



Geotechnical Report

To: Kevin Nightingale
AKM Custom Homes

Date: April 28, 2023

From: Rock Glen Consulting Ltd.
Okanagan Falls, BC

File: RGC-2960

Subject: ***Geotechnical Assessment for Demolition of House and Backfilling
At 811 West Bench Drive, Penticton, BC***

1 Introduction

Rock Glen Consulting Ltd. (RGC) was retained by Mr. Kevin Nightingale (AKM Custom Homes- General Contractor) to review geotechnical conditions related to planned demolition and backfilling of an old house site at 811 Westbench Drive, Penticton BC.

Previously RGC assessed geotechnical conditions at this property for a recently constructed new house and septic system. RGC have considered previous geotechnical reports and prepared this report to meet requirements of RDOS Bylaw. RGC have prepared Schedule B- Assurance for Field Reviews, as part of planned demolition and backfilling works.

In accordance with Regional District of Okanagan Similkameen (RDOS) Soils Removal and Deposit Permit (Bylaw No. 2500.29), Chief Administrative Office requires a geotechnical review of site conditions with respect to potential geotechnical/geohazard impacts of the proposed demolition on adjacent and downslope properties.

This report has been prepared based on RDOS requirements for obtaining an Soil Deposit and Approval Permit, adapted from Schedule 12 – Section 5d Hillside Development Permit Application Requirements.

1.1 Project Description

Subject property is located at 811 Westbench Drive in Summerland, BC as shown on the attached Figure 1- Location Plan.

The property has an approximate area of 3,495m² and is legally described as Lot 60, DL 5076, Plan KAP 5817, ODYD, Except plan 24758. See attached Figure 2 - Site Plan which includes spot elevations

RGC's understanding of the planned scope of project is to demolish old house (~1250 sqft in plan) and any associated buried services, including wood framed superstructure, concrete footings, surplus excavated material and plumbing or other buried materials. Considering the house plan area and assumed depth of concrete footings at 6ft, an estimated volume- 6,000 cubic feet (or 170m³) of structural backfill may be placed and compacted within the house footprint. Volume of soils materials to be removed from site is expected to be less than volume of materials imported.

This work is expected to exceed RDOS Bylaw limit of 25m³ and therefore a geotechnical assessment is required.

Soil movements to complete the scope of this project include hauling surplus excavated material to spoil off site and importing structural fill materials as backfill within the footprint of the demolished house. Demolition and earthworks are expected to be completed by the end of 2023.

2 Geotechnical Assessment

In accordance with the requirements of RDOS Soils Removal and Deposit Permit (Bylaw No. 2500.29), RGC's geotechnical assessment of the site included desktop review of GWBG reports mapping (Ecora, 2022) and previous RGC reports for the property, and a site reconnaissance visit to confirm site conditions.

2.1 Geological Setting

The subject property is located east of Westbench Road across from intersection with Bartlett Drive.

Klohn Leonoff Geological Mapping - As shown on Figure 3: Hazard Plan, area surrounding 811 West Bench Drive as "Silt Bluff Hazard Zone" with a low to moderate hazard classification.

Geohazard mapping in GWBG report provide geotechnical characterisation for the subject property. List of geohazard characteristics and discussion are summarised below.

- Terrain Map, Map 2.0 – Glaciolacustrine Sediments

RGC observation of foundation for new house confirm that underlying sediments are glaciolacustrine in nature.

An indicative geological section of the property can be interpreted from Geological Section A-A (Appendix, GWBG). Although Section A-A is offset more than 500m from the property, drillhole 36132 (MOTI, 1976) is reasonable representation of soil stratigraphy, with a thickness of glaciolacustrine soils on surface underlain by glaciofluvial sediment, and cumulative thickness of 50m over bedrock.

- Geohazard Mapping

1. Landslide (Map 3.0)

Low Hazard – landslide setback distance $> 2.0H + 10m$, where H is height of silt bluff

The property is located about 350m from the nearest moderate landslide hazard area. A low landslide hazard classification is consistent with site observations. The subject property is flat to gently sloping, with an indicative elevation of 421m; gently sloping

northeast towards the lowest corner at elevation of 420.8m. See spot elevations across the property in Figure 2: Site Plan.

2. Sinkholes Hazard Zone (Map 4.0)

Moderate- areas located on glaciolacustrine silt sediments

The property is located about 250m from the nearest high hazard sinkhole area, and mapped sinkholes within a similar radius. No observations of sinkholes were recorded during recent construction activities

Mitigation during demolition and backfill activities will include protection of exposed silts slopes from rainfall and runoff. Placement of structural backfill and final site grading will address long term risks.

