



**REGIONAL  
DISTRICT  
NORTH  
OKANAGAN**

# STAFF REPORT

**TO: Electoral Area Advisory Committee**

**FROM: Planning Department**

**File No: 22-0403-C-TA**

**Date: November 28, 2022**

**SUBJECT: In-Process Land Use Applications – Keddlestone Groundwater Study - Phase 2**

## **RECOMMENDATION 1:**

That further consideration of Electoral Areas “B” and “C” Official Community Plan Amendment Bylaw No. 2771, 2018 and Zoning Amendment Bylaw No. 2772, 2018 which propose to change the Electoral Areas “B” and “C” Official Community Plan land use designation and the zoning of the properties legally described as Lot 2, Plan 2558, Except Plans 32888, KAP49691, KAP78923 & EPP59507; Lot A, Plan EPP59507; and Lot B, Plan EPP45787, Except Plan EPP45973 and located at 7505, 7601, and 7605 McLennan Road, Electoral Area “C” from Non-Urban (N.U) and Country Residential (C.R) to Small Holding (S.H) be withheld until the applicant has submitted a hydrogeological report that provides an evaluation of how the proposal aligns with the findings and recommendations of the Keddlestone Groundwater Study – Phase 2 and which demonstrates:

1. that groundwater sources would be available to service the full buildout potential of the subject property (30 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
2. that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifer 351.

## **RECOMMENDATION 2:**

That further consideration of Zoning Amendment Bylaw No. 2805, 2018 which proposes to change the zoning of the property legally described as The E 20 Chains of Frac. N 1/2 of SE 1/4, Sec 30, Twp 5, ODYD, Except Plans 19993, 35843 & 36141 and located at 7867 Wilson Jackson Road, Electoral Area “C” from Non-Urban (N.U) to Country Residential (C.R) be withheld until the applicant has submitted a hydrogeological report that provides an evaluation of how the proposal aligns with the findings and recommendations of the Keddlestone Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (4 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifers 349 and 351 and from alluvial deposits along BX Creek.

## **RECOMMENDATION 3:**

That further consideration of Zoning Amendment Bylaw No. 2838, 2019 which proposes to change the zoning of the property legally described as The NE ¼ of the SE ¼ of Sec 20, Twp 5, ODYD and located at Wallace Road, Electoral Area “C” from Non-Urban (N.U) to Country Residential (C.R) be withheld until the applicant has submitted a hydrogeological report that provides an evaluation of how the proposal aligns with the findings and recommendations of the Keddlestone Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (8 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifers 349 and 351.

#### **RECOMMENDATION 4:**

That further consideration of Zoning Amendment Bylaw No. 2850, 2019 which proposes to change the zoning of the property legally described as Lot 1, Sec 25, Twp 8, ODYD, Plan 2558, Except Plan 37038 and Plan EPP74629 and located at McLennan Road, Electoral Area "C" from Non-Urban (N.U) to Country Residential (C.R) be withheld until the applicant has submitted a hydrogeological report that provides an evaluation of how the proposal aligns with the findings and recommendations of the Keddlestone Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (8 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifer 351.

#### **RECOMMENDATION 5:**

That further consideration of Zoning Amendment Bylaw No. 2903, 2021 which proposes to change the zoning of the property legally described as District Lot 3421, ODYD and located at Forsberg Road, Electoral Area "C" from Large Holding (L.H) to Country Residential (C.R) be withheld until the applicant has submitted a hydrogeological report that provides an evaluation of how the proposal aligns with the findings and recommendations of the Keddlestone Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (30 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifers 349 and 350.

#### **BACKGROUND:**

At the Regular Meeting held on July 20, 2022, the Board of Directors endorsed a report from Golder Associates Ltd titled "Keddlestone Groundwater Study – Phase 2" and dated June 29, 2022. After considering the report, the Board passed the following resolution:

*That staff be directed to bring back a report on the implications of the recommendations contained in the report on in-process land use applications for properties in Electoral Area "C".*

There are five in-process land use applications within Electoral Area "C". Staff have made contact with all five applicants. This report provides background information on each application including any water supply information that has been provided by the applicants and has not been previously considered by the Board of Directors. The report also provides recommendations on how to deal with each application with due consideration of the recommendations (see below) contained in the Keddlestone Groundwater Study – Phase 2.

#### **KEDDLESTON GROUNDWATER STUDY – PHASE 2:**

The objective of the Keddlestone Groundwater Study – Phase 2 was to assess the groundwater levels in Aquifer 351, portions of Aquifer 349 and the alluvial deposits along BX Creek and to provide recommendations that would support the Regional District in making informed decisions regarding sustainable development in the study area with respect to groundwater supply.

The Keddleston Groundwater Study – Phase 2 was prepared in follow-up to the Keddleston Groundwater Study prepared by Golder Associates Ltd and dated January 31, 2020. The summary conclusions of the Phase 1 study are that:

- properties within Aquifer 349 have a higher relative potential to supply future development to individual properties and that it is likely that individual wells would not have an impact on neighbouring properties; and
- properties within Aquifers 350 and 351 have limited to no capacity for further development based upon water balance estimates showing that groundwater use is similar or greater than the predicted recharge.

The Keddleston Groundwater Study – Phase 2 report concluded that there is a limited groundwater supply for a number of areas within the study area.

The following summarizes the recommendations in the Keddleston Groundwater Study – Phase 2:

1. Continue the groundwater monitoring program to establish baseline conditions and provide the basis to assess seasonal patterns and long-term trends in water levels. With the data provided from the monitoring program, develop a numerical groundwater flow model to conduct quantitative water budgets and to predict cumulative water level drawdowns in key areas of the aquifer under future development and climate change scenarios. The numerical model would provide a technical basis to support decision-making regarding the sustainability of additional development in different portions of the study area, including the potential implications of developing the additional 350-400 residences that could potentially be developed under current zoning.
2. Strengthen the proof of water supply requirements in the Regional District Subdivision Servicing Bylaw and Building Bylaw to require a more comprehensive assessment of aquifer conditions that demonstrates the availability of a sustainable water supply. The proposed proof of water supply requirements would include the following:
  - At least one year of continuous groundwater level monitoring be conducted and the results analyzed and interpreted by a Qualified Professional;
  - Well pumping tests must be supervised by a Qualified Professional;
  - 48-72 hour pumping tests at the current bylaw rate of 6,550 litres of water per day (1.0 Imperial Gallon per Minute) per parcel, depending on the aquifer type;
  - Water level recovery must be monitored for the same period of time as the pumping test (48-72 hours) and achieve 90 to 95% recovery;
  - At least one observation well must be monitored in the same aquifer and within the same fracture network, during the pumping test and recovery period;
  - Pumping tests are to be conducted in the dry months of the year (August 1st –March 1st);
  - Where an application to the RDNO includes more than one proposed lot, the pumping test must be conducted simultaneously at all wells proposed to service each lot.
3. For existing and future development applications:
  - require a hydrogeological assessment that is signed and stamped by a qualified professional and includes, for each well that is proposed to be used for water supply, analysis and interpretation of at least one year of continuous groundwater level monitoring data and a pumping test that adheres to the proposed changes to the Subdivision Servicing Bylaw and Building Bylaw;
  - consider a phased approach by only approving the number of properties that would support sustainable development with respect to groundwater supply. Further approvals would be contingent upon provision of satisfactory groundwater monitoring data during buildout of the approved number of dwellings.

4. Consider designating Development Permit Areas to control and limit development where groundwater availability issues have been identified. Approval of development permits would be contingent upon specific criteria such as groundwater monitoring and site-specific groundwater protection measures; limiting site disturbance and impervious surfaces; preserving natural soils and vegetation; and low- to no-water use landscaping and alternative water sources.
5. Develop a conservation strategy that advocates for implementation of a household audit program and landscape planning and irrigation initiatives to reduce groundwater demand and encourage the use of alternative water supplies for non-potable uses.

#### **IN-PROCESS LAND USE APPLICATIONS:**

- 1. Electoral Areas "B" and "C" Official Community Plan Amendment Bylaw No. 2771, 2018 and Zoning Amendment Bylaw No. 2772, 2018**  
**File No.: 17-0076-C-OR**  
**Address: 7505, 7601, & 7605 McLennan Road**

The above noted application relates to a proposal to change the Electoral Areas "B" and "C" Official Community Plan land use designation and the zoning of the above noted properties from Non-Urban and Country Residential to Small Holding. If successful in rezoning the properties, the applicant proposes to subdivide the properties into 16 lots. Rezoning the properties as proposed would potentially allow for the subdivision of up to 30 lots.

The applicant submitted a report from Western Water Associates Ltd dated September 27, 2017. The report concludes that sufficient groundwater resources would be available at the site to support  $\pm 15$  lots. The conclusion was based in part on the analysis of data collected from a 68 hour pump test conducted on one well located on the properties and a 72 hour pump test conducted on another well located on the properties.

At the Regular Meeting held on July 17, 2019, the Board considered the application and resolved to refer the associated Official Community Plan Amendment Bylaw No. 2771 and Zoning Amendment Bylaw No. 2772 to a Public Hearing. The Board further resolved that Final Adoption of the Bylaws not be considered until a covenant has been registered on the title of the subject properties, in favour of the Regional District and in priority to all financial charges, that would limit subdivision of the three subject properties to a maximum of 13 new (additional) lots (16 lots in total). The covenant is to contain a clause that would authorize it to be discharged if the Regional District receives a report from a Professional Engineer which states that there is a sufficient groundwater supply to service the full build-out potential of the subject property in accordance with the provisions of the Regional District Subdivision Servicing Bylaw and that the use of groundwater supplies would not have a negative impact on existing wells using the local aquifer.

