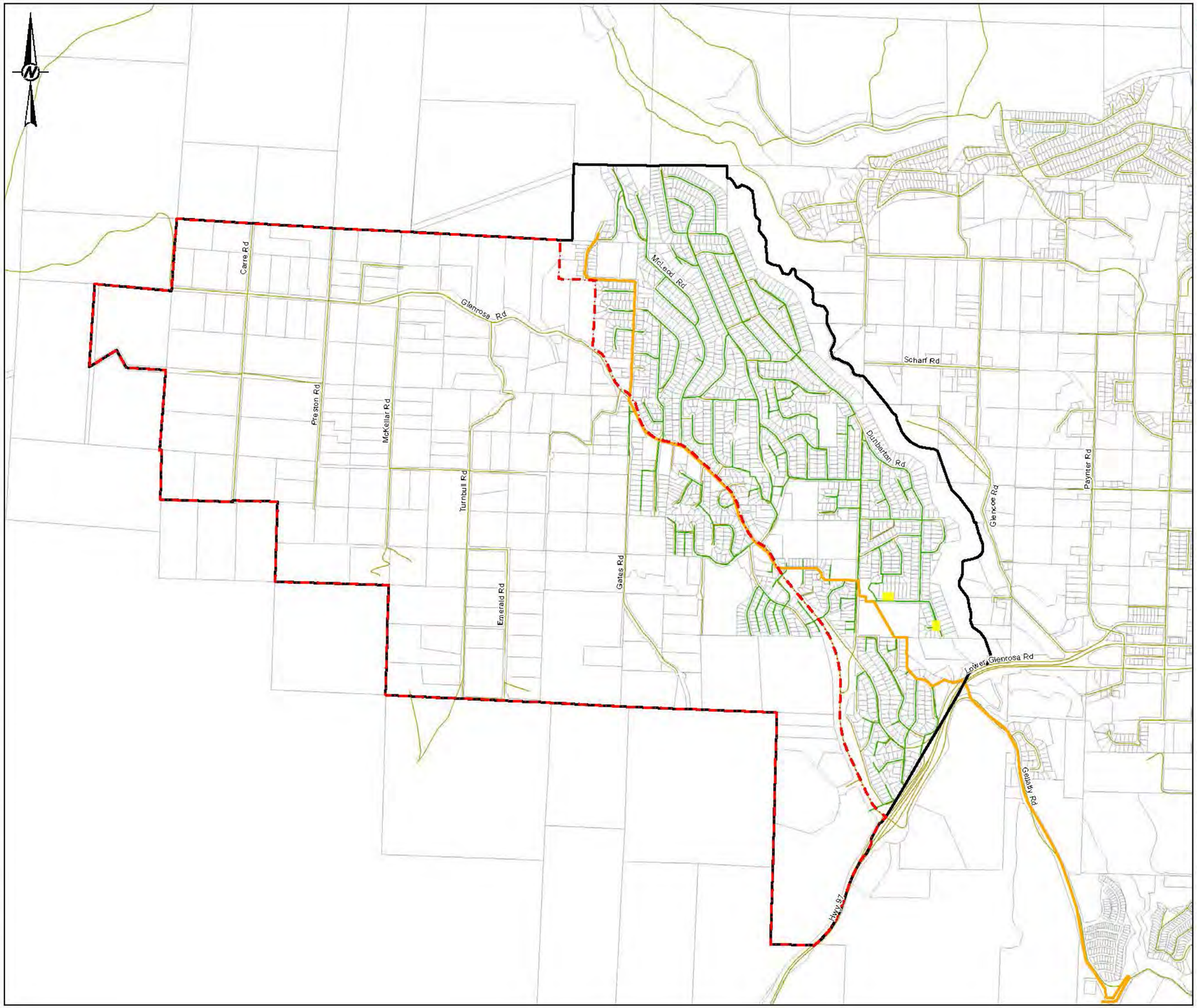
PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	**8**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: Y:\burnaby\CAD-GIS\Client\District_of_West_Kelowna\UpperGlenrosa\09_PROJECTS\1416015_WKelowna_Glenrosa\02_PRODUCTION\Phase1\MXD\Report\1416015_TRANSPORTATION_Figure_8_Existing_Pedestrian_Facilities.mxd



LEGEND

- UPPER GLENROSA
- GLENROSA
- CADASTRAL PARCEL
- EXISTING LIFT STATION
- TRUNK LINE
- SANITARY SEWER LINE
- ROAD
- WASTEWATER TREATMENT PLANT

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCE(S)
1. TRUNK LINE, WASTEWATER TREATMENT PLANT, AND EXISTING LIFT STATIONS FROM WATT CONSULTING GROUP (02-19-2015).
2. CADASTRAL PARCELS, SANITARY SEWER LINES, AND ROADS FROM DISTRICT OF WEST KELOWNA.
3. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
EXISTING GLENROSA SERVICE AREA

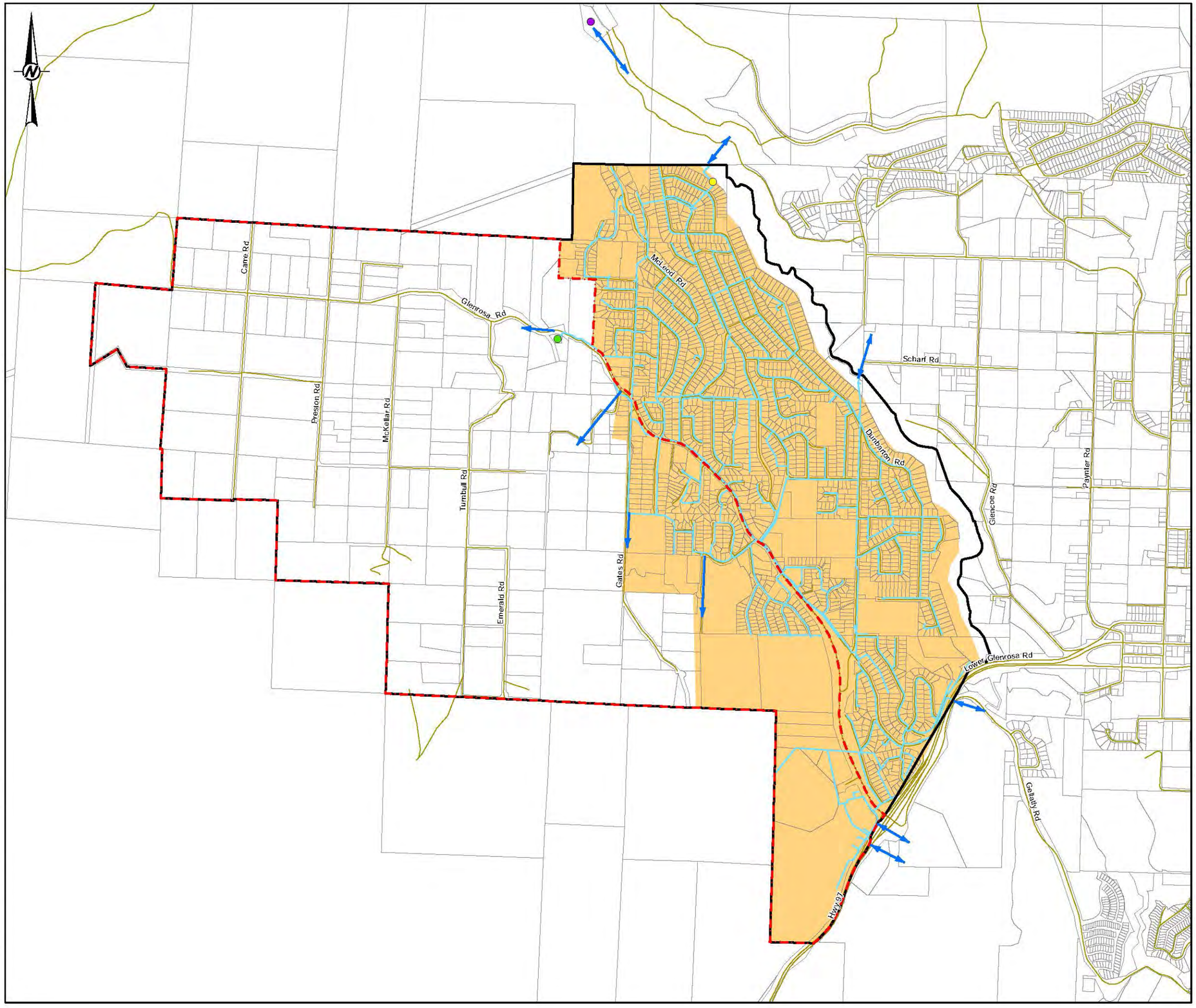
CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	JW
PREPARED	DL
REVIEWED	####
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	9

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

PATH: N:\Client\District_of_West_Kelowna\Upper_Glenrosa\08_PROJECT\1416015_JW\Kelowna_Glenrosa\02_PRODUCTION\Phase1\MXD\[Report]1416015_SANITARY_Figure_2_Existing_Service_Area.mxd



LEGEND

- UPPER GLENROSA
- GLENROSA
- EXISTING SERVICE BOUNDARY OF WESTBANK WATER SERVICE AREA
- CADASTRAL PARCEL
- WATER LINE
- ROAD
- CONNECTION WITH OUTSIDE OF STUDY AREA
- POTENTIAL TIE IN
- POWERS CREEK WTP
- PUMPHOUSE
- RESERVOIR

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCE(S)
1. POWERS CREEK WTP, PUMPHOUSE, RESERVOIR, POTENTIAL TIE INS AND CONNECTIONS WITH OUTSIDE OF THE STUDY AREA FROM WATT CONSULTING GROUP (02-19-2015).
2. CADASTRAL PARCELS, WATER LINES, AND ROADS FROM DISTRICT OF WEST KELOWNA.
3. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
EXISTING GLENROSA WATER SYSTEM

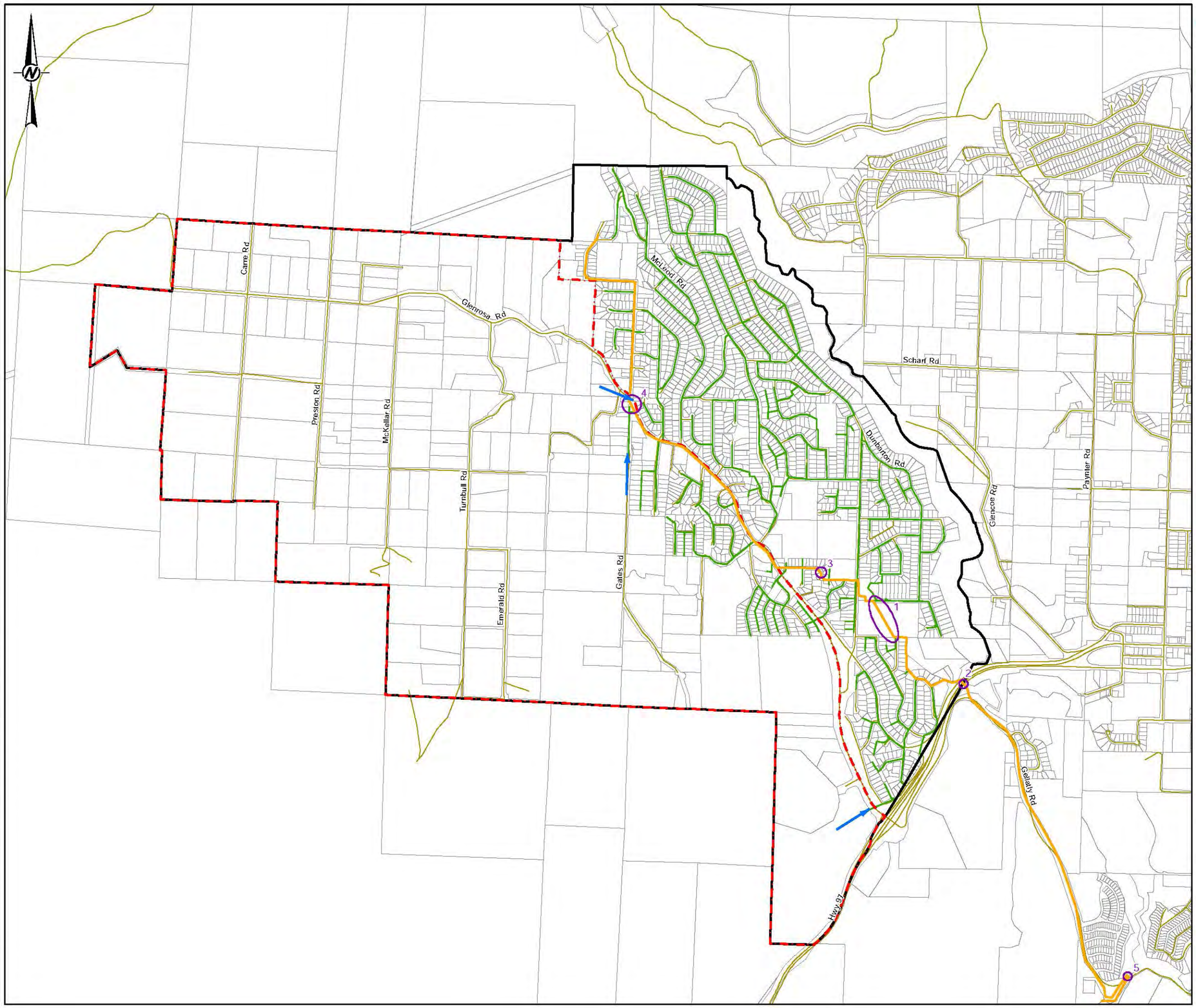
CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-10
DESIGNED	JW
PREPARED	DL
REVIEWED	####
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	10

0 25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

PATH: N:\Clients\District_of_West_Kelowna\Upper Glenrosa\99_PROJECTS\1416015_WKelowna_Glenrosa\03_PRODUCTION\Phase1\MXD\Report\1416015_WATERLINE_Figure_1_Existing_Water_System.mxd



LEGEND

- UPPER GLENROSA
- GLENROSA
- CADASTRAL PARCEL
- BOTTLENECK SECTION
- TRUNK LINE
- SANITARY SEWER LINE
- ROAD
- POTENTIAL TIE IN

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCE(S)

1. TRUNK LINE, BOTTLENECK SECTIONS AND POTENTIAL TIE INS FROM WATT CONSULTING GROUP (02-19-2015).
2. CADASTRAL PARCELS, SANITARY SEWER LINES, AND ROADS FROM DISTRICT OF WEST KELOWNA.
3. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SANITARY EXPANSION OPPORTUNITIES AND RESTRICTIONS

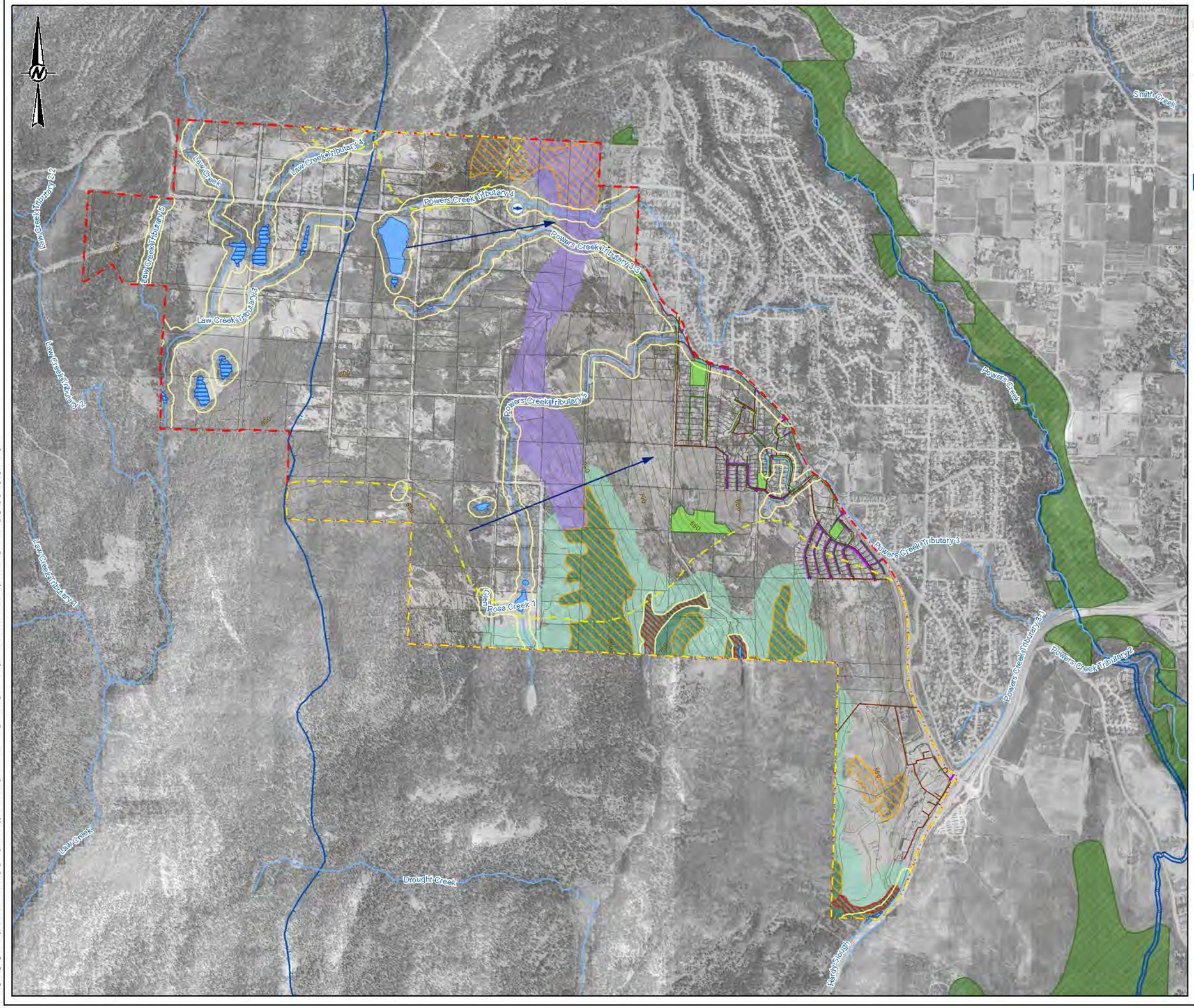
CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	JW
PREPARED	DL
REVIEWED	####
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	11

PATH: N:\Clients\District_of_West_Kelowna\UpperGlenrosa\09_PROJECT\51416015_Wrakwana_Glenrosa\02_PRODUCTION\Phase1\MXD\Report\1416015_SANITARY_Figure_3_Sanitary_Expansion_Opportunities.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B



LEGEND

- UPPER GLENROSA AREA
- SANITARY SEWER LINE
- WATER LINE
- STORMWATER PIPE
- CONTOUR (10m)
- INFERRED DIRECTION OF GROUNDWATER FLOW IN BEDROCK FRACTURES
- WATERCOURSE (1:20,000 SCALE)
- WATERBODY
- WETLAND
- GROUNDWATER AQUIFER
- DWK DEVELOPMENT PERMIT AREAS (DWK 2014) - AQUATIC
- GREENBELT
- PARK
- POTENTIAL ROCKFALL / ROLLING ROCK HAZARD

SENSITIVE ECOSYSTEM RANKING (SER)

- HIGH
- MODERATE

CONSERVATION ZONES

- CORE CONSERVATION AREA
- CORE CONSERVATION BUFFER
- WILDLIFE CORRIDOR

FISH OBSERVATION RECORDS (MOE 2014)

- FISH OBSERVATION

DRAFT

0 450 900

1:18,000 METRES

NOTE(S)

1. STORMWATER PIPES ARE INCOMPLETE AND HAVE NOT BEEN VERIFIED FOR CORRECTNESS.

REFERENCE(S)

1. FISH OBSERVATIONS FROM RDCO, 2002.
2. POTENTIAL ROCKFALLS AND ROLLING ROCK HAZARDS FROM GOLDER ASSOCIATES LTD.
3. STORMWATER PIPES, WATER LINES, SANITARY SEWER LINES, PARKS, AQUATIC DEVELOPMENT PERMIT AREAS, CADASTRAL PARCELS, AND CONTOURS FROM DISTRICT OF WEST KELOWNA.
4. SPRING POINT OF DIVERSION FROM B.C. MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS.
5. WATERCOURSES FROM RDCO, 2001-2003.
6. WATERBODIES AND WETLANDS FROM SHIM
7. SENSITIVE ECOSYSTEM CLASSES AND CONSERVATION ZONES FROM HANEY AND IVERSON, 2009.
8. ORTHO IMAGERY FROM DISTRICT OF WEST KELOWNA, OCTOBER 2012.
9. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
ANALYSIS SUMMARY

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-09
DESIGNED	AMW
PREPARED	RH
REVIEWED	AMW
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	1000	0	12

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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APPENDIX B: REFERENCE INFORMATION

TECHNICAL MEMORANDUM

DATE February 10, 2015 **REFERENCE No.** 1416015-TM-RevC

TO Anne-Marie Whittaker
Golder Associates Ltd. (Vancouver)

CC Gerald Imada - Golder Associates Ltd.
Leigh Holt - Golder Associates Ltd.

FROM Pana Athanasopoulos **EMAIL** pathanas@golder.com

TECHNICAL OVERVIEW ANALYSIS OF OPEN SPACE AND NATURAL AREAS, AND GEOTECHNICAL AND HYDROGEOLOGICAL CONDITIONS, UPPER GLENROSA, BC

As part of the District of West Kelowna RFP No. 2014-10-P348, Phase 1 – Upper Glenrosa Area Plan, the following technical memorandum provides a general and preliminary overview of land uses in the Upper Glenrosa Neighbourhood (Study Area) as they relate to sensitive ecosystems, including wildlife corridors; general hillside stability and geotechnical hazards; and groundwater conditions. It is our understanding that the information provided herein may be used for future land use and servicing purposes for the Study Area. Recommendations for further assessments have been provided to assist the District of West Kelowna in future planning for the Study Area.

1.0 SENSITIVE ECOSYSTEMS

1.1 Scope of Work and Methodology

Golder conducted an analysis of sensitive ecosystems, including wildlife corridors, for the Upper Glenrosa Area (Study Area) which involved compilation of:

- The most recent and updated GIS mapping data and reporting of the Sensitive Ecosystem Inventory (SEI) studies covering the Upper Glenrosa Area. This includes:
  - The SEI conducted for the Central Okanagan (2000-2001) (Iverson and Cadrin 2003), and,
  - The 2009 update for the Central Okanagan (Haney and Iverson 2009).

  Locations of sensitive ecosystems, Sensitive Ecosystem Rankings, and Conservation Zones within the Study Area were identified;
- GIS mapping data for DWK Aquatic Ecosystem and Terrestrial Ecosystem Development Permit Areas (DWK 2011a);
- Fish occurrence records and stream habitat information for the Study Area (RDCO 2002; BC MOE 2015); and,
- GIS mapping files of occurrence records for wildlife and plant species of management concern within the Study Area (i.e., designated as red- or blue-listed in BC, or federally listed as special concern, threatened, or endangered).

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1.2 Results

1.2.1 Terrestrial Ecological Communities

A broad description of the Study Area's natural resources can be made based on the Biogeoclimatic (BGC) Ecosystem Classification (BEC) system. The BEC system delineates the province into BGC zones based on topographic and climatic conditions that are in turn reflected by the presence of specific plant and wildlife communities. Based on data available on iMapBC 2.0 (Province of BC 2015), the Study Area occurs within three BGC zones, from lowest to highest elevation: the Ponderosa Pine (PP) Very Dry Hot subzone (PPxh1), Interior Douglas-fir (IDF) Very Dry Hot subzone (IDFxh1), and IDF Dry Cool subzone (IDFdk2) (Province of BC 2013).

The Ponderosa Pine (PP) BGC zone, Okanagan Very Dry Hot Variant (PPxh1) is the driest subzone of the PP zone, located within an elevational band between Bunchgrass (BG) and IDF zones along the Thompson River (from Lytton to the east and north of Kamloops) and also in the Okanagan Valley between Vernon and the US border (Hope et al. 1991). In general, natural areas within the PPxh1 are characterized by open ponderosa pine (*Pinus ponderosa*) forest ecological communities with understories dominated by bluebunch wheatgrass (*Pseudoroegneria spicata ssp. inermis*), drought-resistant forbs such as arrow-leaved balsamroot (*Balsamorhiza sagittata*), and scattered shrubs such as Saskatoon (*Amelanchier alnifolia*), tall Oregon-grape (*Mahonia aquifolium*), and common snowberry (*Symphoricarpos albus*). Riparian areas typical of the PPxh1 are characterized by dense stands of black cottonwood (*Populus balsamifera* spp. *trichocarpa)*, trembling aspen (*Populus tremuloides*), and birch (*Betula* spp.) (Lloyd et al. 1990; Hope et al. 1991).

The IDF zone is dominant within the low- to mid-elevations of the south central interior of the province and extends south in the US and Alberta. The IDF BGC zone has a continental climate characterized by warm, dry summers, a fairly long growing season, and cool winters and is predominated by open to closed mature forests of Douglas-fir (Hope et al. 1991). In general, natural areas within the IDFxh1 are characterized by mature Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) forest interspersed with ponderosa pine where fires have passed and usually at lower elevation south facing slopes. Understory vegetation is dominated by pinegrass (*Calamagrostis rubescens*), birch-leaved spirea (*Spiraea betulifolia* ssp. *lucida*), heart-leaved arnica (*Arnica cordifolia*), soopolallie (*Shepherdia canadensis*), falsebox (*Paxistima myrsinites*), twinflower (*Linnaea borealis*) and kinnikinnick (*Arctostaphylos uva-ursi*). Riparian areas typical of the IDFxh1 are characterized by Douglas-fir and hybrid white spruce (*Picea engelmannii x glauca*), and understory vegetation a mix of black gooseberry (*Ribes lacustre*), red-osier dogwood (*Cornus stolonifera*), black twinberry (*Lonicera involucrata*), and prickly rose (*Rosa acicularis*) (Lloyd et al. 1990). The IDFdk subzone occupies an elevational band above IDFxh, with the IDFdk2 differentiated by the presence of falsebox and prince's pine (*Chimaphila umbellata* ssp. *umbellata*) (Lloyd et al. 1990).

The process of Terrestrial Ecosystem Mapping (TEM) provides a more detailed ecological characterization than BGC zone mapping, but is still relatively general compared to what is determined based on detailed Study A inventory. A TEM and Sensitive Ecosystem Inventory (SEI) project was conducted throughout the Central Okanagan in 2001 and 2009 (Iverson and Cadrin 2003; Haney and Iverson 2009). The initial 2001 project conducted by Iverson and Cadrin delineated TEM polygons (ecosystem units) based on bioterrain mapping using 1994 aerial photos at 1:15 000 scale. Ecosystem units were assigned up to three map units / deciles (ecological communities), which included the forest and grassland ecological communities defined in Lloyd et al. (1990), and non-forested units such as wetlands, rock outcrops, grassland seral associates, and anthropogenic units defined in previous SEI studies in the Okanagan. In the 2009 update, Haney and Iverson updated the TEM polygons using 2005 aerial photos at a scale of 1:10 000.

Following updated TEM analysis, the updated SEI process involved classification of each map unit / decile as a sensitive, important, or non-sensitive ecosystem. The SEI method uses additional criteria than just the ecological community when determining the sensitivity of an ecosystem, and generalizes groups of ecosystems with similar ecological sensitivity (i.e., environmental specificity, susceptibility to hydrological changes, soil erosion, spread of invasive plants and sensitivity to human disturbance), ecosystem processes, conservation status and wildlife habitat values (BC MOE 2006).

A summary of the results of the 2009 updated TEM and SEI for the area mapped within the Study Area are provided in Table 1, with the TEM polygons and polygons containing sensitive ecosystem classes depicted in Figure 1. It should be noted the orthophotography base shown on Figures 1 and 2 is from 2012 and the TEM/SEI conducted in 2009 was based on 2005 aerial imagery. As a result, the TEM/SEI units assigned to specific polygons may not reflect what is present now (or in 2012), if Study Area alterations have occurred. For example, the Glenrosa fire in 2009 would have changed some features, particularly in the southeast portion of the Study Area, and the classifications would likely be different if based on more current imagery. Also, mapping of TEM and SEI was only completed for 54% of the total Upper Glenrosa Area, with no TEM or SEI coverage of approximately the upper half of the Study Area. Descriptions of the SEI ecosystem classes present within the Study Area are provided in Table 2.

Table 1: Description of TEM units and SEI classes mapped within the Study Area (Haney and Iverson 2009).

Sensitive Ecosystem Class	TEM Ecological Communities (Map Code and Provincial red- or blue-listing)	Structural Stages	Coverage within Study Area (ha)	% Composition of Study Area
Coniferous Woodland (WD)	Douglas-fir – Ponderosa Pine – Bluebunch Wheatgrass – Pinegrass (DW; blue-listed) Douglas-Fir - Ponderosa Pine - Bluebunch Wheatgrass – Balsamroot (PB; not listed) Ponderosa Pine - Bluebunch Wheatgrass - Rough Fescue (PF; red-listed) Ponderosa Pine - Red three-awn (PT; blue-listed) Ponderosa Pine - Bluebunch Wheatgrass – Cheatgrass (PC; not listed)	Shrub / Herb; Pole / Sapling; Young Forest	26.5	4.1
Sparsely Vegetated (SV)	Selaginella – Bluebunch Wheatgrass Rock Outcrop (SB; not listed)	Herb	0.7	0.1
Riparian (RI)	Hybrid White Spruce – Douglas-fir – Douglas Maple – Dogwood (SD; not listed) Douglas-fir – Water Birch – Douglas Maple (DM; red-listed)	Shrub / Herb; Young Forest	0.6	0.1
Wetland (WN)	Pond (PD; not listed)	N/A	0.4	0.1

Sensitive Ecosystem Class	TEM Ecological Communities (Map Code and Provincial red- or blue-listing)	Structural Stages	Coverage within Study Area (ha)	% Composition of Study Area
Grassland and Disturbed Grassland (GR)	Bluebunch Wheatgrass – Balsamroot (WB; blue-listed)	Herb	0.3	0.05
Not Sensitive (NA)	Non-Sensitive Forested Feature (various Ecological Communities)	Shrub / Herb; Pole / Sapling; Young Forest	156.3	24.0
	Cultivated Field (CF)	Herb	73.6	11.3
	Urban / Suburban (UR)	N/A	42.8	6.6
	Rural (RW)	N/A	23.3	3.6
	Road Surface (RZ)	N/A	18.3	2.8
	Exposed Soil (ES)	Sparse / Bryoid	9.7	1.5
Total Sensitive Ecosystem Area Mapped:			**28.5 ha**	**4.4%**
Total Not Sensitive Ecosystem Area Mapped:			**324.1 ha**	**49.7%**
Total Area Not Mapped for TEM/SEI:			**299.7 ha**	**45.9%**
Total – Upper Glenrosa Area:			**652.3 ha**	**100%**

Note: GIS shapefiles from Haney and Iverson (2009) were used to determine TEM units and SEI classes within the Study Area. Calculations of coverage and percent composition within the Study Area were conducted by Golder.

Table 2: 2009 Sensitive Ecosystem Class Descriptions (Haney and Iverson (2009).

SEI Class	Description
Coniferous Woodland (WD)	Open stands of Douglas-fir or ponderosa pine, often on shallow soils with typically grassy understories (old coniferous woodlands are included in the Old Forest category)
Sparsely Vegetated (SV)	Shrubby rock outcrops, grassy or unvegetated rock outcrops, talus slopes and cliffs.
Riparian (RI)	Streamside ecosystems occurring on floodplains or in gullies with intermittent or permanent creeks, fringe ecosystems associated with pond and lake shorelines, and river and beach ecosystems.
Wetland (WN)	Non-forested ecosystems where the water table is at or near ground surface, including wet meadows, marshes, swamps and shallow open water features (including ponds).
Grassland and Disturbed Grassland (GR)	Non-forested ecosystems dominated by bunchgrass species, or non-native invasive plants with some bunchgrass species. Also includes shrubland ecosystems occurring in a grassland matrix.

Within the Study Area, available TEM/SEI mapping has determined there is a total area of 28.5 ha (4.4% of the Study Area's total area) comprised of sensitive ecosystems. The remaining mapped area (324 ha, or almost 50% of the Study Area's total area) is not sensitive, and is comprised of non-sensitive immature forest stands, cultivated fields, urban / suburban and rural land use, road surfaces, and exposed soil. Based on Golder's preliminary visual interpretation of 2012 orthophotography of the remaining un-mapped portion of the Study Area, it appears that another approximately 25% of the Study Area's total area is most likely not sensitive (cultivated fields, rural land use, road surfaces), with the remaining un-mapped areas (approximately 21% of the

total Study Area area) comprised of potentially sensitive Douglas-fir and ponderosa pine dominated coniferous woodlands, riparian ecosystem areas surrounding watercourses (i.e., the undisturbed riparian corridor segments of Law Creek and Powers Creek tributaries), broadleaf woodlands, and wetlands (i.e., large ponds). More detailed map interpretation and ground-based surveys are required to confirm what is actually present on the Study Area.

The majority of area mapped as sensitive ecosystems as part of the TEM/SEI project (26.5 ha, or 4.1% of total Upper Glenrosa Area), is coniferous woodland. These areas are located primarily toward the south end of the Study Area, and have connection to the Mount Drought area. There are additional areas of coniferous woodland at the northeast corner, and middle of the Study Area (See Figure 1). Smaller areas of sensitive ecosystems are made up of sparsely vegetated (0.7 ha), riparian (0.6 ha), wetland (0.4 ha) and grassland or disturbed grassland (0.3 ha) habitat. The two sparsely vegetated areas are within polygons that also contain coniferous woodland ecosystems at a higher decile (therefore not shown on Figure 1), and are located at the south end of the Study Area. The two riparian areas are also on the south edge of the Study Area (Figure 1). One of the wetland areas is visible on Figure 1 (largest decile), and is on the south edge of the Study Area, with the other two smaller wetland areas located within polygons also containing riparian habitat (visible on Figure 1). The one small area containing grassland habitat is within another polygon containing coniferous woodland, on the southeast edge of the Study Area.

Within the sensitive coniferous woodland, riparian, and grassland areas there are ecological communities that are also considered to be rare in the Province of BC. Red-listing of an ecological community by the BC Conservation Data Centre (BC CDC) means it is considered extirpated, endangered, or threatened in BC. Blue-listing means the ecological community is considered to be of special concern in the province, and is at-risk, but not currently extirpated, endangered, or threatened. Within the Study Area, these provincially-listed ecological communities include two blue-listed forested ecosystems (Douglas-fir – Ponderosa Pine – Bluebunch Wheatgrass – Pinegrass and Ponderosa Pine - Red three-awn), one red-listed forested ecosystem (Ponderosa Pine - Bluebunch Wheatgrass - Rough Fescue), one red-listed riparian ecosystem (Douglas-fir – Water Birch – Douglas Maple), and one blue-listed grassland ecosystem (Bluebunch Wheatgrass – Balsamroot).

In terms of legal protection provided to red- or blue-listed ecosystems in BC, there is limited legislated status unless the ecosystems are demonstrated to provide habitat for wildlife species listed under the federal *Migratory Birds Convention Act* (Government of Canada 1994) or in some special cases, the *Species at Risk Act* (Government of Canada 2002). Wetlands and riparian ecosystems can be protected under the BC *Water Act* (Government of BC 1996), during approvals for development activities in and around water when a Section 9 *Water Act* permit is required, and under the provincial Riparian Areas Regulation (RAR) of the *Fish Protection Act* (Government of BC 2004). They are also afforded protection if they are within areas mapped as an Aquatic Ecosystem or Sensitive Terrestrial Ecosystem Development Permit Area by the DWK (see Sections 1.2.1.1 and 1.2.2 for further information).

1.2.1.1 Sensitive Ecosystem Ranking

As part of the 2009 updated SEI process, Haney and Iverson also conducted conservation analysis. The scores were based on a combined calculation which considered two factors: the SEI value (from 0 to 10) for each map unit (ecological communities) which considers the relative rarity, sensitivity and general importance to wildlife and the current condition, and also the wildlife habitat values, which consider the presence of important habitat requirements for 10 rare species that occur in the Okanagan. These species included amphibians (Great Basin

spadefoot; *Spea intermontana*), reptiles (painted turtle; *Chrysemys picta* pop. 2, western rattlesnake; *Crotalus oreganus* and gopher snake; *Pituophis catenifer deserticola*), birds (Lewis' woodpecker; *Melanerpes lewis*, flammulated owl; *Psiloscops flammeolus*, western screech-owl; *Megascops kennicottii macfarlanei* and yellow-breasted chat; *Icteria virens*) and mammals (American badger; *Taxidea taxus* and California bighorn sheep; *Ovis canadensis*) (Haney and Iverson, 2009). Wildlife habitat ratings were based on habitat requirements that were either general (e.g., nesting and foraging) or important for specific life stages (e.g., egg-laying or breeding). The SEI values were then combined with the wildlife species at risk habitat values, with a two to one weighting of ecosystems to wildlife, to determine the overall conservation value of the ecosystem. This process was completed individually for each of the up to three ecosystem components within each TEM polygon, with the highest conservation value given to the entire polygon. These conservation values (with values between 0 and 10) were then categorized into Sensitive Ecosystem Rankings (SER) of low, medium, or high (Haney and Iverson, 2009):

- **SER1** areas contain ecosystems with **high** conservation value (scores of 7 to10) that are locally and provincially significant and critically important to rare wildlife species;
- **SER2** areas contain ecosystems with **medium** conservation value (scores of 3 to 6.9) with ecosystem rarity and sensitivity and rare wildlife species value considered to be of moderate ecological importance;and,
- **SER3** areas contain ecosystems with **low** conservation value (scores of 0 to 2.9) that are considered to have little or no inherent ecological value or wildlife habitat importance.

Within the areas of the Study Area that have been mapped, the majority of the area has been ranked as SER3 (low). There are three small polygons mapped as SER1 on the south edge of the Study Area. These are located around two ponds near Gates Road, and on the upstream end of Hardy Slough (See Figure 2). There are four SER2 polygons also on the south edge of the Study Area, and one on the north edge of the Study Area (See Figure 2). The ranking of SER2 considers that even anthropogenically modified landscapes can still provide habitat values.

The DWK has also delineated Sensitive Terrestrial Ecosystem Development Permit (DP) Areas, and there are a number of Terrestrial DP Areas within the Study Area. The guide to Sensitive Terrestrial Ecosystem DPs indicates that SEI was used as the basis for development of the Terrestrial DP mapping (DWK No date). All of the Terrestrial DP areas are located at the south end of the Study Area. Three correspond to SER1 polygons (covering pond features and the area near Hardy Slough and Gorman Brothers mill), and two correspond to SER2 polygons. Others correspond to polygons mapped as containing coniferous woodland sensitive ecosystems (See Figure 1). As noted, this area of the Study Area was affected by the 2009 Glenrosa fire, and the current conditions may be different than what was present in 2005 (which was the basis for SEI and Terrestrial DP designation). As a result, the SER and Terrestrial DP designations may require updating, based on current conditions.

1.2.1.2 Conservation Zones

Following calculation of conservation values and production of a conservation values map, the updated SEI also delineated Conservation Zones based on the size, concentration and connectivity of high value areas (Haney and Iverson 2009). The conservative process used by Haney and Iverson was designed to capture the highest conservation values of each polygon. Priority conservation areas were classified as Core Conservation Areas, Buffers, Wildlife Corridors, and Other Important Conservation areas.

Within the areas of the Study Area that have been mapped, a Wildlife Corridor has been delineated extending from near the mainstem of Powers Creek, north (upstream) of the Study Area, continuing southward, and joining a large area delineated as a Core Conservation Area, along an east-facing slope. The Core Conservation Area extends south of the Study Area, and is buffered on its perimeter by a Core Conservation Buffer (See Figure 2). Based on visual examination of orthophotography and topography, it is not immediately apparent why the Wildlife Corridor was established in this location, as it is not along any obvious riparian corridors or valley features, and crosses a number of roads and rural properties with cultivated fields. The Core Conservation Area covers the Mount Drought area which provides known habitat for mule deer (*Odocoileus hemionus*) (Gyug 1994; 1999) and potential habitat for California bighorn sheep (Stelfox 1993; Gyug 1994).

1.2.1.3 Plant and Animal Species of Management Concern

A geographical query of iMapBC 2.0 found no occurrence record for plant or animal species of management concern within the Study Area (Province of BC 2015). This does not mean these species are not potentially present in the Study Area, it just means that surveys and inventory work conducted to-date within the area has not resulted in observation records that have been provided to the provincial government.

1.2.2 Aquatic Habitat Features

The Study Area contains two primary aquatic habitat areas, within two watersheds. Law Creek (watershed code: 310-742200-03600) is a 6.8 km long, 2nd order tributary of Trepanier Creek that ultimately drains to Okanagan Lake. There are no fish records available for Law Creek or its three tributaries located within the Study Area (BC MOE 2015), however Trepanier Creek is a known Kokanee (*Oncorhynchus nerka*) spawning habitat area, and also contains Rainbow Trout (*O. mykiss*) (BC MOE 2015). A fish habitat assessment for Law Creek conducted further downstream of the Study Area determined there is a gradient barrier (i.e., > 20% slope), which constitutes an obstruction to upstream fish passage (Trumbley 1997). Powers Creek (watershed code: 310-766700) is a 29.4 km long, 4th order, fish bearing tributary of Okanagan Lake, with four tributaries within the Study Area (BC MOE 2015). There are no fish records for the tributaries within the Study Area; however the Powers Creek mainstem (outside of the Study Area), contains areas of Kokanee and Rainbow Trout spawning habitat (BC MOE 2015). There have been a number of instream enhancement projects conducted in the past in Powers Creek, including removal (blasting) of a rock chute barrier to fish passage in 1999, addition of approximately 40 cubic yards of gravel for Kokanee spawning enhancement in 1992, cleaning of spawning gravel in 1993, and installation of a fishway to improve Kokanee and Rainbow Trout passage. The Kokanee spawning habitat in Powers Creek is considered extremely important and Powers Creek is considered one of the two major Rainbow Trout spawning areas in the Okanagan.

The riparian (terrestrial) habitat surrounding these streams and tributaries has the potential to serve as wildlife corridors, if they are in an undisturbed state. According to the TEM/SEI mapping conducted within the lower half of the Study Area, the authors determined that the anthropogenic disturbances to the Powers Creek tributaries within the Study Area were at a level that reduced the ecological value to low (i.e., none of the Powers Creek riparian corridors within the Study Area have been assigned moderate or high SER value, or are considered to be a Conservation Zone or Wildlife Corridor). The Law Creek riparian corridors were not within the area mapped for TEM/SEI.

Sensitive Habitat Inventory and Mapping (SHIM) was conducted on streams within the Regional District of Central Okanagan (RDCO) by District staff in 2001 and 2002 (RDCO 2002). Streams and other aquatic habitat

features (i.e., ponds) mapped as part of the SHIM project were incorporated into Aquatic Ecosystem DP areas within the DWK (DWK 2011a). These mapped Aquatic DP areas have been established "*for the protection of watercourses such as streams, ponds, and wetlands and the critical habitat and biodiversity in their riparian areas*" (DWK no date). The objectives of creating the Aquatic DP areas were to broadly protect, restore, and enhance aquatic ecosystems, protect vital fish and wildlife features and functions (including habitat, travel corridors and refuge and breeding areas), to implement RAR for protection of fish habitat, and to protect water quality and quantity (DWK 2011b). The Aquatic DP areas generally incorporate 30 m protection buffers to the watercourses and waterbodies (i.e., ponds) regardless of the current habitat conditions.

Within the Study Area, the entire lengths of all Law Creek and Powers Creek tributaries, and the large pond features, are designated as Aquatic DP areas by the DWK. This is in spite of the SHIM characterization of these watercourses as generally ephemeral and undefined, or ditched, with little remaining natural riparian vegetation (RDCO 2002). The designation of Aquatic DP area considers the inherent value of these aquatic features and the need to protect and enhance them for protection of fish, provision of wildlife corridors and habitat, as well as water quality and quantity. The mainstem of Powers Creek (which is not within the Study Area boundaries) and Trepanier Creek (which is downstream of Law Creek and the Study Area boundaries) provide valuable salmonid spawning habitat which is protected under the federal *Fisheries Act* (Government of Canada 1985) and provincial *Water Act* (Government of BC 1996). Upstream disturbances to the headwater tributaries of these salmonid systems should therefore be avoided, with habitat enhancement and restoration prioritized to protect fish and water quality.

