Naramata North

Comprehensive Development Plan

The Site: The subject property, Lot 197s, is a 305.7 acre parcel located north east of the Narmata Townsite and above the agricultural lands on North Naramata Road. The site is bisected roughly in half by the Kettle Valley Railway trail corridor. The site, a forested hillside, has been logged in the past and is currently vacant. There are 2 creeks on the property, Baerg Creek in the central portion and Robinson Creek in the southern portion, near the KVR. There are several right-of-ways including a RDOS statutory r/w along Robinson Creek, no longer in use and power and gas pipeline r/w above the KVR. New air photography and contour mapping is shown on Map 1.

The Proposal: It is proposed to subdivide the lands of about 61 ha (150 ac) on the west side of the KVR into 40 rural parcels of 1 ha in size and to dedicate a park for public access to the KVR.

The proposed development features a main access road from North Naramata Road proceeding up the slope and an east-west road parallel to the KVR right-of-way to service the upper lands. The remainder of the parcel to the east of the KVR is to remain as one large parcel of about 60 ha (150 ac). An area near the bottom of the site and along Baerg Creek is proposed to remain as a natural area at this time, due to creek impacts and access limitations. Despite some steep grades, a building site is available on each of the 40 lots with only 3 lots having some impact on the Moderately rated Environmentally Sensitive lands – any impacts can be mitigated elsewhere on the property. It is proposed to develop the land in 3 phases over the next 10 or so years, after zoning and subdivision approval and subject to market demand. The Development Concept is shown on Map 2.

There have been a number of Community Plan Designations on the subject property over the years. The current owners acquired the subject property, Lot 197s along with neighbouring lots to south Block A and Lot 3314 in 1990. At that time the Community Plan designation was SH, Small Holdings (2 acre) while the zoning was FG, Forestry Grazing (10 acre). The Community Plan of 1995 designated the subject lands as RA (50 acres) and the zoning was changed to RA (50 acres). The OCP in 2008 designated the lands as RA (20 ha – 50 ac). In 2015 the owners applied for a Community Plan amendment for SH, Small Holdings, but the consultant did not follow-up with the application and it did not proceed.

Benefits of Development

The development of new 40 lots offers a number of benefits to Naramata and the Penticton area:

- Economic activity and jobs based on spending of about $30,000,000 (Subdivision / Servicing $6,000,000; plus construction, on-site servicing, landscaping, furnishing of 40 houses at $500,000 each; plus professional fees, sales and marketing
- Upgrades to the Naramata Water System and annual taxes and user fees
- Property taxes on about $30,000,000 assessed value (@$750,000 per home) for Naramata services, such as parks & recreation, fire services, land use planning, engineering and for Regional Services such as 911, Landfill, Emergency Services, Government Administration
- Local spending in retail, restaurant, entertainment and other services

COMPREHENSIVE DEVELOPMENT PLAN

In the following Comprehensive Development Plan, environmental, planning, and servicing design considerations are reviewed.

Environmental Considerations

Regional Terms of Reference (TOR) are used to define a four-class Environmentally Sensitive Area (ESA) ranking system. Factors considered during the refinement of ecosystem mapping include provincial status (i.e., Red or Blue-listed), rare and endangered species occurrence and/or potential, general landscape condition (i.e., degradation, disturbance, isolation, connectivity, fragmentation), successional stage, regional rarity, relative biodiversity, and professional judgment. The four classes of ESA classification are described below:

ESA 1 (High) – areas that provide significant environmental value, due to the presence of rare physical features, rare ecosystems, or rare plants and animals. These areas represent habitat of great importance to the functioning of natural ecosystems. Various types of habitat will qualify as ESA 1 on the basis of sensitivity, vulnerability, connectivity, and biodiversity. For example, all wetlands, rare plant communities, and habitat for rare animal species have high value.

ESA 2 (Moderate) – areas that contain physical features, plants, animals and habitat characteristics that contribute toward the overall diversity and contiguous nature of the surrounding natural features. These will include sensitive ecosystems, as refined according to the ESA stratification criteria for the scale of mapping. These may also include areas used to buffer ecological functions of high value ecosystems.

ESA 3 (Low) – areas that may contain important features or remnant stands/sites with ecological value but are not identified in the SEI nor considered neither locally nor regionally

rare. Areas mapped as ESA 3 may be in a stage of succession that provides limited value to local wildlife species and expresses a level of previous disturbance.

ESA 4 (Not Sensitive) – areas that contribute little or no value to the overall diversity of vegetation, soils, terrain and wildlife characteristics of the area. Areas mapped as ESA 4 typically include heavily disturbed ecosystems, previously cleared areas (gravel pits, expose soil etc.) and areas of existing infrastructure such as roads.