A Public Hearing was held on August 21, 2019. At the Regular Meeting held on September 18, 2019, the Board gave Third Reading to Bylaw No. 2771 and Bylaw No. 2772. The Board further resolved that an amendment be made to the resolution passed on July 17, 2019 to replace the requirement to register a covenant that would limit subdivision of the subject properties to a maximum of 13 new lots with a requirement to register a covenant that would limit subdivision of the properties until the RDNO undertakes and completes an aquifer assessment that confirms the adequacy of water supply for the level of potential development in the area of Aquifer 351.

At the Regular Meeting held on May 20, 2020, the Board of Directors rescinded Third Reading of Bylaw No. 2771 and Bylaw No. 2772 and resolved to withhold further consideration of the Bylaws until a comprehensive review of the water supply in Aquifer 351 has been completed and the review has

confirmed the adequacy of water supply for the level of potential development in the study area. The Board resolved to forward the Bylaws to a second Public Hearing after the review of the water supply in Aquifer 351 had been completed.

On June 21, 2022, the applicant submitted a letter and report from Western Water Associates Ltd dated June 13, 2022 and October 2021 respectively (available at: <https://www.rdno.ca/keddleston>). The October 2021 report states:

- As of the date of this report, 18 wells have been drilled on the subject properties, of which 15 wells satisfy RDNO Subdivision Bylaw No. 2600 water quantity requirements for drilled wells providing a source of domestic potable water. All 18 of the wells have driller-estimated yields above the RDNO requirement of 1.2 US gmp. 12 of the 18 wells have driller-estimated yields equal to or greater than the RDNO threshold of 3.6 US gpm which pumping tests are not required. One well did not meet Bylaw requirements when subjected to a 72-hr pumping test, and two wells have lower driller-estimated yields and still require pumping tests to verify adequate yields. 72-hour pumping tests were conducted on 5 of the on-site wells. Water level monitoring was conducted on 11 on-site and off-site wells.
- All of the wells drilled on the site are completed in bedrock Aquifer 351, but it is important to note that the mapped extent of Aquifer 351 does not explicitly take into account underlying geology, which varies across the mapped extent of the aquifer. It is our opinion that differences in the geological setting between the Nodding Hill site and other nearby areas such as the Keddleston Road area result in more favourable conditions for groundwater development in the Nodding Hill area.
- Simulation of collective effects of multiple wells drawing on the aquifer was evaluated by subjecting a centrally located well, WPID 62008, to a variable rate step test and a continuous high volume 72-hour pumping test. The pumping rate used for this test (30 US gpm) was chosen based on the results of the step test, and is equivalent to 25 domestic wells being operated at the RDNO Bylaw requirement at the same time.
- Data collected during the WPID 62008 test suggests that surface water and snowmelt at the site may quickly recharge the underlying aquifer system, as water discharged to ground from this test appears to have quickly returned to the aquifer and raised water levels in wells downslope. The unnamed seasonal stream that transects the site is likely a significant source of aquifer recharge for the area.
- In conclusion, it is our opinion that sufficient groundwater resources exist on the site to support the rezoning application for development to be serviced by private wells without negatively impacting existing wells in the neighbourhood. We recommend a phased approach to development commencing with an initial phase of 10 lots at the north end of the property while groundwater levels in multiple wells onsite continue to be monitored to develop a better understanding of seasonal groundwater fluctuations and aquifer recharge. We recommend that the longer-term monitoring data be reviewed and interpreted and used as the basis for a decision on subsequent future phases of development to the south.

The June 13, 2022 letter states:

- In 2020, we conducted an expanded and more extensive hydrogeological assessment at the property, as reported on in our October 2021 report (WWAL 2021). The work included installation of five water level transducers in wells at the site to monitor groundwater levels, completion of five 72-hour constant rate tests with monitoring of onsite and offsite wells, and water quality sampling. Our 2021 report included water level monitoring data up to September 2021. Since that time, water levels have continued to be monitored.

- Observed recovery during a period of such a significant precipitation deficit demonstrates that Aquifer 351 beneath the Nodding Hill Site is capable of receiving recharge in spite of prolonged drought conditions and is a positive sign as it relates to aquifer recharge and groundwater availability for the proposed project.
- The ongoing water level monitoring at Nodding Hill supports the conclusions of our October 2021 report. Well testing at that time confirmed wells at the property meet the RDNO Subdivision Servicing Bylaw requirements for quantity. Ongoing monitoring demonstrates that the local aquifer receives recharge even during a period of abnormally dry weather (2021) and longer-term below average precipitation. It continues to be our opinion that sufficient groundwater resources exist to support rezoning of the property. We continue to recommend a phased approach to development, beginning with 10 lots in the northern part of the property. A decision to proceed with additional phases of development would be based on the results of continued groundwater level monitoring.

On July 29, 2022, staff sent a letter to the applicant to advise that the Keddleston Groundwater Study – Phase 2 has been presented to the Board of Directors and that the Board has requested a follow-up report as noted above. Staff met with the applicant and asked if he would like to provide any new information about the proposal. In response, the applicant advised that he would like to have the above noted reports considered by the Board of Directors and that in recognition of the recommendations contained in the reports, he is proposing a phased development approach. The applicant has indicated that should the Bylaws be adopted, he would pursue a proposed 17 lot subdivision in phases with an initial 10 lots at the north end of the property. Groundwater levels would continue to be monitored in multiple onsite wells with long-term monitoring data used to inform an assessment of sustainable water usage for future phases of development to the south.

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**2. Zoning Amendment Bylaw No. 2805, 2018**  
**File No.: 18-0681-C-RZ**  
**Address: 7867 Wilson Jackson Road**

The above noted application relates to a proposal to change the zoning of the above noted property from Non-Urban to Country Residential. If successful in rezoning the property, the applicants propose to subdivide the property into 4 lots. Rezoning the property as proposed would potentially allow for the subdivision of up to 4 lots.

At the Regular Meeting held on November 21, 2018, the Board of Directors considered the application and gave First Reading to the associated Zoning Amendment Bylaw No. 2805. The Board resolved that Second Reading of the Bylaw be withheld until the applicants submitted a water supply study which takes into consideration the potential to service the proposed lots and the impact it could have on the water supply in the area.

In follow-up to the Board's direction, the applicant submitted a report from Watterson Geoscience Inc. dated April 15, 2019 (available at: <https://www.rdno.ca/keddleston>). The report concludes that sufficient groundwater resources would be available at the site to support 4 lots. The conclusion was based in part on the analysis of data collected from a 24 hour pump test conducted on one well on the property. The report states that:

- Available well and aquifer mapping data, field observations, and the presence of other nearby residences and their wells indicate that sufficient groundwater to meet bylaw volume and flow requirements is likely present beneath the proposed lots from Aquifer 351 IIC. It should be noted, however that bedrock water production capability depends on encountering water-bearing fractures, and these fractures may or may not be present at any given drilling location.

- Groundwater may also be present in sand and gravel Aquifer 349 IIC. Although not mapped as below the proposed subdivision, it may overlie the bedrock in this area and also serve as a useful groundwater resource.
- Given the distances between the proposed lots and closest wells, it is unlikely that groundwater use at required 1 or 2 IGPM flow rate from the proposed lots will negatively affect groundwater supplies in the area.

On May 8, 2019, the Board gave Second Reading to Bylaw No. 2805 and referred the Bylaw to a Public Hearing. The Board also resolved that Final Adoption of Bylaw No. 2805 be withheld until the applicant has registered a covenant against the title of the subject property which would prohibit subdivision of the property until a professional hydrologist has verified that all wells proposed to service all new lots are proven to meet the quantity and quality standards of the Regional District Subdivision Servicing Bylaw and that the extraction of water from the wells will not negatively impact the water supply of neighbouring wells.

A Public Hearing was held on June 5, 2019. At the Regular Meeting held on June 19, 2019, the Board resolved that further consideration of application be deferred until the feasibility of establishing a community water system in the Keddlestone area is considered.

At the Regular Meeting held on May 20, 2020, the Board resolved that further consideration of the application be withheld until a comprehensive review of the water supply in Aquifer 351 has been completed and the review has confirmed the adequacy of water supply for the level of potential development in the study area. The Board further resolved that Bylaw No. 2805 be forwarded to a second Public Hearing after the review of the water supply in Aquifer 351 has been completed.

On July 29, 2022, staff sent a letter to the applicants advising that the Keddlestone Groundwater Study – Phase 2 has been presented to the Board of Directors and that the Board has requested a follow-up report as noted above. Staff spoke with the applicants and asked if they would like to provide any new information about the proposal. In response, the applicants advised that they would like to continue with the application as is.

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### **3. Zoning Amendment Bylaw No. 2838, 2019**

**File No.: 19-0350-C-RZ**  
**Address: Wallace Road**

The above noted application relates to a proposal to change the zoning of the above noted property from Non-Urban to Country Residential. If successful in rezoning the property, the applicant proposes to subdivide the property into 6 lots. Rezoning the property as proposed would potentially allow for the subdivision of up to 8 lots.

The application was presented to the Board of Directors as the Board had previously resolved at the Regular Meeting held on February 19, 2020 that the "current planning and development process be maintained for properties within, and obtaining water from Aquifer 349." This decision was based on the Board's consideration of the Keddlestone Groundwater Study prepared by Golder Associates Ltd and dated January 31, 2020 which identified the subject property as being above Aquifer 349 and concluded that "the potential for groundwater development in Aquifer 349 is generally considered to be feasible throughout the aquifer."



At the Regular Meeting held on September 18, 2019, the Board of Directors considered the application and gave First Reading to the associated Zoning Amendment Bylaw No. 2838. The Board resolved that Second Reading of the Bylaw be withheld until the applicant has provided a water study which takes into consideration the potential to service the full build-out potential of the subject property in accordance with the provisions of the Regional District Subdivision Servicing Bylaw and the impact the use of groundwater supplies could have on existing wells in the neighbourhood and the local aquifer.

