Keystone Environmental
Knowledge-Driven Results

April 22, 2022

Mr. John Robertshaw
Brunswick Property Holdings Ltd.
2960 Altamont Crescent
West Vancouver, BC V7V 3C1

Dear Mr. Robertshaw:

Re: Environmental Impact Assessment
10566, 10582, and 10620/10626 Scott Road
Surrey, BC
Project No. 15934

We have enclosed the report titled *Environmental Impact Assessment, 10566, 10582, and 10620/10626 Scott Road, Surrey, BC.* If you have any questions, please do not hesitate to contact us.

Sincerely,

Keystone Environmental Ltd.

Jamie Slogan, Ph.D., R.P.Bio.
Department Head Biological Services

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encl.

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Keystone Environmental

Knowledge-Driven Results

Environmental Impact Assessment

10566, 10582, 10620/10626 Scott Road
Surrey, BC

Prepared for: Brunswick Property Holdings Ltd.

Project No.15934
April 22, 2022

Environmental Consulting • Engineering Solutions • Environmental Planning

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EXECUTIVE SUMMARY

Keystone Environmental Ltd. (Keystone Environmental) was retained by Brunswick Property Holdings Ltd. (the Client/ Proponent) to complete an environmental assessment for development of an industrial business park (the Project) located at 10566, 10582, 10620/10626 Scott Road in Surrey, BC (the Site). To avoid potential effects from the Project to terrestrial and aquatic sensitive areas, multiple reiterations of the Project design have been completed in consultation with Qualified Environmental Professionals. High value watercourses and wetlands, along with their associated riparian areas have been avoided to preserve water storage and maintain water flow through and off-Site, while conserving contiguous wildlife corridors through the Site. Fish were not observed at the Site.

The Site is approximately 107,180 m^2 and includes +/- 67,400 m^2 of developable area comprised of two large industrial warehouses, access roads, loading bays, paved open spaces, and parking spaces. This developable area is the western 63% of the Site which has been historically occupied for farming, storage, trucking and other similar uses. The Project proposes to maintain +/-39,780 m^2 of regulated aquatic and streamside setback areas on-Site.

The Site is located in the Dry Maritime Coastal Western Hemlock biogeoclimatic subzone and within the 200-year floodplain of the Fraser River (City of Surrey 2020), overlapping the South Westminster Integrative Stormwater Management Plan (ISMP) drainage boundary. This drainage boundary is split between two drainage catchments: the Old Yale Catchment basin, which drains north and the Manson Catchment, which drains south.

Historic aerial photos indicate the Site has been impacted by human settlement since before 1932, when the property was occupied for residential and agricultural purposes. An archeological site data request to the Archaeology Branch of FLNRORD did not return any known archaeological sites records for the Site.

The western two-thirds of the Site were highly disturbed and used for mixed industrial/commercial operations. Activities observed during the Site visit included container truck egress and access, with evidence of longer-term truck and trailer storage. The ground surface consisted of imported fill. Vegetated areas were effectively limited to a fringe margin of regenerating pole sapling black cottonwood and red alder, primarily below top-of-bank within the riparian areas. Extensive invasive plant species and ruderal vegetation typical of disturbed sites were documented around the perimeter of the industrial area.

A review of the BC CDC iMap database did not yield occurrences of rare or endangered flora within the Site. Wildlife observations were primarily concentrated on the eastern portion of the Site, which is comprised of a network of wetlands and streams that are anticipated to support life requisites for a spectrum of species. A review of the CDC iMap did not yield historic occurrences of wildlife species at risk within a 2.5 km radius of the Site. Amphibians were abundant in Wetland C and D, including observations of red-legged frog. Several wetlands, streams and ditches were observed on the Site. A non-fish bearing status and riparian setbacks were determined for each of the aquatic features.

The total area within the Site is approximately 107,180 m^2 and the proposed development footprint is 67,400 m^2, after avoiding a majority of the high and moderately sensitive areas. Following the implementation of avoidance measures to reduce potential effects to aquatic, riparian, and terrestrial environments, and mitigation measures outlined in Section 6.3, the ESC plan, and the EMP, the following residual effects were identified: loss of 1,434 m^2 of non-fish bearing aquatic habitat and 17,109 m^2 of non-fish bearing riparian habitat according to the RAPR setbacks including 4,105 m^2 of existing riparian vegetation. Water flow into, through, and from the Site is expected to be maintained based on design of a stormwater management plan. Hydrological assessment and modelling of the proposed development have been completed. These modifications are expected to result in an insignificant change to fish habitat within the Project footprint; therefore, harmful alteration, destruction, or destruction of fish habitat is not expected, and an Authorization should not be required.

Keystone Environmental recommends submitting a Request for Review to Fisheries and Oceans Canada to confirm that an Authorization is not required and that additional mitigation measures are not required.

The following report has been updated based on a recent Site visit conducted on February 24, 2022, where it was observed that there had been alterations to watercourses since the original environmental assessment had been completed. The South Detention Pond, South Ditch A, and Culvert 2 were infilled/removed by the owner of the neighbouring property. Background information on watercourse conditions in this report have not been changed since the original assessment; however, information regarding Site hydrology, fish presence, and impact assessments has been updated to reflect observed changes on-Site.

This Executive Summary is subject to the same general limitations as contained in the report and must be read in conjunction with the entire report.

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1. INTRODUCTION

Keystone Environmental Ltd. (Keystone Environmental) was retained by Brunswick Property Holdings Ltd. (the Client/ Proponent) to complete an environmental assessment (the Assessment) for development of an industrial business park (the Project) located at 10566, 10582, and 10620/10626 Scott Road in Surrey, BC (the Site). 10620/10626 Scott Road is currently occupied by a vacant residence and a portable open-sided truck and tire repair structure, 10582 Scott Road is occupied by a trailer repair shop and laydown yard, and 10566 Scott Road property appears to be an industrial yard used for trailer staging. The Site location is shown on **Figure 1**, **Appendix A**, and selected aerial photographs of the Site are included in **Appendix B**.

The environmental assessment report is intended to support an application as part of the Vancouver Fraser Port Authority (VFPA) environmental review process and requirements under the federal *Fisheries Act*. If at the time of development land is outside of the jurisdiction of the VFPA, then additional approval may be required including:

- BC *Water Sustainability Act* – Approval for Changes in and About a Stream
- City of Surrey – Development Variance Permit under their Bylaw Part 7A

The environmental assessment consists of:

1. A desktop review of existing literature, maps, and publicly available government and citizen science data;
2. A field assessment to ground-truth the results of the desktop review and collect new information at the Site, characterize baseline conditions, and assess potential effects to Environmentally Valuable Resources (EVR); and
3. Consultation to discuss and confirm the approach and results with regulators. EVR identified for assessment within this report include sensitive and/or regulated:
   - Aquatic and riparian habitats;
   - Terrestrial habitats and vegetation;
   - Wildlife and wildlife habitat; and
   - Species of management concern (i.e., species at risk).

To avoid potential effects from the Project to terrestrial and aquatic sensitive areas, multiple reiterations of the Project design have been completed in consultation with Qualified Environmental Professionals. High value watercourses and wetlands, along with their associated riparian areas have been avoided to preserve water storage and maintain water flow through and off-Site, while conserving contiguous wildlife corridors through the Site.

1.1 Location and Setting

The Site is comprised of three properties located east of Scott Road in Surrey, BC. There are industrial lots north, south, and west of the Site. There is a school east of the Site and residential properties east of the school.

The following information summarizes the location and identification of the Site (**Table 1**):

Table 1 Property Description

Parcel Identifier (PID):	001-525-905
Owner:	VFPA under option from 0822340 BC Ltd
Legal Description:	Lot 2, Except; Part on SRW Plan LMP20327 Section 19 Block 5 North Range 2 West New Westminster District Plan 14280
Civic Address:	10582 Scott Rd, Surrey, BC
Zoning:	A-1 (General Agriculture)
Site Area:	25,480 m^{-} (approximate)
Latitude:	49°11'43.97"N
Longitude:	122°53'3.89"W
Parcel Identifier (PID):	009-932-313
Owner:	VFPA under option from 0787554 BC Ltd
Legal Description:	Lot 1, Except; Part on SRW Plan LMP20327 Section 19 Block 5 North Range 2 West New Westminster District Plan 14280
Civic Address:	10620, 10626 Scott Rd, Surrey, BC
Zoning:	A-1 (General Agriculture)
Site Area:	25,510 m^2 (approximate)
Latitude:	49°11'43.28"N
Longitude:	122°53'3.26"W
Parcel Identifier (PID):	013-197-754
Owner:	VANCOUVER FRASER PORT AUTHORITY
Legal Description:	Parcel B, Block 5N, Section 19, Range 2W, New Westminster Land District
Civic Address:	10566 Scott Rd, Surrey, BC
Zoning:	A-1 (General Agriculture)
Site Area:	56,188 m^2 (approximate)
Latitude:	49°11'40.73"N
Longitude:	122°53'1.61"W

The approximate latitude and longitude entered for the Site was determined from the Google Earth software program (http://earth.google.com/).

1.2 Project Proponent

Contact information for the Project Proponent:

Brunswick Properties

Mr. John Robertshaw
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2960 Altamont Cres.
West Vancouver BC V7V 3C1
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Authorized Representative:

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2. PROJECT DESCRIPTION

2.1 Project Rationale

The proposed development has been driven by a desire to support and diversify the industrial sector in British Columbia to address the chronic shortage of industrial and employment lands in the lower Mainland. The Site belongs to the Port of Vancouver, who's mandate under the federal minister of transport is to responsibly facilitate Canada's trade for the benefit of all Canadians. This Project aims to support building the needed industrial capacity for the Vancouver Fraser Port Authority, which provides direct access to local and international markets. The Site is situated within an important cluster of existing industrial areas central to the region's transportation network offering opportunities to connect firms, suppliers and institutions. This Site is ideally located to support the regional and national industrial sectors with increased efficiencies in the transfer of goods and commodities to meet the mandate of the Canadian Port Authorities.

The proposed Project is a new multi-building industrial park that is thoughtfully designed to protect and be integrated into the surrounding natural environment. The design goals are to efficiently utilize the industrial productivity of the lands within an attractive work environment, while maintaining the ecological function of the surrounding natural green spaces. Project design drawings illustrating the building and development footprints are provided in **Figure 2, Appendix A**.

2.2 Project Features and Operations

The Site is approximately 107,180 m^2 and includes 67,400 m^2 of developable area comprised of two large industrial warehouses, access roads, loading bays, paved open spaces, and parking spaces. This developable area is the western 63% of the Site, which has been historically occupied for farming, storage, trucking and other similar uses. The proposed business park will be a state-of-the-art high-capacity warehouse and distribution logistic facilities with the latest sustainable features such as energy efficient building envelope design, power, lighting, HVAC, plumbing, sensors and automated control systems. While there is general demand and insufficient supply of local industrial spaces, there is an urgent lack of supply for the type of project proposed here to meet the demands of today's global supply chain, changing consumer markets and requirements for green sustainable facilities and infrastructures.

The Project proposes to maintain 39,780 m^2 of regulated aquatic and streamside setback areas on-Site.

2.3 Schedule

Construction of the Project is scheduled to begin in 2022 (**Table 2**). The overall construction schedule is estimated at approximately four years. Site preparation including clearing and grubbing, establishing ESC measures, and initial grading will occur in the spring of 2022. The Site will then support preload for a period of approximately three years, until June 2025. Building construction is expected to be completed over a period of one year from June 2025 to 2026.

Table 2 Estimated Project Timeline

Task	Start	Finish
Permitting		
Environmental permitting	Fall 2020	Winter 2021/22
Construction		
Site preparation	Spring 2022	June 2025
Preload	June 2022	June 2025
Building envelope and interior construction	June 2025	June 2026

2.4 Regulatory Context

Table 3 provides a review of regulatory considerations that may apply by jurisdiction. Keystone Environmental understands that the properties will transition to federal ownership, which would trigger a change in regulatory considerations, including a Port of Vancouver Project and Environmental Review to meet requirements under Section 82 of the *Impact Assessment Act.*

Keystone Environmental understands that the Site is currently zoned as A-1 (Agriculture General), but listed as Mixed Employment under the City's Official Community Plan (OCP). For the purposes of this assessment, the regulations considered here are provided with the understanding the property will be re-zoned for industrial/ commercial use.

Table 3 Key Environmental Acts and Regulations

Jurisdiction	Title	Description
Federal	*Fisheries Act,* 2019	Provides protection for all fish and fish habitats; prohibits harmful alteration, disruption, or destruction of fish habitat.
	Species at Risk Act, 2002	Protects the individual and critical habitat, as defined in the recovery strategy, of species listed as Threatened, Endangered, or Extirpated under Schedule 1 of the *Act* where they occur on federal land. Protection of species at risk on private land falls primarily to local government and voluntary stewardship.
	Impact Assessment Act, 2019	Section 82 stipulates that non-designated projects which occur on federal land require the authority to determine that the project will not adversely affect the environment.
	Migratory Birds Convention Act 1994	Migratory birds and their nests are protected under the federal *Migratory Birds Convention Act* (*MBCA*). Should any vegetation clearing on the Site occur for this project during the bird breeding season (March 1 to August 31 of any year), in accordance with the *Act* an active bird nesting survey will be required prior to vegetation removal in order to identify and protect any active nests associated with the vegetation removal until a QEP confirms the nest is no longer active

3. METHODS

3.1 Background Review

The existing conditions at the Site and surrounding area were assessed through a review of online databases. The objective of the background review was to collect pertinent biophysical information to identify sensitive ecosystems or ecosystem components that may affect the developable area or require further assessment. Species and ecosystems of management concern were defined as species or ecosystems that are blue- or red-listed provincially or designated under Schedule 1 of the federal *Species at Risk Act*. The BC Conservation Data Centre (BC CDC) was queried for known occurrences of species at risk within a 2,500 m buffer of the Site (BC CDC 2020).

The following sources of information were reviewed as part of the desktop review:

- City of Surrey Mapping Online System (COSMOS; City of Surrey 2021)
- Aerial Photographs
- Google earth historical mapping
- BC Biogeoclimatic Ecosystem Classification Program BECweb
- BC Conservation Data Centre (CDC)
- BC Frogwatch Atlas
- BC iMap
- BC Habitat Wizard
- BC Ministry of Environment and Climate Change Strategy (BC ENV) Fisheries Information Summary System (FISS)
- BC ENV EcoCat: Ecological Reports Catalogue
- BC Soil Information Finder Tool
- Metro Vancouver Sensitive Ecosystem Inventory
- Sensitive Habitat Inventory Mapping

3.2 Field Assessment

Site assessments were conducted on the following dates:

- September 1 and 4, 2020: reconnaissance-level field assessment.
- December 23, 2020: delineating the stream boundary and TOB.
- January 19, 2021: delineating the stream boundary and TOB flagging and fluvial geomorphologist assessment.
- February 3, 2021: High water level geomorphology assessment and collection of drone imagery.

- February 7, 2021: Collection of drone imagery.
- February 17, 2021: Review of HWM flagging and aquatic classification.
- April 8, 2021: Review wetland channel, south ditch, drainage along Scott Road, and hydrology and ecology of potential habitat offsetting areas.
- September 7 to 9, 2021: Presence/ absence fish surveys of and isolated channel north of Wetland D and in the eastern section of wetland channel.
- October 8, 2021: Presence/ absence fish surveys of and isolated channel north of Wetland D and in the eastern section of wetland channel were conducted after heavy rains and increased water levels on-Site.

3.2.1 Terrestrial Field Assessment

Vegetation communities were identified in the field to the lowest practical taxonomic level. A soil pit was dug in the eastern portion of each parcel to characterize Site soils. Wildlife habitat was assessed qualitatively through documentation of habitat characteristics with the ability to meet one or more life requisites for wildlife known or with potential to occur within the Site, including breeding/denning, migration and foraging habitat. Wildlife observations were noted, including the species, activity and location.

Spatial data was recorded using the Avenza Maps application. A Trimble R1 was used for increased mapping accuracy where required.

3.2.2 Aquatic Field Assessment

The aquatic assessment consisted of the following tasks: (1) characterizing each aquatic feature within or adjacent to the Site, (2) delineating the high water mark (HWM)[1] and TOB for a BCLS survey, (3) determining the fish-bearing status of each feature, and (4) identifying applicable streamside protection and enhancement area (SPEA) setbacks pursuant to the provincial RAPR.

Aquatic Feature Classification and Survey

The following definitions were used to characterize aquatic features within or adjacent to the Site, pursuant to the RAPR:

- Stream: a stream was defined as a natural watercourse, whether or not the stream channel has been modified, characterized by flowing water. Evidence of flowing water includes: a visible channel, erosion and scour of the bed material, sediment/ leaf litter deposition, and bank erosion.
- Ditch: anthropogenic features constructed for the purpose of facilitating drainage with no significant headwaters.

[1] The high water mark of a feature, including the active floodplain, characterized by a distinct change in vegetation and sediment. For the purposes of this report, the high water mark is considered equivalent to the natural/ stream boundary.

- Wetland: A swamp, marsh, fen or prescribed feature where soils are water-saturated for a sufficient period of time to support low soil oxygen levels, a relative abundance of hydrophytic vegetation, and/ or soils feature “hydric” characteristics (MacKenzie and Moran, 2004).

The HWM for aquatic features was determined in the field by a QEP based on changes to soil composition, vegetation, rafted debris, or signs of sloughing (e.g., undercut banks, exposed roots), and field-verified by a senior fluvial geomorphologist. Due to high water levels at the time of the HWM assessment (i.e., December 23, 2020 and January 19, 2021) and dense blackberry thickets, portions of the HWM were not accessible for flagging. In these areas, the HWM was extrapolated through a review of contour data, the BCLS survey, and visual interpretation of aerial imagery. The TOB was determined as the point closest to the floodplain where the slope breaks to less than 3 (vertical): 1 (horizontal) for a minimum distance of 15 m. The natural/stream boundary and TOB for each aquatic feature were delineated with pin flags. A BCLS survey of the HWM and TOB was completed, as presented in the Lot Survey Plan (**Appendix A**).

3.2.3 Fish and Fish Habitat

The fish-bearing status of aquatic features was assesses based on the presence of surficial connectivity to fish-bearing features, fish passability through man-made infrastructure (e.g., culverts), and through presence/ absence surveys. Fish habitat characteristics were also noted for each aquatic feature, including characterization of substrate, morphology, stream permanence, and potential barriers to fish passage.

Presence/ absence fish sampling methods were completed in accordance with the ‘Terms of Conditions’ of Licence No. XHAB 350 2021 under the Federal *Fisheries Act.* Two sampling techniques were used to assess fish presence/ absence on the Site and consisted of baited Gee minnow trapping and dip netting. A total of four Gee minnow traps were baited and deployed in the wetted sections on the Site and were inspected regularly for the presence of fish from September 7 to 9, 2021, and then again om October 8, 2021. Fish exclusion netting was not required as the wetted areas were isolated ponded sections.

Two traps were set in an isolated section of the Wetland Channel at 16:30 on September 7, 2021, were left overnight and inspected the morning and afternoon of September 8, 2021. An additional two traps were set in an isolated wetted area within a channel northwest of Wetland D at 10:45 on September 8, 2021 and inspected later that afternoon.

Dip netting was also conducted to assess fish presence/ absence in each of previously mentioned isolated sections on the Site on September 8, 2021. Two field staff methodically swept using hand nets in a western direction a minimum of ten times in each of the wetted areas. **Table 4** presents approved salvage personnel.

Table 4 Salvage Personnel

Date	Field Crew
2021-09-07	L. Williams
2021-08-11	L Williams and C. Gillespie

3.2.4 Streamside Setback Areas

Streamside Protection and Enhancement Areas

The *Fisheries Act* does not prescribe stream setbacks; however, projects that conform to RAPR are considered to meet the spirit and intent of the *Fisheries Act,* through an intergovernmental cooperation agreement established between the Provincial Ministry of FLNRORD and Federal Fisheries and Oceans Canada (DFO). The provincial *RAPR* streamside protection and enhancement areas (SPEAs) were assessed using detailed assessment methods consistent with the RAPR (MFLNRORD 2019).

For each feature identified as a stream under the regulation, between 7 and 11 bankfull width measurements were taken to approximate the average stream width, and the stream gradient was measured with a clinometer. For the purpose of this assessment, the bankfull width was defined as consistent with RAPR technical manual (MFLNRORD 2019). A SPEA was assigned to each stream, pursuant to the detailed assessment methodology, and established from the HWM (MFLNRORD 2019). The SPEA for wetland features was prescribed according to the detailed methods under RAPR and established from the HWM (MFLNRORD 2019).

For each ditch, the ditch channel width was determined as the width of the ditch at the midpoint between the ditch invert and the ditch top of bank. Between 7 and 11 measurements of the ditch channel width were recorded in the field and the ditch gradient was measured with a clinometer. A ditch SPEA was prescribed according to the RAPR detailed methodology, which was established from the top of ditch bank.

4. RESULTS

4.1 Ecological Setting and Site Background

4.1.1 Ecological Context

The Site is located in the Dry Maritime Coastal Western Hemlock (CWHdm) Biogeoclimatic subzone (Green and Klinka 1994; BC CDC 2021). This subzone occurs at low elevations throughout the lower mainland, extending from sea level to approximately 650 m. Vegetation in the CWHdm subzone is influenced by a warm climate with relatively dry summers and moist, mild winters with little snowfall. Natural forest canopies are dominated by Douglas fir (*Pseudostuga menziesii*), western redcedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*). Typical understory species include salal (*Gaultheria shallon*), red huckleberry (*Vaccinium parvifolium*), and step moss (*Hylocomium splendens*). Less common understorey species include dull Oregon-grape (*Mahonia nervosa*), vine maple (*Acer circinatum*), bracken fern (*Pteridium aquilinum* var. *pubescens*), and sword fern (*Polystichum munitum*).

4.1.2 Historical Imagery

Historical aerial photography, satellite imagery and recent drone imagery of the Site were reviewed to understand the historical environmental context of the Site. Assessed air photos include the years 1932, 1940, 1949, 1954, 1963, 1969, 1974, 1980, 1986, 1990, 1994, 1999, 2004, 2009 and 2016 (**Appendix B)**. Available satellite imagery of the Site from 1998, 2001 to 2008, and 2012 to 2021, with the most recent imagery being from May 13, 2021 was reviewed. Drone imagery was collected by the project team of the Site and surrounding area during the field assessment on February 7, 2021, to capture conditions at the time of the assessment (**Appendix B**).

Aerial photos indicate the Site has been impacted by human settlement since before 1932, when the property was occupied for residential and agricultural purposes. The 1932 air photos show a few homes and barns on the Site just east of Scott Road and some land clearing in proximity to the buildings. There are no obvious indications of streams on the Site, however, a fait line in the north-south direction in the middle of the Site may indicate a small drainage channel. Much of the area is not occupied by mature forest but the forested patches in the eastern portion of the southern lot and immediately north of the Site may suggest low-lying wetland areas.

The 1940 air photo shows the Site has been cleared for agriculture except for a small, forested patch near the eastern boundary between the northern and central lots. The 1949 photo shows minimal development on the eastern half of the Site and the western half of the southern property. A drainage ditch in the north-south direction appears in the middle of the Site as well as through the western half of the southern property.

In 1954 additional ditches can be seen in the northern and central properties as well as in the western half of the southern property. Imagery from the 1950s and 1960s suggest the Site and neighboring properties were subject to a high water table or regular flooding, as standing water is observable in the photographs. Linear water features can be observed around the perimeters of

the properties as early as 1949. The Site has experienced varying levels of disturbance since that time. The conditions and land-use of each of the three properties indicated by the aerial and satellite imagery are summarised in the following paragraphs.

10620/10626 Scott Road (Northern Property)

The 1949 photo indicates the west side of the property has historically been used for agriculture. Linear water features are evidence around the east and south side of the property. Greenhouses were constructed on western third of the property between 1979 and 1986. The eastern two thirds of the property were used as agricultural fields up to 2006, when it appears to have been fallow and left to revegetate until present. In 2007 the greenhouses appear to have been removed. In 2008 it appears that fill was first introduced to the western portion of the Site. Only minimal infilling eastward occurred after 2009 to present as the eastern third of the property remained undeveloped.

10582 Scott Road (Central Property)

The earliest aerial imagery reviewed indicates the property was historically used for agriculture. Greenhouses were constructed on the west side of the property between 1979 and 1986. Between 1986 and 1997, additional greenhouses were added to the east side of the property. By 2004 the greenhouses extended almost to the eastern property boundary. The greenhouses remained on the property until approximately 2008/2009. From that time, the east side of the property was left fallow and appears to have revegetated. The west side of the property experienced increasing fill placement from west to east, encroaching on the vegetated portion of the central property. The middle third of the property was infilled between 2009 and 2016 and no additional infilling eastward has occurred since. A ditch running north to south in the middle of the property appears between 2011 and 2012 and is no longer visible in aerial imagery by April 2013.

10566 Scott Road (Southern Property)

The property at 10566 Scott Road appears to have experienced varying levels of agricultural use starting in the 1930s. Aerial imagery from 1954 indicate the property was subject to standing water for at least part of the growing season. In 1974 the property was mostly undeveloped with a few buildings in the northwest corner. By 1980, the west and central portion of the property had been cleared and were no longer used as agricultural fields. By 1986 the western two thirds of the property had been infilled and the eastern third remained undeveloped and continues undeveloped presently. The infilled western two thirds re-vegetated after 1986 as shown in the 1990, 1994 and 1999 photos. By 2002 a driveway is visible bisecting the west half of the property west to east from Scott Road, and the imagery indicates activities to add fill on top of the existing fill. Between 2002 and 2013 the western two thirds of the property experienced varying levels of revegetation and human disturbance. Evidence of the property being used for equipment storage appears on the west side of the site between 2013 and 2014. The east third of the property has remained largely vegetated throughout most of the property's agricultural use.

4.2 Archaeological Resources

An archeological site data request to the Archaeology Branch of FLNRORD did not return any known archaeological sites records for the Site (**Appendix C).** The Archaeology branch indicated that further archaeological studies or Provincial heritage permit(s) are not required by the province at this time. It is noted that there remains a possibility for previously unidentified archaeological sites to be present on the Site.

4.3 Terrestrial Ecosystems and Vegetation

For the purposes of this assessment, the Site has been divided into the upland area (eastern two-thirds of the Site; described in this section of the report) and instream area (western one-third; described in Section 4.5 of this report).

The eastern two-thirds of the Site were highly disturbed and used for mixed industrial/ commercial operations (**Photograph 1, Appendix D,).** Activities observed during the Site visit included container truck egress and access, as well as evidence of longer-term truck and trailer storage. The ground surface consisted of imported fill. Vegetated areas were effectively limited to a fringe margin of regenerating pole sapling black cottonwood (*Populus trichocarpa)* and red alder (*Alnus rubra*), which was documented primarily below top-of-bank within the riparian areas (e.g., **Photograph 2, Appendix D**).

4.3.1 Invasive Plants

Extensive invasive species and ruderal vegetation typical of disturbed sites were documented around the perimeter of the industrial area, including bull thistle (*Cirsium vulgare*), reed canarygrass (*Phalaris arundinacea*), horseweed (*Conyza sp.),* dandelion (*Taraxacum spp*.), and western Canada goldenrod (*Solidago canadensis*). Himalayan blackberry (*Rubus armeniacus)* was common on the perimeter of the properties and where vegetation transitioned from tree to shrub and/ or aquatic environment. Noxious weed species listed under Schedule A of the provincial Weed Control Regulation observed on Site include: Canada thistle (*Cirsium arvense*), knotweed (*Fallopia sp.*), and purple loosestrife (*Lythrum salicaria*). Additionally, a patch of giant hogweed (*Heracleum mantegazzianum)* was observed approximately 10 m east of the eastern Site perimeter. The giant hogweed showed evidence of recent chemical treatment.

4.3.2 Rare and Endangered Plants

A review of the BC CDC iMap database did not yield occurrences of rare or endangered flora within the Site. Three species at risk were identified within a 2.5 km radius of the Site (**Table 5**: Vancouver Island beggarticks (*Bidens amplissima),* Roell's brotherella (*Brotherella roellii),* and streambank lupine (*Lupinus rivularis).* Keystone Environmental reviewed the habitat associations for these species relative to the conditions encountered in the field; Vancouver Island beggarticks and streambank lupine are considered to have a probability of occurring on Site.