1.3 Recommendations

Data gaps that should be addressed in future phases of the Upper Glenrosa Area Planning process include:

- Completion of TEM / SEI mapping of the entire Upper Glenrosa Area (currently missing mapping of 54% of the total land area), and update to the previously mapped portion (which was based on 2005 aerial imagery);
- Consideration of DWK's Aquatic DP area mapping for watercourses and waterbodies for establishment of prioritized conservation zones, particularly along the riparian corridors of Law and Powers creek tributaries, as SEI mapping did not take into consideration the inherent value of headwater streams, their connectivity to valuable Rainbow Trout and Kokanee spawning habitat, and their future potential for provision of wildlife corridor habitat, regardless of current disturbance levels;
- Detailed field survey(s) to assess the sensitivity of ecosystems identified through TEM/SEI desktop study, including surveys for wildlife and/or plant species of management concern that may occur in undeveloped or under-developed areas; and,
- Establish delineation of larger-scale Environmentally Sensitive Areas (ESAs), consistent with what was established for the Lower Glenrosa Neighbourhood Plan (PACE No date), and in keeping with DWK guidance.

As part of future neighbourhood planning, Golder recommends that development be directed away from areas containing sensitive ecosystems, to areas assessed as not sensitive. Once data gaps have been filled, this will include areas determined to contain red- or blue-listed ecological communities, areas assessed through TEM/SEI as being high and moderate SER and Conservation Areas, riparian corridors (designated as DWK

Aquatic DP areas), DWK Terrestrial Ecosystem DP areas, and areas delineated as ESA-1 or 2 (i.e., High or Moderate sensitivity) as part of future ground-based surveys.

If sensitive ecosystems cannot be avoided, the DWK should consider development of a habitat banking system (a.k.a. offsetting) to direct future habitat compensation requirements. This will be particularly useful as a planning tool if mitigation and compensation is not achievable within the land parcel to be developed. For example, off-Study Area compensation could be directed towards riparian enhancement of headwater tributaries of Law and Powers creeks. This is in keeping with the recently developed provincial policy and guidance on environmental mitigation procedures (BC MOE 2014).

2.0 GEOTECHNICAL CONDITIONS

2.1 Scope of Work and Methodology

The preliminary geotechnical assessment was carried out by reviewing surficial geology maps obtained from the Geological Survey of Canada. These maps roughly outlined the areas in the Study Area where bedrock and various soil types would be encountered. In addition, selected aerial photographs of the Phase 1 Upper Glenrosa Area Plan dating from 1938 to 2001 were examined to delineate areas where potential geotechnical hazards could be encountered. It should be noted that the identified geotechnical hazards are natural and not man-made through road construction, subdivision/lot development or other ground altering activities.

2.2 Discussion

2.2.1 Rockfall/Rolling Rock Hazards

Potential rockfall/rolling rock hazards could exist below the areas where bedrock has been identified as shown on Figure 3. The potential for this type of hazard is greatest below natural rock faces or man-made bedrock cuts. Development below these areas should be avoided. If development occurs, rockfall/rolling rock mitigation measures should be implemented, such as design and construction of rockfall barrier or installation of a rockfall protection mesh.

2.2.2 Steep Slopes

Development/construction on slopes greater than 30 degrees (measured from horizontal) would likely require site grading that would include cut and fill. Situations such as this would require a detailed geotechnical investigation and construction supervision to be undertaken to ensure the development area as well as areas above are not subject to instability.

2.2.3 Landslide

As shown on Figure 3, one area within the Phase 1 Upper Glenrosa Area Plan was identified as a possible old slide. Further detailed investigation of this area is required prior to development.

2.3 Recommendations

Golder recommends that during future phases of the Upper Glenrosa Area Plan, a field survey should be conducted to corroborate areas where geotechnical hazards were identified during the desktop review.

3.0 HYDROGEOLOGICAL CONDITIONS

3.1 Scope of Work and Methodology

Golder's scope of work for this component comprised a desktop review of general hydrogeological conditions in the Study Area, including evaluation of aquifer characteristics, groundwater levels and estimated yields of existing water supply wells. The following available existing information was reviewed:

- In-house hydrogeological and geotechnical reports;
- Surficial soil, bedrock and topographic mapping; and,
- Well records from 116 water wells registered with the BC Ministry of Environment Water Resource Atlas (BC WRA).

Additionally, Golder corresponded with Mr. Rob Hillis, Engineering Manager with District of West Kelowna, on groundwater-related issues in the Study Area, including seepage and water quantity/quality concerns.

3.2 Servicing and Hydrogeological Issues

The Study Area is presently not serviced by municipal water, storm sewer or sanitary sewer structures, with the exception of the Ranch Road/Country Pines and Morningside Drive developments located at the east end of the Study Area along Glenrosa Road ; and the Gorman Brothers sawmill at the southeast corner of the Study Area. Instead, potable water is obtained from one (or more) private wells completed on each individual lot, with some property owners obtaining or supplementing their water supply with water available at a bulk potable water distribution facility located outside of the Upper Glenrosa Neighbourhood, in the Shannon Lake area. Well records indicate that a number of wells had been deepened; this is typically conducted as a result of a decrease in water supply volumes in the original drilled well. Storm water across the Study Area is directed overland to ditches/swales, while sanitary waste is directed to private in ground effluent disposal fields located on each individual lot.

According to Mr. Rob Hillis, a shortage of private potable water is the main issue that residents face in the Study Area. Groundwater seepage and poor water quality are reportedly not concerns associated with the Study Area.

3.3 Topographic and Hydrological/Hydrogeological Conditions

General topographic, hydrological and hydrogeological conditions present across the Study Area are shown graphically in Figure 3, attached, and discussed below.

Topography: Topographic elevations across the Study Area range from approximately 925 meters above sea level (masl) at the southwest corner and 835 masl at the northwest corner, to 580 masl along the east-central boundary, to 500 masl at the southeast corner. The northwest portion of the Study Area plateaus at an elevation

of approximately 775 masl, while the remainder of the Study Area generally slopes to the east-northeast, towards Powers Creek, at a gradient of approximately 0.25 m/m.

Hydrology: Three small ponds, including Glenrosa Pond, are located in the west portion of the Study Area. Law Creek and three of its tributaries are present in the northwest corner of the Study Area. The Law Creek water system drains south, away from the Study Area, towards Okanagan Lake. Three tributaries of Powers Creek are present in the north and central portions of the Study Area; these tributaries drain to the north and/or east, towards Power Creek. Tributaries in the Study Area are reportedly ephemeral.

Surficial Geology: The surficial geology of the Study Area generally comprises a blanket of glacial till (Tb; continuous till) overlying bedrock (Okulistch, 2013). In some areas along the south side of the Study Area, the glacial till is described as a veneer (Tv; discontinuous till). Soils described on well records and in previous reports prepared by Golder for portions of the Study Area indicate that soil deposits typically consist of a mixed and interlayered sequence of clay, sand and gravel and/or glacial till. Well records suggest that soils range in thickness from <1 m to approximately 67 m (with an average thickness of 8 m).

Bedrock Geology: Bedrock in the Study Area generally consists of fine clastic sedimentary rocks (mudstone, siltstone, shale) of the Kettle River and Springbrook Formations, with undivided volcanic rocks of the Marron, Kettle River, Springbrook, Marama and Skaha Formations in the southwest and southeast corners of the Study Area (BC WRA). Geological mapping suggests that bedrock outcrops are present in the southeast corner of the Study Area (Okulistch, 2013).

Hydrogeology: Of the 116 registered water wells, 110 are reportedly completed in bedrock; while 6 are reportedly completed in unconsolidated deposits above the bedrock. The Study Area aquifer is a bedrock aquifer (Number 304), and is classified as “IIB”, having moderate demand, low productivity and moderate vulnerability to surface contamination. Well records indicate that bedrock wells were drilled to depths ranging between 55 and 236 m below ground surface (mbgs) (average depth of 116 mbgs). An assessment of water bearing fractures (orientation, extents) was beyond the scope of this overview. Insufficient information (i.e., screen depths, water levels) was provided in the well records to allow for any comments with respect to a water bearing zone in the unconsolidated deposits.

Seven springs are located in the Study Area; surface water licences for these springs indicate that water is/was utilized for domestic or irrigation purposes. A detailed review of the source of the springs and of each surface water licence was beyond the scope of this overview.

Water levels reported on the well records, where available, indicate that water levels ranged from 0.3 to 91 mbgs (with an average depth of 29 mbgs). A total of 6 well records reported “artesian” and/or “flowing artesian” conditions. Five of these wells are located along the east side of the Study Area; one is located along the south side of the Study Area. The Ministry of Environment (MOE) operates an observation well (Observation Well 411) at 3470 Gill Road. According to Ms. Nicole Pyett, Regional Hydrogeologist at MOE, only limited manual water level measurements are presently available for this well, and water quality has been not yet been assessed. Based on approximate groundwater elevations reported for the Study Area, the inferred direction of groundwater flow in bedrock fractures is generally to the northeast.

Estimated yields provided on 103 well records for bedrock wells indicate that well yields across the Study Area ranged from 0.3 to 130 USgpm (with an average of 8 USgpm). A summary of the distribution of estimated well yields is provided in Figure A below. Approximately 63% of the wells reported estimated well yields of less than

5 USgpm. Only 2 wells reported estimated well yields greater than 50 USgpm (one at 75 USgpm, the other at 130 USgpm).

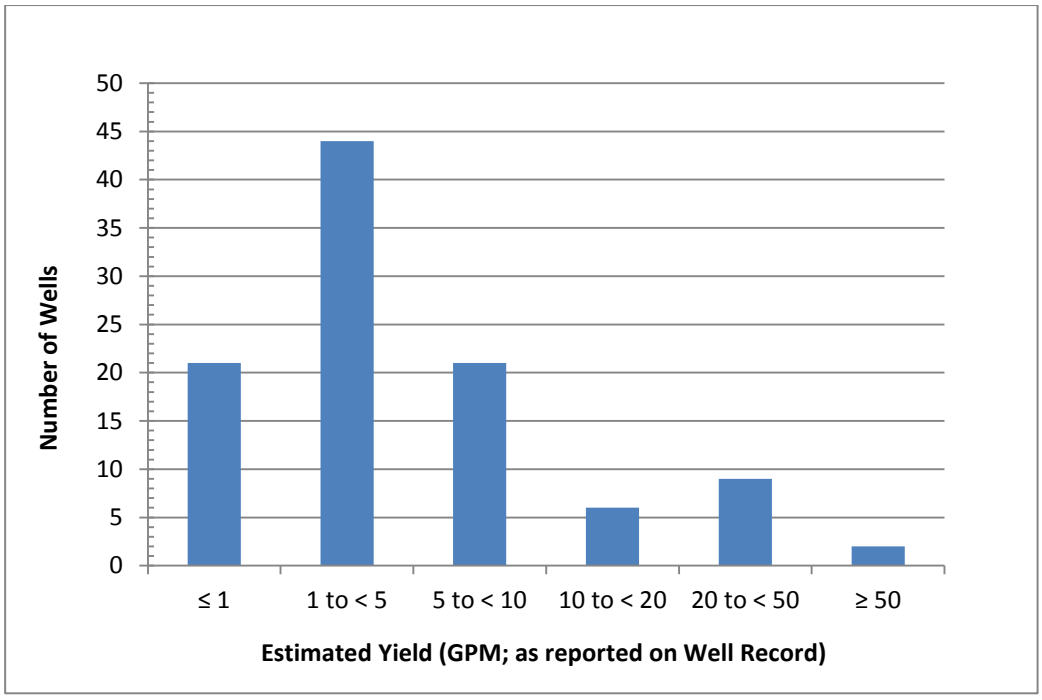


Figure A. Summary of estimated well yields reported for bedrock wells in the Study Area.

3.4 Recommendations

The following recommendations are provided to fill data gaps in future phases of the Upper Glenrosa Area Plan with respect to hydrogeological conditions:

- A detailed assessment of the potential for groundwater seepage in future growth/development areas;
- Detailed groundwater assessments, including, but not limited to: a comprehensive groundwater availability assessment for future growth/development areas, and groundwater protection planning for existing groundwater well users; and/or,
- Storm water disposal operational assessment to evaluate the efficacy of current storm water disposal systems in the study area, and to assess the feasibility of storm water disposal in future growth/development areas.

4.0 LIMITATIONS

The technical memorandum was prepared for the exclusive use of the District of West Kelowna, and was prepared for the purposes of satisfying the requirements of the District of West Kelowna RFP No. 2014 10 P348, Phase 1 – Upper Glenrosa Area Plan. The information in this technical memo is based on an overview-level desk-top review of available data and information for the Study Area. Golder has relied in good faith on information provided by others and does not accept responsibility of any deficiency, misstatements or

inaccuracies contained in the technical memorandum as a result of omissions, misinterpretation and/or fraudulent acts of the persons interviewed or contacted, or errors or omissions in the reviewed documentation.

Any use which a third party makes of this technical memorandum, or any reliance on, or decisions to be made based of it, are the responsibilities of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken, based on this technical memorandum.

The services performed as described in this technical memorandum were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

New information may be discovered during future work, including excavations, borings or other studies, and may result in amendments to conclusions made.

5.0 CLOSURE

We trust the information contained in this report meets your present requirements. If you have any questions or concerns regarding the information provided above, please contact the undersigned.

Regards,

GOLDER ASSOCIATES LTD.

Leigh Holt, M.A.Sc., R.P.Bio.
Biologist

Pana Athanasopoulos, M.Sc., P.Geo.
Senior Hydrogeologist

Gerald Imada, P.Eng.
Senior Geotechnical Engineer

LMH/DJA,PA/JF,GI/kv

Attachments: Figure 1 – TEM, SEI Classes and Aquatic Habitat Features
Figure 2 – Sensitive Ecosystem Ranking and Conservation Zones
Figure 3 – Preliminary Overview of Hydrogeological and Geotechnical Conditions

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Boulevard Transportation
a division of Watt Consulting Group

2406 Drought Road
West Kelowna, BC V4T 1P6
T 250.215.0544
F 250.388.9879
wattconsultinggroup.com
blvdgroup.ca

MEMORANDUM

To: Anne-Marie Whittaker, Golder Associates

Copy: Dan Casey

From: Tom Baumgartner, P.Eng.

File #: 1786

Project: Upper Glenrosa Neighbourhood Plan

Date: February 5, 2015

RE: Transportation Background

1.0 Transportation Overview

The Upper Glenrosa Neighbourhood is accessed via Glenrosa Road, an arterial road constructed to a rural standard (shown in **Figure 1**). Glenrosa Road extends from the Highway 97 interchange to the Crystal Mountain Ski Resort. The north end also connects to forestry roads behind Carrot Mountain and Mount Hayman that provide a circuitous connection to Traders Cove / Westside Road. An additional access near the Highway 97 interchange is provided at Lower Glenrosa Road, which connects the Glenrosa neighbourhood to Westbank Centre.

The neighbourhood is predominantly large-lot with rural road standards and limited connectivity to the west and typical single-family residential closer to south end of Glenrosa Road. Aside from automobile travel, the area is known for horseback. The neighbourhood has limited access and egress, no cycling facilities, limited and disconnected pedestrian infrastructure, and transit services do not extent into the Upper Glenrosa Neighbourhood.

1.1 Glenrosa Road

The existing construction of Glenrosa Rod has deficiencies in vertical curvature, horizontal curvature, and cross-section design that affect sight lines, vehicle operations, and safety of motor vehicles and vulnerable road users. Posted speeds along Glenrosa Road are 50km/h with operating (85th percentile) speeds of 72km/h south of Morningside

Drive and 67km/h north of McIver Road. The intersection of McIver Road is known to have poor sightlines, no sidewalks, and an unsafe pedestrian crossing.

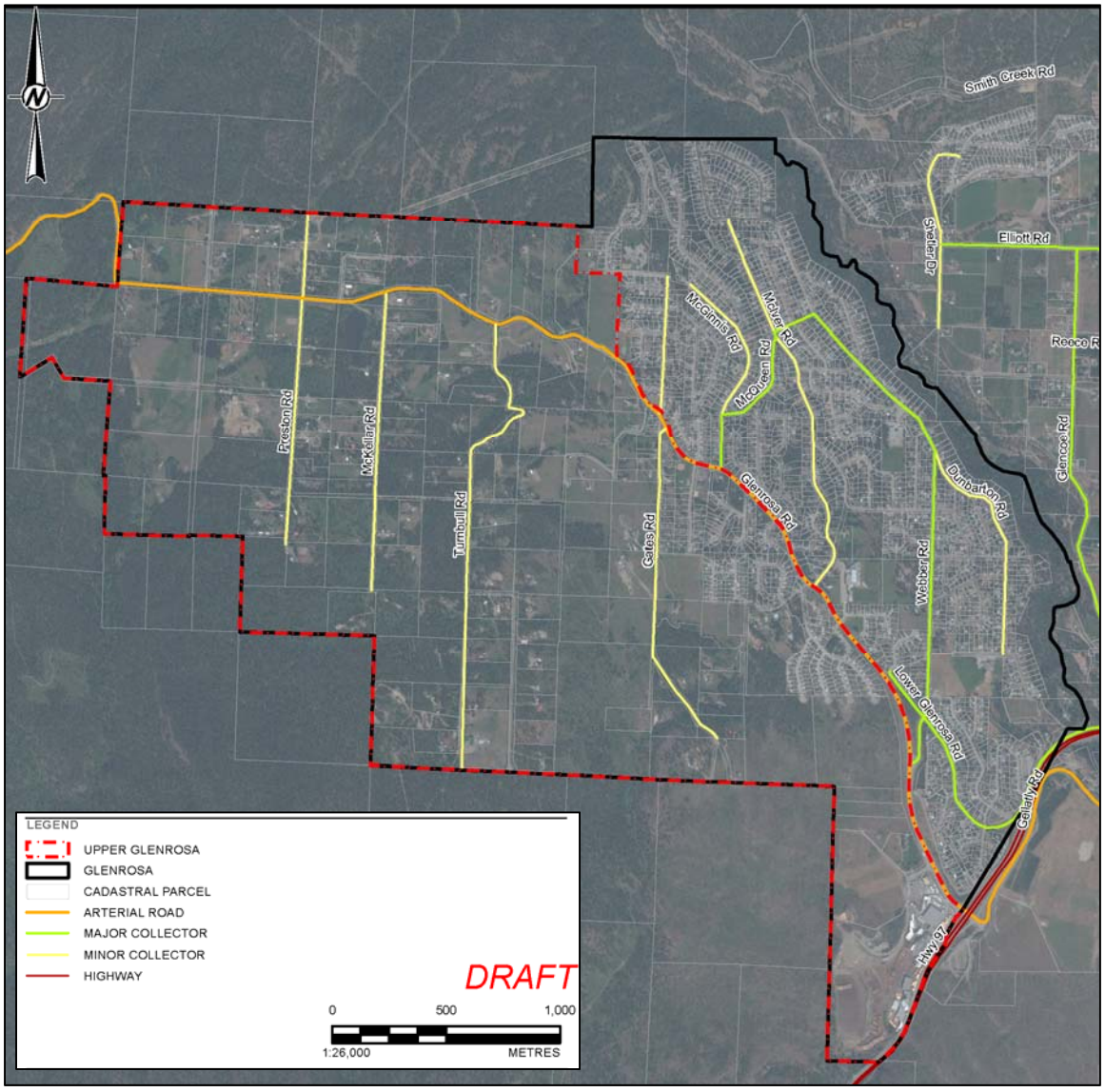


Figure 1: Glenrosa Neighbourhood Street Network

1.2 Neighbourhood Access and Egress

During the 2009 wildfires, over 4500 homes in the Glenrosa Neighbourhood were evacuated. The limited access / egress for the neighbourhood has since been a critical concern for residents. The District's Transportation Master Plan identifies potential connections. The following section elaborates on the connection routes and illustrates alternatives. The routes are also shown in **Figure 2**. These routes include:

- a connection to Trepanier (in the RDCO);
- a bridge over the Glen Canyon / Powers Creek;
- an emergency egress connection to Highway 97 or Highway 97C; and
- connect Glenrosa Road and Smith Creek Road to a future New Connector Route to the north

The Transportation Master Plan identifies the potential for a Ministry New Connector Route north of the community that could provide a connection between Smith Creek and Glenrosa as well as a connection to a potential future Peachland bypass. The Ministry is currently conducting the Central Okanagan Planning Study looking at potential routes for a future second crossing of Okanagan Lake. The study commenced in the fall of 2014 and has a three-year duration. This could greatly influence access / egress to the Upper Glenrosa neighbourhood if an alignment similar to the New Connector Route is followed. If a route similar to the New Connector Route is provided then upgrades to Glenrosa Road and Smith Creek Road are required to connect. It is also anticipated that the New Connector Route would connect to Trepanier in the RDCO.

Trepanier Connection

The Trepanier Road connection would provide a link from Glenrosa Road to Trepanier Road or MacKinnon Road in the RDCO. The Trepanier Road connection could potentially be made from Glenrosa Road around Mt Law to connect to Trepanier Road. The MacKinnon connection would be made in between Mt Law and Mt Drought. The constructability of these routes and potential for development along them are challenged by the terrain and environmentally sensitive areas.

Glen Canyon / Powers Creek Connection

The Glen Canyon / Powers Creek connection would incorporate a two-lane bridge to connect Smith Creek to Glenrosa. This option would provide needed additional access to both neighbourhoods and eliminate trips between the two neighbourhoods via Highway 97. As such, a change in travel patterns may direct more traffic through the Glenrosa and Smith Creek neighbourhoods. Densifying Upper Glenrosa land use would further impact these roads by adding additional vehicle trips.

Potential connections may be made from:

- Webber Road to the Powers Creek Water Treatment Access: This would involve upgrading the existing access road to an urban standard.
- Webber Road to Glencoe Road or Shetler Drive: Providing access from Webber Road is likely undesirable from the neighbourhood as the east ridge (facing Glen Canyon) is currently fully developed with single-family residential.
- Glenrosa Road to Smith Creek Road: This would connect as an arterial link or connection to the New Connector Route. This option would have the least impact to neighbourhood roads.

Highway Emergency Egress

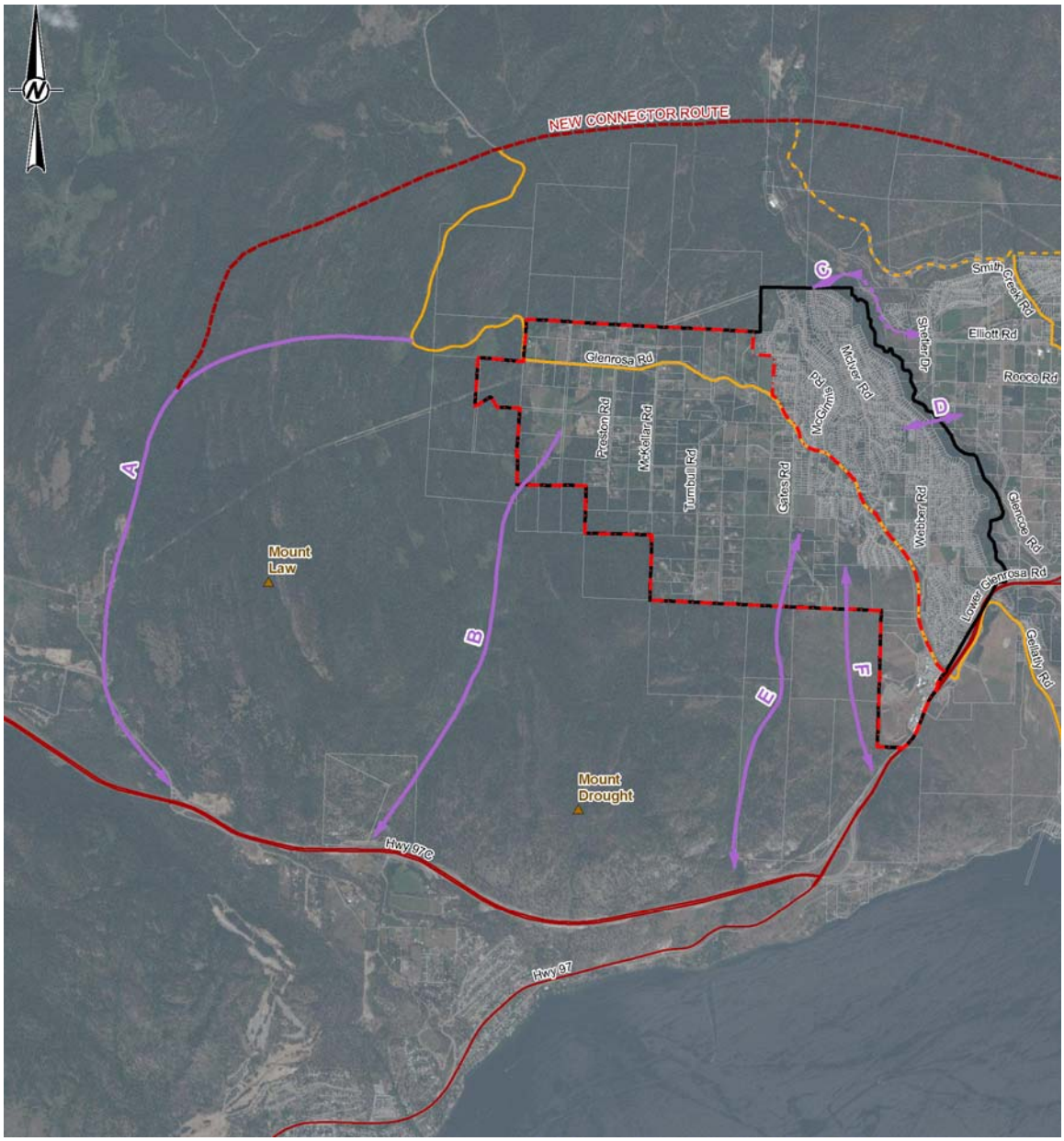
The Highway Emergency Egress would require a new road to connect an emergency only route to Highway 97 south of the Gorman Brother's Lumber Mill or Highway 97C along Mount Drought. These options do not provide full-time access or a connection to the Smith Creek neighbourhood. There is still development potential for either route, however, due to the close proximity of the Highway 97 / Highway 97C and Highway 97 / Glenrosa Road interchanges full-time access would likely not be granted by the Ministry.

Evaluation of Alternatives

Alternatives should be evaluated for benefits versus costs considering the following:

- overall lifecycle cost of alternatives
- cost sharing opportunities with other agencies
- utility (how will it get used) and development potential
- impacts on existing roads / neighbourhoods

The New Connector Route would be a Ministry facility. The benefit to this is that the direct costs would be made by the Ministry and the District would then tie-in. This option would provide a connection west of Glenrosa (Trepanier) and connect to Smith Creek. Going forward, the results of the Central Okanagan Planning Study will greatly influence the access and egress alternatives.



Trepanier Connections
A – Trepanier Road Connection
B – MacKinnon Road Connection
Glen Canyon Connection
C – via Water Treatment Plant
D – Webber Road
Highway Emergency Egress
E – Highway 97C
F – Highway 97

Figure 2: Access and Egress Options

Note: Route connections are approximate to show general alignment of links. A functional corridor analysis is required to determine the best alignment.

1.3 Existing Multi-Modal Profile

This section describes the existing transportation infrastructure for alternate modes. Recommendations made are in consideration that the neighbourhood will be densified.

1.3.1 Pedestrian Facilities

Pedestrian facilities in the Upper Glenrosa neighbourhood are limited. **Figure 3** shows the existing sidewalk infrastructure and nearby schools and community centres with circles illustrating 5- and 10-minute walking trips. The walking circles extend across Glenrosa Road into the Upper Glenrosa Neighbourhood indicating areas with high potential for walking to/from schools but without a connected sidewalk network.

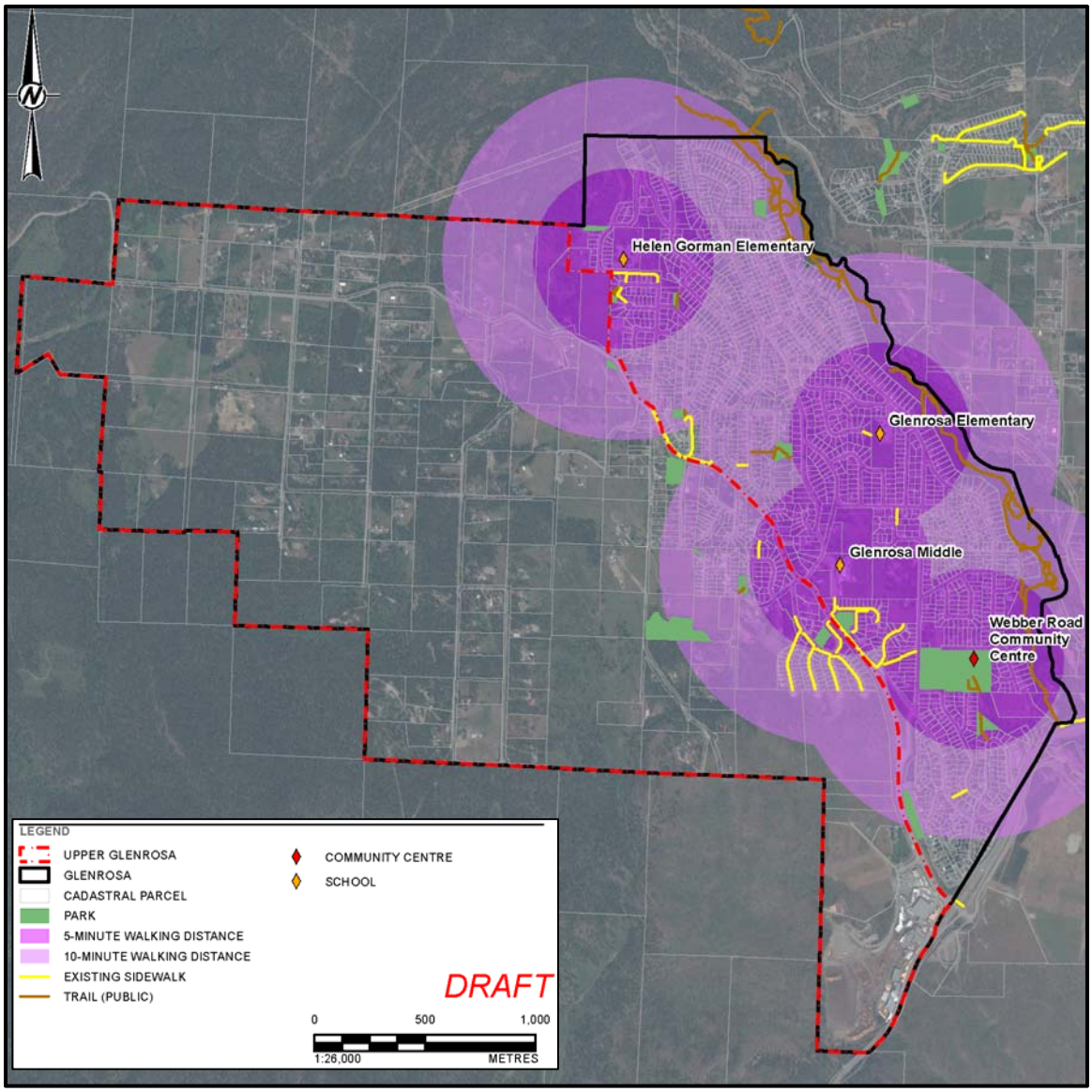


Figure 3: Existing Sidewalks and Nearby Schools and Community Centres

Some segments of the east side of Glenrosa Road have one-side sidewalk from Walnut Glen Drive to Glen Abbey Place and McGinnis Road to Gates Road. The Morningside Road, Yorkton Road subdivision, which is one of the only areas that provides an urban cross-section (curb and gutter) in Glenrosa, has one-sided sidewalk. The proposed Salco development will connect to these streets south of the development and to the Webber Road / Glenrosa Road intersection.

There is a limited network of off-road trails in the Upper Glenrosa Neighbourhood. There will be opportunities for linear park connections and recreational trail connections that can be integrated with parks to provide nodes for recreation. This will encourage active transportation, recreation, and provide a high-degree of connectivity for pedestrian travel within the neighbourhood.

For future planning and development of the Upper Glenrosa Neighbourhood, providing a walkable neighbourhood should consider the following aspects:

- Network connectivity of sidewalks and off-road pathways to key activity centres (i.e. schools, community centres, commercial centres, and so on). This includes improving connections to the existing Glenrosa Neighourhood.
- Ensuring accessibility infrastructure design including curb drop design, suitable sidewalk and trail grades (vertical and cross grades), and enhanced crossing treatments where warranted.
- Minimize the distance of pedestrian crossing where applicable. This may include the use of curb bulbs, median refuges, and other traffic calming elements that will reduce pedestrian exposure to the roadway and enhance the pedestrian environment.
- Linear trail connection through neighbourhood (as applicable).

1.3.2 Bicycling Facilities

There are no bicycle facilities in the Upper Glenrosa neighbourhood, however a small number of cyclists have been observed on Glenrosa Road. Important cycling trips can be generated by schools, commercial properties, and within the neighbourhood. Future plans to include bike lanes on Glenrosa Road may encourage cycling commuting to and from the neighbourhood.

While standard road cross-sections will guide the types of cycling facilities, the following aspects of road design and maintenance as they pertain to cycling should be considered:

- Steep and long grades may warrant the use of bicycle climbing lanes (wider bike lanes to give a cyclist space to sway).
- Maintenance for removal of debris from the shoulder / bike lane.
- Supporting signage and pavement markings for designated bicycle routes.

- End use facilities such as bike parking at key trip generators (commercial, office, institutions, parks, and so on).
- Network connectivity to other cycling routes and off-road trails.

1.3.3 Transit Facilities

Existing transit service is provided by the 21 – Glenrosa route along Glenrosa Road and the neighbourhood to the east of Glenrosa Road. The route is shown in **Figure 4**. Route 21 provides service to Westbank Centre and transfers to the 97 – Okanagan route with rapid bus service to the City of Kelowna. Weekday peak service frequency is approximately one trip every 30 minutes, with a total of 22 trips per day. Service operates on Saturday and Sunday with reduced frequency.

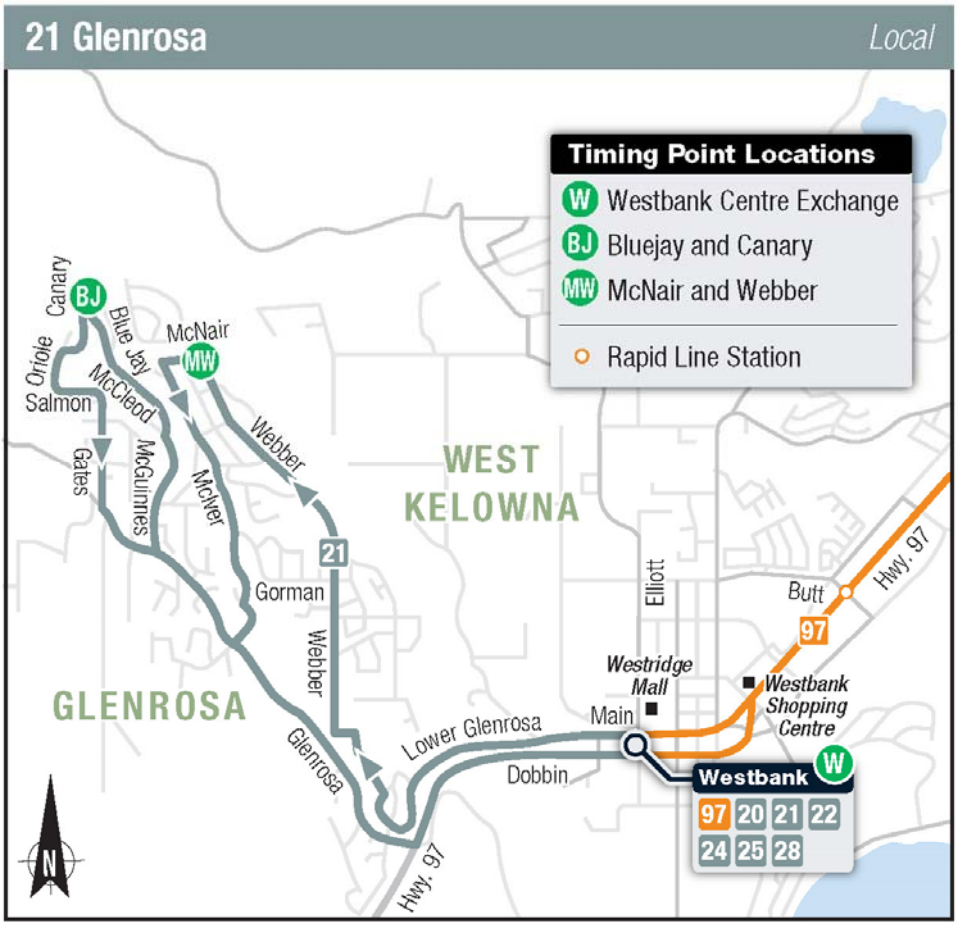


Figure 4: Glenrosa Neighbourhood Transit Route
Source: http://bctransit.com/kelowna/schedules/route-overview?route=21

Glenrosa Road is identified in the *Central Okanagan Transit Future Plan*[1] as a part of the "Frequent Transit Network" that will experience convenient, reliable, and frequent service (15 minutes or better).

In order to provide transit service into the Upper Glenrosa neighbourhood, the following should occur:

- Create an interconnected road network so transit may loop through the neighbourhood. The existing segmented network would likely not be cost effective to operate. Appropriate density in residential dwellings would be needed to support frequent service (i.e. 15-minute service or better during peak hours).
- Provide sidewalk and pathway connections to bus stops.
- Bus stops should generally be design as at-curb facilities (i.e. no bus bay), but consideration may be given to bus bays where warranted[2].
- Add bus stop amenities including, but not limited to: benches, shelters, route information, trash receptacles, bike parking, and light (for safety and security).

1.3.4 Parking Facilities

Area land uses are primarily single-family homes with parking in driveways and garages. Parking demand is generally met on-site.

Consideration should be given to the following parking management approaches as the land uses and development form for Upper Glenrosa are established:

- Specific parking supply rates suitable for all non- single family residential land uses (possibly different from District Zoning requirements)
- Appropriate road widths to accommodate on-street parking, if desired. Alternatively, small on-street parking "pockets" may be defined.
- Shared public parking supplies where commercial and multi-family residential land uses are nearby.
- Appropriate public parking restrictions (user, time) in areas of mixed land use and/or higher density.

[1] http://bctransit.com/kelowna/transit-future/central-okanagan-transit-future-plan
[2] Consideration should be given to BC Transit's *Infrastructure Design Guidelines*, available at: http://bctransit.com/servlet/documents/1403640670226

Please contact me if you have any questions or comments at (250) 215-0544. Thank you.

Sincerely,
Boulevard Transportation
a division of Watt Consulting Group



Tom Baumgartner, P.Eng.
Transportation Engineer

WATT Consulting Group
Since 1983

#310, 3016 – 5 Avenue NE
Calgary, Alberta T2A 6K4

T 403.273.9001
F 403.273.3440
wattconsultinggroup.com

MEMORANDUM

To: **ANNE-MARIE WHITTAKER, GOLDER ASSOCIATES**

From: James Wong, P.Eng.

Our File #: 3223.E01

Project: Upper Glenrosa Neighbourhood Plan

Date: February 18, 2015

RE: **ENGINEERING BACKGROUND**

1.0 Water System Overview

Potable water in the Glenrosa neighbourhood is supplied from the Powers Creek Water Treatment Plant. The system serves approximately 5325 people (~1775 households) and a number of community/institutional buildings within the Glenrosa study area. The Coventry Crescent pump station is equipped with three 100 hp vertical turbine pumps to provide pressure boost; and a reservoir on Glenrosa Road provides 500,000 gallon (1893 m^3) of storage. There is full hydrant coverage within the Glenrosa service boundary. The Glenrosa area straddles four pressure zones. The existing water distribution network is shown in Figure 1.

According to an August 6, 2010 Council Report, 165 existing homes in the Upper Glenrosa area are unserviced. The pump station is currently being upgraded with a fourth pump.

1.1 System Capacity

The existing reservoir requirement for the Glenrosa neighbourhood is about 4735 m^3. This includes balancing storage, fire flow and emergency storage for the residential and institutional land use demand in the area. With capacity of the existing Glenrosa reservoir at 1893 m^3, there is a short fall of 2842 m^3. A similar volume has been identified in the 2010 council report.

It is assumed that the pumping shortfall outlined in the same council report is being addressed with the current upgrade at the Coventry Crescent pump station.

The 2014 Water Utility Master Plan completed by AECOM has identified three areas of watermain upgrade in the Glenrosa neighbourhood. These involve upsizing the watermains in Weber Road; Glenrosa Industrial Area; and McIver/Gorman Road to provide adequate flow.

1.2 Service Potential

In order to address the current storage shortfall and expand the distribution network into the unserviced homes in the higher elevations of Upper Glenrosa, it is necessary to provide additional reservoir storage and additional pumping capabilities. This involves expanding the existing reservoir and pump house, or acquiring new site(s) for these facilities.

Three potential tie-in locations have been identified (Figure 1) to expand the distribution system where it may provide opportunity for system looping.

The 2010 council report provided a preliminary cost estimate for a conceptual design to extend water servicing to the area. This includes the pump house upgrade; additional pump house and reservoirs; supply trunk line; and distribution mains to service 165 homes in Upper Glenrosa. The estimated cost is in the neighbourhood of $15,500,000. It is considered that these estimates, which are based on a 2006 review and concepts only, reasonably reflect current costs. This works out to about $94,000 per household. This cost per household is expected to lower if development densifies the area which would increase servicing efficiency.

2.0 Sanitary System Overview

The Glenrosa neighbourhood is serviced collectively by the Glenrosa sanitary gravity trunk line along Glenrosa Road. The line turns east at Glen Abbey Place and runs southeast towards Highway 97. Once the line crosses the highway it runs along Gellatly Road South until it reaches the tie-in point with the Regional District of Central Okanagan (RDCO) West Bank trunk line south of the Canyon Ridge community. Following approximately 231 m of the RDCO 750mm diameter gravity line, effluent reaches Westside Regional Wastewater Treatment Plant for treatment. The Glenrosa trunk line was first constructed in the early 1990s and almost all the pipes are PVC, with a few Perma Loc IV pipe sections. The line measures just under 5 km from Gates Road to the RDCO line tie-in as shown in Figure 2.

There are two lift stations in operation in the Glenrosa neighbourhood. Both the Glengary and Inverness lift stations service approximately 215 homes east of the trunk line. It is not expected new development in Upper Glenrosa west of the trunk line will contribute flow to these two lift stations.

The Glenrosa trunk line serves approximately 5910 people (approximately 1970 homes) in the area. This includes two communities south of Highway 97 and also a number of community/institutional buildings. Approximately 260 homes in Upper Glenrosa west of the trunk line are already serviced, leaving approximately 170 unserviced homes.

2.1 System Capacity

Currently the total effluent peak flow rate (including infiltration) discharged from the trunk line is approximately 102 L/s. Based on the District of West Kelowna (DWK) sanitary system design criteria, analysis shows the existing trunk line is under capacity to service the connected homes in Glenrosa. It also has the capacity to connect 170 unserviced homes in Upper Glenrosa, which adds approximately 6.7 L/s peak dry flow rate.

Four sections of the trunk lines have been identified to have available capacity of less than 100 L/s. This is based on design criteria of the peak hour design flow at 75% of the full pipe capacity. The section near the Weber Road Community Centre contains two pipe sections that have the lowest available capacity at 44 L/s and 46 L/s (Section 1 in Figure 3). This is well capable of servicing the additional 170 homes mentioned above. The other three sections have available capacities of 71 L/s; 95 L/s and 97 L/s respectively matched to the Sections 2-4 shown in Figure 3. It is worth mentioning that the trunk line outfall (Section 5 in Figure 3) has available capacity of 108 L/s.

Without contributing flow data from other areas of the region, it has not been confirmed what capacity is available in the RDCO West Bank Trunk Line and at the wastewater treatment plant.