Ecora prepared new ecosystem mapping to identify habitat suitability and key environmental features such as streams, wetlands and other valuable features. The property was logged in 2001. The mapping was based on field work carried out in November 2018 and April 2019.

The mapping provided Environmentally Sensitive Ratings of High, Moderate and Low. Most of the site has a Low rating. Baerg and Robinson Creek corridors and a steep rocky area in the north west corner of the site are rated as High, and a Moderate rating is shown in the land below the KVR corridor and west of Baerg Creek.

The High or ESA1 area in the corner east is associated with a large patch of rock outcrop with old coniferous forest. The Creeks have Riparian values. The Moderate or ESA2 lands are generally young to mature coniferous woodland with patches of rock outcrop and sparsely vegetated area. There is also a gully west of Baerg Creek.

Environmental Mapping is illustrated on Map 3.

Planning Considerations

The property is currently designated in the Area E Official Community Plan (OCP) and the Area E Zoning Bylaw as RA, Resource Area, with a minimum parcel size of 20 ha. The development proposal requires amending the Community Plan to redesignate the site to SH, Small Holdings and rezoning to SH3, Small Holdings with a minimum parcel size of 1.0 ha (2.5 ac). The land is designated as an Environmentally Sensitive Development Permit Area and the creek corridors as Water Course Development Permit Development Permit Areas.

The Area "E" Community Plan, Bylaw No. 2458, 2008. Appendix A to this report has a detailed list of goals, objectives and policies relevant to this development proposal -- summarized below:

- Key OCP goals include provision of safe, quiet and attractive residential and rural areas that satisfy housing social needs of all residents; future development should be compatible with community values of scenic vistas, green space, privacy, quality of life, low population density and rural ambiance; and protect important and sensitive features of the natural environment.

- Growth Management Objectives are to direct growth to where it will have the most positive and least negative impacts on the community, agricultural and natural environment.
- Growth Management Policies encourages residential development within the infill capacities of the existing land use designations, but indicates that new development proposals will be considered within a Comprehensive Development Plan (for sites greater than 20 ha or 20 units) framework and outlines criteria for the CDP
- Minimal impacts on adjacent agricultural lands – with low density acreages on a hillside well above the farms
- Policies provide for additional lands to be designated Rural Holdings with review of criteria outlined in the Plan including – environment values, water, sewer services and roads, hazards, and visual impact of hillside development
- Park Policies provide for rural recreation activities, new parks in residential areas and focuses on trail corridors, including the KVR
- Environmental Goals and Policies are to require an Environmental Impact Assessment to protect environmentally sensitive lands from development.
- Servicing objectives are to direct development to areas that can best be serviced by existing or planned utility services. Water policies are to encourage developers of land adjacent or above the KVR to undertake engineering studies for future expansion of the water system to these areas.

Regional Growth Strategy, Bylaw No. 2770, 2017

The Regional Growth Strategy (RGS) was originally adopted in 2012 and redrafted in 2017. In the RGS, Naramata is designated as a "Rural Growth Area" where "limited future development is anticipated." The RGS also directs the RDOS to "establish growth containment boundaries around Rural Growth Areas in Official Community Plans". This will be a requirement of the Area "E" OCP when it is updated. In the meantime, the existing Community Plan provides direction for future growth of the Naramata community. As Naramata is a Rural Growth Area, the proposed subdivision is not inconsistent with the RGS.

Over the past 5 years, 2014-2018, there has been an average of 18 building permits issued each year for single family units – reflecting a limited amount of new development. If this trend continues, over the next 10 years, about 180 new houses may be developed.

Adjacent Land Uses

There are a number of parcels near the subject property on the east side of North Naramata Road that are zoned for SH, Small Holdings. Directly adjacent and to the north west is a SH2 and SH3 area, and to the south there are sites zoned SH5 and SH3 – all with lots in the 1 ha size

range. The proposed rezoning of the subject parcel is not out of character with developments existing in the immediate neighbourhood.

Small Holdings Development

Small Holdings development makes up a significant amount of rural single family development area in Naramata. There are 4 SH zones in the Bylaw with minimum parcel sizes as follows: SH2 – 2 ha; SH3 – 1 ha; SH 4 – 4040 m^2; and SH 5 – 2020 m^2. SH parcels are located:

1. Scattered sites at the southern end of Area "E"
2. Large area south of the Townsite to Hayman Road
3. East of the Townsite along Smethurst Road and at the upper end of Arawana Road
4. Numerous sites along North Naramata Road, mainly on the eastern slopes above the agricultural bench lands in 3 main pockets up to an including Indian Rock.

Areas 1, 2 and 3 listed above have limited subdivision potential, with most lots less than 2 ha in size, while there is some potential in the larger parcels in Area 4 above.