Table 5 Rare and Endangered Plants observed within 2.5 km of the Site

Common Name	Scientific Name	Provincial Status	Federal	
			COSEWIC Status	SARA Listing
Vancouver Island Beggarticks	*Bidens amplissima*	Blue	SC (2001)	1-SC (2003)
Roell's Brotherella	*Brotherella roellii*	Red	E (2010)	1-E (2018)
Streambank Lupine	*Lupinus rivularis*	Red	E (2002)	1-E (2005)

During the field assessment, occurrences of beggartick (*Bidens spp.)* were observed; however, the observations were nodding beggarstick (*Bidens cernua*).

4.4 Wildlife and Wildlife Habitat

Wildlife observations were primarily concentrated on the eastern portion of the Site, which is comprised of a network of wetlands and streams that are anticipated to support life requisites for a spectrum of species. The west side of the Site was observed to be a highly modified industrial area comprised of compact fill that is subject to regular human disturbance (**Photograph 1, Appendix D**). This portion of the Site is not expected to provide substantial wildlife habitat but may support incidental use by a variety of species tolerant of human disturbance. Wildlife observations within this portion of the Site were limited to common birds, which were documented in the narrow bands of vegetation on the perimeter of the industrial area.

Amphibians were abundant in Wetland C and D, including observations of red-legged frog (*Rana aurora),* which is provincially blue-listed and federally recognized as Special Concern under Schedule 1 of the *SARA* (**Photograph 3, Appendix D**). All of the wetland features identified on Site are considered to provide good amphibian breeding habitat.

Mammal observations included sign of American beaver (*Castor canadensis*) (i.e., chewings), primarily along the western edge of the wetland complex where a tree layer prevails. A recently constructed beaver dam was observed on the eastern edge of the Wetland Channel during the winter Site visits; the dam was not present in September 2020 (**Photograph 4, Appendix D**). Mule deer (*Odocoileus hemionus*) scat and beds were also noted throughout the wetland complex.

Numerous birds were documented, including the Great Blue Heron (*Ardea Herodias fannini*), which is federally-listed under Schedule 1 of the *SARA* as Special Concern and blue-listed provincially. Tree and shrub habitat throughout the wetland complex is expected to provide nesting habitat to a wide complement of bird species. Nests protected year-round under the Provincial *Wildlife Act* were not observed.

A summary of wildlife observations on Site is included in **Table 6**.

Table 6 On-Site Wildlife Observations (September 1, 2020 and September 4, 2020)

Common Name	Scientific Name	Status	
		Provincial	Federal (SARA)
Birds			
Song sparrow	*Melospiza melodia*	Yellow	----
Cedar waxwing	*Bombycilla cedrorum*	Yellow	----
Anna's Hummingbird	*Calypte anna*	Yellow	----
American Crow	*Corvus brachyrhynchos*	Yellow	----
Mallard	*Anas platyrhynchos*	Yellow	----
Great Blue Heron, *fannini* subspecies	*Ardea Herodias*	Blue	1-Special Concern (2010)
Amphibians			
Red-legged frog	*Rana aurora*	Blue	1-Special Concern (2005)
Pacific Treefrog	*Pseudacris regilla*	Yellow	-----
Mammals			
American Beaver (sign)	*Castor canadensis*	Yellow	-----
Deer (sign)	*Odocoileus virginianus*	Yellow	-----

4.4.1 Wildlife Species at Risk

A review of the CDC iMap did not yield historic occurrences of wildlife species at risk within a 2.5 km radius of the Site. Two species at risk were observed on Site during the field assessments: Great Blue Heron and red-legged frog (**Table 7**). Both of these species were observed in Wetland D, overlapping the northern-most parcel; however, there is a likelihood of these species occurring in all of the wetland habitat affiliated with the Site.

Species identified as potentially occurring on Site for one or more life requisites are included in **Table 7.**

4.5 Aquatic and Riparian Habitat

4.5.1 Site Drainage

The Site is situated within the 200-year floodplain of the Fraser River (City of Surrey 2021) and overlaps two sub-drainages as identified in the South Westminster Integrative Stormwater Management Plan (ISMP) (Parsons, 2015). The two northern properties of the Site at 10620/10626 and 10582 Scott Road are within the Old Yale Catchment basin, which drains this portion of the Site north towards Old Yale Road. The southern property of the Site at 10566 Scott Road is in the Manson Catchment, which drains this property southwest to Manson Canal. The drainage divide taken from the 2015 ISMP is shown on **Figure 4**.

Table 7 Species at Risk with a likelihood of Occurring on Site

Common Name	Scientific Name	BC	SARA	Description, Habitat Associations, and Historical Occurrences
Mammal				
Trowbridge's shrew	*Sorex trowbridgii*	Blue	---	Found in mature forests with abundant ground cover, typically in riparian fringe areas (BC CDC, 1989).
Southern Red-backed Vole, *occidentalis* subspecies	*Myodes gapperi occidentalis*	Red	---	Known to occupy wooded riparian areas of bogs.
Olympic shrew	*Sorex rohweri*	Blue	---	Limited habitat information is available; appears to prefer mixed forests and areas in proximity to forests.
Pacific water shrew	*Sorex bendirii*	Red	1-E (2003)	Associated with freshwater riparian habitats, including wetlands, channelized watercourses, and streams (Environment Canada, 2014). Dependent on large and coarse woody debris (i.e., downed trees and limbs).
Snowshoe hare, *washingtonii* subspecies	*Lepus americanus washingtonii*	Red	1-E (2003)	Limited habitat associations available on the BC CDC. Previous documented within Burns Bog.
Little brown myotis	*Myotis lucifugus*	Yellow	1-E (2014)	Use anthropogenic structures and mature wildlife trees for breeding (ECCC 2015).
Birds				
Great Blue Heron, *fannini* subspecies	*Ardea herodias fannini*	Blue	1-SC (2010)	Breeding; mature forest within 10 km of suitable foraging waterbodies (restricted to mature forest within riparian habitats on-Site (Butler & Vennesland, 2015). Colonies or nesting behaviours were not detected within or adjacent to the Site.
Green heron	*Butorides virescens*	Blue	---	Breeds in freshwater marshes with abundant cattails, sedges, or other instream vegetation and pockets of open water (CDC, 1994).
Olive-sided flycatcher	*Contopus cooperi*	Blue	1-T (2010)	Breeding; mature forest near a natural or artificial edge (throughout Site). Nonbreeding habitat includes variety of forest and open habitat, with preference for areas with abundant snags (CDC, 2010b).

Common Name	Scientific Name	BC	SARA	Description, Habitat Associations, and Historical Occurrences
Purple Martin	*Progne subis*	Blue	----	Associated with riparian areas, known to occupy regions of the Fraser River estuary (Cousens & Lee, 2012).
Band-tailed Pigeon	*Patagioenas fasciata*			Breeding; coniferous and mixed forest with understory of fruit (Davidson, 2015)
Barn swallow	*Hirundo rustica*	Blue	1-T (2017)	Breeding; artificial structures and wildlife trees (Hearne, 2015)
Herptafauna				
Northern red-legged frog	*Rana aurora*	Blue	1-SC (2018)	Breeding and overwintering; variety of waterbodies are used, typically with abundant emergent and or submerged vegetation (rushes, sedges, shrubs), southern exposure and absence of fish can be important habitat characteristics; overwintering typically in adjacent forested habitat (All wetlands and forested habitat on-Site; ECCC, 2017).
Western toad	*Anaxyrus boreas*	Yellow	1-SC (2018)	
Invertebrates				
Dun Skipper	*Euphyes vestris*			Year-round; open Douglas-fir or deciduous forest, grasslands, meadows, utility rights-of-way, and permanent or ephemeral wetlands (ECCC, 2017c). Critical habitat mapped greater than 2.5 km from the Site.

Detailed descriptions of surface drainage patterns for each aquatic feature on the Site are provided below in Section 4.5.2, and details regarding off-Site drainage is provided in Section 4.5.3.

4.5.2 Site Drainage and Description of Aquatic Features and Riparian Habitat

Keystone Environmental mapped the following aquatic features overlapping or adjacent to the Site, as shown in **Figure 1**:

- South Stream 1
- Wetland A
- South Stream 2
- Wetland B
- Wetland C
- Wetland D
- North Stream
- Wetland Channel
- South Ditch
- South Sediment Detention Pond
- Scott Road Ditches 1 to 3

A description of each of these features is provided in the following sections. The City of Surrey COSMOS aquatic mapping is provided in **Appendix E** (City of Surrey 2021); the municipal mapping is not considered reflective of existing field conditions. Current conditions of each of the features are shown on **Figure 4** and **Appendix B** Figure AB-16 using recent drone imagery. **Figure 4** shows the ID and aquatic area of each feature, and Figure AB-16 shows aerial imagery unobstructed without shading or labels.

South Stream 1

South Stream 1 originates at the south end of the panhandle and conveys flow northwest towards Wetland A (**Photographs 5 and 6; Figure 4; Figure AB-16**, **Appendix B**). A south connection under 104 Avenue to Robson Creek was not observed, suggesting that 104 Avenue is the upstream terminus of the feature. Prior to the development of this area, Robson Creek may have naturally flowed north into South Stream 1; currently Robson Creek flows northwest, south of 103A Avenue, before joining Manson Canal, which flows northwest into the Fraser River.

South Stream 1 drains northward from its headwater at the north toe of the 104 Avenue embankment for approximately 35 m before flowing through a 6 m long by 1200 mm diameter corrugated steel pipe (CSP) (Culvert 1) installed under a very low volume gravel vehicle road which is partially grown over with vegetation (**Photograph 6**) Culvert 1 discharges to Wetland A.

South Stream 1 was characterized as a relatively linear feature with an average width of 3 m measured from the HWM, for an approximate area of 105 m^2. South Stream 1 slopes down northward from El. 6.65 m to the invert of Culvert 1 at El. 5.22 m (**Appendix A**), resulting in an average gradient of 4.1%. The slopes of the stream banks average 1.5 horizontal to 1 vertical (1.5:1) and appear stable (Photograph 5). The channel substrate was comprised of mineral soil with sparse contributions of gravel and substantially accumulated leaf litter and woody debris. South Stream 1 was dry during the September 2020 and February 2021 site assessments, and evidence of flow (e.g., rafting) was not observed, suggesting that this feature is highly ephemeral. The lack of alluvial bed material (i.e., sand and gravel) also suggests this stream sees very little flow, even during wet winter months. A poorly defined HWM was visible where the vegetation abruptly shifts to moss species intolerant to prolonged inundation. Trailing blackberry (*Rubus ursinus)* and horsetail (*Equisetum sp.)* were present within the channel bed.

The western bank of South Stream 1 was bordered by a narrow band of riparian vegetation that transitioned to an industrial area approximately 2 m west of the HWM. The eastern bank of the stream was bordered by a native canopy of red alder and big leaf maple (*Acer macrophyllum*) with an understory of salmonberry. A substantial portion of the off-Site riparian area to the east of South Stream 1 was cleared between the September and December 2020 field assessments as part of a neighbouring development project, as shown in the background of Photograph 10.

Invasive species including policeman's helmet (*Impatiens glandulifera*) and Himalayan blackberry were sparsely occurring within South Stream 1. Giant hogweed (*Heracleum mantegazzianum*), a noxious weed designated under the *Weed Control Act,* was observed at the upstream terminus of South Stream 1 where it enters Culvert 1. The giant hogweed appeared to have recently been treated. Human debris (e.g., residential garbage) was considered abundant within the South Stream 1 riparian area.

Wetland A

Wetland A is a permanent wetland (**Photographs 7 to 10; Figure 4**; and **Figure AB-16, Appendix B**) located downstream (north) of Culvert 1 and drains northward to South Stream 2. Wetland A receives flow from South Stream 1 via Culvert 1, precipitation, and overland runoff from a limited area to the west and a larger area to the east. Groundwater interaction was not confirmed during the Site assessments, but is considered likely due to the proximity of the Site to the Fraser River both horizontally and vertically. Additionally, the fact that the Site is within the 200-year floodplain boundary for the Fraser River further suggests that groundwater interaction is likely. This feature has been classified as permanent (contains water >6 mo. of the year), due to the presence of water during the summer following an extended dry period.

The southern portion of Wetland A was characterized by extensive policeman's helmet, reed canarygrass, and subcontributions of cattail (*Typha latifolia)*. Approximately 15 m north of Culvert 1, Wetland A transitioned into a swamp/marsh wetland with a tree layer of black cottonwood and western redcedar (*Thuja plicata),* and low-growing emergent vegetation such as skunk cabbage (*Lysichiton americanus)* and horsetail (*Equisetum* sp.).

The riparian area to the east of Wetland A was characterized by young black cottonwood and red alder trees with interspersed patches of dense Japanese knotweed (*Reynoutria japonica*)

(**Photograph 9**). The property east and southeast of Wetland A was recently cleared, which has resulted in substantial fine sediment migrating from the upslope neighbouring property to Wetland A (Photographs 8 and 10). A sports field and school are located northeast of Wetland A, and a pedestrian trail is located in between the Wetland and the sports field. The riparian area to the west of Wetland A is comprised of an industrial area with limited to no ecological value (**Figure 4**).

Measured from the HWM, Wetland A is 75 m long and averages 18 m wide but 30 m wide at its widest point, resulting in an area of approximately 1,350 m^2. The slope of the east wetland bank is not well-defined and gradually transitions to the upslope area (Photograph 10). The slope of the west bank averages 1.5:1 and is heavily vegetated but appears stable (Photographs 8 and 9). The wetland drains south from El. 4.95 m near the outlet of Culvert 1 to the upstream end of South Stream 2 at El. 3.65 m (**Appendix A**) giving Wetland A an average gradient of 1.7%. The surface of the wetland was absent of alluvial material except for the recent silt deposited on the grasses due to erosion from the upslope land clearing to the east (Photographs 8 and 10).

South Stream 2

South Stream 2 is a channelized stream that receives flow from Wetland A and conveys flow approximately 127 m northward where it discharges to Wetland B (Photographs 11 to 14, **Figure 4** and **Appendix B Figure AB-16**). This feature appears to have been subject to considerable alterations. At the upstream (southern) portion, South Stream 2 was poorly defined and effectively stagnant (Photograph 13). Towards the downstream (northern) portion of South Stream 2, the channel banks become vertically incised (varying between 1 to 2 m deep) and linear (Photograph 11). The channel bed is dominated by fine sediment (silt and sand) and accumulated leaf litter (Photograph 13). The western bank abuts a lock block retaining wall and industrial area, and the eastern bank was vegetated by patchy red alder trees and extensive Himalayan blackberry (**Photographs 12 and 14)**.

The 127 m long stream is 5 m wide measured from the HWM, giving it an area of 635 m^2. South Stream 2 slopes down northward from El. 3.65 m to the southeast corner of Wetland B at El. 2.26 m (**Appendix A**) giving South Stream 2 an average gradient of 1.1%. The slopes of the stream banks average 1.5:1 and appear stable (**Photograph 13**).

Wetland B

Wetland B is a reed canarygrass wetland that encompasses the southeastern section of the Site overlapping 10566 Scott Road (**Photographs 15 and 16**; **Figure 4; and Appendix B Figure AB-16**). Wetland B is bordered to the east by a school and sports field and to the south by an industrial area. The northern perimeter of Wetland B is contiguous with Wetland C.

Wetland B is considered permanent, owing to the presence of hydric conditions across seasons. During the summer field assessment, Wetland B was saturated with localized areas of pooling water, and during the winter field assessments, deep pooling water (i.e., 0.3-0.5 m) was observed across this feature. It is noted that the substantial differences in water depth between the field assessments may be partially attributed to a beaver dam (Beaver Dam 1) that had been

constructed at the upstream (east) end of the Wetland Channel near the confluence with Wetlands B and C during the fall of 2020 (Photograph 4). Wetland B is assumed to interact with groundwater, in consideration of the proximity of the Fraser River to the Site. The eastern-most portion of Wetland B appears to have been weakly channelized as shown by the wetted area in Photograph 15. **Appendix B** Figure AB-16 clearly shows the channelized feature as a thin dark line along the eastern boundary.

The majority of Wetland B was characterized by hummocks of reed canarygrass that have formed a dense monoculture across the feature (Photograph 15). **Appendix B** Figure AB-16 shows the unique monoculture nature of the feature compared to the other wetlands in the area. Wetland B is relatively flat with minimal variation in elevation. Measured from the HWM, Wetland B is approximately 100 m wide in the north-south direction and approximately 150 m long in the east-west direction for an area of 15,000 m^2.

The bed of the wetland averages El. 2.0 m and varies from El. 2.26 m in the southeast corner at the outlet of South Stream 2 to El. 0.91 m in the northwest corner near the inlet of the Wetland Channel (**Appendix B**). Wetland B drains southeast from South Stream 2 to the northwest at the Wetland Channel but also drains north into Wetland C. The occurrence of Beaver Dam 1 at the inlet of the Wetland Channel partially controls the water level in both Wetlands B and C and therefore determines how much of Wetland B drains north into Wetland C or northwest into the Wetland Channel.

There is a shallow linear depression contiguous with the wetland with no defined gradient along the northern boundary of Wetland B, adjacent to Wetland C. The eastern and southern boundary of Wetland B are defined by banks averaging 3 m high with crest heights varying between El. 5 m and El. 6 m (eastern) and El. 5 m (southern). The slopes of these banks average 1.5:1 on the south bank and 2:1 on the east bank. The western boundary gradually slopes upward to the west as vegetation transitions to a pole sapling red alder canopy that appears to be inundated during high rain events (**Photograph 16**). The top of the bank at the edge of the canopy averages El. 4.5 m with a vertical height averaging 2 m and slopes averaging 2:1 (**Appendix A**).

Wetland C

Wetland C was characterized as a permanently flooded swamp located between Wetlands B and D, which encompasses the low-lying eastern third of the middle lot at 10582 Scott Road (**Photographs 17 and 18**; **Figure 4;** and **Appendix B Figure AB-16**). Wetland C is considered permanent due to the presence of obligate aquatic vegetation and standing water during the summer field assessment, which was conducted following an extended period of no rain. This feature appears to receive flows from Wetland B and overland flow from the east and west. Groundwater interaction is considered likely due to the proximity to the Fraser River. Standing water was observed in low depressions throughout the swamp during the field assessment.

A canopy of black cottonwood has established in Wetland C with sporadic occurrences of red-osier dogwood (*Cornus sericea)* and salmonberry in the shrub layer. The understory of the swamp became more developed to the west with increasing plant diversity, including willow

(*Salix sp.*), hardhack, nodding beggarticks, reed canarygrass and purple loosestrife (*Lythrum salicaria*). An occurrence of ornamental bamboo was observed on the northeast corner of the property boundary. Wooden foundation frames of the former greenhouses were observed in the middle of the swamp, oriented north to south (**Photograph 18).**

A soil pit was excavated near the western perimeter of Wetland C. The top layer (0 to 10 cm deep) was comprised of abundant fibrous material with sub contributions of silt and low clay/sand content. Below 10 cm deep, the soil transitioned to dark brown/red in colour and was dominated by silt. Gleying and mottling were not observed, however the soil had a strong sulfur odor indicative of hydric soils.

Appendix B Figure AB-16 shows the uniqueness of Wetland C compared to Wetland B to the south and Wetland D to the north. The forest canopy mixed with ponded water is in distinct contrast to the neighbouring wetlands. Wetland C is relatively flat with minimal variation in elevation. Measured from the HWM, Wetland C is approximately 60 m wide in the north-south direction and approximately 150 m long in the east-west direction for a total area of (9,000 m^2). The wetland extends east of the property boundary an average of 8 m. The bed of the wetland averages El. 1.95 m and varies from El. 2.26 m near the northwest corner to El. 1.83 m near the southwest corner (**Appendix B**). Wetland C likely drains both north into Wetland D and southwest into the Wetland Channel. The occurrence of Beaver Dam 1 at the inlet of the Wetland Channel (**Photograph 4**) partially controls the water level in both Wetlands B and C and therefore determines how much of Wetland C drains north into Wetland D or southwest into the Wetland Channel.

High banks with crests averaging El. 5 m define the eastern boundary of Wetland C. The east bank averages 3 m high with an average slope of 2:1 and appears stable. The western boundary of the wetland gradually slopes upward to the west at the treeline where the developed and infilled area begins with the top of bank averaging El. 2.5 m. The western bank averages less than 0.5 m high and is stable. Both the north and south boundaries of Wetland C are defined by shallow linear depression contiguous with the wetland with no defined gradient (**Appendix A**).

Wetland D

Within the eastern third of the Site, north of the property boundary between 10582 Scott Road and 10620/10626 Scott Road, the treed swamp transitioned to an open marsh, with less than 10% standing dead trees (Wetland D, **Photographs 19 to 22**, **Figure 4** and **Appendix B Figure AB-16**). The marsh was characterized by standing water ranging in depth from approximately 20 cm to exceeding 75 cm during the summer assessment. During the winter, the Wetland depth precluded an assessment of this feature, but it is assumed to be well over a meter deep in sections.

Dense mats of duckweed (*Lemna sp.)* grew throughout the areas of standing water. Reed canarygrass, rushes (*Juncus sp.*) and hardhack had established on higher hummocks of the marsh. Indicators of the HWM were not visible on the west side of the marsh, as consolidated fill appeared to have been recently placed (Photograph 22).

Appendix B Figure AB-16 shows the uniqueness of Wetland D compared to Wetlands B and C to the south. Wetland D is mostly ponded water with minimal vegetation compared to the other

wetlands on the Site. Wetland D is relatively flat with minimal variation in elevation. Measured from the HWM, this feature is approximately 70 m wide in the north-south direction and approximately 140 m long in the east-west direction, for a total area of 9,800 m^2. The wetland extends east of the property boundary an average of 12 m. The bed of the wetland averages El. 1.70 m and varies from El. 2.00 m near the toe of the western bank to El. 0.80 m near the northeast corner (**Appendix B**). Wetland D drains north off Site near the eastern boundary and receives most of its flow from Wetland C to the south with some runoff from the east and west upland areas.

The eastern bank of Wetland D has an average crest of El. 4.0 m, is between 2 and 3 m high, has an average slope of 3:1 and the bank appears stable. The crest of the western bank slopes down from the north at El. 4.27 m to El. 2.50 m at the south end. The western bank averages between 0.5 to 1 m high with slopes between 1:1 and 3:1. A fine gravel and sand mix of fill material has recently been placed along this bank which is eroding into the ponded water in the wetland. The erosion is due to runoff and rill erosion of the fine fill material which is depositing sediment into the wetland (**Photograph 22**). Both the north and south boundaries of Wetland D are defined by shallow linear depressions contiguous with the wetland with the southern depression having no defined gradient, but the northern depression flows east (**Appendix A**).

North Stream

The North Stream is a 70 m long "L" shaped feature that originates near the southeast corner of an old-abandoned house on the northern-most property (**Photographs 23, Figure 4** and **Appendix B Figure AB-16**). The North Stream follows near the house foundation north for 30 m, before turning west and continuing for 40 m where it discharges to Scott Road Ditch 3. The North Stream appears to intercept groundwater and surface runoff from the surrounding industrial yard.

The southeastern portion of the North Stream was characterized by a sparse canopy of young red alder and an understorey dominated by red osier dogwood and Himalayan blackberry (**Photograph 23**). Towards the northern extent of this feature, the understory transitioned to a dense stratum of Himalayan blackberry and reed canarygrass (**Photograph 23**). The channel substrate consisted of fine sediment and extensive leaf litter.

The North Stream averages 2 m in width and the vertical height of the sloped banks average 0.2 m. The area of the stream measured to the HWM is 140 m^2. The gradient of the bed is nearly flat; ponded water was observed in the upstream portion of the stream, and the downstream portion was dry during the site assessments.

Wetland Channel

The Wetland Channel is a permanent, nearly flat wetland feature located along the property boundary between the southern property at 10566 Scott Road and the central property at 10582 Scott Road (**Photographs 25 and 26; Figure 4; and Appendix B Figure AB-16**). The channel conveys flow west from Wetlands B and C (Photograph 25) over Beaver Dam 1 (Photograph 4) and then through Culvert 2 (Photograph 26) to the inlet of Culvert 3, located under the driveway to 10566 Scott Road (Photographs 25 and 26). From here, flow is conveyed to the northern portion of Scott Road Ditch 1 and then into Culvert 4 which flows southwest under Scott Road.

The eastern portion of the Wetland Channel is contiguous with Wetland B and D. Here, the Wetland Channel is approximately 12 m wide and estimated to be over a meter deep in sections. Beaver Dam 1 was constructed approximately 25 m west of the eastern perimeter of Wetland C and the upstream end of the Wetland Channel (**Photographs 4 and 26**). The dam is contributing to high water levels east of the dam. The dam was constructed recently, between the summer 2020 and winter 2020 field assessments. West (downstream) of the dam, water levels drop approximately 0.8 m as shown in Photograph 26.

The Wetland Channel is highly degraded due to ongoing human disturbances. Below the HWM, the Wetland Channel is dominated by dense hummocks of reed canarygrass with sparse pockets of cattail and rush species. The northern bank is vegetated by reed canarygrass and Himalayan blackberry for approximately 0.5 to 1 m, after which the riparian area transitions to a truck and trailer parking lot. Frequent tire marks extending from the parking lot to the north into the Wetland Channel were visible. South of the Wetland Channel was a steep fill slope dominated by extensive Himalayan blackberry.

The Wetland Channel is 317 m long and averages 5 m wide measured from the HMW, resulting in an area of 1,585 m^2. The channel bed slopes down westward very slightly from El. 1.66 m at the eastern (upstream) end to El. 1.24 m at the western (downstream) end near the inlet of Culvert 3 yielding an average gradient of 0.13%. However, the water surface of the Wetland Channel drops approximately 0.8 m, solely due to the beaver dam. The bed material is organic and the lack of alluvial sediment suggests this ditch does not convey significant flows with notable velocities.

The northern bank height of the Wetland Channel averages 1 m vertically and is sloped approximately 1.5H:1V and stable (**Photograph 26**). The south bank has an average vertical height of 4 m and this is due to the considerable fill that has been placed on the southern lot at 10566 Scott Road. The south bank is sloped approximately at 2:1 and is densely vegetated and appears stable.

During the April 8, 2021 field assessment, a new vehicle crossing was established across the downstream end of the Wetland Channel approximately 10 m upstream of Culvert 3. This recent crossing has 300 mm diameter steel pipe (Culvert 2) under the fill material for the crossing.

South Ditch

The South Ditch is located along the southern boundary of the southern property at 10566 Scott Road (**Photographs 27 and 28**; **Figure 4;** and **Appendix B Figure AB-16**). This feature appears to receive water from surface runoff from the industrial yard, precipitation, and from flow that decants out of the South Sediment Detention Pond. South Ditch conveys flow eastward towards Wetland B.

The eastern portion of the South Ditch was steeply graded on either side, apparently a result of the northern and southern lots being filled, which precluded an effective assessment of the ditch invert. This portion of the Ditch was vegetated with young black cottonwood saplings, Canada

goldenrod, and Himalayan blackberry. Towards the western extent of the South Ditch, the banks become more gradually sloped and the Ditch invert lost definition. The western portion of the South Ditch appeared to be highly ephemeral.

Riparian vegetation around this feature included weedy species such as ruderal grasses, forbs, and Himalayan blackberry. Young pole/sapling cottonwood trees were observed along the banks of this feature.

The South Ditch is 195 m long and averages 2.5 m wide measured from the HWM resulting in an area of 488 m^2. The ditch slopes down to the east from El. 4.83 m to El. 2.55 m resulting in an average gradient of 1.2%. The bed material is organic and the lack of alluvial sediment suggests this ditch does not convey significant flows with notable velocities. The north bank averages 1 to 1.5 m high with slopes between 1.5:1 and 1:1 and the south bank averages 0.5 m high with a slope of 2:1 (**Photographs 32 and 33**). Both banks appear stable and a lock block retaining wall is set back approximately 1.5 m from the South Ditch.

South Ditch A

South Ditch A is a small tributary ditch located on the north side of the South Ditch (**Appendix B Figure AB-16**), South Ditch A is 16 m long and 1 m wide resulting in an area of 16 m^2. This small ditch is approximately 0.2 m deep with stable banks and has no riparian vegetation on the east bank and very limited vegetation on the west bank as shown in. South Ditch A drains south into the South Ditch from El. 4.78 m to El. 4.35 m resulting in a gradient of 2.7%. South Ditch A conveys runoff from the surrounding fill material and the bed material is the gravel and sand fill material placed throughout this southern property.

