Attachment A

AECOM

Stave Falls Aquifer Hydrogeologic Review

City of Mission

December 2023

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Quality Information

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Revision History

Revision	Revision Date	Details	Authorized	Name	Position
1	December 1, 2023	Draft	RM	Ryan Mills	Senior Hydrogeologist
2	December 12, 2023	Final	RM	Ryan Mills	Senior Hydrogeologist

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Figures (In-Text)

1 Introduction

1.1 Initiation

The City of Mission (City) issued a Request for Proposals (RFP 2023-006) for Consulting Services for Stave Falls Aquifer Hydrological Review. The review was to consider the aquifer or aquifers underlying the Stave Falls Neighborhood (SFN). AECOM submitted a proposal dated May 23, 2023 was accepted by the City and the contract was executed on June 28, 2023.

1.2 Background

The SFN is nestled on the City's western municipal boundary, approximately 9 km northwest of city centre (**Figure 1-1**). The SFN is flanked by the City of Maple Ridge municipal boundary to the west, the Fraser River to the south, and Stave River and impoundments to the east. The northern boundary of the SFN lies between Rolley Lake Provincial Park and Devil's Lake.

There are two hydroelectric dams on Stave River along the eastern boundary of the SFN. The northern hydroelectric dam, Stave Falls Dam, separates Stave Lake to the north and Hayward Lake to the south. Hayward Lake is bounded to the south by the Ruskin Dam, with the Stave River flowing south from the dam toward the Fraser River.

1.3 Objectives

As stated in the RFP, the objective of the review is to provide a "concise understanding with respect to the limitations of the aquifer(s), whether there is potential to add users into the aquifer(s) through subdivision or rezoning, and recommended changes to current private well policies, monitoring, and management."

1.4 Scope of Work

AECOM has conducted this review based on publicly available data and information provided by the City. The scope of work included the following:

- Review of local area geology, including available maps and plans of topography, surface geology, aerial photographs.
- Review of existing groundwater supply investigation reports and published data including water well logs/reports, Provincial observation well records, aquifer mapping reports and any other publicly available relevant data. Review of the current City of Mission private well policy available at: https://www.mission.ca/wp-content/uploads/Potable-Water-Supply-Form.pdf. Documentation of available water quality data and identification of potential groundwater contamination hazards in the study area.
- Mapping of septic system locations based on information provided by the City. Preparation of this technical report which includes the following:
  - Estimation of the capacity of the aquifer(s) underlying the SFN
  - Summary of the number of current licensed allowances
  - Estimation of the safe maximum extraction capacity of the aquifer(s) and associated number of users
  - Recommended changes to the City's current private well policies.
  - Recommended further assessment and monitoring programs to ensure best management of the aquifer(s)

Within the middle and eastern portions of the SFN, bedrock is overlain by overburden (**Figure A**). Overburden in the SFN mainly consists of fine-grained materials including till, silt and clay units, and gravel and sand. At ground surface, till generally covers northern half of the SFN while the south is generally composed of silt and clay. A gravel and sand unit underlies the till and silt and clay units. The gravel and sand outcrops as a band east of Iron Mountain along Wilson Street (NRC 1998).

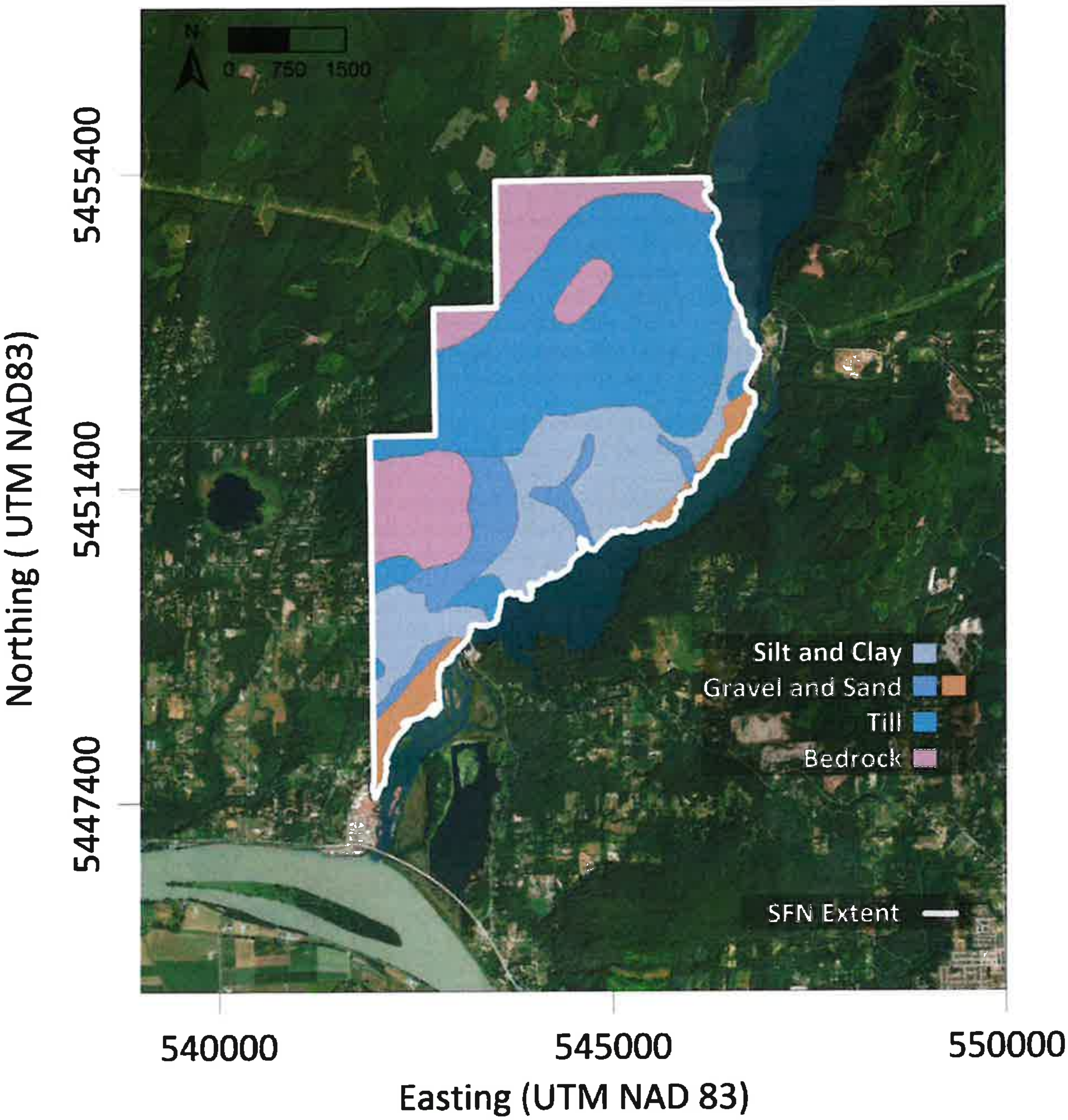


Figure A. Stave Falls Neighborhood Geology (Digitized from the GeoMap of Vancouver; NRC 1998)

2.4 Land Use

According to the City of Mission's zoning codes (**Appendix B**), land use within the SFN, is 55.5% rural (**Figure B; Table C**). Institutional/Commercial Park, Open Areas, or Recreational Sites make up 35% of the land use. Residential land use that is primarily rural makes up 6.1% of the SFN, agricultural land makes up 2.7%, and commercial development makes up 1.6%. All of the agricultural and commercial development land is located south of Dewdney Trunk Road while the majority of the residential land is north of Dewdney Trunk Road. At the time of this report, the two commercial development parcels are largely undeveloped or are being utilized for residential development.

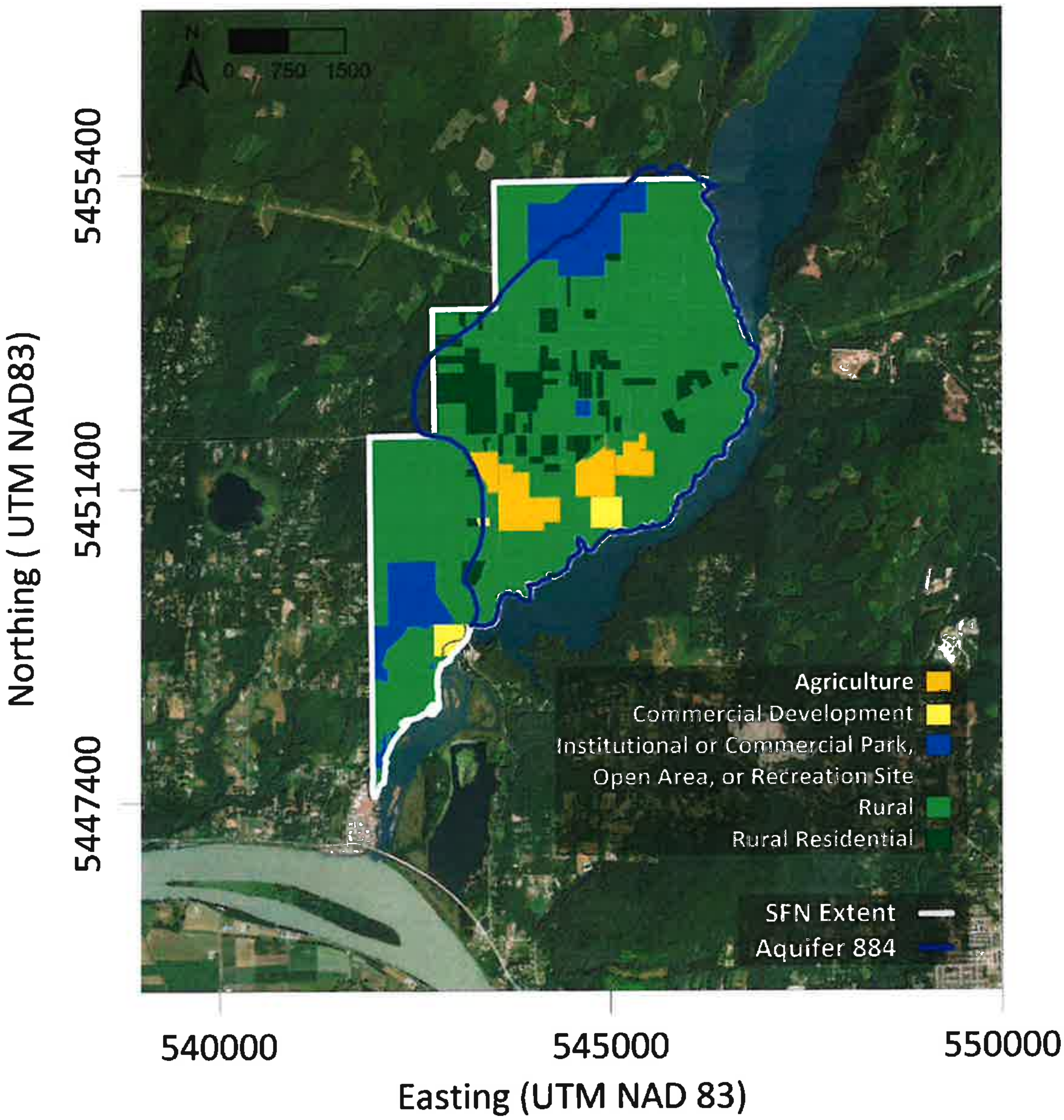


Figure B. Land Use According to the Zoning Code Within the Stave Falls Neighborhood

3.1.1 Mapped Bedrock Aquifers

There are two mapped bedrock aquifers within the SFN that have identified: Aquifer 154 and Aquifer 19.