In follow-up to the Board's direction, the applicant has submitted a report from Associated Engineering Ltd. dated May 2022 (available at: <https://www.rdno.ca/keddleston>). The report states that a desktop study was completed to assess groundwater availability for the property. The report states:

- Wells in the area source water from either Aquifer 349 or Aquifer 351.
- Average and geometric mean well yield for wells constructed in surficial deposits within 500 m of the site boundary are 99.7 m<sup>3</sup>/d and 55.6 m<sup>3</sup>/d, respectively, which are significantly higher than the 6.55 m<sup>3</sup>/d required under RDNO Subdivision Servicing Bylaw, thus indicating that required well yields would likely be achievable from wells drilled at the site.
- Average and geometric mean well yield for wells constructed in bedrock within 500 m of the site boundary are 116.3 m<sup>3</sup>/d and 80.2 m<sup>3</sup>/d, respectively, which are significantly higher than the 6.55 m<sup>3</sup>/d required under RDNO Subdivision Servicing Bylaw, thus indicating that required well yields would likely be achievable from wells drilled at the site.
- Based on a water demand of 6,550 L/day per lot, the proposed 7-8 lots' water demand would be approximately 1.2-1.8% of the estimated quantity of groundwater flow, as estimated using Darcy's flux calculations for the aquifers found beneath the site.
- The potential density of wells at the site would be similar (or less dense) to the density of existing wells in the area, suggesting that well interference caused by new domestic wells on the site is unlikely to be a problem.
- No drawdown of aquifer levels is indicated in the two observation wells (OBS Wells 311 and 322), suggesting that the use of groundwater at the existing well density is sustainable.
- It is reasonable to assume that there is sufficient groundwater available from either the surficial aquifer or the bedrock aquifer underlying the site to provide domestic use water supplies for 7-8 lots at the site. Based on the well log information for existing wells in the vicinity of the site, the bedrock aquifer appears to be the aquifer that is more likely to provide water supplies to any future properties on the site, although within the site there could be a combination of wells, some constructed in the surficial aquifer and some constructed in bedrock. It is also reasonable to assume, based on the findings of this assessment, that any impacts on neighbouring water supply sources from groundwater use from wells constructed at the site would be negligible.

On July 29, 2022, staff sent a letter to the applicant advising that the Keddleston Groundwater Study – Phase 2 has been presented to the Board of Directors and that the Board has requested a follow-up report as noted above. Staff spoke with the applicant and asked if he would like to provide any new information about the proposal. In response, the applicant advised that he would like to have the above noted report considered by the Board and that he would like to continue with the application as is.

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**4. Zoning Amendment Bylaw No. 2850, 2019**  
**File No.: 19-0906-C-RZ**  
**Address: 7500 McLennan Road**

The above noted application relates to a proposal to change the zoning of the above noted property from Non-Urban to Country Residential. If successful in rezoning the property, the applicants propose to subdivide the property into 8 lots. Rezoning the property as proposed would potentially allow for the subdivision of up to 8 lots.



At the Regular Meeting held on December 11, 2019, the Board of Directors considered the application and gave First Reading to the associated Zoning Amendment Bylaw No. 2850. The Board resolved that Second Reading of the Bylaw be withheld until the Regional District undertakes and completes the Keddleston Groundwater Study and the study has confirmed the adequacy of water supply for the level of potential development in the study area.

At the Regular Meeting held on May 20, 2020, the Board again considered Bylaw No. 2850 and again resolved that further consideration of the Bylaw be withheld until a comprehensive review of the water supply in Aquifer 351 has been completed and the review has confirmed the adequacy of water supply for the level of potential development in the study area.

In 2021, the property was sold to new owners. On July 29, 2022, staff sent a letter to the new owners to let them know that the Keddleston Groundwater Study – Phase 2 has been presented to the Board of Directors and that the Board has requested a follow-up report as noted above. Staff spoke with the new owner and asked if he would like to provide any new information about the proposal. In response, the applicant advised that he would like to continue with the application as is.

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## **5. Zoning Amendment Bylaw No. 2903, 2021**

**File No.: 21-0252-C-RZ**

**Address: Forsberg Road**

The above noted application relates to a proposal to change the zoning of a property located off the south end of Forsberg Road from Large Holding to Country Residential. If successful in rezoning the property, the applicants propose to subdivide the property into 27 lots. Rezoning the property as proposed would potentially allow for the subdivision of up to 30 lots.

The application was presented to the Board of Directors as the Keddleston Groundwater Study prepared by Golder Associates Ltd and dated January 31, 2020 identified the subject property as not being above Aquifers 349, 350 and 351 and the Board had not previously resolved to withhold further consideration of such applications.

At the Regular Meeting held on August 18, 2021, the Board of Directors considered the application and gave First Reading to the associated Zoning Amendment Bylaw No. 2903. The Board resolved that Second Reading of the Bylaw be withheld until the applicant has provided a water study which takes into consideration the potential to service the full build-out potential of the subject property in accordance with the provisions of the Regional District Subdivision Servicing Bylaw and the impact the use of groundwater supplies could have on existing wells in the neighbourhood, any underlying aquifer, and neighbouring downslope aquifers to the west.

In follow-up to the Board's direction, the applicant has submitted reports from Cassiar Geoscience dated August 27, 2021 and March 8, 2022 (available at: <https://www.rdno.ca/keddleston>). The August 27, 2021 report states the following:

- The findings presented should be considered within the context of the scope of work; further, the findings are time sensitive and considered valid only at the time this report was produced.
- A search of iMapBC indicates that there is no mapped aquifer beneath the subject property, although there are two mapped aquifers adjacent to the west-northwest boundary of the property.
- The northeast boundary of the confined sand and gravel Aquifer 349 is approximate and there is potential this aquifer may extend beneath the subject property. The other aquifer (Bedrock Aquifer 350) may also extend towards the direction of the subject property and may outcrop within the property or the upland area to the east of the property.

- Based on a desktop review of available water well and aquifer data it is inferred that groundwater is likely present beneath the subject property which would be sufficient to service the full build out (up to 30 lots) of the development and have negligible effect on any neighbouring wells.
- It is anticipated that either a bedrock aquifer or an unconsolidated glacial aquifer could be encountered within 300 feet (91 m) of the ground surface.
- It is recommended as the project progresses to subdivision to drill a minimum of one test well to add certainty to the abundance of groundwater within the subject property. A pumping test may be required depending on the lithology encountered and the results from a standard well yield test.

The March 8, 2022 report states that:

- A new well was drilled on the property in the northwest corner. On February 8th, 2022, the drillers conducted a short-term yield test via the air-lifting technique for approximately 1.25 hours. The measured flow rate was 30 gallons per minute (gpm).
- The bedrock in which the well is located has characteristics of a confined aquifer.
- The high potentiometric water level combined with the yield test flow rate of 30 gpm confirm that this well is capable of meeting the subdivision bylaw requirements of the Regional District of North Okanagan. In addition, it is not expected that there will be interference with other domestic water wells as the nearest registered water well is approximately 400 m northwest of Well #1.

On July 29, 2022, staff sent a letter to the applicants advising that the Keddlestone Groundwater Study – Phase 2 has been presented to the Board of Directors and that the Board has requested a follow-up report as noted above. Staff spoke with the applicants and asked if they would like to provide any new information about the proposal. The applicants advised that they would like to have the above noted reports considered by the Board and that they would like to continue with the application as is.

## **DISCUSSION:**

### **1. OCP Amendment Bylaw No. 2771 and Zoning Amendment Bylaw No. 2772 (McLennan Road)**

The Planning Department recommends that further consideration of OCP Amendment Bylaw No. 2771 and Zoning Amendment Bylaw No. 2772 be withheld until the applicant has submitted a hydrogeological report which gives due consideration to the findings and recommendations of the Keddlestone Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (30 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifer 351.

The submission of a new hydrogeological report is recommended for the following reasons:

- The subject properties are located just to the east of the west and downgradient side of Aquifer 351 which the Keddlestone Groundwater Study – Phase 2 identifies as an area where groundwater supplies “may be limited and will require future proof of water assessments for subdivision or development approvals in this area to characterize the groundwater supply potential sufficiently, and groundwater protection and conservation measures should be considered.” While the Keddlestone Groundwater Study – Phase 2 does not identify the property as being located in an area of specific concern, it does identify the property as being in an area that requires continued groundwater monitoring and stronger proof of water supply requirements for new developments.
- the hydrogeological reports submitted for the application conclude that sufficient groundwater resources exist on the site to support the rezoning application for development to be serviced by private wells without negatively impacting existing wells in the neighbourhood. However, the report

does not explicitly consider the findings of the Keddleston Groundwater Studies - Phase 2 and while the methodology used to support the findings in the report is very comprehensive, it does not appear to be as comprehensive as the methodology recommended for "existing development applications" in the Keddleston Groundwater Study – Phase 2.

- for existing development applications, the Keddleston Groundwater Study – Phase 2 recommends that for each well proposed to be used as a water supply, an analysis be done of at least one year of continuous groundwater level monitoring data and a pumping test be done that adheres to the proposed changes to the Subdivision Servicing Bylaw and Building Bylaw, including a 48-72 hour pump test on each well proposed to service a lot. Of note, the methodology used to support the findings of the hydrogeological report submitted for the application include the drilling of 18 wells on the subject properties, of which 15 wells satisfy RDNO Subdivision Bylaw requirements. All 18 of the wells have driller-estimated yields above the RDNO requirement of 1.2 US gmp. 12 of the 18 wells have driller-estimated yields equal to or greater than the RDNO threshold of 3.6 US gpm which pumping tests are not required. One well did not meet Bylaw requirements when subjected to a 72-hr pumping test, and two wells have lower driller-estimated yields and still require pumping tests to verify adequate yields. 72-hour pumping tests were conducted on 5 of the on-site wells. Water level monitoring was conducted on 11 on-site and off-site wells.
- Simulation of collective effects of multiple wells drawing on the aquifer was evaluated by subjecting a centrally located well, WPID 62008, to a variable rate step test and a continuous high volume 72-hour pumping test. The pumping rate used for this test (30 US gpm) was chosen based on the results of the step test, and is equivalent to 25 domestic wells being operated at the RDNO Bylaw requirement at the same time.
- the submission of a revised hydrogeological report could compare the methodology outlined in the reports submitted for the application with the methodology recommended in the Keddleston Groundwater Study – Phase 2 and provide an opinion on whether the methodology used in the prior report is a reasonable proxy to the methodology recommended in the latter report.