During a recent Site visit on February 24,2022, it was observed that South Ditch A had been infilled by the owners of the neighbouring property.

South Sediment Detention Pond

The South Sediment Detention Pond is a recently constructed feature situated on the southern perimeter of the Site (**Figure AB-16**). The Pond appears to have been constructed to collect and retain water from the property south of the Site. This feature is highly anthropogenic and is effectively void of riparian or instream vegetation. A review of the satellite imagery for the Site (**Appendix B**) indicates that the Pond was constructed after the latest Google Earth imagery dated June 12, 2019.

The Pond is approximately 100 m long and averages approximately 10 m wide estimated from the HWM resulting in an area of approximately 1,000 m^2. The bank is 2.5 to 3 m high on the north side and 3 to 3.5 m high on the south side. The north bank has a slope averaging 1.5:1 and some bank material is eroding into the Pond. The west and south banks are over-steepened (1:1 and steeper) and the bank material is eroding and being deposited in the Pond. The eroding bank and upslope material is pre-load material which is highly erodible. Plastic tarps have been placed on

sections of the bank to help mitigate the erosion. The high turbidity in the Pond suggests the fine eroded sediment from the pre-load (silt and clay) remains in suspension in the Pond**.**

During a recent Site visit on February 24, 2022, it was observed that the South Sediment Detention Pond had been infilled by owners of the neighbouring property.

Scott Road Ditch 1

A series of ditches and culverts were observed along the east side of Scott Road, which appear to have been constructed to facilitate road drainage (**Figure 4**). The ditches were observed to be dry and a defined channel or stream boundary (e.g., scouring, change in vegetation structure) was not observed in these features. This suggests that regular flow or standing water does not occur along the Scott Road ditches with the exception of the north end of Ditch 1 which conveys flow from the Wetland Channel.

Scott Road Ditch 1 is located adjacent to the western boundary of the southern property at 10566 Scott Road (**Photographs 34 and 40; Figure 4; and Appendix B, Figure AB-16**). The Ditch has a catch basin and culvert (Culvert 5) at its southern end (**Photograph 34**) and two culverts exist near the northern end (Culverts 3 and 4). The outlet of Culvert 3 is located at the very northern end of Ditch 1 and this culvert is a 300 mm diameter concrete pipe located under the driveway for the southern property and conveys drainage from the Wetland Channel. The inlet of Culvert 4 is a 350 mm diameter concrete culvert with a debris rack and concrete headwall and wingwalls (**Photograph 35**). Culvert 4 is located near the northern end of Ditch 1 on the west bank adjacent to the outlet of Culvert 3. Culvert 4 conveys drainage southwest under Scott Road. Drainage from both Culvert 4 and the catch basin (Culvert 5) is piped southwest and then south under Scott Road and daylights at the Manson Canal at Scott Road and Grace Road. Manson Canal drains west into the Fraser River

Ditch 1 is 110 m long and 1 m wide resulting in an area of approximately 110 m^2. Due to the lack of flow in this Ditch, the HWM was difficult to identify (**Photograph 36**). The Ditch, which drains at both ends, is essentially flat as the south end of the ditch is at El. 1.63 m and the north end of the ditch is at El. 1.73 m. The banks of Ditch 1 are sloped at approximately 3:1 and are stable. The bed of the Ditch is organic and the lack of alluvial sediment suggests this ditch conveys very little flow.

There is essentially no roadside ditch on the east side of Scott Road adjacent to the central property at 10582 Scott Road as well as the southern third of the northern property at 10620/10626 Scott Road. Through this area there is a slight depression between the fenced western property boundary and the grass boulevard, but this would not be considered a ditch and there was no evidence that water collects in this depression (**Photograph 37**).

Scott Road Ditch 2

Scott Road Ditch 2 is located north of the abandoned southern driveway on the northern property at 10620/10626 Scott Road and the main driveway for that property (**Photographs 38; Figure 4; and Appendix B, Figure AB-16).** This Ditch has been cleared of all vegetation and the inlet of

Culvert 6 is located at the northern (downstream) end of this Ditch. Culvert 6 is a 300 mm diameter concrete pipe located under the main driveway for the northern property (Photograph 43).

Ditch 2 is 23 m long and 1 m wide resulting in an area of approximately 23 m^2. Due to the lack of flow in this Ditch, the HWM was difficult to identify. The Ditch is essentially flat as the south (upstream) end of the ditch is at El. 2.11 m and the north (downstream) end of the ditch is at El. 2.09 m. The banks of Ditch 2 are sloped at approximately 3:1 and are stable. The bed of the Ditch is organic and the lack of alluvial sediment suggests this ditch conveys essentially no flow. Ponded water was observed at the downstream end of Ditch 2 at the inlet of Culvert 6.

Scott Road Ditch 3

Scott Road Ditch 3 is located between the buried outlet of Culvert 6 at the main driveway for the northern property at 10620/10626 Scott Road and the inlet of Culvert 7 at the driveway for the property north of the Site (**Photographs 40 to 42; Figure 4; and Appendix B, Figure AB-16**), The upstream (south) end of this Ditch has been cleared of all vegetation (Photograph 44) and the rest of the Ditch is occupied with Himalayan blackberry (Photograph 45). Culvert 7 is a 300 mm diameter concrete pipe located under the driveway for the property north of the Site. The inlet of Culvert 7 at the north (downstream) end of Ditch 3 has a trash rack and concrete headwall and wingwalls (**Photograph 42**).

Ditch 3 is 60 m long and 1 m wide resulting in an area of approximately 60 m^2. The North Stream enters Ditch 3, 27 m south of Culvert 7. North of the confluence with the North Channel, Ditch 3 has a defined HWM but south (upstream) of the North Channel the lack of flow in Ditch 3 makes it difficult to identify the HWM. The Ditch flows north but is essentially flat as the south (upstream) end of the ditch is at El. 1.67 m and the north (downstream) end of the ditch is at El. 1.62 m at the inlet of Culvert 7. The banks of Ditch 3 are sloped at approximately 3:1 and are stable. The bed of the Ditch is organic, and the lack of alluvial sediment suggests this ditch conveys essentially no flow upstream of the confluence with the North Stream and only minimal flow downstream (north) of the confluence.

4.5.3 Off-Site Drainage

As discussed above, surface drainage leaves the Project Site at three locations.

- To the north through Culvert 7 after flowing through the North Stream and Ditch 3.
- To the southwest under Scott Road through Culvert 4 after flowing through the Wetland Channel and Culverts 2 and 3.
- To the north along the northern boundary of Wetland D near the northeast corner of the Site.

The majority of flow appears to leave the Site northward via Wetland D as well as westward via Culvert 4, with very minimal flow leaving the Site via Culvert 7. The percentage of flow leaving the Site northward via Wetland D compared to westward via the Wetland Channel (Culvert 4) is partially dependent on Beaver Dam 1 (Photographs 4 and 26) on the Wetland Channel as discussed previously. However, Site drainage also depends on features off-site to the north of

Wetland D. The location of features north of the Site discussed in this section are shown on drone image **Appendix B** Figure AB-16.

North of Wetland D, drainage flows north into another low-lying undeveloped wetland area referred to as the Off-Site Wetland area which extends north to Old Yale Road. A channel flows through this wetland referred to as the Off-Site Wetland Channel. The channel can be easily seen flowing though the reed canarygrass on **Appendix B, Figure AB-16** and is also clearly visible on the 2004 air photo (**Appendix B, Figure AB-13**). This channel flows north to Culvert 8 (Photograph 47) located under Old Yale Road just east of Scott Road (**Appendix B, Figure AB-16**). Culvert 8 is a 600 mm diameter concrete pipe. At this point the flow is piped under Old Yale Road and flows northwest to the Fraser River.

Along the southern edge of the Off-Site Wetland is a Constructed Habitat Pond located south of the Off-Site Wetland Channel (Photograph 48, **Appendix B, Figure AB-16**). Based on the historical air photos and satellite imagery, the Pond was constructed between 2008 and 2009. As shown on the 2009 air photo (**Appendix B, Figure AB-14**), the recently constructed Pond is 150 m long in the north-south direction and 25 m wide in the east-west direction at its widest point. This pond has a culvert at its inlet at the south end (Culvert 9) and a culvert at its outlet at the north end (Culvert 10) as shown on **Appendix B, Figure AB-16.** The outlet of the south culvert on the pond has a concrete headwall and wingwall and the pipe was submerged during the field assessment (**Photograph 45**). The inlet of the north culvert has a debris rack and concrete headwall and wingwalls (**Photograph 46**).

A very large nearly 2 m high beaver dam (Beaver Dam 2) is located 50 m north of the northern boundary of Wetland D (**Photograph 47**) on the Off-Site Wetland Channel that flows through the Off-Site Wetland north of the Site (**Appendix B, Figure AB-16**). This dam results in significant backwatering south of the dam on the Off-Site Wetland Channel (**Photograph 48**) and throughout Wetland D (**Photograph 49**). Hence, water levels and drainage in Wetland D appears to be influenced by the presence of Beaver Dam 2. In turn, water levels in Wetland D will affect levels in Wetland C to the south and also affect levels in Wetland B. As discussed earlier, Beaver Dam 1 on the Wetland Channel (**Figure 4**) affects water levels and drainage on Wetlands B and C. Therefore, both Beaver Dams 1 and 2 combine to have a significant impact on drainage within all three wetlands.

North and downstream of Culvert 7, drainage flows north along an Off-Site Scott Road Ditch on the east side of Scott Road. This ditch extends to Old Yale Road where the flow enters Culvert 8. Hence, drainage that leaves the Site from the North Channel and Ditch 3 ultimately joins the drainage that leaves the Site north of Wetland D via the Off-Site Wetland and Off-Site Wetland Channel. However, it should be noted that during high water levels not all the flow that leaves Wetland D to the north reaches Culvert 8 at Old Yale Road. Some of the flow that leaves Wetland D to the north may enter the Constructed Habitat Pond and hence leaves the pond via Culvert 10. The distribution of flow from Wetland D that ultimately reaches Culvert 8 versus Culvert 10 appears to depend partly on the crest elevation and effectiveness of Beaver Dam 2 to obstruct flow from the Off-Site Wetland Channel (**Appendix B, Figure AB-16**). Culvert 10 flows north to Old Yale Road where flow is then directed northwest under Old Yale Road where it connects with the flow from Culvert 8 and flows piped to the Fraser River.

4.5.4 Fish-Bearing Status

The City of Surrey fish classifications are provided in **Appendix E** of this report. The City of Surrey fish classification identifies a stream on the eastern perimeter of the Site as Class A (inhabited or potentially inhabited by salmonids year-round; City of Surrey 2020; **Appendix E**). Note that the alignment of the eastern stream on COSMOS correlates with Stream 1, Wetland A, Stream 2, and Wetlands B-D in this assessment. The municipal mapping indicates that the eastern network of wetlands and streams conveys flow north for approximately 200 m before entering the municipal storm infrastructure at Old Yale Road. From Old Yale Road, flow is conveyed approximately 940 m along Old Yale Road before discharging to the Fraser River. A review of the provincial Habitat wizard database[2] provided documented occurrences of three-spine stickleback (*Gasterosteus aculeatus)* approximately 300 m north of the Site near Old Yale Road (**Figure 4**). Barriers to fish migration were observed between Old Yale Road and the Site (i.e., Beaver Dam 2).

A portion of the Site discharges through the Wetland Channel and enters the municipal stormwater infrastructure at Scott Road (**Appendix D**; City of Surrey 2021). From here flow is conveyed approximately 325 m through the stormwater infrastructure before daylighting in a 75 m class B ditch (significant food/ nutrient value, no fish present; City of Surrey 2021), which discharges to Manson Canal (Watershed code: 100-018500-48900). Manson Canal is identified as a class A stream by the City of Surrey (inhabited or potentially inhabited by salmonids year-round). A review of the provincial Habitat Wizard database yielded occurrences of cutthroat trout (*Oncorhynchus clarkii*), coho salmon (*Oncorhynchus kisutch)*, flathead minnow, threespine stickleback, and lamprey (*Entosphenus spp.)* in Manson Canal (Ministry of Environment 2021).

No fish were caught during sampling efforts conducted from September 7 to 9, 2021. Assessment activities were not observed to negatively impact fish or their habitat for the duration of the work. No fish handling mortalities occurred, and no wildlife mortalities were encountered.

In consideration of the connectivity to known fish-bearing features (i.e., Manson Canal and the Fraser River), but lack of suitable habitat to support direct fish use, we have classified the on-Site network of wetlands and streams as non fish-bearing. Aquatic features of non-fish bearing status include the South Stream 2, Wetland A, South Stream 1, Wetland B, Wetland C, Wetland D, and Wetland Channel, Ditches 1 to 3, the North Stream, and South Ditch. The above features were classified as non-fish-bearing, as these are not likely to provide habitat for salmonids or other species of fish, but may provide some food and nutrients to downstream fish populations due to direct connectivity to fish habitat.

It is understood that the southern property is currently under federal ownership and the northern two parcels will transition to federal ownership in 2022. Setbacks will be determined in consultation with the federal Fish and Fish Habitat Protection Program and the Vancouver Fraser Port Authority and may result in RAPR setbacks. We have proposed a setback strategy that aligns with the streamside protection and enhancement areas (SPEAs) afforded under the provincial

[2] https://maps.gov.bc.ca/ess/hm/habwiz/ (accessed 2021).

RAPR detailed assessment methodology (**Table 7** and **Figure 5).** Two deviations from the RAPR compliant setbacks are proposed under the following justification:

South Ditch

Since the South Ditch receives flow from the man-made South Sediment Detention Pond, which expresses groundwater, the South Ditch has a "headwater" and would be considered a stream under RAPR. However, Keystone Environmental propose that this feature should be treated as a "ditch" for the purposes of determine an applicable streamside setback area, since the groundwater in the Pond is expressed via an unnatural mechanism (i.e., as a result of preload on the neighbouring site). Additionally, the South Ditch is non-fish-bearing and does not appear to provide substantial food or nutrient value to downstream fish-bearing habitat, justifying a minimal streamside setback area. It is Keystone Environmental's opinion that a 2 m setback maintains adequate protection for water quality considerations.

Table 8 Streamside Setback Area Strategy

Watercourse Name	SPEA Determined under the Provincial RAPR Detailed Assessment Methodology		Recommended Setback
	Classification	Setback from HWM (m)	
South Stream	Non-fish-bearing	10	10
Wetland A	Non-fish-bearing	15 E, W, N, 30 S	15 E, W, N, 30 S
Wetland B	Non-fish-bearing	15 E, W, N, 30 S	15 E, W, N, 30 S
Wetland C	Non-fish-bearing	15 E, W, N, 30 S	15 E, W, N, 30 S
Wetland D	Non-fish-bearing	15 E, W, N, 30 S	15 E, W, N, 30 S
North Stream	Non-fish-bearing	10	10
South Ditch	Non-fish-bearing	10	***2***
Wetland Channel	Non-fish-bearing	15 E, W, N, 30 S	15 E, W, N, 30 S
Scott Road Ditch	Non-fish-bearing	2	2

5. DESCRIPTION OF POTENTIAL EFFECTS ON FISH AND FISH HABITAT

Based on the project description in Section 2 and the upland, riparian, and aquatic conditions identified in Section 4.5, Keystone Environmental has completed a review to identify potential effects to environmentally valued resources, including fish and fish habitat. The DFO Pathways of Effects diagrams[3] for common land-based and in-water activities were considered when identifying the potential effects. The following activities are considered applicable to the proposed development:

- Placement of material or structures in water
- Change in timing, duration and frequency of flow
- Addition or removal of aquatic vegetation
- Excavation/ grading
- Vegetation clearing
- Use of industrial equipment

5.1 Terrestrial Habitat and Vegetation

The project is anticipated to avoid impacts to terrestrial habitat and vegetation, as most of the footprint overlaps with an industrial yard void of vegetation. Potential effects to terrestrial habitat and vegetation include:

- Invasive and non-native species were identified throughout the Project area. Equipment access and soil disturbance may increase opportunity for invasive vegetation and noxious weeds to propagate and colonize.
- Encroachment of vegetation removal into areas outside of the project footprint.
- Alteration of habitat and fragmentation.

5.2 Wildlife and Wildlife Habitat

Effects to wildlife and wildlife habitat are anticipated to occur primarily through the infilling of aquatic areas (**Figure 5).** Other potential effects include:

- Increased risk of mortality from construction activities (e.g., vehicle strikes, accidental entrapment).
- Habitat loss and mortality.
- Sensory disturbances from increased noise and visual changes causing displacement.
- Disruption of active songbird nests during vegetation removal or increased auditory/ visual disturbances during the breeding bird window.

[3] http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html (accessed May 2021).

5.3 Aquatic and Riparian Habitat

Aquatic and riparian environments will be directly affected through decommissioning and infilling aquatic features to accommodate the development footprint. Potential effects to aquatic and riparian areas include:

- Placement of fill below the HWM, which may result in alterations to aquatic food supplies, habitat structure, and cover.
- An increase in sediment concentrations to downstream fish-bearing features, which may result in deleterious effects such as reduced visibility, gill abrasion, and reduced quality of spawning/ rearing habitat (through sediment deposition).
- Change in the timing, duration, or frequency of flow to downstream aquatic habitat through land modifications.
- Release of contaminates from construction equipment, which could negatively impact water quality.
- A loss of potential riparian habitat. The riparian area around the above-listed aquatic feature is not predominately consolidated fill void of vegetation or dominated by thickets of Himalayan blackberry.

5.4 Species at Risk

Species at risk that have the potential to occur on Site are presented in **Table 7**. Based on the habitat present at the Site as defined in Section 4.4 and 4.5 and the based on the life requisites of the species at risk identified in **Table 7** as defined by Nagorsen and Brigham 1996, Campbell et al. 1990, Green and Campbell 1992, Licht 1970, Chapman and Feldhammer 1982, Knopf 1981, Cannings and Cannings 1998, Cannings 2002, Walker 1953, Corbet 1999, there is a potential for six species at risk to occur on the Site for either breeding or foraging. They consist of the following:

- Little brown myotis – Roosting and foraging.
- Great Blue Heron – Foraging in channels and wetlands.
- Green heron – Potential foraging and nesting in wetlands.
- Band-tailed Pigeon – Potential nesting and foraging in wetland and riparian areas.
- Barn swallow – Potential nesting on structures and foraging in riparian areas.
- Northern red-legged frog – Potential breeder in wetlands.

Clearing, grading, and other construction-related noises may cause wildlife to avoid habitats adjacent to the Site. The magnitude of these varies with the timing of construction activities, with larger effects expected during key periods, such as the bird breeding season generally, March 1 through August 31 in the lower mainland. Careless clearing practices and accidental fill placement could damage habitats and habitat elements to be retained and areas adjacent to them. However, effective mitigative measures are available and can significantly reduce most of these effects.

Increased human presence may have an indirect detrimental effect on vegetation and wildlife. Vegetation trampling and introduction of invasive species may effect habitat as well, habitat fragmentation may have some effect on wildlife with very small home ranges (<1 ha), such as amphibians and shrews.

5.5 Site Hydrology

The proposed project development includes the decommissioning and infilling of North Stream, South Ditch, and the Wetland Channel (Figure 4). North Stream have very small drainage areas and infilling of these features will be negligible with respect to site drainage. Infilling the South Ditch will potentially decrease the amount of flow that currently drains east into Wetland B then toward Scott Road via the Westland Channel and ultimately to Manson Canal. However, this can be mitigated by having the runoff from the developed footprint of South Ditch area directed into either Wetland B or into the 122 Street storm system which ultimately drains into Manson Canal.

The infilling of the Wetland Channel will have a significant effect on the drainage pattern within the Site as well as potential effects on Off-Site drainage. As discussed above in Section 4.5.3 Off-Site Drainage, surface drainage leaves the Project Site at three locations: 1) To the north through Culvert 7 after flowing through the North Stream and Ditch 3; 2) To the southwest under Scott Road through Culvert 4 after flowing through the Wetland Channel and Culverts 2 and 3, and 3) To the north along the northern boundary of Wetland D near the northeast corner of the Site. Almost all flow on the Site appears to leave the Site either northward via Wetland D or westward via Culvert 4, The percentage of flow leaving the Site northward via Wetland D compared to westward via the Wetland Channel (Culvert 4) is partially dependent on the crest elevation and effectiveness of Beaver Dams 1 and 2. If the crest of Beaver Dam 2 is high enough, there is potential for flow to enter the Constructed Habitat Pond.

The infilling of the Wetland Channel will result in the drainage from this channel being directed north through Wetlands C and D and ultimately to either Culvert 8 at Old Yale Road via the Off-Site Wetland Channel or to Culvert 10 via the Constructed Habitat Pond. The percentage of the re-directed flow from the proposed infilled Wetland Channel that enters either Culverts 8 or 10 will partially depend on the crest elevation and effectiveness of Beaver Dam 2. This large, nearly 2 m high dam controls flow in the Off-Site Wetland Channel and water levels in Wetland D as well as potentially directing flow into the Constructed Habitat Pond as discussed in Section 5.5.3. See **Appendix B** Figure AB-16 and Photographs 48 to 53. Both Culverts 8 and 10 flow into the piped storm system under Old Yale Road that flows subsurface to the Fraser River.

A review of stormwater conditions at the Project Site was carried out to understand the On-Site and Off-Site hydrology, specifically with respect to the effects of infilling the Wetland Channel and evaluating the feasibility of routing water from the proposed development into Wetlands B, C and D and how that may increase flows at Culverts 8 and/or 10.

The hydrological analysis and subsequent hydraulic analysis were completed to assess the changes to runoff conditions and provide recommendations on future drainage management. Hence, the analysis was completed to support stormwater management concepts for the Project Site. The stormwater assessment report is provided in Appendix F.

Based on design standards issued by the City of Surrey as detailed in their Engineering Department's Design Criteria Manual, drainage works for the Site would be required to pass the five-year storm event under free flow conditions. Further, stormwater from the Site must be managed to control the 5-year post-development flow to 50% of the 2-year post development rate or control the 5-year post-development flow to 5- year pre-development flow rate.

The results of the hydrology and hydraulic analysis detailed in Appendix F suggest that Wetlands B, C and D can accommodate the increased design flow without negatively impacting the surrounding properties, however there would still be an increase in flood risk for the properties at Scott Road and for this reason diverting all flows in that direction is not recommended. The amount of water required to be stored in the wetland would be increased and this would increase the occurrence of flooding of properties downstream, including Old Yale Road itself. It is recommended that measures be implemented to help control runoff so as to replicate pre-development conditions as much as possible. However, controlling runoff is likely to be a significant challenge within this area as there is minimal grade within existing drainage infrastructure and much of the infrastructure is below sea level.

The analysis identifies that multiple options could be explored to help control runoff from the Project Site and could include one or a combination of the following:

- Supplement outflow capacity from the wetlands with drainage channels to the west or to the south. Under current conditions, up to 70% of the current runoff flows towards Scott Road and 122nd Street with the remaining 30% flowing into the wetlands. It is recommended that alternative drainage paths be maintained to reduce load on the Old Yale Road inlet. Currently it is estimated that 56% of the runoff from the Site is directed to Scott Road, of which 24% flows to the north within the storm system while the other 32% flows to the south. The remaining 14% is directed to 122nd Street.
- Retain excess water in the wetlands or in detention facilities with the purpose of regulating releases into the downstream wetlands to the north. Flows larger than design values would cause higher than expected flows in the downstream area. If using the wetlands as storage, it is likely that a control structure would be needed at the outlet to regulate flows. Any constructed outlet in the wetlands could be subject to additional regulation through the BC Water Sustainability Act.
- Upgrade the inlet at Old Yale Road to accommodate increased flows into the storm system. While an additional 600 mm pipe is currently proposed, to get water levels to be consistent with pre-development conditions further upgrades would be required. Based on current estimates, using an inlet with a diameter of 1000 mm would result in a water elevation of 0.47 m during the 5-year storm with climate change scenario, which represents an increase of 7 cm above the predevelopment condition.

The purpose of the stormwater assessment report (Appendix F) is to provide clarity on the stormwater interactions with the wetlands and provide data for KM Civil Consultants Ltd. (KM Civil) which prepared the Stormwater Management Plan (SMP) for the proposed development. Appendix G provides the SMP and Sheet 9 shows the proposed catchment areas and drainage direction for each of the catchments. The catchments within the developed footprint are colour coded to clearly show the areas and the drainage directions.

The SMP design (Appendix G Sheet 9) has taken the approach that involves maintaining stormwater connections to multiple parts of the system rather than directing all runoff into Wetlands B, C and D. This is in line with the first recommendation in the hydrology and hydraulic assessment report (see first bullet above). As detailed on Sheet 9 (Appendix G):

- The south building (purple area) drains into the 122nd Street stormwater system which flows piped until daylighting into Manson Canal:
- The western parking lot (red area) drains into Scott Road storm system which flows piped southwest under Scott Road until daylighting into Manson Canal;
- The north building (blue area) drains into the Scott Road storm system which flows piped northeast under Scott Road before joining the piped system under Old Yale Road which flows into the Fraser River;
- The main parking lot (green area) drains east into Wetland B, C and D which drains north to Culvert 8 which then flows piped under Old Yale Road before joining the Fraser River.

Sections 4.5.1, 4.5.2 and 4.5.3 and Appendix F detail the existing drainage patterns within and in proximity to the Site including the distribution of flow from the Site that drains south to Manson Canal and north to Old Yale Road. The SMP design for the proposed development shown on Sheet 9 in Appendix G illustrates that the red and purple areas drain south and daylight into Manson Canal and the blue and green areas drain north to the Old Yale Road storm system. The proposed SMP is designed to not significantly alter future water flow to fish habitat to the south in Manson Canal. Hence, the proposed SMP is expected to result in minimal impacts to fish and fish habitat in Manson Canal.

As discussed in Sections 4.5.2 and 4.5.3 the beaver dams partially control water levels in Wetlands B, C and D and therefore affect the flow distribution that leaves the Site either to the north or the south. Under the proposed development Beaver Dam 1 will be removed when the Wetland Channel is infilled. However, Beaver Dam 2 is located off-site and will remain post development and will therefore continue to partially control water levels in the wetlands.

6. MITIGATION AND STANDARDS TO AVOID OR MITIGATE THE HARMFUL ALTERATION, DISRUPTION, OR DESTRUCTION OF FISH HABITAT

Mitigation measures and standards to reduce the potential for harm to fish and fish habitat identified in Section 5 of this report are detailed below. The measures discussed shall be implemented during Project works.

6.1 Avoidance Measures

The preferred means of protecting fish and fish habitat is to practice avoidance of activities that may lead to impacts to the environment. Where those activities are necessary, and reasonable measures of avoidance have been integrated into the Project, residual impacts may still occur and thus mitigation measures are to be implemented. Across numerous design iterations, the development footprint has been reduced and strategically aligned to avoid impacts to the eastern portion of the Site where a network of wetlands is located, thereby protecting the highest functioning habitat present on Site. The proposed development footprint overlaps the western portion of the Site, which is predominately occupied by an industrial yard subject to decades of enduring disturbance. Two aquatic features bisect the western portion of the Site, which will be decommissioned and infilled to accommodate the project:

- *Wetland Channel*: The wetland channel bisects the western portion of the Site and is highly constrictive to maintaining an economically developable area. The proponent has explored various design options that retain this feature; however, this would effectively break the developable area into *a northern and southern area without vehicle or pedestrian connectivity. Additionally, the wetland channel is not considered to provide substantial value to fish in its present condition. The instream area is dominated by extensive reed canarygrass, and riparian vegetation that would provide nutrient inputs or shade is effectively absent.*
- North Stream: The North Stream appears to be a low point on the Site that collects and retains surface runoff from the surrounding industrial yard. The North Stream discharges predominately to ground; during high water conditions, flow appears to decant from the North Stream to Ditch 3. This feature is not accessible to fish, owing to an extensive network of highly ephemeral ditches and stormwater infrastructure downstream of this feature, and does not provide substantial nutrient or flow inputs to downstream fish habitat as it discharges predominately to ground. Additionally, this feature is dominated by extensive Himalayan blackberry and reed canarygrass. Design options that retain the North Stream were not considered to be viable, as this feature overlaps the proposed vehicle access area.

6.1.1 Timing of Works

The following best management practices will be incorporated into the work in order to minimize the potential for adverse effects on fish and wildlife.