2.2 Service Potential

Based on the lowest available capacity of 44 L/s mentioned above, and the density of 30 people per hectare single family zoning, this equates to an additional peak flow rate (including infiltration) from about 1100 single family homes or 3300 people in the Upper Glenrosa area.

At least three potential tie-in locations have been identified for system extension in the Upper Glenrosa Area (Figure 3). This includes extending the trunk line at Glenrosa Road/Gates Road in the West and South directions, and also from the existing stub near Glenrosa Road at Highway 97.

The topography in Upper Glenrosa slopes generally towards east and north, which suggests new development should occur from lower elevations in the east and north towards the higher elevations to facilitate gravity flow.

It is estimated that about 14 km of sewer mains is necessary to service 170 homes in Upper Glenrosa. The estimated cost is about $5,000,000, and works out to about $29,500 per household. This cost per household is expected to lower if development densifies the area which would increase servicing efficiency.

3.0 Storm System Overview

The existing stormwater system for the Glenrosa Watershed basin is described in detail in the "District of West Kelowna Master Drainage Plan" (MDP) prepared by RSB Engineering, October 25, 2011. Section 3 of the report lists seven projects that were required to address current deficiencies in the existing stormwater system. The majority of the existing stormwater system is a network of roadside ditches and culverts along with some small detention areas. The newer developed areas west of Glenrosa Road have been constructed with curbs and a piped storm system that ties into the existing network of roadside ditches and culverts. The runoff from the Glenrosa watershed basin ultimately discharges into Powers Creek.

3.1 Service Potential

Based on the assumption that these projects were completed the MDP listed five future areas of development within the Glenrosa watershed basin. These five areas included a 5.6 ha area north of Canary Drive, a 10.1 ha area south of Ranch Road, a 3.6 ha area south of Gorman Road, a 25.4 ha area south of Morningside Drive and a 2.1 ha area south of Inverness Road. The MDP provides stormwater design recommendations for these five areas included the allowable release rates and estimated stormwater storage requirements.

Development that occurs outside of these areas will require further modeling and an update to the MDP. The analysis of these undeveloped areas will help identify future upgrades to the existing stormwater system as well as any future stormwater infrastructure or facilities that will be required to meet the runoff quality and quantity requirements for the District of West Kelowna.

Other than the seven projects identified in the MDP, there is no storm water deficiency identified in the Upper Glenrosa Area. There is no new construction cost required to maintain the status quo.

Should you have any questions or require additional detail please do not hesitate to contact me.

Sincerely,
Watt Consulting Group

James Wong, P.Eng.
Project Manager

Report Signature Page

GOLDER ASSOCIATES LTD.

Anne-Marie Whittaker
Planner-Designer

Jana Zelenski
Associate, Senior Landscape Architect

AW/JZ

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APPENDIX B
Public Consultation 1 Summary

MEMORANDUM

TO Darin Shaal, Planner, West Kelowna **DATE** March 18, 2015

CC Jana Zelenski

FROM Golder Associates Ltd. **PROJECT No.** 1416015

UPPER GLENROSA AREA PLAN
OPEN HOUSE #1 – SUMMARY OF CONSULTATION

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Background

On October 14, 2014, West Kelowna Council approved the terms of reference for the preparation of the Phase 1 Upper Glenrosa Area Plan. Project work was initiated in December, 2014. A background review and analysis which included a review of environmental, transportation, servicing and land use opportunities and constraints was conducted for the planning area in January and February, 2015.

Overview and Purpose of the Open House

The first public open house for the Upper Glenrosa Area Plan was held on March 11th, 2015 from 4:00pm to 7:00pm. The purpose of the open house was to provide residents and stakeholders with an opportunity to review background and analysis work and provide input on key issues (i.e. servicing, costs, land use and development, etc.) and to begin developing a collective vision for the future of the neighbourhood.



Figure 1: Image of open house display boards.

Open House Format

The event was held as an interactive, drop-in format where participants were encouraged to record input (comments and sticky dots) directly on the display boards and participate in a mapping exercise. In addition, a feedback form was available for residents wishing to provide additional input. Participants were encouraged to fill out the forms at the open house and submit immediately in hard copy or online at an ipad station available at the event. The feedback form was available online until March 27, 2015 for additional input from participants or those residents who were not able to attend the open house. An overview presentation of the information was delivered at two set times, 5:00 pm and 6:00 pm, during the evening and was followed by facilitated small group discussion at two tables for further questions, answers and general expression of concerns, issues, and opportunities as seen by residents. District staff from development services and engineering attended the event to respond questions and participate in the discussions. A sign in sheet provided an opportunity for residents to indicate whether they would like to join an email list to remain up-to-date on the project as it progresses.

Attendance & Participation

In total, 90 participants signed into the open house. It is estimated there are 170 households within the planning area. A large map of the planning and surrounding area was located at the entrance to the open house and attendees were asked to record where they live (see Appendix A. Display Boards – "Where do you Live?" map). The map generally shows an even representation of participants throughout the Upper Glenrosa planning area. Participants from outside Upper Glenrosa generally lived directly adjacent to planning area.

Summary of Feedback

The following provides a summary of responses received through the input opportunities available during Phase 1 of the area planning process, including:

- display boards (available at open house)
- mapping exercise (available at the open house)
- feedback form (available at the open house and online until March 31, 2015)



Figure 2: Image of attendees and display board discussion.

Display Boards

The following is a summary of comments received on each display board. Please see **Appendix A** for a record of individual comments.

Board 1: Environment

Comments Received on Display Board = 8

Summary of Related Comments:

- Review and correct the incidence of fish recorded in the area, as some of the water bodies are stocked with fish by resident(s);
- Review and consider residents' water rights in the area and identify implications for residents with respect to environmental issues for future planning in the area, and;
- Consider fire protection for the area within the environmental context (for example, fire breaks/tree removal, dead wood clean up, etc.) and whether/how this may be addressed in the area plan.

Several comments referred to existing trails in the area, access points and trail extension into the surrounding Crown Land as an important aspect, including equestrian, ATV, hiking, and hunting activities. These should be considered and incorporated into further planning work.

Board 2: Current Land Use & Planning Context

Comments Received on Display Board = 3

Summary of Related Comments:

- Support for, and discussion on, the presence of commercial space (local serving)
- Consideration for policy related to RV parking

Board 3: Additional Development

Comments Received on Display Board = 5

Summary of Related Comments:

- Desire for residents to have a clear picture of what development means
- Location of development is important – not all types of development are appropriate in all locations
- Desire for an understanding of why current developments have been approved

This board also included an opportunity for residents to identify the types and locations of development they would consider appropriate for Upper Glenrosa. Support was generally recorded for existing types of development, including:

- Rural Residential - small (RU2) and medium (RU3), preferred over large lot (RU4);
- Large Parcel Single Detached (most popular), and;
- Standard Single Detached (limited support).

There was also some interest recorded in multi-family options – Duplex (R2) and to a lesser extent, Compact Single Family (RC3) and Low Density Residential (RC3); however, these received the fewest responses overall.

Responses indicate strong support for neighbourhood service commercial.

Board 4: Transportation Review

Comments Received on Display Board = 15

Summary of Related Comments:

- Road safety
    - Glenrosa Rd (upgrades for traffic flow and pedestrians, parking)
        - Key points – East of McInnis (pedestrian), sidewalks from Firehall to Helen Gorman, intersection at McIvor, crosswalks at Firehall, Webber and Glenrosa Rd.,
    - Gates Road (speeding)
    - General signage (speed limits)
    - Illumination for roads and end/access points
- Network connectivity
- Egress
- Trails as a network for off-road mobility within the neighbourhood and as multi-modal options

Board 5: Community Servicing Review

Comments Received on Display Board = 7 (also mentioned on other boards)

Summary of Related Comments:

- Current tax rates for the community are considered high for the services provided
- Concern about costs of future servicing (a need to consider offsets or subsidies for residents)
- Indication that water servicing for fire protection should be considered in the area planning

Board 6: Vision

Comments Received on Display Board = 25

Summary of Related Comments:

Many comments received on the vision board related to specific issues in the area. However a general picture can be created based on this input for what residents like to see in the future. There is some level of openness to additional, yet sensitive, development that respects the rural character and current "look and feel" of the neighbourhood. Servicing for the area is desired by most residents; however costs are a major concern. Most residents feel the area's connectivity, mobility options and safety require improvement. Overall, residents are open to some change and expressed a vision for a moderately developed, serviced area that maintains a rural look and feel, with a better connected network of roads and trails.

To provide preliminary guidance on a vision for Upper Glenrosa, the following key themes have been identified:

- Character
  - Area to maintain a rural look and feel.
- Development
  - Low intensity
  - Little to modest increase in development/subdivision in key locations
- Servicing
  - Desire to have servicing in the neighbourhood
- Cost to residents
  - Current taxes considered high for current level of servicing
  - Little to no cost is desirable for servicing
  - Growing recognition of the relationship between costs, servicing and future development
- Network and Roads
  - Improved safety
  - Second emergency egress
  - Improved connectivity with multi-modal (pedestrian) and off-road (trail) options, especially linking to key destinations
  - Maintaining existing trails and access into Crown Land recreation networks

Mapping Exercise

The following is a summary of the mapping exercise and small group facilitated discussion that followed the presentations. To review individual comments see **Appendix B. Mapping Exercise**.



Figure 3: Image of participants at the mapping exercise.

The mapping exercise provided participants with an opportunity to discuss key concerns, values and ideas within the context of the actual planning area. Facilitators recorded notes and where possible, located feedback directly on the map. Many participants expressed a number of ongoing issues for the neighbourhood related to road safety, servicing, development and surrounding uses of Crown Lands. The following **Figures** outline a visual summary of the mapping exercise.

Figure 4: Visual summary of Mapping Exercise Outcome #1.

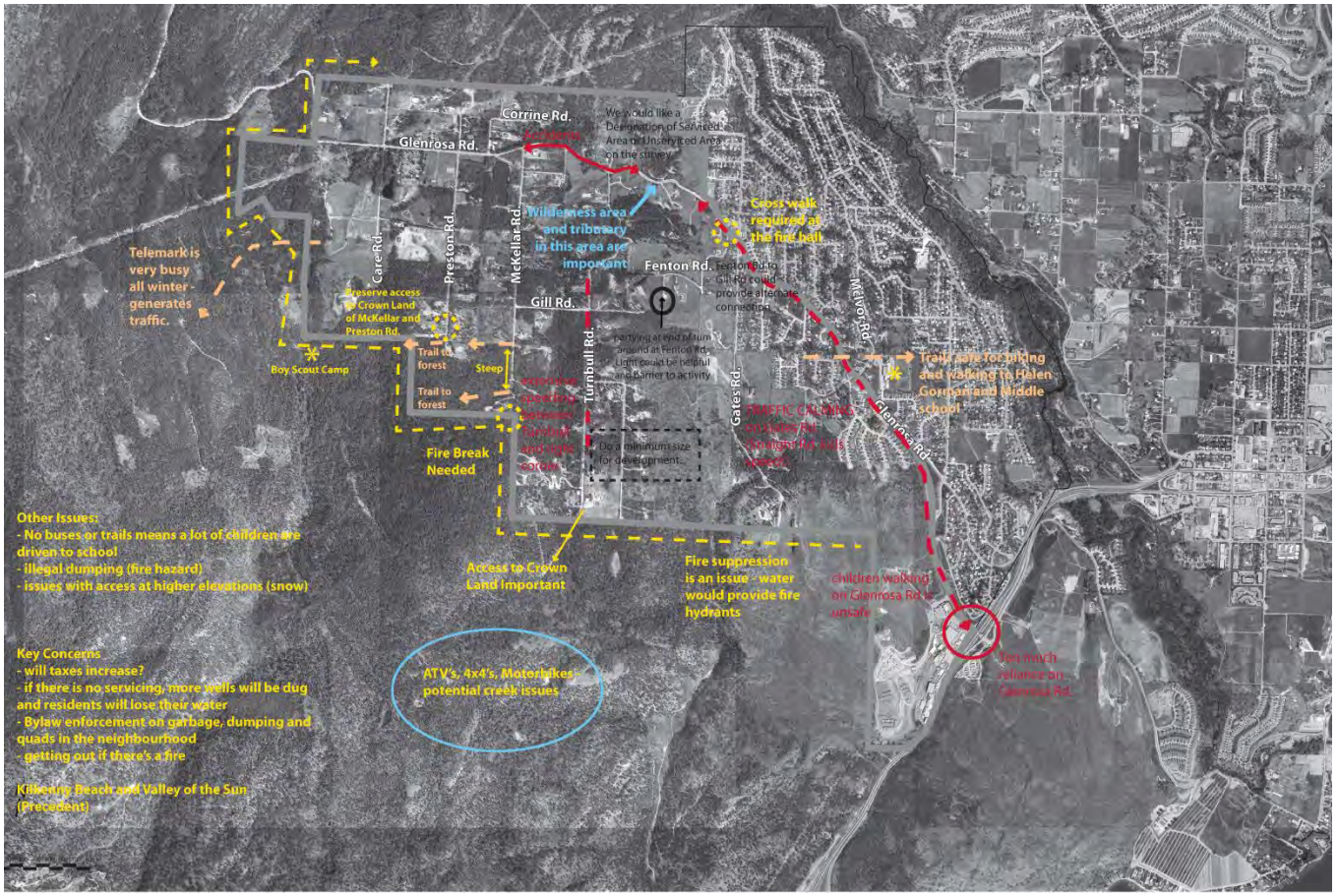
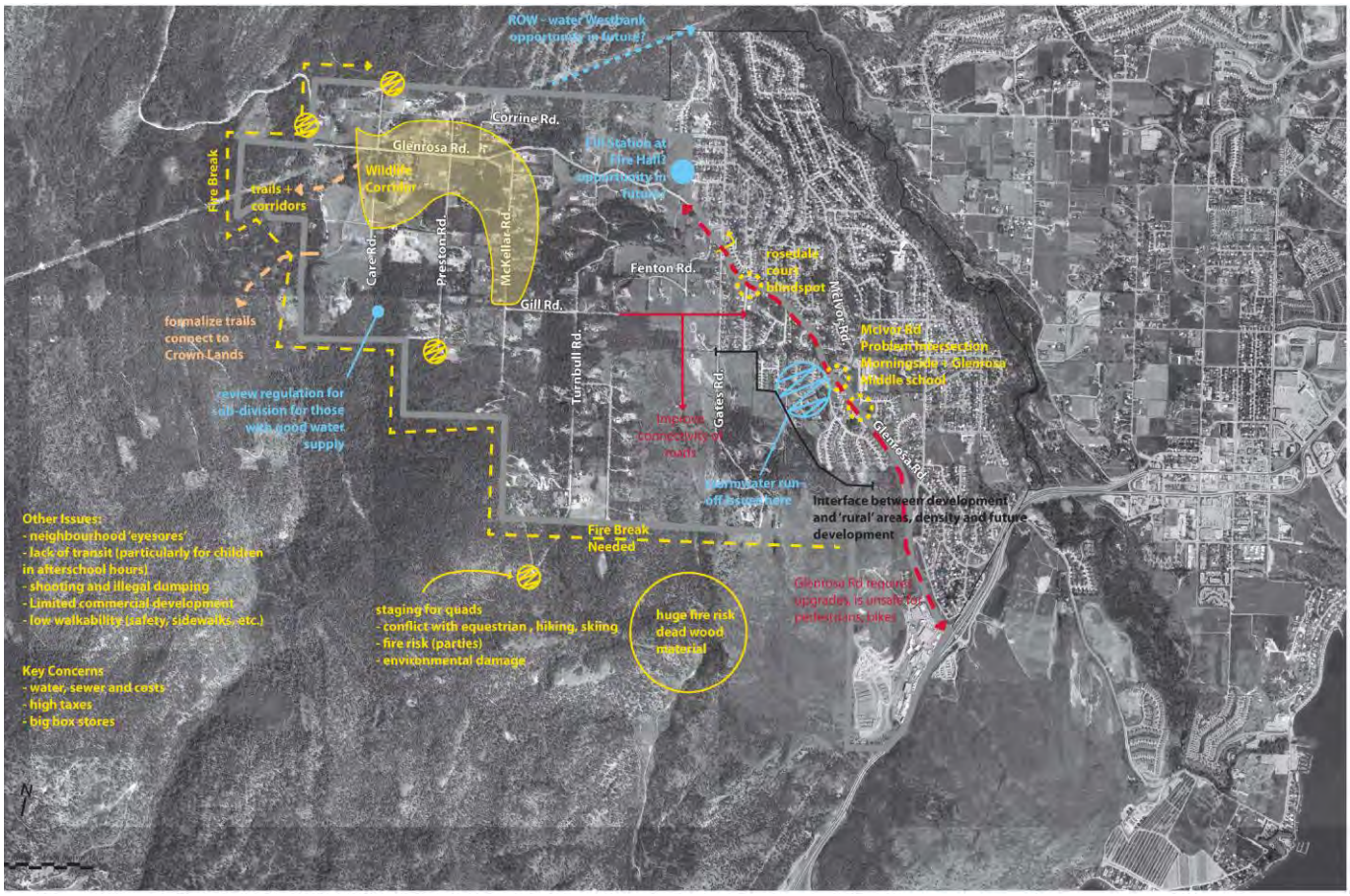


Figure 5: Visual summary of Mapping Exercise Outcome #2.



Feedback Form

A total of 117 feedback forms were received between March 11 and March 27, 2015. The following is a summary of input received through the feedback form, organized by each question provided. For a more detailed breakdown of comments received, see **Appendix C**.

Question: Where do you live?

Approximately 66% of respondents live in the Upper Glenrosa Area and 18% in Glenrosa (lower area) neighbourhood (Figure 6). In addition, there was interest from outside the Upper Glenrosa Area with 16% of responses received from Lakeview Heights, outside of Kelowna, Westbank Centre, Smith Creek, Casa Loma and West Kelowna Estates.

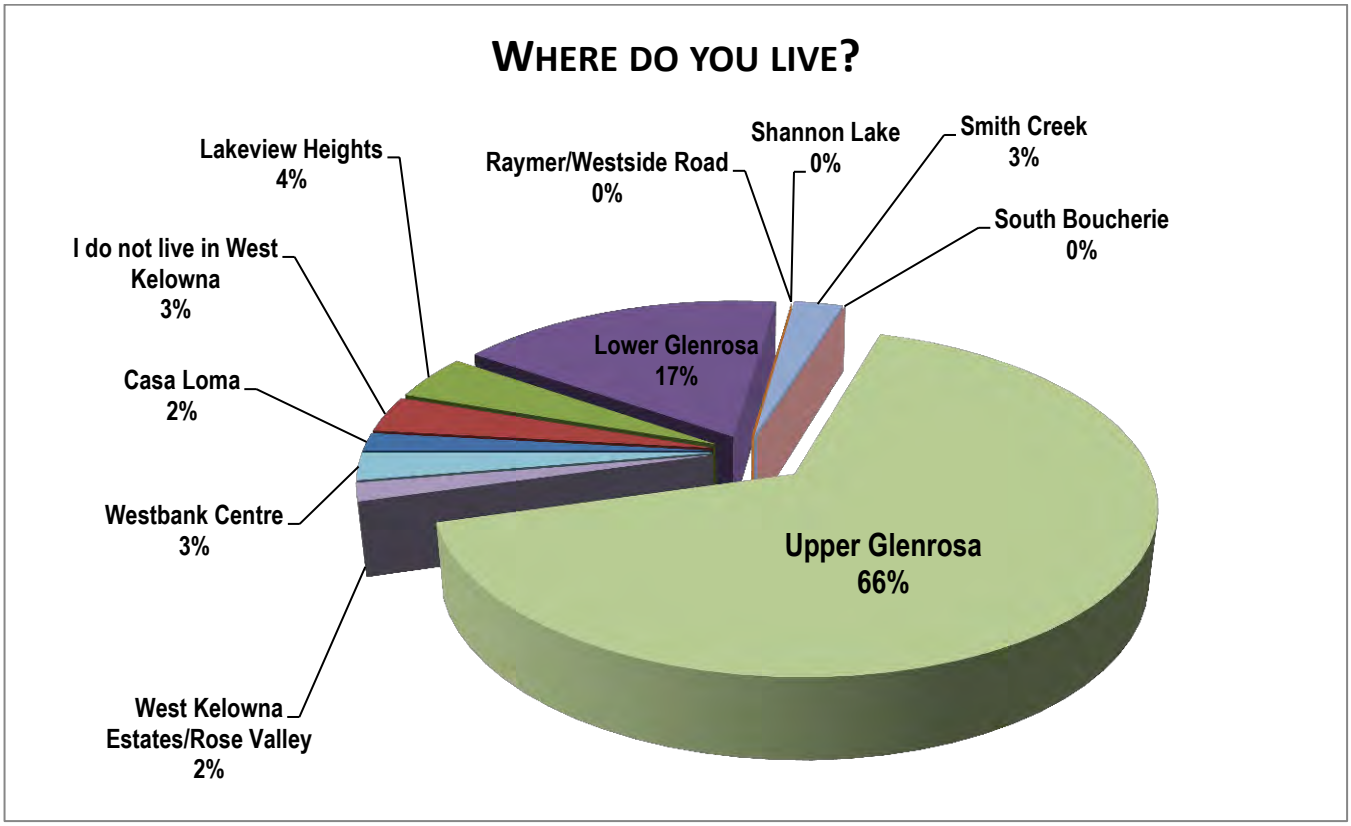


Figure 6: Overview of where respondents live who completed the feedback form.

Question: What do you value most about Upper Glenrosa Neighbourhood today?

Respondents expressed a range of values for the area. These are shown as follows.

Table 1: Valued components in the planning area.

Access to trails/green spaces	78	12.60%
Affordability	27	4.36%
Development potential	22	3.55%
Great views	54	8.72%
Lack of through traffic	59	9.53%
Large lots	60	9.69%
Mature trees	57	9.21%
Neighbourhood character	47	7.59%
Other (answers below)	10	1.62%
Preservation of natural areas	70	11.31%
Privacy	60	9.69%
Rural Lifestyle	75	12.12%
	619	100.00%

Other indicated values not listed in the feedback form but included in the "other" category were as follows:

- Access to Crown Lands for ATVs snowmobiles, etc.
- Agricultural interface
- Family oriented
- Quiet area

Question: Do specific locations in Upper Glenrosa have special meaning to you?

Less than half of the respondents indicated special places in the area. Of these responses, there was no clear one or two locations that stood out; respondents provided a range of responses. However, approximately 28 of the 44 responses related to greenspace, trails and recreational aspects of the area.

Question: Would you support new development in Upper Glenrosa?

The majority of respondents would consider new development in the area. Within this, 48% of respondents indicated they would consider new development depending on the type and location and 29% indicated they would support new development overall. 20% indicated they would not support new development in the area. 3% are undecided.

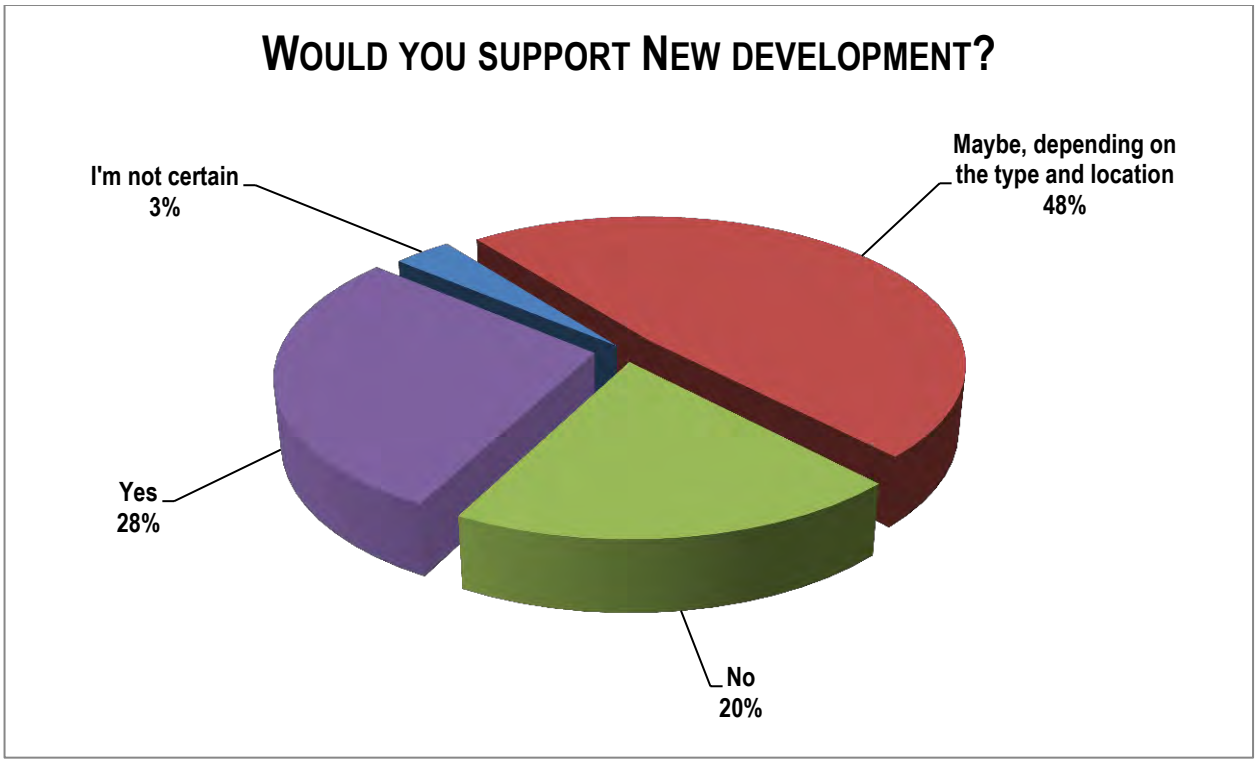


Figure 7: Support for new development.

Question: What types of development do you think could be appropriate in Upper Glenrosa?

Respondents were provided with a range of development options from multi-family to large rural lots. Of all the choices provided, there were none that received zero rating.

Respondents indicated the top three development types appropriate to the area were:

- Rural residential – small parcel;
- Large parcel single detached residential, and;
- Rural residential – medium and single detached residential (tied).

Other responses not included in the options provided are as follows.

- A mix of all options, including multi-family, carriage homes, etc.
- Clustering higher intensity of development in the lower part of the Upper Glenrosa area and larger parcels to the north.
- Development that accommodates greenspace.
- Concerns additional development would cause an increase in taxes

Question: Do you have specific comments or questions about development in the Upper Glenrosa Area?

In total there were 38 comments received of 116 responses. Of these comments, several themes can be identified, these are as follows:

- Concerns about development if there is no additional servicing and costs related to servicing.
- Concern that development would result in loss of neighbourhood character, in particular, greenspace and the "rural" look and feel.
- Concerns regarding access and road safety/maintenance (upgrades required if the area developed).
- Concerns and comments on a lack of amenities in the area to support additional residents.

Question: Do you support extending water and sewer to existing development in Upper Glenrosa?

Of 114 responses, 52% replied maybe, depending on cost. 29% wanted servicing regardless of cost, 16% said no and 3% were undecided.

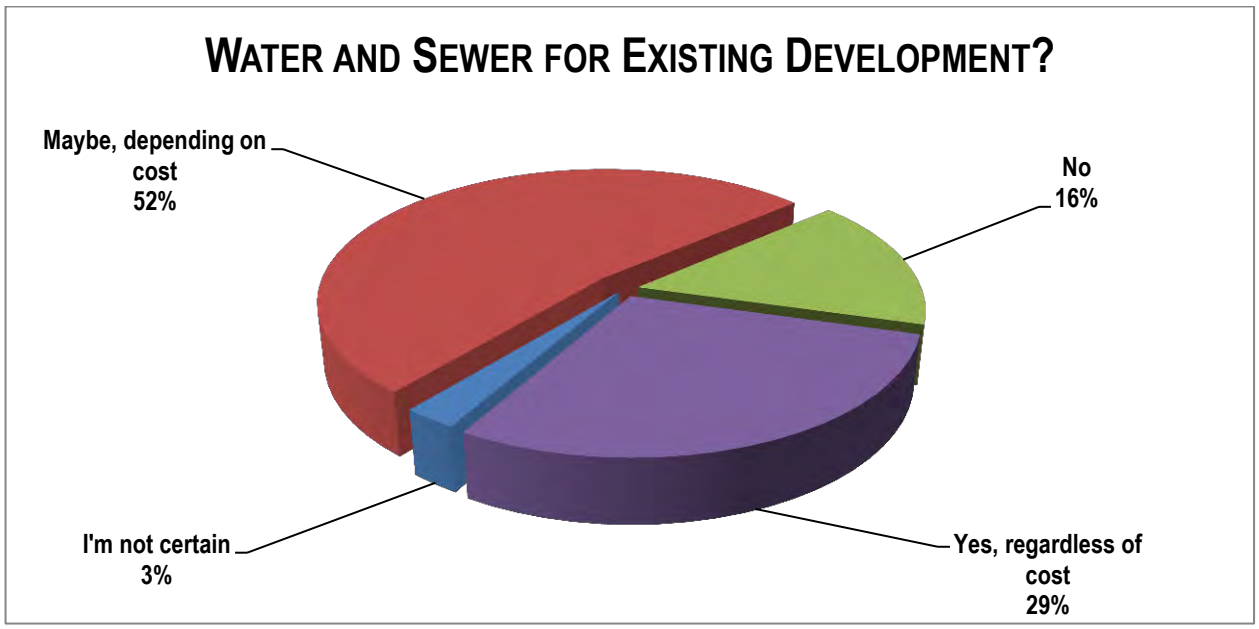


Figure 8: Support for servicing existing development.

Question: Do you support extending water and sewer to new development in Upper Glenrosa?

There was a similar response when asked if respondents supported servicing for new development (as opposed to just for existing). 45% replied maybe, depending on the cost and 21% said yes, regardless of cost. A slightly higher number of responses, 28% said they did not support servicing for new development and 6% were not certain. Only 12% of people responded they would not support servicing for new development but would support for existing.

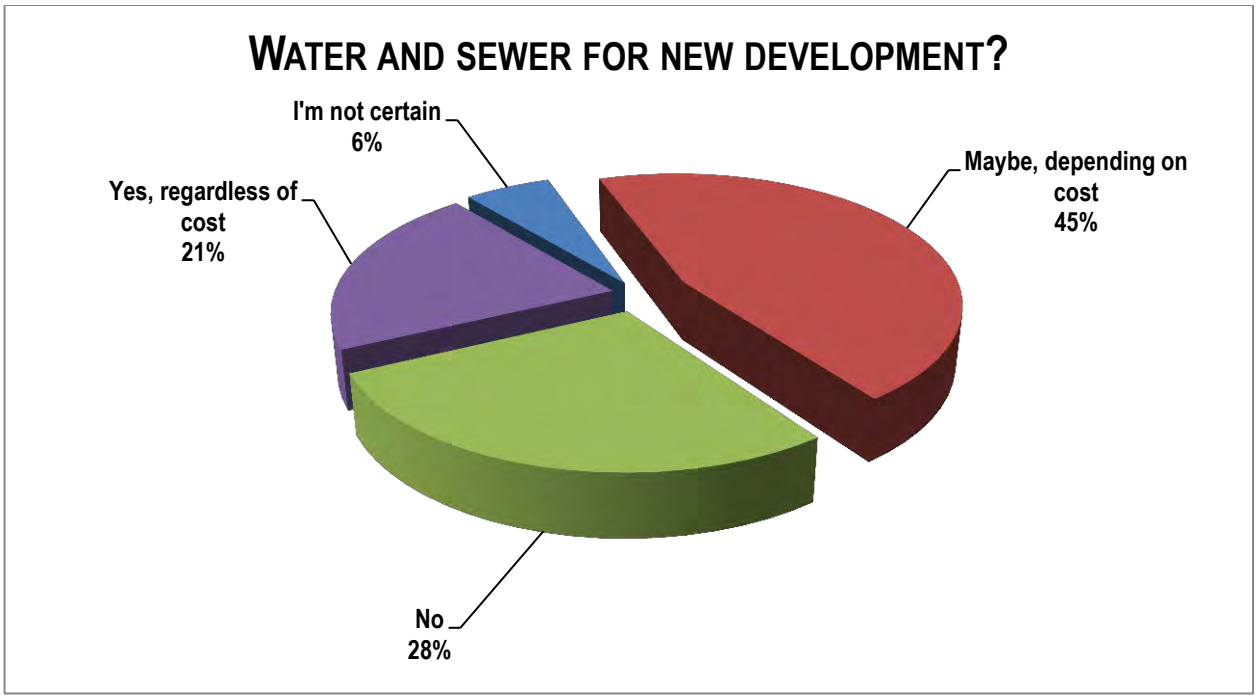


Figure 9: Support for servicing new development.

Question: Do you have specific comments or questions about water and sewer services in Upper Glenrosa?

In total there were 49 comments received of 116 responses. Of these comments, the majority of responses centered on the need for servicing in the area, potential cost of servicing or opposition to paying for services. Other comments expressed concerns for development without servicing and the impacts on water supply (ie. potential well shortages).

Question: Please rank the following transportation issues in order of importance to you.

Respondents indicated the highest priority for transportation was access and egress into the neighbourhood. The lowest priority was equestrian safety. Overall, transportation priorities were ranked as follows (highest to lowest).

1. Access/egress
2. General road safety
3. Improved pedestrian infrastructure
4. Speeding
5. Improved cycling infrastructure

6. Lighted intersections
7. Improved transit
8. Equestrian safety

Question: Should additional access/egress be provided in Glenrosa if additional development is desired?

The majority of respondents see access and egress as an important consideration should the area include additional future development. 40% of respondents indicated this depended on cost, 33% said yes, regardless of cost and the remaining responded no (12%) and uncertain (8%).

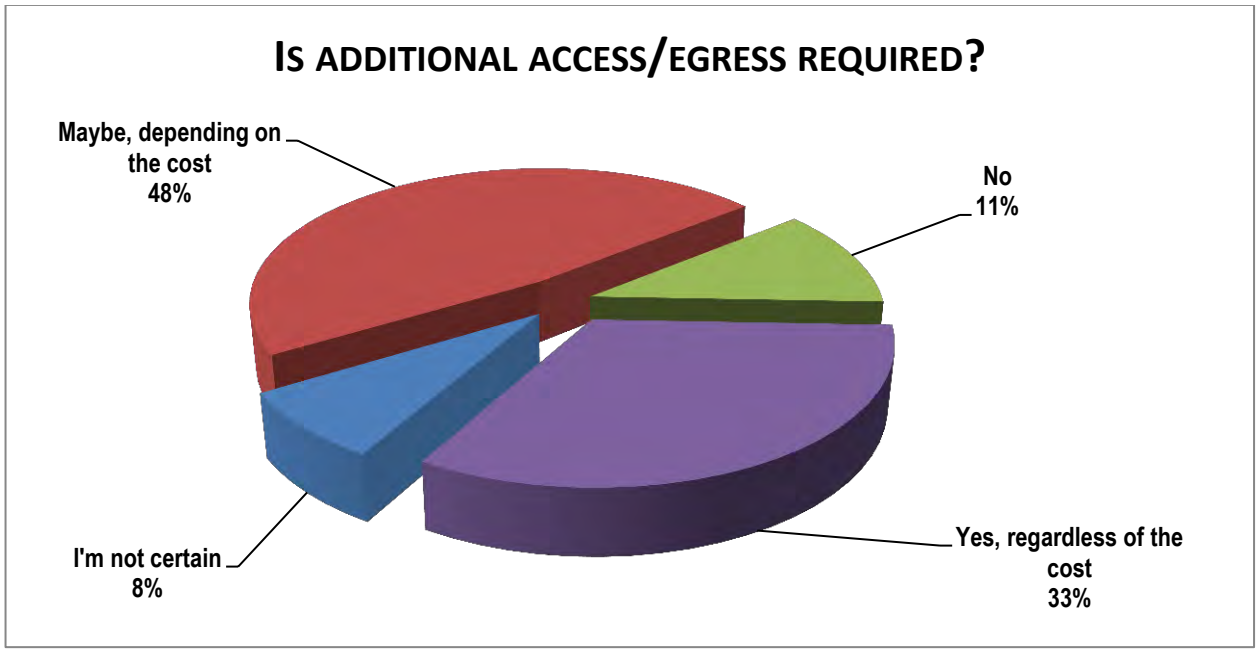


Figure 10: Support for additional access and egress.

Question: Do you have any specific comments or questions about transportation in the Glenrosa Neighbourhood?

Of 116 responses, 38 comments were received. Comments provided information on specific upgrades required, safety issues and concerns with additional development and the need for access/egress. These comments will be considered in the scenario development process and further study on transportation issues.

APPENDIX A: Display Board Comments

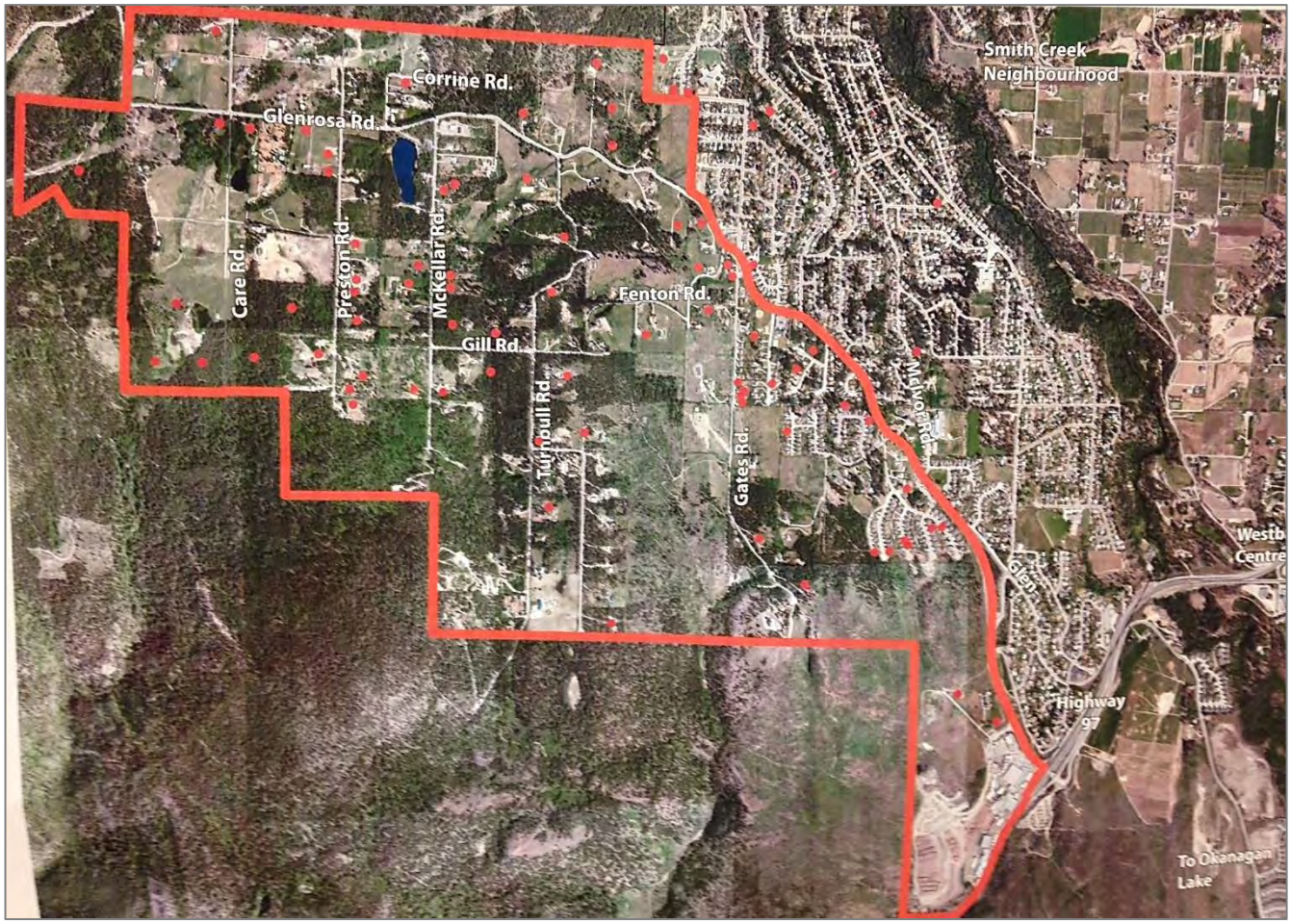


Figure 11: "Where do you live?" Map

Upper Glenrosa Area Plan

ENVIRONMENT

In preparation for planning, an initial background review and assessment of the planning area was prepared. Here are some of the environmental findings to be further explored.

Please add your knowledge of Upper Glenrosa to the map.
Write it on a sticky note and place on the map.