Aquifer 154

Aquifer 154 is a crystalline bedrock aquifer composed mainly of quartz diorite but can also contain granitic, volcanic, metamorphic, and sedimentary rocks. The aquifer is mapped as IIIB, which means it is lightly developed and has a moderate vulnerability (MWLAP 2002). The aquifer underlies most of the SFN except for portions of its northern and southern extents. It is generally confined except where it outcrops, which increases its vulnerability. These areas also serve as recharge zones that replenish the aquifer with direct infiltration and precipitation. The aquifer is also recharged by lateral groundwater flow from upland areas. Groundwater flow likely follows surface topography and is inferred to be to the east and southeast. No groundwater quantity or quality concerns are noted.

Aquifer 19

Aquifer 19 consists of fractured sedimentary bedrock in association with old sedimentary basins and is named the Grant Hill Aquifer. Hydrogeological information obtained from aquifer mapping reports indicates this unit is comprised of the Kitsilano Formation, which is a fractured sedimentary bedrock unit consisting mainly of sandstone and shale. The aquifer is classified as IIB which means it is moderately developed and has a moderate vulnerability (MWLAP 2002). The aquifer covers a small (approximately 1.4 km^2) portion of the study area in southern portion of the SFN. A till layer generally covers the bedrock surface, and the aquifer is generally confined but appears to outcrop in areas west of SFN near Grant Hill and another bedrock high in the region. The main recharge area is inferred to be near Grant Hill, with radially outward groundwater flow ultimately discharging to the Fraser River. The eastern portion of the aquifer may discharge into the Stave River. Minor issues associated with water quantity and water quality have been reported but are judged to be anomalies in the data set.

Information on both aquifers is limited to groundwater use (discussed below) as no aquifer properties are known. Both aquifers are identified as low productivity and serve as minor water supplies for the SFN.

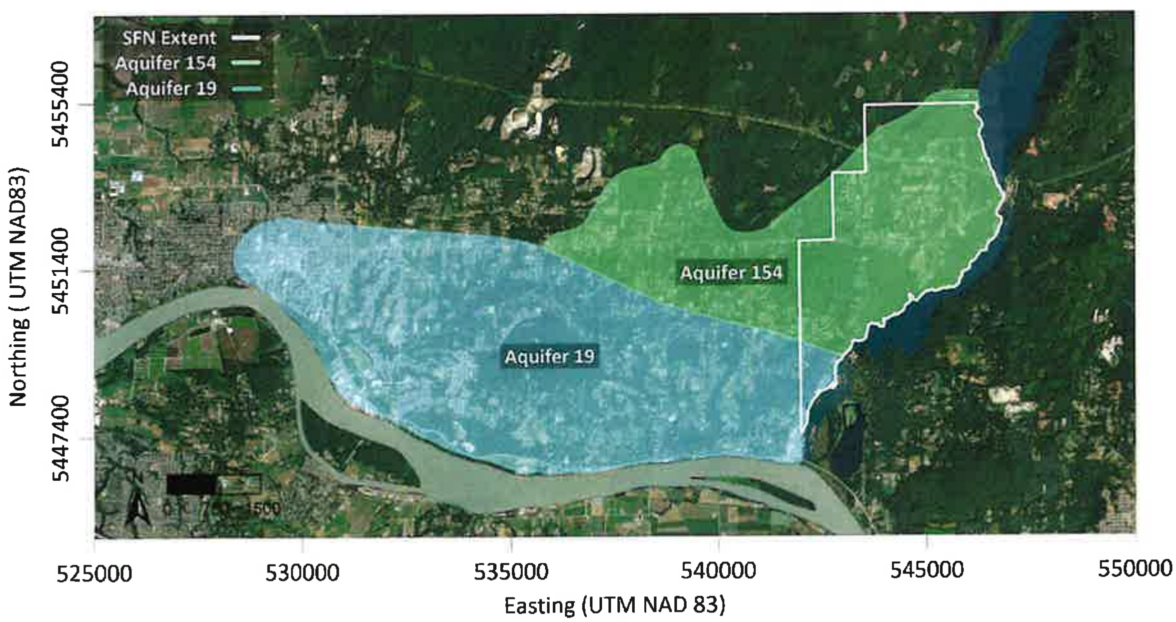


Figure C. Stave Falls Neighborhood Bedrock Aquifers

3.1.2 Mapped Unconsolidated Aquifers

There are three mapped unconsolidated aquifers within the SFN that have identified: Aquifer 884, Aquifer 26 and Aquifer 971.

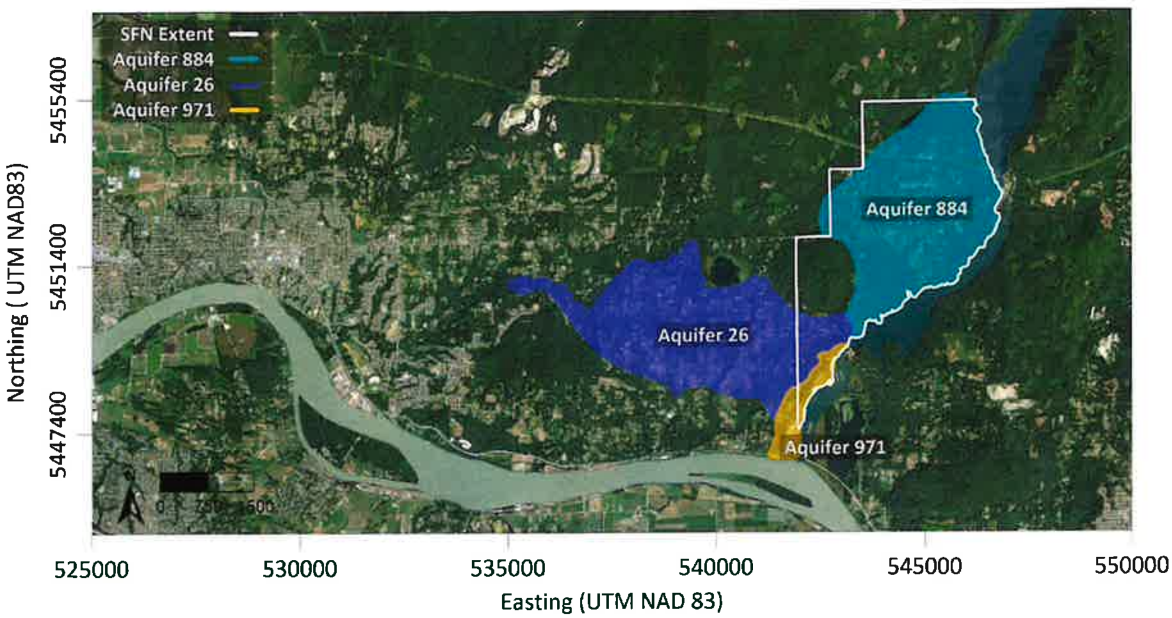


Figure D. Stave Falls Neighborhood Unconsolidated Aquifers

3.2 Hydrostratigraphic Units

Hydrostratigraphic units are defined as hydraulically continuous, mappable, and scale-independent entities. Based on available data, there are three hydrostratigraphic units within the SFN:

- Unconsolidated Materials: This unit is subdivided based on the interpreted permeability and saturated thickness into confining units (aquitards) and unconsolidated aquifers.
  - Unconsolidated Aquitards or Confining Units: These units are typically comprised of the low permeability till unit and the silt and clay unit.
  - Unconsolidated Aquifers: These units are typically comprised of the relatively permeable sand and gravel.
- Bedrock Aquifers: These units are primarily comprised of fractured crystalline bedrock and fractured sedimentary bedrock.

3.2.1 Bedrock Aquifers

The top of the bedrock hydrostratigraphic unit (**Figure 3-2**) was delineated by spatially interpolating the "depth to top of bedrock" measurements (**Figure 3-3**) included in GWELLS and subtracting the bedrock depth from the elevation of the topographic surface (**Figure 2-2**).

3.2.2 Unconsolidated Materials

The aquifer mapping reports and interpreted geology indicates that unconsolidated material in the SFN generally consists of a confining unit (comprised of till in addition to silt and clay) overlying aquifer sediment (comprised of sand and gravel). The Aquifer Mapping Report for Aquifer 884 and the accompanying Fact Sheet indicates that the aquifer is confined by fine-grained materials evident in all but four boreholes correlated to this aquifer. These resources suggest that the confining unit thickness ranges 0 to 72.5 m, with an average thickness of 21.9 m.

To develop unconsolidated material surfaces, we used GWELLS data to understand: 1) confining unit maximum depth at each well and 2) maximum thickness of unconsolidated material (i.e. depth to bedrock) at each well. We used values calculated from Equation 1 below as the basis for interpolation across the SFN and surface development:

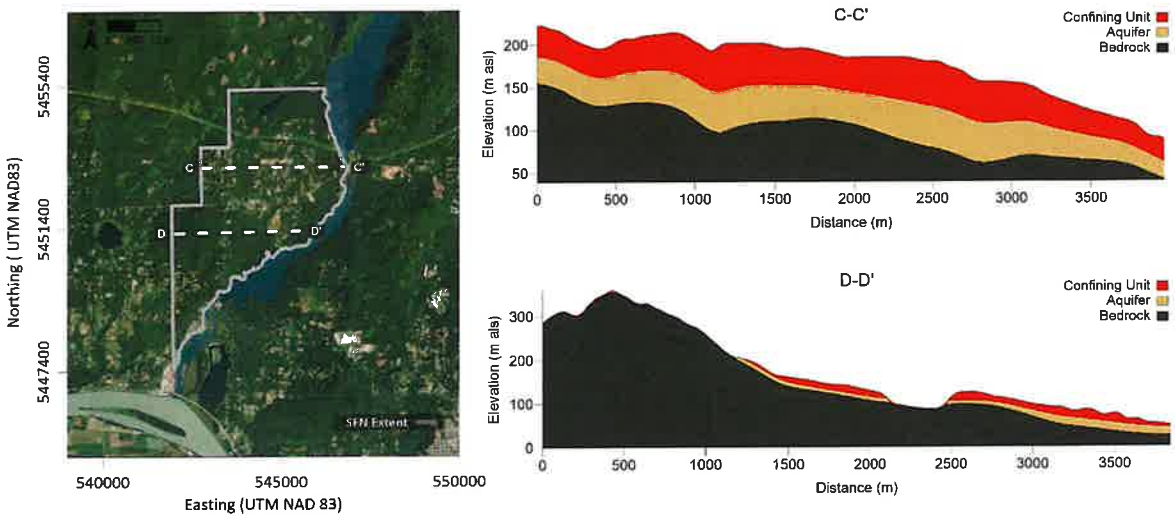


Figure F. East to West Conceptual Cross Sections.

3.2.4 Initial Geologic Modeling Framework

As a value-added service, an initial geological modeling framework was developed within Leapfrog™ to refine the SFN conceptual geologic model. Leapfrog™ is a geological modeling software that aids in the visualization of 3D geologic and hydrogeologic data. The software is the industry standard for analysing spatial data and creating 3D geologic models.

The initial geologic modeling framework included the compilation of GWELLS lithology data, topographic elevations, bedrock elevations, confining unit-aquifer contact surfaces, and satellite imagery (**Figure 3-7**). Lithology data contained in the GWELLS database is highly variable and does not follow a unified logging protocols, making it difficult to interpolate lithological or hydrostratigraphic units without extensive pre-processing. GWELLS data was simplified using a Python code developed for the SFN to recharacterize the drilling descriptions in GWELLS into common lithological terms and the associated hydrostratigraphic unit (**Appendix C**).

Results from this recharacterization of drilling data identified questions about the extent and continuity of the confining unit throughout the SFN. The geologic model may be advanced in the future to refine the geologic interpretation and resolve uncertainties surrounding the confining unit and aquifer outcrops.

3.3 Hydrogeologic Properties

Aquifer depth and thickness were discussed in earlier sections of this report. Other hydrogeologic property data including hydraulic conductivity, transmissivity, and storativity, were limited to one report for a new subdivision at 30782 Dewdney Trunk Road. Well data from GWELLS in the SFN were devoid of aquifer property data.