- The regional timing window to protect fish during in-water works as identified by provincial government is August 1 to September 15 of any year. To reduce the potential for deleterious effects to fish and fish habitat, Instream work, including infilling aquatic areas and installing instream servicing, shall be conducted during dry weather within the regional fish window

(August 1 – September 15). Based on project justification and risk, instream work may occur outside of the reduced risk instream work window subject to the following:

  - A QEP shall provide a letter of advice that outlines the ecological justification for conducting work outside of the reduced risk window, based on environmental values, water quality, channel stability, weather conditions, and other relevant factors.
  - Work is conducted in dry conditions (e.g., through the installation of a temporary flow diversion).
- Songbirds construct nests and raise young between March 1 to August 30. Vegetation clearing should be planned to avoid this nesting period where possible. If vegetation removal must occur during this period, a qualified environmental professional (QEP) must conduct a pre-disturbance bird survey to identify the location of active nests and establish a buffer (e.g., 30 m) from the nest to ensure no harm befalls a bird, its eggs, or its nest. Clearing may proceed for a period up to 5 days of each nest survey.
- Work will be avoided during inclement weather such as heavy rainfall (i.e., 25 mm or more in a 24-hour period).
- Once works starts, it will be completed as quickly as possible to reduce potential for impacts to occur.

6.2 General Mitigation Measures

Mitigation measures provide an active approach to protecting the environment from harmful impacts once measures of avoidance have been implemented. The mitigation measure provided in the following sections outline general measures to be implemented during the Project. It is expected that a project-specific Environmental Management Plan (EMP), Erosion and Sediment Control Plan (ESCP), Spill Response Plan, and Invasive Species Management Plan shall be completed for the project prior to works commencing. These plans shall be living documents that expand on the general mitigation measures provided in this assessment and shall be updated as needed based on Site conditions.

In addition to the measures provided in the following sections, all required permits and approvals must be in place prior to the start of work and the contractor must comply with the conditions of all approvals, permits, self-assessments, and notifications at all times. The contractor shall maintain copies of all approvals, permits, and notifications on-Site during works.

6.2.1 Erosion and Sediment Control

Change in sediment concentrations can occur when sediment is mobilized into the environment[4]. Sediment mobilization during construction activities can occur when the ground surface is disturbed, or erodible material is brought to a site. Rain and wet conditions can further exacerbate the issue by mobilizing sediment in surface flow and carrying material to watercourses. The following are examples of construction activities that lead to sediment mobilization:

[4] http://www.sxd.sala.ubc.ca/9_resources/fed_%20files/fed%20land%20development%20guidelines.pdf (accessed May 2021).

- Excavation
- Vegetation removal
- Stockpiling material (e.g., fill and landscaping soil)
- Driving vehicles or equipment over exposed surfaces

Where avoidance of these activities is not feasible, the following measures should be implemented during the project:

- Ground disturbance shall be minimized to that what is necessary to complete work.
- Areas of disturbance shall be clearly marked before work commences.
- Work shall be temporarily postponed during periods of heavy rainfall.
- Run-off shall be directed away from exposed surfaces to areas for infiltration.
- Run-off leaving the Site shall be tested for compliance with BC Water Quality Guidelines for turbidity (BC WQG). Run-off leaving the Site that is not compliant with BC WQG will be contained and either treated on-Site or taken to a facility for treatment. The Site shall have capacity to contain run-off in the event it is non-compliant with BC WQG.
- Exposed surfaces shall be covered when not in use. Covers used for this purpose will be anchored to prevent them from sloughing or being windblown.
- Driving surfaces shall be caped to reduce the likelihood of sediment tracking and erosion.
- Catch basins in proximity to the Site that may receive run-off from the Site shall have protections such as drop-in filters.
- An Environmental Monitor with experience conducting ESC monitoring shall conduct regular monitoring visit to identify compliance of ESC measures at the Site. Monitoring visits shall be conducted bi-weekly during the dry season, weekly during the wet-season, and within 24 hr of significant rainfall events (equal or greater than 25mm in a 24 hr period).
- A project specific ESCP will be developed that includes the measures listed above and any additional measures needed based on conditions at the Site prior to work commencing.

6.2.2 Maintaining Hydrological Pathways

Change to base flow can occur when there is a change to groundwater inputs to surface flow or when surface drainage is modified[6]. Existing surface flow patterns that are temporarily modified during construction shall be restored following Project construction.

It should be noted that groundwater diversion is regulated under Section 10 of the *Water Sustainability Act* and any use or diversion of groundwater is anticipated to require a Water Use Approval from the province.

6.2.3 Water Quality

Runoff from the proposed development eventually will discharge to the regulated streams. A development has the potential to affect water quality in a variety of ways, all of which can and will

be mitigated. Therefore, the proposed development is not expected to have any adverse effects on water quality for the Streams and wetlands. Potential effects of the development include the following:

- Increased sediment loadings due to erosion during construction;
- Potential spills of construction materials;
- Discharge of oils or other contaminants in storm water runoff from parking lots; and
- Discharge of fertilizers or pesticides in runoff from residences.

The following sections discuss mitigation measures that will be implemented to prevent the potential effects of the proposed development on the Park.

6.2.3.1 Sediment Control

Sediments carried in site runoff would discharge to the regulated streams. Sedimentation could potentially affect the regulated waters.

Sediment traps can be incorporated into the design of the development storm water system. However, to minimize the possibility of sediment affects to the wetlands and regulated streams during construction; a sediment control plan will be developed prior to construction and implemented during the construction. The sediment control plan will incorporate the following recommendations:

- To the extent possible, time site clearing and grading for the dry weather period (summer), when the potential for surface runoff to erode exposed soils is lowest. As much as possible, avoid having large areas of disturbed soil present during the winter;
- Avoid clearing several months ahead of construction. Site clearing should immediately precede construction to minimize the amount of time that disturbed soils are exposed to weathering;
- Construct sediment control structures such as silt interception ditches and sedimentation ponds, as necessary. These structures should be installed as the first construction activity and check regularly to ensure proper protection;
- Use drainage control measures (ditching, berming) to direct surface runoff away from and minimize the length of flow pathways along disturbed areas;
- If necessary, include silt fencing to retain sediments on site. Inspect all sediment control structures regularly, and repair/maintain them as necessary;
- If any soil is to be stockpiled for more than seven days, cover it with polyethylene sheeting or contain it totally within a silt fence to prevent erosion; and
- After construction, revegetate any remaining disturbed soils with native vegetation as soon as practical.

6.2.3.2 Spill Prevention

Spill prevention measures will be implemented during construction. The construction staging area will be situated and designed to minimize the potential that spills of vehicle fuels and other materials could enter drainage channels. It should be located at least 30 m away from any drainage that terminates into a regulated stream. Where necessary areas can be contained and bermed areas in order to contain any liquid spills.

Activities that carry a risk of materials spills will take place within the bermed staging area. These activities include mixing concrete or other materials and any vehicle fuelling and other maintenance that is done on site.

6.2.3.3 Storm Water Management

A storm water management system designed by a P.Eng. will provide treatment to ensure acceptable water quality in any discharge to any of the Site's regulated streams.

6.2.4 Deleterious Substance Control and Spill Management

Change in contaminant concentrations can result from the release of oil, grease, fuel, solvents, paints, or other chemicals into the environment. Introducing contaminants into the environment can result in direct fatality to organisms, alteration of ecosystem structure, and deformities, alterations in growth, reproductive success, and competitive abilities of individuals. The following measures will be implemented to reduce the likelihood of changing contaminant concentrations:

- Chemicals shall be handled and stored in accordance with their Material Safety Data Sheet (MSDS).
- Chemicals shall have a minimum secondary containment in the event primary containment is breached.
- Spill containment shall be a minimum 125% of the stored volume of each chemical on Site.
- Spill response materials shall be available on Site in quantities sufficient to respond to spills of chemical volumes stored at the Site. Personnel shall be advised as to the location of spill kits at the Site.
- Containment measures shall be regularly reviewed for deficiencies by a qualified Environmental Monitor. Containment measures that are considered deficient will be improved or repaired in a time period reasonable to the deficiency.
- Spills of a substance of reportable quantities that are toxic, polluting or deleterious to aquatic life will immediately be reported to the Provincial Emergency Program, Environmental Emergency Management Plan Incident Reporting Hotline.
- A project specific Spill Response Plan shall be developed that includes the measures listed above and any additional measures needed based on conditions at the Site prior to work commencing. The Spill Response Plan shall be posted at the Site.
- Personnel shall be trained in the Spill Response Plan.

6.2.5 Vegetation Management

Changes in food supply can occur when the quantity or composition of the food supply is increased or decreased. When the quantity of plant and organic debris that falls into a waterway is altered, the structure of the aquatic community can be impacted. Additionally, the introduction of invasive plants can lead to changes in invertebrate diversity and abundance in riparian areas. The following measures shall be implemented to reduce the likelihood of changing aquatic food supplies through vegetation alterations:

- Vegetation removal shall be limited to the minimum area necessary to complete works.
- Areas of vegetation removal shall be clearly marked to reduce the likelihood of incidental damage to vegetation.
- The root zones of trees outside of the project footprint must be protected with snow and silt fencing prior to the start of works. A qualified arborist or forester will delineate the tree root zone.
- An invasive plant management plan will be in place, which will outline measures to control the spread of invasive and noxious weeds during construction activities.
- Invasive species material and associated soils originating at the Site shall be treated and/or disposed of according to applicable local, provincial, and federal guidelines and BMPs.
- Invasive species material, including aboveground stems, roots, flowers, seeds, and associated soils that may contain plant material shall be separated from other material.
- Fill material shall be verified as weed-free before being accepted for use at the Site.
- Provincial Best Management Practices (BMPs) for land development are a series of documents which help guide land managers to meet specific requirements for preserving species and ecosystems across the landscape. These provincial BMPs are effective strategies that mitigate effects from projects on vegetation. They have become accepted practices for land development. They will be considered during Project implementation.
- Minimize vegetation removal by limiting surface disturbance.
- Allow natural recovery of native vegetation.
- Have a qualified professional conduct a detailed assessment of plant species at risk along the wetlands prior to construction at the appropriate times of the year to identify vascular plants that may be affected.
- Use native seed mixes adapted to local conditions for re-vegetating along the riparian areas.
- Control invasive plants (e.g., Japanese knotweed) following weed management plans that will be developed prior to construction.
- Avoid the use of heavy machinery and equipment when soil is saturated (e.g., inclement weather, spring melt).
- If possible, restrict vehicles and activity during the spring and summer (i.e., growing season).
- Allow wetlands to recover naturally, wetland areas will not be seeded.
- Monitor the effectiveness of the environmental mitigation prescriptions and implement improvements as necessary.

6.2.6 Fish and Fish Habitat

Fish were not observed or expected within the Project area. The following measures shall be implemented to reduce the likelihood of negative impacts to fish downstream:

- The works shall follow an Erosion and Sediment Control Plan inclusive of regular ESC monitoring.
- In-stream works will be completed during the regional fish window (August 1 – September 15).
- An Environmental Monitor shall be present during the tie-in of the west drainage ditch to existing ditches or during periods of in-stream works outside the work window.
- Flow diversions will maintain base flow to downstream habitat to prevent stranding fish.
- Avoid working in wet, rainy conditions or use aerial methods to install lines.
- Operate machinery on land in a manner that limits disturbance to wetlands and the streams.
- Install effective sediment and erosion control methods and inspect them regularly and during rain events
- Wash, refuel, and service machinery and store fuels and other deleterious materials away from the regulated streams of the Site.
- Keep an emergency spill kit on site in case spills of deleterious substances.
- Restore any disturbed banks or wetland areas.
- Stabilize any waste materials removed from the Site.
- Vegetate disturbed areas as soon as possible and ensure that banks are stabilized and sediment and erosion control measures are in places until vegetation is established.
- Riparian areas will be marked with “Riparian areas” at the regulated distances to ensure compliance during construction and clearing.
- Use vegetation pruning and other non-invasive techniques rather than clearing in the riparian areas along any waterbody.
- Trucks and tire tracks of clearing crews will be avoided in the riparian area and clearing will be done by hand.
- A QEP will prepare a Construction Environmental Management Plan for all proposed works.

6.2.7 Wildlife

- Vegetation clearing activities within the bird nesting window should take place within five days of the completion of bird nest surveys for areas where no active nests are present. If clearing cannot commence within that five day period, additional pre-clearing survey would need to be conducted immediately prior to clearing. In the event a nest is identified as active, a qualified professional will determine a suitable buffer to reduce the potential for adverse effects. Typically, active songbird nests require a 20 to 30 m species-specific buffer zone applied. Raptor nests were not present.

6.2.8 Species and Ecosystems at Risk

- Pre-construction surveys will be conducted by a QEP in advance of intrusive works (i.e., excavation, vegetation clearing) to confirm that species at risk are not present prior to the commencement of these works or to determine an appropriate adaptive strategy to avoid impacting a species at risk.
- A QEP should be consulted if species at risk are observed during construction activities when an environmental monitor is not present.
- Amphibian salvages will be conducted in the riparian area prior to works beginning. Amphibians will be relocated downstream, away from the Site.
- In water works shall occur during the regional fish-timing window (August 1 – September 15) and outside of the Northern red-legged frog breeding seasons.
- Bird nest surveys will be conducted prior to construction commencing and throughout the bird nest season based on bird presence and nesting activity.
- Attractants such as food will be stored in vehicles and removed from Site daily.
- Chemicals will be stored and handled according to their MSDS and BMPs.
- Equipment will be operated at reasonable speeds to reduce the risk of fatal interactions with wildlife.
- Appropriate permits and licenses for the handling of regulated species at risk will be in place prior to salvages. Copies of all permits and licenses will be available on hand at the Site for review by the Environmental Monitor and/ or regulators.

7. RESIDUAL EFFECTS TO FISH AND FISH HABITAT AFTER IMPLEMENTATION OF AVOIDANCE AND MITIGATION MEASURES AND STANDARDS

7.1 Summary of Mitigation Measures and Potential for Residual Effects

Table 9 provides a summary of the potential effects, associated mitigation measures and best practices to reduce the potential for impact to EVRs, and an assessment of potential for residual effects following the successful implementation of the mitigation measures and practices.

Table 9 Summary of Mitigation Measures and Residual Effects Anticipated

Resource Category	Potential Environmental Effects	Mitigation Measures	Residual Effect
Water Quality	Increase in total suspended solids. Inputs of petroleum hydrocarbons from small spills and/or leaks from equipment.	Trucks hauling fill materials to Site will not be overloaded to prevent loss of material over the sides of the box, and all loads will be covered to prevent mobilization of material by wind. The Environmental monitor will measure turbidity in discharge waters and advise the contractor on additional measures where necessary. Have a water treatment system available on Site should there be any rainfall or residual water requiring treatment during works. Have a Spill Response Plan posted at the Site understood by all contractors. The Environmental monitor will confirm spill kits are appropriately stocked and available if needed. Equipment must be in good condition and free of leaks, inspected regularly; no excess oil or grease that could enter the water. Prevent discharge of stormwater into the lagoon. Avoid use of fertilizers and soils high in nitrates and fecal coliforms to avoid nutrient loading of lagoon. Use care when pouring concrete, if required, to prevent a change in pH in adjacent water bodies.	Potential temporary increase in total suspended solids in adjacent areas of the access channel during works, and after first rainfall
Sediment Quality	Inputs of petroleum hydrocarbons from small spills and/or leaks from equipment.	Stop works if suspect sediment is found (e.g., staining or smells that may indicate petroleum hydrocarbons, etc.) have the environmental monitor assess the sediment to advise on the appropriate course of action.	None expected

Resource Category	Potential Environmental Effects	Mitigation Measures	Residual Effect
Vegetation	Loss of additional native riparian vegetation.	Machinery will operate within the marked boundaries of the worksite to prevent damage to adjacent vegetation Restore area by planting native grass seeds on fill area after works. Native or indigenous vegetation should be retained wherever possible. If not practicable, restoration should be incorporated into the development, such as the replanting of previously cleared native or indigenous vegetation species. Maintain a minimum of 5m wide ecological area from the natural boundary for majority of the outer park length. The current Park design maintains an average backshore vegetation width of 8 m.	Permanent net loss of vegetation to create the industrial park.
Fish and Fish Habitat	Effects on juvenile salmon.	Conduct excavation activities on dry days to minimize the suspension of fine sediment particles in the water column downstream.	None expected
Wildlife	Loss of nesting and foraging habitat for birds, mammals and amphibians, reduced survival or fecundity of birds if disturbed during nesting, negative impacts from spills of deleterious substances.	Pre-construction surveys in advance of intrusive works and during nesting/breeding periods to determine if breeding wildlife species are present and determine appropriate setbacks/buffers in time and space to reduce the potential for adverse effects. Environmental monitoring during works to confirm wildlife species are not being impacted.	None expected
Species and Ecosystems at Risk	Loss of foraging or wading habitat for great blue heron.	Pre-construction survey in advance of intrusive works to confirm species at risk are not present, or to develop appropriate adaptive strategies if they are found.	None expected
General	Environmental incident due to lack of awareness. Works occur outside of the approved worksite boundary.	Contractor must conduct a kickoff meeting to ensure general industry best management practices have been identified and are understood by all crew and subcontractors prior to commencement of work. An environmental monitor will perform regular visits during the works as per the Environmental Monitoring Plan. Prior to the commencement of works, the perimeter of the work area will be flagged so that works will only occur within the confines of the plan shown in the Park (Figures 3 and 4). Operate machinery from the top of bank, or, if necessary, from atop fill material in a manner that reduces disturbance to the bottom substrate.	None expected

7.2 Residual Effects

The total area within the Site is approximately 107,180 m^2 and the proposed development footprint is 67,400m^2, after avoiding a majority of the high and moderately sensitive areas. Following the implementation of avoidance measures to reduce potential effects to aquatic, riparian, and terrestrial environments, and mitigation measures outlined in Section 6.3, the ESC plan, and the EMP, the following residual effects were identified: loss of 1,434 m^2 of non- fish bearing aquatic habitat, 17,109 m^2 of riparian habitat according to the RAPR setbacks.

7.3 HADD

Harmful alteration, disruption, or destruction of fish or fish habitat at the Site can be avoided by implementing the mitigation measures described in Sections 6.0, an EMP and ESC plan. There is currently no fish presence, or fish access to the Site. The Project will not significantly change fish habitat at the Site or contribution of water, food and nutrients to fish habitat downstream of the Site.

After incorporation of mitigation measures and strategies to avoid and minimize impacts to fish and fish habitat, it is expected that impacts associated with the Project works will not result in a harmful alteration, disruption or destruction of fish habitat and that an Authorization under the *Fisheries Act* is not anticipated to be required.

8. LIMITATIONS

Keystone Environmental Ltd. confirms that this letter report has been prepared in a manner consistent with that level of care and skill normally exercised by other members of the environmental science and engineering profession practising under similar circumstances in the area at the time of the performance of the work. It must be understood that the extent of aquatic areas was based on municipal mapping and field observations. As shown in the report, figures and calculations are approximate.

This report has been prepared solely for the internal use of Brunswick Property Holdings Ltd. pursuant to the agreement between Keystone Environmental Ltd. and Brunswick Property Holdings Ltd. By using this letter report Brunswick Property Holdings Ltd. agrees that they will review and use the letter report in its entirety. Any use which other parties make of this letter report, or any reliance on or decisions made based on it, are the responsibility of such parties. Keystone Environmental Ltd. accepts no responsibility for damages, if any, suffered by other parties as a result of decisions made or actions based on this letter report.

We thank you for the opportunity to provide this assessment. The assessment is considered preliminary at this time and is to be used for the purposes of planning and regulatory discussions.

If you require clarification of this assessment report, please do not hesitate to contact the undersigned at 604-430-0671.

Sincerely,

Keystone Environmental Ltd.

Jamie Slogan, Ph.D., R.P.Bio.
Department Head, Biological Services

9. REFERENCES

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APPENDIX A

FIGURES

LOCATION PLAN

N

LEGEND

- SITE
- PROPERTY LINE
- LOT LINES

Keystone Environmental

NOTES:
1. *THIS DRAWING IS FOR GENERAL INFORMATION ONLY. LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.*
2. *THE DATE OF AERIAL PHOTO IS 2019.*

25 0 125 m

SCALE: 1:2,500 (approx.)

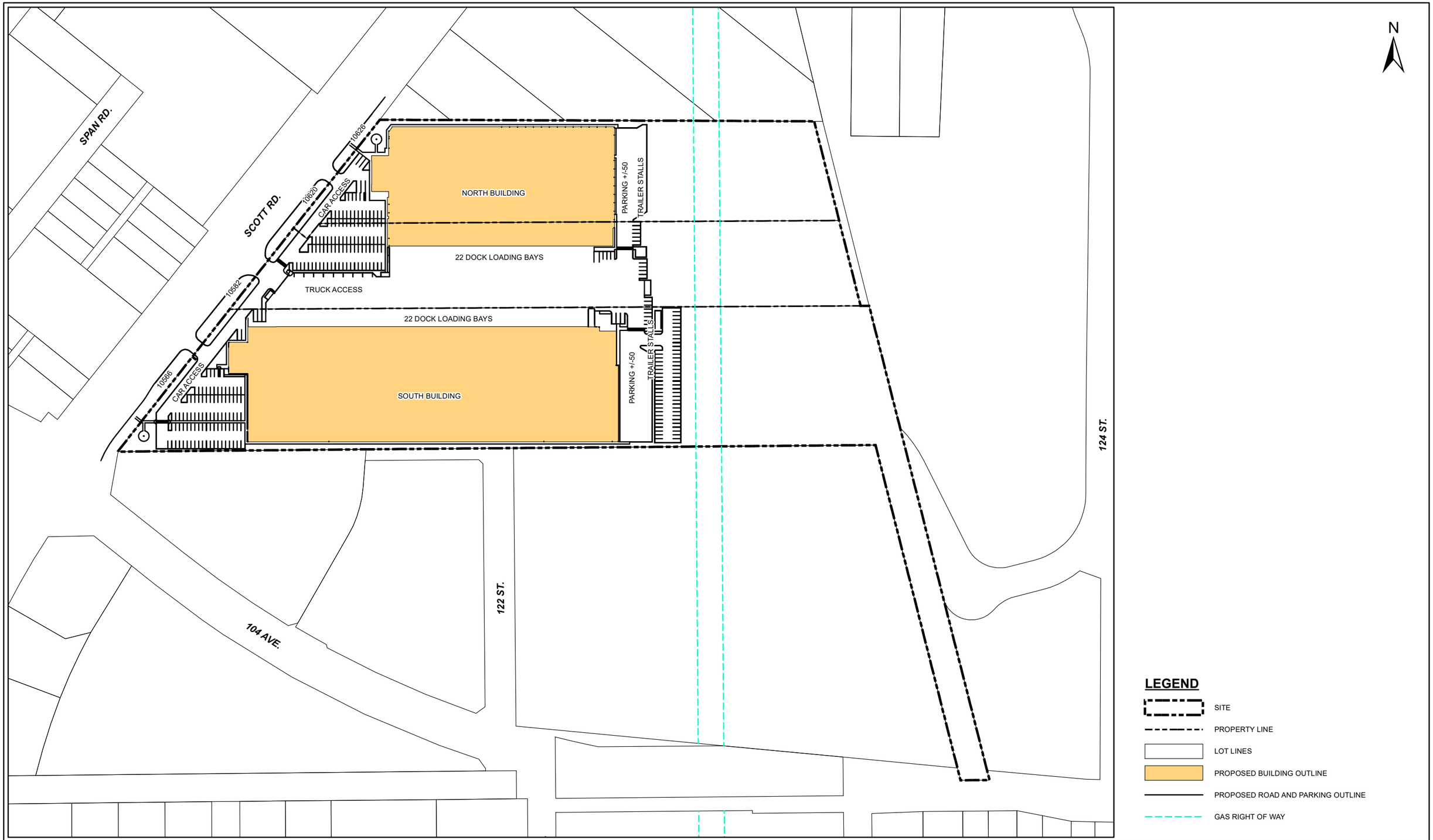
10626 Scott Road
Surrey, B C
Brunswick Property Holdings Ltd.

REVISION No.	DATE	PROJECT No.
C	Nov. 2021	15934-104

Figure 1

Site Location

DRAWN BY: CY Document Path: I:\0-GIS\1-Projects\1-10626_ScottRoad\Phase 100 - Environmental Assessment\GIS_CADD\Fig1-LocationPlan-RA.mxd



Keystone Environmental

NOTES:
1. *THIS DRAWING IS FOR GENERAL INFORMATION ONLY. LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.*
2. *DRONE (UNMANNED AERIAL VEHICLE) ORTHOMOSAIC IMAGERY COLLECTED ON FEBRUARY 7, 2021*

25 0 125 m

SCALE: 1:2,500 (approx.)

10626 Scott Road
Surrey, B C
Brunswick Property Holdings Ltd.

REVISION No.	DATE	PROJECT No.
D	Nov. 2021	15934-104

Figure 2

Project Description

DRAWN BY: CY Document Path: I:\0-GIS\1-Projects\1-10626_ScottRoad\Phase 100 - Environmental Assessment\GIS_CADD\Fig2-ProjectDescription-RA.mxd

N

LEGEND

- SITE
- PROPERTY LINE
- LOT LINES

INVASIVE SPECIES

- POLICEMAN'S HELMET
- GIANT HOGWEED
- HIMALAYAN BLACKBERRY
- KNOTWEED SPP.
- PURPLE LOOSESTRIFE
- REED CANARY GRASS
- GAS RIGHT OF WAY

SPECIES AT RISK

- BEGGERTICK SPP.

Keystone Environmental

NOTES:
1. *THIS DRAWING IS FOR GENERAL INFORMATION ONLY.*
   LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.
2. *DRONE (UNMANNED AERIAL VEHICLE) ORTHOMOSAIC IMAGERY COLLECTED ON FEBRUARY 7, 2021*

25 0 125 m

SCALE: 1:2,500 (approx.)

10626 Scott Road
Surrey, B C
Brunswick Property Holdings Ltd.

REVISION No.	DATE	PROJECT No.
D	Nov. 2021	15934-104

Figure 3

Terrestrial Conditions

DRAWN BY: CY Document Path: I:\0-GIS\1-Projects\1-10626_ScottRoad\Phase 100 - Environmental Assessment\GIS_CADD\Fig3-TerrestrialConditions-RA.mxd

LEGEND

- SITE
- PROPERTY LINE
- LOT LINES
- NON-FISH BEARING AQUATIC
- RAPR SPEA
- DRAINAGE ISMP BOUNDARIES
- GAS RIGHT OF WAY
- CULVERT
- FLOW DIRECTION
- BEAVER DAM

Keystone Environmental

NOTES:
1. *THIS DRAWING IS FOR GENERAL INFORMATION ONLY. LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.*
2. *DRONE (UNMANNED AERIAL VEHICLE) ORTHOMOSAIC IMAGERY COLLECTED ON FEBRUARY 7, 2021*

25 0 125 m

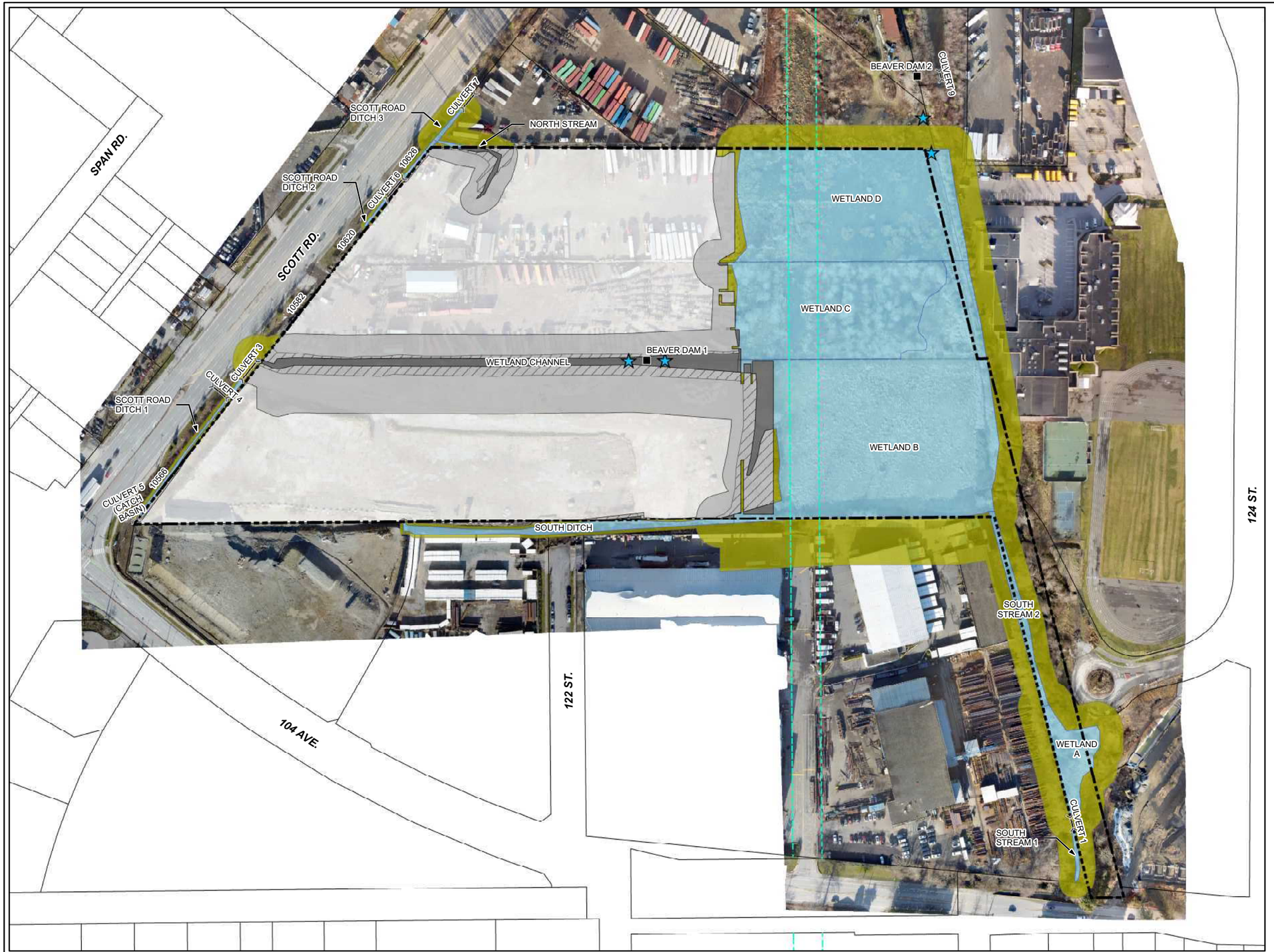
SCALE: 1:2,500 (approx.)