A general inventory of all Small Holdings zoned parcels has been undertaken to determine the supply of SH lots of 2.0 ha and under. Within Area E, there are about 110 SH lots, 15 of which are vacant.

In addition, there are several larger Small Holdings development sites as follows:

- About 50 ha in 2 parcels east of Indian Rock at 6325 and the 6500 block of North Naramata Road zoned SH2 – say 20 lots minimum size of 2 ha.
- 3498 Arawana Road – zoned SH5s, minimum parcel size of 2020 m^2 - 41 lots proposed
- 4800 North Naramata Road – 15 ha area recently rezoned SH5 (from RS1), minimum parcel size of 2020 m^2. Eleven (11) lot bare land strata subdivision at Grace Estates is in the approval process. Lots around 1 ha in area.

Small Lot Single Family

A review of RS1 development in the eastern hillsides above Naramata indicates a number of vacant single family lots and potential for additional development as follows:

- Kettle Ridge – about 20 vacant lots in the Workman Place Area and 37 future lots to be created in the next phases
- Outlook – about 40 vacant lots

There are about 100 single family lots that are vacant or to be created in this area, but no significant development sites for additional future single family development of RS1 lots. The Community Plan does not provide for new small lot single family development areas.

Development Summary

An overview of current of growth potential, based on existing zoning and outside of the Agricultural Land Reserve, is provided on Map 4. There is some infill development potential in the Townsite – limited by the lack of a sanitary sewer system. On the hillsides, it is concluded that the current/future supply of small lot single family development is limited to about 100 lots and the supply of 0.2 ha (1/2 acre) lots is about 40. At the present average rate of construction of 18 single family per year, this inventory will be exhausted in 7 or so years. The potential for small acreage development in the 1 ha size range in Naramata is currently limited to the Grace Estates site, with 11 lots.

The Current Growth Potential Map also illustrates that the North Naramata Road area represents the only sizeable and available development land in the community that is not in the ALR, is located in reasonable proximity to the Townsite and is below the Kettle Valley Railway corridor.

Small Holdings, small acreage development is an established use in Naramata contributing to the rural residential character of the community. SH parcels are located throughout the community, north, east and south of the Townsite. The proposed 40 lot subdivision with 1 ha minimum sized lots is very consistent with the established character of Naramata and provides a supply of small acreages for the short to medium term (3 to 10 years). The proposed development maintains the rural ambiance of Naramata, is respectful of the natural environment, and provides an adequate level of services with new roads, drainage, community water and fire protection as well as a public park.

Park Dedication

The RDOS requires a 5% park dedication from the lands of about 3 ha (7.5 ac). The owners are proposing to dedicate a park to provide for public amenities and parking with access to the adjacent KVR trail corridor. There are no public access points to the KVR in the North Naramata area between Smethurst and Chute Lake Roads. The proposed park is 1 ha in size. To make up the 5% requirement, the owners would contribute to the development of the parking area and site amenities, such as picnic tables, benches and toilet facilities and/or pay cash-in-lieu.

Hillside Development

Newer hillside development is focused on the eastern hillsides south of Naramata Creek. RS1 zoning in the Noyes Road, Winfred Road, Dedeck and Flagstone Place areas have been developed over past years, with lot sizes in the 2000 m^2 size range with on-site septic disposal. With the change of regulations to require community sewer for lots less than 1 ha, newer strata subdivisions – Kettle Ridge, Benchlands and Outlook are parcels of around 1000 m^2 with community sewer.

As the development spreads eastward, slopes are generally steeper and to provide for road construction and sufficient building sites, significant alteration to the hillside topography has occurred with the recent small lot RS1 subdivisions. Visual and environmental impacts and storm drainage concerns have been identified by the community.

The proposed 1 hectare lot development will overcome many of the concerns about small lot hillside development. With larger lots there are more options for house siting with less land disturbance and driveways that follow contours. Most of the area of the lots can be retained in a natural condition and protect the hillside environment. The owners are willing to be subject to a Hillside Development Permit to provide comfort to the community of these intentions.

Development Hazards

As outlined in the ***Narmata Community Wildfire Protection Plan 2007,*** there are 2 biogeoclimate subzones in the Naramata area, including the lower elevation Very Dry Hot Ponderosa Pine and the upper areas within the Very Dry Hot Interior Douglas-fir Zones. Vegetation in these zones consists of grassland and open forest communities. A threat analysis has determined that the forest interface areas have a high to extreme hazard rating. Options to reduce the risk of fire and fire intensity include fuel modification, removal of ladder fuels, tree spacing and fuel breaks. For residential development there are establish guidelines through the Fire Smart program. Provision of a community water system will also reduce the forest fire hazard rating.