3. Collapsible Soils (Map 5.0)

Moderate Hazard – mapped as glaciolacustrine Silt sediments, where by a damaging soil collapse event, as significant soil compression is more likely to occur

Consideration of exposed silts and protection from rainfall and runoff will be required during demolition and backfill activities. Placement of structural backfill and final site grading will address long term risks of soil collapse due to changes in soil moisture.

- Geotechnical Constraints - Map 6.0

Zone B – moderate risk level for damaging event to occur (ie 100 to 1000 years)

Geotechnical Constraint Zones provide a cumulative assessment of the three unique hazards; whereby Zone B is indicative of land area with one of three hazards rated as moderate. For property at 811 Westbench Drive two hazards are mapped as moderate due the glaciolacustrine silt sediments. This consistent with site reconnaissance flat terrain and presence of glaciolacustrine sediments were observed.

For comparison, Zone A with Low probability of a damaging event and three hazards are rated low, are generally underlain by glaciofluvial sediments; located 50m across Westbench Drive. The nearest Zone C with high probability (one hazard rated high) is located approximately 350m to northeast.

visit to assess local site conditions. This report provides a summary of geotechnical and a geohazard assessment for the planned demolition and backfilling at 811 West Bench Drive.

2.2 Site Investigation

Previously, RGC excavated two test pits on the property and soils were primarily SILTS with some fine-grained SANDS. These predominantly silt soils are susceptible to collapse and settlement when subjected to excess moisture conditions. Mitigative measures, including placement of a protective layer of crushed gravel and the installation of foundation drainage around the planned house, are required to protect these silt soils.

2.3 Site Reconnaissance

A site visit to the property was conducted by Travis Brown (RGC) and Kevin Nightingale (AKM) on April 26, 2023. Site reconnaissance found alignment between existing areas of disturbance and RGC's previous testpit logs and photos, which describe fine-grained glaciolacustrine SILT soils underlying the broader site.

The arrangement of site structures was confirmed as shown in Figure 2: Site Plan. The property is access from West Bench Drive via a panhandle driveway, and is surrounded by developed residential lots. On the day site observations of site soils were limited to areas of recent disturbance. Review of previous RGC testpit logs and recent house construction photos also confirm presence of glaciolacustrine sediments. It is anticipated that construction backfill materials may be present near the old house but this will be confirmed further as part of demolition.

Groundwater levels are expected to be greater than 5m below ground- based on RGC's experience in the area.

The planned house demolition will not have a significant change for the impermeable area on the property; as new house was recently constructed such that impermeable area on the property will relatively unchanged and should not affected geotechnical site conditions. Collection or ponding of runoff within the backfilled materials be mitigated by compacted soil density and surrounding grades.

During demolition and backfilling control of runoff and avoid concentrated flow that could cause soil erosion.

3 Conclusion

This geotechnical assessment was completed on the basis of desktop assessment including review of reference reports, previous RGC geotechnical projects and a brief site reconnaissance to assess the possible consequences of the planned demolition of old house and buried services.

Geotechnical conditions at 811 Westbench Drive are expected to consist of fine-grained glaciolacustrine SILT soils underlying the broader site, with backfill materials adjacent to the old house foundation. RGC confirms the property is considered Zone B (GWBG, 2022) with a moderate risk of a Sinkhole or Collapsed soils event, occurring with a 1 in 100 to 1000 year return period.

Where RDOS impose conditions on the Soils Permit, RGS recommend the following mitigative measures for soils movements related demolition and backfilling of old house at subject property:

1. The scope of the demolition and backfilling of the old house will have no net increase in impervious surfaces, considering recent construction of new house (in 2022).
2. The silt soils underlying the property at 811 West Bench Drive are suitable for the planned demolition and backfilling of the original house. Typical backfill details include placement 75mm minus structural backfill material, in lifts of 300mm thickness and to be compacted to 98% SPMD. Site soils should remain stable once backfilling is complete.

3. Final site grades will tie to existing grades surrounding the old house, offering limited changes the existing gentle grades, with no slopes affected.
4. Previous RGC assessment identified only limited geohazards on the subject property. In this regard, proper water management on the property is required to maintain soil stability during demolition and backfilling. RGC are available for field reviews during project activities.
5. An RGC professional geotechnical engineer shall review excavation subgrade, progress of structural backfilling, and final site grading.

4 References

1. Rock Glen Consulting, 2020. Memorandum to Kevin Nightingale, Subject: Geohazard Assessment for a Proposed House at 811 West Bench drive, Penticton BC. RGC File- 2966. Dated 27 February, 2020.
2. Aztec Drafting Services, 2019. Figure 2- Proposed Site Plan- Bitor-Webb Residence- 811 Westbench Drive Penticton BC. Project No 181783. Sheet 1 of 1 Rev 0 (Dated 30 September, 2019).
3. Klohn Leonoff Ltd. 1992. "West Bench / Sage Mesa Geological Hazards Review", submitted to the Regional District of Okanagan-Similkameen. File PB5847 0101. Richmond, BC.
4. Ecora & Clarke Geoscience Ltd., 2022. "Greater West Bench Geotechnical Review Report". File No 191010. Dated December 22, 2022. Regional District of Okanagan Similkameen.
5. EGBC. 2010. "Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC". Vancouver, BC.
6. Roed, M.A. and R.J. Fulton (Eds.) (2011). "Okanagan Geology South – Geologic Highlights of the South Okanagan Valley, British Columbia". Okanagan Geology Committee. Kelowna, BC.