10626 Scott Road
Surrey, B C
Brunswick Property Holdings Ltd.

REVISION No.	DATE	PROJECT No.
G	Mar. 2022	15934-104

Figure 4
Aquatic and Riparian Conditions

DRAWN BY: CY Document Path: I:\0-GIS\1-Projects\1-10626_ScottRoad\Phase 100 - Environmental Assessment\GIS_CADD\Fig4-AquaticRiparianConditions-RA.mxd



N

LEGEND

- SITE
- PROPERTY LINE
- LOT LINES
- EXISTING RIPARIAN HABITAT
- INFILLED AQUATIC
- RETAINED AQUATIC
- INFILLED RAPR SPEA
- RETAINED RAPR SPEA
- PROPOSED DEVELOPABLE FOOTPRINT
- GAS RIGHT OF WAY
- CULVERT
- FISH SAMPLING LOCATIONS
- BEAVER DAM

Keystone Environmental

NOTES:
1. *THIS DRAWING IS FOR GENERAL INFORMATION ONLY. LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.*
2. *DRONE (UNMANNED AERIAL VEHICLE) ORTHOMOSAIC IMAGERY COLLECTED ON FEBRUARY 7, 2021*

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SCALE: 1:2,500 (approx.)

10626 Scott Road
Surrey, B C
Brunswick Property Holdings Ltd.

REVISION No.	DATE	PROJECT No.
F	Apr. 2022	15934-104

Figure 5
Impact Assessment

DRAWN BY: CY Document Path: I:\0-GIS\1-Projects\1-10626_ScottRoad\Phase 100 - Environmental Assessment\GIS_CADD\Fig5-ImpactAssessment-RA.mxd

APPENDIX B

HISTORICAL IMAGERY

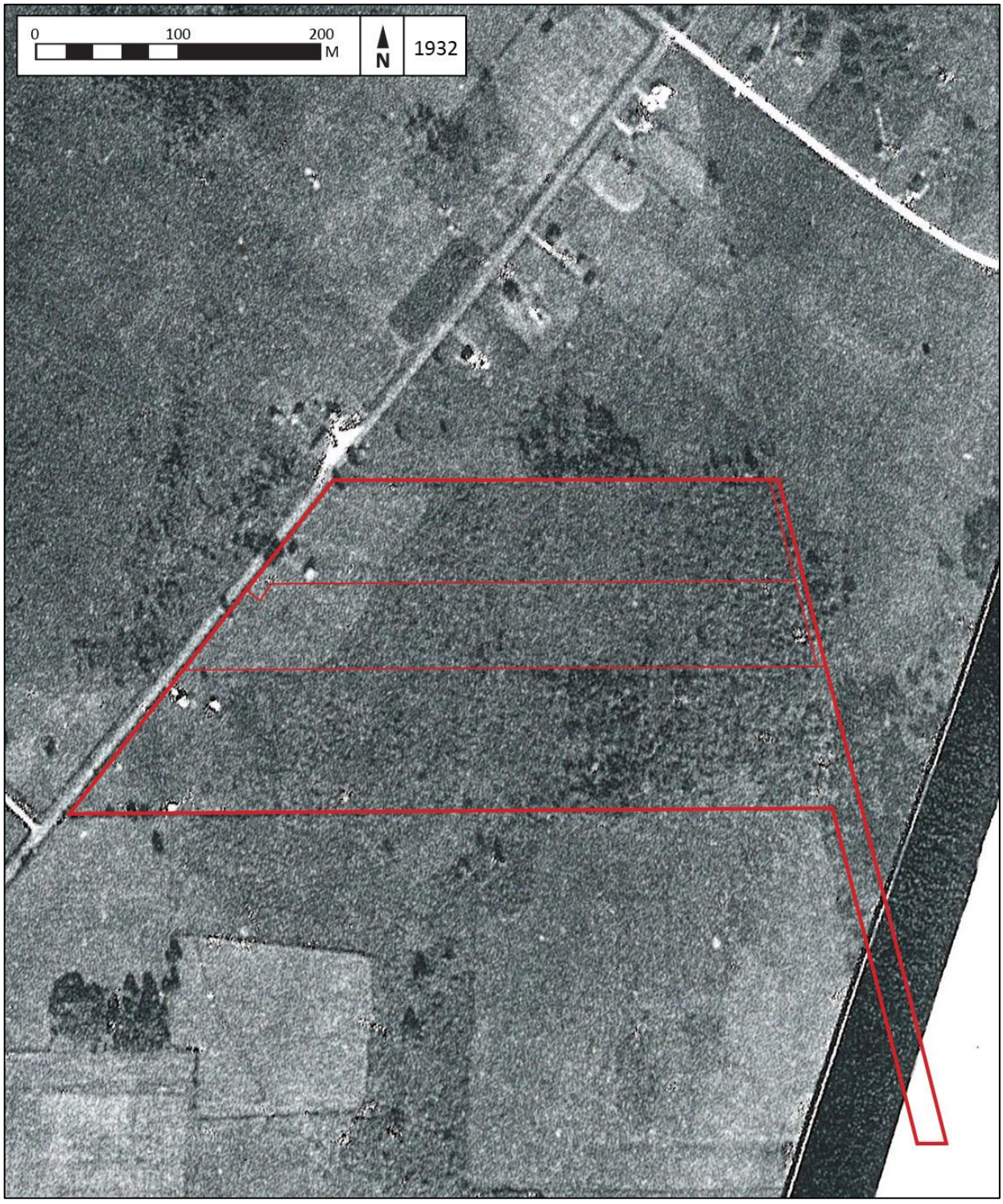


Figure AB-1: 1932 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

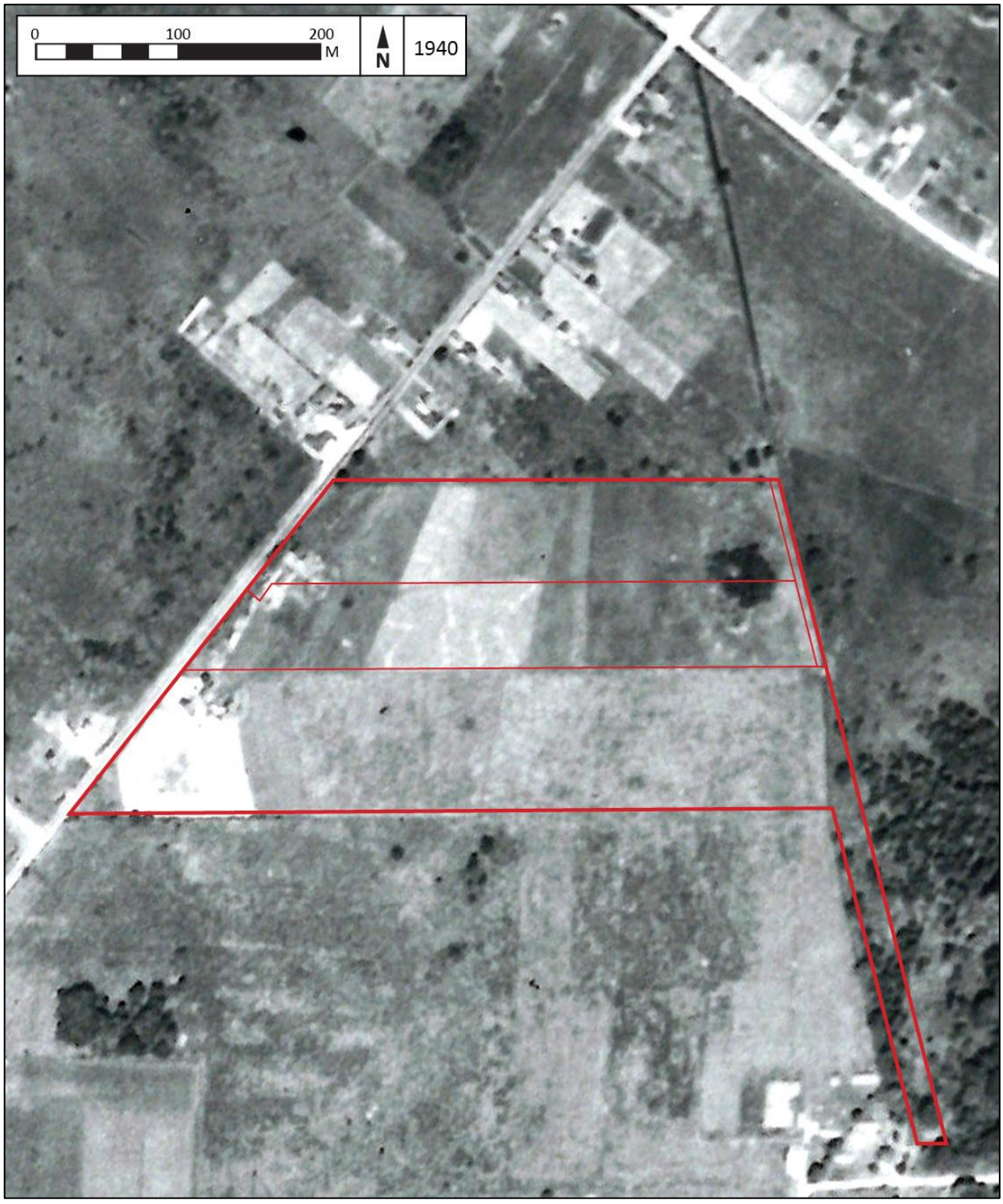


Figure AB-2: 1940 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

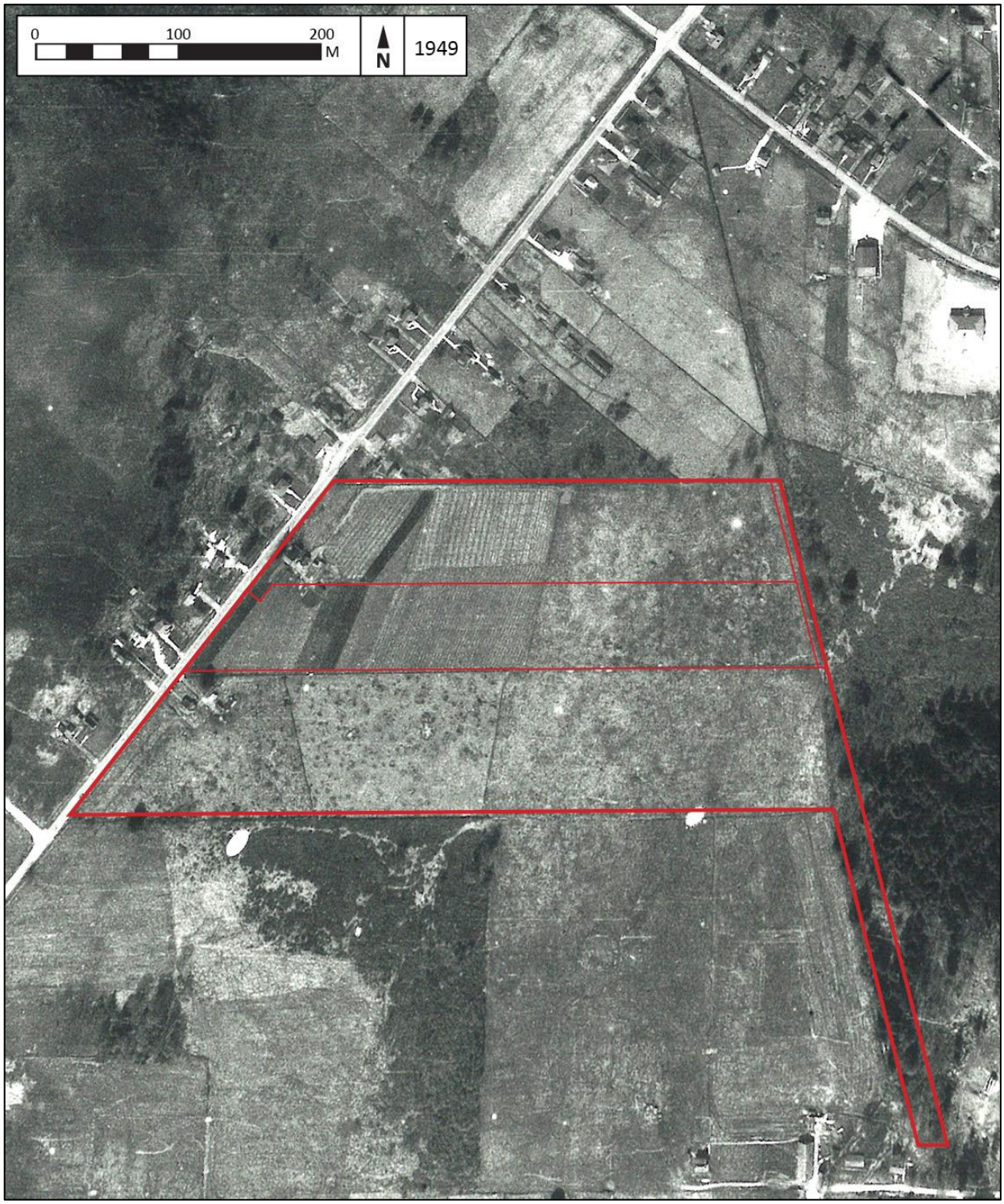


Figure AB-3: 1949 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-4: 1954 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

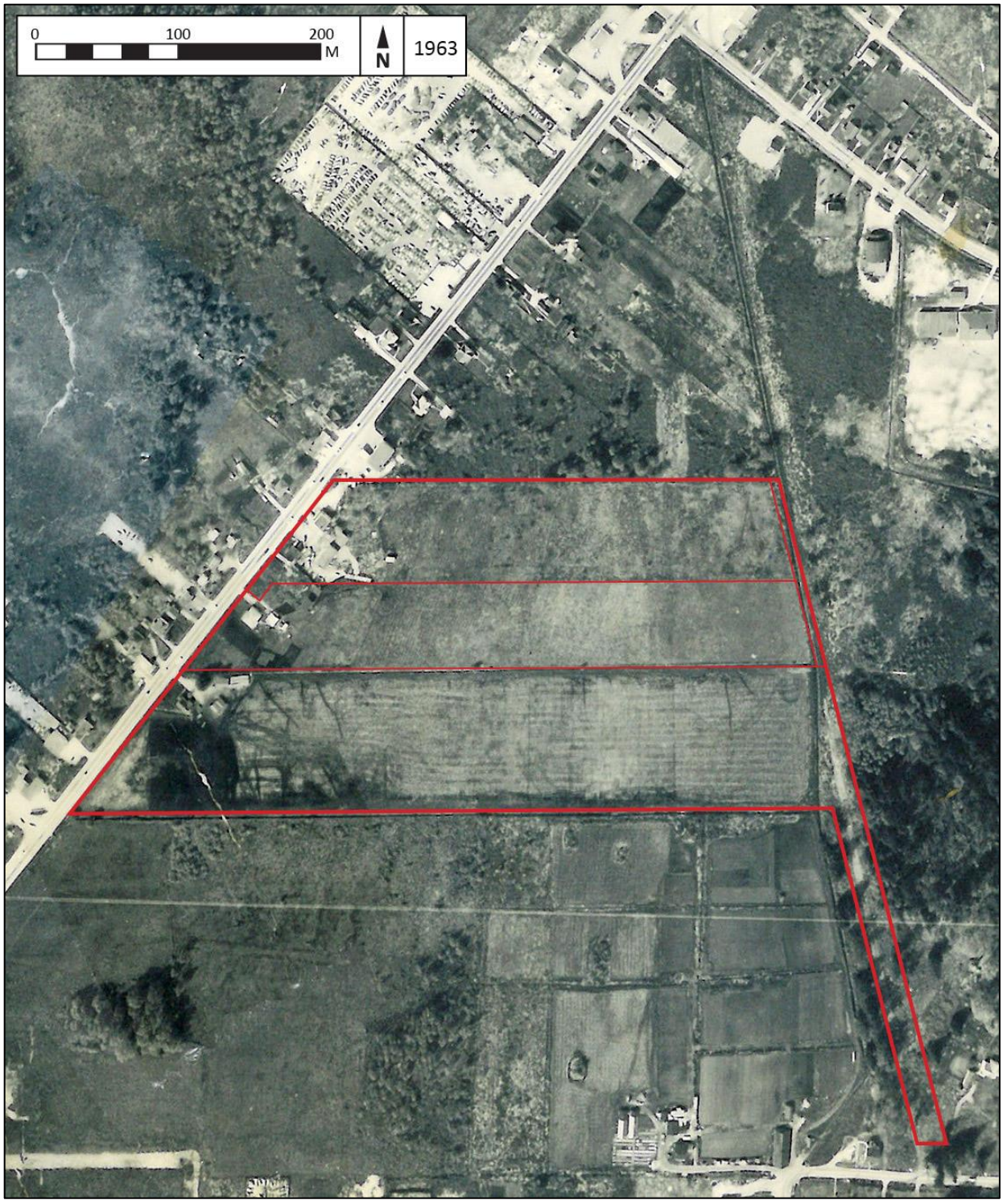


Figure AB-5: 1963 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

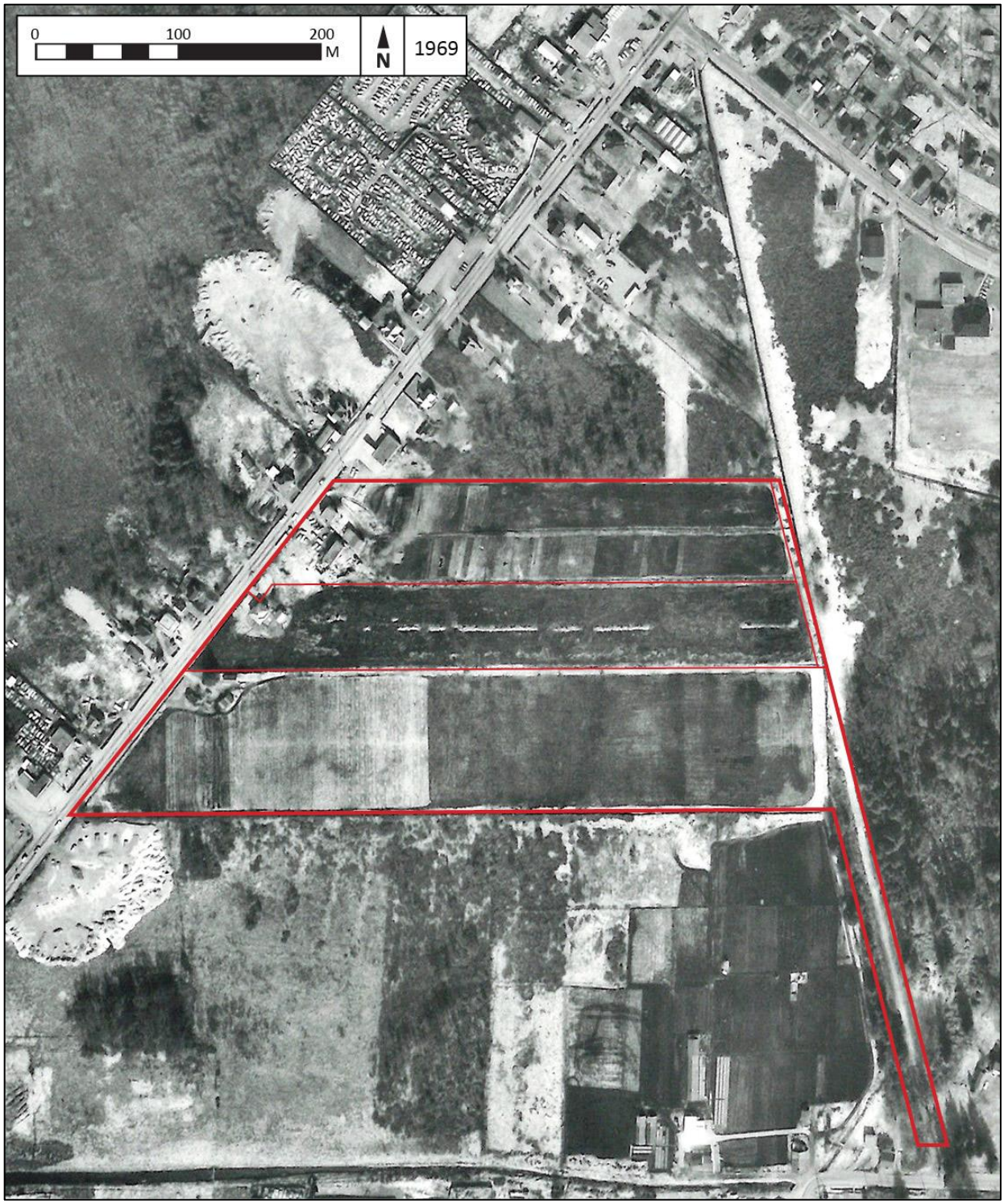


Figure AB-6: 1969 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

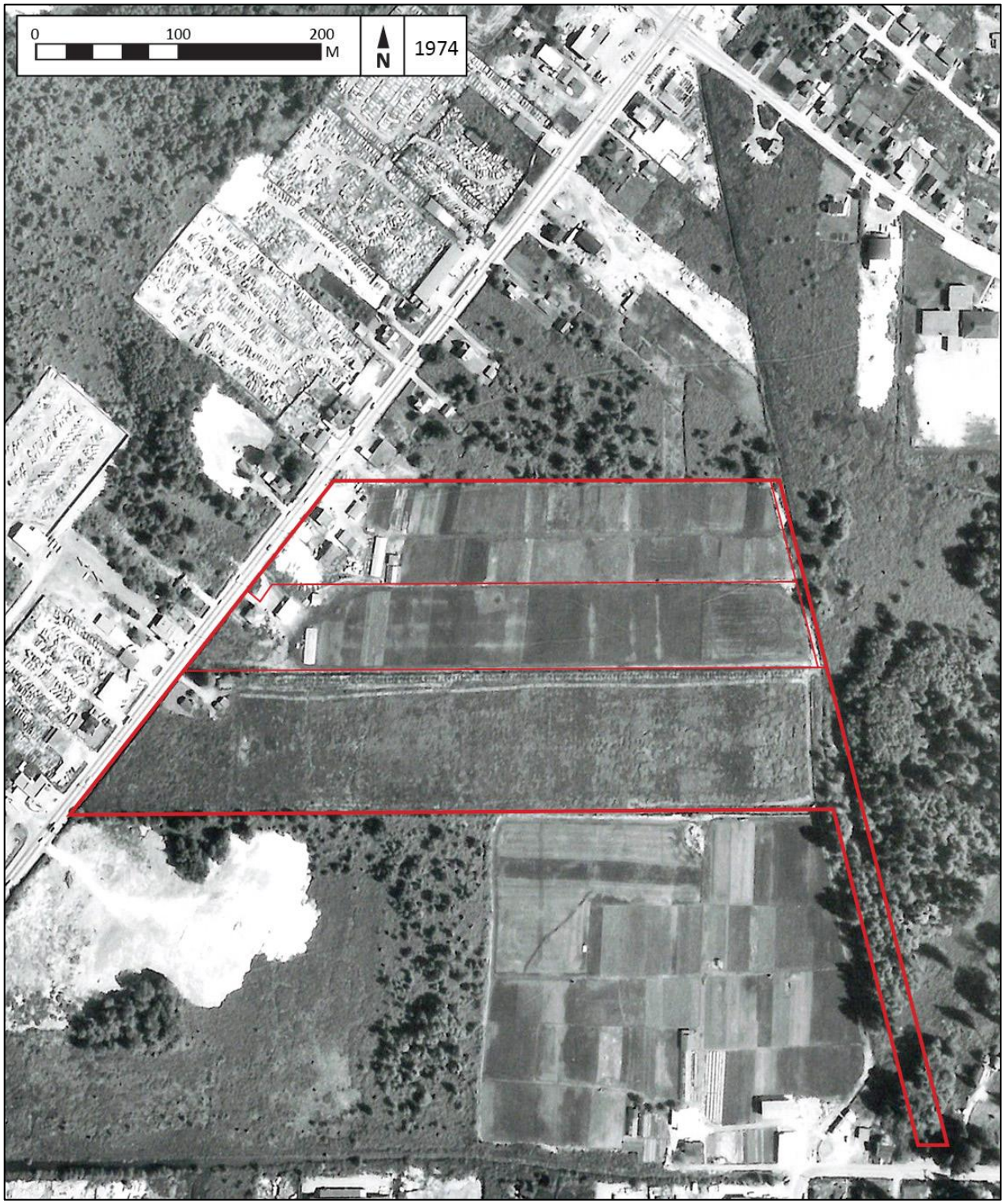


Figure AB-7: 1974 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-8: 1980 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-9: 1986 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-10: 1990 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-11: 1994 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

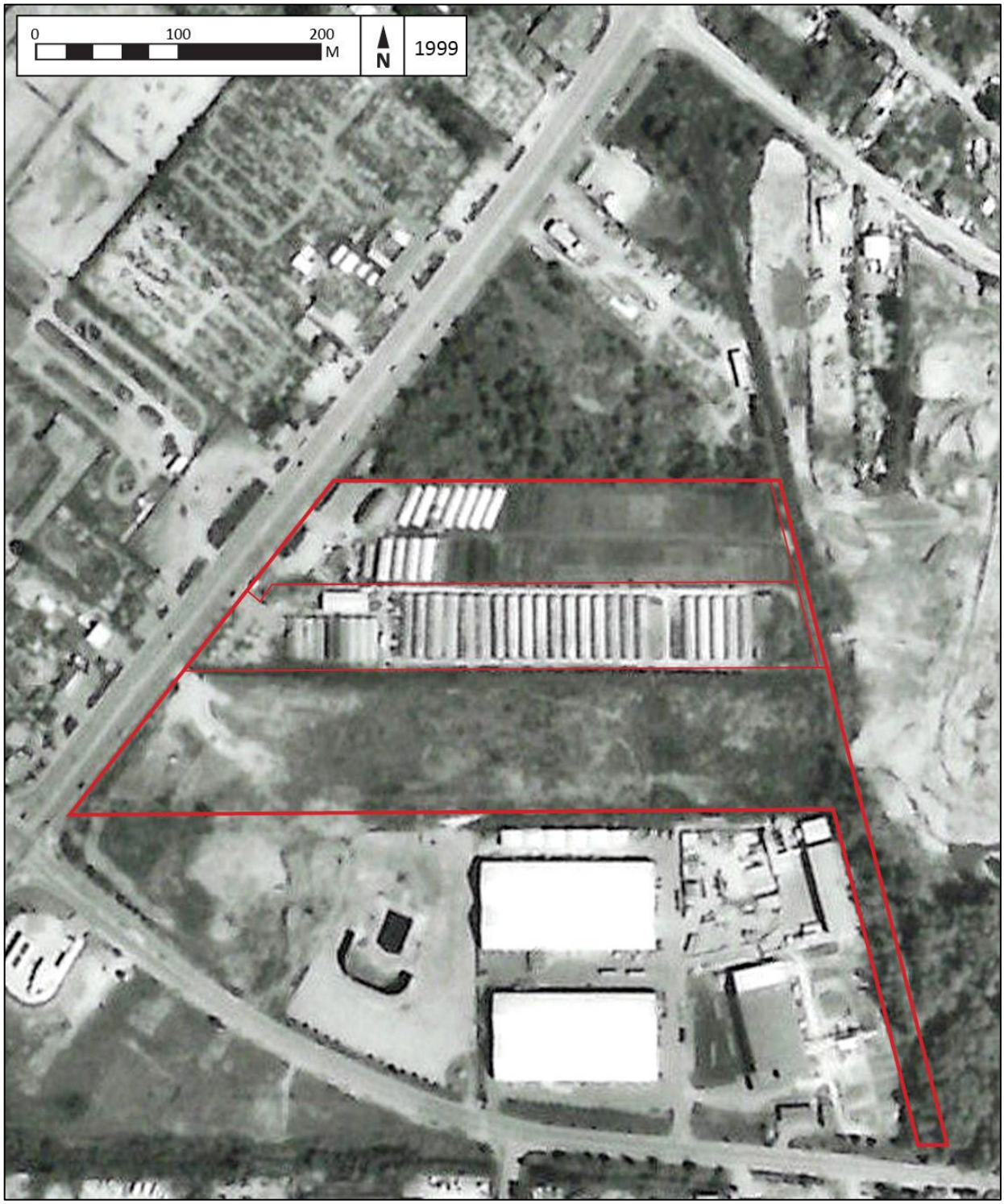


Figure AB-12: 1999 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-13: 2004 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-14: 2009 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-15: 2016 air photo of the Project Site (Base map source: Geographic Information Centre, UBC)

Figure AB-16: 2021 drone image of the Project Site (Base map source: Stirling Geoscience Ltd.)