The site is characterized by slopes ranging from 10 – 50% in grade and has numerous bedrock outcrops and is not considered a high hazard area from a slope stability point of view.

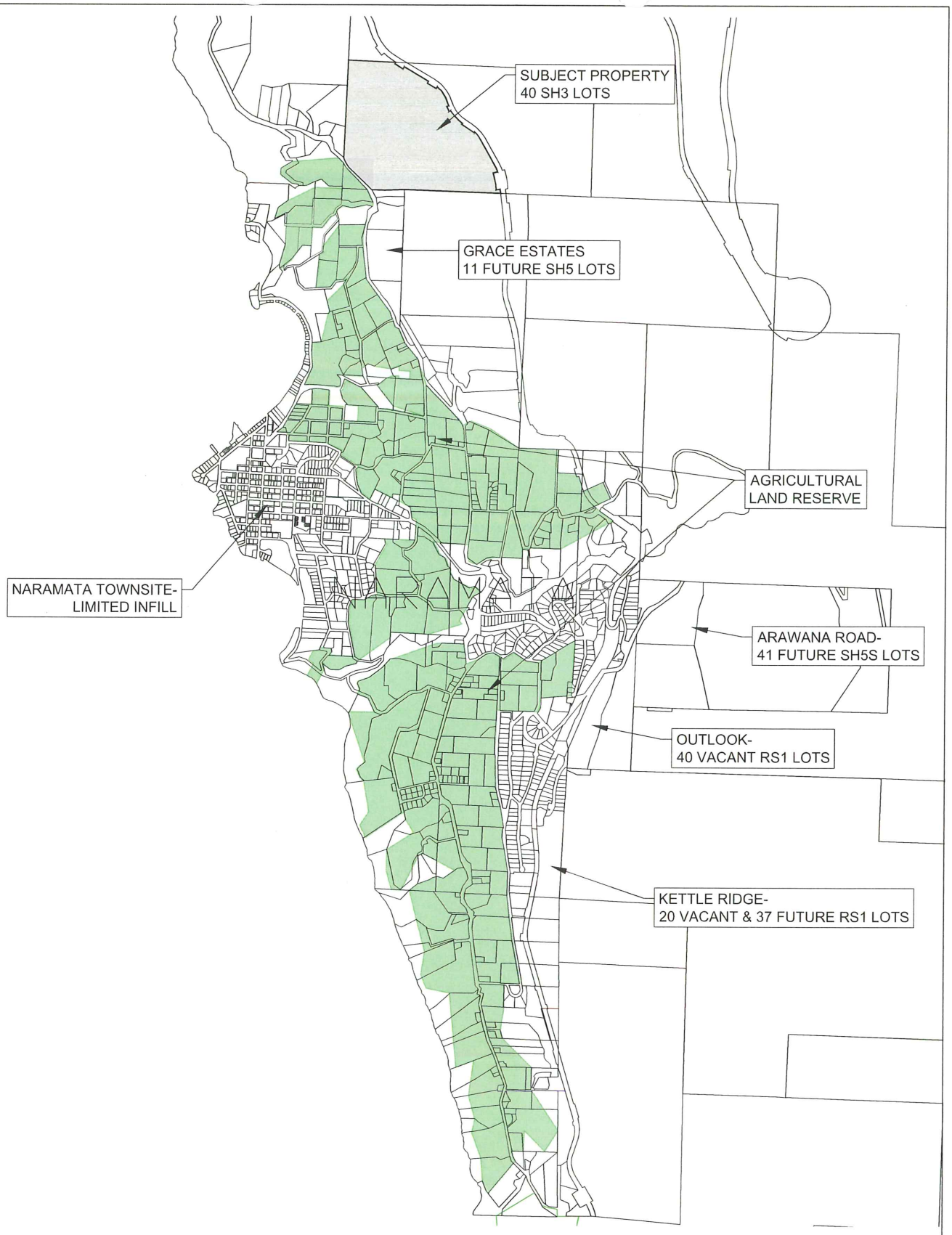
At the subdivision stage of the development, the Approving Officer will require Forest Fire Hazard and Geotechnical Reports to address development safety.

Fire Protection

DL 197s is included in the Naramata Fire Service Area and pays taxes for fire protection.

Utility Servicing

The attached Water System and Servicing report outlines the strategy to provide a community water system to be part of the Narmata Water System and other servicing requirements. The Naramata Community Plan supports expansion of the existing Water System in the north bench of Naramata for lands adjacent or above the Kettle Valley corridor.