5 Closure and Limitations

This report was prepared for Kevin Nightingale of AKM Custom Homes with respect to planned demolition and backfilling of foundation area at 811 West Bench Drive in Penticton, BC. RGC's assessment was completed in accordance with generally accepted geotechnical engineering practice. No other warranty, expressed or implied, is intended. RGC assessment does not consider contaminated soils or details of material movements.

We trust that the contents of this letter are appropriate for requirements of Soil Permit Application .
If you have any questions, please do not hesitate to contact our office.

Yours truly,

This document is a printed copy from a digitally authorized original.



2023-04-28

Travis Brown, P.Eng.
Rock Glen Consulting Ltd.
EGBC Permit No. 1002767

- Attachments:
- 1) Figure 1: Location Plan
 - 2) Figure 2: Site Plan
 - 3) Figure 3: Hazard Map



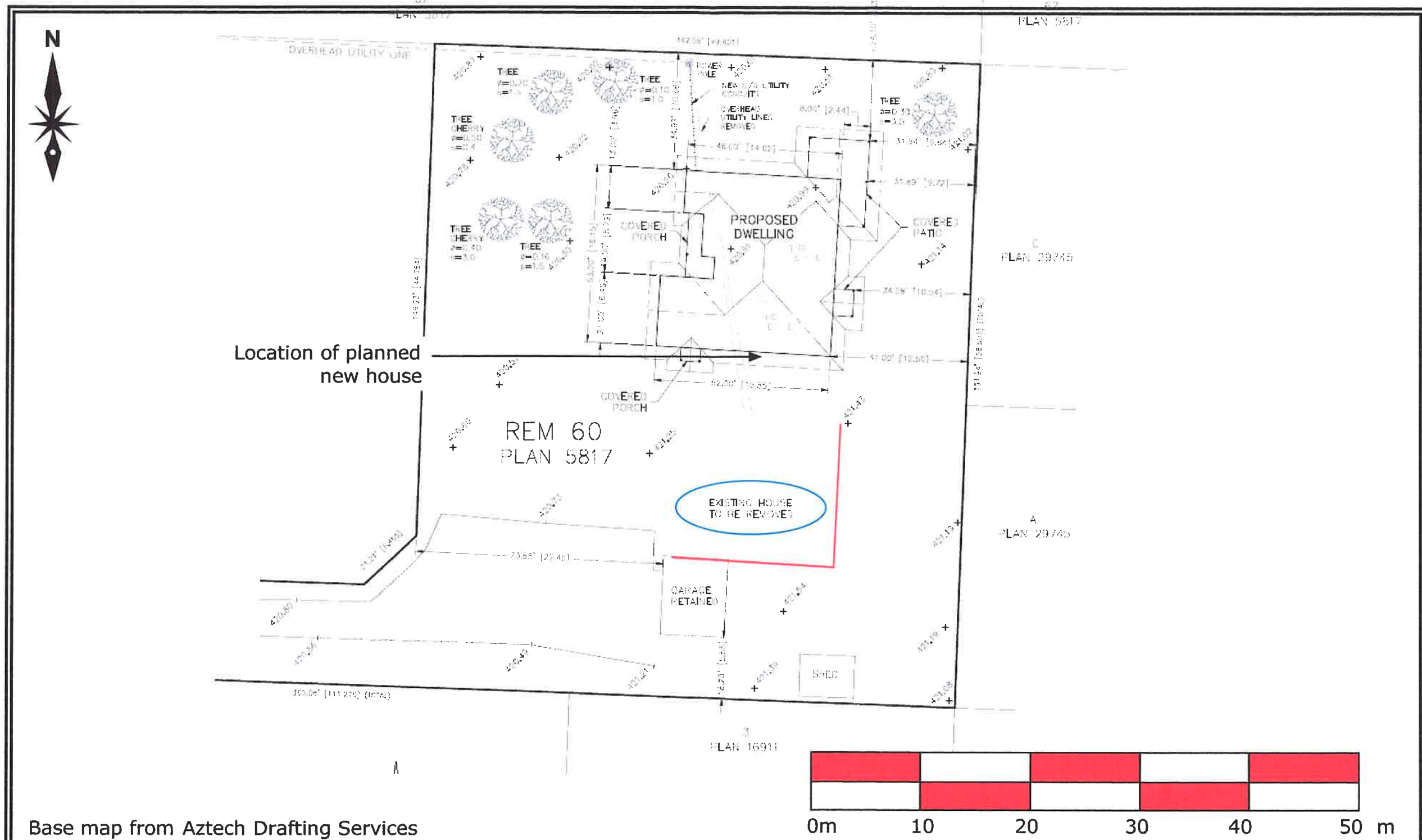
Base map from RDOS Parcel Viewer



Figure 1: Location Plan
811 West Bench Drive, Penticton, BC

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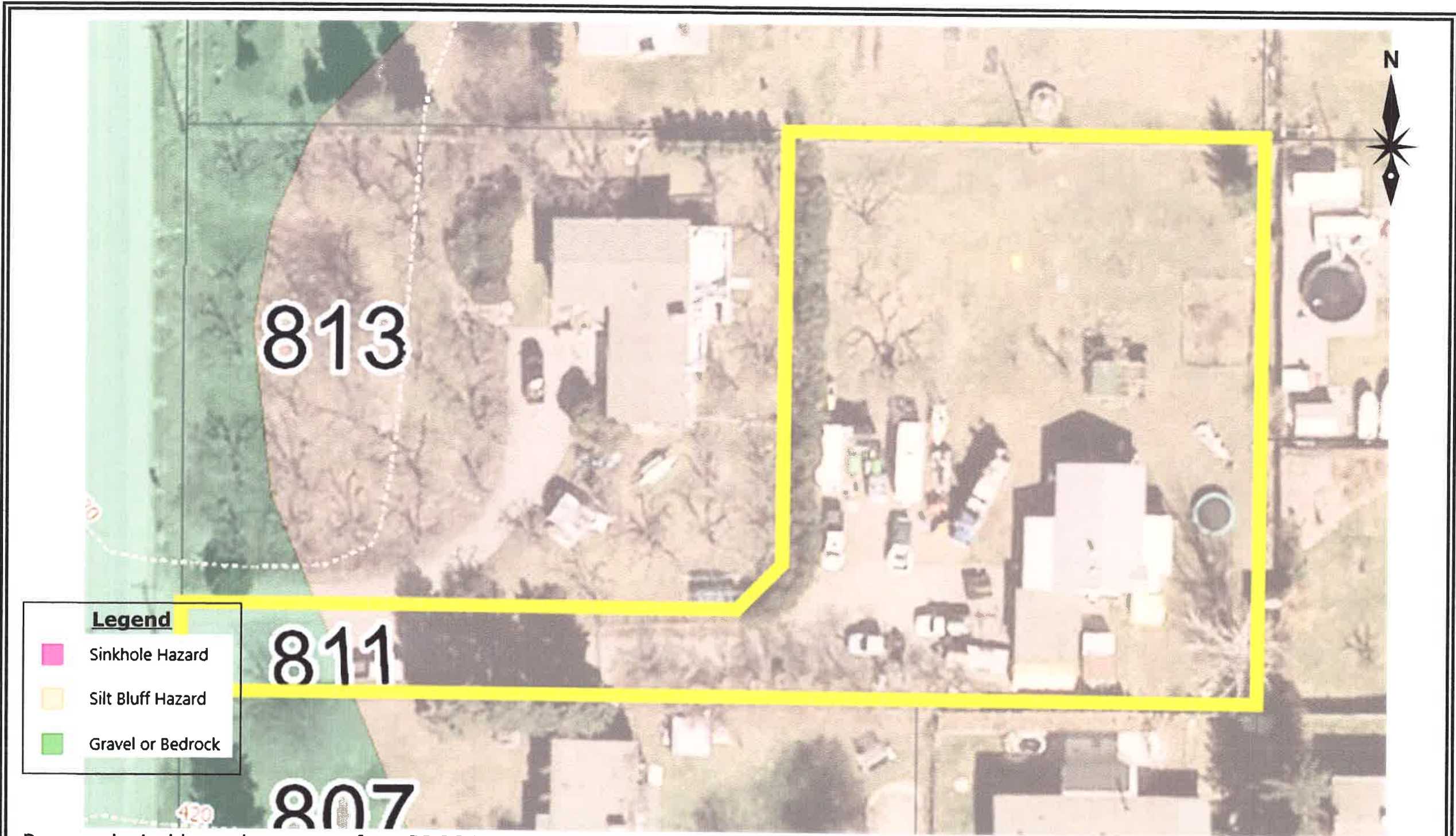
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Figure 2: Site Plan
811 West Bench Drive, Penticton, BC

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Base geological hazard zone map from RDOS Parcel Viewer



Figure 3: Hazard Map 9 (Leonoff, 1992)
811 West Bench Drive, Penticton, BC

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