Should the Board of Directors wish to obtain public comments on the proposal based on the fact that the applicant has submitted a comprehensive hydrogeological report, the Board could recommend that the Bylaws be advanced to a Public Hearing at this stage. Should the Board wish to take this approach, staff recommend that Final Adoption of the Bylaws be withheld until a covenant has been registered on the title of the subject properties to ensure the property is developed in accordance with the recommendations of the hydrogeological reports which recommend a phased approach to development commencing with an initial phase of 10 lots at the north end of the property while groundwater levels in multiple wells onsite continue to be monitored to develop a better understanding of seasonal groundwater fluctuations and aquifer recharge. The longer-term monitoring data would be used as the basis for a decision to amend the covenant to allow future phases of development to the south to proceed.

Alternatively, the Board could resolve to only support rezoning a portion of the properties consistent with the recommendation of the hydrogeological reports. The remainder of the properties could be rezoned once the owner submits a hydrogeological report with water supply data that demonstrates the potential to service the full-build out potential of the properties.

## **2. Zoning Amendment Bylaw No. 2805 (Wilson Jackson Road)**

The Planning Department recommends that further consideration of Zoning Amendment Bylaw No. 2805 be withheld until the applicant has submitted a hydrogeological report which gives due consideration to the findings and recommendations of the Keddleston Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (4 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifers 349 and 351 and from alluvial deposits along BX Creek.

The submission of a new hydrogeological report is recommended for the following reasons:

- the subject property is located in the Wilson-Jackson / upper Keddleston Road and Clearview Road area which the Keddleston Groundwater Study – Phase 2 identifies as an area “where groundwater availability issues exist and where the groundwater supply potential is inferred to be limited.”
- the property is also located in the Wilson-Jackson Road, Jordashe Road and Chew Road area which the Keddleston Groundwater Study – Phase 2 identifies as an area “where groundwater availability is relatively low in the alluvial deposits within the central portion of the Keddleston Area and a sustainable groundwater source may be limited in the area, particularly during drier years.”
- the hydrogeological report submitted for the application concludes that sufficient groundwater resources would be available at the site to support 4 lots and that it is unlikely that groundwater use from the proposed lots would negatively affect groundwater supplies in the area. However, the report does not consider the findings of the Keddleston Groundwater Studies (Phases 1 and 2) and the methodology used to support the findings in the report is not as comprehensive as the methodology recommended for “existing development applications” in the Keddleston Groundwater Study – Phase 2.
- for existing development applications, the Keddleston Groundwater Study – Phase 2 recommends that for each well proposed to be used as a water supply, an analysis be done of at least one year of continuous groundwater level monitoring data and a pumping test be done that adheres to the proposed changes to the Subdivision Servicing Bylaw and Building Bylaw, including a 48-72 hour pump test on each well proposed to service a lot. Of note, the methodology used to support the findings of the hydrogeological report submitted for the application did not include groundwater level monitoring or a 48-72 hour pump test. The report analyzed the results of a 24 hour pump test conducted on one well on the property.

### **3. Zoning Amendment Bylaw No. 2838 (Wallace Road)**

The Planning Department recommends that further consideration of Zoning Amendment Bylaw No. 2838 be withheld until the applicant has submitted a hydrogeological report which gives due consideration to the findings and recommendations of the Keddleston Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (8 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifers 349 and 351.

The submission of a new hydrogeological report is recommended for the following reasons:

- the property is located to the east of the west-central edge of Aquifer 349 which the findings of the Keddleston Groundwater Study – Phase 2 show that “there is variability in the groundwater potential of Aquifer 349, and the potential for a sustainable groundwater supply is limited.” While the Keddleston Groundwater Study – Phase 2 does not identify the property as being located in an area of specific concern, it does identify the property as being in an area that requires continued groundwater monitoring and stronger proof of water supply requirements for new developments.

- the hydrogeological report submitted for the application concludes that there is sufficient groundwater available from either Aquifer 349 or 351 to provide domestic use water supplies for 7-8 lots and that any impacts on neighbouring water supply sources from groundwater use from wells constructed at the site would be negligible. However, the report does not consider the findings of the Keddleston Groundwater Studies (Phases 1 and 2) and the methodology used to support the findings in the report is not as comprehensive as the methodology recommended for "existing development applications" in the Keddleston Groundwater Study – Phase 2.
- for existing development applications, the Keddleston Groundwater Study – Phase 2 recommends that for each well proposed to be used as a water supply, an analysis be done of at least one year of continuous groundwater level monitoring data and a pumping test be done that adheres to the proposed changes to the Subdivision Servicing Bylaw and Building Bylaw, including a 48-72 hour pump test on each well proposed to service a lot. Of note, the methodology used to support the findings of the hydrogeological report submitted for the application did not include groundwater level monitoring or the testing of a well on the property.

#### **4. Zoning Amendment Bylaw No. 2850 (McLennan Road)**

The Planning Department recommends that further consideration of Zoning Amendment Bylaw No. 2850 be withheld until the applicant has submitted a hydrogeological report which gives due consideration to the findings and recommendations of the Keddleston Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (8 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifer 351.

The submission of a new hydrogeological report is recommended for the following reasons:

- the subject property is located just to the east of the west and downgradient side of Aquifer 351 which the Keddleston Groundwater Study – Phase 2 identifies as an area where groundwater supplies "may be limited and will require future proof of water assessments for subdivision or development approvals in this area to characterize the groundwater supply potential sufficiently, and groundwater protection and conservation measures should be considered." While the Keddleston Groundwater Study – Phase 2 does not identify the property as being located in an area of specific concern, it does identify the property as being in an area that requires continued groundwater monitoring and stronger proof of water supply requirements for new developments.
- a hydrogeological report has not been submitted for the application. It is noted that the Board resolved that Second Reading of the Bylaw be withheld until the Regional District undertakes and completes the Keddleston Groundwater Study and the study has confirmed the adequacy of water supply for the level of potential development in the study area.

#### **5. Zoning Amendment Bylaw No. 2903 (Forsberg Road)**

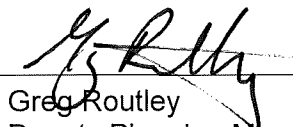
The Planning Department recommends that further consideration of Zoning Amendment Bylaw No. 2850 be withheld until the applicant has submitted a hydrogeological report which gives due consideration to the findings and recommendations of the Keddleston Groundwater Study – Phase 2 and which demonstrates:

- that groundwater sources would be available to service the full buildout potential of the subject property (30 lots) in accordance with the provisions of Subdivision Servicing Bylaw No. 2600; and
- that the use of the groundwater supplies would not have a negative impact on the use of existing wells that obtain water from Aquifers 349 and 350.

The submission of a new hydrogeological report is recommended for the following reasons:

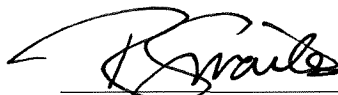
- the hydrogeological report submitted by the applicant notes that the property may partially overlap Aquifers 349 and 350. The Keddleston Groundwater Study – Phase 2 identified that there is a limited groundwater supply for a portion of Aquifer 349 and the Keddleston Groundwater Study prepared by Golder Associates Ltd and dated January 31, 2020 concludes that properties within Aquifer 350 have limited to no capacity for further development based upon water balance estimates showing that groundwater use is similar or greater than the predicted recharge.
- the hydrogeological report submitted for the application concludes that groundwater is likely present beneath the subject property which would be sufficient to service the full build out of the development and have negligible effect on any neighbouring wells. However, the report does not consider the findings of the Keddleston Groundwater Studies (Phases 1 and 2) and the methodology used to support the findings in the report is not as comprehensive as the methodology recommended for "existing development applications" in the Keddleston Groundwater Study – Phase 2.
- for existing development applications, the Keddleston Groundwater Study – Phase 2 recommends that for each well proposed to be used as a water supply, an analysis be done of at least one year of continuous groundwater level monitoring data and a pumping test be done that adheres to the proposed changes to the Subdivision Servicing Bylaw and Building Bylaw, including a 48-72 hour pump test on each well proposed to service a lot. Of note, the methodology used to support the findings of the hydrogeological report submitted for the application did not include groundwater level monitoring or a 48-72 hour pump test. One well has been drilled on the property and the report notes that the drillers conducted a short-term yield test on the well via the air-lifting technique for approximately 1.25 hours.