Notes:

Project No.:	18-587
Client:	-
Office:	-
Scale:	N.T.S.
Date:	SEPT. 11 2019
DWN:	DH

ecora

CURRENT NARAMATA GROWTH POTENTIAL

MAP 4

NORTH NARAMATA SUBDIVISION – PLANNING APPROACH

Amendment to Area "E": Community Plan and Zoning Bylaw required for proposed 40 lot 1 hectare minimum lot size rural residential subdivision plus park dedication for parking lot and access to KVR trail.

Area "E" Communit y Plan, Bylaw No.2458, 2008

Subject property currently has a RA, Resource Area, designation and designated as an Environmentally Sensitive and Watercourse Development Permit Area. The following excerpts from the Area "E" Community Plan illustrate that the proposed 40 lot rural development is consistent with overall Plan goals and policies.

- 6.0 Broad Goals:
  - Provide for safe, quiet and attractive residential neighbourhoods and rural areas that will satisfy the housing and social needs of all Naramata Residents (6.1.3)
  - Ensure future development and growth are compatible with community values (e.g. scenic vistas, green space, privacy, quality of life, low population density , rural ambiance) (6.1.6)
  - Ensure an orderly level of growth to protect the "rural sense of community" in Naramata, and to ensure that growth does not result in large tax increases. (6.2.1)
  - Protect important and sensitive features of the natural environment. (6.3.1)
  - Ensure appropriate solutions to reduce the risk of hazards to development. (6.3.3)
  - Preserve Agricultural Land (6.3.4)
- 7.0 Growth Management Objectives:
  - To utilize a variety of growth management techniques to direct growth to where it will have the most positive and least negative impacts on the community, the agricultural and the natural environment. (7.1.2)
- 7.2 Growth Management Policies:
  - Encourages residential development within the infill capacities of the existing land use designations, where services are available. (7.2.1)
  - May consider new development proposal that are consistent with the community's low growth mandate and that are assessed through a Comprehensive Development Plan – for a significant land use change involving more than 20 ha or 20 or more housing units. List of CPD criteria / content. (7.2.2) *OCP provides a process for significant land use changes.*
  - Supports a range of housing types, densities and affordability options for new residential developments. (7.2.8)
- Agriculture Objectives
  - Minimize conflicts between agriculture and other land uses (9.2.2)
- 10.0 Rural Holdings Objectives:
  - Retain and enhance the rural character of Rural Holdings (10.2.1)

- Preserve and protect areas with significant wildlife or habit value and encourage conservation stewardship (10.2.3)

- 10.0 Rural Holdings Policies:
  - Small Holdings provide for rural or semi-rural, country residential lifestyle with minimum parcel sizes of 0.4ha to 4.0 ha, subject to servicing requirements
  - Proposals to create additional land designated as Rural Holdings should demonstrate the need for it in the context of its impact on the community and use the following criteria to assess the application:
    - Capability of the natural environment / important habitat
    - Capability to accommodate on-site water and sewage disposal
    - Natural hazards, flooding, slope instability, wildfire risk
    - Compatibility with adjacent land uses and designations and character of existing areas
    - Proximity and access to existing roads and other community and essential services
    - Consideration of visual impacts of the development on hillside areas (10.3.3)
- 15.2.1 Park Objectives:
  - Provide local parks and trails and other outdoor recreation opportunities in locations and size for all members of the community (15.2.1.1)
  - Ensure recreation activities are compatible with the rural character of the Plan area. (15.2.1.2)
- 15.2.2 Park Policies:
  - The "Crown Land sections of the KVR" are designated on Schedule B as Park (15.2.2.1)
  - Dedication of not more than 5% of the parcel area for park use may be required where a proposed subdivision is not close to existing parks, a suitable size is proposed or additional park land is required. Park land dedication is intended to provide sites for parks to serve new residential subdivisions or to establish trail corridors (15.2.2.2)
  - Cash-in-lieu may be required where land dedication is not appropriate (15.2.2.3)
  - The list of criteria for new parks includes areas with scenic views, outdoor recreation opportunities, need for trail connections and areas with and adjacent to natural features or environmentally sensitive areas (15.2.2.4)
  - Designates the Kettle Valley Railway trail as a "Public Corridor" to protect future use
- 15.3.1 Natural Environment Objectives:
  - Foster an awareness of the natural environment and to protect ESAs from negative impacts of development (15.3.1.1)
  - Adhere to senior government legislation by protecting all wildlife and fish habitats, including riparian corridors (15.3.1.5)
- 15.3.2.1 Natural Environment Policies:

- Recognize environmentally sensitive land and designate it as a development permit area in the ESDP area. Retain sensitive land in its natural state or developed according to guidelines outlined on OCP (15.3.2.1)
- Will consider an Environmental Impact Assessment (EIA) Report prepared by a QEP where a proposed development is located on environmentally sensitive land (15.3.2.3)
- RDOS Terms of Reference to guide preparation of the EIA. EIA may be considered prior to redesignating land to a higher density, subdividing and developing land (15.3.2.4)
- Redesignation of land in the OCP will not be permitted where it is determined that there would be significant impact on Federally or Provincially listed species or riparian areas and that the impact cannot be mitigated to an acceptable level (15.3.2.6)
- Incorporate park and trail corridors within the ESDP area and where impacts can me mitigated 15.3.2.7)
- Supports measures to protect vegetated riparian areas and control soil erosion, sedimentation and storm water run-off and stewardship (15.3.2.13)

- 16.2 Hazard Lands Objectives:
  - Prevent development is areas of know hazardous conditions unless the hazard has been sufficiently addressed (16.2.1)
- 16.4 Fire Management Policies:
  - May request the developer to undertake a fire hazard risk assessment at the time of Community Plan amendment application indicating that the property may be subject to a moderate or higher risk. The assessment to provide a fire mitigation strategy and include fuel breaks, zones around homes and structures, fireproof building design and materials, adequate roads and water supply (16.4.1)
- 18.1 Servicing Objectives:
  - Direct development to areas that can be best serviced by existing or planned utility services (18.1.1.2)
  - Require all parcels of 1 hectare or less in size to connected to a community sewer system (18.1.1.6)
- 18.1.3.4 Water Policies:
  - Encourage developers of lands adjacent or above the Kettle Valley corridor and the north bench of Naramata undertake an engineering study for future expansion of the existing water system to these areas

Full Conceptual System Plan

Water main upgrade – Naramata Rd

It is proposed that the 40 subdivision be included in the Naramata Water System, operated by the Regional District of Okanagan Similkameen. In the following, a conceptual design of the on-site system it outlined.

An existing 100 mm (4") AC water main traverses the southwest corner of the property proposed for development: it extends from Languedoc Rd along a ROW of varying width and terminates in the vicinity of 4865 Naramata Rd.

The Bylaw minimum water main size for servicing a hydrant is 150 mm. Because the existing 100 mm AC water main is a dead-end and exceeds 200 m and would serve more than one hydrant, there may be a requirement to upsize this main to 200 mm in order to conform to the RDOS Subdivision Servicing Bylaw (SS Bylaw) #2000.

The existing water main is about 370 m in length. The property has a frontage of about 250 m along this main/ROW. The full upsizing of the main may require inclusion of the additional length of water main from the intersection of Languedoc Rd to the south property line, an additional distance of 100 m. The total length of upgrade would be in the order of 350 m. The cost is estimated at $250,000.

This cost does not include any additional road works or widenings through the ROW along the property frontage. The existing ROW would require a widening to at least a minimum width of 20 m from the current 14 or so metres through most of the frontage, to be dedicated at the subdivision stage.

The size of the water main upgrade i.e., 150 mm or 200 mm would depend on the future plans by the RDOS for this northern area. Depending on the alignment of the existing water main within the ROW, it would be either abandoned in place - if a new alignment was chosen – or removed and disposed of. Because the existing water main is Asbestos Cement (AC) precautions, as per WorksafeBC, would be in force and there would be additional costs incurred for safe disposal. These disposal costs are not included in the estimated upgrade cost.

Water system

The water supply for the proposed development will be tapped off the upgraded water main In North Naramata Road. Water is supplied to this main from the Naramata Water system through the McKay Pressure Station and Reservoir. Water main pressure in this section of Road within the ROW vary between 30 m (45 psi) to 52 m (75 psi).

There is a 196 m elevation rise from Naramata Rd to the proposed water reservoir location.

Drawing CP-18-587-P-00 shows a schematic of a proposed water supply and distribution system for this development.

The water system to provide the needs of the 40 lots consists of the following:

- A 75 mm or 100 mm connection to the water main on Naramata Rd to supply a booster station. The connection elevation is estimated at the 461 m elevation contour.

- A Booster Station with three pumps that will meet the Maximum Day Demand (MDD) and Peak Hour Demand (PHD) flows with one pump out of service. Based on40 lots and a population of 3 persons per lot, the MDD is estimated to be 3.9 lps (62 US gpm), as averaged over 24 hours, and the PHD is estimated to be is 6.6 lps (104 US gpm). The Booster Station will be required to meet MDD with the Reservoir on line and PHD in the event that the Reservoir is off line. Should the Reservoir be a single cell, an additional Fire pump may be required in the event that a cell is off-line during a fire event.

- A standby power supply to provide power to the Booster Station in the event of a power outage. Standby power sufficient to provide MDD plus Fire Flow (FF) may be required.