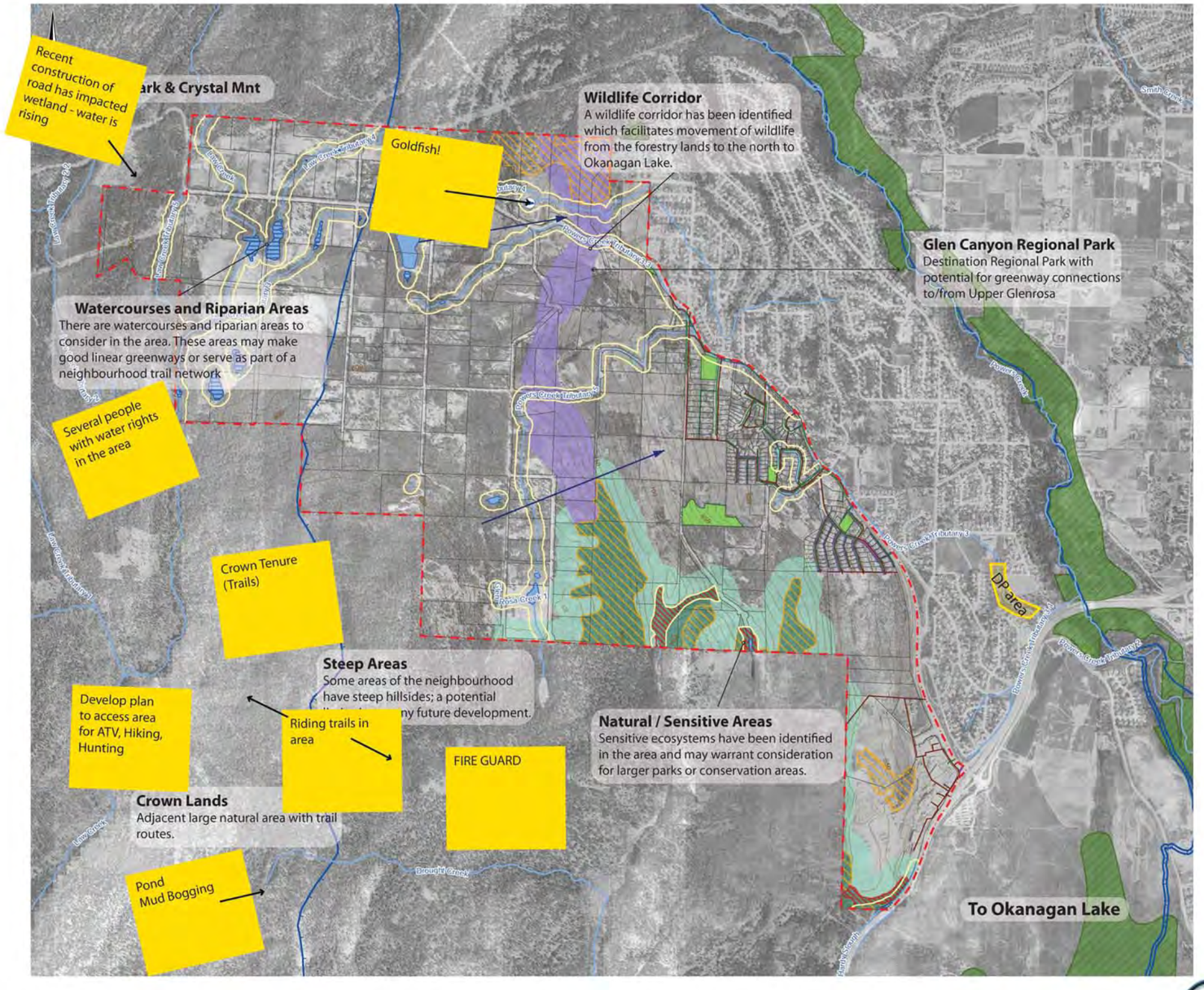


LEGEND
- UPPER GLENROSA AREA
- CONTOUR (10m)
- INFERRED DIRECTION OF GROUNDWATER FLOW IN BEDROCK FRACTURES
- WATERCOURSE
- WATERBODY (1:50.000)
- WETLAND
- DWK DEVELOPMENT PERMIT AREAS (DWK 2014) - AQUATIC BUFFER AROUND WATER FEATURES
- GREENBELT
- PARK
- POTENTIAL ROCKFALL / ROLLING ROCK HAZARD AREA

SENSITIVE ECOSYSTEM RANKING (SER)
- HIGH
- MODERATE

CONSERVATION ZONES
- CORE CONSERVATION AREA
- CORE CONSERVATION BUFFER
- WILDLIFE CORRIDOR

FISH OBSERVATION RECORDS (MOE 2014)
- FISH OBSERVATION



Upper Glenrosa Area Plan

CURRENT LAND USE & PLANNING CONTEXT

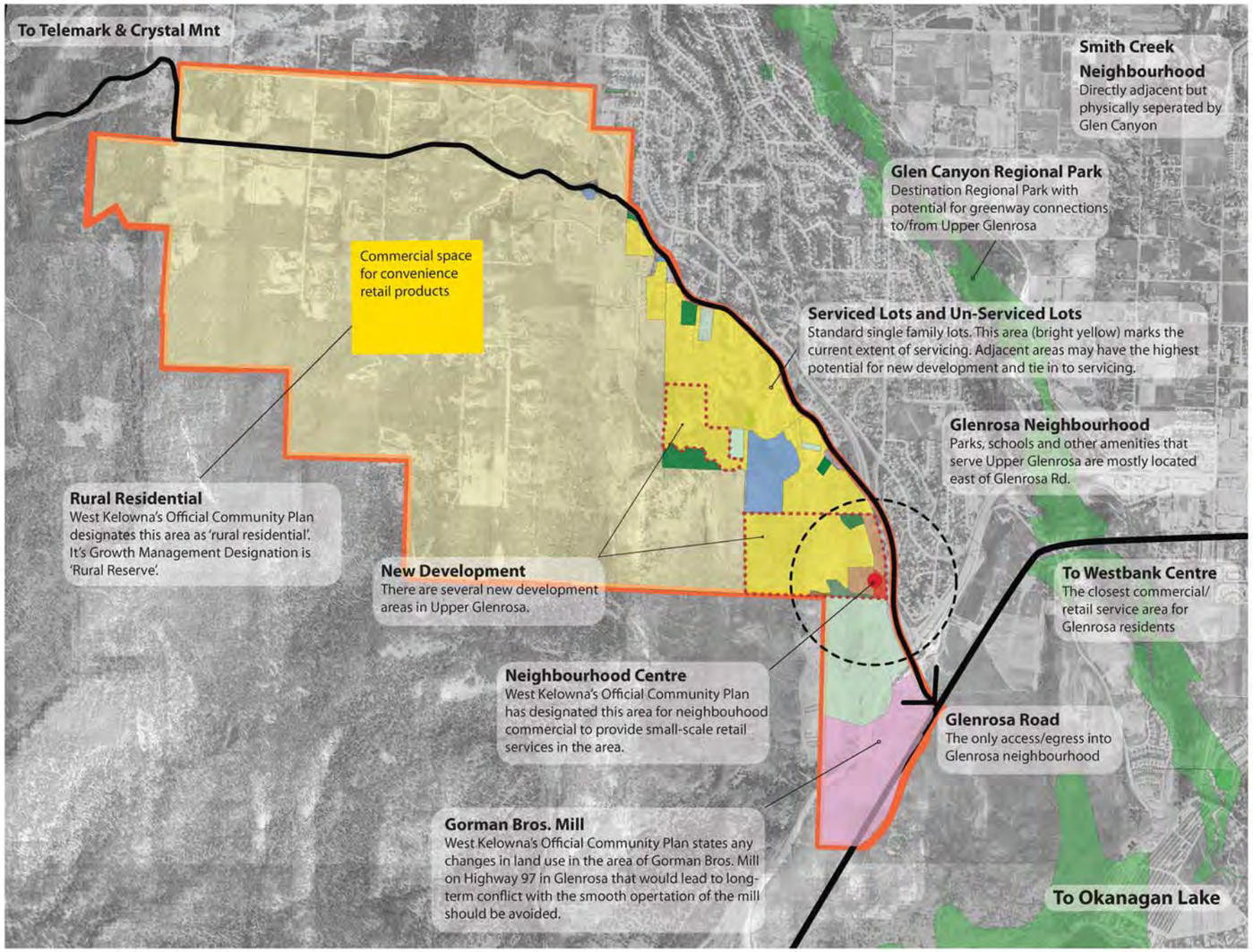
In preparation for planning, an initial background review and assessment of the planning area was prepared. Here is the current land use and planning context to be further explored.

Please add your knowledge of Upper Glenrosa to the map.
Write it on a sticky note and place on the map.



LEGEND

- Planning Area Boundary
- Rural Residential
- Single Family Residentiial
- Parks and Natural Areas
- Regional Parks (Greenbelts)
- Agricultural
- Schools and Institutional
- Low Density Multi-family
- Commercial
- Proposed Neighbourhood Centre (local shops and services)



Upper Glenrosa Area Plan

ADDITIONAL DEVELOPMENT?

UPPER GLENROSA TODAY

WHAT ABOUT THE R1 LOTS APPROVED IN GATES RD SUBDIVISION 110 LOTS

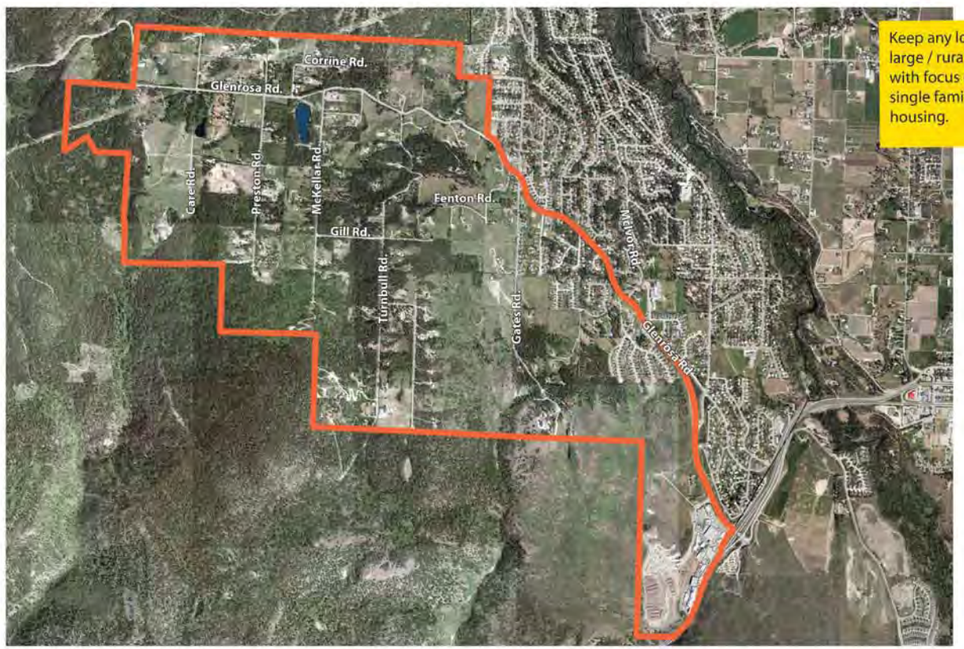
Today Upper Glenrosa is a rural resid with most lot sizes ranging from 2.5 acres (1 ha) to over 160 acres (65 ha). There are more densely developed single family areas near Glenrosa Road (off McIver Road) with lot sizes typically ranging between 0.25 acres (0.1 ha) to 0.50 acres (0.2 ha).

DO YOU THINK FUTURE DEVELOPMENT IS APPROPRIATE, IF SO, WHERE?

Development comes in many forms – it may include a subdivision of one large lot to two smaller lots, a new duplex, or a larger 15 to 30 unit multi-family project. However not all development is suitable in every place. Is new development right for the Upper Glenrosa Area? If yes, where do you think development would be most appropriate?

I don't mind a second house (small) for Granny (not strangers)

(*Using sticky dots, show us on the map below or if you think no further developn appropriate anywhere, please write this on a sticky note and post below.*)



Keep any lots large / rural and with focus on single family housing.

WHAT TYPES OF DEVELOPMENT ARE APPROPRIATE IN UPPER GLENROSA?

Use red dots provided to select forms of development you think fit and provide your responses on a feedback form. If you do not support further development, please indicate (on a sticky note) below in the space provided.

Types of housing that already exist in the neighbourhood.



Rural Residential - Large Parcel (RU4)
Min. Lot Size = 9.9 acres (4.0 ha)



Rural Residential - Medium Parcel (RU3)
Min. Lot Size = 4.9 acres (2.0 ha)



Rural Residential - Small Parcel (RU2)
Min. Lot Size = 2.5 acres (1.0 ha)



Large Parcel Single Detached Residential (R1L)
Min. Lot Size = 0.62 acres (0.25 ha)



Single Detached Residential (R1)
Min. Lot Size = 0.14 acres (0.06 ha)



Compact Single Detached Residential (RC3)
Min. Lot Size = 0.08 acres (0.03 ha)



Duplex Residential (R2)
Min. Lot Size = 0.20 acres (0.08 ha)



Low Density Multiple Residential (R3)
Min. Lot Size = 0.25 acres (0.1 ha)



Neighbourhood Commercial (C2)
Min. Lot Size = 0.1
(0.04 ha)

Neighbourhood eatery!

Other(*please specify, sticky notes provided*)

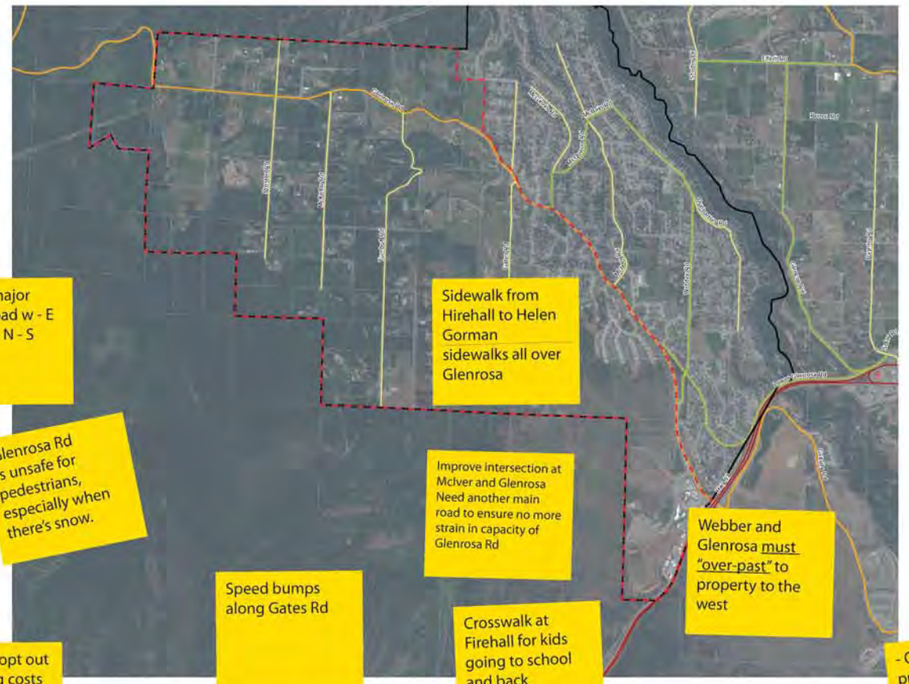
Development should creep up the mtn as it is needed.

No Development (*please specify, sticky notes provided*)

Upper Glenrosa Area Plan

TRANSPORTATION REVIEW

The Area Planning Process is reviewing the transportation context and identifying opportunities for improvement. Here is the transportation review to be further explored. Today, Glenrosa Road is a rural road (i.e. no sidewalks, two-way traffic, ditches rather than curb and gutter) and serves as the only access/egress point to both the Upper and Lower Glenrosa areas. Concerns about emergency access /egress were magnified during the 2009 wildfires when the neighbourhood was evacuated. As a rural area, there are limited pedestrian, cycle, transit amenities.



map above shows the main road network in ar er Glenrosa Area. To date, key es identified within the existing system include:

- Limited access/egress (emergency route).
- Safety concerns on Glenrosa Road, including sightlines, pedestrian and equestrian safety.
- Speed issues - Posted speeds on Glenrosa Road are 50km/hr, however operating speeds are in the order of 70 km/hr, especially south of Morningside Drive.
- Pedestrian safety concerns at the intersection of McIver and Glenrosa Roads.

What (will be or is) mandatory with respect to servicing, should it be an option? i.e if you're a resident that has no issues with water/ sewer

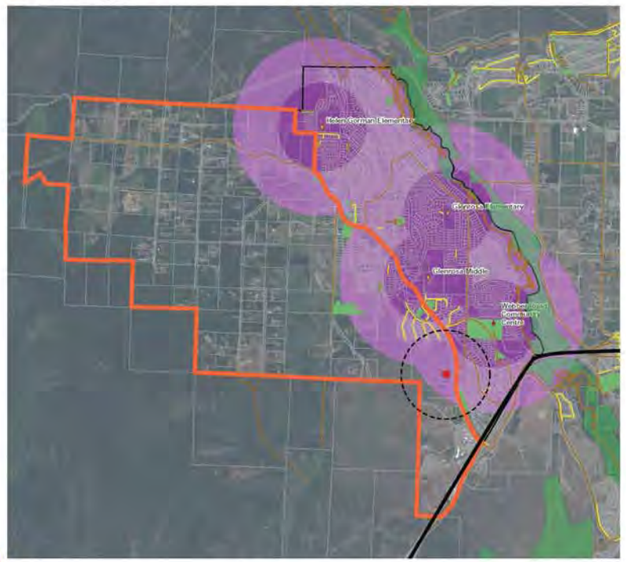
Glenrosa Road needs pedestrian area widened East of McGinnis too narrow

No Posted speed signs past fire hall "Drivers" too fast for road conditions

safe roads for students and seniors to walk along. This means move sidewalks

Identify existing trails - improve connectivity

Existing Pedestrian Facilities



The map (left) shows current pedestrian facilities (shown as yellow lines) in the Glenrosa Neighbourhood with existing sidewalk infrastructure and nearby schools and community centres with circles illustrating 5- and 10-minute walking trips.

Observations include:

- Pedestrian facilities (yellow lines) in Upper Glenrosa are currently limited.
- A number of streets have sidewalks on one-side only.
- There is a limited network of off-road trails (shown in brown) in the Upper Glenrosa Neighbourhood.

What do you think?

What other concerns or opportunities about transportation do you have? What did we miss?

Write them on a sticky note and add them here.

District of West Kelowna

Upper Glenrosa Area Plan

COMMUNITY SERVICING REVIEW

Should community servicing be extended to Upper Glenrosa? Should additional development, funding models or grants be considered to reduce costs?
Write your comments on a sticky note and add it here.

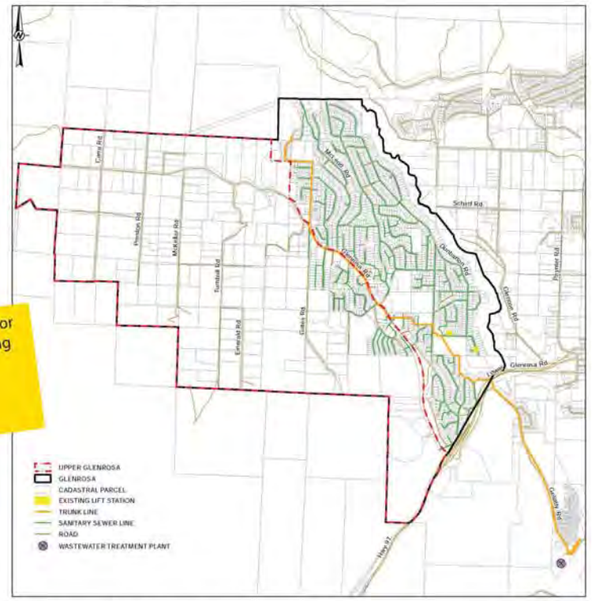
Today, most of Upper Glenrosa is unserviced – there are not water or sewer connections to the municipal network. Input to date has suggested servicing may be desirable. Preliminary cost estimates indicate it will be expensive to residents to extend water and sewer to the existing lots as they are configured today. Additional development, funding models and/or grants may decrease the cost of extending services in the neighbourhood.

What do you think?

Yes, grants and funding will off set costs to property owners!

Kettle Valley Reservoir - just completed. Could reservoir be created?

Service Area



Taxes are high for level of servicing provided.

The map above shows the existing Glenrosa service area today.

- Only the eastern half of the Glenrosa neighbourhood is currently serviced, this includes a small portion of the Upper Glenrosa Area directly adjacent to Glenrosa Road.
- The majority of the Upper Glenrosa Neighbourhood is unserviced.

Water System

Even if you have plenty of water, do you have a fire hydrant near by when a house is burning?

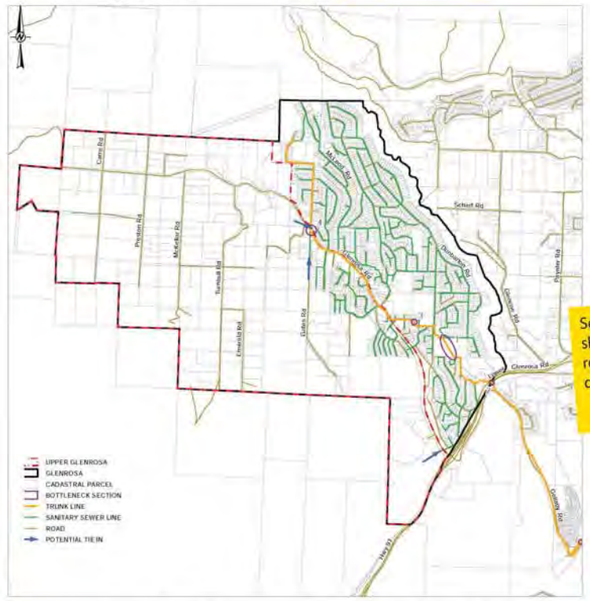
TAXES ARE WAY TOO HIGH when you have to haul your own water and have no Fire hydrants

Water for fire fighting is important

The map above shows the existing Glenrosa water system.

- Potable water is supplied from the Powers Creek Water Treatment Plant.
- The system serves approximately 5,325 people (~1,775 households) and a number of community/institutional buildings.
- Approximately165 existing homes in the Upper Glenrosa area are unserviced.
- A shortfall has been identified in the capacity of the system for existing uses and watermain upgrades have been completed or are scheduled for completion to address this deficiency.
- To expand the water system to unserviced areas, an additional reservoir and pumping would be required.

Sewer System



Servicing upgrade should be responsibility of developer.

The map above shows the sewer system within the neighbourhood.

- The area is serviced collectively by the Glenrosa sanitary (sewer) gravity trunk line along Glenrosa Road.
- The system serves approximately 5,910 people (approximately 1,970 homes).
- There are two lift stations in operation.
- There is approximately 165 unserviced homes.
- There is capacity in the existing system to accommodate an additional 1,100 single family homes or 3,300 people in the area.

Upper Glenrosa Area Plan

WHAT IS YOUR VISION FOR UPPER GLENROSA IN 2035?

Please tell us what your ideas are for the future of Upper Glenrosa.

Write your comments and thoughts on a sticky note and add it here.

Intersection Morningside @ Glenrosa Middle School

I would like to have water and sewer extended to lot 6, Plan 777, Ie at the upper end of Fenton Road

AS IS!

WATER & SEWER

WATER! GAS! SEWAGE!

so you don't have liars working at it

Water Sewer Emerg. Road Development Sub-divide!

Get rid of open drainage ditches eg. Lansbury Way. Water flows year round Sidewalks

What do you think?

Connect Fenton and Gill Rds

Water! Sewer Emergency Rd!!! Ditto!!

More development - need good water wells, threatening existing waterwells

Sidewalks around all neighborhoods

"Upper" Glenrosa area - high taxes and no services

No condos

WATER!

Sidewalks Keep it Green

- Sidewalks - 2nd entry/exit road

No development keep it country!!

Connected pathways thru the neighbourhoods away from main roads for pedestrian traffic thru to downtown :)

Water and sewer as well as development subdivide

Water and sewer up Fenton Rd

Another major road - take pressure off of Glenrosa Road - Service the new areas

WATER + SEWER and EMERGENCY ROAD

Water! Sewer! Gas!

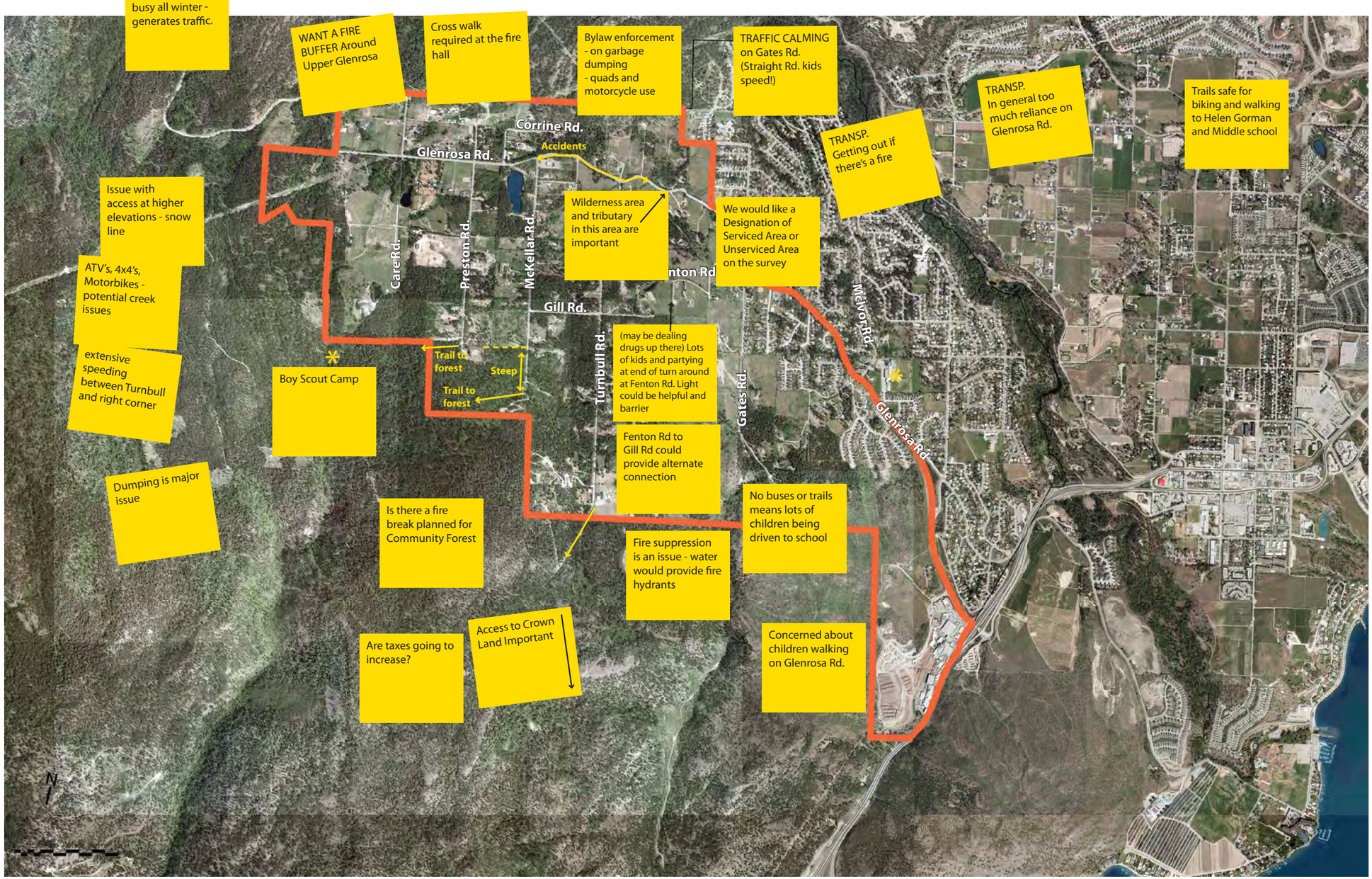
Clean but Rural Water Sewer Peaceful

Upper Glenrosa Area --- APPING EXERCISE ---

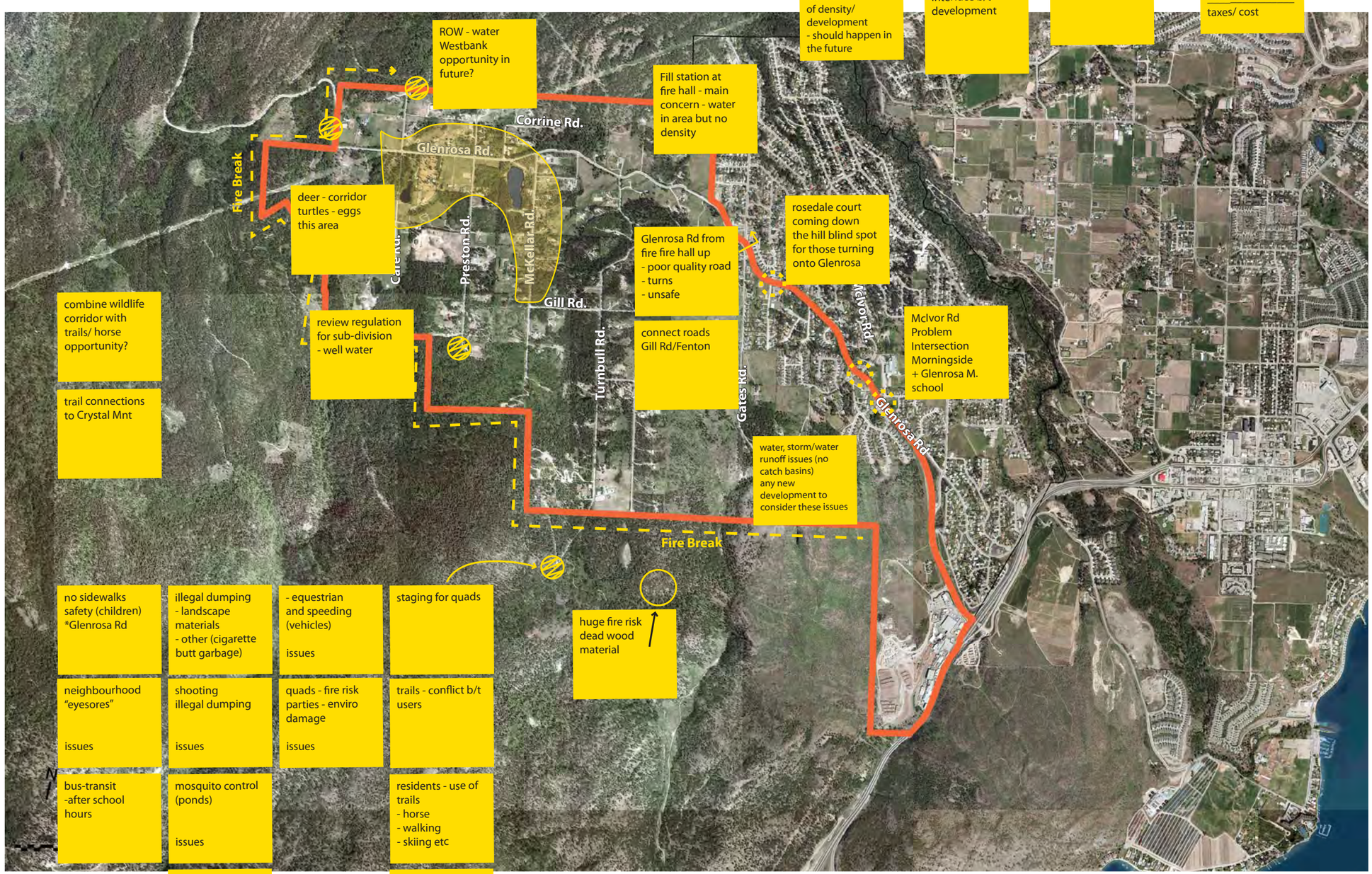
We don't want mroe wells dug because we will lose our well water

Reserve access to Crown Land of McKellar and Preston Rd.

Killkenny Beach precedent? Valley of the Sun.



Upper Glenrosa Area Plan --- MAPPING EXERCISE ---



APPENDIX C
Draft Scenario Maps & Summaries

This section includes the DRAFT conceptual land use maps and summaries, servicing maps and transportation maps that were developed during the scenario development stage. It also includes a servicing summary at the end that explains the assumptions used when determining DRAFT servicing requirements.

LAND USE DESIGNATION SUMMARY - DRAFT (Internal Review)

Current Land Use Designations (per OCP)

Existing Land Use Designation	Comments	Land Use Area (sq.m)	Land Use Area (Ha)	% UG Land Area	Net Current UPHa[1]	Total Units	Population Estimate		Estimated School-Age Children
		6,523,835	652		Avg	Existing (approx.)	Typical Pop/DU[2]	Estimated Current Population	Estimate: 0.3 children/DU[3]
Rural Residential	Currently within Rural Reserve	5,066,423	506.6	77.7%	0.3	165	3.1	512	49.5
Single Family Residential	Partial build-out; about half undeveloped lands	766,342	76.6	11.7%	4	272	3.1	843	81.6
Low Density Multiple Family	None existing, proposed in OCP Land Use Plan	45,199	4.5	0.7%	0	0	2.5	0.0	0.0
Commercial/Mixed Use	None existing, proposed in OCP Land Use Plan	0	0.0	0.0%					0.0
Institutional	Morning Star Bible Camp; small undeveloped site on Glenrosa Road	80,476	8.0	1.2%					0.0
Industrial	Gorman's Mill	288,167	28.8	4.4%					0.0
Agricultural	Small areas of ALR	233,864	23.4	3.6%					0.0
Park	Ball field; undeveloped open space. Some future parks identified in future development areas.	43,363	4.3	0.7%					0.0
		6,523,834	**652**	**100%**		**437**		**1355**	**131**

Notes:
1. Net Current UPHa based on count of currently developed lots. Areas designated for development not included in total units count.
2. Typical Pop/DU numbers based on population estimates used in previous planning exercises. Numbers may be updated based on WK numbers.
3. Estimated children/DU numbers based on planning estimate provided by SC#23.

Helen Gorman Elementary

Glenrosa Elementary

Glenrosa Middle

Webber Road Community Centre

George Pringle Elementary

LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK
- MIXED USE - FINAL LOCATION TBD (MU)
- PARK SITE - FINAL LOCATION TBD (P)
- 400m (5 MINUTE) WALKING RADIUS

DWK DEVELOPMENT PERMIT AREAS (DWK 2014)

- AQUATIC
- TERRESTRIAL
- HILLSIDE
- WILDFIRE INTERFACE

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

1. CADASTRAL PARCELS, CONTOURS, TERRESTRIAL AND AQUATIC DEVELOPMENT PERMIT AREAS FROM DISTRICT OF WEST KELOWNA.
2. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 1 - LAND USE

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-06-11
DESIGNED	JZ
PREPARED	GI
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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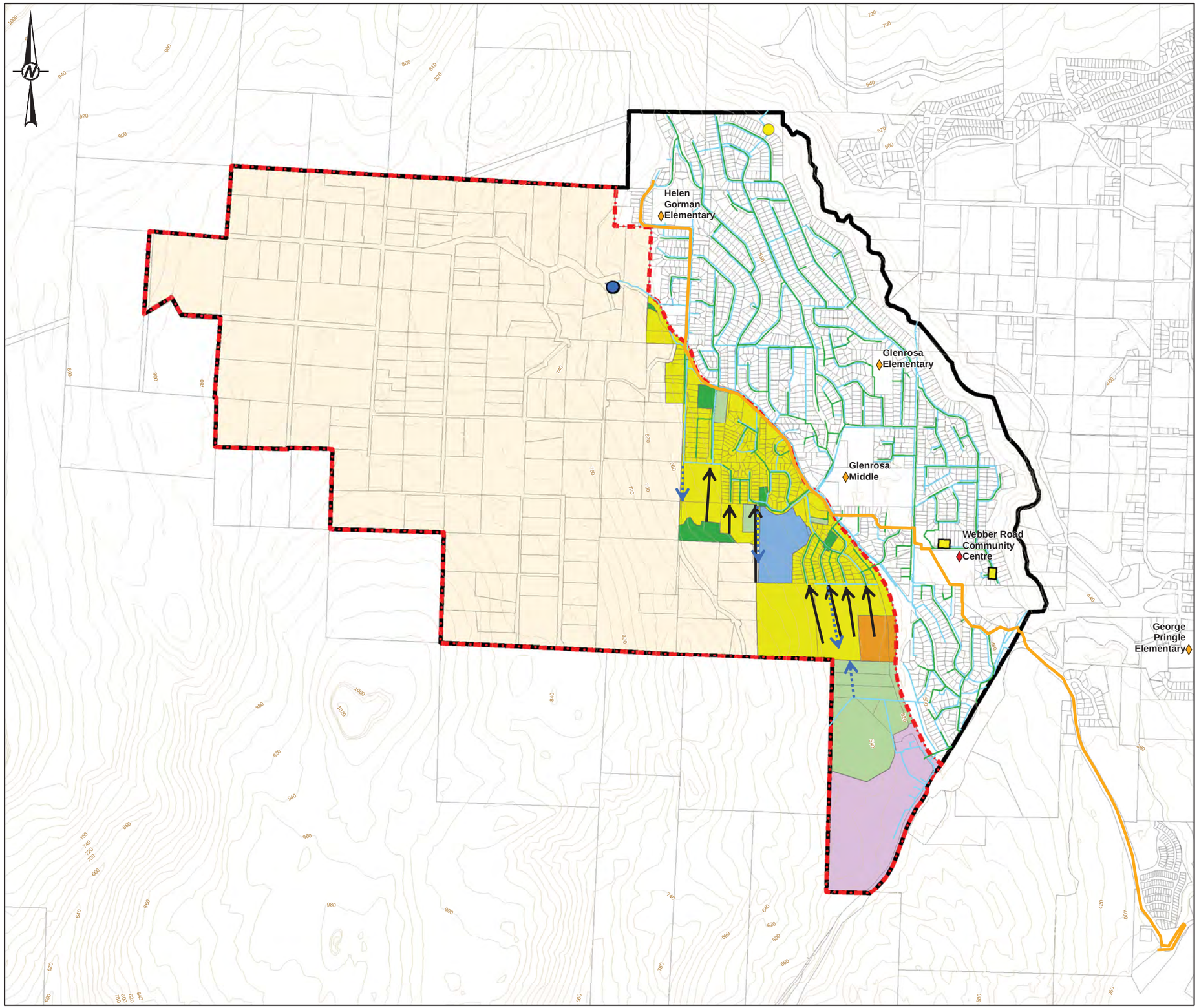
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Scenario 1: Status Quo

Proposed Land Use	Comments	Land Use Area (sq.m)	Land Use Area (Ha)	% UG Land Area	Net UPHa		Total Units		Population Estimate			Estimated School-Age Children
		6,523,834	652		Low	High	Build-out (low)	Build-out (high)	Typical Pop/DU[4]	Estimated Build-Out Population (low)	Estimated Build-Out Population (high)	Estimate: 0.3 children/ DU[5]
Rural Residential[1]	Status quo, no additional subdivision recommended due to lack of servicing.	5,066,423	506.6	77.7%	0.3	0.3	165	165	3.1	512	512	49.5
Single Family Residential[2]	Recommends continued development to current SF designated areas. Potentially includes mix of R1, R1L and RC3 zones. Recommend consideration to increase the mix of SF housing types and tenure to offer more housing choice.	754,454	75.4	11.6%	8	13	604	981	3.1	1871	3040	294.2
Low Density Multiple Family	Potentially includes mix of R2 and R3 zones. Typical LDMF lots in WK range between 20 to 30 UPHa[3]	39,139	3.9	0.6%	20	35	78	137	2.5	196	342	41.1
Commercial/Mixed Use	Integrated Commercial/Mixed Use within LDMF	3,800	0.4	0.1%								
Institutional	As existing. Morning Star Bible Camp; small undeveloped site on Glenrosa Road	80,476	8.0	1.2%								
Industrial	Gorman's Mill	288,167	28.8	4.4%								
Agricultural	As existing	233,864	23.4	3.6%								
Park	Min. 5% dedication in SF and LDMF areas	57,511	5.8	0.9%								
		6,523,834	**652**	**100%**			**847**	**1283**		**2578**	**3894**	**385**
						Additional Units (over current units)	**410**	**846**	**Additional Population (over current population)**	**1224**	**2540**	**254**

Notes:
1. Status Quo does not support servicing beyond the current development areas. It is recommended that unserviced areas remain within WK's Rural Reserve.
2. For SF Residential, the low UPHa reflects typical lots sizes existing today in Upper Glenrsoa and Glenrosa. Typical SF lots in Upper Glenrsoa/Glenrosa range from 700 sq.m to 1500 sq.m. It is recommended there be consideration for more variety in zones to promote an increased diversity of housing choices available - which could be reflective of the high UPHa.
3. For LDMF Residential, UPHa numbers can vary depending on the style of development. For planning purposes, numbers are derived from previous planning work and review of existing LDMF development in WK.
4. Typical Pop/DU numbers based on population estimates used in previous planning exercises. Numbers may be updated based on WK numbers.
3. Estimated children/DU numbers based on planning estimate provided by SC#23.



LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

SERVICING

WATER

- PROPOSED TIE IN
- EXISTING WATER LINE
- EXISTING PUMPHOUSE
- EXISTING RESERVOIR

SANITARY

- LOCAL MAIN TIE INS AND FLOW DIRECTION
- EXISTING TRUNK LINE
- EXISTING SANITARY SEWER LINE
- EXISTING LIFT STATION

LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

1. CADASTRAL PARCELS, CONTOURS AND ROADS FROM DISTRICT OF WEST KELOWNA.
2. TRAILS FROM KAREN HANSEN, UPPER GLENROSA AREA RESIDENT.
3. BUS 21 ROUTE OBTAINED FROM BC TRANSIT, ALL RIGHTS RESERVED.
4. HIGHWAYS FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
5. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 1 - SERVICING

CONSULTANT
Golder Associates

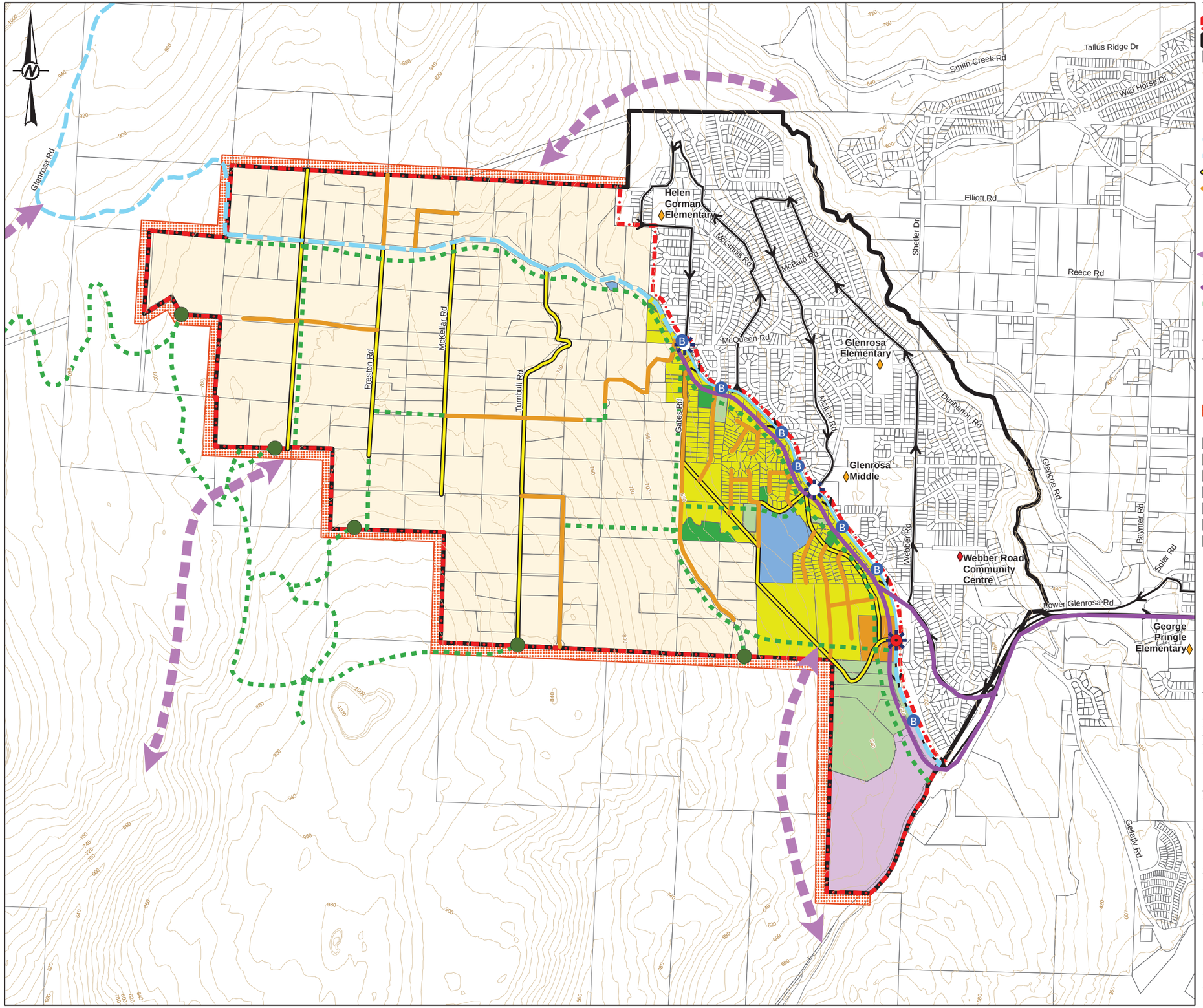
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APPROVED	

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LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

ROADS

- URBAN ARTERIAL
- RURAL ARTERIAL
- MINOR COLLECTOR
- LOCAL ROAD
- IMPROVED INTERSECTION
- ROUNDABOUT
- POTENTIAL ACCESS EGRESS CONNECTION

ACTIVE TRANSPORTATION

- CYCLING ROUTE
- PEDESTRIAN ROUTE
- POTENTIAL TRAILHEAD TO CROWNLAND

TRANSIT

- BUS 21 ROUTE
- BUS STOP

FIRE PROTECTION

- POTENTIAL 50 m FIRE BREAK

LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

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2. TRAILS FROM KAREN HANSEN, UPPER GLENROSA AREA RESIDENT.
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5. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 1 - TRANSPORTATION

CONSULTANT
Golder Associates

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APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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Helen Gorman Elementary

Glenrosa Elementary

Glenrosa Middle

Webber Road Community Centre

George Pringle Elementary

LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

LAND USE

- RURAL RESIDENTIAL
- RURAL RESIDENTIAL WITH POTENTIAL TO SUBDIVIDE (BASED ON 1.4ha MINIMUM LOT SIZE)
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK
- MIXED USE - FINAL LOCATION TBD (MU)
- PARK SITE - FINAL LOCATION TBD (P)
- 400m (5 MINUTE) WALKING RADIUS

DWK DEVELOPMENT PERMIT AREAS (DWK 2014)

- AQUATIC
- TERRESTRIAL
- HILLSIDE
- WILDFIRE INTERFACE

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

1. CADASTRAL PARCELS, CONTOURS, TERRESTRIAL AND AQUATIC DEVELOPMENT PERMIT AREAS FROM DISTRICT OF WEST KELOWNA.
2. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 2 - LAND USE

CONSULTANT
Golder Associates

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PREPARED	GI
REVIEWED	
APPROVED	