Submitted by:



Greg Routley  
Deputy Planning Manager

Endorsed By:



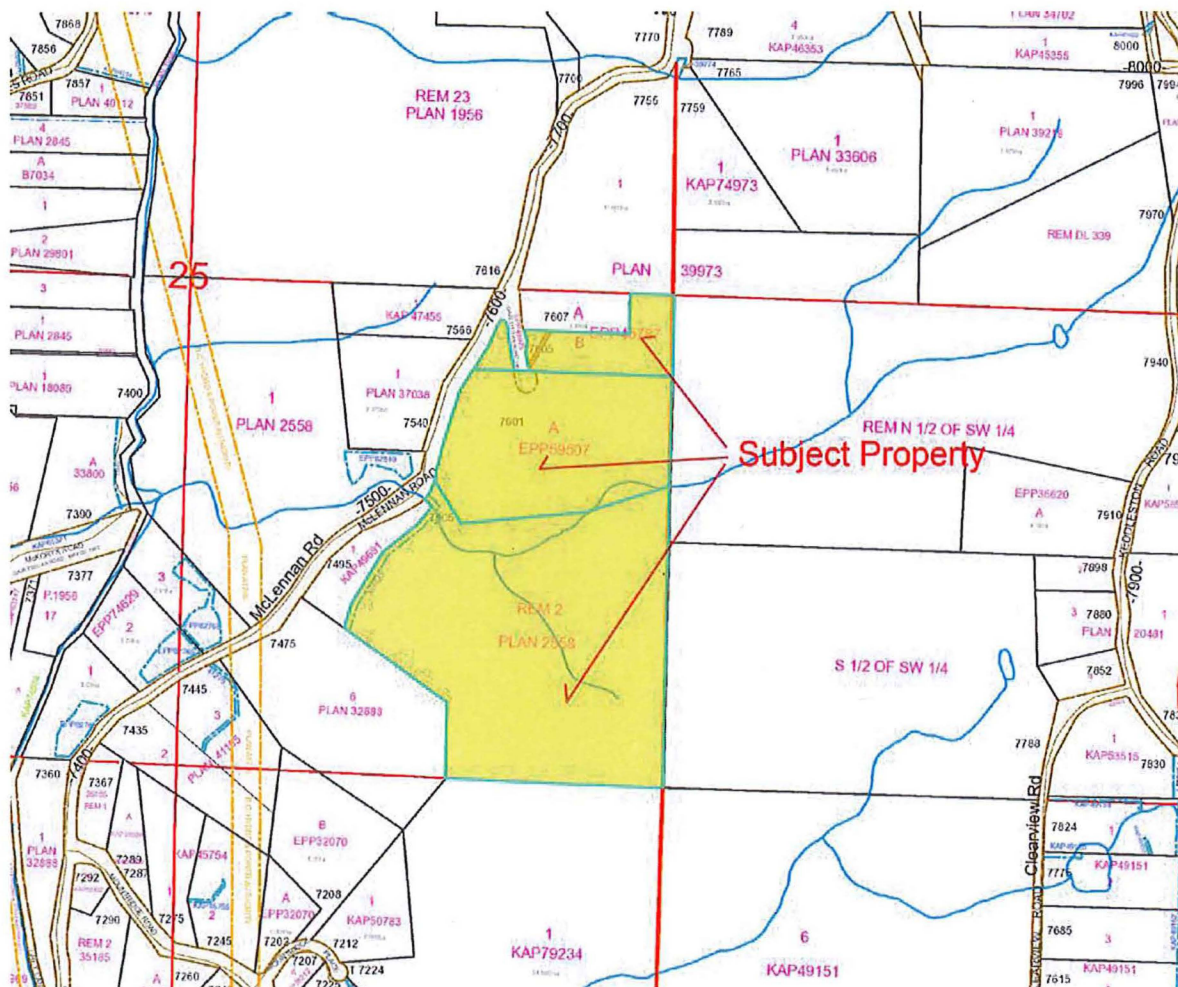
Rob Smailes, RPP, MCIP  
General Manager, Planning and Building

Approved for inclusion by:

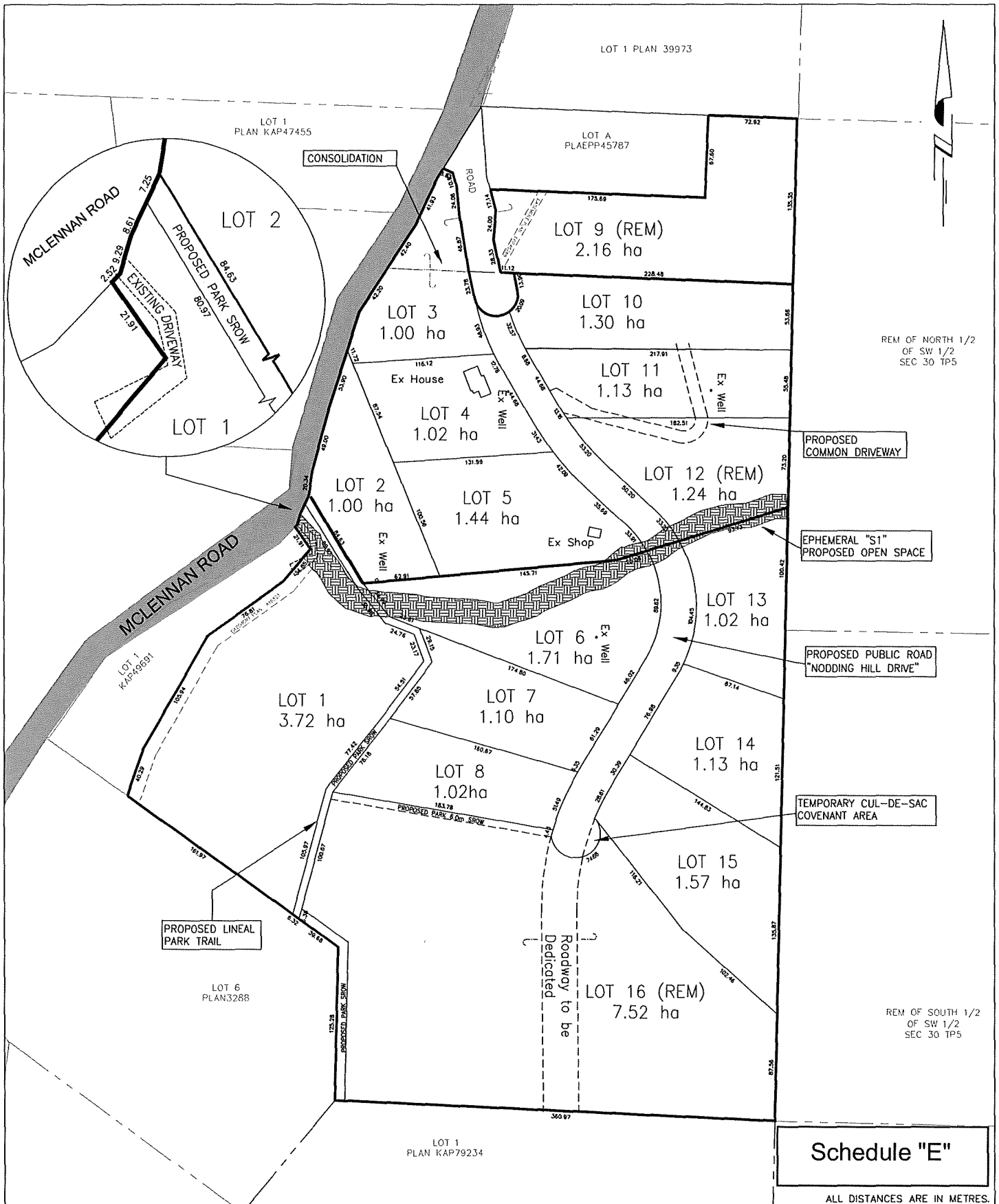


David Sewell  
Chief Administrative Officer

**File:** 17-0076-C-OR  
**Owner/Applicant:** Nodding Hill Developments Ltd  
**Location:** 7505, 7605 & 7601 McLennan Rd







SKETCH PLAN OF SUBDIVISION OF:

(1) LOT B, SEC 25, TP 8, ODYD, PLAN EPP45787; EXCEPT PLAN EPP45973;

(2) LOT A, , SEC 25, TP 8, ODYD, PLAN EPP59507;

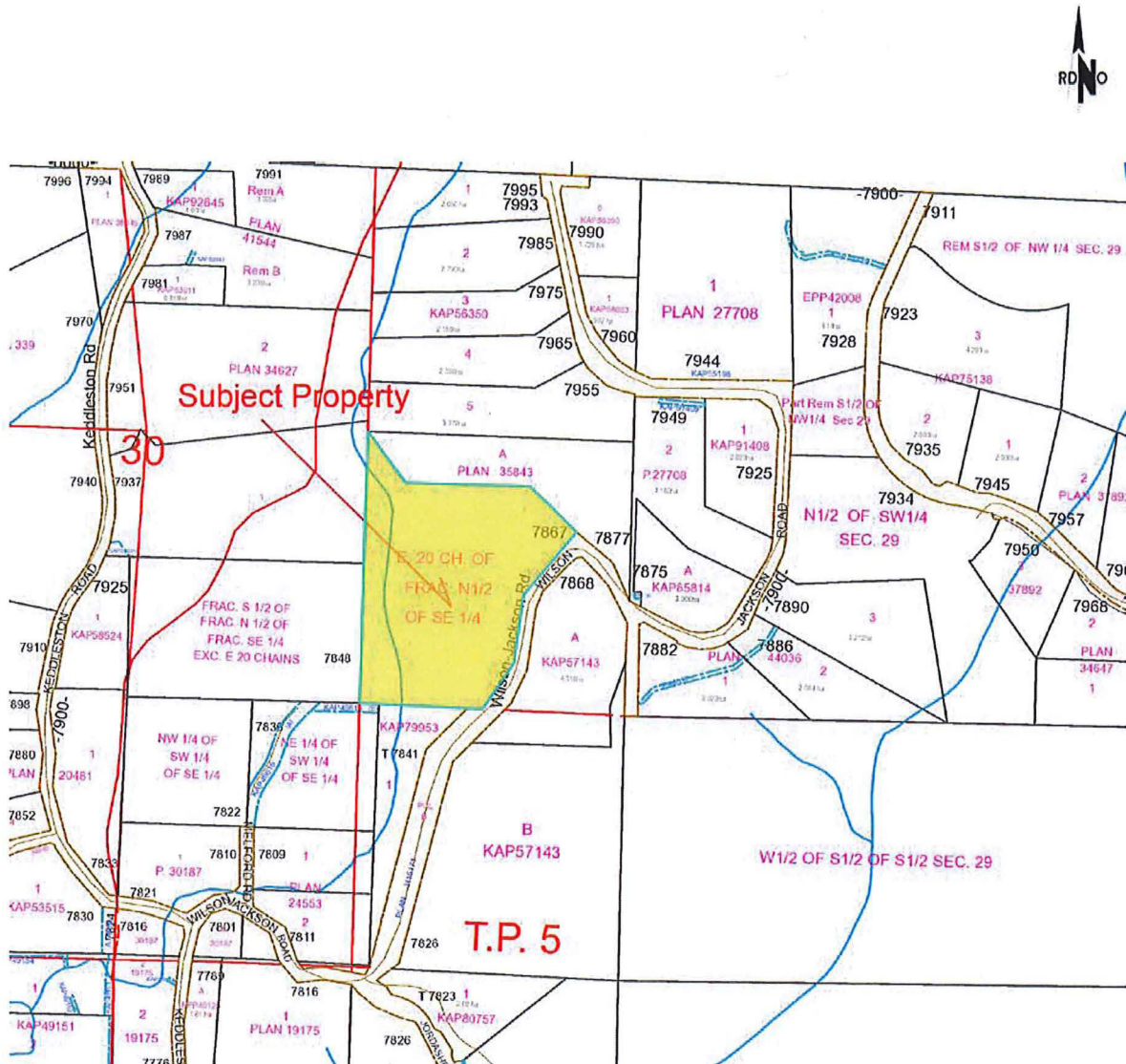
(3) REM LOT 2, SEC 25. TP 8, ODYD, PLAN KAP2558; EXCEPT PLANS KAP49691 KAP78923 and EPP59507