APPENDIX C

ARCHEOLOGICAL EMAIL

Corrie Allen

From: Emily West
Sent: March 25, 2021 11:23 AM
To: Corrie Allen; Jamie Slogan; Libor Michalak
Subject: FW: Data Request: Emily West - Keystone Environmental Ltd.

Emily West M.Sc., R.P. Bio
Biologist

Keystone Environmental Ltd.
www.keystoneenvironmental.ca

From: Cooper, Diana FLNR:EX <Diana.Cooper@gov.bc.ca>
Sent: March 25, 2021 11:21 AM
To: Emily West <ewest@keystoneenvironmental.ca>
Subject: RE: Data Request: Emily West - Keystone Environmental Ltd.

Hello Emily,

Sorry for the length of time it's taken to send you a response. There's been a sudden and gigantic increase in the number of requests received by the Archaeology Branch, and while we are working as quickly as possible to answer them, they're coming in faster than they're going out!

Thank you for your archaeological information request regarding 10620/ 10626 Scott Road, Surrey, PID 009932313, LOT 1, EXCEPT; PART ON SRW PLAN LMP20327 SECTION 19 BLOCK 5 NORTH RANGE 2 WEST NEW WESTMINSTER DISTRICT PLAN 14280, 10582 Scott Road, Surrey PID 001525905, LOT 2, EXCEPT; PART ON SRW PLAN LMP20327 SECTION 19 BLOCK 5 NORTH RANGE 2 WEST NEW WESTMINSTER DISTRICT PLAN 14280 and 10566 Scott Road, Surrey, PID 013197754, PARCEL "B" (REFERENCE PLAN 4663) FRACTIONAL SECTION 19 BLOCK 5 NORTH RANGE 2 WEST EXCEPT: FIRSTLY: PART 208.2 SQUARE METRES (BYLAW PLAN 58239),SECONDLY: PART ON SRW PLAN LMP20327 NEW WESTMINSTER DISTRICT. Please review the screenshot of the properties below (outlined in yellow) and notify me immediately if it does not represent the properties that are listed in your information request.

Results of Provincial Archaeological Inventory Search

According to Provincial records, there are no known archaeological sites recorded on any of the properties.

Data is not currently available to the Province that describes the potential for previously unidentified archaeological sites to occur in the area.

Archaeology Branch Advice

The Archaeology Branch does not identify a need for archaeological study or Provincial heritage permit(s) at the time of this information request.

Please notify all individuals (e.g., owners, developers, equipment operators) involved in land-altering activities (e.g., home renovations, property redevelopment, landscaping, service installation) that if archaeological material is encountered during development, they **must stop all activities immediately** and contact the Archaeology Branch for direction at 250-953-3334.

Rationale and Supplemental Information

- Archaeological study and Provincial heritage permit(s) are not required in the absence of an archaeological site.
- There is always a possibility for previously unidentified archaeological sites to exist on any of the properties.
- Archaeological sites are protected under the *Heritage Conservation Act* and must not be damaged or altered without a Provincial heritage permit issued by the Archaeology Branch. This protection applies even when archaeological sites are previously unidentified or disturbed.

Questions?

For questions about the archaeological permitting and assessment process, please contact the Archaeology Branch at 250-953-3334 or archaeology@gov.bc.ca.

For more general information, visit the Archaeology Branch website at www.gov.bc.ca/archaeology.

Please let me know if you have any questions regarding this information.

Kind regards,

Diana

Please note that subject lot boundaries (yellow) indicated on the enclosed screenshot are based on information obtained by the Archaeology Branch on the date of this communication and may be subject to error or change.

Diana Cooper
Archaeologist/Archaeological Information Administrator
Archaeology Branch|Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Phone: (250) 953-3343|Email: diana.cooper@gov.bc.ca |Website www.gov.bc.ca/archaeology

From: ewest@keystoneenvironmental.ca <ewest@keystoneenvironmental.ca> **On Behalf Of** ArchDataRequest@gov.bc.ca
Sent: February 18, 2021 12:29 PM
To: Arch Data Request FLNR:EX <ArchDataRequest@gov.bc.ca>
Subject: Data Request: Emily West - Keystone Environmental Ltd.

Terms and Conditions Accepted	Yes
Name	Emily West

Email	ewest@keystoneenvironmental.ca
I am a	Environmental Consultant
Affiliation	Keystone Environmental Ltd.
Address	320-4400 Dominion Street
City	Burnaby
Province	BC
Postal Code	V5G 4G3
Phone Number	604-430-0671

Information Requested	I request information and advice about archaeological sites on the properties described below (In the text box below, include the Parcel Identifier (PID), street address, and the legal description if available. If you have maps, please upload them to the File Attachments section near the end of the form.): I am requesting information for three adjacent properties in Surrey, BC. PROPERTY 1 Street Address: 10620/ 10626 Scott Road, Surrey, BC PID: 009-932-313 PROPERTY 2 Street Address: 10582 Scott Road, Surrey, BC PID: 001-525-905 PROPERTY 3 Street Address: 10566 Scott Road, Surrey, BC PID: 013-197-754
Why Site Information is Required	Other (describe below): This information is being collected as part of an environmental background assessment of the three properties and will inform the client on known archaeological occurrences at the properties for planning purposes.
Third Party Access	The following person(s) may have access to this information (Include the person's full name and relationship to you below. If you would like them to be copied on our email reply containing property information, please also include their email address): Employees of Keystone Environmental Ltd. working on the project, including but not limited to: Jamie Slogan, Corrie Allen, and Libor Michalak. Our client for the project will also have access to the information, Mr. John Robertshaw of Brunswick Property Holdings Ltd.
Format Required	PDF, Shapefile (ESRI, NAD 83, BC Albers Projection), Map(s)
Who Prompted	This is part of our due diligence process

File Attachment#1	COSMOS_arch-request.pdf
File Attachment#2	
File Attachment#3	
File Attachment#4	
File Attachment#5	

APPENDIX D

PHOTOGRAPHS

Photograph 1: Eastward view of the industrialized portion of the Site. Photograph taken September 4, 2020.

Photograph 2: Northward view of a patch of vegetation within the western portion of the Site above the compact fill line. Photograph taken September 1, 2020.

Photograph 3: View of a red-legged frog observed in Wetland D. Photograph taken September 4, 2020.

Photograph 4: Southeast view of Beaver Dam 1 near the eastern end of the Wetland Channel. The dam was constructed between the September 4, 2020 and December 23, 2020 field assessments. Photograph taken January 19, 2021.

Photograph 5: Northward view of South Stream 1. The approximate channel midline is marked with the tape measure shown in the photograph. Photograph taken September 4, 2020.

Photograph 6: Northward view of the inlet of Culvert 1. Culvert 1 is a 1200 mm corrugated steel pipe. Photograph taken January 19, 2021.

Photograph 7. Northwestern view across Wetland A during summer conditions. Photograph taken September 4, 2020.

Photograph 8. Westward view across Wetland A during winter conditions. Photograph taken January 19, 2021. The silt deposited in the wetland (shown in the middle of the photo) is due to runoff from the upslope development shown in Photograph 10.

Photograph 9. Northward view of the riparian community east of Wetland A with dense patches of knotweed. Photograph taken September 4, 2020.

Photograph 10. Southward view of the conditions east of Wetland A where a residential development is under construction. Photograph taken January 19, 2021. The silt fences are intended to prevent further sediment from entering the wetland as shown in Photograph 8.

Photograph 11. Westward view of the conditions at the northern portion of South Stream 2. Photograph taken January 19, 2021.

Photograph 12. Southward (upstream) view of the conditions near the central portion of South Stream 2. Photograph taken January 19, 2021.

Photograph 13. Southward (upstream) view of the conditions at the southern portion of South Stream 2. Photograph taken January 19, 2021.

Photograph 14. Northwest view of the riparian area view of the conditions at the southern portion of South Stream 2. Photograph taken January 19, 2021.

Photograph 15. Northward view across Wetland B near the eastern edge showing the weakly channelized portion of the wetland. Photograph taken April 8, 2021.

Photograph 16. Northward view across the western portion of Wetland B where a canopy of pole sapling has established. Photograph taken September 4, 2020.

Photograph 17. Northward view across Wetland C. Photograph taken September 4, 2020.

Photograph 18. Southward view across Wetland C. Photograph taken September 4, 2020.

Photograph 19. Northward view across the western portion of Wetland D during high water levels. Photograph taken December 23, 2020.

Photograph 20: Southward view of the eastern portion of Wetland D. Photograph taken September 4, 2020.

Photograph 21: Northeast view across the northern portion of Wetland D. Photograph taken September 4, 2020.

Photograph 22: South view of the west bank of Wetland D. Note the rill erosion of the fine fill material depositing sediment into the wetland. Photograph taken January 19, 2021.

Photograph 23: Southward view of the southern portion of the North Stream. Photograph taken January 19, 2021.

Photograph 24: Westward view of the northwestern portion of the North Stream. Photograph taken February 17, 2021.

Photograph 25. Westward view of the eastern end of the Wetland Channel showing the backwatering due to Beaver Dam 1 in the background. Photograph taken February 17, 2021.

Photograph 26: Western view of Beaver Dam 1 located 25 m downstream (west) of the upstream end of the Wetland Channel. Photograph taken January 19, 2021.

Photograph 27: Southwestern view of the new vehicle crossing located near the downstream end of the Wetland Channel showing the inlet of Culvert 2. Photograph taken April 8, 2021. Note Culvert 2 has since been removed by neighbouring property owner.

Photograph 28: Eastern view of the central portion of the Wetland Channel. Photograph taken September 4, 2020.

Photograph 29: Eastern view of the western (downstream) portion of the Wetland Channel. Photograph taken January 19, 2021.

Photograph 30: Eastward view of the Wetland Channel at the inlet of Culvert 3. The white line shows the alignment of the Wetland Channel. Photograph taken September 1, 2020.

Photograph 31: Inlet of Culvert 3 at the downstream end of the Wetland Channel. Culvert 3 drains into the northern end of Ditch 1. Photograph taken January 19, 2021.

Photograph 32: Westward view of the eastern portion of the South. Photograph taken January 19, 2021.

Photograph 33: Westward view of the western portion of the South Ditch. Photograph taken January 19, 2021.

Photograph 34: Northward view of the southern portion of Ditch 1. A catch basin (Culvert 5) is located below the white PVC pipe shown in the foreground. Photograph taken January 19, 2021.

Photograph 35: Westward view of the inlet of Culvert 4 located at the northern end of Ditch 1. Culvert 4 conveys drainage west under Scott Road. Photograph taken January 19, 2021.

Photograph 36: Northward view of the northern portion of Ditch 1. Photograph taken January 19, 2021.

Photograph 37: Southward view of the slight depression along the boulevard west of the central property at 10582 Scott Road. Photograph taken January 19, 2021.

Photograph 38: Northward (downstream) view of Ditch 2 adjacent to the property at 10620/10626 Scott Road. Culvert 6 is in the background under the driveway. Photograph taken January 19, 2021.

Photograph 39: Northward view of the inlet of the 300 mm diameter concrete pipe (Culvert 6) at the downstream (north) end of Ditch 2. Photograph taken January 19, 2021.

Photograph 40: Northward view of the southern end of Ditch 3. Photograph is taken from Culvert 6 under the driveway for 10620/10626 Scott Road. The outlet of Culvert 6 is buried. Photograph taken January 19, 2021.

Photograph 41: Southward view of the downstream end of Ditch 3 at Culvert 7 under the driveway for the property to the north of the Site. Photograph taken January 19, 2021.

Photograph 42: Inlet of Culvert 7 at the north (downstream) end of Ditch 3 at the driveway for the property to the north of the Site. Photograph taken January 19, 2021.

Photograph 43: Northward view of the inlet of Culvert 8 at Old Yale Road which conveys the flow from the Off-Site Wetland Channel. Culvert 8 is a 600 mm diameter concrete pipe. Photograph taken April 8, 2021.

Photograph 44: Eastward view across the middle of the Constructed Habitat Pond located north of the Site just north of Wetland D. Photograph taken January 19, 2021.

Photograph 45: Outlet of Culvert 9 which is located at the south (upstream) end of the Constructed Habitat Pond situated along the south side of the Off-Site Wetland. Photograph taken April 8, 2021.

Photograph 46: Inlet of Culvert 10 at the outlet of the Constructed Habitat Pond at the north end of the pond. Culvert 10 is a 600 mm diameter concrete pipe. Photograph taken January 19, 2021.

Photograph 47: Northward view of Beaver Dam 2 which is almost 2 m high and located along the Off-Site Wetland Channel 50 m north of Wetland D and adjacent to the inlet of the Constructed Habitat Pond and Culvert 8. Photograph taken April 8, 2021.

Photograph 48: Southward view from Beaver Dam 2 showing the significant backwatering of the Off-Site Wetland Channel. Photograph taken April 8, 2021.

Photograph 49: Southward view from near Beaver Dam 2 showing the significant backwatering of Wetland D due the dam. Photograph taken April 8, 2021.

Photograph 50: View looking west of the isolated wetted area in the Wetland Channel on September 8, 2021.

Photograph 51: View looking east of the isolated wetted area in the Wetland Channel during dip netting efforts conducted on September 8, 2021.

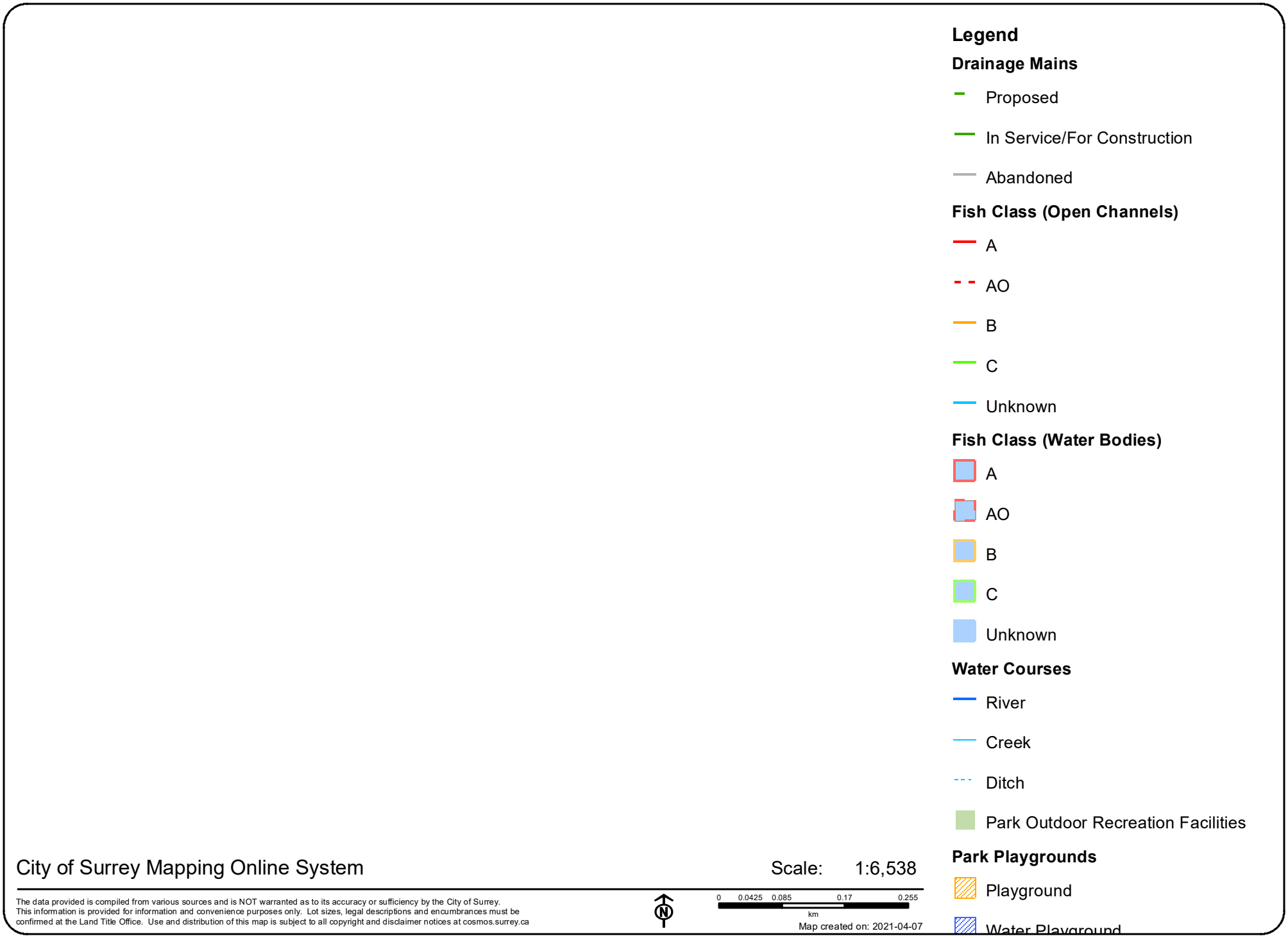
Photograph 52 View looking south of the isolated wetted area northwest of Wetland D on September 8, 2021.

Photograph 53: View looking northwest of the isolated wetted area northwest of Wetland D on September 8, 2021.

APPENDIX E

MUNICIPAL STREAM CLASSIFICATIONS

[redacted] Municipal Fish Classification



APPENDIX F

SITE HYDROLOGY MODEL

December 8, 2021 Ecora File No.: 212795

Stirling Geoscience Ltd.
1506 Sowden St, V7P 1M1
North Vancouver, BC

Attention: **Jamie Stirling, M.Sc., P.Geo.**

Reference: **Scott Road Stormwater Assessment (Rev.0)**

---

1. Introduction

Ecora Engineering & Resource Group Ltd. (Ecora) was requested by Stirling Geoscience Ltd. to undertake a review of stormwater conditions at the project site to evaluate the feasibility of routing water from the proposed development into the wetland. The proposed development is located along the eastern side of Scott Road between 104 Avenue and Old Yale Road. The subject property is identified as 10566, 10582, 10620, and 10626 Scott Road. Further information on the location and scope of the work is discussed below.

2. Hydrologic and Hydraulic Analysis

2.1 General

A hydrologic analysis was completed to support stormwater management concepts for the project site. The proposed development of the project site will result in changes to runoff patterns and will include the infilling of a drainage channel located between properties Rem 2 and Rem B, the location of which are shown in Figure 1. The hydrological analysis and subsequent hydraulic analysis were completed to assess the changes to runoff conditions and provide recommendations on future drainage management. Currently the site drains primarily in two directions, towards the wetland to the immediate east of the proposed development and to the west along the drainage infrastructure along Scott Road. Based on the survey completed for this project, drainage from the channel between Rem 2 and Rem B primarily flows to the southwest with sections of Rem 1 and possibly Rem 2 draining towards the north. A fourth drainage path includes ditches lining the southern side of Rem B which drain into a culvert at 122nd Street.

Figure 1 Location of Features around Proposed Development

Based on design standards issued by the City of Surrey as detailed in their Engineering Department's Design Criteria Manual, drainage works for the subject property would be required to pass the 5-year storm event under free flow conditions. Further, stormwater from the property must be managed to control the 5-year post-development flow to 50% of the 2-year post development rate or control the 5-year post-development flow to 5-year pre-development flow rate. The purpose of this report is to provide clarity on the stormwater interactions with the wetland while the onsite drainage plan is to be undertaken by others.

2.2 Catchment Description

Based on the design drawings dated August 24, 2021, the currently proposed plan will route runoff from the proposed development to flow east into the wetland, where it will flow north towards Old Yale Road. A 600 mm diameter inlet to the storm sewer is located at Old Yale Road approximately 500 m downstream from the proposed development. Based on topographical information including 0.5 m contours available through the City of Surrey's mapping service, and the survey completed for the project, it is estimated that the catchment for the Old Yale Road Inlet extends south up to 104 Ave at its furthest extent, while being bounded to the west by industrial properties along Scott Road and to the east by Khalsa Secondary School. There are two sections of wetland identified, one located directly east of the proposed development and the second being located at the inlet location at Old Yale Road. Figure 2 below shows the estimated catchment area that would drain towards the Old Yale Road inlet once the development is in place if the current configuration is maintained. It is estimated that the catchment area post development is 16.8 ha. Much of the development will be paved or covered by a hard surface, whereas the property is currently unpaved. As a result, increases in runoff rate and quantity are expected.

Figure 2 **Estimated catchment area at Old Yale Road stormwater inlet post-development outlined in red**

2.3 Hydrologic Analysis

In order to help analyze the effects that the development would have on the surrounding area, two approaches were utilized. The first approach was the completion of a rational method analysis that focused on calculating the difference in peak outflows from the catchment between pre and post development scenarios. The second approach involved evaluating a longer duration 5-day storm using a hydrologic model, so as to understand how inflows would affect water levels within the wetlands. The rational method analysis is detailed in Section 1.3.1 and the hydrologic model is detailed in Section 1.3.2.

2.3.1 Rational Method

As stated, peak flows within the catchment were estimated using the rational method as recommended by the City of Surrey for sites with catchments less than 20 ha. Inputs to the rational equation were based on information in the Design Criteria Manual (April 2020). In this case, two scenarios were identified and used for calculations. The two scenarios were based on the pre and post development catchments and focused on water interacting with the wetland. The pre-development catchment that drains to the wetland was estimated to be 11.7 ha while the post-development catchment was estimated to be 16.8 ha. The 5.1 ha difference is a result of areas of the property draining to ditches on the southern end of the project extents or draining directly into the drainage features lining Scott Road. Table 1 below provides inputs and the calculated peak flows for the pre and post development scenarios.

Table 1 5-year Peak Flows from Catchment

Parameter	Pre-development	Post-development
Runoff Coefficient (C)[1]	0.33	0.40
Intensity (mm/hr)[2]	23.4	23.4
Area (ha)	11.7	16.8
Flow, Q (m^3/s)	0.25	0.51
Flow, Q (m^3/s) +20% Increase for Climate Change	0.30	0.62

1. Runoff coefficient represents a mixture of wetland and industrial land uses and was estimated based on the percentage of the catchment covered by each land use. Industrial land uses C = 0.80, Wetland uses C = 0.25 for a 5-year storm.
2. Rainfall intensity is based on the 30 min 5-year extreme rainfall as detailed in Surrey's Design Criteria Manual. The time of concentration used in the analysis is 30 min.

It is noted that as the flow is split through multiple drainage pathways the peak flow may be shared between multiple culverts leaving the project site. Based on the current design the post development scenario would result in at least doubling of peak flows experienced at the culvert at Old Yale Road even without consideration that some of the flow would be expected to be diverted to the western drainage channel in the predevelopment scenario. Based on the above, and the requirements of the engineering criteria manual indicate that a method of attenuating the flow would be required. Recommendations concerning attenuation are detailed in Section 2.

2.3.2 Hydrologic Model

A hydrologic model was developed using the United States Army Corps of Engineers (USACE) hydrological modelling software, HEC-HMS to estimate the effects of the development would have on the surrounding area. Hydrologic inputs were based on local climate data obtained through the Meteorological Service of Canada (MSC) or as detailed in the Design Criteria Manual (2020). The hydrologic model was selected as the model allows for the inclusion of reservoirs within flood routing. In this instance, the wetland to the east of the property is treated as a reservoir that feeds into the smaller wetland at the outlet at Old Yale Road, which is treated as a second reservoir.

Outlet rating curves were developed for the outlets of the wetlands including for the western channel, the outlet of the main wetland at the northern end, and the culvert at Old Yale Road. Note that the capacities are estimates based on topographical information provided from the survey and from available LiDAR data. Capacities of the culverts are based on hydraulic analysis using the U.S. Department of Transportation Federal Highway Administration's culvert modelling software, HY-8, while capacities of the channels were evaluated using the USACE hydraulic modelling software, HEC-RAS. For the outlet along the western channel, it was determined that the channel capacity would be governed by the capacity of a 300 mm driveway culvert along Scott Road. While the City of Surrey's mapping service, Cosmos, indicates that it is possible for flow to go north, no hydraulic connection was identified in the survey. The outflow capacity of the eastern wetland was determined based on the survey using HEC-RAS in which the hydraulics of the channel were modelled. The channel hydraulics was based on the assumption that the beaver dam currently restricting flow to the north is removed. The inlet at Old Yale Road was modelled using HY-8 and treated as a culvert. The capacity of storm water inlets needs to be confirmed by a wider stormwater model to fully account for backwatering from other areas of the system.

Storage rating curves for the wetland to the east of the property and for the wetland at the inlet of Old Yale Road were developed based on the available topographical data including survey and LiDAR. Based on topographical information, it is estimated that the eastern wetland has an approximate surface area of 34,700 m^2 while the wetland at Old Yale Road has a surface area of 9,200 m^2. In the case of the Old Yale Road wetland, much of the area is shown to be above a bordering property including Old Yale Road which has a minimum elevation of approximately 1.5 m according to available LiDAR data. Based on typical freeboard requirements, the maximum elevation in the wetlands before properties are inundated is 2.4 m for the eastern wetland and 1.2 m for the Old Yale Road wetland.

Removing any hydraulic connections to the western drainage channels along Scott Road would cause an increase in peak flows towards Old Yale Road. Several properties at Old Yale Road are located at low elevations and could be inundated at lower return period events, even without the additional runoff.

For the hydrologic model, 5-year and 100-year storms were analysed. While the 5-year event is the applicable design return period, the 100-year event was analysed to assess the increase in major drainage system flows that would be expected as a result of the development. The rainfall distribution utilized was from the Design Criteria Manual. While the distribution was only provided for the 10-year event, it was scaled to be appropriate for the 5-year and 100-year events. Climate change was factored into the design by using rainfall values that were adjusted for future climate scenarios by using Western University's IDF_CC Tool 5.0. Rainfall magnitudes used are detailed below in Table 2.