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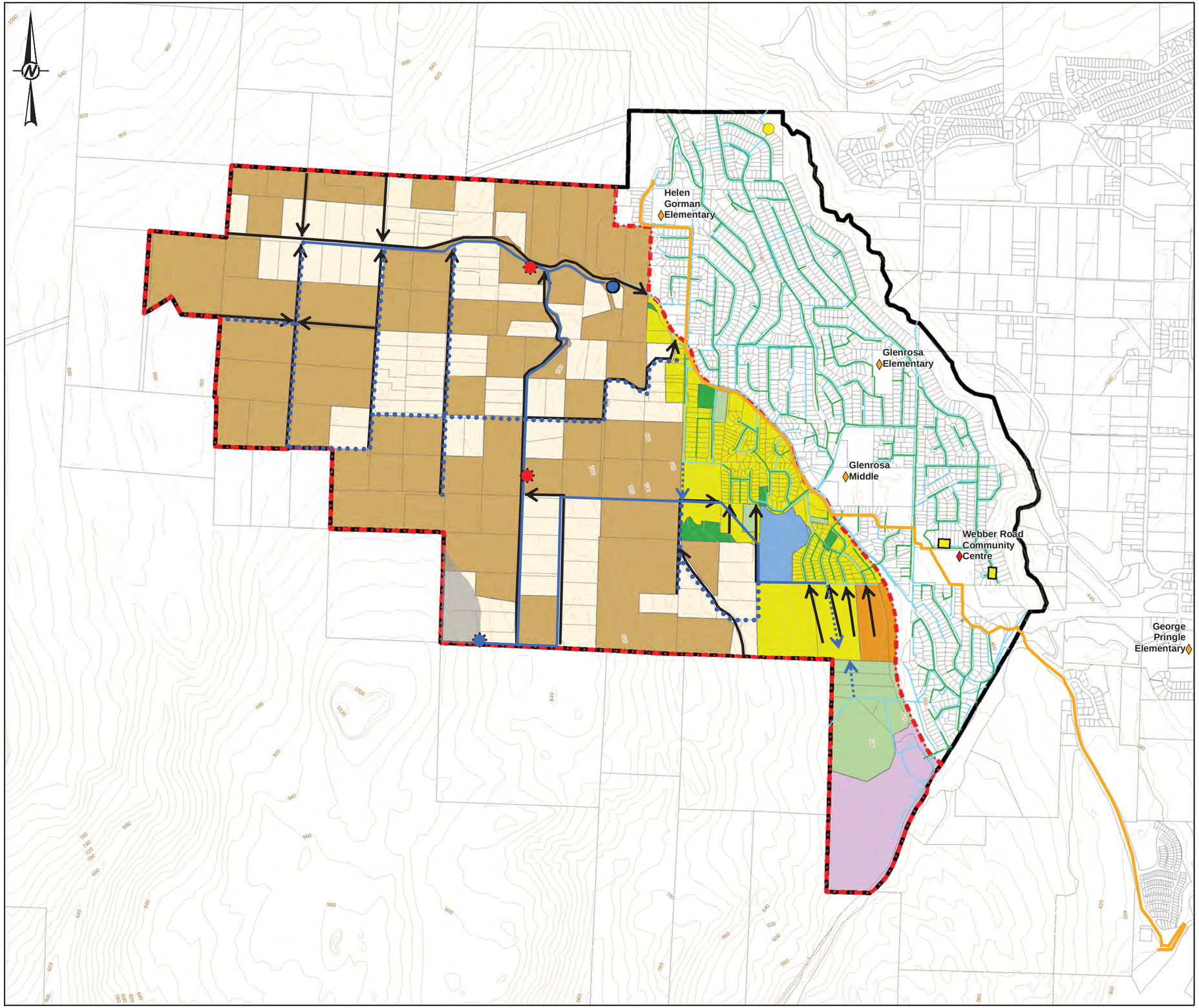
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Scenario 2: Servicing Expansion & Subdivision of Rural Lots

Proposed Land Use	Comments	Land Use Area (sq.m)	Land Use Area (Ha)	% UG Land Area	Approx. Net UPHa (based on local precedents)		Total Units		Population Estimate			Estimated School-Age Children
		6,523,835	652		Low	High	Current (no subdivision)	Build-out (max subdivision)	Typical Pop/DU[5]	Estimated Build-Out Population (low)	Estimated Build-Out Population (high)	Estimate: 0.3 children/DU[6]
Rural Residential - Servicing provided and subdivision considered based on min. lot size/frontage[1]	Lots smaller than 2.8 ha (min. lot size for subdivided properties 1.4 ha)	1,647,743	164.8	25.3%	0.5	0.5	88	88	3.1	273	273	26
	Rural Residential greater than 2.8 ha lots - potential for subidivion to 1.4 ha lots[2]	3,368,882	336.9	51.6%	0.2	0.7	75	180	3.1	233	559	54
	Lots with sufficient size, but less than 30m frontage	49,797	5.0	0.8%	0.4	0.4	2	2	3.1	6	6	1
					Low	High	Build-out (low)	Build-out (high)	Typical Pop/DU	Estimated Build-Out Population (low)	Estimated Build-Out Population (high)	Estimate: 0.3 children/DU
Single Family Residential[3]	Continue development to currently SF designated areas. Potentially includes mix of R1, R1L and RC3 zones. Typical SF lots in Upper Glenrsoa/Glenrosa range from 700 sq.m to 1500 sq.m	725,996	72.6	11.1%	8	13	581	944	3.1	1800	2926	283
Low Density Multiple Family[4]	Potentially includes mix of R2 and R3 zones. Typical LDMF lots in WK range between 20 to 30 UPHa (limited LDMF development currently.)	66,691	6.7	1.0%	20	35	133	233	2.5	333	584	70
Commercial/Mixed Use	Integrated Commercial/Mixed Use within LDMF.	4,750	0.5	0.1%								
Institutional	As existing. Morning Star Bible Camp; small undeveloped site on Glenrosa Road. Potential consideration to SF residential in long-term?	80,476	8.0	1.2%								
Industrial	Gorman's Mill	288,167	28.8	4.4%								
Agricultural	As existing	233,864	23.4	3.6%								
Park	Min. 5% dedication in SF and LDMF areas	57,468	5.7	0.9%								
		6,523,834	**652**	**100%**			**879**	**1448**		**2645**	**4348**	**434**
						Additional Units (over current units)	**442**	**1011**	**Additional Population (over current population)**	**1291**	**2993**	**303**

Notes:
1. Scenario 2 considers servicing to all areas of Upper Glenrosa. With servicing, subdivision may warrant consideration in rural residential areas. Several approaches to subdivision in rural residential areas could be considered – for example, based on min. lot size (in this case 1.4 ha, consistent with smaller rural residential lots sizes in the Upper Glenrosa Area) and min. lot frontage (30m, consistent with zoning bylaw). Alternate criteria or approaches including down-zoning may warrant consideration.
2. For the Build-out (max subdivision) calculation, the lot area is divided by 1.4 ha, then a multiplier of 0.75 is added to factor in the inability for lots to subdivide exactly to 1.4 ha lots (for example, several lots in the area are 4.0 ha in size, which may only support subdivision to 2 lots of 2 ha in size). Further consideration about the lot size is likely warranted.
3. For SF Residential, the low UPHa reflects typical lots sizes existing today in Upper Glenrsoa and Glenrosa. Typical SF lots in Upper Glenrsoa/Glenrosa range from 700 sq.m to 1500 sq.m. It is recommended there be consideration for more variety in zones to promote an increased diversity of housing choices available - which could be reflective of the high UPHa.
4. For LDMF Residential, UPHa numbers can vary depending on the style of development. For planning purposes, numbers are derived from previous planning work and review of existing LDMF development in WK.
5. Typical Pop/DU numbers based on population estimates used in previous planning exercises. Numbers may be updated based on WK numbers.
6. Estimated children/DU numbers based on planning estimate provided by SC#23.



LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

SERVICING

WATER

- PROPOSED DISTRIBUTION MAIN
- FUTURE TIE IN
- PROPOSED TRUNK LINE
- FUTURE RESERVOIR
- FUTURE RESERVOIR FOR FIRE FLOW AT ELEVATIONS 715 m AND 799 m
- EXISTING WATER LINE
- EXISTING PUMPHOUSE
- EXISTING RESERVOIR

LEGEND

- ELEVATION ABOVE PROPOSED PHASE 1 RESERVOIR (+880 m)

SANITARY

- FUTURE TRUNK LINE AND FLOW DIRECTION
- EXISTING TRUNK LINE
- EXISTING SANITARY SEWER LINE
- EXISTING LIFT STATION

LAND USE

- RURAL RESIDENTIAL
- RURAL RESIDENTIAL WITH POTENTIAL TO SUBDIVIDE (BASED ON 1.4ha MINIMUM LOT SIZE)
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

1. CADASTRAL PARCELS, CONTOURS AND ROADS FROM DISTRICT OF WEST KELOWNA.
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5. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 2 - SERVICING

CONSULTANT
Golder Associates

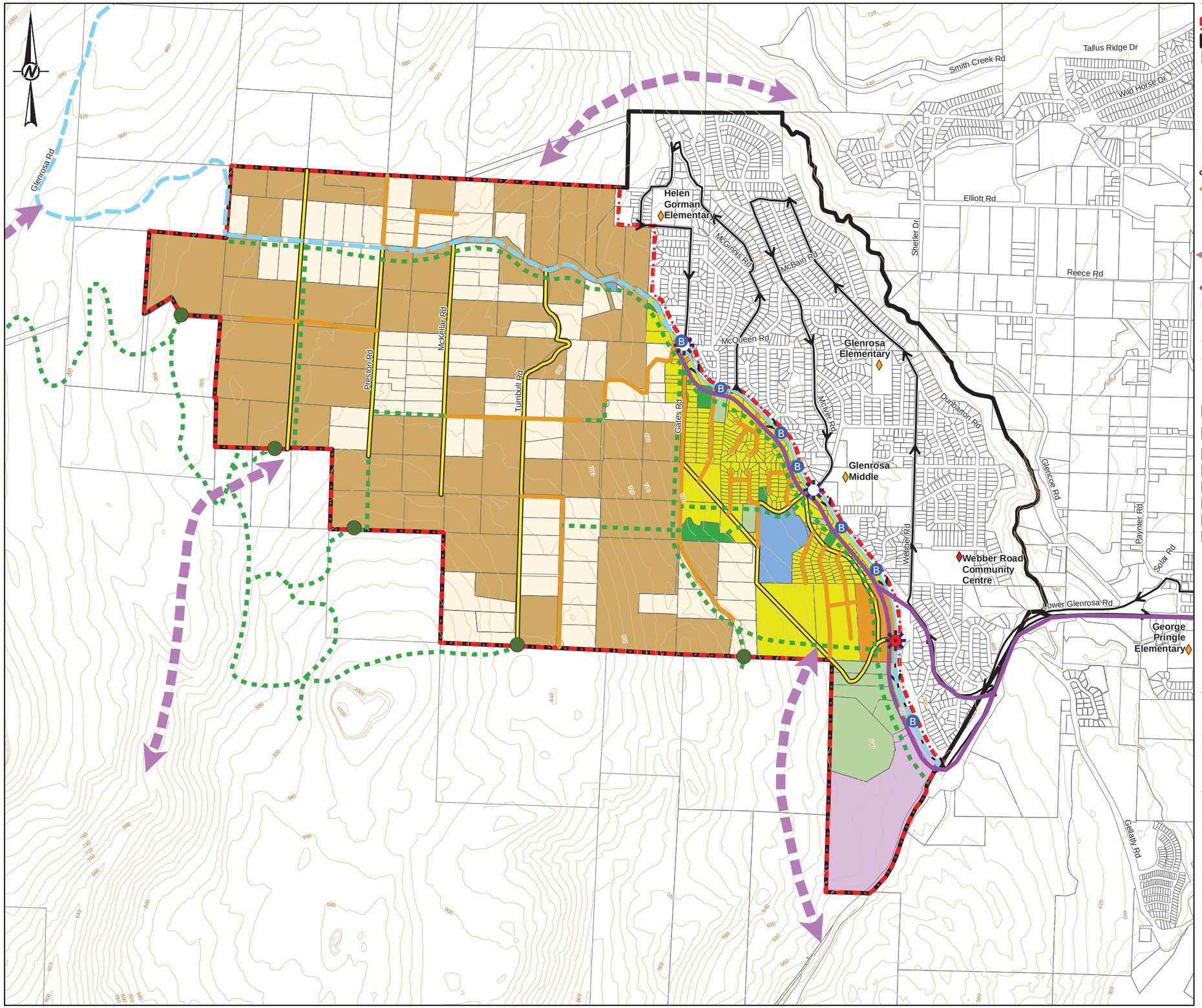
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PROJECT NO.	CONTROL	REV.	FIGURE
1416015	2000	B	**2-b**

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LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

ROADS

- URBAN ARTERIAL
- RURAL ARTERIAL
- MINOR COLLECTOR
- LOCAL ROAD
- IMPROVED INTERSECTION
- ROUNDABOUT
- POTENTIAL ACCESS EGRESS CONNECTION

ACTIVE TRANSPORTATION

- CYCLING ROUTE
- PEDESTRIAN ROUTE
- POTENTIAL TRAILHEAD TO CROWNLAND

TRANSIT

- BUS 21 ROUTE
- BUS STOP

LAND USE

- RURAL RESIDENTIAL
- RURAL RESIDENTIAL WITH POTENTIAL TO SUBDIVIDE (BASED ON 1.4ha MINIMUM LOT SIZE)
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

1. CADASTRAL PARCELS, CONTOURS AND ROADS FROM DISTRICT OF WEST KELOWNA.
2. TRAILS FROM KAREN HANSEN, UPPER GLENROSA AREA RESIDENT.
3. BUS 21 ROUTE OBTAINED FROM BC TRANSIT, ALL RIGHTS RESERVED.
4. HIGHWAYS FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
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CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 2 - TRANSPORTATION

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-06-11
DESIGNED	JZ
PREPARED	GI
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	2000	B	**2-c**

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Helen Gorman Elementary

Glenrosa Elementary

Glenrosa Middle

Webber Road Community Centre

George Pringle Elementary

LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK
- LOCAL INSTITUTION - FINAL LOCATION TBD
- MIXED USE - FINAL LOCATION TBD
- PARK SITE - FINAL LOCATION TBD
- SMALL SCALE COMMERCIAL - FINAL LOCATION TBD
- 400m (5 MINUTE) WALKING RADIUS
- EXPANSION OF SOUTH DEVELOPMENT AREA (BEYOND CURRENT GROWTH BOUNDARY)

DWK DEVELOPMENT PERMIT AREAS (DWK 2014)

- AQUATIC
- TERRESTRIAL
- HILLSIDE
- WILDFIRE INTERFACE

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

1. CADASTRAL PARCELS, CONTOURS, TERRESTRIAL AND AQUATIC DEVELOPMENT PERMIT AREAS FROM DISTRICT OF WEST KELOWNA.
2. PROJECTION: UTM ZONE 11 DATUM: NAD 83

CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 3 - LAND USE

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-06-11
DESIGNED	JZ
PREPARED	GI
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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Scenario 3: Expanded Development & New Upper Glenrosa Village

Proposed Land Use	Comments	Land Use Area (sq.m)	Land Use Area (Ha)	% UG Land Area	Approx. Net UPHa (based on local precedents)		Total Units		Population Estimate			Estimated School-Age Children
		6,523,835	652		Low	High	Build-out (low)	Build-out (high)	Typical Pop/DU[5]	Estimated Build-Out Population (low)	Estimated Build-Out Population (high)	Estimate: 0.3 children/DU[6]
Rural Residential	No additional development recommended to maintain rural character[1]	4,096,548	409.7	62.8%	0.3	0.3	118	118	3.1	366	366	35
Single Family Residential - South Site[2]	Consider expansion of existing development site in south. Consider addition of new development "village" in the north with focused design character. Potentially includes mix of R1, R1L and RC3 zones. Typical SF lots in Upper Glenrsoa/Glenrosa range from 700	1,155,544	115.6	17.7%	8	13	924	1502	3.1	2866	4657	451
Single Family Residential - North "Village"[3]	Consider addition of new development "village" in the north with focused design character. Potentially includes mix of R1, R1L and RC3 zones. A mix of smaller and larger lots used to contribute to village fabric.	412,485	41.2	6.3%	10	13	412	536	3.1	1279	1662	161
Low Density Multiple Family[4]	Potentially includes mix of R2 and R3 zones. Typical LDMF lots in WK range between 20 to 30 UPHa (limited LDMF development currently.)	62,796	6.3	1.0%	20	35	126	220	2.5	314	549	66
Commercial/Mixed Use	Integrated Commercial/Mixed Use within LDMF and consideration for additional small-scale site in North "Village"	7,500	0.8	0.1%								
Institutional	As existing. Morning Star Bible Camp; small undeveloped site on Glenrosa Road. Potential consideration to SF residential in long-term?	82,476	8.2	1.3%								
Industrial	Gorman's Mill	288,167	28.8	4.4%								
Agricultural	As existing.	233,864	23.4	3.6%								
Park	Min. 5% dedication in SF and LDMF areas. Focused protection of key terrestrian and aquatic areas.	184,454	18.4	2.8%								
		6,523,834	**652**	**100%**			**1581**	**2376**		**4824**	**7234**	**713**
						Additional Units (over current units)	**1144**	**1939**	**Additional Population (over current population)**	**3470**	**5880**	**582**

Notes:
1. Scenario 3 suggests focused development with preservation of rural areas to maintain character of the area. For servicing, there may be potential option for user pay extension of services to rural areas at a lower cost than the full servicing option (ie. potential to extend servicing from new development areas through coordinated effort by local rural landowners).
2. On the south site, it is envisioned that development build out from existing development areas. For SF Residential in these areas, the low UPHa reflects typical lots sizes existing today in Upper Glenrsoa and Glenrosa. Typical SF lots in Upper Glenrsoa/Glenrosa range from 700 sq.m to 1500 sq.m. It is recommended there be consideration for more variety in zones to promote an increased diversity of housing choices available - which could be reflective of the high UPHa.
3. For the North Village, it is envisioned that development be centered around the existing pond as a focal green space with a strong design character that creates a village feel and walkable area. It is envisioned the village would host a broader range of potential land use types to support concepts of aging in place and varied population along with a more traditional village character.
4. For LDMF Residential, UPHa numbers can vary depending on the style of development. For planning purposes, numbers are derived from previous planning work and review of existing LDMF development in WK.
5. Typical Pop/DU numbers based on population estimates used in previous planning exercises. Numbers may be updated based on WK numbers.
6. Estimated children/DU numbers based on planning estimate provided by SC#23.

Helen Gorman Elementary

Glenrosa Elementary

Glenrosa Middle

Webber Road Community Centre

George Pringle Elementary

LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

SERVICING

WATER

- PROPOSED TIE IN
- PROPOSED TRUNK LINE AND FLOW DIRECTION
- FUTURE RESERVOIR
- FUTURE RESERVOIR FOR FIRE FLOW AT ELEVATIONS 715 m AND 757 m
- EXISTING WATER LINE
- EXISTING PUMPHOUSE
- EXISTING RESERVOIR

LEGEND

- ELEVATION ABOVE PROPOSED PHASE 1 RESERVOIR (+800 m)

SANITARY

- FUTURE TRUNK LINE AND FLOW DIRECTION
- FUTURE POTENTIAL TIE IN
- EXISTING TRUNK LINE
- EXISTING SANITARY SEWER LINE
- EXISTING LIFT STATION

STORMWATER

- POTENTIAL STORMWATER FEATURE

LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

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CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 3 - SERVICING

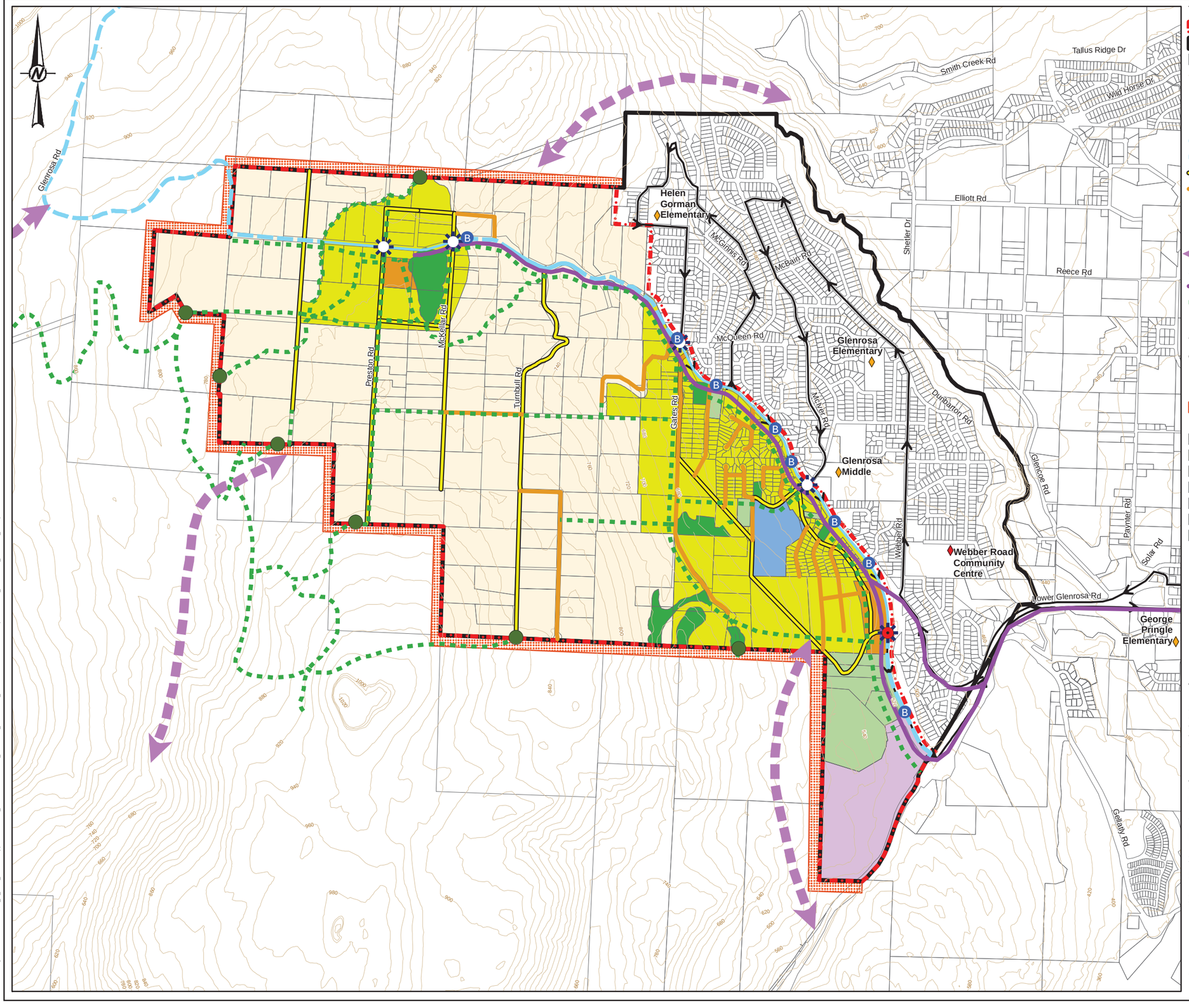
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Golder Associates

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DESIGNED	JZ
PREPARED	GI
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

ROADS

- URBAN ARTERIAL
- RURAL ARTERIAL
- MINOR COLLECTOR
- LOCAL ROAD
- IMPROVED INTERSECTION
- ROUNDABOUT
- POTENTIAL ACCESS EGRESS CONNECTION

ACTIVE TRANSPORTATION

- CYCLING ROUTE
- PEDESTRIAN ROUTE
- POTENTIAL TRAILHEAD TO CROWNLAND

TRANSIT

- BUS 21 ROUTE
- BUS STOP

FIRE PROTECTION

- POTENTIAL 50 m FIRE BREAK

LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK

DRAFT

0 500 1,000

1:20,000 METRES

REFERENCES

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CLIENT
DISTRICT OF WEST KELOWNA

PROJECT
UPPER GLENROSA AREA PLAN

TITLE
SCENARIO 3 - TRANSPORTATION

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-06-11
DESIGNED	JZ
PREPARED	GI
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
1416015	2000	B	**3-c**

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Preliminary Summary

	Comments	Current	Scenario 1 (low)	Scenario 1 (high)	Scenario 2 (low)	Scenario 2 (high)	Scenario 3 (low)	Scenario 3 (high)
Population	Total Estimated Number of Dwelling Units (All Residential LUs)	437	847	1,283	879	1,448	1,581	2,376
	Estimated Population	1,355	2,578	3,894	2,645	4,348	4,824	7,234
	Estimated Student Population	131	254	385	264	434	474	713

	Residential Land Use Type	Current	Scenario 1 (low)	Scenario 1 (high)	Scenario 2 (low)	Scenario 2 (high)	Scenario 3 (low)	Scenario 3 (high)
Number of Residential Units	Rural Residential	165	165	165	165	270	118	118
	Single Family Residential	272	604	981	581	944	1,337	2,038
	Low Density Multiple Family	0	78	137	133	233	126	220
		437	847	1,283	879	1,448	1,581	2,376

	Land Use Type	Current - Area (ha)	Current - Percentage of Land Area	Scenario 1 - Area (ha)	Scenario 1 - Percentage of Land Area	Scenario 2 - Area (ha)	Scenario 2 - Percentage of Land Area	Scenario 3 - Area (ha)	Sencario 3 - Percentage of Land Area	Notes
Land Use Area	Rural Residential	506.6	77.7%	506.6	77.7%	506.6	77.7%	409.7	62.8%	Scenarios 1 and 2 maintain similar areas of Rural Residential to current land use. In Scenario 2, subdivision of Rural Residential to small lots sizes is consdered; however, it is recommended the remain rural. In Scenario 3, more compact development is considered in two locations, reducing the amount of Rural Residential.
	Single Family Residential	76.6	11.7%	75.4	11.6%	72.6	11.1%	156.8	24.0%	Scenarios 1 and 2 maintain similar areas of SF Residential, focusing development in areas previous identified for development. Scenario 3 considered expanding SF development in two areas of Upper Glenrosa - in the south adjacent ot existing SF areas, and in a village style in the North, increasing the number of SF lots. In all cases, consideration for creating a variety of SF land use types is recommended - ranging from more compact development to standard lots.
	Low Density Multiple Family	4.5	0.7%	3.9	0.6%	6.7	1.0%	6.3	1.0%	All options recommend consideration for some integrated MF development within the site. Scenario 1 recommends an area consistent with the current Land Use Plan. Scenario 2 focuses MF development in a more compact area in the south of the site. Scenario three recommends consideration for additional MF in both the south and in the central area of the upper village to increase housing options for the community.
	Commercial/Mixed Use	0.0	0.0%	0.4	0.1%	0.5	0.1%	0.8	0.1%	Neighbourhood-scale commercial in the south, integrated with the Low Desnity Multiple Family development is recommended in all scenarios. Scenario 3 includes consideration for a small-scale commerical within the village core (e.g. corner store).
	Institutional	8.0	1.2%	8.0	1.2%	8.0	1.2%	8.2	1.3%	Institutional designation is recommended to remain as existing for all scenarios. Population increases for Scenarios 1 and 2 should be easily accommodated within existing schools. Further investigation of Scenario three is required to determine impacts on existing school capacity.
	Industrial	28.8	4.4%	28.8	4.4%	28.8	4.4%	28.8	4.4%	Industrial designation is recommended to remain as existing for all scenarios. Buffering to Gorman's Mill is provided to protect its industrial function.
	Agricultural	23.4	3.6%	23.4	3.6%	23.4	3.6%	23.4	3.6%	Agricultural designation is recommended to remain as existing for all scenarios. Opportunities to encourage agricultural activities in other zones should be considered.
	Park	4.3	0.7%	5.8	0.9%	5.7	0.9%	18.4	2.8%	Park Land dedication in Scenarios 1 and 2 is consistent with current land use, providing 5% or more dedication in areas as they develop. For Scenario 3, additional park land dedication would accompany further development - focusing on protection of key resources including aquatic and terrestrial sensitive ecosystems and providing local recreation uses such as trails, playground amenities and gathering spaces in key
		652	100.0%	652	100.0%	652	100.0%	652	100.0%	

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Servicing Summary

The following summary provides additional details about the servicing approaches for the three scenarios considered in this summary. This information is to be read in conjunction with the scenario servicing maps (see Appendix E).

Scenario 1

Population Estimate (based on land use plan for Scenario 1)**:**

- Additional 1,224 (low) to 2,540 (high) people become serviced*
  **Note: Additional population estimated based on UG Population Estimate for Scenario 1 (2,578 to 3,894) – Current UG Population Estimate (1,355)*

Water Service

- Approved development areas are within pressure zones 640 and 673.
- Currently planned West Kelowna water service upgrades should be sufficient to support this demand.
- No current reservoir upgrade project is noted at this time. The 2014 Water Utility Master Plan identifies an existing storage shortfall of 1,111 m^3 in pressure zones 673/640.
- 1,500 m^3 – 2,510 m^3 in additional storage would be needed for equalization. This volume does not include the shortfall mentioned above.
- Additional water consumption in Scenario 1 is between 12.8 L/s (for low population estimate) to 26.5 L/s (for high population estimate). This is the average daily consumption based on the additional serviced population.

Sanitary Service

- Local topography favours gravity sanitary sewer connections to existing mains. No lift station would be necessary.
- Glenrosa trunk line is capable of handling additional 3,300 people with no upgrades or upsizing. Development for Scenario 1 would likely maintain the population within this limit, so no upgrades would be required.

Scenario 2

Population Estimate (based on land use plan for Scenario 2)**:**

- Additional 1,291 (low) to 2,993 (high) people become serviced*
  **Note: Additional population estimated based on UG Population Estimate for Scenario 2 (2,645 to 4,348) – Current UG Population Estimate (1,355).*

Water Service

- New water trunk line will along main roads and minor distribution mains along other roads to create looped system and as required by development.
- A reservoir is recommended at approximately the 880 m elevation to service most of Upper Glenrosa (there is a corner of the study area above elevation 880 m that could not be serviced – see plans).
- Pumps required at the existing Glenrosa Rd reservoir to lift water to the new reservoir.
- Foreseeable up to 6 pressure zones within the area.
- No current reservoir upgrade project is noted at this time. The 2014 Water Utility Master Plan noted there is an existing storage shortfall in pressure zones 673/640.
- 1,510m^3 – 2,785 m^3 in additional storage would be needed for the area (at the proposed reservoir at 880m elevation). Although the above volume does not include the shortfall mentioned above, this reservoir could be built to include the existing shortfall in the lower pressure zones (1,111m^3).
- Additional water consumption in Scenario 2 is between 13.5 L/s (for low population estimate) to 31.2 L/s (for high population estimate).
- Estimated Costs for Water Service Expansion:
  - Pump station at Ex. Reservoir = $0.9 - $1.1 million
  - New reservoir = $2.0 - $2.3 million
  - Distribution pipes = $4.2 - $4.6 million*
  - Contingency + Engineering (20%) = $1.2 - $1.6 million

  **Note: This cost is based on the pricing provided in the 2006 Upper Glenrosa Water System Review memo. A multiplier of 2.0 was used to bring unit prices to current prices. Watt's lineal estimate is approximately 12.2 km of mains. Estimate only includes one new reservoir and one pump upgrade at the existing reservoir. If a larger reservoir was required to include storage from lower pressure zones (total 3,790 m^3), the reservoir cost would be estimated at $3.0 million.*

Sanitary Service

- Local topography favours gravity sanitary gravity sewer lines.
- A new collector trunk is required on Glenrosa joining the existing trunk at Gates.
- Tributaries would flow north towards the trunk line.

- Glenrosa trunk line is capable of handling additional 3,300 people with no upgrades or upsizing. Development for Scenario 2 would likely maintain the population within this limit, so no upgrades would be required.
- Estimated costs for Sanitary Services Expansion:
  - Trunk lines and network = $3.5 million*
  - Contingency + Engineering (20%) = $0.7 million

    **Based on 10.5 km of trunk*

Scenario 3

Population Estimate (based on land use plan for Scenario 3):

- Additional 3,470 (low) to 5,880 (high) people become serviced*
  **Note: Additional population estimated based on UG Population Estimate for Scenario 3 (4,824 to 7,234) – Current UG Population Estimate (1,355)*

Water Service

- In a first phase, a reservoir could be placed at elevation around 800 m to serve the proposed village area. This is two pressure zones above the existing reservoir on Glenrosa Road.
- Pumps required at the existing Glenrosa Rd reservoir to lift water to the new reservoir.
- Ultimately if parcels above elevation 800 m are to be serviced, a reservoir will be needed at about 880 m elevation at the south end of the study area. Or, no parcels above 800 m will be serviced.
- No current reservoir upgrade project is noted at this time. The 2014 Water Utility Master Plan noted there is an existing storage shortfall in pressure zones 673/640.
- 3,145 m^3 – 4,950 m^3 in additional storage would be needed over the area (based on the population estimate above. Updates may be needed if land use areas are adjusted).
- Additional water consumption in Scenario 3 is between is between 36.2 L/s (for low population estimate) to 61.3 L/s (for high population estimate).
- Estimated Costs for Water Service Expansion:
  - Pump station at Existing Reservoir = $0.9 - $1.1 million
  - New Reservoir = $3.7 - $4.1 million (single reservoir at 780 m elevation).
    Does not include future reservoir at 880 m elevation.
  - Distribution Pipes = $1.9 - $2.3 million*
  - Contingency + Engineering (20%) = $1.1 - $1.5 million

    **Note: This cost is based on the pricing provided in the 2006 Upper Glenrosa Water System Review memo. A multiplier of 2.0 was used to bring unit prices to current prices. Estimate only includes one new reservoir and one pump upgrade at the existing reservoir.*

Sanitary Service

- Local topography favours gravity sanitary gravity sewer lines.
- A new collector trunk is required on Glenrosa joining the existing trunk at Gates.
- Tributaries will flow north towards the trunk line.
- Glenrosa trunk line is capable of handling additional 3,300 people with no upgrades or upsizing. Development for Scenario 3 would likely increase population above this limit, so upgrade to the existing trunk line likely would be required as the area develops.

- Additional peak dry weather flow rate is between to 50.7 L/s to 79.2 L/s. Total load on the sewer trunk will depend on the spread of service area (to include infiltration).
- Estimated costs for Sanitary Services Expansion:
  - Trunk lines and network = $2 million (5 km of pipeline; this cost does not include Glenrosa trunk line upgrade)
  - Contingency + Engineering (20%) = $0.4 million

Storm Water (all scenarios):

A Storm Water Best Management Practices Manual exists for the City of West Kelowna, published in 2012. The City determines if stormwater permanent BMP is required for any new developments and significant redevelopment projects. Once BMP is deemed applicable to a development, design and installation shall be done in accordance to the criteria, guidelines, and design standards. BMPs include storm water quality and quantity control.

APPENDIX D
Public Consultation 2 Summary

TECHNICAL MEMORANDUM

DATE July 20, 2015 **PROJECT No.** 1416015

TO Darin Schaal, Planner
City of West Kelowna

CC Don Crockett, Principal

FROM Jana Zelenski, Associate **EMAIL** jana_zelenski@golder.com

UPPER GLENROSA AREA PLAN PHASE 1
COMMUNITY CONSULTATION #2 – SUMMARY OF CONSULTATION

1.0 BACKGROUND

On October 14, 2014, West Kelowna Council approved the terms of reference for the preparation of the Phase 1 Upper Glenrosa Area Plan. The planning initiative was driven by public requests to consider potential for water and sewer connections to the currently unserviced portions the neighbourhood. The goal of the project is to assess potential directions for transportation, servicing and development and create a framework to be further refined during Phase 2 of the Area Plan.

Project work was initiated in December, 2014. A background review and analysis was conducted for the planning area in January and February, 2015 and included a review of environmental, transportation, servicing and land use opportunities and constraints.

2.0 COMMUNITY CONSULTATION #1

On March 11, 2015 the first public open house was held to provide community members an opportunity to review background and analysis work and provide input on key issues (i.e. servicing, land use and development and transportation) and to begin developing a collective vision for the future of the neighbourhood. In total, 90 participants signed into the open house and 117 people submitted a feedback form.

Key feedback from the open house and feedback form is summarized below. Refer to the **Community Consultation #1 – Summary of Consultation** document for additional details.

- Participants said they valued the following elements most about Upper Glenrosa:
  1) Access to trails/green spaces
  2) Rural lifestyle
  3) Natural areas
- **68%** of participants said they would consider supporting new development in Upper Glenrosa, **48%** of which said it would depend on the type and location of development.

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- Participants noted that if new development is considered:
  - Current rural water supply limitations must be addressed. It is perceived that without connection to City water services there is insufficient well water supply to support future development.
  - Preservation of rural neighbourhood character and green space is important.
  - Access and egress into the neighbourhood should be addressed prior to addition of residents.
  - Amenities to support new development should be considered (e.g. parks, playing fields, trails, etc.)
- **81%** of participants would consider supporting extension of water and sewer to unserviced areas of Upper Glenrosa, **52%** of which said it would depend on the cost.
- Participants identified the following key transportation issues in Upper Glenrosa:
  1) Access/egress
  2) General road safety (notably on Glenrosa Road)
  3) Lack of pedestrian infrastructure
- **81%** of participants felt additional access/egress should be provided to Glenrosa, **48%** of which said it would depend on the cost
- Words used to describe a future vision for Upper Glenrosa included:
  1) Rural character
  2) Low intensity / limited development
  3) Trails and Crown land access

Based on this feedback, the planning process proceeded to Step 2 to develop potential concept scenarios for Upper Glenrosa.

3.0 COMMUNITY CONSULTATION #2

During the second stage of planning for Upper Glenrosa, three concept scenarios were developed based on the community values and concerns identified in Step 1. These scenarios were created to explore different ways to respond to the aspirations identified – including protection of rural character, opportunities for servicing and improvements to transportation.

Table 1: Overview of Draft Scenarios

Scenario 1: Status Quo	Scenario 1 protects rural character by limiting development and focusing on improving existing infrastructure in Upper Glenrosa. In this scenario, development and servicing are recommended to be limited to areas identified for growth in the current OCP. Improvements to the transportation network are focused on upgrading the alignment and cross-section of Glenrosa Road, connecting and preserving trails and supporting planning for improved access/egress to the area. Green spaces are focused on preserving trail connections and trailheads for access throughout the community and into the Crown lands.
Scenario 2: Area-Wide Servicing	Scenario 2 considers the option of expanding servicing throughout Upper Glenrosa financed through establishment of a Local Service Area. The scenario considers limited development opportunities within rural residential areas that are consistent with the rural

	context of the area. Similar to Scenario 1, continued residential development in the south is considered, adjacent to existing development areas to the growth boundary identified in the current OCP. Slightly more low density multiple family residential development than in Scenario 1 is considered at the south end of the site to increase housing options. Improvements to the transportation network are focused on upgrading the alignment and cross-section of Glenrosa Road, connecting and preserving trails and supporting planning for improved access/egress to the area. Green spaces are focused on preserving trail connections and trailheads for access throughout the community and into the Crown lands.
Scenario 3: Focused Development	Scenario 3 considers growth in key areas while preserving surrounding Rural Reserve to maintain rural community character. The concept includes expansion of single family and low density multiple family residential land uses in two core areas: an expanded growth area in the south and a "village" area in the north. The village concept focuses on creating a distinct village character – providing a diversity of housing types with a small-scale village look and feel. The village would be a recreational launch point with strong connections to the surrounding trail networks. Servicing would be extended to the growth areas through development and with this extension, opportunities for more cost efficient servicing connections for rural residents may occur. Additional park land dedication would accompany development – focusing on protection of sensitive ecosystems and providing recreation uses such as trails and gathering space in key locations. Transportation improvements would occur concurrent with development.

Refer to **Attachment A: Open House Display Boards** for additional details about each scenario.

The second round of consultations was designed to be a community discussion about the different scenarios, to identify strengths and challenges and gain information about community preferences. The feedback obtained during this open house will help guide recommendations for a preferred planning framework for Upper Glenrosa to be studied further during the Phase 2 Area Plan.

This memo summarizes feedback that was received during Step 2 from:

- Public Open House #2
- Feedback Form
- Stakeholder Input
- Advisory Planning Committee Input
- Staff Technical Committee Input

3.1 Public Open House #2

Overview and Purpose of the Open House

The second public open house for the Upper Glenrosa Area Plan was held on June 17, 2015 from 4:00pm to 7:00pm. The purpose of this open house was to present the draft scenarios and receive feedback on the pros and cons of each. This feedback will help develop a recommended framework that considers land use, servicing and transportation components to be refined during the Phase 2 Area Plan.

Open House Format

The event was held as an interactive, drop-in format where participants were encouraged to record input directly on the display boards and using a feedback form (see **Attachment A** for the display boards). Participants were encouraged to complete a feedback form at the open house in hard copy or online at an ipad station. The feedback form was also available online until June 30, 2015. An overview presentation of the information was delivered during the open house at two times, 5:00 pm and 6:00 pm.

District staff from development services and engineering departments attended the event to respond to questions and participate in discussions.

Participation

In total, 65 participants signed into the open house – but from personal observation it is estimated about 80 people were in attendance. A large map of the planning and surrounding area was located at the entrance to the open house and attendees were asked to record where they live. The map generally showed representation of participants throughout the Upper Glenrosa planning area, as well as from the adjacent (lower) Glenrosa neighbourhoods.

Open House Feedback

Feedback at the Open House was gathered through:

- The feedback form to capture detailed feedback on the scenarios (see Section 3.2 for a summary).
- Sticky notes and dots on the display boards to document public comments and obtain a snapshot of participants' opinions.
- Staff and the consulting team conversations with participants.

Comparing the Scenarios

Open House participants were asked to identify their preferred scenarios for land use and development. It should be noted that some participants may have added more than one dot to their preferred scenarios, so these results should be considered in connection with the feedback form.

Table 2: Summary of Public Feedback on Display Boards

	Scenario 1	Scenario 2	Scenario 3
Which Scenario do you think best reflects your vision for **land use** in Upper Glenrosa?	3	10	12
Which Scenario do you think best reflects your vision for **servicing** in Upper Glenrosa?	2	4	11

	Scenario 1	Scenario 2	Scenario 3
General Comments on Scenarios		• Provide water only, not sewer to reduce costs. • This leaves more parcels as is – but will people subdivide to provide more households and reduce servicing costs? • Emergency access required prior to ANY development	• Water improvements – Yes! • Emergency access very important • I like more young families up here • Do not want sprawl • Start development up by Gates, working way up, not down • Let's do some roads first, then development • Put the reservoir at 880m initially to maximize the service area, rather than at 800m initially.

General comments from display boards:

- Concerns that if the carriage home bylaw goes through it may adversely affect well water in the area if people drill new wells for carriage homes.
- Intersection at McIver/Glenrosa should be more of a priority for improvements than the intersection at Webber/Glenrosa.
- Consider a walkway over Glenrosa at McIver to keep kids safe as this is a dangerous intersection.
- We don't know how many wells are affected by lack of water. District should do a survey to understand this.
- How about connecting neighbourhoods by walkways so people / kids can get off Glenrosa Road?

3.2 Feedback Form

A total of 62 feedback forms were received between June 17 and June 30, 2015. The following is a summary of input received through the feedback form, organized by question. For a complete record of comments received, see **Attachment B**.

Question 1: Where do you live?

Approximately 68% of respondents live in the Upper Glenrosa Area and 12% in Glenrosa (lower area) neighbourhood. In addition, there was interest from people outside the Upper Glenrosa Area with 20% of responses received from areas including Casa Loma, Lakeview Heights, Shannon Lake, Westbank, Smith Creek and outside West Kelowna.