Several single-well pumping tests in well IDs 51761, 63652, 63687, 40652, and 63686 are assumed to have been completed in Aquifer 884 (**Table E**). The tests were conducted and analyzed by Active Earth Engineering Ltd. in 2021 (AEE 2021). While results were provided in the report, no analysis was provided to indicate the basis for testing and aquifer property determination. This information may have been included in a separate appendix or may not have been reported.

Table E. Summary of Reported Aquifer Properties – 30782 Dewdney Trunk Road, Mission

Aquifer Property	Units	Estimated Range
Transmissivity	m^2/s	$1.2 \times 10^{-4} – 3.5 \times 10^{-3}$
Hydraulic Conductivity	m/s	$2.3 \times 10^{-5} – 6.9 \times 10^{-5}$
Storage Coefficient	unitless	$4.2 \times 10^{-8} – 5.9 \times 10^{-6}$

3.4.2 Existing Groundwater Use and Well Yield

Hydrogeologic information for each aquifer is derived from GWELLS and summarized in the Aquifer Mapping Reports and Fact Sheets. Data from these sources are summarized for mapped aquifers within the SFN below. Some of the values are approximated as described in the notes (**Table F**).

There is only one water use license in this area issued for domestic water supply use at 30259 Dewdney Trunk Road, Mission. The well was finished in Aquifer 884 with well diameter of 6", finished depth of 26 m, and reported well yield of 50 U.S. gallons per minute (GPM).

Table F. Groundwater User Data Summary.

Aquifer Property	**Aquifer 884**	**Aquifer 26**	**Aquifer 971**	**Aquifer 154**	**Aquifer 19**
Aquifer Type	Surficial	Surficial	Surficial	Bedrock	Bedrock
Confinement	Confined	Confined	Unconfined	Confined	Confined
Maximum Well Yield	3.8	18.3	1.9	≈ 0.08	≈ 0.03
Minimum Well Yield	0.03	0.06	0	≈ 0.6	≈ 0.6
Median Well Yield	0.9	0.6	0.6	0.2	0.2
Geometric Mean, Well Yield	0.8	0.6	0.3	0.2	0.2
Maximum Water Depth	97.5	95.4	24.4	88.1	182.9
Minimum Water Depth	0.3	0.3	1.5	Artesian	0.9
Median Water Depth	9.1	9.1	7.0	20.7	19.8
Geometric Mean, Water Depth	9.1	6.1	7.0	14.9	18.3
Maximum Well depth	131.7	106.4	≈ 24.5	194.8	286.5
Minimum Well depth	1.5	0.6	≈ 12.0	31.1	2.7
Median Well depth	21.3	23.2	19.2	97.5	93.3
Geometric Mean, Well Depth	20.1	14.0	NA	94.5	86.0

Notes:

1) Units: Aquifer area (km^2), Well yield (L/s), Well and water depth (m bgs)

2) Some discrepancies were noted between data values provided in Fact Sheets and Reports. Data above is generally taken from Aquifer Mapping reports. Values with ≈ indicate estimated values from Fact Sheets.

Aquifers underlying the SFN are utilized for a range of purposes but are predominantly for domestic use (**Figure 3-1**). Reported well yields in the SFN (**Figure 3-8**) are summarized in **Table F**, which shows a wide range of reported values for each aquifer.

Available but limited groundwater user distribution data in SFN aquifers is described below:

- **Aquifer 884:**
  - 98 wells are installed in Aquifer 884, with finished depths between 3.8 to 129 m.
  - 40 wells are reported as domestic, 1 as commercial / industrial and 5 wells belong to a water supply system. One of them is referenced as "Rolley Lake Water Supply System".
- **Aquifer 26:**
  - Two (2) wells are installed within Aquifer 26, one of which has the finished depth of 106 m bgs and a well yield of 10 US GPM for domestic water use while the other well was finished with depth of 41 m bgs and a well yield of 3 US GPM for unidentified water use.
- **Aquifer 971:**
  - Two (2) wells are installed within Aquifer 971, one of which had a finished depth of 13.7 m bgs for unidentified water use but was abandoned. The other well was finished with unidentified well construction for domestic water supply.

$$P = Ro + ET + R \qquad \text{Equation 3}$$

In this equation, precipitation is the primary water input into the surface water system while runoff, evapotranspiration, and recharge are outputs leaving the surface water system. The groundwater balance considers recharge as the primary input into the groundwater system and groundwater discharge (Gd) leaving the system.

$$R = Gd \qquad \text{Equation 4}$$

Combining the surface water and groundwater balance equations, **Equation 5** shows the scoping level water balance considered in this analysis:

$$P = Ro + ET + Gd \qquad \text{Equation 5}$$

Precipitation

Precipitation (P) data was obtained from the Canadian Climate Normals **(Table A**). Canadian Climate Normals up to 2010 were retrieved from Station 1107680 ("STAVE FALLS") as discussed in **Section 1.2**.

Runoff

Runoff (RO) is approximated monthly using a runoff coefficient method based on land cover to reflect the ratio of rainfall that results in surface runoff. Runoff coefficients were assigned to each zoning category (Table C) as a proxy for land cover within the SFN **(Figure B**). Overall, runoff coefficients assigned to the SFN are low, signifying the relatively high proportion of infiltration compared to runoff and reflecting the rural landscape within the SFN. Increased runoff coefficients representing lower infiltration and higher runoff were assigned to a commercial development zone due to the higher likelihood for pavement and other non-permeable material. A runoff coefficient of 0.19 for the SFN was developed by considering area weighted coefficients for each land use in **Table G**. This method does not consider topographic variability throughout the SFN, but this represents for future refinements to the runoff estimation and water balance.

Table G. Runoff Coefficients for Each Zone Type

Zone Type	Percent of Total SFN Area (%)	Runoff Coefficient Range	Assigned Runoff Coefficient
Rural Residential	6.1	0.3 - 0.5	0.3
Rural	55.5	0.1 - 0.25	0.17
Institutional or Commercial Park, Open Area, or Recreation Site	34.0	0.1 - 0.25	0.17
Commercial Development	1.6	0.5 - 0.9	0.7
Agriculture	2.7	0.2 - 0.5	0.35
Weighted Average	**100**	**0.1 – 0.9**	**0.19**

Evapotranspiration

Potential Evapotranspiration (ET) was estimated using a well-known analytical equation (following the Thornthwaite, 1948 methodology). The original Thornthwaite method calculated monthly PET based on average daily temperature, the number of days within the month, the average number of sunshine hours, and a heat index, which is dependant on the 12 monthly mean temperature. Day length data were not available directly from Environment Canada climate stations, so a latitude correction (of 49.2 degrees N) to the Thornthwaite method was applied instead.

Groundwater Discharge

Groundwater discharge (Q) from the surficial aquifers underlying the SFN to Stave Lake and Hayward Lake was approximated using the Darcy equation (**Equation 6**):

Water Balance Components					Summary
Month	Precipitation (m^3)	Potential ET (m^3)	Runoff (m^3)	Groundwater Discharge (m^3)	Inflow - Outflow (m^3)
July	1,653,997	2,345,605	0	88,553	-780,161
August	1,647,946	2,164,899	0	88,553	-605,506
September	2,071,531	1,621,807	85,448	88,553	275,723
October	4,752,217	865,082	738,556	88,553	3,060,026
November	7,479,296	389,914	1,346,983	88,553	5,653,846
December	5,680,069	160,083	1,048,797	88,553	4,382,636
Year	**47,592,767**	**13,127,917**	**6,777,948**	**25,859,520**	**26,624,264**

The current scoping level water balance does not account for any change in water storage throughout the SFN and should be considered an order-of-magnitude estimate that requires confirmation with additional field investigation, testing, desktop analysis and monitoring.

Specific considerations for improving this scoping level water balance include:

- Climate Data: Climate normals used in this water balance were developed for 1981-2010 and have not recently been updated. More recent climate normals combined with local climate station measurements are needed to assess the current inflows and outflows within the SFN.
- Interactions with Surface Water Features: The degree of aquifer interaction with the surrounding water bodies, including Stave Lake, Hayward Lake, and the Fraser River, is uncertain. These water bodies may significantly interact with SFN aquifers and affect the overall water balance calculation. This interaction needs to be quantified through drilling, monitoring, and testing to support further analysis.
- Extent and Continuity of the Confining Unit: Recharge entering the groundwater system through infiltration from ground surface is expected to be reduced or delayed in areas where the confining unit is present and thick.
- Spatial Extent of Recharge Areas: Identification, coverage extent and distribution of recharge areas within the SFN would benefit this analysis by leading to more accurate recharge estimates.
- Groundwater Withdrawal: Groundwater withdrawal data in the SFN is incomplete and/or limited. Detailed accounting of groundwater abstraction within the SFN to refine water balance estimates.
- Climate Factored Analysis: To be best prepared for future water management decisions, a climate-factored water balance is required. Climate factored precipitation and temperature data can be obtained from the Pacific Climate Impacts Consortium and NASA and should be applied in future water balance updates to ensure conclusions and recommendations are climate resilient.

5 Vulnerability of Groundwater to Contamination

5.1 Methodology

Vulnerability is defined in this report as a combination of the physical susceptibility of an aquifer(s) to groundwater contamination in the presence of a hazard or hazard threat, which is any stressor (natural or anthropogenic) that may act to adversely impact groundwater resources.

Similar definitions of vulnerability within integrated risk frameworks have been used in groundwater applications (Simpson et al. 2014 Holding and Allen 2016; Klassen and Allen 2017). Several of these studies were completed locally within southern British Columbia. We chose this definition of vulnerability over the DRASTIC method, which is commonly used, as it can account for many specific and known hazards within the SFN. The method employed in this study may be refined in the future upon further data availability to include some DRASTIC method components (such as topography, soil media, and vadose zone impact) within the calculation of aquifer susceptibility, where susceptibility in this report is analogous to intrinsic vulnerability defined within the DRASTIC method.

The resulting hazard map (**Figure 5-2**) is limited by available data sets and in this case any hazards present in SFN not identified or accounted for in **Table J** remain as data gaps. Other prominent hazards may include dry cleaners, gas stations, and unidentified industrial lands. In some cases, specific property activities may represent certain hazards (e.g. a homeowner has a large "shop" where mechanical work is completed). Due to data and scope limitations, our hazard analysis does not consider groundwater flow direction, the potential for downgradient impacts from upgradient sources and impacts from surface water - groundwater interactions.