(16 Lots including 3 Remainders)

SCALE: 1:4000	OUR FILE: MCL-17
DATE: 10 JUN 2018	DRAWN: JFG
NODDING HILL DEVELOPMENTS	
FIGURE #3	

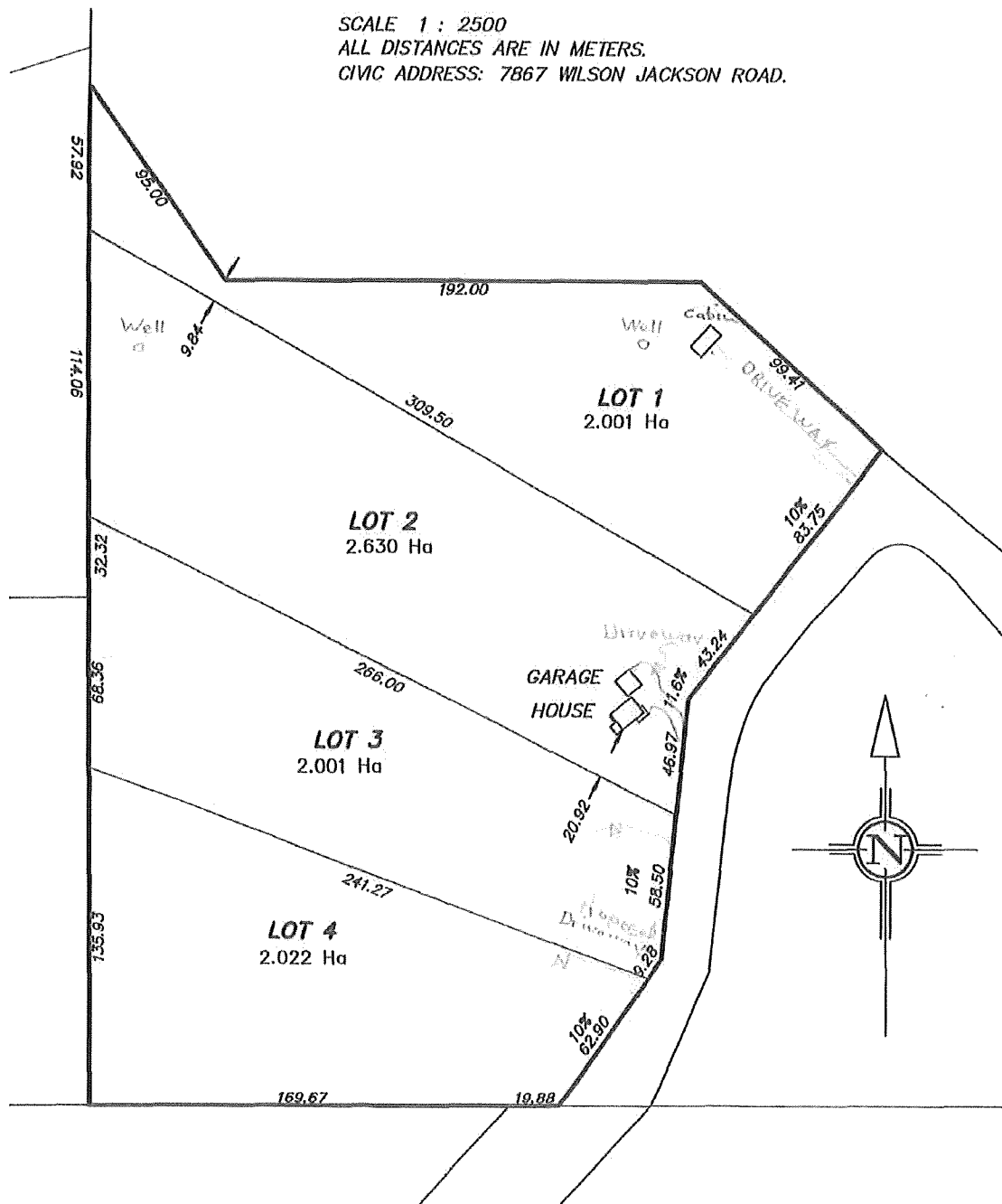
# SUBJECT PROPERTY MAP

File: 18-0681-C-RZ  
Owner/Applicant: Roy & Rebecca Ott  
Location: 7867 Wilson Jackson Road



**SKETCH PLAN OF PROPOSED SUBDIVISION OF  
REM. EAST 20 CHAINS OF FRAC. N 1/2, SE 1/4,  
SEC 30, TP.5, ODYD.**

SCALE 1 : 2500  
ALL DISTANCES ARE IN METERS.  
CIVIC ADDRESS: 7867 WILSON JACKSON ROAD.



**CAUTION:**

A THOROUGH EVALUATION OF REQUIREMENTS WAS MADE DURING THE PREPARATION OF THIS SKETCH, BUT IT IS THE SOLE RESPONSIBILITY OF THE USER TO ENSURE FULL COMPLIANCE WITH ALL NECESSARY REGULATIONS.

ALL DIMENSIONS AND AREAS SHOWN HEREON ARE APPROXIMATE AND ARE SUBJECT TO LEGAL SURVEY.

THIS SKETCH MAY INCLUDE INFORMATION SUPPLIED BY THE CLIENT OR THE CLIENT'S AGENT.

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PREPARED FOR:  
ROY OTT \_\_\_\_\_ FOR ONE TIME USE.