Table 2 Rainfall Totals

Return Period	24-hour Rainfall (mm)	5-Day Rainfall (mm)[1]	24-hour Rainfall Adjusted for Climate Change (mm)	5-Day Rainfall Adjusted for Climate Change (mm)[1]
5-year	86.1	158.1	90.0	254.3
100-year	138.5	165.3	177.2	325.3

1 Rainfall totals are based on the scaled 10-year distribution provided in the Surrey Engineering Design Manual

3. Result of Flood Routing

Results of the hydrologic model are summarized in Tables 3 and 4 below. Table 3 provides the results of the routing through the eastern wetland pre- and post-development while Table 4 provides the results of the routing through the Old Yale Road wetland pre- and post-development and includes a third scenario incorporating a proposed drainage upgrade at Old Yale Road as detailed in Surrey's web mapper.

Table 3 5-day Duration Event Results at East Wetland

Scenario	Return Period	Initial Wetland Level (m)	Peak Wetland Level (m)	Peak Inflow (m^3/s)	Peak Outflow (m^3/s)
Pre-development	5-year	0.820	1.34	0.308	0.303
	5-year +CC	0.820	1.35	0.324	0.319
	100-year	0.820	1.45	0.516	0.509
	100-year +CC	0.820	1.52	0.668	0.656
Post-development	5-year	0.820	1.44	0.457	0.448
	5-year +CC	0.820	1.46	0.479	0.471
	100-year	0.820	1.59	0.755	0.739
	100-year +CC	0.820	1.68	0.973	0.954

Table 4 5-day Duration Event Results at Old Yale Road Wetland

Scenario	Return Period	Initial Wetland Level (m)	Peak Wetland Level (m)	Peak Inflow (m^3/s)	Peak Outflow (m^3/s)
Pre-development	5-year	-0.120	0.41	0.287	0.285
	5-year +CC	-0.120	0.43	0.300	0.297
	100-year	-0.120	0.61	0.456	0.450
	100-year +CC	-0.120	0.81	0.581	0.569
Post-development – No upgrades	5-year	-0.120	0.60	0.448	0.443
	5-year +CC	-0.120	0.64	0.471	0.461
	100-year	-0.120	1.03	0.739	0.710

Scenario	Return Period	Initial Wetland Level (m)	Peak Wetland Level (m)	Peak Inflow (m^3/s)	Peak Outflow (m^3/s)
	100-year +CC	-0.120	1.20	0.954	0.804
Post development – New 600 mm pipe	5-year	-0.120	0.57	0.448	0.446
	5-year +CC	-0.120	0.59	0.471	0.468
	100-year	-0.120	0.84	0.739	0.734
	100-year +CC	-0.120	0.98	0.954	0.947
Post Development – Upgraded Inlet (1000 mm pipe)	5-year	-0.120	0.45	0.448	0.446
	5-year +CC	-0.120	0.47	0.471	0.469
	100-year	-0.120	0.74	0.739	0.735
	100-year +CC	-0.120	0.95	0.954	0.952

Based on the above, peak wetland water levels are expected to increase by approximately 10 cm in the eastern wetland and by approximately 19 cm at Old Yale Road assuming there are no upgrades made. The proposed 600 mm inlet at Old Yale Road has a proposed inlet elevation of 0.50 m and would not have a major impact on the routing of low return period events, but would help with routing of high return period events assuming that the system downstream has sufficient hydraulic capacity. An upgrade of the current stormwater inlet at Old Yale Road would result in a elevation of 0.47 m which is 4 cm above pre-development conditions. The differences in inflow volumes to the Old Yale Road wetland as a result of some 5-day inflow events are provided below.

Table 5 Total Inflow Volume During 5-day Rainfall Event

Return Period	Pre-development Inflow Volume (m^3)	Post Development Inflow Volume (m^3)
5-year	13,400	20,600
5-year +CC	14,200	21,800
100-year	24,200	36,400
100-year +CC	32,300	48,100

Based on the results summarized in Table 5, the difference in inflow volume directed towards the wetland is between 7,200 m^3 during the 5-year event without modification for climate change and 15,800 m^3 for the 100-year event when modified for climate change. It is estimated that approximately 30% of the development site drains directly towards the wetland in the current pre-development condition and that 70% of the area either currently drains towards drainage infrastructure along Scott Road or to the drainage infrastructure at the southern end of the property flowing into infrastructure at 122nd Street.

4. Recommendations

Based on the above analysis, the wetland can accommodate the increased design flow without negatively impacting the surrounding properties, however there would still be an increase in flood risk for the properties at Scott Road and for this reason diverting all flows in that direction is not recommended. The amount of water required to be stored in the wetland would be increased and this would increase the occurrence of flooding of properties downstream, including Old Yale Road itself. It is recommended that measures be implemented to help control runoff so as to replicate pre-development conditions as much as possible. However, controlling runoff is likely to be a significant challenge within this area as there is minimal grade within existing drainage infrastructure and much of the infrastructure is below sea level.

Multiple options could be explored to help control runoff from the project site and could include one or a combination of the following:

- Supplement outflow capacity from the wetland with drainage channels to the west or to the south. Under current conditions, up to 70% of the current runoff flows towards Scott Road and 122nd Street with the remaining 30% flowing into the east wetland. It is recommended that

alternative drainage paths be maintained to reduce load on the Old Yale Road inlet. Currently it is estimated that 56% of the runoff from the property is directed to Scott Road, of which 24% flows to the north within the storm system while the other 32% flows to the south. The remaining 14% is directed to 122nd street.

- Retain excess water in the wetland or in detention facilities with the purpose of regulating releases into the downstream wetlands. Flows larger than design values would cause higher than expected flows in the downstream area. If using the wetland as storage, it is likely that a control structure would be needed at the outlet to regulate flows. Any constructed outlet in the wetland could be subject to additional regulation through the BC Water Sustainability Act.
- Upgrade the inlet at Old Yale Road to accommodate increased flows into the storm system. While an additional 600 mm pipe is currently proposed, to get water levels to be consistent with pre-development conditions further upgrades would be required. Based on current estimates, using an inlet with a diameter of 1000 mm would result in a water elevation of 0.47 m during the 5-year storm with climate change scenario, which represents an increase of 7 cm above the predevelopment condition.

5. Limitations of Report

This report and its contents are intended for the sole use of Stirling Geoscience Ltd., their agents and the applicable regulatory authorities. Ecora Engineering & Resource Group Ltd. (Ecora) does not accept any responsibility for the accuracy of any data, analyses, or recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Stirling Geoscience Ltd.`, their agents, the applicable regulatory authorities or for any Project other than that described in this report. Any such unauthorized use of this report is at the sole risk of the user.

Where Ecora submits both electronic file and hard copy versions of reports, drawings and other project-related documents, only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by Ecora shall be deemed to be the original for the Project. Both electronic file and hard copy versions of Ecora's deliverables shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Ecora.

Ecora's General Conditions are provided in Appendix A of this report.

6. Closure

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Sincerely

Ecora Engineering & Resource Group Ltd.

Prepared by:

Andrew Gain, E.I.T.
Junior Hydrotechnical Engineer
Andrew.Gain@ecora.ca

Reviewed by:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
Dr. A. G. CHANTLER
10592

2021 Dec 8

Adrian G. Chantler, Ph.D., P.Eng.
Senior Hydrotechnical Consultant
Adrian.Chantler@ecora.ca

Approved by:

ECORA ENGINEERING & RESOURCE GROUP LTD.
ENGINEERS AND GEOSCIENTISTS OF BRITISH COLUMBIA
PERMIT TO PRACTICE # 1001040

RESPONSIBLE REGISTRANT

2021-12-08
DATE

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Hydrotechnical Engineer
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Version Control and Revision History

Version	Date	Prepared By	Reviewed By	Approved By	Notes/Revisions
0	2021-12-08	AG	AGC	BVV	ISSUED FOR USE

Attachments: Appendix A General Conditions

Appendix A

Statement of General Conditions

Statement of General Conditions — Geotechnical

Standard of Care

Ecora Engineering and Resource Group Ltd. (Ecora) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report

This report and the recommendations contained in it are intended for the sole use of Ecora's Client. Ecora does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than Ecora's Client unless otherwise authorized in writing by Ecora. Any unauthorized use of the report is at the sole risk of the user. In order to properly understand the suggestions, recommendations and opinions expressed herein, reference must be made to the whole of the report. We cannot be responsible for use by any party of portions of the report without reference to the whole report.

Alternate Report Format

Where Ecora submits both electronic file and hard copy versions of reports, drawings and other project-related documents, only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by Ecora shall be deemed to be the original for the Project. Both electronic file and hard copy versions of Ecora's deliverables shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Ecora.

Soil, Rock and Groundwater Conditions

Classification and identification of soils, rocks and geological units have been based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Ecora does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities such as traffic, excavation, groundwater level lowering, pile driving, blasting on the site or on adjacent sites. Excavation may expose the soils to climatic elements such as freeze/thaw and wet /dry cycles and/or mechanical disturbance which can cause severe deterioration. Unless otherwise indicated the soil must be protected from these changes during construction.

Environmental and Regulatory Issues

The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Sample Disposal

Ecora will dispose all soil and rock samples for 30 days following issue of this report. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

Construction Services

During construction, Ecora should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Ecora's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Ecora's report. Adequate field review, observation and testing during construction are necessary for Ecora to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Ecora's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Job Site Safety

Ecora is responsible only for the activities of our employees on the jobsite. The presence of Ecora's personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that Ecora never occupy a position of control of the site. The Client undertakes to inform Ecora of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general.

Changed Conditions and Drainage

Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Ecora be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Ecora be employed to visit the site with sufficient frequency to detect if conditions have changed significantly. Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Ecora takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

Services of Sub consultants and Contractors

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. Ecora may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend Ecora from and against all claims arising through such hiring's to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

APPENDIX G

CIVIL DESIGN DRAWINGS

A. CITY GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION AND ACCOUNTABILITY THE DEVELOPER MUST ADVISE THE SURREY CITY INSPECTOR, IN WRITING, WHICH OF THE CITY NOTES IS GOING TO BE THE RESPONSIBILITY OF THE DEVELOPER'S CONTRACTOR.

2. CONSTRUCTION IS TO BE IN ACCORDANCE WITH THE CITY OF SURREY HIGHWAY AND TRAFFIC BYLAW NO. 13007, SUBDIVISION BYLAW NO. 8830 AND THE APPLICABLE MUNICIPAL MASTER SPECIFICATIONS AND STANDARD DETAIL DRAWINGS, CITY OF SURREY STANDARD CONSTRUCTION DOCUMENTS, SUPPLEMENTARY SPECIFICATIONS & STANDARD DRAWINGS AND CITY DESIGN CRITERIA.

3. TRAFFIC CONTROL IS THE RESPONSIBILITY OF THE DEVELOPER AND THE DEVELOPER SHALL COMPLY WITH SECTION 52 OF THE INDUSTRIAL HEALTH AND SAFETY REGULATIONS OF THE WORKERS' COMPENSATION BOARD OF B.C. AND THE INSTRUCTIONS OUTLINED ON THE CITY ROAD AND RIGHT-OF-WAY PERMIT AND TRAFFIC OBSTRUCTION PERMIT ISSUED BY THE CITY.

   THE DEVELOPER IS TO HAVE, ON SITE, A COPY OF THE CURRENT "B.C. TRAFFIC CONTROL MANUAL FOR WORK ON ROADWAYS" AS PUBLISHED BY THE MINISTRY OF TRANSPORTATION AND HIGHWAYS.

4. THE DEVELOPER SHALL BE RESPONSIBLE FOR OBTAINING ALL CITY PERMITS FOR WORK WITHIN THE CITY ROAD ALLOWANCE.

5. WHERE UTILITY OR SERVICE CROSSINGS ARE REQUIRED ACROSS EXISTING PAVEMENTS, AN UNDERGROUND METHOD OF INSTALLATION IS REQUIRED UNLESS SPECIAL APPROVAL IS GIVEN FROM THE CITY FOR AN OPEN CUT OPERATION. ALL EXISTING PAVEMENTS, BOULEVARDS, DRIVEWAYS, ETC., ARE TO BE REINSTATED TO ORIGINAL OR BETTER CONDITION AND IN ACCORDANCE WITH CITY SPECIFICATIONS AND THE PAVEMENT CUT POLICY.

6. SURREY'S ISA MONUMENT(S) ARE TO BE PROTECTED AND SHOULD THEY REQUIRE RAISING OR RELOCATING, THE DEVELOPER WILL NOTIFY SURREY'S SURVEY DEPARTMENT AT (604)591-4253 FORTY-EIGHT (48) HOURS IN ADVANCE OF SCHEDULING WORK AFFECTING THEM. AN ISA MONUMENT SHALL BE CONSIDERED TO BE DISTURBED OR DESTROYED, BY THE DEVELOPER, IF THE CONSTRUCTION FOR THE PROJECT:
   (1) LOWERS THE GRADE OF THE ROAD AT THE LOCATION OF AN ISA MONUMENT(S),
   (2) RAISES THE GRADE OF THE ROAD AT THE LOCATION OF AN ISA MONUMENT(S) OR
   (3) INSTALLS ANY UNDERGROUND UTILITIES (INCLUDING BC GAS, BC HYDRO, BC TELEPHONE, GVRD WATER/SANITARY SEWER/OR DRAINAGE ETC.) WITHIN 1.500 METRE RADIUS OF THE ISA MONUMENT(S).

   THE CITY WILL INVOICE THE DEVELOPER A NON REFUNDABLE FLAT RATE FEE OF
   -$1,750.00 FOR EACH ISA MONUMENT DISTURBED OR DESTROYED
   -$3,150 FOR EACH HIGH PRECISION SECONDARY BENCHMARK DISTURBED OR DESTROYED
   -$7,250 FOR EACH HIGH PRECISION NETWORK BENCHMARK DISTURBED OR DESTROYED

7. ALL STREET, TRAFFIC, AND ADVISORY SIGNS, PAVEMENT MARKINGS AND NO-POST GUARDRAILS REQUIRED BUT NOT NECESSARILY SHOWN ON THE DRAWINGS, SHALL BE INSTALLED BY THE CITY AT THE DEVELOPER'S COST.

8. WHERE INFILLING OF EXISTING DITCHES IS REQUIRED OR WHERE SERVICES ARE CONSTRUCTED IN A FILL SECTION, FILL MATERIAL IS TO BE IN ACCORDANCE WITH CITY SPECIFICATIONS AND IS TO BE COMPACTED TO 95 % OF MODIFIED PROCTOR DENSITY.

9. DRIVEWAY BOULEVARD CROSSINGS TO EACH OF THE PROPOSED LOTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE CITY STANDARD DRAWINGS.

10. RESIDENTS DIRECTLY AFFECTED BY CONSTRUCTION OF THIS PROJECT MUST BE GIVEN 48 HOURS WRITTEN NOTICE OF THE PROPOSED START OF CONSTRUCTION.

    THE DEVELOPER WILL REQUIRE WRITTEN AUTHORIZATION FROM A PRIVATE PROPERTY OWNER, WITH A COPY TO THE CITY, PRIOR TO ANY ENTRY ONTO PRIVATE PROPERTY AND A WRITTEN RELEASE, FROM THE PROPERTY OWNER, WHEN COMPLETED.

11. WHEN NATIVE SITE GRANULAR BACKFILL IS PROPOSED FOR USE IN TRENCHES THE DEVELOPER SHALL EMPLOY A PROFESSIONAL ENGINEER WITH EXPERIENCE IN GEOTECHNICAL ENGINEERING FOR PERFORMANCE OF IN PLACE DENSITY AND SIEVE TESTING. SELECTION OF THE PROFESSIONAL ENGINEER AND USE OF THE SITE MATERIAL IS TO BE APPROVED BY THE CITY. THE SITE MATERIAL MUST FALL WITHIN ONE OF THE GRANULAR BACKFILL MATERIAL SPECIFICATIONS. RIVER SAND IS NOT ACCEPTABLE AS TRENCH BACKFILL MATERIAL.

12. THE DEVELOPER SHALL FACILITATE AND SUPPLY ALL NECESSARY SAFETY EQUIPMENT REQUIRED UNDER THE WCB REGULATIONS FOR THE CITY OR ITS REPRESENTATIVES OR THE ENGINEER OF RECORD TO INSPECT THE SANITARY SEWER AND STORM SEWER SYSTEMS. THE EQUIPMENT SHALL BE SUPPLIED UNTIL SUCH TIME AS A CERTIFICATE OF COMPLETION IS ISSUED BY THE CITY.

13. DEVELOPER IS TO VERIFY THE LOCATION AND ELEVATION OF ALL PIPES, OR OTHER UTILITY CROSSINGS, PRIOR TO CONSTRUCTION AND SHALL NOTIFY THE ENGINEER OF RECORD OF ANY CONFLICTS.

14. THE DEVELOPER SHALL EMPLOY A PROFESSIONAL ENGINEER TO DESIGN A SEDIMENT AND EROSION CONTROL SYSTEM IN THE DEVELOPMENT IN ORDER TO PREVENT SILT DISCHARGES TO THE STORM DRAINAGE SYSTEM AND WATERCOURSES.

15. THE "TREE CUTTING AND PRESERVATION BYLAW NO. 12880" REQUIRES THAT A CUTTING PERMIT BE OBTAINED BEFORE ANY TREES ARE REMOVED FROM THE SITE. OTHER PROVISIONS OF THE BYLAW MAY ALSO BE APPLICABLE.

B. CITY ROADWORK NOTES

1. THE DEVELOPER SHALL EMPLOY A PROFESSIONAL ENGINEER WITH EXPERIENCE IN GEOTECHNICAL ENGINEERING FOR PERFORMANCE OF IN PLACE TESTING DURING THE PREPARATION OF THE SUB-GRADE AND CONSTRUCTION OF THE ROAD STRUCTURE TO VERIFY THE ADEQUACY OF THE PROPOSED AND EXISTING ROAD STRUCTURE AND SUB-GRADE. SELECTION OF THE PROFESSIONAL ENGINEER IS TO BE APPROVED BY THE CITY.

2. EXISTING VALVE BOXES, MANHOLES, ETC. WITHIN THE ROAD ALLOWANCE MUST BE ADJUSTED TO SUIT THE PROPOSED FINISHED GRADE.

3. ALL LOOSE, ORGANIC, OTHERWISE DELETERIOUS MATERIALS OR SOFT SPOT(S) ARE TO BE EXCAVATED AND REMOVED FROM THE ROADWAY AND UTILITY TRENCHES IN THE ROADWAY AS PER THE GEOTECHNICAL CONSULTANT'S REPORT OR AS DIRECTED BY THE CITY.

C. CITY SANITARY SEWER AND STORM SEWER NOTES

1. UNLESS PRIOR APPROVAL IS GIVEN TO THE DEVELOPER BY THE CITY, TIE-INS AND CONNECTIONS TO EXISTING SANITARY SEWERS ARE TO BE PERFORMED BY THE CITY AT THE DEVELOPER'S COST.

2. ALL SERVICE CONNECTIONS SHALL BE MADE TO THE MAIN WHEREVER POSSIBLE. SHOULD A CONNECTION HAVE TO BE MADE TO A MANHOLE, THE CONNECTION INVERT SHALL BE AT THE SAME ELEVATION AS THE CROWN OF THE HIGHEST SEWER MAIN.

3. ALL MANHOLES ARE TO BE A MINIMUM OF 1050 MM DIAMETER UNLESS OTHERWISE NOTED.

4. ALL SANITARY SEWER AND STORM SEWER SERVICE CONNECTIONS ARE TO BE A MINIMUM 100 MM DIAMETER.

5. ALL GRANULAR PIPE BEDDING SHALL BE EITHER TYPE 1 OR TYPE 2 ONLY AS PER THE CITY SPECIFICATIONS.

D. CITY WATER WORKS NOTES

1. THE DEVELOPER SHALL SUPPLY ALL MATERIALS AND FITTINGS REQUIRED FOR THE TIE-IN OF THE NEW WATER MAINS BY THE CITY.

2. ALL NEW WATER MAINS, AT TIE-IN POINTS, ARE TO BE CAPPED 1.5 M FROM THE EXISTING WATER MAIN. THE PROPOSED WATER MAIN IS TO BE SET AT THE LINE AND GRADE TO MEET THE EXISTING WATER MAIN.

3. TIE-INS TO EXISTING WATER MAINS AND FINAL TESTING AND CHLORINATION OF NEW MAINS IS TO BE PERFORMED BY THE CITY AT THE DEVELOPER'S COST.

4. ALL DOMESTIC SERVICE CONNECTIONS WILL BE A MINIMUM OF 19 MM DIAMETER UNLESS OTHERWISE SPECIFIED.

5. WHERE 100 MM DIAMETER PIPE IS USED IT WILL BE DUCTILE IRON (D.I.) AND SHALL CONFORM TO THE CITY SPECIFICATIONS.

6. NO MCAVITY FITTINGS OR VALVES ETC. ARE TO BE USED.

7. NO CAST IRON VALVES ON FITTINGS.

A. CONSULTANT'S SUPPLEMENTARY GENERAL NOTES:

1. FIGURED DIMENSIONS SHALL GOVERN OVER SCALED DIMENSIONS.
2. ALL DIMENSIONS AND ELEVATIONS ARE METRIC.
3. THE CONTRACTOR SHALL REFERENCE THE ARCHITECTURAL DRAWINGS FOR THE SITE TO CONFIRM BUILDING AND CURB ALIGNMENTS/LAYOUT .
4. THE LOCATION OF EXISTING UNDERGROUND SERVICES IS NOT GUARANTEED, AND HAS BEEN COMPILED FROM A COMBINATION OF 'AS-CONSTRUCTED' DRAWINGS AND GROUND SURVEYS. THE CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND SERVICES BY HAND EXCAVATION OR HYDRO-VACUUM EXCAVATION TO CONFIRM THEIR LINE AND GRADE PRIOR TO COMMENCEMENT OF SITE SERVICING. ANY AND ALL DISCREPANCIES SHALL BE COMMUNICATED TO KM CIVIL CONSULTANTS LTD. IMMEDIATELY.
5. SHOP DRAWINGS, IF REQUIRED, SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW AND COMMENT PRIOR TO ORDERING MATERIALS. COMMENTS PROVIDED BY THE CONSULTANT REFER TO GENERAL ARRANGEMENT OF SHOP DRAWING COMPONENTS (DIMENSIONS AND ELEVATIONS) ONLY AND DO NOT CONSTITUTE A DETAILED DESIGN REVIEW OF INDIVIDUAL COMPONENT DETAILS, WHICH IS THE RESPONSIBILITY OF THE MANUFACTURER.
6. THE CONTRACTOR SHALL ENSURE THAT THEY ARE WORKING FROM A CERTIFIED COPY OF THE 'ISSUED FOR CONSTRUCTION' DRAWINGS PRIOR TO COMMENCING CONSTRUCTION. ANY DRAWINGS NOT BEARING THE 'ISSUED FOR CONSTRUCTION' REVISION NOTE SHALL NOT BE USED FOR CONSTRUCTION.

B. CONSULTANT'S SUPPLEMENTARY ROADWORKS NOTES:

1. THE CONTRACTOR SHALL COORDINATE ALL COMPACTION/DENSITY TESTING WITH THE DEVELOPER'S GEOTECHNICAL ENGINEER DURING PREPARATION OF ROAD SUBGRADE, AND PLACEMENT OF SUB BASE FILLS AND PAVEMENT STRUCTURE GRAVELS.
2. ALL CHANGES IN GRADE SHALL BE FORMED USING SMOOTH VERTICAL CURVES.
3. COMPACTED ROAD SUB BASE AND BASE MATERIALS SHALL EXTEND A MINIMUM OF 0.30m BEYOND THE SIDEWALK AND/OR CURB AND GUTTER.
4. CONDITIONS FOR PLACEMENT OF ASPHALT OR PORTLAND CEMENT CONCRETE SHALL CONFORM TO THE SPECIFICATIONS DETAILED UNDER THE MMCD SPECIFICATIONS AND THE CITY SUPPLEMENTARY SPECIFICATIONS.

C. CONSULTANT'S SUPPLEMENTARY SANITARY AND STORM SEWER NOTES:

1. ALL ON-SITE PIPEWORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE BC BUILDING CODE, PART 7, PLUMBING SERVICES.
2. ALL STORM MAIN PIPE SHALL BE PVC DR35 (150mm TO 250mm DIAMETER) OR PVC RIBBED (300mm DIAMETER AND GREATER). WHERE STORM MAINS ARE TO BE INSTALLED UNDER BUILDINGS, ALL PIPE SHALL BE PVC DWV.
3. ALL SANITARY MAIN PIPE SHALL BE PVC DR28 (150mm DIAMETER) OR PVC DR35 (200mm DIAMETER AND GREATER). WHERE SANITARY MAINS ARE TO BE INSTALLED UNDER BUILDINGS, ALL PIPE SHALL BE PVC DWV.
4. ALL STORM SEWER PIPES WITH LESS THAN 1.0m COVER TO BE CONCRETE ENCASED OR DWV PIPE IN ACCORDANCE WITH BRITISH COLUMBIA BUILDING CODE, 2006, PLUMBING SERVICES (PART 7).
5. STORM AND SANITARY SERVICE CONNECTIONS SHALL BE INSTALLED TO WITHIN 1.0m OF BUILDING FOUNDATIONS. THE CONTRACTOR SHALL COORDINATE WITH THE BUILDING PLUMBING CONTRACTOR TO ENSURE THAT SERVICE CONNECTIONS ARE INSTALLED AT A LINE AND GRADE THAT WILL FACILITATE CONNECTION TO THE BUILDING DRAINAGE/SANITARY SYSTEM.
6. ALL CLEANOUTS INSTALLED WITHIN THE TRAVELLED PORTION OF THE ROADWAY SHALL BE COMPLETE WITH LIDS CAPABLE OF SUPPORTING H20 TRAFFIC LOADING.

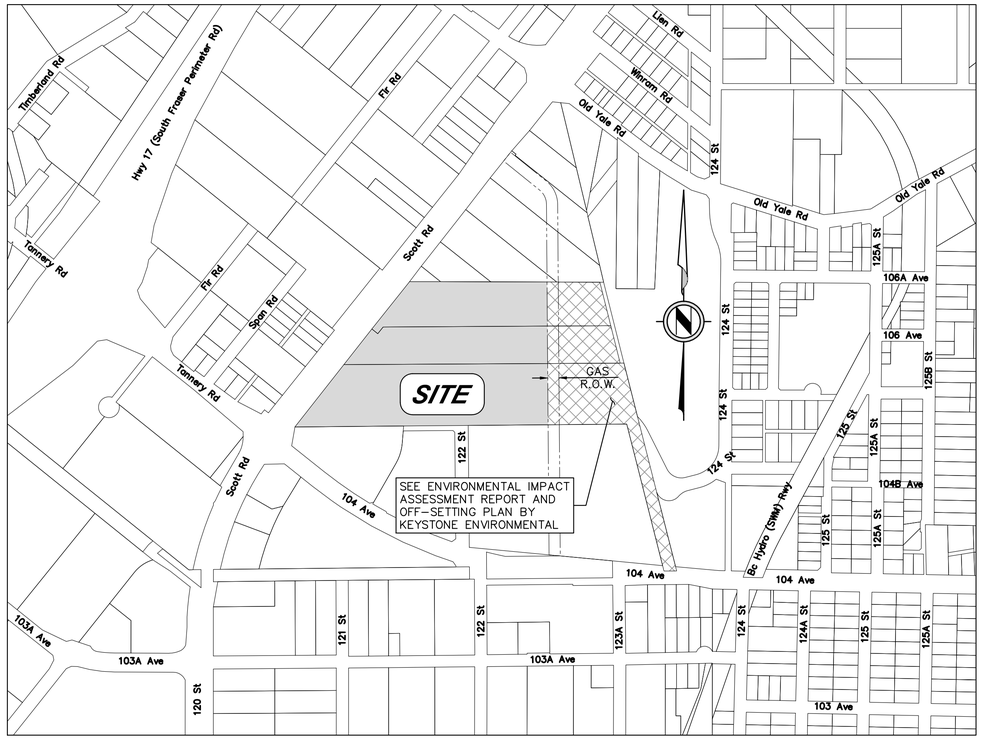
D. CONSULTANT'S SUPPLEMENTARY WATERWORKS NOTES:

1. ALL WATERMAINS SHALL BE INSTALLED WITH MINIMUM 1.2m COVER FROM TOP OF PIPE TO FINISHED GRADE, UNLESS OTHERWISE NOTED. FOR INSTALLATIONS WITH LESS THAN 1.2m COVER, A CONCRETE PIPE CAP, PER MMCD STD G7 - ALTERNATIVE 2 SHALL BE UTILIZED.
2. ALL WATERMAIN SHALL BE PVC C-900 OR DUCTILE IRON PC350, UNLESS OTHERWISE NOTED.
3. WATERMAIN SERVICE CONNECTIONS SHALL BE INSTALLED TO WITHIN 1.0m OF BUILDING FOUNDATIONS. THE CONTRACTOR SHALL COORDINATE WITH THE BUILDING PLUMBING CONTRACTOR TO ENSURE THAT SERVICE CONNECTIONS ARE INSTALLED AT A LINE AND GRADE THAT WILL FACILITATE CONNECTION TO THE BUILDING WATER SYSTEM.
4. ON-SITE DOMESTIC AND FIRE WATER SYSTEM PRESSURE, DISINFECTION, AND BACTERIOLOGICAL TESTING SHALL BE PERFORMED BY A CERTIFIED TESTING FIRM, RETAINED BY THE CONTRACTOR AT THE CONTRACTOR'S COST, UNDER WITNESS BY THE CONSULTANT. WATERMAIN TEST RESULTS SHALL BE FORWARDED TO THE CONSULTANT IMMEDIATELY UPON RECEIPT FOR REVIEW AND DISTRIBUTION TO THE CITY.
5. PRESSURE TESTING OF BOTH DOMESTIC AND FIRE WATER SYSTEMS SHALL BE CONDUCTED IN ACCORDANCE WITH AWWA C600 STANDARDS. DISINFECTION AND BACTERIOLOGICAL TESTING OF BOTH DOMESTIC AND FIRE WATER SYSTEMS SHALL BE CONDUCTED IN ACCORDANCE WITH AWWA C651 STANDARDS.
6. TIE-IN OF ON-SITE WATER SYSTEM TO MUNICIPAL SYSTEM TO BE COMPLETED BY THE CITY.