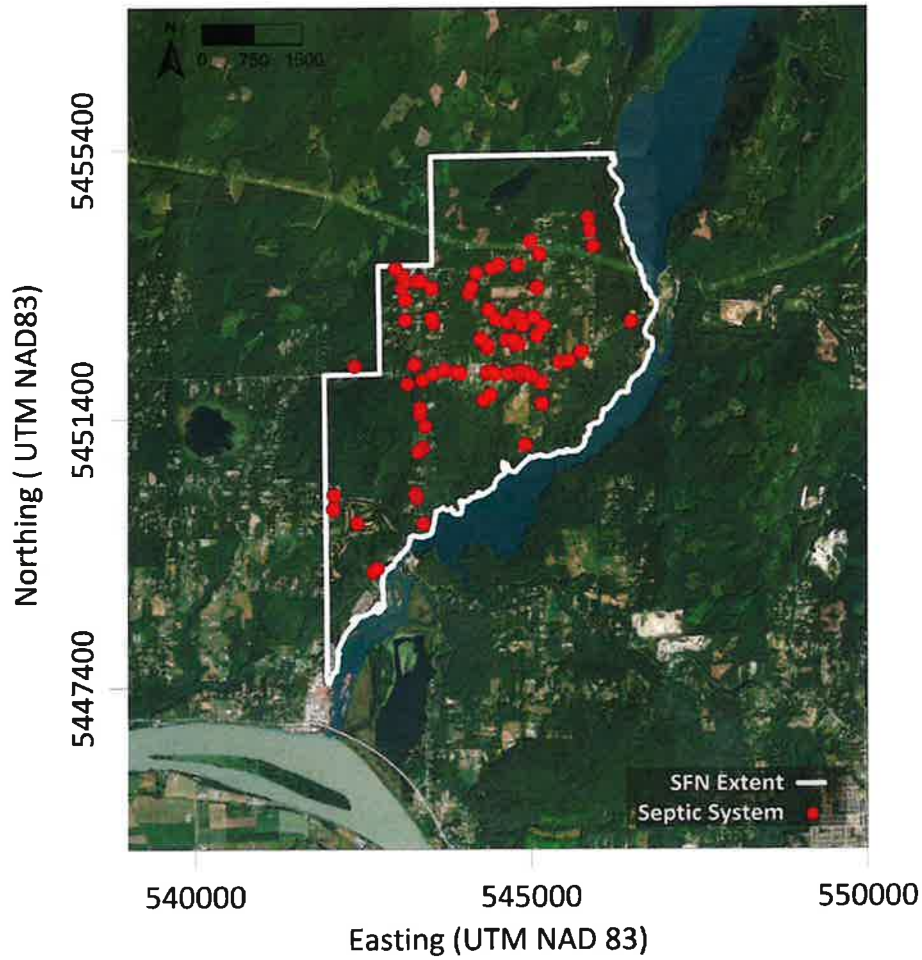


Figure H: Septic systems within the SFN.

5.2 Results

Vulnerability to groundwater contamination (**Figure I**) is highest within the southern part of the SFN where susceptibility is high due to interpreted aquifer outcropping collocated with agricultural land or septic systems. The highest vulnerability within the SFN was interpreted along Dewdney Trunk Road where residents and agricultural lands are dispersed, along the northern part of Wilson Street where Aquifer 884 is expected to outcrop at ground surface, and along Wilson Street south of Ruskin Dam where Aquifer 971 is exposed at surface.

Comparing vulnerability to existing groundwater development indicates that there is already groundwater development within interpreted vulnerable areas along Dewdney Truck Road (**Figure 5-3**). High vulnerability areas may be used to identify future groundwater monitoring locations and/or inform policy decisions regarding zoning codes and development in highly vulnerable areas.

- More Comprehensive Water Level And Aquifer Property Data Sets: To account for potential downgradient impacts from upgradient sources, more detailed and current groundwater elevation information is needed in addition to larger aquifer property data sets. With strong data sets, the accuracy of groundwater discharge, infiltration rates and gradients can be improved. Further, a three-dimensional numerical groundwater flow model may also be used to identify source-receptor pathways, establish a robust water balance for the aquifer and identify areas that should be protected to avoid contamination of a wellfield or the aquifer.

6 Private Well Policy Review

We have reviewed the *Potable Water Supply – Rural Subdivisions & Building Permit Application* document issued by City of Mission Development Services and the associated documents. While the document is generally clear, it is also highly focused. As the SFN and the City of Mission continues development, refinements to the Well Policy may be required.

6.1 Well Policy

Our comments are summarized below on a section-by-section basis together with key recommendations for modifications to the document. It is recommended that the City's in-house legal council also review the document before it is updated and issued.

General:

The objective of the Well Policy is clearly stated. There is a mandatory requirement for the owner of a subdivision to prove a potable water supply by way of a private well for each lot prior to approval of a subdivision. The third paragraph could be shortened for conciseness. The end of the paragraph contains verbiage from Bylaw 56509-2017 Section 3.15.2, which is redundant as the previous sentence indicates that conformance with all requirements outlined in Section 3.15 is required.

> **Policy Recommendation #1:** Change this paragraph to the following: "All new lots must be serviced by drilled or dug wells and must be tested and certified in accordance with the City of Mission Development and Subdivision Control Bylaw 5650-2017 (as amended), Section 3.0–Water Distribution, 3.15 Private Water Systems. Groundwater use is governed by the provincial government and an additional reference to the provincial acts and regulations governing groundwater use and licensing should be added as follows: "The use of groundwater is governed by the *Water Sustainability Act*, Water Sustainability Regulation, and the Groundwater Protection Regulation, which establish the requirements for groundwater investigations, analysis and licensing in the Province of British Columbia. It is recommended that all developers and groundwater users consult these documents for additional information in advance of investigating a groundwater and/or surface water supply".

Building Permits:

This section clearly states a completed private well certification form is required at application stage for any property without municipal water, and appropriately describes the relationship to other municipal approval processes.

> **Policy Recommendation #2:** Consider providing a flowchart or table that lists all required approvals and the sequencing of document submission, municipal reviews and approvals.

Detailed Report on Water Quantity, Water Quality, and Hydrogeological Impact Assessment and Form F-3:

Clearly states requirements that a report and F-3 Form are required and who must prepare the report. However, the Association of Engineers and Geoscientists of British Columbia (APEGBC) was renamed as Engineers and Geoscientists of British Columbia (EGBC) several years ago. Furthermore, the *Professional Governance Act* was implemented and requires firms to have a Professional Practice Management Plan (PPMP) in place as of September 30, 2021. The document is to assign Responsible Registrants that are able to apply the firm's Permit to Practice to all technical documents.

> **Policy Recommendation #3:** Update the reference to the professional association to be Engineers and Geoscientists of British Columbia (EGBC), and require the firms meet the requirements of the *Professional Governance Act* and all applicable EGBC Bylaws.

requested to comment on the viability of a single well. It is also important to recognize that one or several wells installed for a subdivision may not be the sole cause of unsustainable withdrawals from an aquifer or provide evidence of adverse impacts on their own. It may be the large number of wells in numerous subdivisions spread across the aquifer that may cause issues such as over pumping or water quality degradation, and these impacts are best evaluated with area-wide assessments conducted by government agencies. Anthropogenic activities and hazards may also harm aquifers following completion of documentation.

Many technical guidance documents have been developed by the provincial government to guide evaluation of the sustainability of groundwater supplies, including "*Guidance for Technical Assessments in Support of an Application for Groundwater Use in British Columbia*", with specific reference to Section 2.1: Assessing Adequacy of Supply, Section 2.2: Assessing Likelihood of Hydraulic Connection to Streams and Other Aquifers, Section 2.3: Assessing Potential Impacts on Nearby Groundwater Users, Section 3.5: Methodology for Assessing the Adequacy of the Supply, Section 3.6: Results Used for Assessing the Adequacy of the Supply, and Section 3.7.3: Assessment of Potential Impacts. While domestic groundwater use evaluations are exempt from many of the requirements,

> **Policy Recommendation #5:** It is recommended that the City of Mission add the following phrase: "The withdrawal of the above daily quantities of water has been conducted in a manner that meets the requirements of the Technical Assessment Guidelines (Todd et al., 2020), and is judged to be able to provide those quantities of water at all times of the year without impacts to existing groundwater and/or surface water users. Furthermore, the impact of climate change on the long-term groundwater extraction has been evaluated in accordance with the requirements of EGBC and all applicable provincial acts and regulations, and the above quantity of water is judged to be sustainable in the context of known existing groundwater users".

The remaining certifying statements regarding water quality are judged to be reasonable and clear.

6.3 Guidance for Detailed Reports for Private Wells – Domestic Use

As stated, "*This guidance is intended for professional engineers and geoscientists in the preparation of detailed reports for submission to the City of Mission so as to meet the minimum information requirements of a "detailed report" as referenced in Section 3.15 of Schedule C of the City of Mission Development and Subdivision Control Bylaw 5650-2017 (as amended).The detailed report must be for one well only, and each report must be signed and sealed by a registered Professional Engineer or Geoscientist with experience in hydrogeology. To meet the definition of "experience in hydrogeology", the professional must be registered with Engineers and Geoscientists BC as having a primary or secondary field of expertise in hydrogeology or as a hydrogeologist*".

This document contains many statements that duplicate and may contradict some of the statements made in provincial guidance documents. Professional engineers and geoscientists licensed with EGBC having expertise in hydrogeology and groundwater supply evaluations should be very familiar with provincial acts, regulations and the technical; requirements outlined in provincial guidance documents and policy. In aggregate, these documents establish industry standard in British Columbia. There are opportunities to simplify the guidance document by referencing provincial guidance documents, and focus on supplementary requirements of the City of Mission, and the noted exemptions.

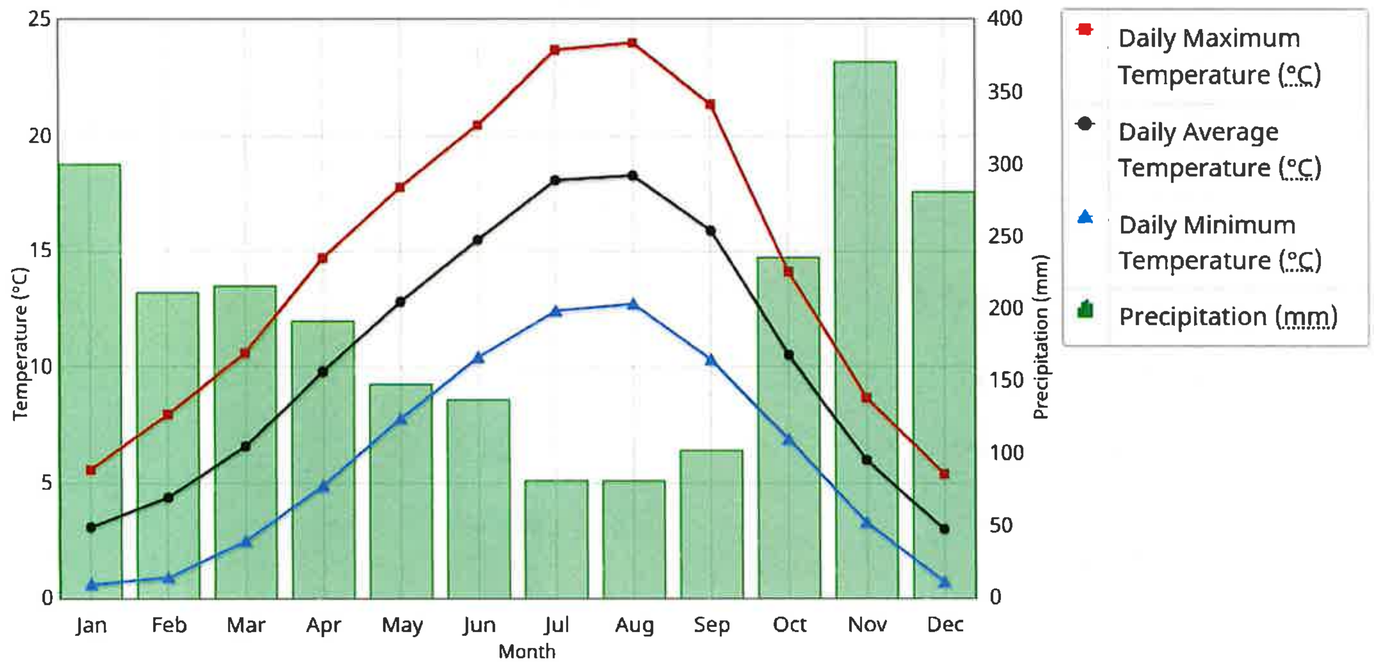
> **Policy Recommendation #6:** It is recommended that the City of Mission reference the requirements of the Technical Assessment Guidelines (Todd et al., 2020) for a list of technical assessment and reporting requirements. To recognize the full value of the analysis and reporting, the City of Mission should:
>
> - Require that professionals provide a copy of pumping test analysis reports and an estimated hydraulic conductivity value for the aquifer.
> - Require that professionals specify how, where and when the water quality samples were collected.
> - Require that professionals provide justification for the methodologies employed in the analysis.