- A dedicated 100 mm Transmission main (TM) of about 1000 m connecting the Booster Station to a Reservoir.

- A water reservoir of approximately 500 cu.m that will provide balancing and emergency storage and a fire storage sufficient to meet a fire flow of 60 lps for 1.5 hours. The reservoir would be positioned around the 652 m elevation contour below the KVR trail. The reservoir is envisioned as a steel-epoxy tank, but a concrete tank may be the requirement of the RDOS if they are taking over the system. A two-cell reservoir would be desirable, but may not be practical in this size of tank. In the event that the reservoir is off-line for servicing, a cross-over connection between the dedicated TM and the return supply main is recommended so that water supply is available for domestic demand and fire protection. A service road would be required to access the Reservoir. An overflow channel would be required adjacent to the Reservoir in the event of a failed pump shut-off. A communication system will be required for pump operations at the Booster Station between high and low reservoir levels.

- A return 150 mm supply main from the reservoir transiting along the subdivision road network and terminating at Lot 3. Water service connections (25 mm) will be tapped off the supply main to each lot. A length of about 2,000 m is estimated from the Reservoir to Lot 3 and an additional 850 m of main would provide service along the uppermost road.

- Interconnection or looping of water mains. Due to existence of dead-end lines, Looping of the main will be required. Up to three loops may be required within the system to maintain water quality through circulation. A 100 mm main would suffice for each loop. Some loops would cross pressure zones; pressure in these loops would be reduced by pressure reducing valves (PRV). Where required, a single PRV should be sufficient.

- Three pressure zones established by two pressure reducing stations (PRS). These PRSs would be positioned to maintain pressure within each zone to the limits of the SS Bylaw i.e., a minimum pressure of 27 m (39 psi) at PHD to a maximum pressure of 88 m (125 psi) with household pressure reducing valves (PRV). Each PRS would consist of two PRVs: a small one of about 50 mm to 75 mm dia that will handle the typical range of domestic flows (from Average Daily Demand (ADD) to Peak Hour Demand (PHD)) with a set-point on the downstream side of the PRV of about 30 m, and a larger one of about 150 mm dia that will open in the event of high

flows - such as fire flows through a hydrant - when pressures falls below a lower set-point, such as 26 m. The PRSs are proposed in the vicinity of the 570 and 510 m elevation contours. Depending on the lot layouts and the location of buildings in the vicinity of Naramata Rd, a third PRS may be required to handle pressures unless the lowest lots can be serviced from the existing Naramata Rd water main. The looping mains would consist of a single PRV within each PRS.

- Approximately 10 to 13 hydrants spaced at 250 m intervals will be required to provide fire flow if/as required and for occasional flushing of the water distribution system.

- Each house would be metered and the meter would be installed in a meter chamber at the property line in the vicinity of the service connection curb stop or shut-off. Payment for the meters and meter chambers would either be paid in advance of final subdivision approval and the cost recovered by the developer from the future lot owner at the time of lot sale – or paid for by the lot owner at Building Permit stage and installed by the RDOS at a direct cost to the homeowner.

Scenario 1 – Phased Booster Station

Phase 1 of the subdivision would consist of the lower 9 Lots. A booster station would supply the necessary water from the upgraded Naramata Road main and provide suitable water pressure to these lots.

At the time of Phase 2, a reservoir would be constructed and this booster station would be upgraded to the full build out plan described below.

Scenario 2 – Reservoir and Phased Water System

Phase 1 of the subdivision would consist of the lower 9 lots. The booster station, water mains, reservoir and a pressure reducing station (described below) would be constructed to service these lots.

Phase 2 would include approximately 14 lots, additional water main and pressure reducing station.

Phase 3 would be the remaining lots and water main.

The estimated cost for the above water supply, storage and distribution system is about $3,800,000.

Roads, Driveways and Reservoir access

Naramata Road, onto which the proposed development fronts, would require a 20 m ROW as a minimum or to a ROW width as determined by the Ministry of Transportation and Infrastructure (MOTI). The current road is of a rural road cross-section: two paved lanes and ditches on each side. Upgrading the water main would likely address deficiencies – if any - in the existing roadway up the centerline of the road.

The subdivision roads would be of similar cross-section within a 20 m ROW with a ditches on the high side. Culvert crossings would be required for driveways and would meet MOTI standards – unless the

RDOS can establish different standards. The current road layout under consideration consists of a main road of approximately 2,700 m and two cul-de-sacs. Grades would be limited to a maximum of 10%.

Driveways accessing a parcel (angle limits between 70 degrees to 110 degrees) have a maximum grade of 5% for first 5 m and are not to exceed 8% within the ROW and not to exceed 10% grade from the lot property line to the Building Site.