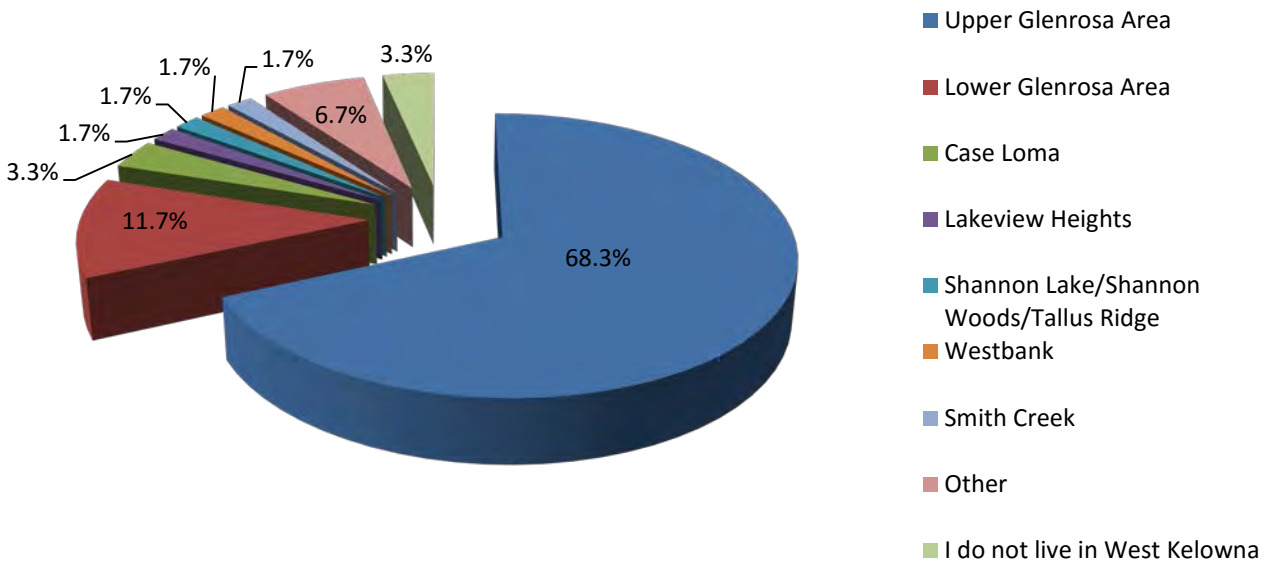


Figure 1: Where Feedback Form Respondents live

Question 2: Do you like, are neutral or dislike the following directions shown in Scenario 1?

Scenario 1 did not generate as much support from participants as Scenarios 2 and 3. The primary elements of this scenario that people liked included:

- Green space focused on trail connections and preservation of trailhead access (**97%** liked or were neutral)
- Development of limited small-scale commercial (**84%** liked or were neutral)

The primary elements of this scenario that people disliked included:

- No expansion of water or sewer services beyond the existing growth boundary (**57%** disliked)
- No additional growth considered in rural areas (**46%** disliked)

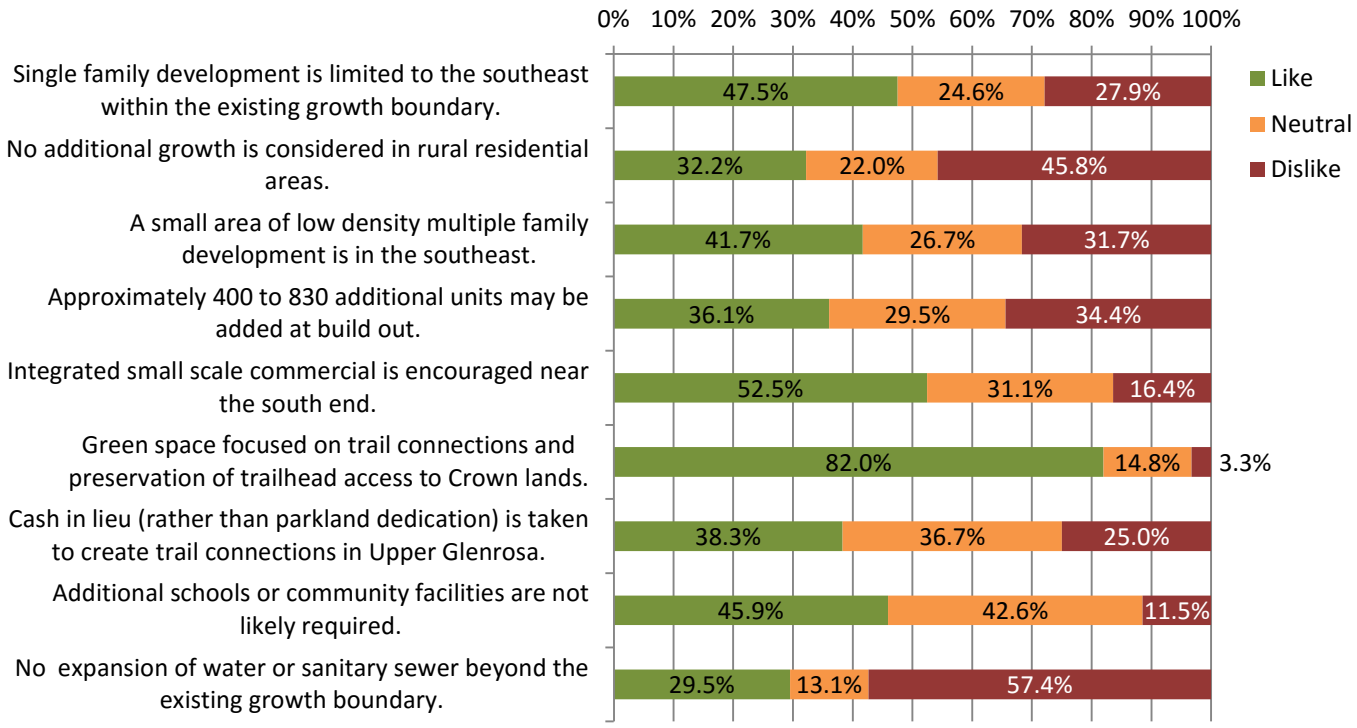


Figure 2: Feedback on Scenario 1

Key themes extracted from comments on Scenario 1 include:

- Reiterated desire for servicing in the area. Several respondents did not support status quo for servicing.
- Support for increased housing diversity and lower cost housing options to support aging in place (potentially within multi-family areas).
- Concern that further development should not be supported until a second access/egress is developed.
- Mixed feedback on development. Some respondents expressed desire to be able to subdivide their properties in the future; others preferred no additional growth.

Question 3: Do you like, are neutral or dislike the following directions shown in Scenario 2?

Scenario 2 generally generated more support from participants. The primary elements of this scenario that people liked included:

- Green space focused on trail connections and preservation of trailhead access (**95%** liked or were neutral)
- Limited need for additional schools/facilities (**85%** liked or were neutral)
- Potential for services to areas (**85%** liked or were neutral)

The primary elements of this scenario that people disliked included:

- Slightly more additional growth than Scenario 1 (**48%** disliked)
- Limited growth in rural residential areas (**40%** disliked)

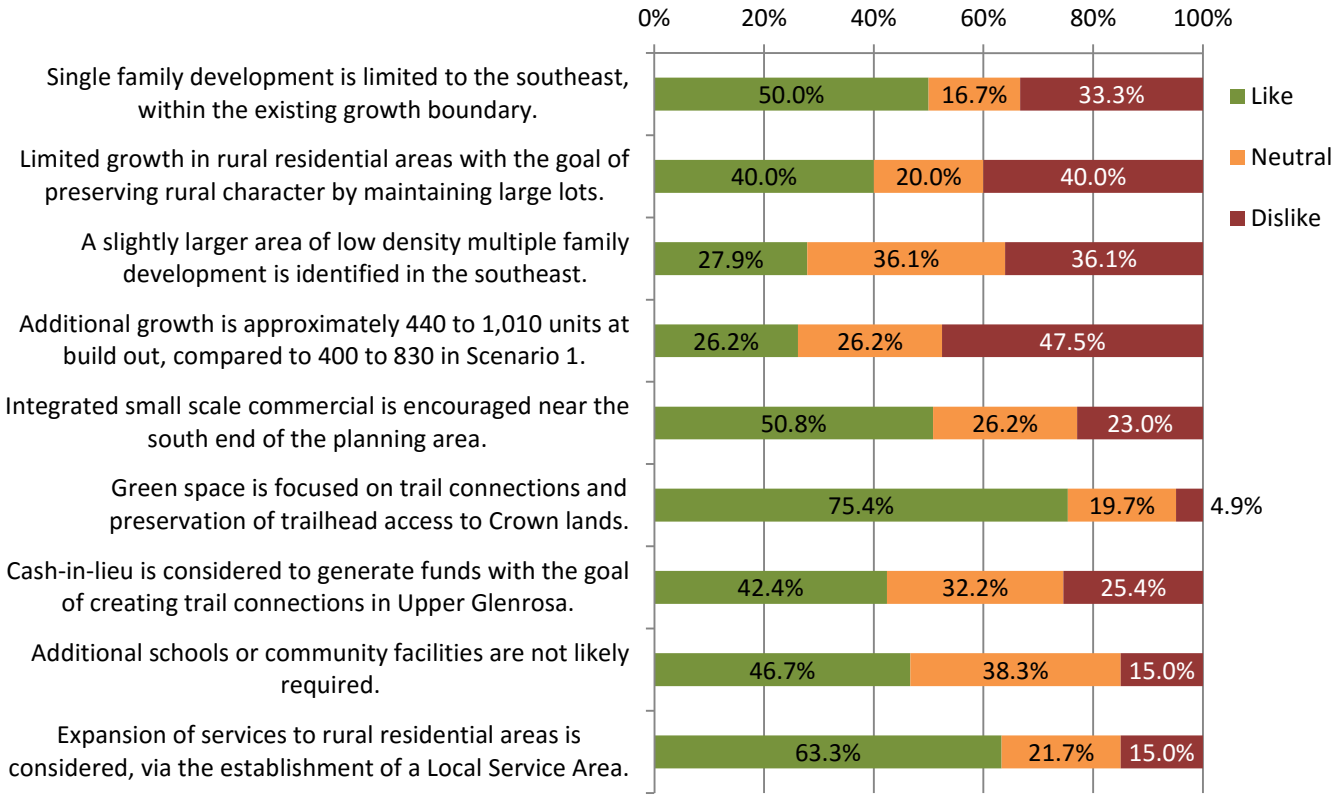


Figure 3: Feedback on Scenario 2

Key themes extracted from comments on Scenario 2 include:

- Positive feedback for water and sewer expansion to the area.
- Concerns about subdivision occurring without water service extension, which has a perceived risk of affecting existing wells.
- Suggestions that smaller parcel sizes should be considered in the Rural Reserve areas to further reduce potential costs of servicing. Most size recommendations were around 1 ha (2.5 acres).
- Concern that further development should not be supported until a second access/egress is developed.
- Concerns from landowners with lots that would not be subdividable based on the 1.4 ha size.

Question 4: Do you like, are neutral or dislike the following directions shown in Scenario 3?

Scenario 3 generated a greater mix of responses – some people were very positive about the scenario, while others had negative opinions. The primary elements of this scenario that people liked included:

- The concept of a trail hub in the village that would serve as a launch point for recreational pursuits (**87%** liked or were neutral)
- Development of new park space alongside new development (**84%** liked or were neutral)
- Development of limited small-scale commercial in the south end (**82%** liked or were neutral)
- Limitation to development in rural reserve areas beyond the identified development areas (**76%** liked or were neutral)

The primary elements of this scenario that people disliked included:

- Establishment of an Upper Village (**45%** disliked)
- Creation of a small area of low density multifamily development in the Upper Village (**43%** disliked)
- Expanded single family development in the southeast, beyond the existing growth boundary (**42%** disliked)

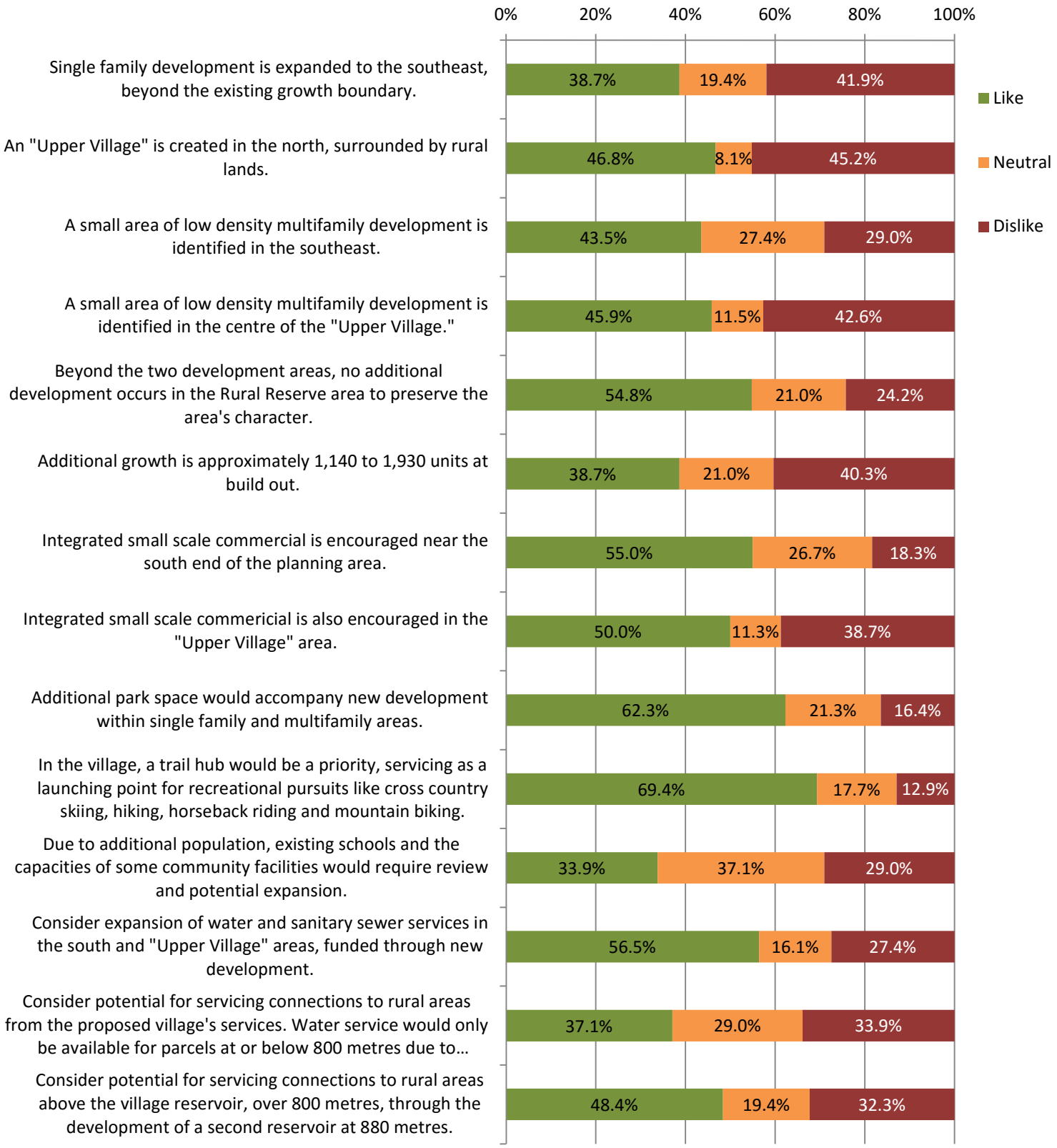


Figure 4: Feedback on Scenario 3

Key themes extracted from comments on Scenario 3 include:

- Recommendation that the reservoir be located at the 880m elevation initially (rather than at 800m), to provide water services to all areas of Upper Glenrosa. Feasibility analysis would be required.
- Concerns about new development including:
  - Some respondents do not support more development in Upper Glenrosa.
  - Questions whether additional development capacity is needed in the area and whether the City should focus in other development areas (e.g. Westbank Centre).
  - Concerns that development may compromise the rural character of the area.
  - Concerns about the intensity of development.
- Support for those who like the village concept and the benefits, including additional tax base, it would bring to the area.
- Concern that further development should not be supported until a second access/egress is developed.
- Concerns from parties with lots outside the identified development areas that their future development opportunities will be limited.
- Concerns from residents within the identified development areas who do not support changes to their existing land use.
- Recommendation for consideration of development starting farther south, connected to existing development areas, rather than as a separate village.

Question 4: Do you like, are neutral or dislike the transportation directions shown on the scenarios?

Given the limited development footprint considered in all scenarios, the transportation directions were generally consistent across the scenarios. Participants who responded to the feedback form were typically supportive of the transportation directions being considered. The primary transportation directions people liked included:

- Ongoing work to identify and develop a secondary access/egress route (**90%** liked)
- Improvements to Glenrosa Road to enhance sightlines, reduce speeding and improve safety (**84%** liked)
- Trail network development to establish connections throughout the community and to Crown lands (**82%** liked)
- Intersection improvements and pedestrian crosswalks considered for Glenrosa/McIver and Glenrosa/Gates (**82%** liked)

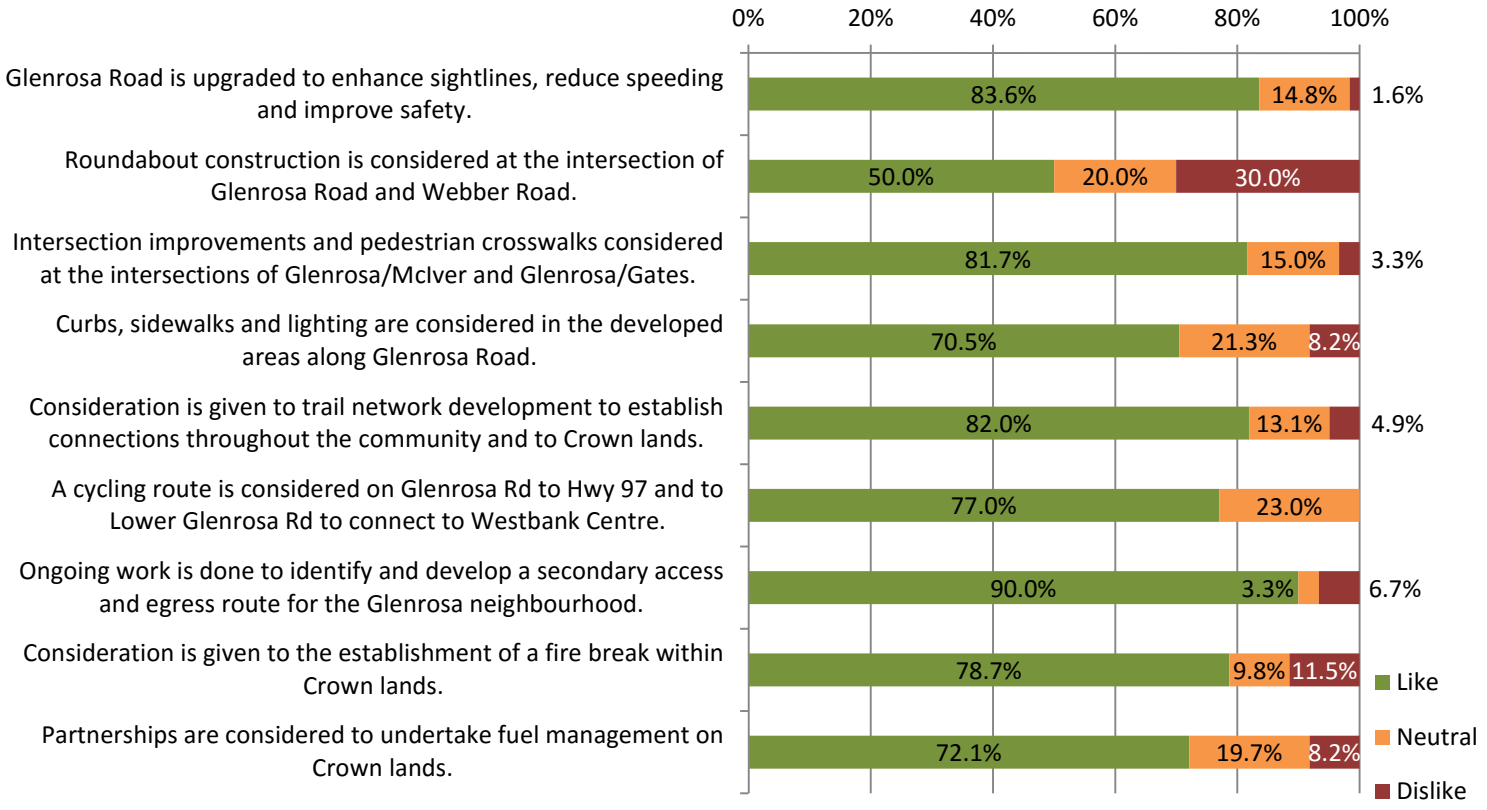


Figure 5: Feedback on Transportation Directions

Question 5: What are your comments or questions about the following potential access/egress routes?

Key comment themes for the Trepanier Connection:

- Potential for wildlife/environmental impacts
- Concerns that egress could be compromised if there is a fire in the area
- Cost
- Increases to through traffic on Glenrosa Road
- Recommendation to consider gating so that the route is used in emergency situations only

Key comment themes for the MacKinnon Road Connection:

- Potential for wildlife/environmental impacts
- Cost
- Concerns that egress could be compromised if there is a fire in the area
- Recommendation to consider gating so that the route is used in emergency situations only

Key comment themes for the Glen Canyon/Powers Creek Connection:

- Cost
- Benefit of improved access between Glenrosa and Smith Creek that would be useful at all times, not just in an emergency
- Impacts to the environmental area and park character
- Lower risk of egress being compromised during a fire

Key comment themes for the Highway 97 Emergency Egress:

- Potentially the most affordable
- Could speed up evacuation
- Concerns that egress could be compromised if there is a fire in the area
- Still requires people to access Glenrosa Road, which may not solve the issues
- Not able to be used at all times
- Potential fewer environmental impacts

Question 6: What evaluation criteria do you believe are the most important when considering the secondary access/egress routes for Glenrosa?

All of the criteria were considered important, with four garnering nearly similar support.

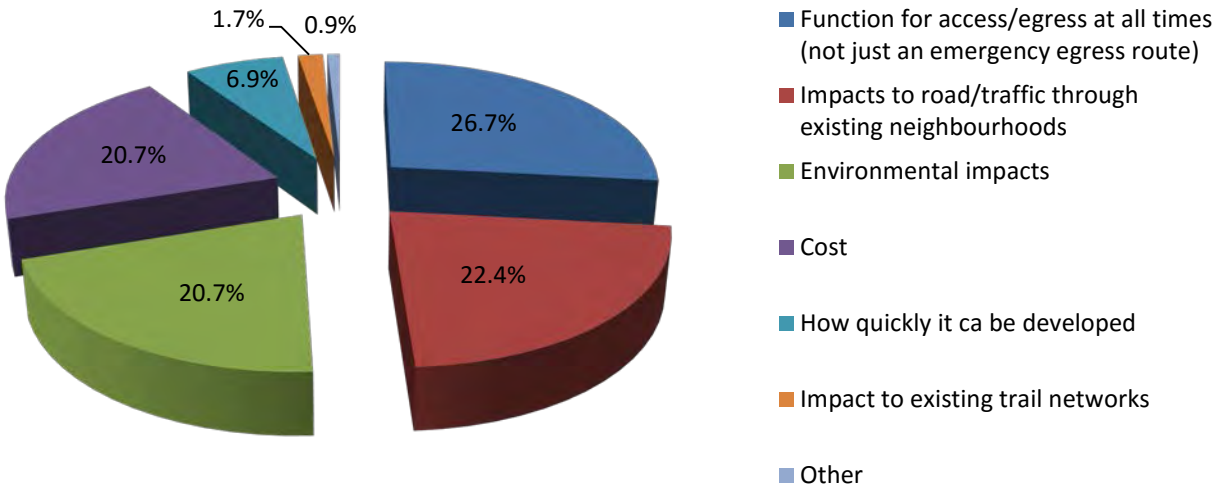
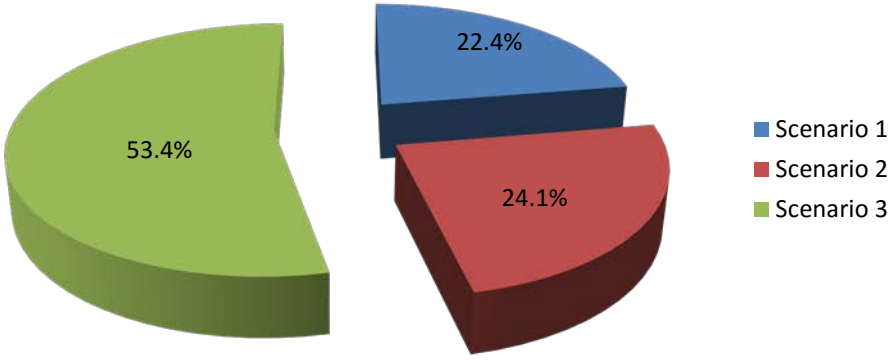


Figure 6: Evaluation Criteria to be Considered in Access/Egress Planning

Question 7: Which scenario do you think serves as the best starting point for developing recommendations for Upper Glenrosa?



Those who selected **Scenario 1** preferred if for the following reasons:

- Least impact to existing area, including rural character
- Focuses development opportunities in other areas of the city (e.g. Westbank Centre)
- Least cost to taxpayers

Those who selected **Scenario 2** preferred if for the following reasons:

- Supports gradual progression (Scenario 3 seems like too much of a jump)
- Supports provision of services to the area
- Minimizes potential change (does not substantially increase density)

Those who selected **Scenario 3** preferred if for the following reasons:

- Recognizes that the area will be a desirable place to live and expansion will likely be needed in the future and directs this expansion in a thoughtful manner
- Provides opportunity for Upper Glenrosa to become a unique area
- Preference for controlled growth, rather than incremental sprawl
- Economical approach to servicing
- Provides a useful long-term goal that can be worked towards with a vision in place
- Provides opportunities for new families to come to the area
- Provides opportunities for small-scale services in the area

Question 8: What would you change about your selected scenario to make it better?

Those who selected **Scenario 1** suggested the following changes:

- A small commercial area
- Improvements to the roadway beyond Gates road

Those who selected **Scenario 2** suggested the following changes:

- Another crown land access off the end of McKellar Road
- Fire break around the area, taking care to limit visual impacts
- Consideration for a smaller subdivision size (e.g. 2.5 acres to as low as 1.25 acres)
- Ensuring servicing is a condition of subdivision/development to ease potential effects on existing wells
- Consideration for natural gas servicing at the same time that water and sewer are developed (would require coordination with FortisBC)

Those who selected **Scenario 3** suggested the following changes:

- More single-family development
- Increased density to support aging in place
- Creation of a second access/egress prior to development
- Consideration for attractive commercial developments (e.g. restaurant)

Question 9: What types of development would you support to help offset the costs of servicing?

While many people preferred Scenario 3 (see previous question), this question garnered only limited support for creation of an Upper Village to support extension of servicing. Generally more support was given to development of single-family and multiple family in the south and potential large lot subdivision. Several comments suggested that while people liked the concept of it, the Upper Village should be considered a longer-term plan.

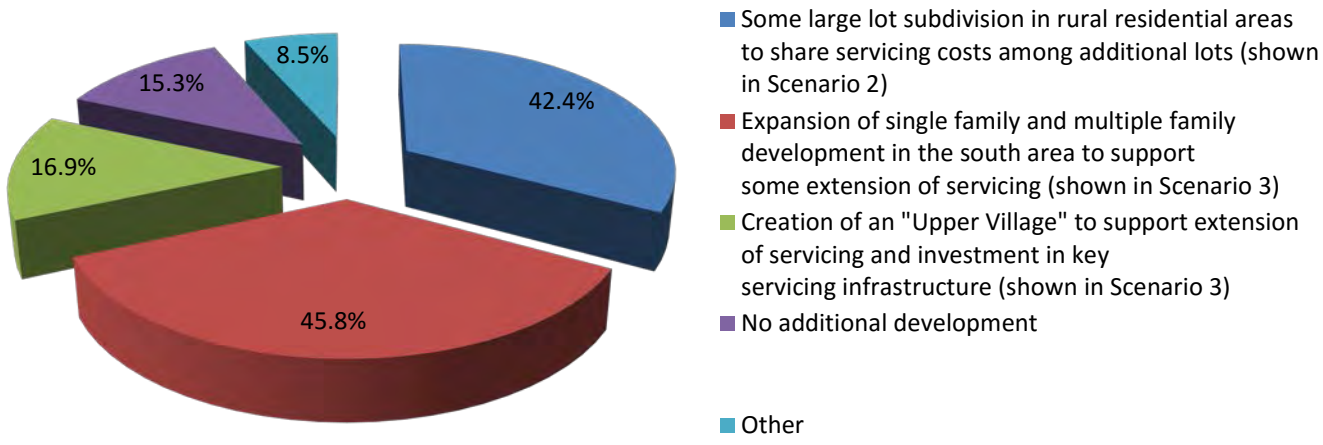


Figure 8: Types of development that may be supported

Question 10: General Comments:

Key themes extracted from general comments include:

- Reiteration of the importance of having water in the area for several reasons, including:
  - Fire hazard management
  - Well limitations
  - Property values
- Mixed feedback for future development, including:
  - Preference to focus development in other areas of West Kelowna, such as Westbank Centre
  - Support for new, careful development in the area (main preference for single-family)
  - General preference for development in the southern areas of Upper Glenrosa in the short-term
  - Emphasis on minimizing effects of development on existing property owners
  - Concerns that future development may impact water services for existing serviced residents (e.g pressure loss, shortages), as well as residents using wells
- Emphasis on the importance of preserving rural nature, sensitive areas, trails and recreation
- Discussion on potential sources of funding and taxation, including:

  - role of the Province
  - grant funding
  - taxation, including concerns about increased tax burden and equity for recovering service costs
- Emphasis of the link between new development and creation of a secondary access/egress
- Reiteration of the importance of improvements to Glenrosa Road and improvements to the transportation network as development occurs
- Recommendation to develop a strong vision that will guide the future, but allow flexibility for adaptation
- Encouragement to maintain an inclusive and accountable planning process

3.3 Stakeholder Input

Stakeholders were provided with copies of the public consultation materials for their review and input. Stakeholders provided the following feedback:

Table 3: Stakeholder Input Overview

Stakeholder	Summary of Key Input
Regional District of Central Okanagan	■ Recommendation to consider the following key bylaws: ▪ RDCO Rural Westside Official Community Plan Bylaw No. 1274 ▪ Regional Growth Strategy Bylaw No. 1336 ■ Recommendation to review the capacities of the Glenrosa Trunk sewer mains
Westbank First Nation	■ Request to see study findings when complete
Glenrosa Residents' Association	■ Recommendation to consider phased water expansion, supplying water to the lower area as a first phase ■ Consideration for pursuing grant funding to offset some costs of water servicing

3.4 Advisory Planning Committee Input

The Advisory Planning Committee received an initial presentation of the options on June 17, 2015 and provided further input at their meeting on July 15, 2015. Key themes are recorded in the following table:

Table 4: Advisory Planning Commission Discussion Overview

Theme	Discussion
Servicing	■ Water supply issues have been an ongoing concern, which indicates a solution should be pursued. ■ Servicing without development means there is significant investment being considered to support a small number of lots. ■ Water supply should be resolved prior to future subdivision in Upper Glenrosa. ■ Maintaining routes for future service lines should be a consideration during all planning and development. ■ Cost per parcel is an issue – densification and grant funding may need to be considered.
Development	■ Consideration for elements like schools and other amenities (e.g. playfields, children's parks) will need to be considered if population increases significantly (as shown in Scenario 3). ■ West Kelowna has limited development space and demand for new development areas will occur in the longer term. It is important to be strategic about how development occurs. ■ Crystal Mountain decisions may affect potential development in Upper Glenrosa. ■ Density is needed to offset cost, but maintaining the rural character of the area is important. ■ The village scenario would require a focused effort; the character proposed will not happen naturally, it would need to be carefully directed. ■ The village concept may not align with the efforts to focus development in Westbank Centre and Boucherie areas. ■ Different types of occupancy / residency in the area would be an important benefit of development. ■ In the short-term, providing water servicing and allowing development based on current zoning may warrant consideration. ■ Housing diversity is important – large lots and houses are disappearing. ■ The area has a unique character – there is a need to maintain that, but provide services. ■ 1.4 ha minimum parcel is too big for the density and servicing required, but the larger lot is needed to maintain rural functionality (e.g. horses).
Transportation	■ Access/egress is important and needs to consider accessibility during a fire (ie. will it be in the path of the fire). ■ The current bypass study result is anticipated in August 2016. A second crossing on Okanagan Lake could play a key role in deciding where to direct traffic. ■ If the Upper Village concept is considered, location may be affected by outcomes of transportation planning (ie. location of access/egress). ■ In the Upper Village concept, trails should be a key component (e.g. envision a place where there are trails for horses, rather than laneways for cars)

Theme	Discussion
	■ If a second access / egress is not feasible, it will affect development potential. ■ Access / egress could be an opportunity to direct people to other parts of the community (e.g. Westbank Centre connection). ■ The function of the second access will need to be carefully considered (ie. is it for local traffic or a bypass for other traffic?). ■ The existing trails though Glenrosa, Smith Creek and Tallus Ridge need to be preserved during potential road planning.
Phasing	■ Timeline is an important consideration for determining when development and servicing will occur. ■ How development would unfold – ie. developer driven or City involvement – needs to be considered. ■ Potential land purchases will want to see a clear vision for the future. ■ An implementation plan will be required.
Public Participation	■ Public feedback will likely be skewed to the personal preferences of those who live in the area.

3.5 Staff Technical Committee Input

The Staff Technical Committee met on June 18, 2015, after the public open house to discuss preliminary outcomes of the event and provide comment on the scenarios. Key themes are recorded in the following table:

Table 5: Staff Technical Committee Discussion Overview

Theme	Discussion
Scenario 1	■ Funding for desired improvements (e.g potential access / egress route, improvements to Glenrosa Road), will be more difficult to generate in the absence of development. ■ Further development of the firebreak concept is needed in future planning, including continued consultation with the fire department and with WFN on potential projects. ■ The fire department is working with WFN on fire protection above Shannon Lake and other areas. The approach to a firebreak for Upper Glenrosa would be determined through planning for the area. ■ Need to continue to work with the fire department to access potential provincial grant funding related to forest fire planning. ■ Access / egress continues to be a major issue and study funding is in place to review the options in detail and make a recommendation in 2017. ■ The 2016 COPS study will impact potential route planning for the area – notably if their recommendation includes access to Bear Creek, Tolka and Sunset Main. ■ Urban arterial roads standards should be used in new SF development areas. The current OCP uses a rural standard, but if land use designations are changed, urban arterial should apply. ■ The road shown near the south end of the site connecting to Webber / Glenrosa intersection should be dashed – its configuration would be different than previous planning. There are difficult slopes that are a limitation to a road connection.

Theme	Discussion
Scenario 2	■ May need to consider going through an appraisal process to understand the value that servicing adds to existing properties. For example, does the addition of water service at $93,000/property provide an equivalent uplift in property value? ■ Effects of servicing on property values may increase if well water access continues to be problematic. The cost to drill a new well is typically in the range of $10,000 to $20,000. ■ In Upper Glenrosa, access to well water varies. People with poor well water supply want water services; those with good well water supply may not want to spend the money required for servicing. ■ If servicing does become available in the area, there will be pressures for development. ■ In a referendum, half the people with half the assessed land value of the area would need to vote in favour of creating a Local Service Area. ■ The approach to setting subdivision policy in the area would need to be carefully considered in future planning. A different lot size or an approach, such as rezoning, could allow more subdivision throughout to offset some costs. From a policy perspective, the OCP endeavours to protect rural reserve lands and too much subdivision could undermine these existing plans.
Scenario 3	■ This concept is based on the extension of major infrastructure through development to reduce cost burden to existing residents. ■ Development could not fully fund servicing to the entire area – would need to recapture some costs. ■ Servicing additional rural residential areas outside main development areas add a relatively small burden to water supply. Reservoirs are sized for fire protection, which requires a significant volume. ■ The rational for the Upper Village appears to make sense. In the long run, this could be a feasible approach to targeted growth. In the short-term, growth demand may not be focused on this location. ■ There is potential for increasing demand for subdivision at the edges of the SF development areas, which could put the area at risk for sprawl. ■ Having successful commercial services in the area would be a challenge. It would require a behavioural change for those living in the area; they are currently conditioned to go to town for what they need. The question would be if something the scale of Nesters Market could be successful. ■ The development plans for Crystal Mountain could have a significant impact on the area. They appear to be on hold at the moment, but preliminary planning has indicated a population of up to 10,000 there. ■ The idea of the village seems to provide unique opportunities. Single Family homes are a good market, so it could have potential.
General Servicing	■ West Kelowna standard water service practice allows for only two pressure zones per storage facility. ■ Future development would need to consider the overall water capacity – the Water Utility Master Plan has a 20-year recommendation to expand the treatment plant in Glenrosa. If development occurred more quickly, this recommendation would need to be prioritized.

Theme	Discussion
	■ The relationship between water servicing and fire protection is a consideration. While having fire hydrants may not protect the community against forest fire, it could help limit potential risk of fires originating in the neighbourhood (e.g. house fire) spreading into the Crown lands. ■ Some concern that perhaps a relatively small group in Upper Glenrosa have issues with water and are driving the demand for servicing.
Transportation	■ The Jack Pine Forest Service Road is the interim secondary / emergency egress from the Glenrosa neighbourhood and it should be identified in the draft Area Plan.
Development (general)	■ There are currently no active DP areas within Westbank Centre. There is a risk that development in Upper Glenrosa (notably the Upper Village concept) could compete with objectives in Westbank Centre. Any additional retail footage may dilute potential for Westbank Centre. ■ The existing commercial opportunities in Glenrosa have not generated substantial success. A number of uses have been tested in the area, but unless you have a significant draw, it is difficult to draw anyone other than the small local population. If the Upper Village were framed as a recreation destination, that could create some draw. ■ Key to success would be the right mix of services – including core local services like daycare that provide an anchor. ■ Glenrosa is a commuting neighbourhood and residents do much of their shopping during trips to / from work. ■ People have lived in the area for decades and are looking at downsizing. The concept of aging in place is attractive for the area. ■ A key for success of the Upper Village is for it to be more than a neighbourhood node – it needs to appeal to recreationalists on a larger scale. ■ A challenge is that development demand likely is not there at the moment. Scenario 3 relies on development to reduce costs of servicing, but this may not solve the servicing issue in the short term. ■ Currently subdivision is permitted in Upper Glenrosa if the landowner can prove out a well. Many are not able to do this so subdivision has been extremely limited. ■ The existing boundaries of the south development area are based on water service potential (elevation). New water would be required to expand beyond current boundaries (shown in Scenario 3). ■ The vision needs to emphasize protection of rural character. ■ During the open house there were many questions about carriage homes for that area and how drawing additional water will affect the area. This is top of mind since it's a current discussion in the community.
Feedback on the Open House	■ Some people felt having the three scenarios was too restrictive. They liked aspects of Scenario 3, notably the water, but felt it was still not fitting their needs. ■ Comments were received that June was a difficult time for an open house – people were already commencing summer activities. ■ The complexity of the scenarios and topic area were a barrier for some responders (ie. it took too much time to understand the details and respond to them).

Theme	Discussion
Process	■ Transparency will be important as planning for the area moves forward. ■ It will be impossible to satisfy all people in the neighbourhood and difficult decisions will be required. ■ There is still a general belief among participants that water servicing can be achieved without development impacts or significant costs. ■ Previous studies have been done regarding servicing and costs – with similar results. There was not enough support in previous studies to move forward. ■ If planning moves forward for Upper Glenrosa it is likely an OCP amendment would be required.

4.0 DISCUSSION

A large amount of feedback has been generated for the Upper Glenrosa Area Plan. The following observations are provided for consideration as the process moves forward:

- The ongoing interest in servicing for Upper Glenrosa, combined with the results gathered through consultation during the Phase 1 Area Plan, indicate that there is a need to address the servicing issue. Scenario 1: Status Quo is unlikely to meet the long-term needs of the community and it is recommended that further planning be considered.
- Scenarios 2 and 3 both garnered some level of support during this process, partly because they each provide a solution to servicing. Each scenario comes with key strengths and weaknesses:

Table 6: Key Strengths and Weaknesses of Scenarios 2 and 3

	Scenario 2: Area Wide Servicing	Scenario 3: Focused Development
Strength	■ Addresses need for water and sewer services throughout Upper Glenrosa ■ Timing of servicing provision is not tied to development, therefore there is more control over when services could be extended ■ Opportunity to maintain rural character by setting a minimum lot size or development approach	■ Provides opportunities for servicing through development, which has potential to significantly reduce landowner costs to extend servicing to rural lots in some areas ■ Creates opportunities for diversified housing options in a neighbourhood where this is currently limited ■ Provides unique character and lifestyle opportunity for West Kelowna that may drive market interest ■ Recreational appeal and access to Crown lands is a significant opportunity to be capitalized on

	Scenario 2: Area Wide Servicing	Scenario 3: Focused Development
Weakness	■ Significant cost burden to existing landowners. It may be a challenge to obtain sufficient support for a development of a Local Service Area given the costs. It is unlikely that the uplift in property value from servicing will offset the project costs ■ Potential to subdivide in rural reserve areas could help ease some costs, but cannot be guaranteed as it would be based on landowner's decisions to subdivide ■ Risk of large-lot sprawl that results in loss of rural character ■ West Kelowna will bear responsibility for maintenance of a large amount of new servicing infrastructure and there will be a limited tax base in the area to contribute resources for managing this over the long-term	■ Timing of servicing provision is tied development market forces, leaving less control over when this would occur ■ Location of development affects servicing provision (ie. can only provide water to elevations below the reservoir) ■ Market demand may not be sufficient to support the type of development envisioned in this scenario ■ A strong commitment to drive the vision for the concept would be required. There is risk that the concept will erode if not carefully planned and executed, resulting in sprawl development ■ Perception that this would be a greater change and impact to the rural character of the area ■ Potential that development in this area, notably commercial development, may dilute opportunities in targeted development areas (e.g. Westbank Centre)

5.0 NEXT STEPS

As we proceed into Step 3 of this process, several steps will be completed, including:

- Feedback on this memo and consideration of how which scenario(s) will move forward into the next Phase of planning
- Presentation of the scenarios and summary of feedback to Council for consideration
- Development of a preliminary framework for advancing future planning for Upper Glenrosa

Jana Zelenski
Associate, BCSLA

Don Crockett
Principal, BCSLA

JZ/DJR

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Attachment A: Display Boards

WELCOME TO OPEN HOUSE #2

WHAT'S HAPPENING?

Upper Glenrosa residents have asked West Kelowna Council to develop an Area Plan for Upper Glenrosa. The Area Plan is an opportunity to look at community servicing, transportation and future development in the area. In December 2014, Council initiated an area planning process.

WHERE ARE WE?

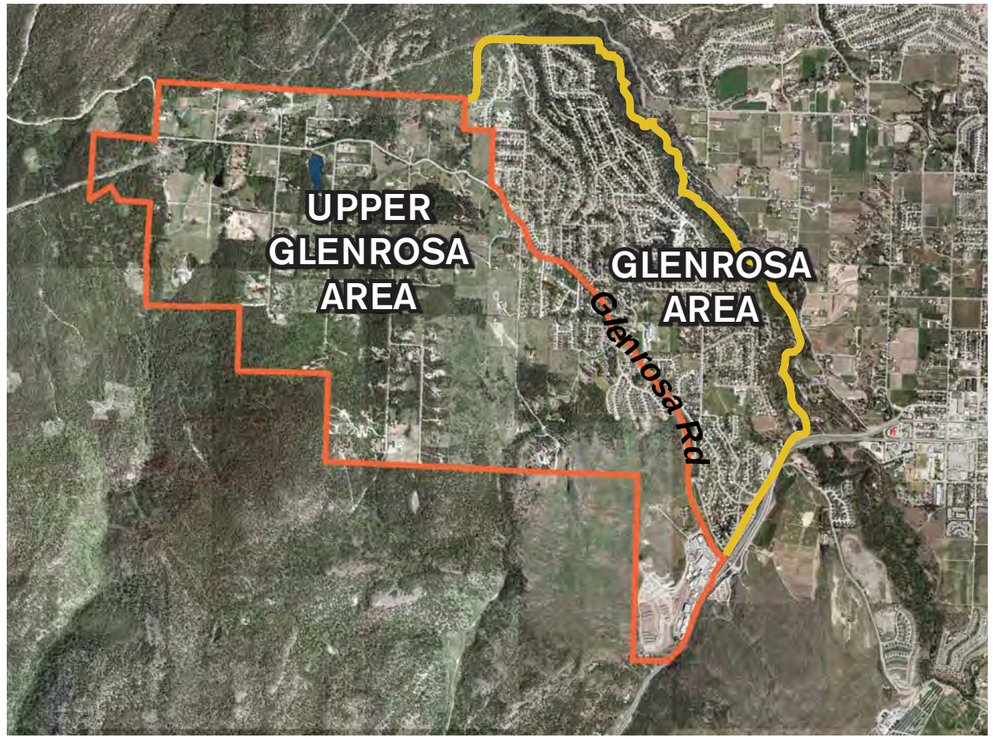
We are in the secondary stages of planning for Upper Glenrosa. Based on community values and concerns identified in Step 1, preliminary scenarios have been developed. These scenarios explore different ways to respond to the aspirations we've heard – including protection of rural character, opportunities for servicing and improvements to transportation. This open house is a community discussion about the different approaches to talk about their strengths and challenges and gain information about community preferences. The feedback obtained during this open house will help guide development of a preferred scenario to be studied in detail in future planning.