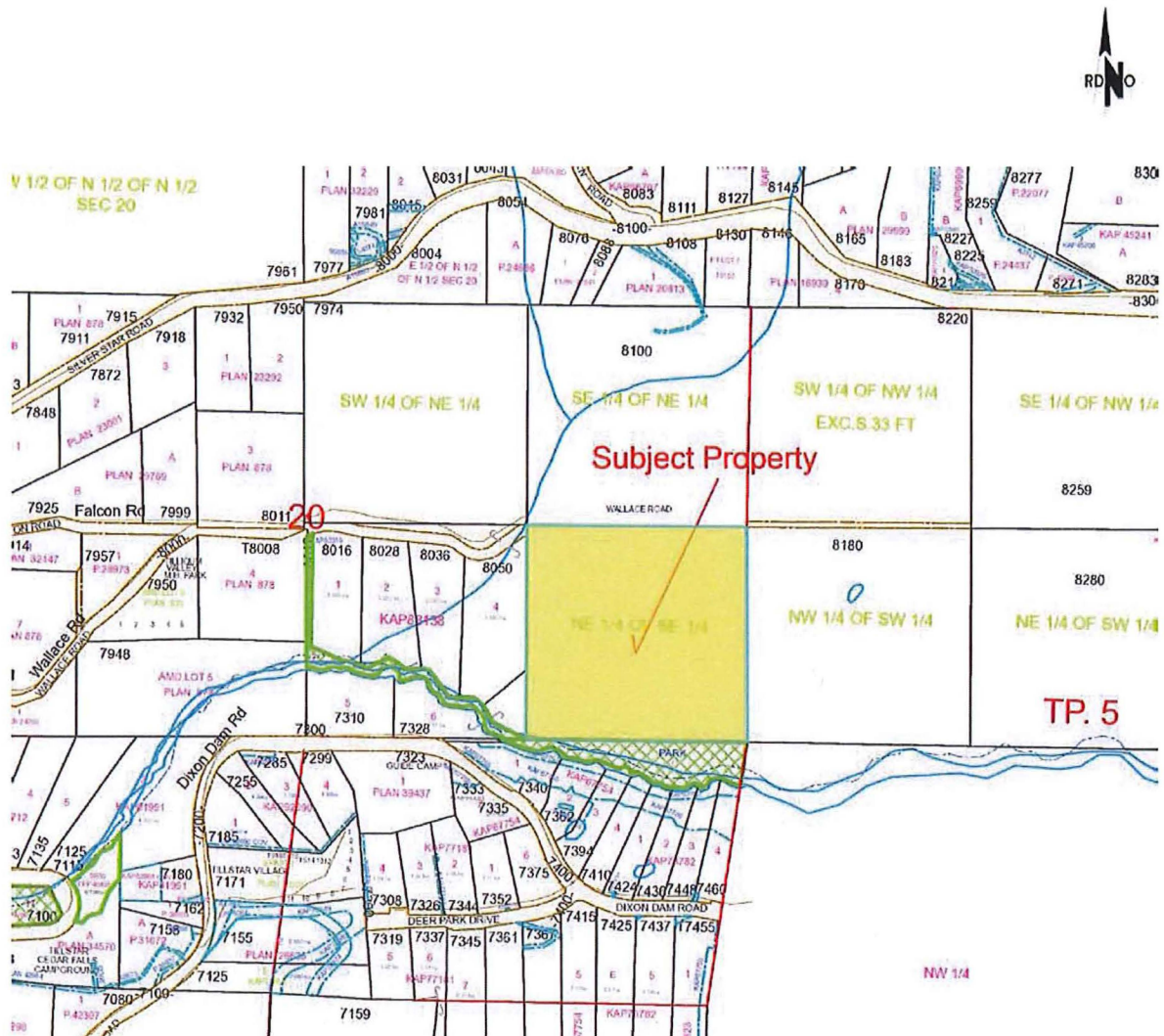
PROFESSIONAL LAND SURVEYORS  
**SHOESMITH LAND SURVEYS**

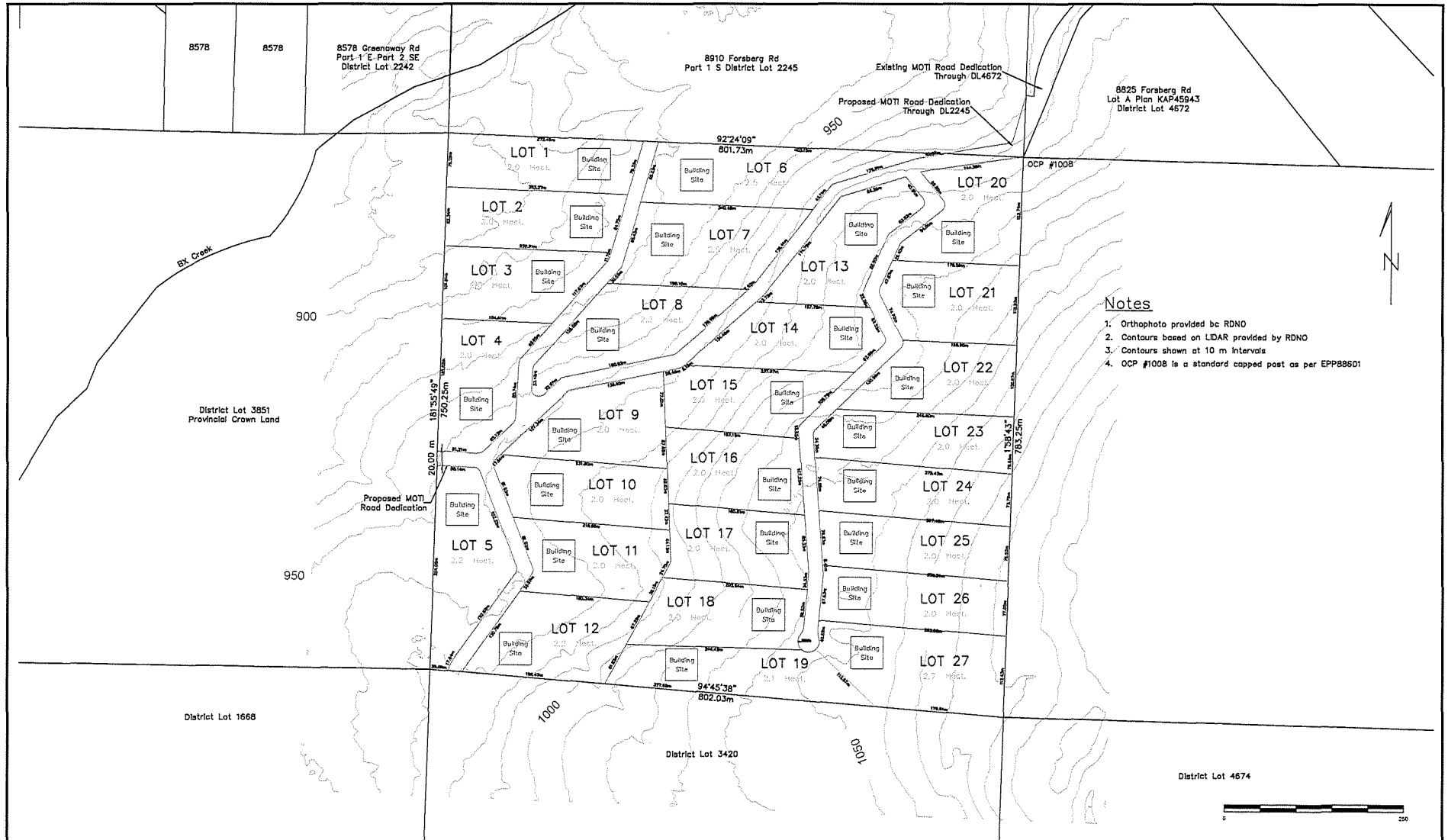
50 SARAH LANE TELEPHONE: 250-503-7971  
COLDSTREAM, BC V1B2X1 FILE: 4642 FB.: LOOSE

4642 SKT 1.DWG  
2JUN15

**File:** 19-0350-C-RZ  
**Owner/Applicant:** Down's Enterprises c/o Monashee Surveying  
**Location:** Wallace Road

**Location:** Wallace Road





#### Notes

1. Orthophoto provided by RDNO
2. Contours based on LIDAR provided by RDNO
3. Contours shown at 10 m intervals
4. OCP #1008 is a standard capped post as per EPP88601

REV.	DATE	REVISION/DESCRIPTION	BY

Green Stream Consulting Ltd.  
106-460 Doyle Ave  
Kelowna B.C., V1Y 0C2  
Tel (250) 804-9215



Sketch Plan to Accompany Application for Rezoning

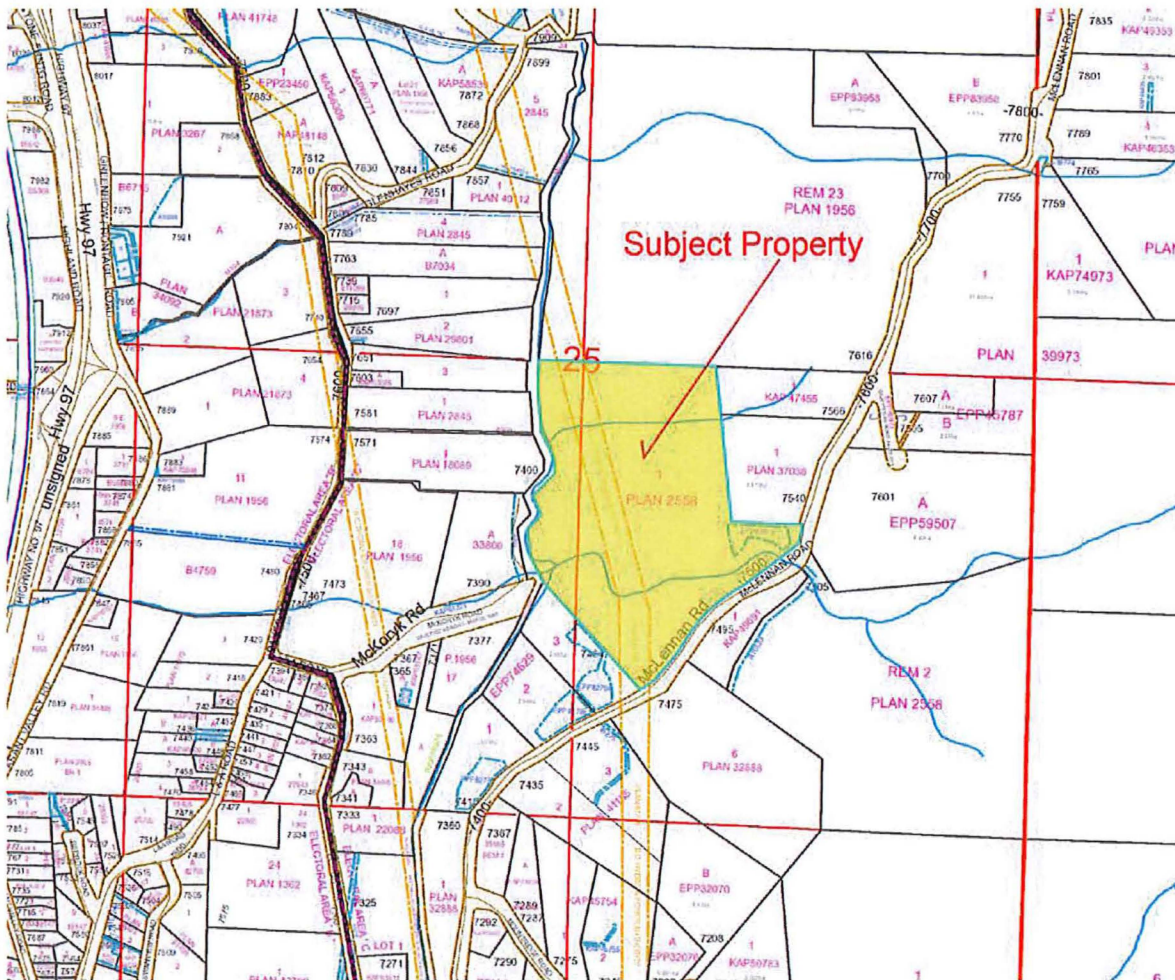
**Subdivision Conceptual Drawing**  
District Lot 3421