8 Recommendations

Detailed context for recommendations is interspersed through the document in relevant sections. The following recommendations are made to improve the overall hydrogeologic understanding in the Stave Falls Neighborhood to inform future policy decisions and ensure sustainable use of groundwater resources for the community:

1. **Establish a Digital Database** to house hydrogeologic data including well locations, water use/groundwater pumping data, groundwater level measurements, well evaluation reports, septic system locations, borehole logs/lithologies, groundwater chemistry, etc. Many hydrogeological analyses utilize geospatial and subsurface data that must be in digital format to be useful. Prospective developers and groundwater users should be required to provide digital data for upload of any new information into this database to streamline digitization and record keeping. Data can be expensive to digitize, so preservation of digital data when available is recommended.
2. **Characterize Aquifer Properties and the Hydrogeologic Connection to Hayward Lake and Stave Lake** to determine the sustainable yield of the unconsolidated aquifers underlying the SFN. Pumping tests are required to confirm aquifer properties (such as hydraulic conductivity) at a scale that is appropriate for a regional assessment. Completing pumping tests in targeted locations near Hayward Lake and Stave Lake would allow for quantification of groundwater/surface water interactions along the eastern boundary of the SFN, which is critical for future water balance evaluations and vulnerability assessments. This information is critical for ultimately determining how much groundwater resources are available for consumption.
3. **Implement a Groundwater Monitoring Program** to monitor the current state of the aquifer systems and how they behave throughout the year in response to meteoric inputs and outputs, groundwater use and fluctuations in the elevation of Stave Lake and Hayward Lake. The monitoring system should include a series of monitoring wells in upland and lowland environments that are initially focused on Aquifer 884 and be monitored for water levels and water quality. Considering some residents within the SFN have experienced dry wells during some summer months, it is critical to create a monitoring program for regular data collection to diagnose these types of problems and monitor for any future issues that arise. Furthermore, the current understanding of groundwater quality is focused on point of use (tap water) data that may be influenced by household plumbing and water treatment systems. Monitoring programs produce the most reliable information when monitoring is conducted at the same locations by the same staff over a prolonged period. This is best completed in municipally owned wells.
4. **Improve the Hydrogeological Conceptual Model** to understand where the aquifer outcrops, characterize the extent and continuity of the confining unit, and determine the connection between the aquifers and Hayward Lake and Stave Lake. Data in the GWELLS database has been utilized to develop a preliminary geological model, but it is critical to ground truth the geological mapping through field investigation. Additional drilling is required to fill data gaps in targeted locations. Having a detailed geologic model is critical for all future hydrogeologic investigations and will support refinements of the initial water balance and vulnerability analysis.
5. **Establish a Local Meteorological** Station to monitor precipitation, temperature, relative humidity, net radiation, wind speed and wind direction within the Stave Falls Neighborhood. This is important information for establishment of the inputs (groundwater recharge) and outputs (evapotranspiration) from the water balance and is known to be highly variable in mountainous environments.
6. **Consider the Impacts of Climate Change** in future water balance evaluations to ensure the long-term sustainable aquifer yield is climate resilient. The Pacific Climate Impacts Consortium (PCIC) Climate Explorer can be used to develop future climate scenarios for the Stave Falls Neighborhood. Data from the proposed meteorological stating within the Stave Falls Neighborhood should also be used to validate model outputs. The Lower Mainland is forecast to experience longer and drier summers in conjunction with more intense fall precipitation events. Short duration extreme weather events like Atmospheric Rivers have already resulted in major flooding within the Lower Mainland and drier summers are resulting in water shortages and more intense forest fire seasons. It is critical to validate these predictions with climate analysis and prepare for future changes in water resources.
7. **Update the Private Well Policy** to minimize duplicity and contradictions with established technical guidance documents and focus on information that is important to the City of Mission.

Figures



PROJECT
STAVE FALLS AQUIFER HYDROGEOLOGIC REVIEW

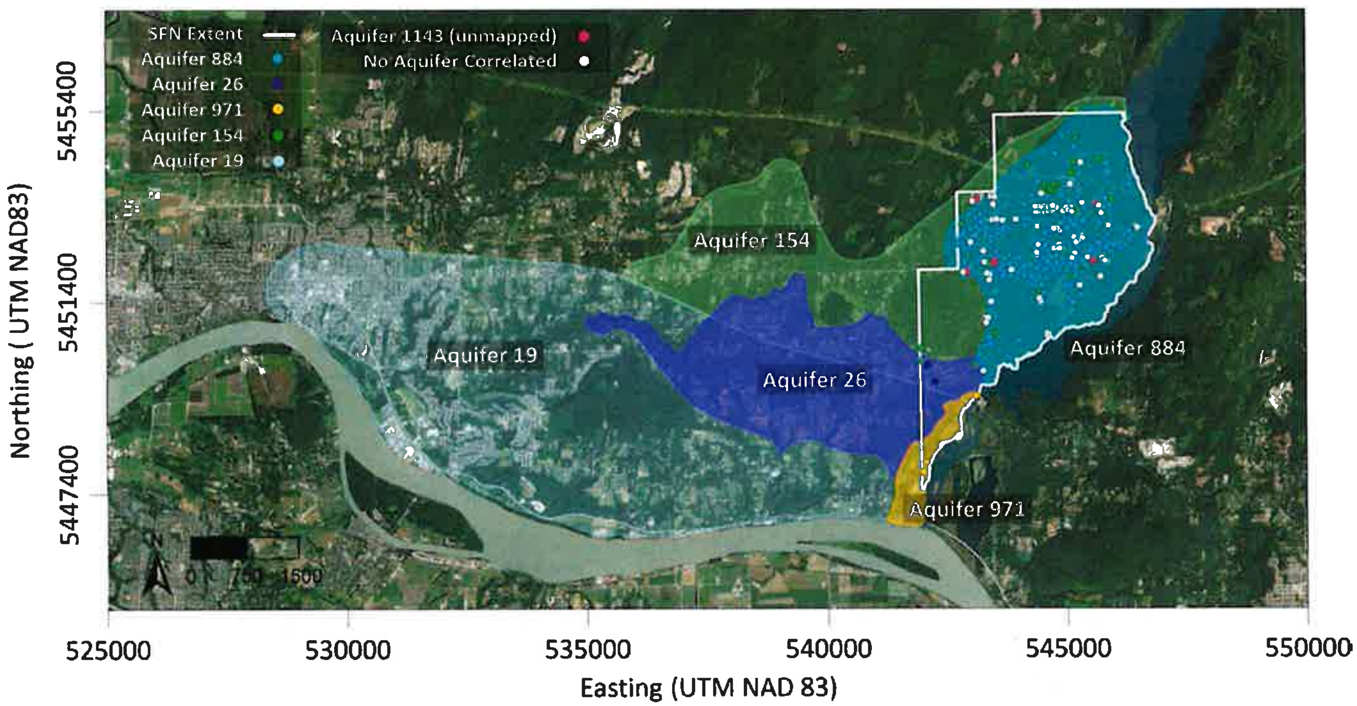
TITLE
1981-2020 Canadian Climate Normals Station 1107680

CLIENT
CITY OF MISSION

DATE	PROJECT NUMBER
Dec 1, 2023	60712246

FIGURE NUMBER
Figure 2-1

AECOM



PROJECT

STAVE FALLS AQUIFER HYDROGEOLOGIC REVIEW

TITLE

Aquifers and Correlated Boreholes

CLIENT

CITY OF MISSION

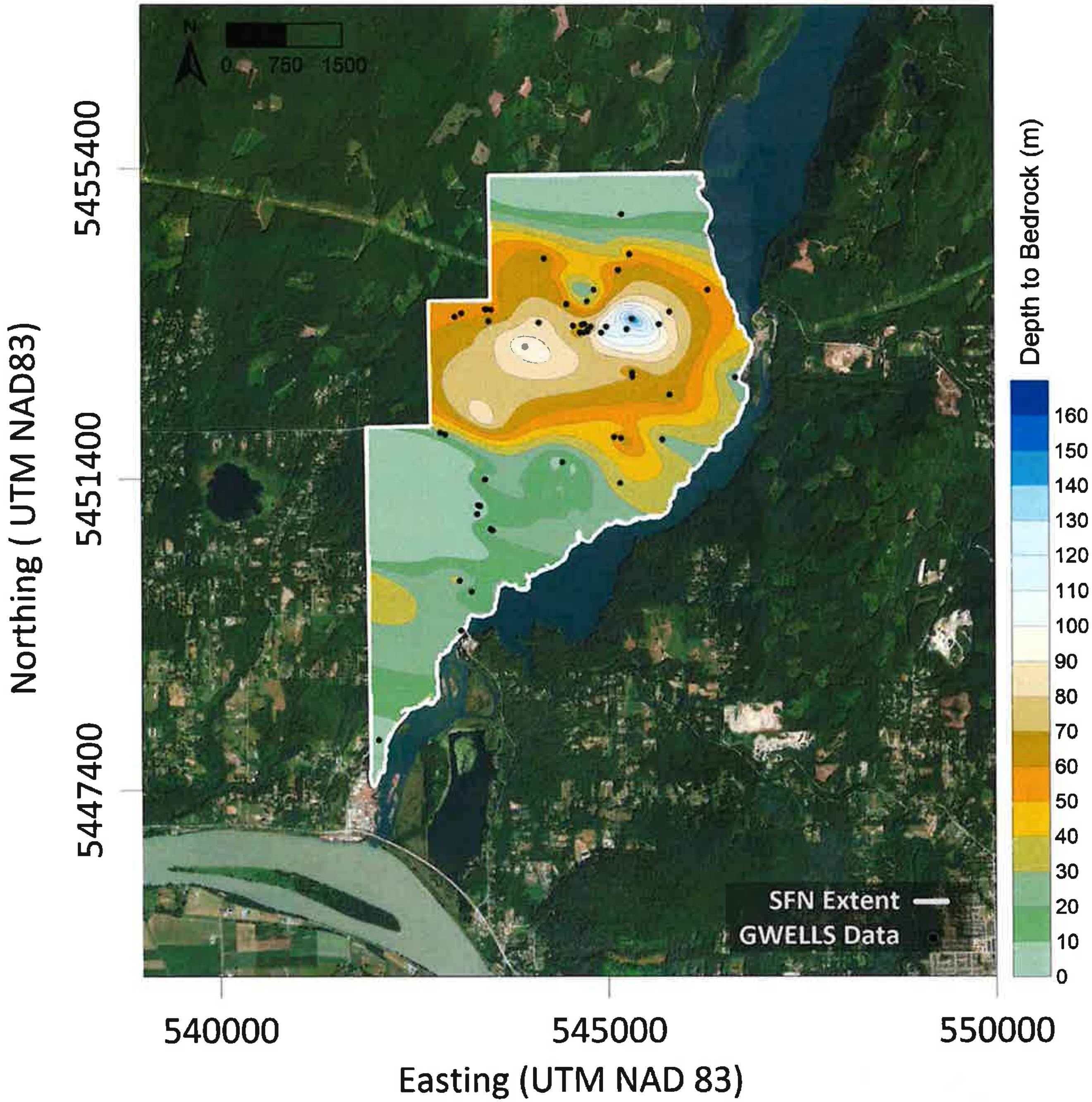
DATE	PROJECT NUMBER
Dec 1, 2023	60712246

FIGURE NUMBER

Figure 3-1

AECOM

File Path: \\na.aecomnet.com\lfs\AMER\Burnaby-CABNY1\DCS\Projects\ENV\60712246_Stave_Falls\400_Technical\430_Hydrogeo_Review\05_Report\Figures