To ensure that large vehicles such as Fire Trucks, moving vans, road maintenance and snow removal equipment can turn around, large elbow style turns and large cul-de-sacs will be required within the development.

Access to build the reservoir could be achieved over the KVR with an 'at grade' connection. Access for long term maintenance could be performed via a newly constructed access road from the upper subdivision road. The access would be graveled with removable bollards or lockable swing gate. Access onto the KVR would also serve as emergency egress in the event of a fire in order to provide a secondary exit from the development.

The internal road system could be gravel, but there may be a requirement to pave. This requirement will need to be finalized through discussions with the MOTI and the RDOS.

The subdivision road system cost could be in the order of $800,000 to $1,000,000.

KVR Crossing – grade separation

In the event that an at-grade crossing was not permitted for future access to the lands above the KVR Trail a below-grade crossing such a bridge would be a consideration. A bridge span of 15 m with a width of 4 m would accommodate traffic along the KVR Trail. The bridge would be rated for 64 tonnes GVW (CL-625 design vehicle). An at-grade crossing would be preferred as it would also allow an access onto (or off of) the KVR trail in the event of a fire and serve as a secondary emergency access.
The crossing of the KVR (or under the KVR) to the upper parcel would serve as an access road to the reservoir site for construction as well as future operation and maintenance. A bridge / below-grade crossing would cost in the order of $500,000.

Sanitary

Sanitary requirements could be met from the use of on-site septic systems providing that sufficient land area and the correct soils are present for percolation of effluent. The cost of the septic systems would be borne by the individual lot owner and installed at time of Building Permit. The tank / tile field would be designed and installed by a Registered Onsite Wastewater Practitioner (ROWP) with the septic system registered with the Interior Health Authority (IHA). Septic systems – depending on the system class and treatment technology is estimated at between $20,000 to $30,000 per lot.

Storm

An area of approximately 59 ha is confined between the KVR Trail, Naramata Rd and the north and south boundaries of the proposed subdivision parcel. This is subdivided into three partial catchment areas: the northern area between Trust and Baerg Creeks of approximately 21 ha; the Baerg Creek area of approximately 22 ha; and the southern area between Baerg and Robinson Creek of approximately 16 ha. The full catchment areas of these creeks continue beyond the limits of the parcel. The general direction of overland flow is from east to west towards Okanagan Lake.

As all the catchment areas are less than 40 ha, the rational method is an option for designing the required storm components.

The proposed road cross-section is that of a rural road with ditches on the high side and culverts at all driveway and road crossings. Ditches will require periodic check dams to reduce the velocity in ditch runs of significant grade.

For ditch inlets to storm drain culverts for less than 1 ha catchments, a 1:10 year design storm is required.

For open ditches and culverts with catchment areas greater than 1 ha, a 1:100 yr design storm is required.

Culverts with inlet control are required to pass the 1:100 year design storm without surcharge.

A minimum culvert size of 400 mm will be required for driveways along with 300 mm cover or more of cover.

For frontage roads, a minimum culvert of 500 mm with 450 mm cover will be required.

There are three road crossings contemplated for Baerg's Creek. A 1:200 yr design storm is required to size these crossings.

A storm detention pond may be required in the lower area should the existing soils not be adequate to infiltrate the road runoff.

Storm water drainage and detention, with controlled released is estimated to range between $80,000 to $150,000.

Cost Summary

Item	Description	Opinion of Probable Cost
Upgrade main	Upgrade water main to 100 mm or 200 mm	250,000
Water system	Booster, Tank, pipe network, PRVs	3,800,000
Roads & driveways	Road system: main road and cul-de-sac -2500 m	800,000 to 1,000,000
Sanitary	On-site septic – lot owners cost ($20K to $30K)	N/A
Storm	Culverts, ditches, stream crossings, storm pond	80,000 to 150,000
	Probable cost range	$5,430,000 to $5,700,000
	Rounded estimated cost per lot (based on 40 lots)	$135 K to $142 K / lot

Note: these costs are preliminary and based on costs for similar projects Ecora has been engaged in over the last few years and on the limited information obtained to date. Detailed engineering and geotechnical investigations have not been done and no discussions have been undertaken with the Authority Having Jurisdiction (AHJ) i.e., RDOS, MOTI, IHA to determine what additional requirements and concerns they may have.

Costs for electrical power, natural gas, telecommunications, cable TV and other service providers are not included in these costs.

These costs do not include geotechnical assessments nor retention of sub-consultants that may be required to undertake specialized analysis not provided by Ecora i.e., the Transient Analysis of the dedicated transmission main between the Booster Station and the Reservoir and the effect of the proposed Booster on the existing boosted system and the instrumentation and control required to mitigate surge.