SURVEYED:	N/A	DATE:	March 2021
DESIGNED:	N/A	FILE:	2021-002-02
DRAWN:	DEG	PAGE:	1 of 2
CHECKED:	MRS	DRAWING NO.:	2021-002-01
SCALE:	N/A	REV.	A

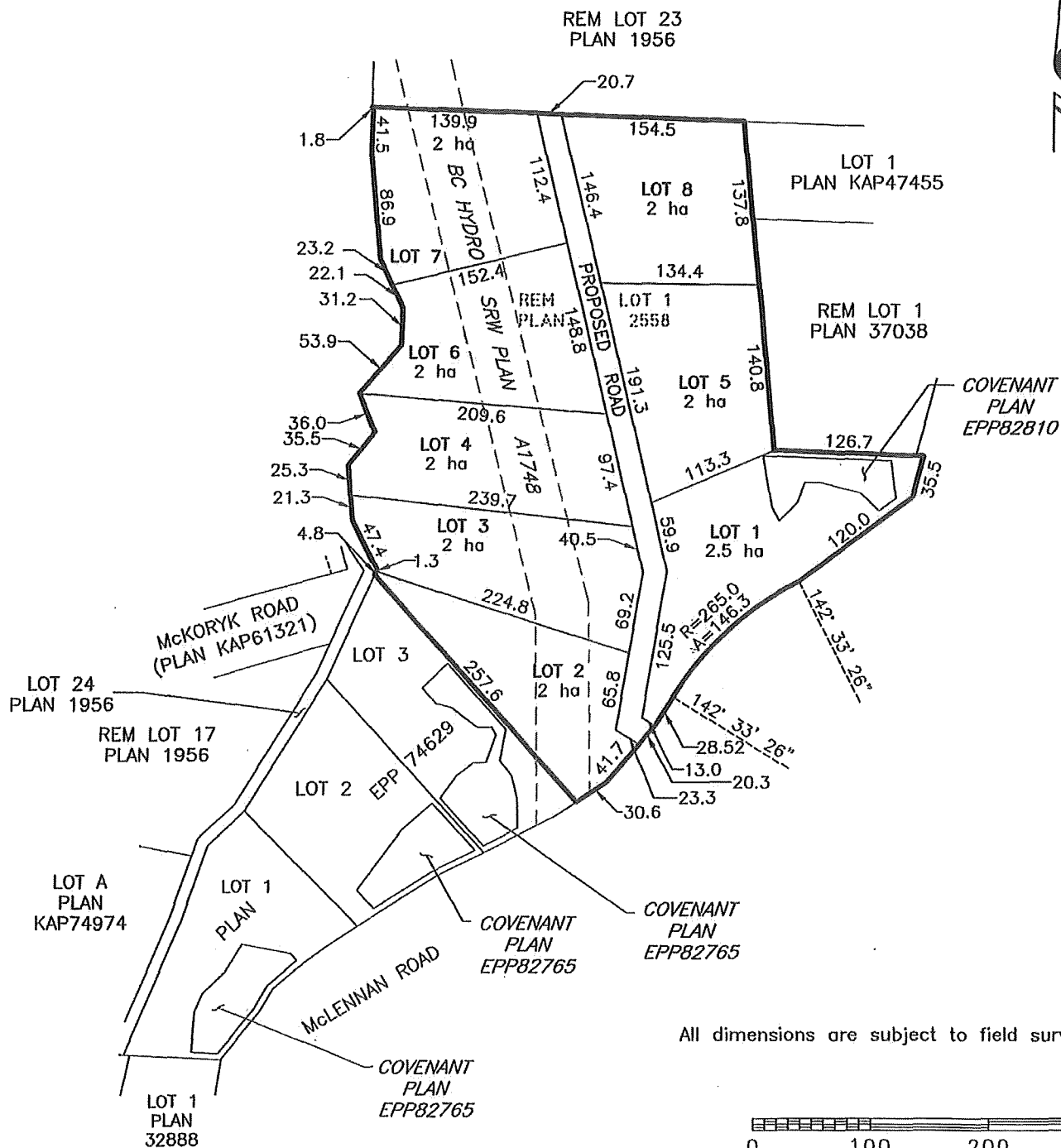


# SUBJECT PROPERTY MAP

File: 19-0906-C-RZ  
Owner/Applicant: Dacron Enterprises c/o Chris Bonnough  
Location: McLennan Road



ALL DISTANCES ARE IN METRES.



All dimensions are subject to field survey.



PLAN OF PROPOSED REZONING AND  
SUBDIVISION OF LOT 1, PLAN 2558,  
SEC 25, TP 8, ODYD EXCEPT PLANS  
37038 & EPP74629

106750A01

SCALE: 1 : 5000 OUR FILE: R10675

DATE: 30 Sep 2019 DRAWN: KG

Dacron Enterprises Ltd

MADDOX & COMPANY

LAND SURVEYORS

3500 - 30th STREET

VERNON, BC V1T 5E8

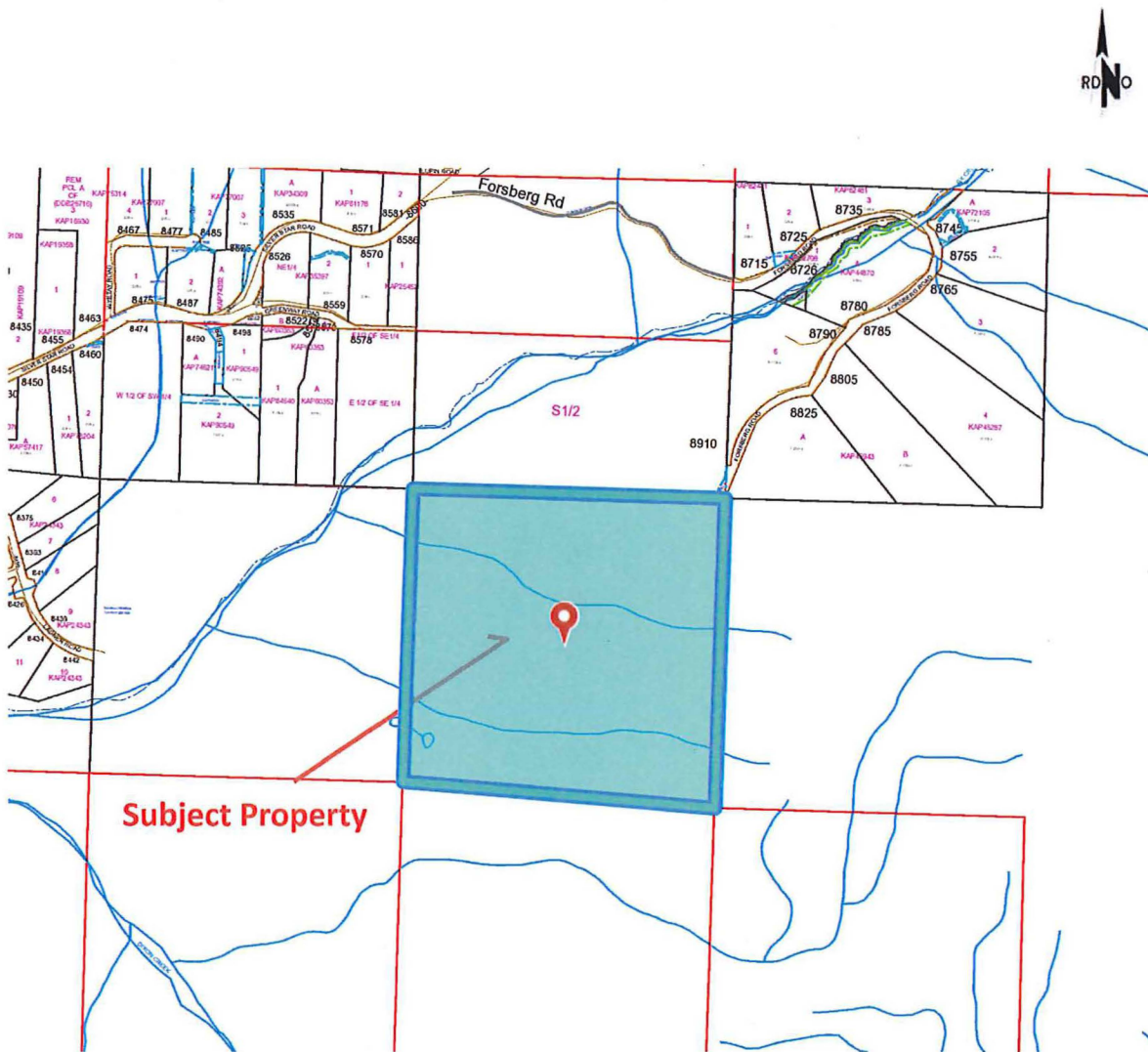
TELEPHONE: (250) 542-4343



# SUBJECT PROPERTY MAP ZONING AMENDMENT

File: 21-0252-C-RZ  
Owner/Applicant: EAG Holdings / Black Stream Holdings / M2MS Holdings  
c/o Doug Griffin  
Location: Forsberg Road

---





SCALE 1:2500

ALL DISTANCES ARE IN METERS.  
CONTOURS ARE FROM MAPPING AND ARE  
AT 5m INTERVALS

THIS PLAN WAS PREPARED FOR THE  
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CORNERS.

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AND CONSEQUENTIAL DAMAGES ARISING OUT  
OF OR IN CONNECTION WITH ANY DIRECT OR  
INDIRECT USE OR RELIANCE UPON THE PLAN  
BEYOND ITS INTENDED USE.

DATED: SEPTEMBER 6 2018

DRAWING: 6932 SITE PLAN.dwg



SURVEYING • GEOMATICS

3710A 26th Street Vernon, B.C. V1T 0X2  
Tel. (250) 545 5990 Fax (250) 545 5912

SHEETS 1 OF 1 SHEETS