PROJECT
STAVE FALLS AQUIFER HYDROGEOLOGIC REVIEW

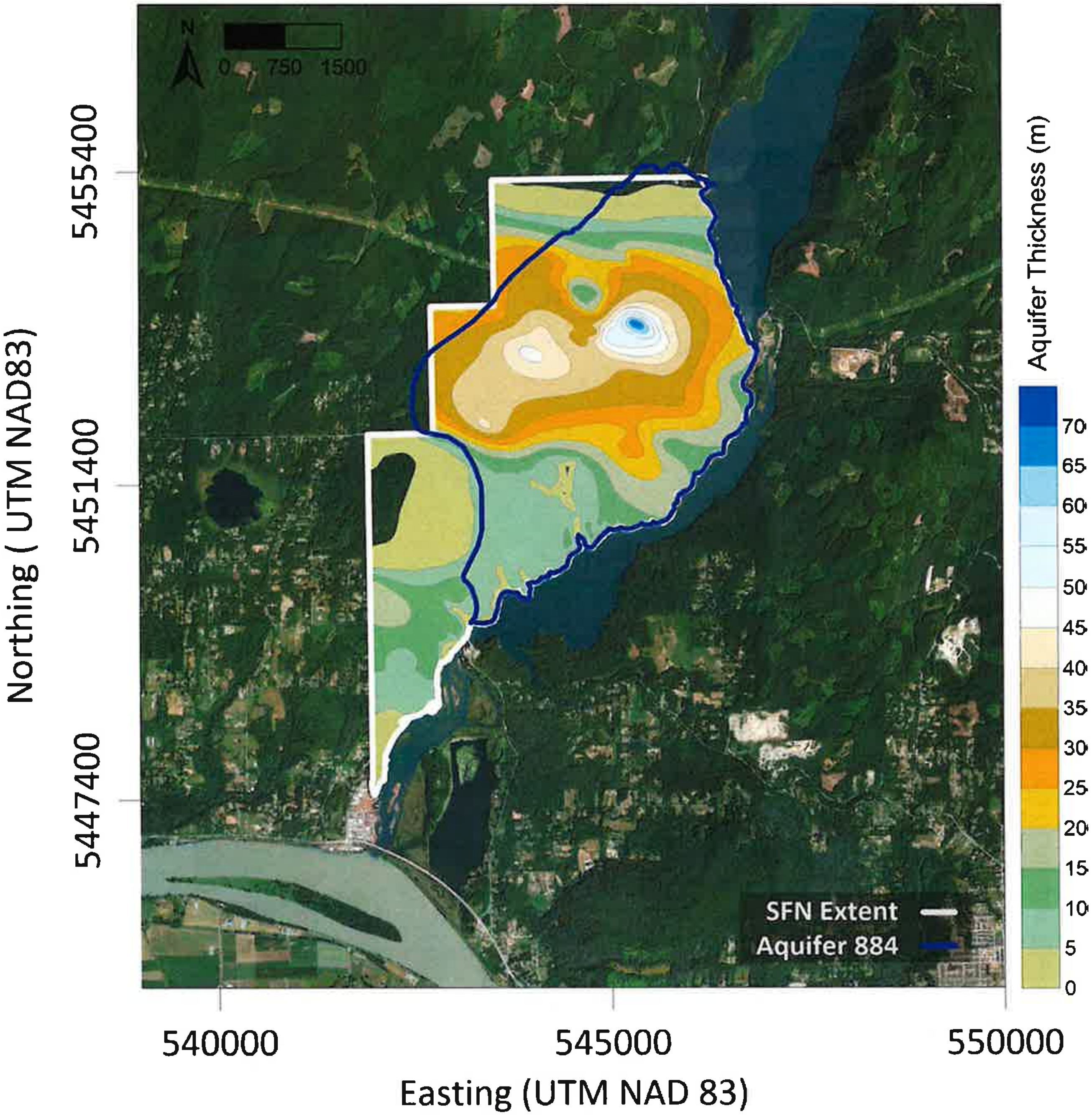
TITLE
Depth to Top of Bedrock

CLIENT
CITY OF MISSION

DATE	PROJECT NUMBER
Dec 1, 2023	60712246

FIGURE NUMBER
Figure 3-3

AECOM



PROJECT
STAVE FALLS AQUIFER HYDROGEOLOGIC REVIEW

TITLE
Unconsolidated Aquifer Thickness

CLIENT
CITY OF MISSION

DATE	PROJECT NUMBER
Dec 1, 2023	60712246

FIGURE NUMBER
Figure 3-5

AECOM

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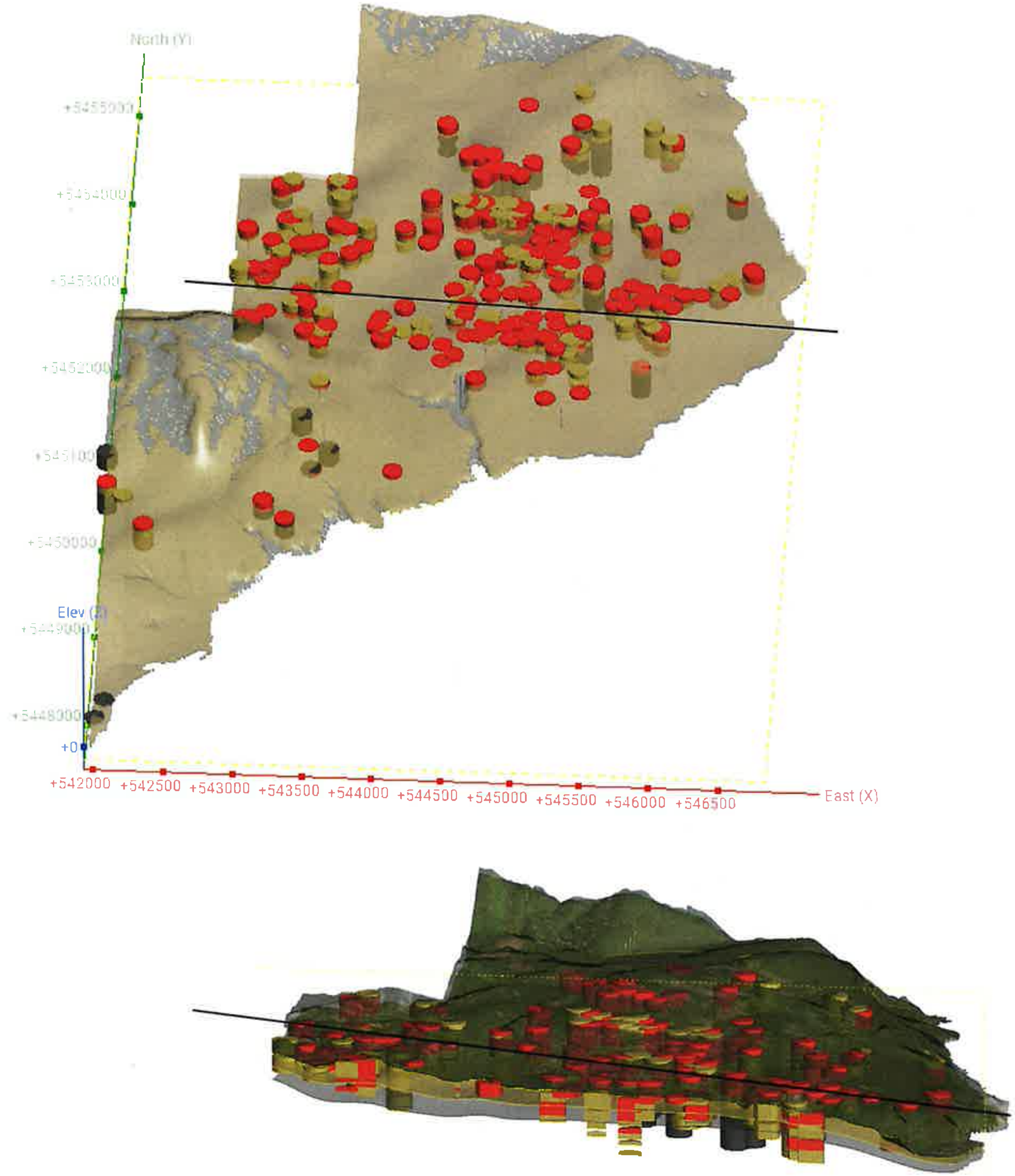


PROJECT

STAVE FALLS AQUIFER
HYDROGEOLOGIC REVIEW

TITLE

Initial Leapfrog Geologic Modeling Framework

CLIENT

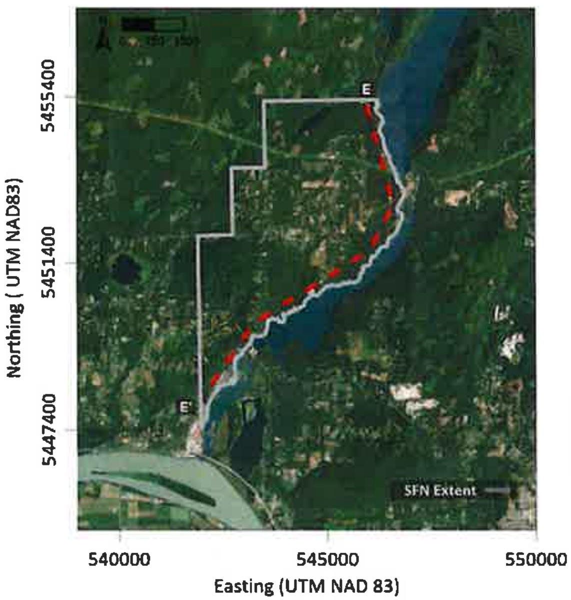
CITY OF MISSION

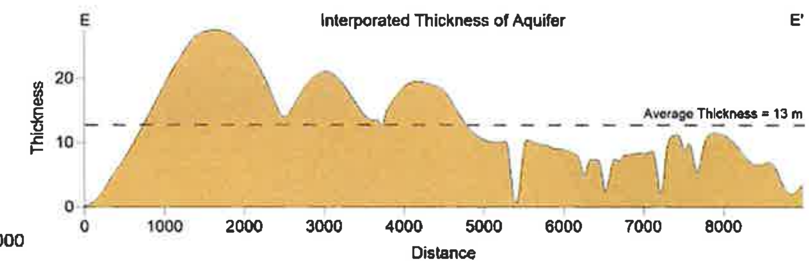
DATE	PROJECT NUMBER
Dec 1, 2023	60712246