We are here

Step 1
Background & Analysis
January – March 2015

Step 2
Draft Scenarios & Framework
April – June 2015

Step 3
Recommended Approach
June – September 2015



Area outlined in red is the subject planning area.

WHAT IS THE OBJECTIVE FOR THIS STEP OF THE PROCESS?

There are many different ways to approach planning for Upper Glenrosa. The objective today is not to select a single scenario, but to look carefully at the pros and cons of each. This feedback will help develop a recommended approach that considers a combination of land use, servicing and transportation components that should be considered for the future.

HOW CAN YOU PROVIDE INPUT?

- Review the scenarios and provide your thoughts directly on the boards using a sticky note
- Fill out a feedback form (*available in paper copy or at ipad stations*)
- Engage in a discussion with the planning team
- Stay in touch with the project – sign up for email notices

Upper Glenrosa Area Plan

WHAT WE'VE HEARD

2

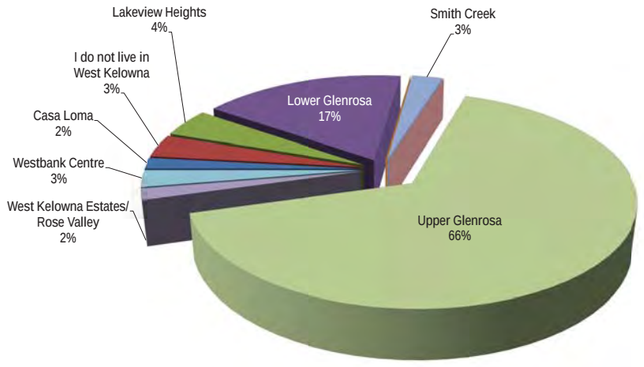
During the first consultations...

90 Participants signed into the open house

117 People shared their input in the questionnaire

Thank you for sharing your ideas!

Where did the participants live?

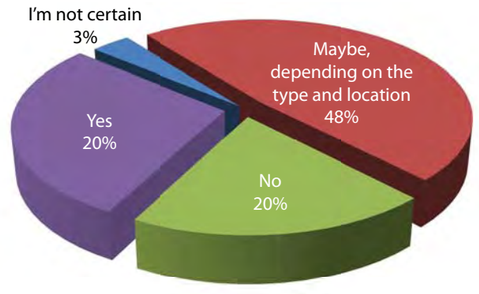


What did people say they value most about Upper Glenrosa today?

1. Access to trails/green spaces
2. Rural lifestyle
3. Preservation of natural areas

Would you support new development in Upper Glenrosa?

68% of participants would consider supporting new development in Upper Glenrosa, 48% depending on the type and location of development

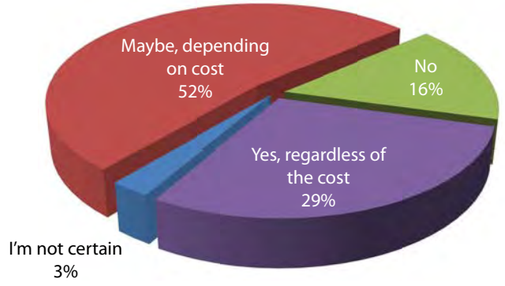


Participants noted that if new development is considered:

- Current rural water supply limitations should be addressed (insufficient well water supply to support more development without servicing)
- Preservation of rural neighbourhood character and green space is important
- Access and egress into the neighbourhood should be addressed
- Amenities to support new development should be considered

Would you support extending water and sewer services to unserviced areas of Upper Glenrosa?

81% of participants would consider supporting extension of water and sewer to unserviced areas of Upper Glenrosa depending on the cost

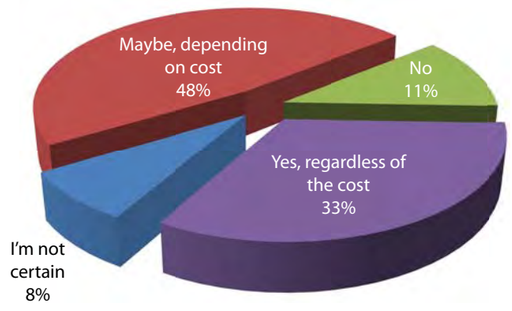


What are the top transportation issues in Upper Glenrosa?

1. Access/egress
2. General road safety (notably on Glenrosa Road)
3. Lack of pedestrian infrastructure

Should additional access/egress be provided?

81% of participants felt additional access/ egress should be provided to Glenrosa depending on the cost



What words could be used to describe a future vision for Upper Glenrosa?

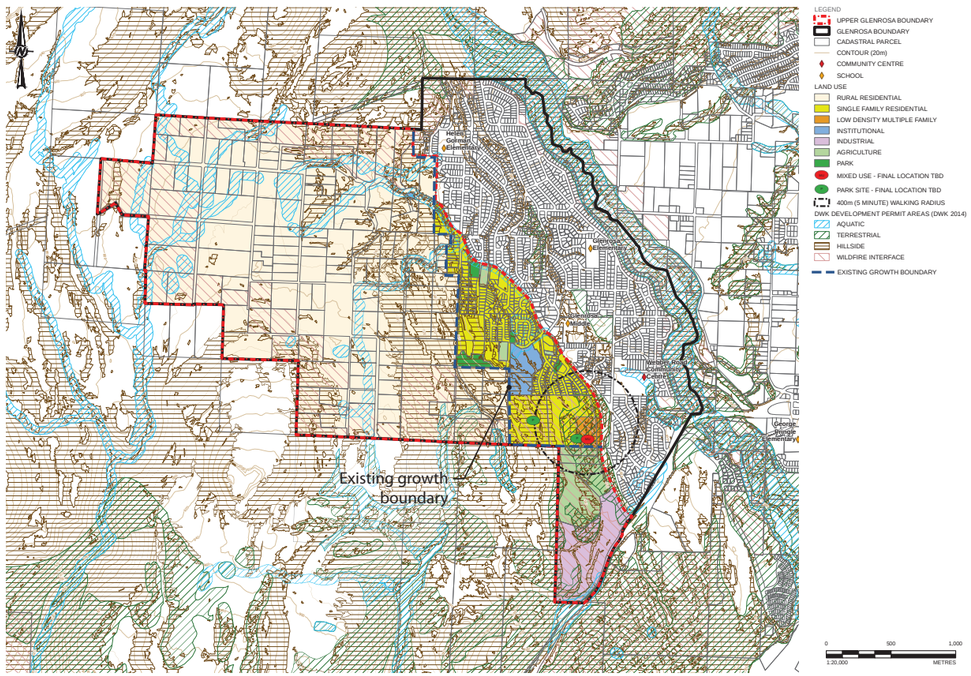
1. Rural character
2. Low intensity/limited development
3. Trails and Crown land access

SCENARIO 1: STATUS QUO - Vision & Land Use

Vision

Scenario 1 protects rural character by limiting development and focusing on improving existing infrastructure in Upper Glenrosa. In this scenario, development and servicing are recommended to be limited to areas identified for growth in the current OCP – the area shown in yellow on the map. Improvements to the transportation network are focused on upgrading the alignment and cross-section of Glenrosa Road, connecting and preserving trails and supporting planning for improved access/egress to the area. Green spaces are focused on creating trail connections and trailheads for access throughout the community and into the Crown lands.

Land Use



Land Use Summary Table

NOTE: Land use estimates are preliminary and based on limited information. These estimates are provided for conceptual planning purposes only. Further study would be required to confirm market demand, servicing costs, land constraints, lot sizes and layout and other detailed requirements for development.

Land use Type	Proposed Approach *(Note: The proposed approaches described are for planning and comment only. Feedback from this process will support development of a refined approach.)*	Total Area (Ha)	% of Land Area	Typical Units/Ha (Range)	Projected Units at Build-out (Range*)	Population Estimate at Build-out (Range*)
Rural Residential	Status quo, no additional subdivision recommended due to lack of servicing	506.6	77.7%	0.3	165	512
Single Family Residential	Recommends continued development to current SF designated areas**	75.4	11.6%	8 -13	604 - 981	1871 - 3040
Low Density Multiple Family Residential	Small area near the south end of the site, consistent with the existing OCP**	3.9	0.6%	20 - 35	76 - 134	191 - 334
Mixed Use	Commercial component integrated within Low Density Multiple Family residential	0.4	0.1%	-	-	
Institutional	Existing	8.0	1.2%	-	-	
Industrial	Existing (Gorman's Mill)	28.8	4.4%	-	-	
Agricultural	Existing. Complementary agricultural activities encouraged within Rural Residential areas	23.4	3.6%	-	-	
Parks	Neighbourhood parks in SF areas and focus on trails and trailheads throughout the area	5.8	0.9%	-	-	
Total		**652**	**100%**		**847 - 1283**	**2578 - 3894**

* A range is provided to account for variables including typical building density and limitations related to slope or development permit areas.
** Approximately half of the single family and multiple family residential areas shown are located within Hillside Development Permit Area, meaning slopes are 20% or greater. It is likely that housing yields within Hillside DPAs would be at the low end of the range due to the complexity of developing on slopes.

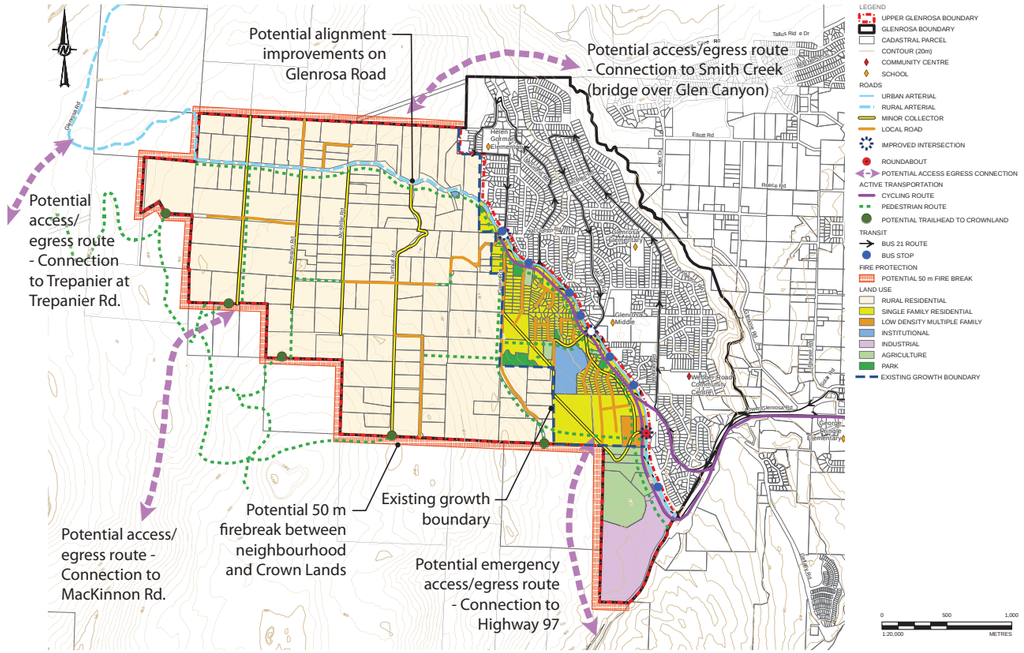
Land Use Component	Recommendations for Proposed Approach
Residential Development	» Single family and low density multiple family residential with extension of servicing to these areas is supported within the current growth boundary. In this scenario, servicing is not extended to rural residential areas » In addition to the existing approximately 440 units in Upper Glenrosa today, final build-out could add another 400 to 830 units to the area, depending on the density of future development (**see note above) » Consistent with the OCP, future development proposals should be encouraged to provide localized housing diversity to support a broader range of housing options available in the area
Commercial Development	» The integration of small-scale commercial opportunities at the south end of Upper Glenrosa, integrated with low density multiple family housing could provide local access to services such as a small grocery, café, bakery or corner store in the Glenrosa neighbourhood
Green Space & Sensitive Areas	» Additional park space would accompany new development within single family and multiple family areas » Cash-in-lieu should be considered to generate funds with the goal of creating trail connections in Upper Glenrosa, through roadside and off-road routes and to preserve trailhead access to the Crown lands
Institutional Facilities	» Because a relatively small population increase is considered in this scenario, it is likely that existing schools and community facilities in the Glenrosa neighbourhood could accommodate projected growth » Improving connectivity to these key destinations should be a focus for new development

Upper Glenrosa Area Plan

SCENARIO 1: STATUS QUO - Transportation & Servicing

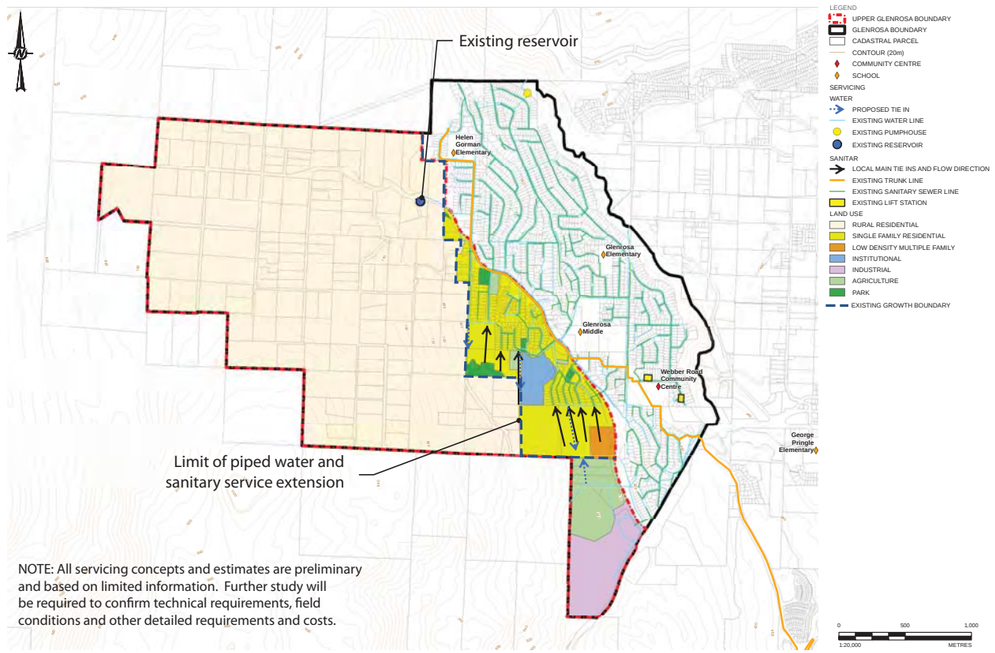
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Transportation



Transportation Component	Recommendations for Proposed Approach
Vehicle	» Upgrade Glenrosa Road to an urban arterial cross-section between Webber Road and Gates Road and a rural arterial cross-section in other areas (see board #12 for information on typical road cross-sections) » Consider intersection upgrades at Glenrosa Rd/McIver Rd and a roundabout at Glenrosa Rd/Webber Rd » Consider a new minor collector between Gates and Glenrosa Road when development occurs » Use urban road standards in all new single family and multiple family developments; rural road standards in rural residential areas
Pedestrian	» Provide curbs, sidewalks and lighting on Glenrosa Road » Improve pedestrian crossings across Glenrosa Road at McIver, Webber and Gates » Provide sidewalks in all new single family and multiple family developments » Consider trails on key rural roads, east-west connections and access points to Crown Lands
Cycling	» Consider a cycle route on Glenrosa Road from Gates Road to Highway 97 » Consider a cycle route along Lower Glenrosa Road, connected to Glenrosa Road at Walnut Glen Drive
Transit	» No change to service levels » Consider improvements to transit stops on Glenrosa Road
Emergency Access/Egress	» Continue the process to identify and develop a secondary access/egress route to the neighbourhood and complete further analysis of the four potential routes shown on the plan warranting consideration » Consider a firebreak between the neighbourhood and Crown lands, pending funding review » Consider partnerships for fuel management within the Crown lands

Servicing



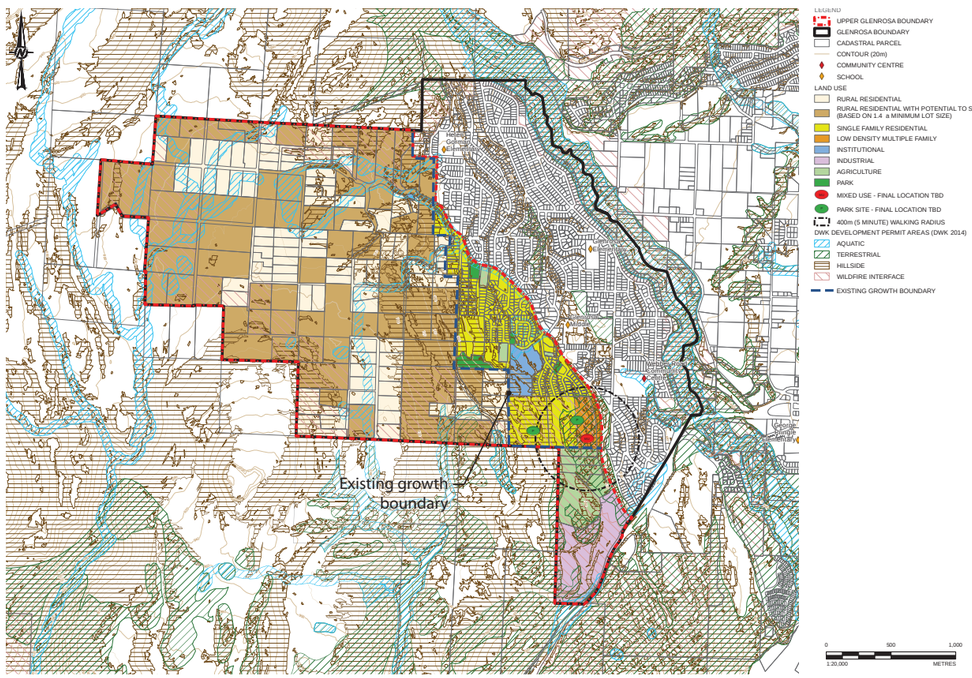
Servicing Component	Recommendations for Proposed Approach
Water	» Provide piped water service to the limits of single family and multiple family development areas only » The current pumping upgrade is anticipated to address demand for this service extension » Scenario 1 does not consider further expansion of the water system to service rural residential areas at this time
Sanitary	» Local topography favours gravity sanitary sewer connections to existing mains. No lift station would be necessary » Servicing review suggests that the existing Glenrosa trunk line is capable of handling an additional 3,300 residents in the area. Development for Scenario 1 would likely maintain the population within this limit, so no upgrades would be required
Storm	» New development should follow the 2012 Storm Water Best Management Practices Manual should stormwater intervention be required
Financing	» Extension of services in Scenario 1 would likely be funded as a component of new development

SCENARIO 2: AREA-WIDE SERVICING - Vision & Land Use

Vision

Scenario 2 considers the option of expanding servicing throughout Upper Glenrosa financed through establishment of a Local Service Area. The scenario considers limited development opportunities within rural residential areas that are consistent with the rural context of the area. Similar to Scenario 1, continued residential development in the south is considered, adjacent to existing development areas. Slightly more low density multiple family residential development than in Scenario 1 is considered at the south end of the site to increase housing options. Improvements to the transportation network are focused on upgrading the alignment and cross-section of Glenrosa Road, connecting and preserving trails and supporting planning for improved access/egress to the area. Green spaces are focused on creating trail connections and trailheads for access throughout the community and into the Crown lands.

Land Use



Land Use Summary Table

NOTE: Land use estimates are preliminary and based on limited information. These estimates are provided for conceptual planning purposes only. Further study would be required to confirm market demand, servicing costs, land constraints, lot sizes and layout and other detailed requirements for development.

Land use Type	Proposed Approach *(Note: The proposed approaches described are for planning and comment only. Feedback from this process will support development of a refined approach.)*	Total Area (Ha)	% of Land Area	Typical Units/Ha (Range)*	Projected Units at Build-out (Range)	Population Estimate at Build-out (Range)
Rural Residential (no option to subdivide)	Servicing is considered, allowing potential for subdivision. Setting a min. lot size is considered to maintain rural character (see table below for more details)	506.6	77.7%	0.2 - 0.7	165 - 270	512 - 838
Rural Residential (option to subdivide)						
Single Family Residential	Recommends continued development to current SF designated areas**	72.6	11.1%	8 -13	581 - 944	1800 - 2926
Low Density Multiple Family Residential	Small area near the south end of the site, consistent with the current land use plan	6.7	1.0%	20 - 35	133 - 233	333 - 584
Mixed Use	Commercial component integrated within Low Density Multi-Family residential**	0.5	0.1%	-	-	
Institutional	Existing	8.0	1.2%	-	-	
Industrial	Existing (Gorman's Mill)	28.8	4.4%	-	-	
Agricultural	Existing. Complementary agricultural activities encouraged within Rural Residential areas	23.4	3.6%	-	-	
Parks	Neighbourhood parks in SF areas and focus on trails and trailheads throughout the area	5.7	0.9%	-	-	
Total		**652**	**100%**		**879 - 1448**	**2645 - 4348**

* A range is provided to account for variables including typical building density and limitations related to slope or development permit areas.
** Approximately half of the single family and multiple family residential areas shown are located within Hillside Development Permit Area, meaning slopes are 20% or greater. It is likely that housing yields within Hillside DPAs would be at the low end of the range due to the complexity of developing on slopes.

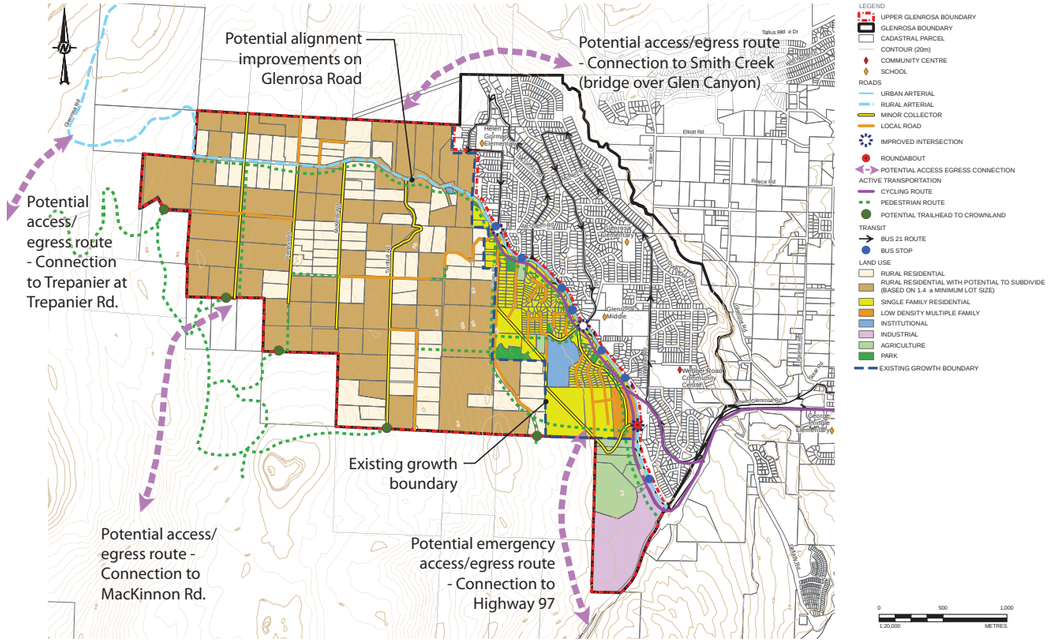
Land Use Component	Recommendations for Proposed Approach
Residential Development	» Single family and low density multiple family residential with extension of servicing to these areas is supported within the current growth boundary » Consider servicing extension to rural residential areas. With servicing extension, subdivision may warrant consideration in rural residential areas, preserving rural character by maintaining large lots. Different approaches to subdivision could be considered – the example shown sets a minimum lot size (1.4 ha) and frontage (30 m) for subdivision consideration. An alternative approach could be to allow rural residential lots to rezone to a zone that permits smaller lot sizes - for example, a lot zoned RU4 has a minimum parcel size of 4.0 ha; shifting to an RU3 zone would allow a minimum parcel size of 2.0 ha which may allow subdivision of that lot. Physical limitations including sensitive areas and existing lot layout would affect subdivision opportunities » In addition to the existing approximately 440 units in Upper Glenrosa today, final build-out could add another 440 to 1010 units to the area, depending on the density of future development (**see note above) » Consistent with the OCP, future development proposals should be encouraged to provide localized housing diversity to support a broader range of housing options available in the area
Commercial Development	» The integration of small-scale commercial opportunities at the south end of Upper Glenrosa, integrated with low density multiple family housing could provide local access to services such as a small grocery, café, bakery or corner store
Green Space	» Additional park space would accompany new development within single family and multiple family areas » Cash-in-lieu should be considered to generate funds with the goal of creating trail connections in Upper Glenrosa, through roadside and off-road routes and to preserve trailhead access to the Crown lands
Institutional Facilities	» Because a relatively small population increase is considered in this scenario, it is likely that existing schools and community facilities in the Glenrosa neighbourhood could accommodate projected growth » Improving connectivity to these key destinations should be a focus for new development

Upper Glenrosa Area Plan

SCENARIO 2: AREA-WIDE SERVICING - Transportation & Servicing

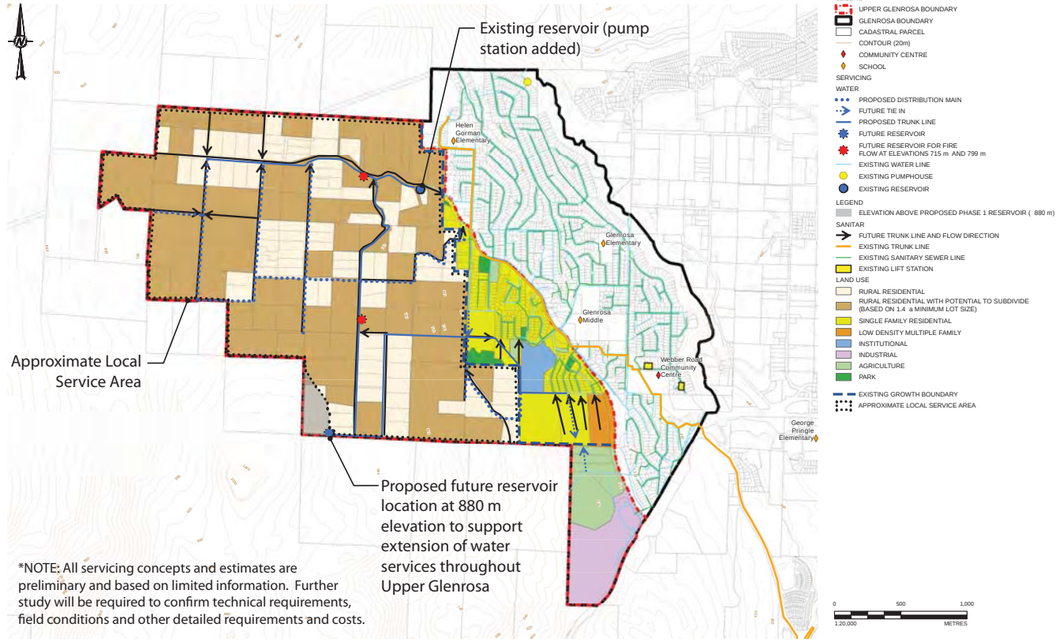
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Transportation



Transportation Component	Recommendations for Proposed Approach
Vehicle	» Upgrade Glenrosa Road to an urban arterial cross-section between Webber Road and Gates Road and a rural arterial cross-section in other areas (see board #12 for information on typical road cross-sections) » Consider intersection upgrades at Glenrosa Rd/McIver Rd and a roundabout at Glenrosa Rd/Webber Rd » Consider a new minor collector between Gates and Glenrosa Road when development occurs » Use urban road standards in all new single family and multiple family developments; rural road standards in rural residential areas
Pedestrian	» Provide curbs, sidewalks and lighting on Glenrosa Road » Improve pedestrian crossings at Glenrosa Road across McIver, Webber and Gates » Provide sidewalks in all new single family and multiple family developments » Consider trails on key rural roads, east-west connections and access points to Crown Lands
Cycling	» Consider a cycle route on Glenrosa Road from Gates Road to Highway 97 » Consider a cycle route along Lower Glenrosa Road, connected to Glenrosa Road at Walnut Glen Drive
Transit	» No change to service levels » Consider improvements to transit stops on Glenrosa Road
Emergency Access/Egress	» Continue process to identify and develop secondary access/egress route to neighbourhood and complete further analysis of the four potential routes shown on the plan warranting consideration » Servicing throughout Upper Glenrosa will provide potential for fire hydrant access in the area » Consider partnerships for fuel management within the Crown lands

Servicing



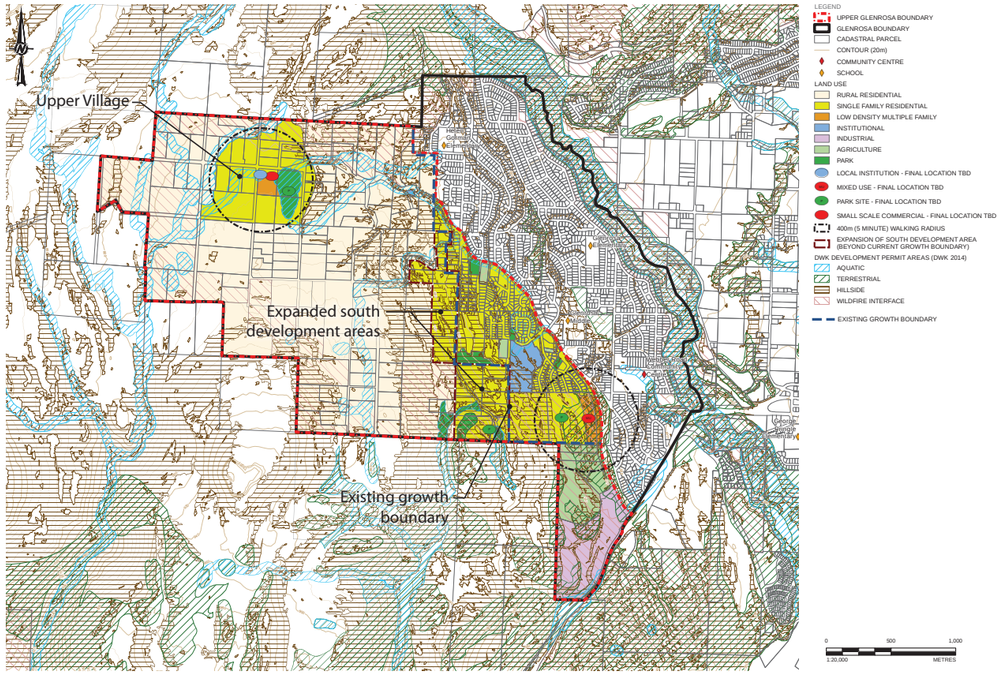
Servicing Component	Recommendations for Proposed Approach
Water	» Extension of services to single family and multiple family residential areas would be supplied during development » Consider expansion of piped water service to rural residential areas through creation of a Local Service Area » A reservoir would be placed at elevation 880 m to service most of Upper Glenrosa; smaller reservoirs would be needed in pressure zones 799 and 715 to supplement fire storage » Infrastructure for water service to rural residential areas would include new reservoirs, a pump station and distribution pipes. Preliminary estimating for this infrastructure is consistent with the 2011 estimate of **$15.4 million*** » With the current 165 rural residential properties, the preliminary estimate to provide water service is **$93,300/property*** » If subdivision occurred to the estimated maximum 270 rural residential properties the estimate would drop to **$57,000/ property** (it is likely the actual lot count would fall between 165 and 270)
Sanitary	» Local topography favours gravity sanitary sewer connections to existing mains. No lift station would be required » A collector trunk line would be extended on Glenrosa Road, joining the existing trunk at Gates Road » Servicing review suggests that the existing Glenrosa trunk line is capable of handling an additional 3,300 residents in the area. Development for Scenario 2 would likely maintain the population within this limit, so no upgrades would be required » Infrastructure for sanitary service to rural residential areas would include trunk lines and network lines. Preliminary estimating for this infrastructure is **$4.2 million*** » With the current 165 rural residential properties, the preliminary estimate to provide sanitary service is **$25,500/property*** » If subdivision occurred to the estimated maximum 270 rural residential properties the estimate is **$15,600/property** (it is likely the actual lot count would fall between 165 and 270)
Storm	» New development should follow the 2012 Storm Water Best Management Practices Manual
Financing	» Servicing improvements to single family and multiple family areas would be funded through new development » The establishment of a Local Service Area for rural residential areas of Upper Glenrosa could be considered to allow investment in new water distribution and sanitary infrastructure, to be paid by property owners over time (see board #12 for more information on Local Service Areas)

SCENARIO 3: FOCUSED DEVELOPMENT - Vision & Land Use

Vision

Scenario 3 considers growth in key areas while preserving surrounding Rural Reserve to maintain rural community character. The concept includes expansion of single family and low density multiple family residential land uses in two core areas: an expanded growth area in the south and a "village" area in the north. The village concept focuses on creating a distinct village character – providing a diversity of housing types with small-scale village look and feel. The village would be a recreational launch point with strong connections to the surrounding trail networks. Servicing would be extended to the growth areas and with this extension, opportunities for more cost efficient connections for rural residents may occur. Additional park land dedication would accompany development – focusing on protection of sensitive ecosystems and providing recreation uses such as trails and gathering space in key locations. Transportation improvements would occur alongside development.

Land Use



Land Use Summary Table

NOTE: Land use estimates are preliminary and based on limited information. These estimates are provided for conceptual planning purposes only. Further study would be required to confirm market demand, servicing costs, land constraints, lot sizes and layout and other detailed requirements for development.

Land use Type	Proposed Approach *(Note: The proposed approaches described are for planning and comment only. Feedback from this process will support development of a refined approach.)*	Total Area (Ha)	% of Land Area	Typical Units/Ha (Range)	Projected Units at Build-out (Range)	Population Estimate at Build-out (Range)
Rural Residential	Recommends preservation of most Rural Reserve to maintain rural character of the area	409.7	62.8%	0.3	118	397
Single Family Residential - South Expansion	Recommends expansion of development area in the south**	115.6	17.7%	8 -13	924 - 1502	2866 - 4657
Single Family Residential - Upper Village	Recommends consideration for a new village in the north	41.2	6.3%	10 -13	412 - 536	1279 - 1662
Low Density Multiple Family Residential	Small area near the south end of the site and second area within the upper village**	6.3	1.0%	20 - 35	126 - 220	314 - 549
Mixed Use	Commercial components integrated in multi-family residential in both the south and village	0.8	0.1%	-	-	
Institutional	Existing, with potential new community facility in the village	8.2	1.3%	-	-	
Industrial	Existing (Gorman's Mill)	28.8	4.4%	-	-	
Agricultural	Existing. Complementary agricultural activities encouraged within Rural Residential areas	23.4	3.6%	-	-	
Parks	Parks in new development areas with a focus on greenways and trail connections	18.4	2.8%	-	-	
Total		**652**	**100%**		**1581 - 2376**	**4824 - 7234**

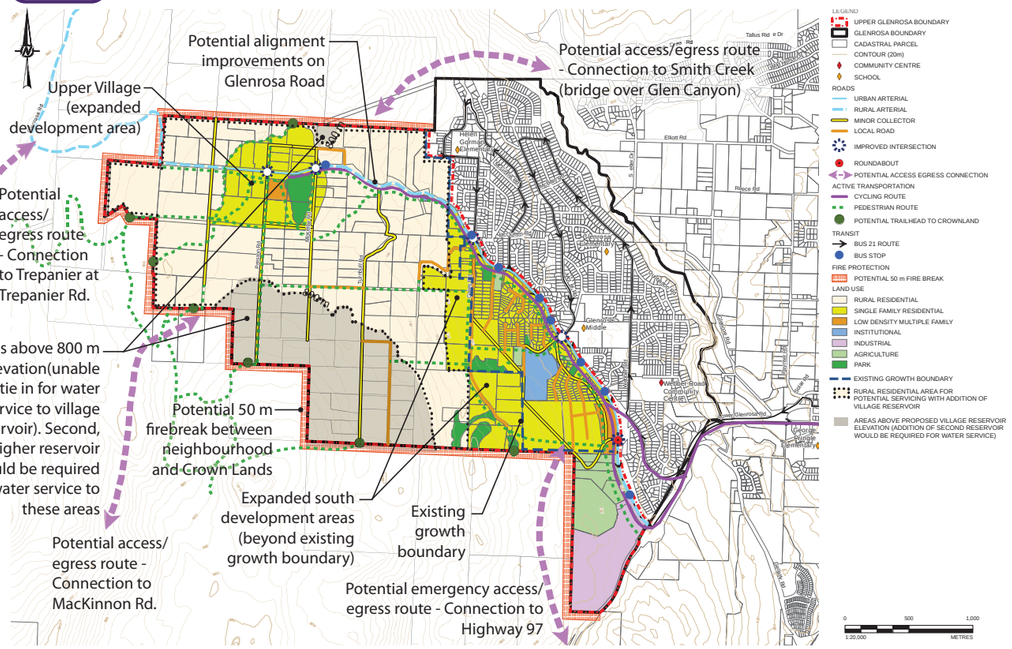
* A range is provided to account for variables including typical building density and limitations related to slope or development permit areas.
** Approximately half of the single family and multi family residential areas shown for the south expansion area are located within Hillside Development Permit Area, meaning slopes are 20% or greater. It is likely that housing yields within Hillside DPAs would be at the low end of the range due to the complexity of developing on slopes. The village area is on relatively flat grades.

Land Use Component	Recommendations for Proposed Approach
Residential Development	» Consider expansion of the south single family and multiple family residential area to support additional growth and extension of services in this area » Consider creation of an "Upper Glenrosa Village" in the north. The concept would reflect a traditional village character surrounded by rural lands. It is recommended to include a diverse housing stock that encourages aging in place and family-friendly housing. Strong design character and spaces that support community gathering would be emphasized with the goal of creating a tight-knit neighbourhood (see board #9 for more about the village concept) » Beyond the two development areas, rural reserve is recommended to preserve the character of the area » In addition to the existing approximately 440 units in Upper Glenrosa today, final build-out could add another 1140 to 1930 units to the area, depending on the density of future development (**see note above) » Consistent with the OCP, future development proposals should be encouraged to provide localized housing diversity to support a broader range of housing options available in the area
Commercial Development	» The integration of small-scale commercial opportunities at the south end of Upper Glenrosa, as well as within the centre of the village, could provide local access to services such as a small grocery, café, bakery or corner store
Green Space	» Additional park space would accompany new development within single family and multiple family areas – focusing on protection of sensitive ecosystems and provision of local recreation such as trails and gathering space in key locations » In the village, a trail hub would be a priority, servicing as a launch point for recreational pursuits like hiking, horseback riding, mountain biking and cross-country skiing » Cash-in-lieu should be considered to generate funds with the goal of creating trail connections in Upper Glenrosa, through roadside and off-road routes and to preserve trailhead access to the Crown lands
Institutional Facilities	» Because this scenario could yield a significantly larger population increase, existing schools and community facility capacity in the Glenrosa neighbourhood would need to be reviewed

Upper Glenrosa Area Plan

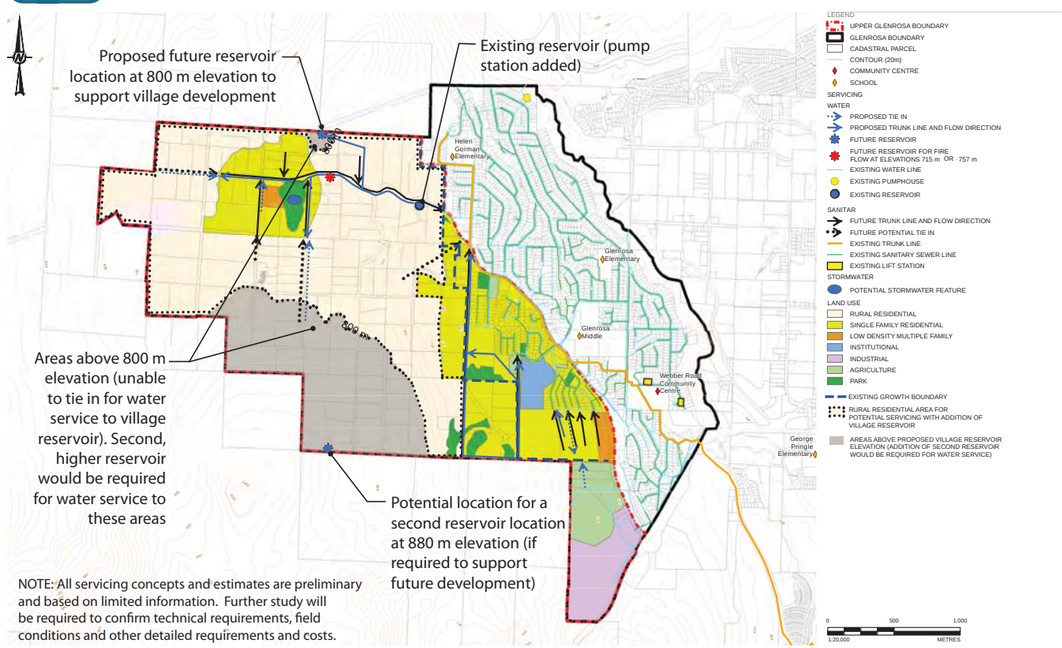
SCENARIO 3: FOCUSED DEVELOPMENT - Transportation & Servicing 8

Transportation



Transportation Component	Recommendations for Proposed Approach
Vehicle	» Upgrade Glenrosa Road to an urban arterial cross-section between Webber Road and Gates Road and between Turnbull Road and Preston Road in the Upper Village and a rural arterial cross-section in other areas (see board #12 for information on typical road cross-sections) » Consider intersection upgrades at Glenrosa Rd/McIver Rd, Glenrosa/Gates Rd, Glenrosa/McKellar Rd, Glenrosa/ Preston Rd and a roundabout at Glenrosa Rd/Webber Rd » Additional minor collector roads in the south and Upper Village development areas » Use urban road standards in all new single family and multiple family developments; rural road standards in rural residential areas
Pedestrian	» Provide curbs, sidewalks and lighting on Glenrosa Road » Improve pedestrian crossings across Glenrosa Road at McIver, Webber, Gates, McKellar and Preston » Provide sidewalks in all new single family and multiple family developments » Consider trails within the Upper Village, along rural roads, east-west connections and Crown land access points
Cycling	» Consider a cycle route on Glenrosa Road from the Upper Village to Highway 97 » Consider a cycle route along Lower Glenrosa Road, connected to Glenrosa Road at Walnut Glen Drive
Transit	» Consider potential extension of the 21 bus route to the Upper Village » Consider improvements to transit stops on Glenrosa Road
Emergency Access/Egress	» Continue process to identify and develop secondary access/egress route to neighbourhood and complete further analysis of the four potential routes shown on the plan warrant consideration » Resolution of the new access/egress route may be required prior to significant development » Consider a firebreak between the neighbourhood and Crown lands, pending funding review » Consider partnerships for fuel management within the Crown lands

Servicing



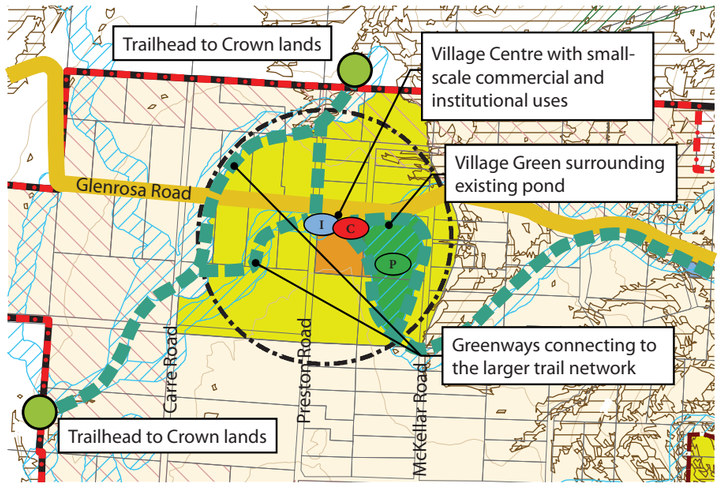
Servicing Component	Recommendations for Proposed Approach
Water	» Consider expansion of water to additional development areas in the south and the proposed Upper Village » Development of the Upper Village would require a new water reservoir at 800 m and pumping to get water to that location. Rural residential lots under the 800 m elevation may have opportunity to tie into the water service at this reservoir. This would reduce costs for water service to these areas as infrastructure costs would likely be mostly limited to distribution piping because other infrastructure (e.g. reservoir, pump station) would occur as part of the Village development » If parcels above 800 m were to be connected, an additional reservoir at the 880 m elevation (similar to Scenario 2) would be required. Costs for this expanded service would be similar to Scenario 2
Sanitary	» Local topography favours gravity sanitary sewer connections to existing mains. No lift station would be necessary to extend sanitary connections » A collector trunk line from the Upper Village on Glenrosa Road would join the existing trunk at Gates Rd » New development would support extension of the sanitary trunk up Glenrosa Road, reducing the overall costs for extending sanitary services to rural residential areas » Servicing review suggests that the existing Glenrosa trunk line is capable of handling an additional 3,300 residents in the area. Upgrades to the existing trunk line would be required as the area develops
Storm	» New development should follow the 2012 Storm Water Best Management Practices Manual should stormwater intervention be required » Stormwater detention could be considered in the existing pond in the proposed Upper Village
Financing	» Servicing to single family and multiple family development areas would be funded as a component of development » Extension of services to rural residential areas would likely be paid by land owners. Potential for combined service extension (e.g. a group of landowners on a road) or establishment of a Local Service Area could be considered

SCENARIO 3: FOCUSED DEVELOPMENT - Upper Glenrosa Village

Why a Village?