FIGURE NUMBER

Figure 3-7

AECOM





PROJECT
STAVE FALLS AQUIFER HYDROGEOLOGIC REVIEW

TITLE
Interpreted Aquifer Thickness Along Stave and Hayward Lakes

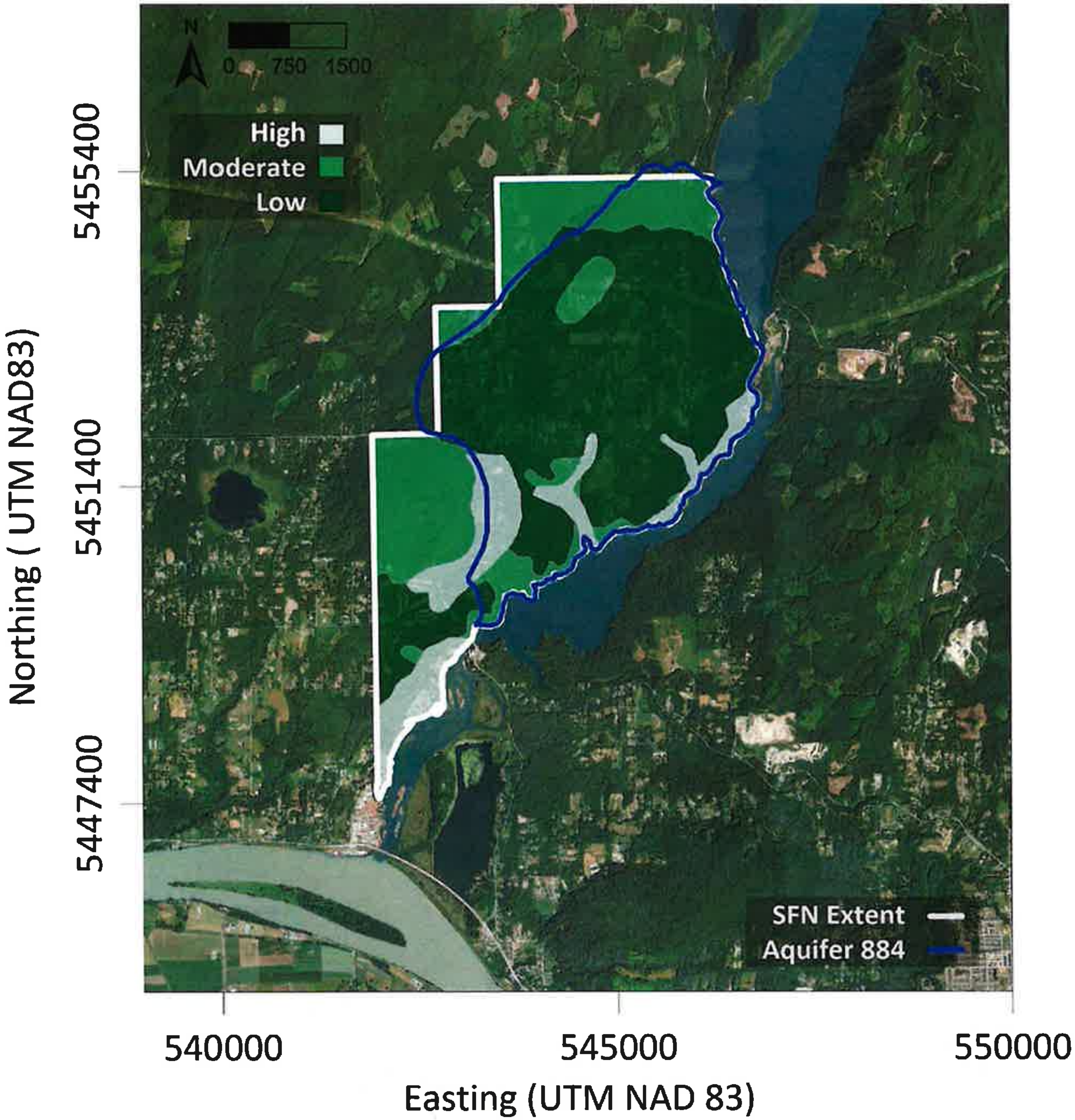
CLIENT
CITY OF MISSION

DATE	PROJECT NUMBER
Dec 1, 2023	60712246

FIGURE NUMBER
Figure 4-1

AECOM

File Path: \\na.aecomnet.com\lfs\AMER\Burnaby-CABNY1\DCS\Projects\ENV\60712246_Stave_Falls\400_Technical\430_Hydrogeo_Review\05_Report\Figures



PROJECT
STAVE FALLS AQUIFER HYDROGEOLOGIC REVIEW

TITLE
Aquifer Suseptibility

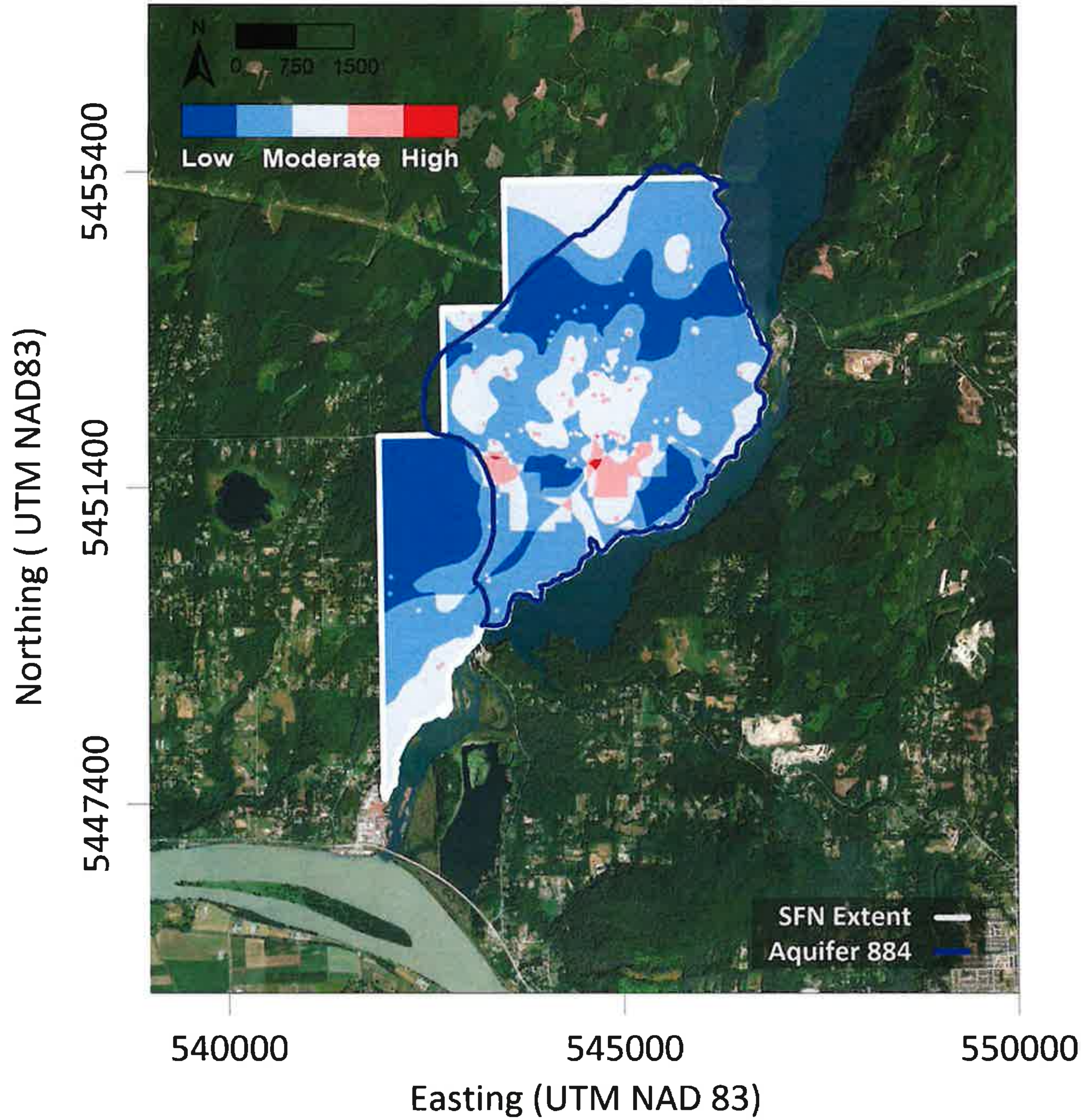
CLIENT
CITY OF MISSION

DATE
Dec 1, 2023

PROJECT NUMBER
60712246

FIGURE NUMBER
Figure 5-1

AECOM



PROJECT
STAVE FALLS AQUIFER HYDROGEOLOGIC REVIEW

TITLE
Combination of Vulnerability and Development

CLIENT
CITY OF MISSION

DATE
Dec 1, 2023

PROJECT NUMBER
60712246

FIGURE NUMBER
Figure 5-3

AECOM

File Path: \\na.aecomnet.com\lfs\AMER\Burnaby-CABNY1\DCS\Projects\ENV\60712246_Stave_Falls\400_Technical\430_Hyrogeo_Review\05_Report\Figures

Appendix B

2023 Zoning Codes

ID	Zone Class	DoM Zoning Description	AECOM Reclassification	Shape Area	Percent of Total Area
111	RR7s	Rural Residential 7 Secondary Dwelling Zone	Rural Residential	10453	0.03
112	RR7	Rural Residential 7 Zone	Rural Residential	3962	0.01
113	RR7	Rural Residential 7 Zone	Rural Residential	8884	0.02
114	RR7s	Rural Residential 7 Secondary Dwelling Zone	Rural Residential	9575	0.02
115	RR7s	Rural Residential 7 Secondary Dwelling Zone	Rural Residential	9364	0.02
116	RR7s	Rural Residential 7 Secondary Dwelling Zone	Rural Residential	61091	0.16
117	RR7s	Rural Residential 7 Secondary Dwelling	Rural Residential	40150	0.10
118	RR7s	Rural Residential 7 Secondary Dwelling Zone	Rural Residential	20175	0.05
119	RR7s	Rural Residential 7 Secondary Dwelling Zone	Rural Residential	11268	0.03
120	RR7s	Rural Residential 7 Secondary Dwelling Zone	Rural Residential	20783	0.05
					100.00

2023 Borehole Data Simplified

ID	Well Tag	Top Elevation (m)	Bottom Elevation (m)	GWELLS Lithology Description	AECOM Simplified Lithology	AECOM Hydrostratigraphy
0	1233	1.8288	18.288	hrd pan and boulders	boulders	coarse
1	1233	19.2024	26.8224	clay	clay	fine
2	1233	28.3464	38.1	hard packed sand and gravel	sand	coarse
3	1233	38.1	56.6928	hard packed sand	sand	coarse
4	1913	0.6096	10.668	blue hardpan clay with boulders	hardpan	fine
5	3118	0	6.096	quicksand	quicksand	coarse
6	5560	0	6.096	glacial hardpan	hardpan	fine
7	5564	0	10.668	glacial hardpan to sand	hardpan	fine
8	5587	0	10.0584	glacial hardpan with 7' of sand at the bottom	hardpan	fine
9	5592	0	11.8872	glacial hardpan	hardpan	fine
10	5594	0	9.144	glacial hardpan with quicksand at the bottom	hardpan	fine
11	5597	0	6.4008	glacial hard clay and gravel with sand at the bottom	clay	fine
12	11376	0	10.668	glacial clay hardpan gravel and rocks	clay	fine
13	11410	0	8.2296	blue hardpan with layers of gravel	hardpan	fine
14	11419	0	8.9916	glacial hardpan and clay	hardpan	fine
15	11423	0	7.62	glacial clay and hardpan	clay	fine
16	11447	0	7.9248	glacial gravel and hardpan	gravel	coarse
17	11452	0	5.1816	glacial hardpan	hardpan	fine
18	11474	0	7.62	glacial hardpan	hardpan	fine
19	11489	0.6096	6.4008	clay with big boulders	clay	fine
20	11579	0	6.096	glacial hardpan	hardpan	fine
21	11599	0	6.096	glacial clay and hardpan	clay	fine
22	11637	0	6.7056	glacial hardpan	hardpan	fine
23	11642	0	9.144	glacial hardpan	hardpan	fine
24	11661	0	6.7056	hardpan and boulders	hardpan	fine
25	11672	0	6.096	glacial clay and sand	clay	fine
26	11679	0	8.5344	glacial hardpan	hardpan	fine
27	11695	0	10.9728	glacial clay hardpan and gravel	clay	fine
28	11696	0	7.0104	clay at top gravel at hardpan	clay	fine
29	11697	0	5.4864	hardpan with boulders	hardpan	fine
30	15377	0.9144	8.2296	3-? brown clay	clay	fine

Well ID	Well Tag No	Date	pH	Turbidity	Total Coliforms	Escherichia coli	Aluminium	Arsenic	Iron	Lead	Manganese
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
54752		2020-04-17			1				4.2		0.31
54752		2020-04-28			6.3				12		0.46
54753		2020-02-27									0.15
67421		2023-03-02									0.02
54720		2020-12-03		2.95					0.42		0.088
54721		2020-12-09		1.04							0.263
	78326				1						0.062
	78326	2022-04-06			<1						-
	124594	2021-12-09			6.3						
	124594	2022-04-06			<1						
	124593	2021-12-09			12.1						
	124593	2022-04-06			<1						
	93361	2021-03-24									0.1
	122289	2021-04-08							0.32		0.046
	122287	2021-03-03									0.035
	122288	2021-02-03			69.7						0.06
	122288	2021-02-19			<1						0.11
64074		2019-11-05			4.2						
64074		2020-12-09			<1						
67589		2022-02-25		0.8							0.065
61552		2020-11-04			7.5						0.032
67588		2022-02-25		0.57							0.044
40652		2020-11-02			>200.5	3.1					
40652		2020-12-08			<1	<1					
64092		2022-03-03		2.25	11.1					0.015	0.033
51761		2020-10-28		5.44	3.1				0.73		0.071
67407		2022-05-19		0.6	1						
63652		2020-10-27		2.86	144.5				0.81		0.093
63652		2020-12-09			17.8						
67406		2022-05-13		0.34							0.092
63687		2020-10-29									0.022
40691		2022-05-05		0.63	2				0.94		0.2
63686		2020-10-30			32.4						
40689				1.48							0.27
61568		2020-12-08		36.4	64.4		1.4		1.4		0.14
40690		2022-04-26		0.8							0.064
63699		2022-05-30		0.66					1.4		0.21
40632		2021-12-08		0.47							0.069
40634		2021-12-01		0.36							0.046
40633		2021-12-02						0.036			0.14
63725		2021-11-30		0.37				0.01			0.11
63677		2021-07-12		0.67	1			0.012			0.057
61540		2021-07-13		1.35							0.065
41582		2021-06-24		1.35							0.064
61595		2021-07-14		4.68					0.64		0.064
65722		2021-06-25		1.55	547.5						0.063
63677		2021-06-23		4.68	62.4						0.064
63721		2021-08-11		0.22	3.1			0.012			0.025
61596		2021-08-13		0.39				0.011			0.035
63706		2021-08-10		0.48	1						0.063
63705		2021-06-23		0.28							0.063
64224		2022-03-01		1.05							0.063
64243		2022-03-01		0.79							0.057
41556		2015-12-15	5.98		1				3.29		

Notes:

Guidelines for Canadian Drinking Water Quality - Maximum Allowable Concentration (MAC) Exceeded

Guidelines for Canadian Drinking Water Quality - Aesthetic Objective (AO) Exceeded

Guidelines for Canadian Drinking Water Quality - Operation Guidelines (OG)

2023 Digitized Septic Locations

Project Number	JTM Eastin	JTM Northin	Year	Applicant	Address 1	Address 2	Comments	Subdivison Number	Rezoning Number	OCP Amend Number	DP Number	DV Permit	Other
P2019-030	544912	5451019	2019	Thor Shay	#13 - 11540 Glacier Dr		Variance for Retaining Wall				DP19-051	DV19-006	
P2021-089	544912	5451019	2021	Eleven Eleven Homes Ltd	#14-11540 Glacier Dr		Fire Interface DP - Duplex				DP21-103		
P2018-057	542647	5449129	2018	Annika & Stewart Swingle	10531 Ruskin Cres		Environmental DP				DP18-058		
P2015-033	542702	5449170	2015	Flowerdew	10549 Reedal St		Garden Cottage		R15-015			DV15-011	
P2020-065	543394	5449844	2020	OTG Developments	10911 Wilson St		5 lot subdivision	S20-010	R20-020		DP20-071/DP20-072/DP20-073		
P2018-022	542047	5450059	2018	Kelly Brack	11020 288th St		Coach House		R18-016				
P2013-050	543294	5450226	2013	Wurster	11061 Wilson St		2 Lot Subdivision	S13-016	R13-024				
P2018-077	543276	5450283	2018	Jeff Tupper	11067 Wilson St		Geo-line Adjustment				DP18-081		
P2023-026	542059	5450266	2023	Wayne Lindberg	11150 288th St		Fire Interface DP				DP23-022		
P2015-061	543384	5450975	2015	Orca Pacific Developments	11445 Wilson St		3 Lot Subdivision	S15-018	R15-028		DP16-010		
P2018-039	543415	5451302	2018	OTG Developments	11533 Wilson St	11511 Wilson St	4 Lot Subdivision	S18-015	R18-027		DP18-033		
P2023-060	545157	5451639	2023	Daniel Ewart	11666 Allan St		Fire Interface DP				DP23-061		
P2021-128	543336	5451483	2021	Marty Nault	11707 Wilson St		2 lot subdivision	S21-028	R21-048		DP21-155/DP21-156/DP21-157		
P2019-083	543341	5451564	2019	Lacey Developments	11764 Wilson St		Fire Interface DP				DP19-099		
P2018-027	544290	5451685	2018	Hilda Goddard	11809 Statim St		Garden Cottage		R18-019				
P2019-023	544290	5451685	2019	Kriemhild Goddard	11809 Statim St		Fire Interface DP				DP19-032		
P2018-024	544387	5451762	2018	Janet Cox	11826 Statim St		Coach House		R18-015			DV18-011	
P2021-109	543149	5451926	2021	Ivon Gill	11919 Wilson St		Variances - SFD				DP21-127/DP21-128/DP21-129		
P2020-013	545153	5451949	2020	Scott Wideen	11930 Yeo St		Fire Interface DP - Accessory Building				DP20-011		
P2023-064	545729	5452388	2023	William Coughlin	12060 Coughlion Crt		Discharge of Covenant - Register New						
P2022-027	544341	5452089	2022	Wei Zhang	12071 Rolley Lake St		Fire Interface DP				DP22-023		
P2023-007	544341	5452089	2023	Wei Zhang	12071 Rolley Lake St		Natural Environmental DP				DP23-005		
P2023-068	545729	5452388	2023	Formosa Homes Joint Venture	12100 Coughlin Ct		Fire Interface DP				DP23-068		
P2023-074	545729	5452388	2023	Ben Sidhu	12140 Coughlin Ct		Release of Septic Cov. and provide new						
P2017-052	544344	5452460	2017	Len Murdoch	12162 Rolley Lake St		3 Lot Subdivision	S17-019	R17-035		DP17-034		
P2022-029	544336	5452512	2022	Lafleur Developments	12187 Rolley Lake St		4 lot subdivision	S22-012	R22-012		DP22-024/DP22-025/DP22-026		
P2019-043	544245	5452592	2019	Kelly Molloy	12243 Rolley Lake St		Fire Interface DP				DP19-059		
P2022-124	545082	5452646	2022	BC Quality Surveyors	12281 Bell St		Discharge of Covenant						
P2018-074	545174	5452785	2018	Lacey Developments Ltd	12334 Bell St		3 Lot Subdivision	S18-022	R18-047		DP18-076/DP18-077		
P2019-136	543538	5452828	2019	Mitchel Loor	12358 Carr St		Secondary Suite		R19-045		DP19-171/DP19-172		
P2022-065	543538	5452828	2022	Mitchel Loor	12358 Carr St		2 lot subdivision	S22-025	R22-028		DP22-074/DP22-075		
P2019-010	543118	5452872	2019	Chad & Amy Hensbee	12370 Powell St		Variance for Setbacks - accessory building					DV19-001	
P2021-069	543118	5452872	2021	Chad Hensbee	12370 Powell St		Enviromental & Fire Interface DP's				DP21-078/DP21-079	<Null>	
P2016-061	543517	5452899	2016	Nolan Woods	12411 Carr St		Garden Cottage		R16-035				
P2020-045	544366	5453026	2020	Sander Hunfeld	12454 Rolley Lake St		Garden Cottage - RAR DP - Fire Interface DP		R20-012		DP20-053/DP20-054		
P2015-006	543119	5453181	2015	Holzapfel	12550 Powell St		2 Lot Subdivision	S15-003	R15-003				
P2013-011	545034	5452916	2013	Pacific Peak Homes Inc	12587 Russell Terr		Rezone to allow for Duplex		R13-006				
P2023-030	544072	5453269	2023	Don Bowins	12620 Cathy Cres		4 lot subdivision	S23-006	R23-008		DP23-027/DP23-028/DP23-029		
P2018-114	545082	5453356	2018	FlorWest Construction	12631 Bell St		26 lot Subdivision	S18-031	R18-062		DP18-128/DP18-129/DP18-130		
P2021-097	543519	5453341	2021	Gary Lowther	12631 Carr St		2 lot subdivision - RR7s	S21-020	R21-036		DP21-111/DP21-112/DP21-113		
P2018-075	543068	5453355	2018	Bodana Ollen	12631 Powell St		2 Lot Subdivision	S18-024	R18-048		DP18-078/DP18-079		
P2015-019	544109	5453364	2015	Chad Swash	12638 Cathy Cres		Secondary Suite		R15-008				
P2015-003	543115	5453448	2015	Bondana Oilen	12654 Powell St		2 Lot Subdivision	S15-002	R15-002				
P2019-061	543115	5453448	2019	Bodana Oilen	12654 Powell St		Fire Interface DP for Coach House				DP19-071		
P2018-076	543080	5453527	2018	James Ollen	12656 Powell St		Fire Interface DP				DP18-080		
P2021-063	542975	5453631	2021	Marie Krzus	12658 Powell St		Fire Interface DP				DP21-069		
P2022-011	542975	5453631	2022	Marie Krzus	12658 Powell St		Environmental DP				DP22-012		
P2022-116	542975	5453631	2022	Marie Krzus	12658 Powell St		Rezone for Secondary Dwelling		R22-051				
P2020-082	544180	5453570	2020	Michael Widdows	12712 Cathy Cres		Coach House		R20-025		DP20-086/DP20-087		
P2017-061	545916	5453968	2017	Gamache	12913 Pilgrim St		Accessory Building					V17-031/DV17-0	
P2022-008	545117	5453855	2022	RayRidge Developments	12933 Bell St		Fire Interface DP				DP22-011		
P2016-012	545869	5454210	2016	Tom Potucek	13033 Pilgrim St	13085 Pilgrim St	10 Lot Subdivision	S16-007	R16-008		DP16-008		
P2022-031	545869	5454210	2022	OTG Developments Ltd	13033 Pilgrim St	13085 Pilgrim St	10 lot subdivision	S22-013	R22-014		DP22-030/DP22-031/DP22-032		
P2023-047	545834	5454393	2023	Harjot Singh Toor	13157 Pilgrim St		4 lot subdivision	S23-008	R23-012		DP23-045/DP23-046/DP23-047		
P2020-096	542406	5449848	2020	Brent Lindberg	29110 Matheson Ave		Variance to build SFD				DP20-100	DV20-019	
P2020-058	542365	5452187	2020	1209381 BC Ltd	29317 Dewdney Trunk Rd		11 lot subdivision & rezoning to RR7s	S20-009	R20-017		DP20-063/DP20-064/DP20-065		
P2021-007	543252	5452213	2021	Cavalier Homes Ltd	29546 Taise Pl		Fire Interface DP - Accessory Building				DP21-009		
P2017-020	543292	5453450	2017	Deanna Garcia	29573 Hudson Ave	29585 Hudson Ave	Lot Line Adjustment	S17-005					
P2018-019	543315	5450914	2018	Olaf Haeussler	29583 Kennedy Terr		Geotechnical DP				DP18-018		
P2022-012	543315	5450914	2022	Edward Grice	29599 Kennedy Terr		2 lot subdivision	S22-004			DP22-010		
P2017-066	543351	5453451	2017	Hellofs & Gillespie	29609 Hudson Ave		5 Lot Subdivision	S17-021	R17-042		DP17-040		
P2018-007	543373	5451980	2018	Eros Homes Ltd	29622 Dewdney Trunk Rd		Gas Station/Convenience Store		R18-006	OCP18-001	DP18-005/DP18-006		
P2019-042	543373	5451980	2019	Veer Sidhu	29622 Dewdney Trunk Rd		Fire Interface DP				DP19-058		
P2020-101	543373	5451980	2020	Eros Homes Ltd	29622 Dewdney Trunk Rd		Variance - Accessory Building Height				DP20-107	DV20-020	