Areas of pasture, open space and tree stands contribute heavily to the character of Upper Glenrosa – a character that was identified as a critical component for the future vision of the community. A rural village is a way to preserve this character while still supporting limited development and servicing extension. It is a compact and sustainable alternative to large-lot residential development.

To help maintain a "critical mass" of rural open space, Scenario 3 designates an Upper Village where development is clustered, surrounded by cropland, pasture, meadow and tree stands.



Proposed Upper Glenrosa Village

Why this Location?

- Siting along Glenrosa Road is important to provide primary road access and support servicing extension to the village
- Preservation of rural lands around the village defines the edges and creates a community that is distinct from other developed areas
- The existing pond provides a central organizing feature and community destination
- The area sits on relatively flat lands that would support the compact community form and a walkable community
- Existing aquatic corridors form natural greenways for protection of sensitive areas and trail routing, making the village centre a natural launch point for trail-based recreation opportunities



















What's in the Village?

The village is a compact community centered around a village green overlooking the pond. Adjacent small-scale shops and community services sit in the centre of the village and radiating out from this central point is a diversity of housing types including single-family, duplex and row houses.

Key Features:

- Sizable areas of rural open space around the village that maintain the rural character of Upper Glenrosa
- A village centre with modest services such as a corner store, bakery, cafe, pub, mailboxes, bus stop and/or hall. The village centre promotes community gathering and daily social interaction
- A walkable boundary with all corners of the village within a 5-minute walking radius of the village centre
- A variety of housing sizes that promote a diversity of population and ages – and support the concept of being part of a community for a lifetime
- A central recreational launch point in the village centre that invites residents and visitors as a starting point for exploring the array of nature-based recreation opportunities just outside the village boundary
- Greenways following aquatic features, protecting sensitive areas and providing linear trail routes for walkers, mountain bikers, cross-country skiers and horseback riders through the community and beyond
- Narrow roads, including Glenrosa Road, with traffic calming and pedestrian and cyclist space that encourage slow vehicle speeds and a safe pedestrian environment
- Servicing extension to the Upper Village funded through development and opportunity for extension of water and/or sanitary to adjacent rural areas through creation of user-pay connections or Local Service Areas

COMPARING THE SCENARIOS

LAND USE & DEVELOPMENT	SCENARIO 1: Status Quo	SCENARIO 2: Area-Wide Servicing	SCENARIO 3: Focused Development
	All scenarios consider relatively modest additional development in Upper Glenrosa. Intensive development is not recommended in Upper Glenrosa due to its location within the city and community desire to maintain the rural character of the area.		
General Approach	Development limited to areas identified for growth in the current OCP	Development within the areas identified for growth in the current OCP and consideration for some subdivision within rural residential areas	Development focused in two areas: an expanded growth area in the south an a village area in the north
Total Unit Count* *Note: Unit counts are estimates provided for conceptual planning and comparison purposes only. Further study would be required to confirm market demand, servicing costs, land constraints, lot sizes and layout and other detailed information for development planning.	**847 - 1283** within the south development area	**879 - 1448** within the south development area and rural residential area	**1581 - 2376** within the south development area and Upper Village
Rural Residential	**165 Units** No additional subdivision due to lack of servicing	**165 - 270 Units** Consideration for limited subdivision based on lot size or zoning	**118 Units** No additional subdivision to maintain rural character
Single Family Residential	**604 - 981 Units** within the south development area	**581 - 944 Units** within the south development area	**1366 - 2038 Units** within the south development area and Upper Village
Low Density Multiple Family Residential	**76 - 134 Units** within the south development area	**133 - 233 Units** within the south development area	**126 - 220 Units** within the south development area and Upper Village
Mixed Use	Small local-based services in the south development area	Small local-based services in the south development area	Small local-based services in the south development area and the Upper Village
Institutional	As existing	As existing	As existing with additional small-scale community institution (e.g. hall) in the Upper Village
Industrial	As existing	As existing	As existing
Agricultural	As existing	As existing	As existing
Parks & Green Space	Neighbourhood parks in development areas Cash-in-lieu to improve trail network and trailheads to Crown lands	Neighbourhood parks in development areas Cash-in-lieu to improve trail network and trailheads to Crown lands	Neighbourhood parks in development areas Trail network hub and village green in the Upper Village Cash-in-lieu to improve trail network and trailheads to Crown lands

Which scenario do you think best reflects your vision for land use and development in Upper Glenrosa?

Please use a dot to record your preference.

Scenario 1	Scenario 2	Scenario 3

Do you have a comment or suggestion related to land use and development for the scenarios? Something you would change on a scenario to make it better?

Write it on a sticky note and place on the table below.

Comments on Scenario 1	Comments on Scenario 2	Comments on Scenario 3
		

COMPARING THE SCENARIOS

	SCENARIO 1: Status Quo	SCENARIO 2: Area-Wide Servicing	SCENARIO 3: Focused Development
TRANSPORTATION	Transportation recommendations are largely consistent among the scenarios. In all scenarios, relatively low growth minimizes demand for significant expansion of the road network, with the exception of continued efforts to identify a second access/egress to Glenrosa. Transportation considerations focus on improvements to key components such as Glenrosa Road and the trail network, both identified as priorities by previous public input.		
Vehicle	Glenrosa Rd cross-section and intersection improvements	Glenrosa Rd cross-section and intersection improvements	Glenrosa Rd cross-section and intersection improvements
Pedestrian	Glenrosa Road improvements including sidewalks/trails, lighting and pedestrian crossings Trail development and access to Crown lands	Glenrosa Road improvements including sidewalks/trails, lighting and pedestrian crossings Trail development and access to Crown lands	Glenrosa Road improvements including sidewalks/trails, lighting and pedestrian crossings Trail development and access to Crown lands Greenways in the Upper Village
Cycling	Cycle route on Glenrosa Road	Cycle route on Glenrosa Road	Cycle route on Glenrosa Road
Transit	As existing	As existing	Extension to Upper Village
Emergency Access/Egress	Identification of additional route (four options)	Identification of additional route (four options)	Identification of additional route (four options)
Fire Protection	Consideration for a fire break and fuel management	Water supply in Upper Glenrosa and fuel management	Consideration for a fire break and fuel management
SERVICING	The scenarios endeavour to consider a range of approaches to servicing. In most cases servicing approaches are related to land use and development.		
General Approach	Servicing limited to areas identified for growth in the current OCP	Servicing extended to rural residential areas through a Local Service Area	Servicing extended to single family and multiple family development areas in the south and Upper Village Opportunities to extend services to adjacent rural residential areas
Water	Water extended only within areas identified for growth in the current OCP	Water extended to all areas of Upper Glenrosa below the 880 m elevation	Water extended in south development area and Upper Village Opportunity to extend water from Village to rural residential areas below the 800 m elevation Areas above 800 m elevation would require a second, higher reservoir for water service
Sanitary	Sanitary extended within areas identified for growth in the current OCP	Sanitary extended to all areas of Upper Glenrosa	Sanitary extended in south development area and Upper Village Opportunity to extend sanitary to rural residential areas
Storm	Stormwater best practices in development areas	Stormwater best practices in development areas	Stormwater best practices in development areas Incorporation of the pond in the Upper Village
Financing	Service extension funded through new development	Service extension funded through new development in single family and multi family areas Service extension funded through a Local Service Area in rural residential areas	Service extension funded through new development in single and multi family areas, including the Upper Village Potential service extension funded through user-pay or Local Service Area in rural residential areas

Which scenario do you think best reflects your vision for servicing in Upper Glenrosa?

Please use a dot to record your preference.

Scenario 1	Scenario 2	Scenario 3

Do you have a comment or suggestion related to transportation or servicing for the scenarios? Something you would change on a scenario to make it better?

Write it on a sticky note and place on the table below.

Comments on Scenario 1	Comments on Scenario 2	Comments on Scenario 3
		

ABOUT LOCAL SERVICE AREAS

What is a Local Service Area (LSA)?

*Under BC's **Community Charter**, a municipality may provide a service within a part of the municipality. Such a service is known as a "local area service", and the area within which the service is provided is known as a "local service area." Municipalities may recover all or part of the cost of a local area service by levying local service taxes against the properties located within the boundaries of the local service area.*

- BC Ministry of Community, Sport & Cultural Development

LSAs are often established to provide sewer service, water service, sidewalks or downtown revitalization. In West Kelowna, LSAs have been used to expand sanitary services to previously unserviced areas.

How is a Local Service Area established?

The establishment of a LSA requires approval of property owners within the proposed LSA using one of the following three methods:

1. A petition signed by at least 50% of property owners representing at least 50% of the assessed value of land in the proposed LSA
2. Council initiative, as long as 50% of property owners representing at least 50% of the assessed value of land in the proposed LSA do not petition against the establishment of the LSA
3. A referendum voted upon by electors in the proposed LSA

A municipality can borrow money to build capital works for the LSA, to be repaid over a defined time period (typically 20 years) through a tax on properties within the LSA. LSA charges are paid annually as a separate line item on a property tax bill. If subdivision were to take place within the LSA during the repayment period, new lots would contribute to the tax, which would lower individual costs by sharing the costs between more properties.

Why would an LSA be used to expand services in Upper Glenrosa?

Typically, expansion of municipal water supply and sanitary infrastructure correspond with planned community growth. These systems are expanded as an area "develops", typically into single or multiple family development areas through rezoning and subdivision. Construction of the required infrastructure is a condition of development.

Because much of Upper Glenrosa is anticipated to remain rural residential for the foreseeable future, there is little opportunity to generate funds for water and sanitary infrastructure through development (Scenario 3 demonstrates some potential). The establishment of an LSA is commonly used to support infrastructure development in a specific area in the absence of development.

GLENROSA ROAD

What improvements could be considered on Glenrosa Road?

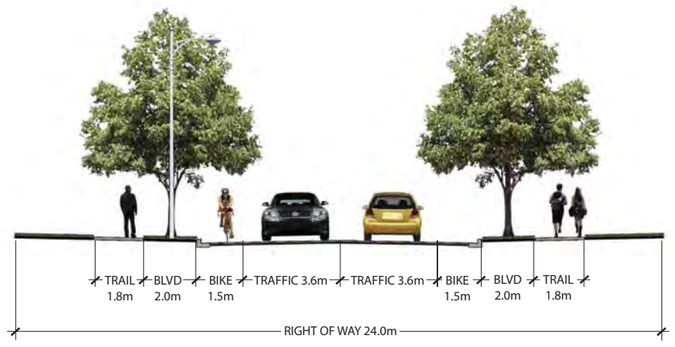
Study participants identified concerns about the current function and capacity of Glenrosa Road. Originally a rural road, increased development has led to more traffic on Glenrosa Road, including vehicles, cyclists, pedestrians and horseback riders.

All scenarios recommend that future development consider upgrades to the road corridor and intersections to improve safety and function.

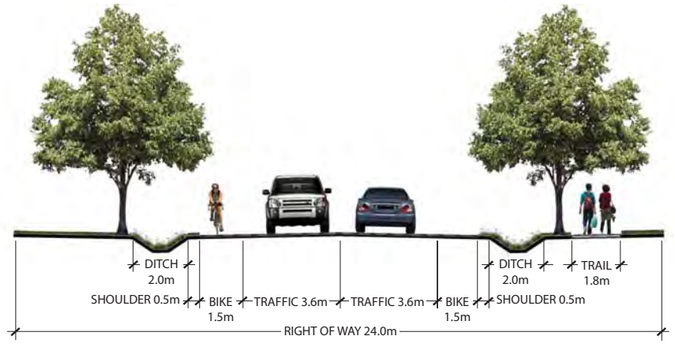
Improvements to the Glenrosa Road cross section should follow West Kelowna's typical road standards. Options to consider different configurations for cycling and walking paths (e.g. multi-use pathways) that are consistent with the rural character of the area may warrant consideration.



Improved intersections, including a roundabout at Webber Road and pedestrian crossings at key intersections, could be considered



Typical Urban Arterial Road Cross Section
(recommended between Webber and Gates for Scenarios 1, 2 and 3 and within the Upper Village in Scenario 3)



Typical Rural Arterial Road Cross Section
(recommended between Highway 97 to Webber and Gates to the western District boundary in all scenarios)

APPENDIX E
Report Maps

Map 1: Study Area

Map 2: Access Options

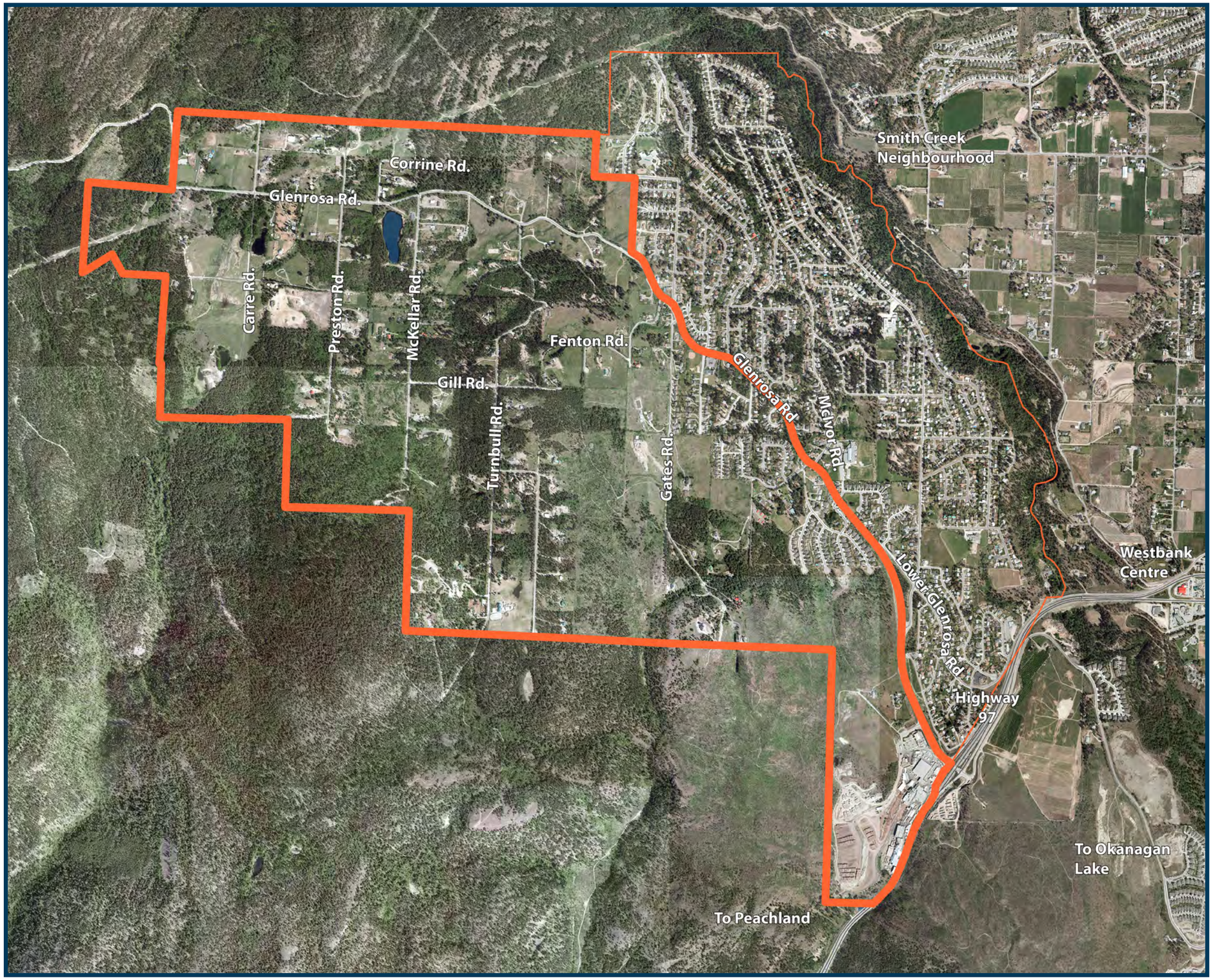
Map 3: Overview of Recommended Road Network Improvements

Map 4: Overview of Recommended Multi-modal Network Improvements

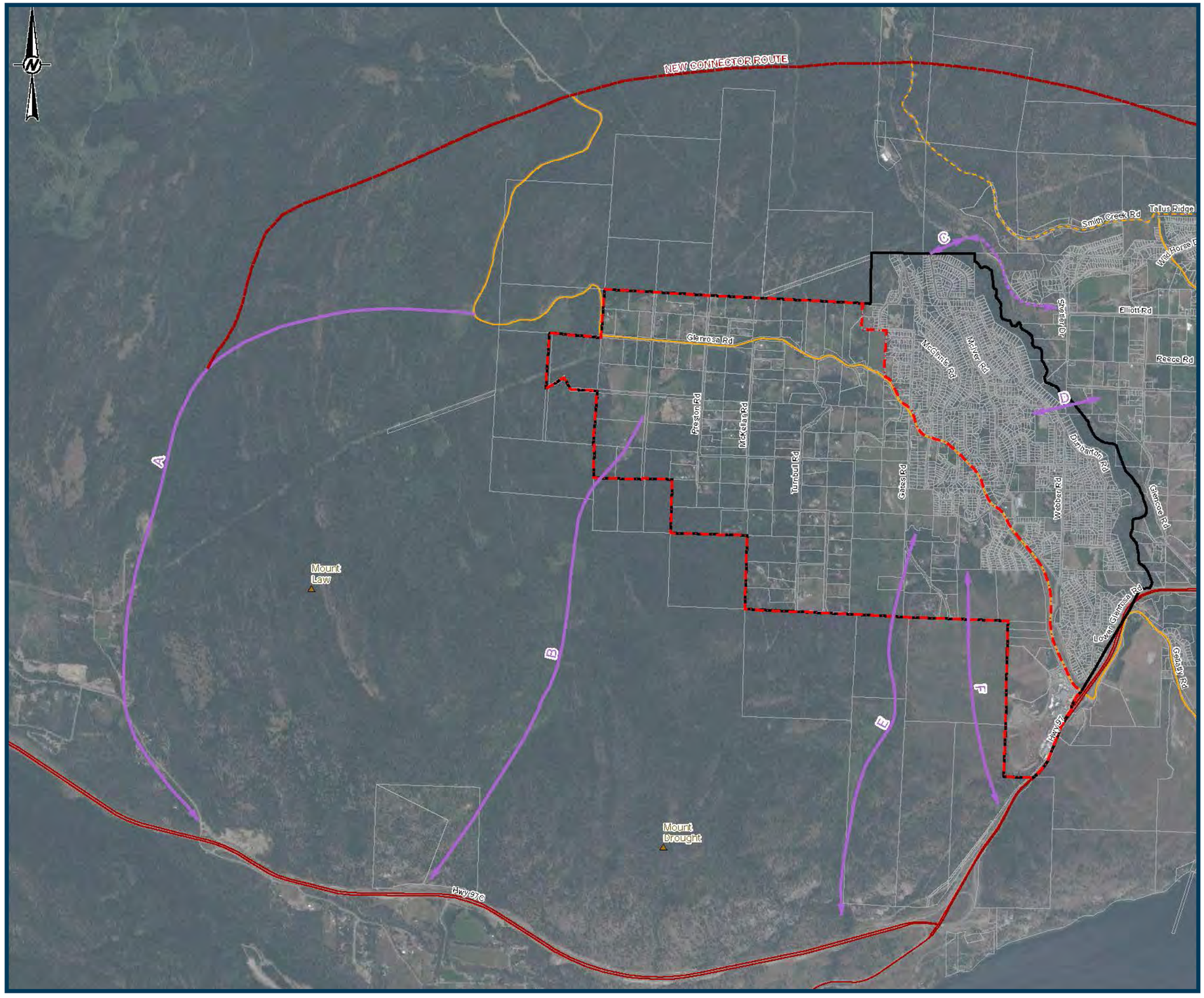
Map 5: Scenario 1 Land Use Map

Map 6: Scenario 2 Land Use Map

Map 7: Scenario 3 Land Use Map



Map 1: Study Area



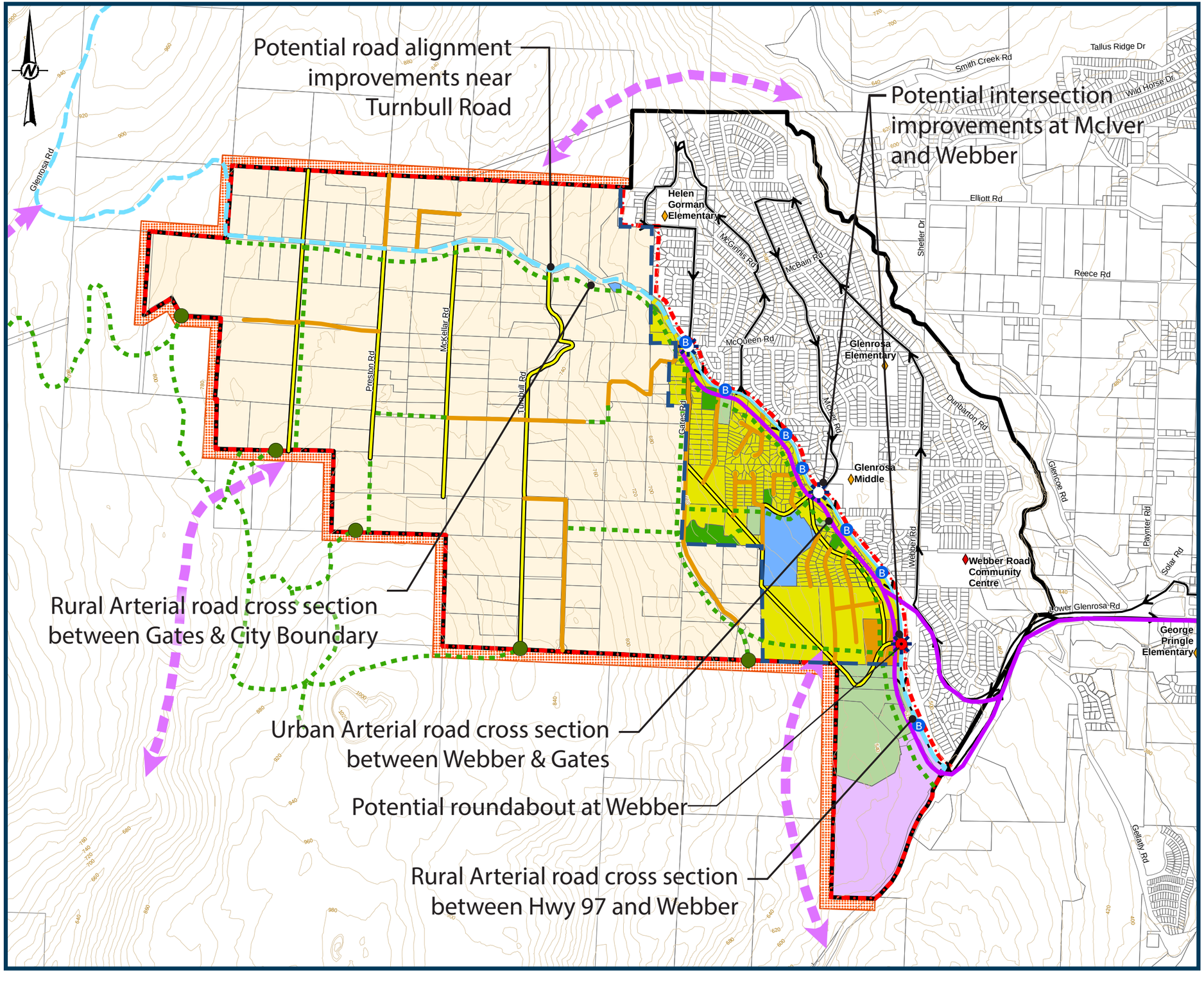
LEGEND

- UPPER GLENROSA
- GLENROSA
- CADASTRAL PARCEL
- PROPOSED ACCESS ROUTE
- ARTERIAL ROAD
- FUTURE ARTERIAL ROAD
- HIGHWAY
- NEW CONNECTOR ROUTE
- MOUNTAIN

0 1,000 2,000

1:30,000 METRES

Map 2: Access / Egress Options



LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

ROADS

- URBAN ARTERIAL
- RURAL ARTERIAL
- MINOR COLLECTOR
- LOCAL ROAD
- IMPROVED INTERSECTION
- ROUNDABOUT
- POTENTIAL ACCESS EGRESS CONNECTION

ACTIVE TRANSPORTATION

- CYCLING ROUTE
- PEDESTRIAN ROUTE
- POTENTIAL TRAILHEAD TO CROWNLAND

TRANSIT

- BUS 21 ROUTE
- BUS STOP

FIRE PROTECTION

- POTENTIAL 50 m FIRE BREAK

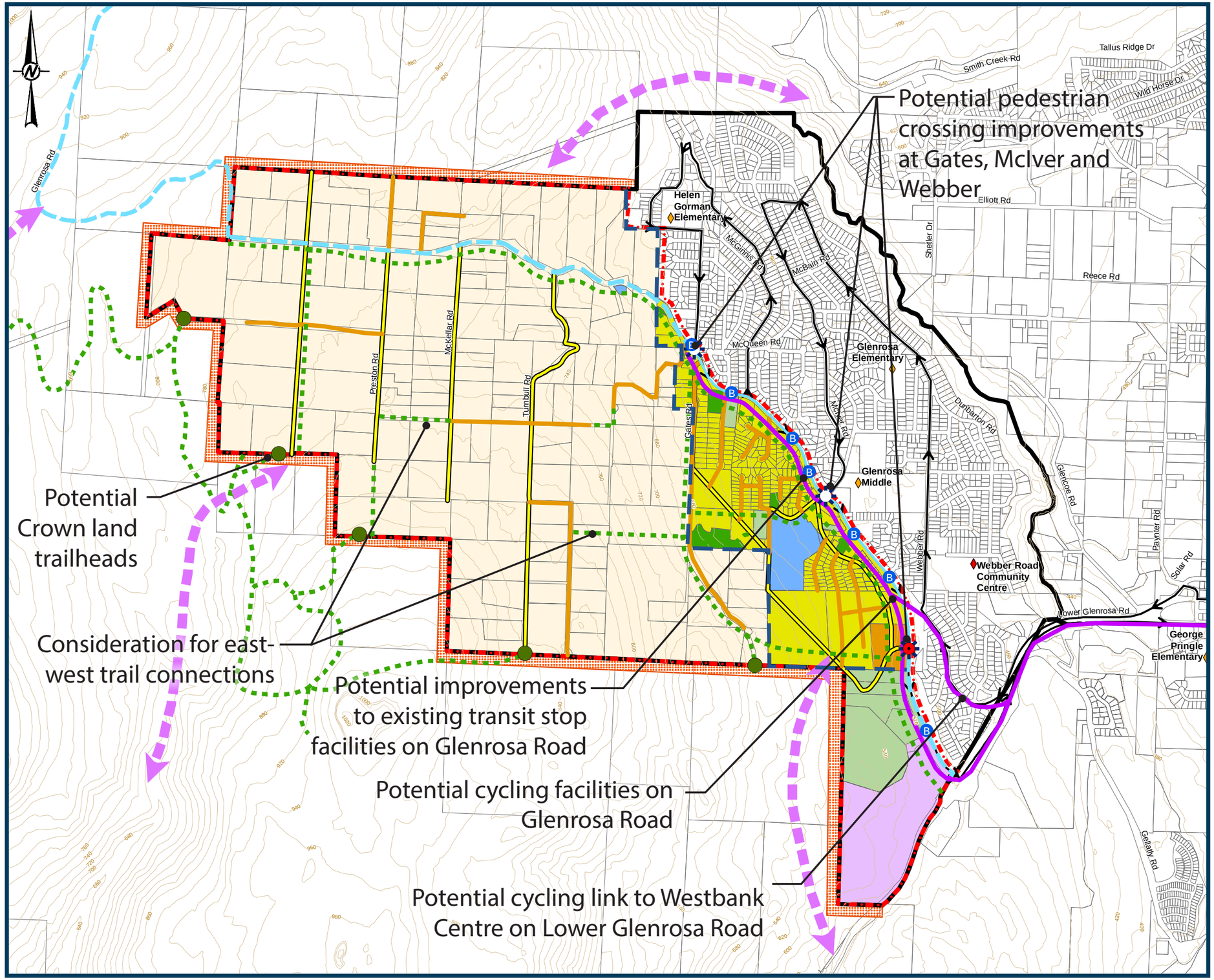
LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK
- EXISTING GROWTH BOUNDARY

0 500 1,000

1:20,000 METRES

Map 3: Overview of Recommended Neighbourhood Road Network



LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

ROADS

- URBAN ARTERIAL
- RURAL ARTERIAL
- MINOR COLLECTOR
- LOCAL ROAD
- IMPROVED INTERSECTION
- ROUNDABOUT
- POTENTIAL ACCESS EGRESS CONNECTION

ACTIVE TRANSPORTATION

- CYCLING ROUTE
- PEDESTRIAN ROUTE
- POTENTIAL TRAILHEAD TO CROWNLAND

TRANSIT

- BUS 21 ROUTE
- BUS STOP

FIRE PROTECTION

- POTENTIAL 50 m FIRE BREAK

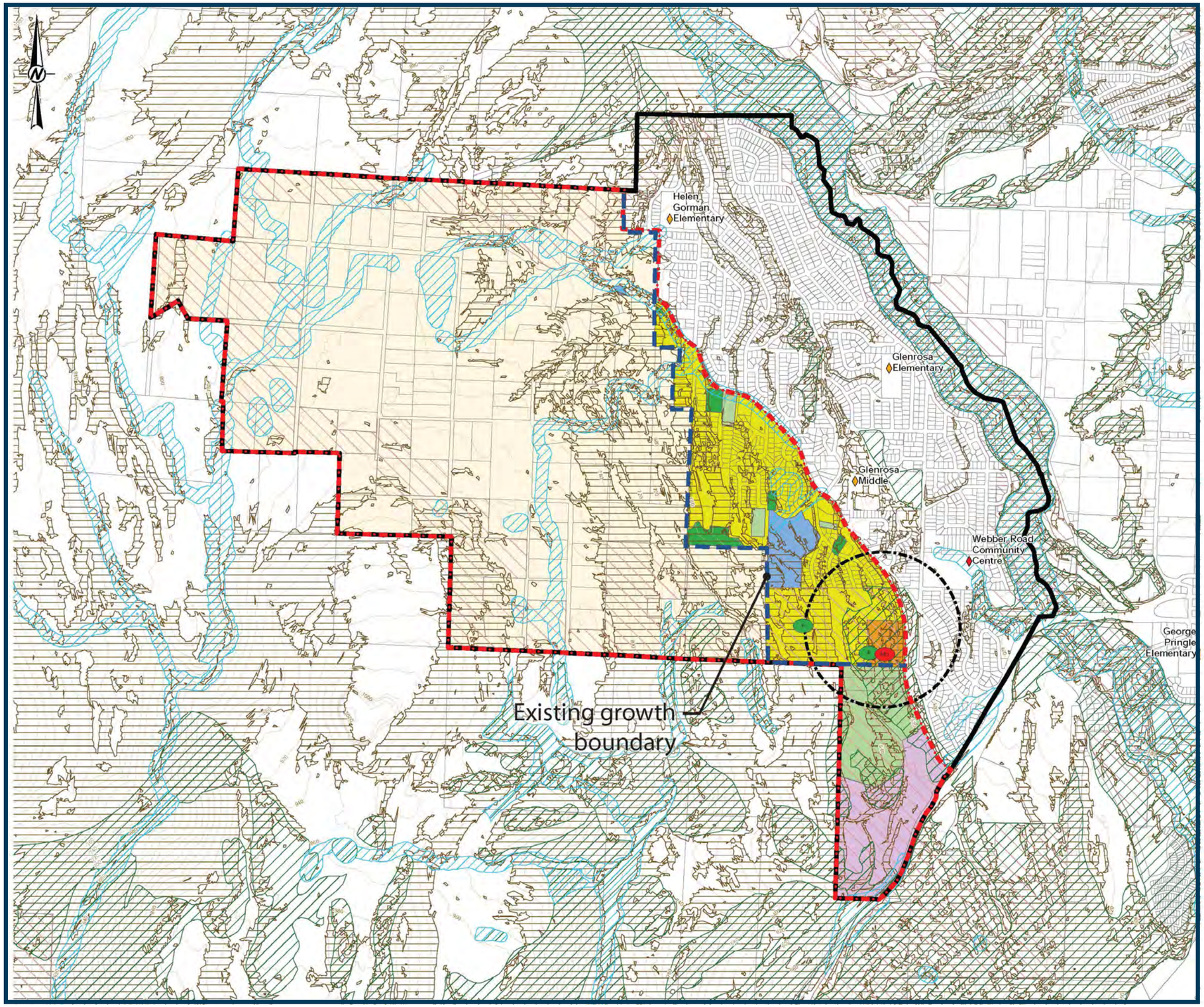
LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK
- EXISTING GROWTH BOUNDARY

0 500 1,000

1:20,000 METRES

Map 4: Overview of Recommended Multi-Modal Network



LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

LAND USE

- RURAL RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK
- MIXED USE - FINAL LOCATION TBD
- PARK SITE - FINAL LOCATION TBD
- 400m (5 MINUTE) WALKING RADIUS

DWK DEVELOPMENT PERMIT AREAS (DWK 2014)

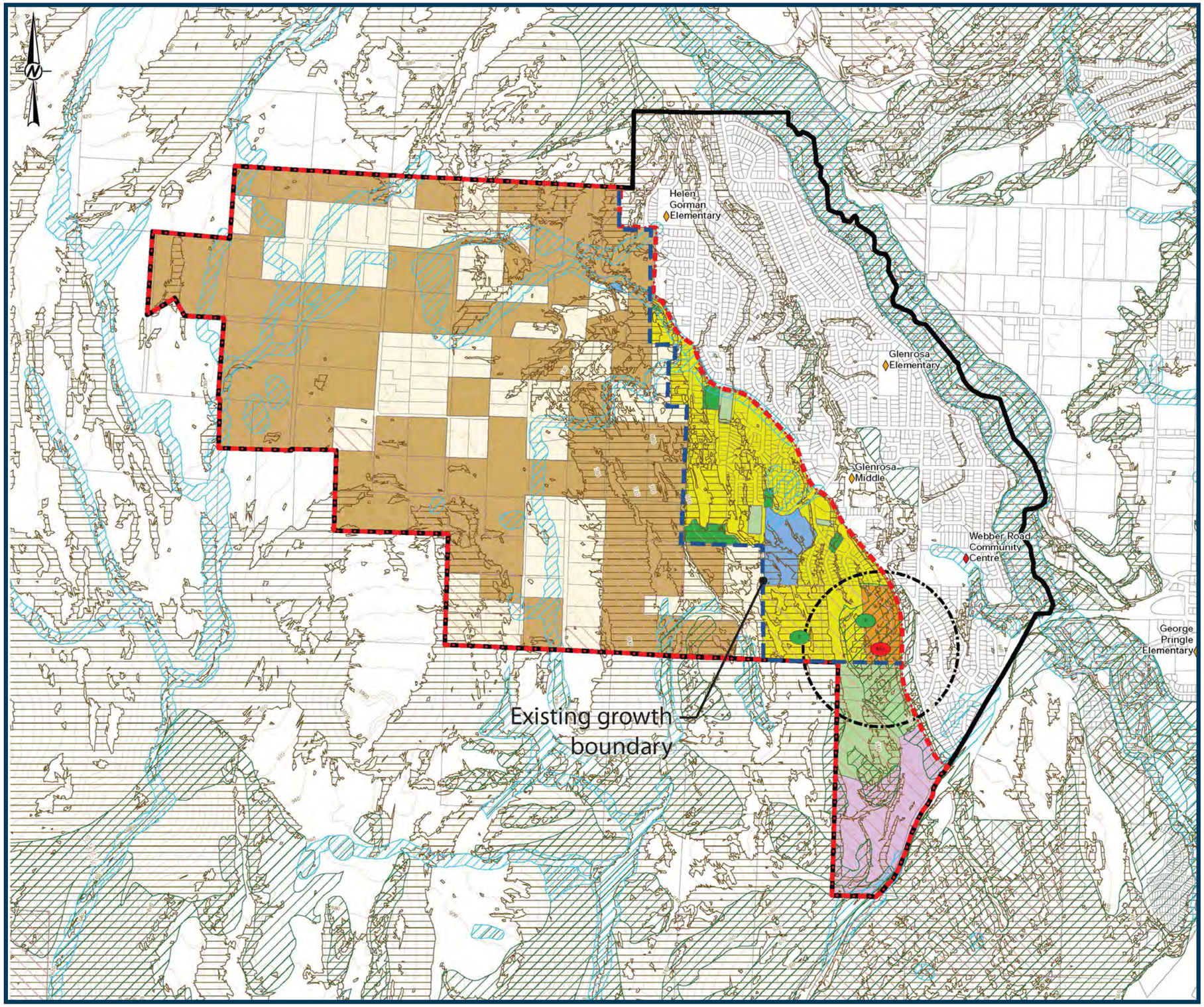
- AQUATIC
- TERRESTRIAL
- HILLSIDE
- WILDFIRE INTERFACE

- EXISTING GROWTH BOUNDARY

0 500 1,000

1:20,000 METRES

Map 5: Scenario 1 Land Use Map



LEGEND

- UPPER GLENROSA BOUNDARY
- GLENROSA BOUNDARY
- CADASTRAL PARCEL
- CONTOUR (20m)
- COMMUNITY CENTRE
- SCHOOL

LAND USE

- RURAL RESIDENTIAL
- RURAL RESIDENTIAL WITH POTENTIAL TO SUBDI (BASED ON 1.4ha MINIMUM LOT SIZE)
- SINGLE FAMILY RESIDENTIAL
- LOW DENSITY MULTIPLE FAMILY
- INSTITUTIONAL
- INDUSTRIAL
- AGRICULTURE
- PARK
- MIXED USE - FINAL LOCATION TBD
- PARK SITE - FINAL LOCATION TBD
- 400m (5 MINUTE) WALKING RADIUS

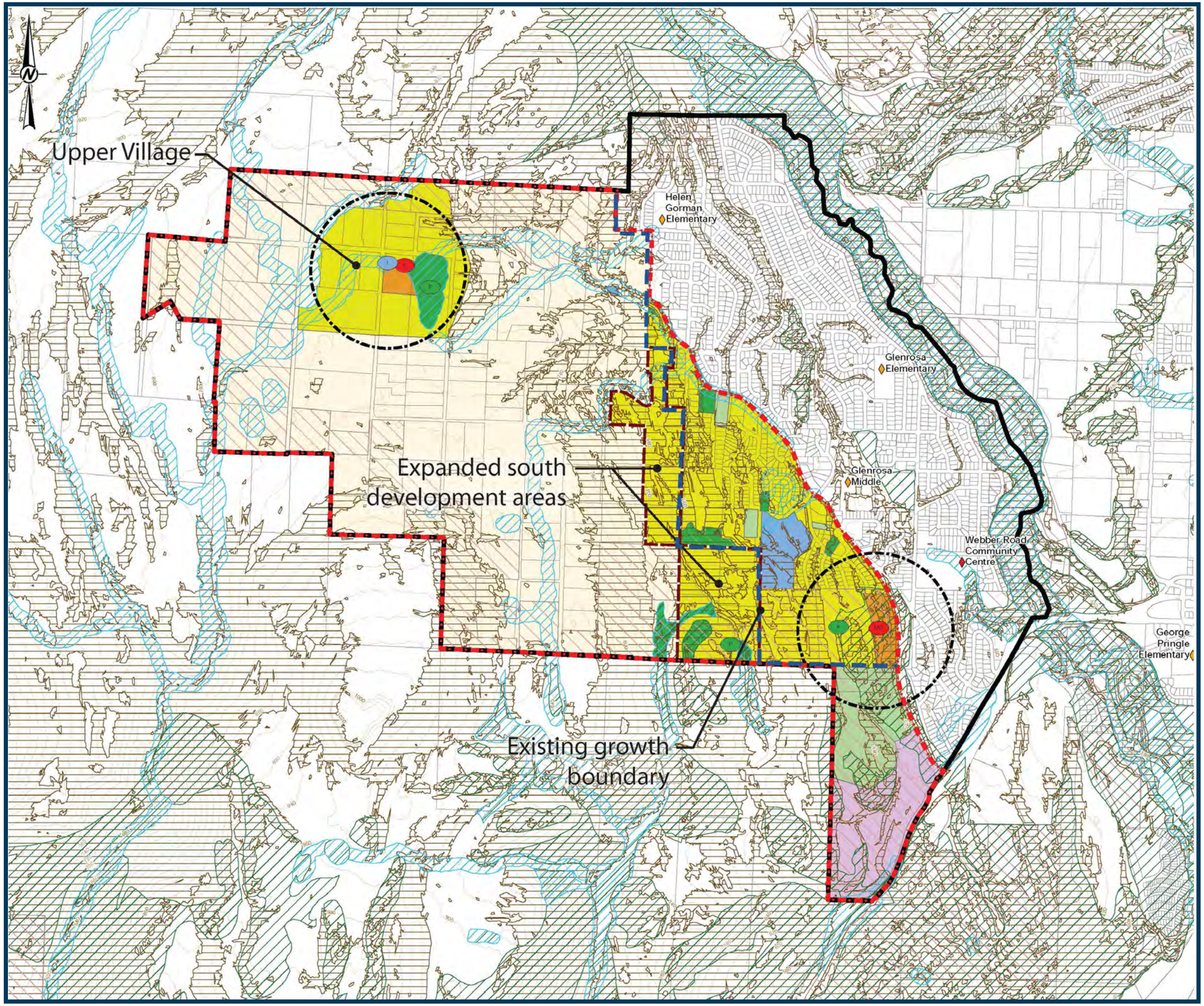
DWK DEVELOPMENT PERMIT AREAS (DWK 2014)

- AQUATIC
- TERRESTRIAL
- HILLSIDE
- WILDFIRE INTERFACE
- EXISTING GROWTH BOUNDARY

0 500 1,000

1:20,000 METRES

Map 6: Scenario 2 Land Use Map



Map 7: Scenario 3 Land Use Map