DRAWING INDEX

LEGEND

PROPOSED	EXISTING	DESCRIPTION
	⊗	BENCH MARK – GEODETIC DATUM
		EDGE OF GRAVEL
		EDGE OF PAVEMENT
		CURB AND GUTTER
S	S	SANITARY SEWER
FM	FM	SANITARY FORCE MAIN
		SANITARY SEWER SERVICE (c/w INSPECTION CHAMBER)
D	D	STORM SEWER
		STORM SEWER SERVICE (c/w INSPECTION CHAMBER)
		CATCH BASIN – TOP INLET
		CATCH BASIN – SIDE INLET
	⊘	LAWN DRAIN
		SWALE
		DITCH
		SIDEWALK (ASPHALT)
		SIDEWALK (CONCRETE)
W	W	WATERMAIN
		WATER SERVICE CONNECTION
W	W	WATER VALVE
W	W	AIR VALVE
W	W	HYDRANT AND VALVE ASSEMBLY
W	W	CAPPED END
W	W	BLOW–OFF
W	W	TEMPORARY BLOW–OFF
		JUNCTION BOX
E/T	E/T	UNDERGROUND HYDRO/TELEPHONE
G	G	GAS MAIN
		UTILITY POLE
		UTILITY POLE WITH LIGHT
		STREET LIGHT



LOCATION PLAN
SCALE 1:5000

LEGAL DESCRIPTION: LOTS 1 AND 2, EXCEPT: PART ON SRW PLAN LMP20327, SECTION 19, BLOCK 5, NORTH RANGE 2 WEST, NEW WESTMINSTER DISTRICT PLAN 14280 AND PARCEL 'B' (REF. PLAN 4663) FRACTIONAL SECTION 19 EXCEPT: FIRSTLY: PART 208.2 SQUARE METRES (0%LMP PLAN 58239), SECONDLY: PART ON SRW PLAN LMP20327, NEW WESTMINSTER DISTRICT

SURVEY BENCHMARK:ELEVATIONS DERIVED FROM CITY OF SURREY MONUMENT 10H2587 LOCATED AT THE INTERSECTION OF LOD YALE ROAD AND SCOTT ROAD EL.=2.269m (CVD28GVRD2018)

REV.	DATE	DESCRIPTION	BY
5			
4			
3			
2	2021.11.30	ISSUED FOR PER	SIM
1	2021.11.17	ISSUED FOR REVIEW	SIM

"BY SEALING AND SIGNING THIS DRAWING, I CERTIFY THAT THE INFORMATION CONTAINED IN THESE DRAWINGS ACCURATELY REFLECTS THE ORIGINAL DESIGN, ADDENDA, CHANGE ORDERS AND MATERIAL DESIGN CHANGES MADE DURING CONSTRUCTION AND FIELD REVIEWED BY ME, OR MY REPRESENTATIVE, AND THAT THE AS–CONSTRUCTED WORKS SUBSTANTIALLY COMPLY WITH THE ORIGINAL DESIGN INTENT, HOWEVER, I DO NOT ACCEPT RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE AS–CONSTRUCTED INFORMATION SUPPLIED BY OTHERS CONTAINED IN THESE DRAWINGS."

CONSULTANT
KM Civil CONSULTANTS LTD.
ABBOTSFORD OFFICE
110 - 34077 Gladys Avenue
Abbotsford, BC V2S 2E8
Tel: 604-853-8831 Fax: 604-853-1580
VANCOUVER OFFICE
110 - 2920 Virtual Way
Vancouver, BC V5M 0C4
Tel: 604-294-6662 Fax: 604-294-6665

CLIENT **WALES McLELLAND CONSTRUCTION**
6211 FRASERWOOD PLACE, RICHMOND, B.C., V6W 1J2
ATTENTION: JULIA VIGINI TEL:(604)638–1212

TITLE **LOCATION PLAN AND GENERAL NOTES**
10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. J. McGREGOR # 22591
2021-11-30

SCALE: HOR. AS SHOWN VERT.
DESIGNED
DRAWN NWP
REVIEWED SIM

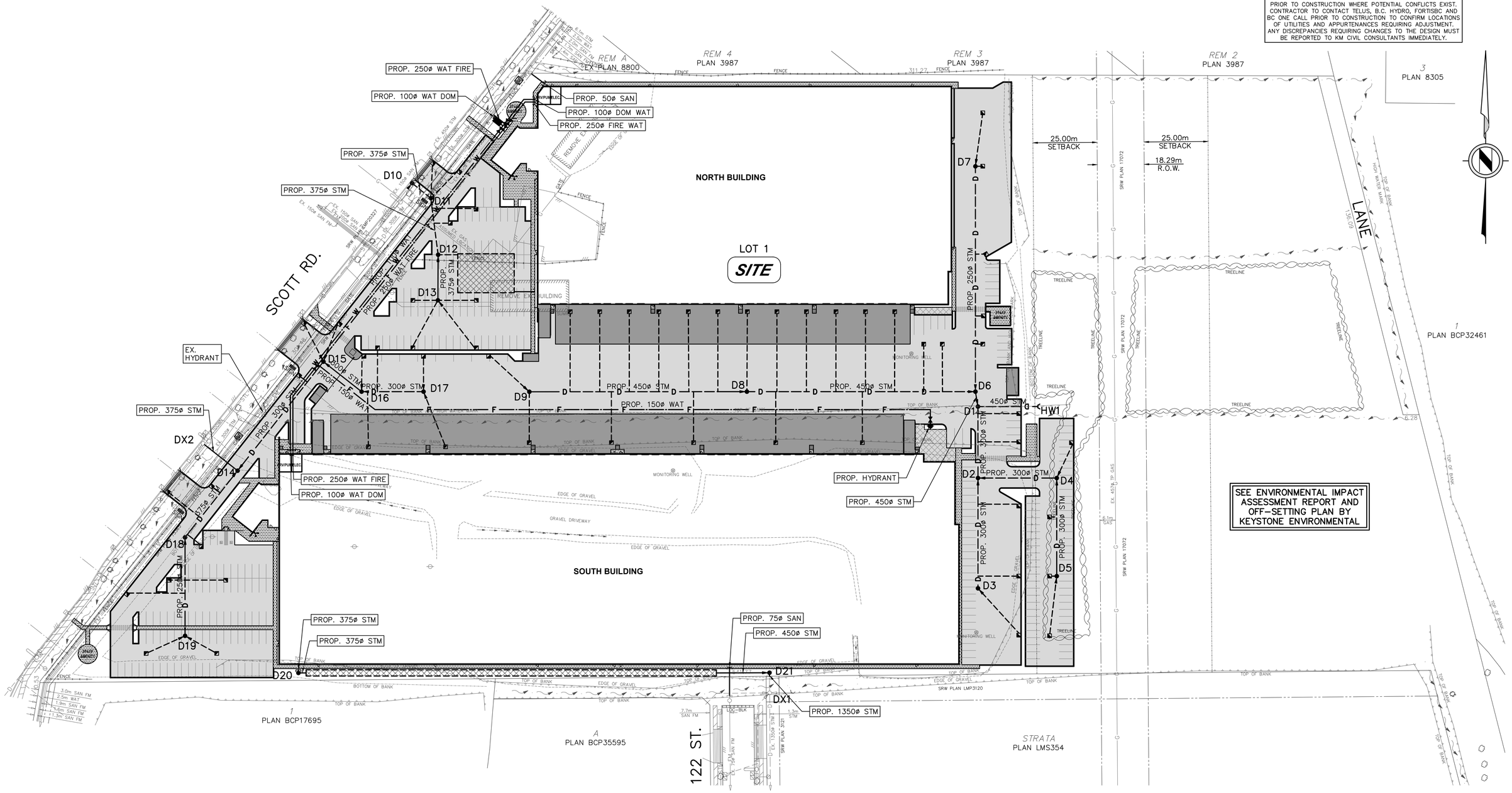
DATE (YYYY.MM.DD) AUGUST, 2021
CONSULTANT PROJ. NO. 210574–C
DWG. NO. 1 OF 9
REV. 2

MUNICIPAL PROJECT NUMBER
DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

BEFORE YOU DIG

EXISTING UNDERGROUND UTILITIES SHOWN ON THIS DRAWING WERE COMPILED FROM A COMBINATION OF VARIOUS AS-CONSTRUCTED RECORD DRAWINGS AND SOME FIELD SURVEYS. THIS INFORMATION IS NOT NECESSARILY ACCURATE OR COMPLETE AND MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION WHERE POTENTIAL CONFLICTS EXIST. CONTRACTOR TO CONTACT TELUS, B.C. HYDRO, FORTISBC AND BC ONE CALL PRIOR TO CONSTRUCTION TO CONFIRM LOCATIONS OF UTILITIES AND APPURTENANCES REQUIRING ADJUSTMENT. ANY DISCREPANCIES REQUIRING CHANGES TO THE DESIGN MUST BE REPORTED TO KM CIVIL CONSULTANTS IMMEDIATELY.



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CONSULTANT

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ATTENTION: JULIA VIGINI TEL:(604)638-1212

TITLE **KEY PLAN**

10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL

PROFESSIONAL ENGINEER — PROVINCE OF — S. I. McGREGOR # 29591 — BRITISH COLUMBIA

2021-11-30

SCALE: HOR. 1: 750 VERT.

DESIGNED

DRAWN NWP

REVIEWED SIM

DATE (YYYY.MM.DD) AUGUST, 2021

CONSULTANT PROJ. NO. 210574-C

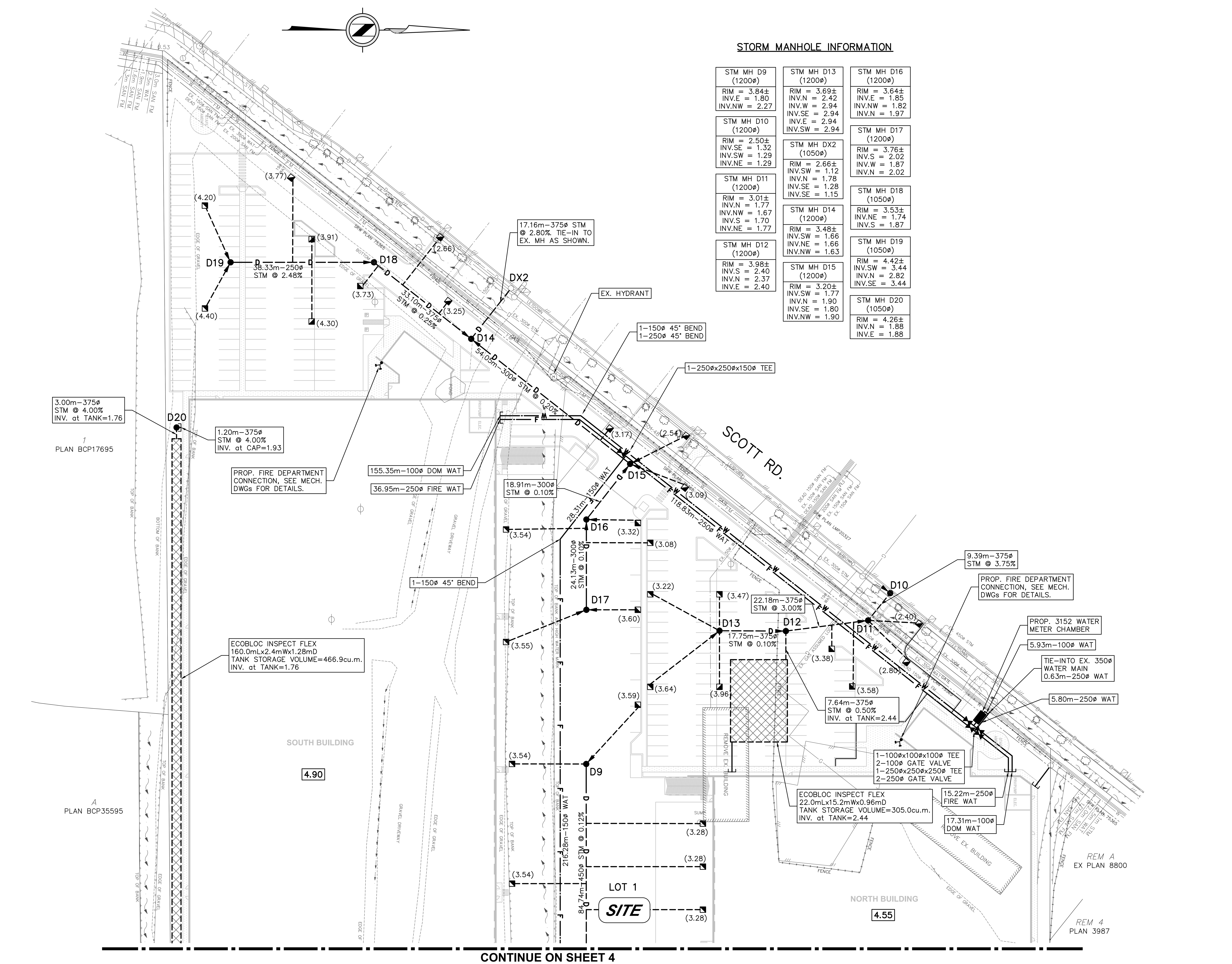
DWG. NO. 2 OF 9

REV. 2

MUNICIPAL PROJECT NUMBER

DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER



STORM MANHOLE INFORMATION

STM MH D9 (1200ø)	RIM = 3.84± INV.E = 1.80 INV.NW = 2.27
STM MH D10 (1200ø)	RIM = 2.50± INV.SE = 1.32 INV.SW = 1.29 INV.NE = 1.29
STM MH D11 (1200ø)	RIM = 3.01± INV.N = 1.77 INV.NW = 1.67 INV.S = 1.70 INV.NE = 1.77
STM MH D12 (1200ø)	RIM = 3.98± INV.S = 2.40 INV.N = 2.37 INV.E = 2.40
STM MH D13 (1200ø)	RIM = 3.69± INV.N = 2.42 INV.W = 2.94 INV.SE = 2.94 INV.E = 2.94 INV.SW = 2.94
STM MH DX2 (1050ø)	RIM = 2.66± INV.SW = 1.12 INV.N = 1.78 INV.SE = 1.28 INV.SE = 1.15
STM MH D14 (1200ø)	RIM = 3.48± INV.SW = 1.66 INV.NE = 1.66 INV.NW = 1.63
STM MH D15 (1200ø)	RIM = 3.20± INV.SW = 1.77 INV.N = 1.90 INV.SE = 1.80 INV.NW = 1.90
STM MH D16 (1200ø)	RIM = 3.64± INV.E = 1.85 INV.NW = 1.82 INV.N = 1.97
STM MH D17 (1200ø)	RIM = 3.76± INV.S = 2.02 INV.W = 1.87 INV.N = 2.02
STM MH D18 (1050ø)	RIM = 3.53± INV.NE = 1.74 INV.S = 1.87
STM MH D19 (1050ø)	RIM = 4.42± INV.SW = 3.44 INV.N = 2.82 INV.SE = 3.44
STM MH D20 (1050ø)	RIM = 4.26± INV.N = 1.88 INV.E = 1.88

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS ARE METRIC.
2. EXPOSE AND VERIFY DEPTH AND LOCATION OF ALL TIE–IN POINTS AND EXISTING UNDERGROUND SERVICES CROSSING PROPOSED STORM, SANITARY AND WATER MAINS PRIOR TO COMMENCING CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED TO KM CIVIL CONSULTANTS IMMEDIATELY.
3. SEE ARCHITECTURAL DRAWINGS FOR DETAILED CURB AND BUILDING ALIGNMENT/LAYOUT, AS WELL AS DETAILS OF CONCRETE SIDEWALKS, STYLES, COLOURING, AND TYPES.
4. ALL WORKS AND MATERIALS TO BE IN ACCORDANCE WITH THE BC PLUMBING CODE, MMCD PLATINUM EDITION (2009), AND THE SURREY SUPPLEMENTARY SPECIFICATIONS.
5. REFER TO MECHANICAL PLANS FOR ALL SERVICING DETAILS WITHIN ONE METRE OF THE BUILDING.
6. TYPE 1 BEDDING AND 100mm GRANULAR BACKFILL PER MMCD STD. DWG. G4.
7. ALL WATER FITTINGS TO BE D.I.
8. ALL WATER MAIN PIPE TO BE PVC C900 UNLESS OTHERWISE NOTED.
9. ALL PVC C900 WATER MAIN TO BE INSTALLED WITH MIN. 1.2m COVER AND MIN. 0.10% GRADE.
10. ALL SANITARY MAIN PIPE TO BE PVC SDR35 UNLESS OTHERWISE NOTED.
11. ALL TRENCH DRAIN AND WALL DRAIN LEADS TO BE 150mm DIAMETER PVC DWV AT MINIMUM 1.0%, UNLESS OTHERWISE NOTED.
12. ALL STORM MAIN PIPE TO BE PVC SDR35 UNLESS OTHERWISE NOTED.
13. ALL CATCH BASINS AND LAWN DRAINS TO BE c/w TRAPPING HOODS AND 600mm SUMPS.
14. ALL LAWN DRAINS TO BE 600ø c/w 150ø PVC SDR35 LEAD at MIN. 1.0% UNLESS OTHERWISE NOTED.
15. ALL STORM MAINS TO BE INSTALLED c/w GASKETED JOINTS.
16. ALL CATCH BASINS TO BE AS PER DOBNEY No. 23 (GRATE) AND No. 24 (FRAME) OR APPROVED EQUIVALENT c/w 150ø PVC SDR 35 LEAD at MIN. 1.0% UNLESS OTHERWISE NOTED.
17. ALL STORM CONNECTIONS TO EXCLUDE BUILDING SUMPS. SUMPS TO BE BY OTHERS.
18. ALL SANITARY AND WATER MAINS AND CONNECTIONS WITH LESS THAN 1.0m COVER TO BE CONCRETE ENCASED PER MMCD STD. DWG. G7.
19. ALL STORM PIPES WITH LESS THAN 1.0m COVER TO BE CONCRETE ENCASED PER MMCD STD. DWG. G7 OR DWV PIPE IN ACCORDANCE WITH BRITISH COLUMBIA PLUMBING CODE, 2018.
20. WATER MAIN JOINTS ARE TO BE WRAPPED WITH PETROLATUM TAPE WITHIN 3.0m ON EACH SIDE OF ALL CROSSINGS, WHERE 0.5m CLEARANCE FROM OTHER UTILITIES CANNOT BE ACHIEVED, IN ACCORDANCE WITH THE LATEST VERSION OF AWWA STANDARDS C217, C214 OR C209.
21. REINSTATE ALL DISTURBED BOULEVARDS, SHOULDERS, CONCRETE AND ASPHALT SIDEWALK AND DRIVEWAYS TO ORIGINAL OR BETTER CONDITION.
22. ADJUST ALL EXISTING MANHOLE, VALVE, ETC. RIM ELEVATIONS AS REQUIRED TO MEET PROPOSED GRADES.
23. ALL WATER MAIN TEES AND BENDS TO HAVE THRUST RESTRAINTS.
24. ALL WATER MAIN JOINTS TO BE FULLY RESTRAINED USING UNI–FLANGE RESTRAINTS OR APPROVED ALTERNATE.

BEFORE YOU DIG

EXISTING UNDERGROUND UTILITIES SHOWN ON THIS DRAWING WERE COMPILED FROM A COMBINATION OF VARIOUS AS–CONSTRUCTED RECORD DRAWINGS AND SOME FIELD SURVEYS. THIS INFORMATION IS NOT NECESSARILY ACCURATE OR COMPLETE AND MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION WHERE POTENTIAL CONFLICTS EXIST. CONTRACTOR TO CONTACT TELUS, B.C. HYDRO, FORTISBC AND BC ONE CALL PRIOR TO CONSTRUCTION TO CONFIRM LOCATIONS OF UTILITIES AND APPURTENANCES REQUIRING ADJUSTMENT. ANY DISCREPANCIES REQUIRING CHANGES TO THE DESIGN MUST BE REPORTED TO KM CIVIL CONSULTANTS IMMEDIATELY.

CONTINUE ON SHEET 4

LEGAL DESCRIPTION: LOTS 1 AND 2, EXCEPT: PART ON SRW PLAN LMP20327, SECTION 19, BLOCK 5, NORTH RANGE 2 WEST, NEW WESTMINSTER DISTRICT PLAN 14280 AND PARCEL 'B' (REF. PLAN 4663) FRACTIONAL SECTION 19 EXCEPT: FIRSTLY: PART 208.2 SQUARE METRES (BYLAW PLAN 58239), SECONDLY: PART ON SRW PLAN LMP20327, NEW WESTMINSTER DISTRICT

SURVEY BENCHMARK: ELEVATIONS DERIVED FROM CITY OF SURREY MONUMENT 10H2587 LOCATED AT THE INTERSECTION OF LOD YALE ROAD AND SCOTT ROAD EL.=2.269m (CVD28GVRD2018)

REV.	DATE	DESCRIPTION	BY
5			
4			
3			
2	2021.11.30	ISSUED FOR PER	SIM
1	2021.11.17	ISSUED FOR REVIEW	SIM

"BY SEALING AND SIGNING THIS DRAWING, I CERTIFY THAT THE INFORMATION CONTAINED IN THESE DRAWINGS ACCURATELY REFLECTS THE ORIGINAL DESIGN, ADDENDA, CHANGE ORDERS AND MATERIAL DESIGN CHANGES MADE DURING CONSTRUCTION AND FIELD REVIEWED BY ME, OR MY REPRESENTATIVE, AND THAT THE AS–CONSTRUCTED WORKS SUBSTANTIALLY COMPLY WITH THE ORIGINAL DESIGN INTENT, HOWEVER, I DO NOT ACCEPT RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE AS–CONSTRUCTED INFORMATION SUPPLIED BY OTHERS CONTAINED IN THESE DRAWINGS."

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KM Civil CONSULTANTS LTD.
ABBOTSFORD OFFICE
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Abbotsford, BC V2S 2E8
Tel: 604-853-8831 Fax: 604-853-1580
VANCOUVER OFFICE
110 - 2920 Virtual Way
Vancouver, BC V5M 0C4
Tel: 604-294-6662 Fax: 604-294-6665

CLIENT **WALES McLELLAND CONSTRUCTION**
6211 FRASERWOOD PLACE, RICHMOND, B.C., V6W 1J2
ATTENTION: JULIA VIGINI TEL: (604)638–1212

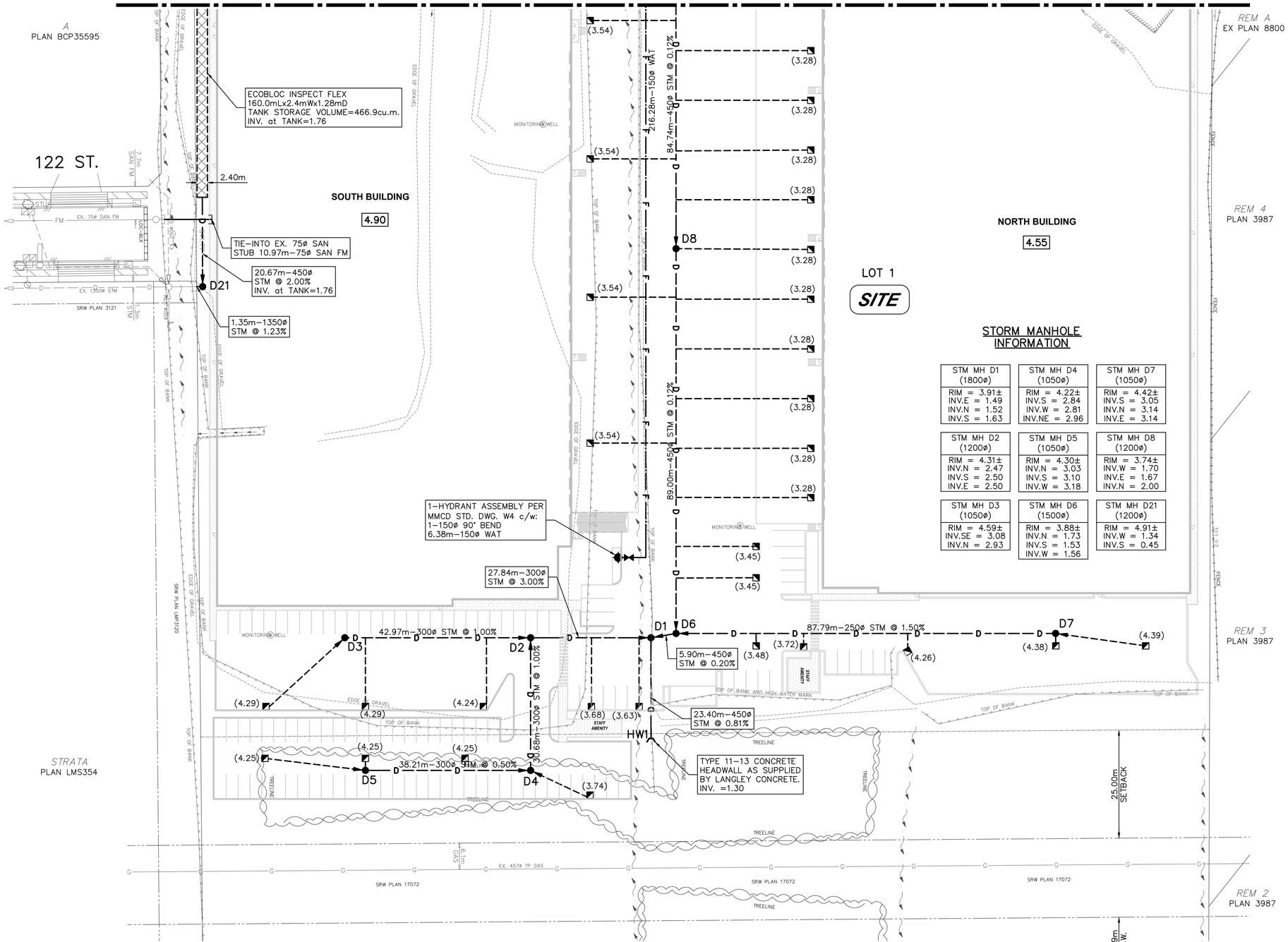
TITLE **SITE SERVICING PLAN: NORTH**
10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. I. McGREGOR
2021-11-30

SCALE: HOR. 1:500 VERT.
DESIGNED
DRAWN NWP
REVIEWED SIM
DATE (YYYY.MM.DD) AUGUST, 2021
CONSULTANT PROJ. NO. 210574–C
DWG. NO. 3 OF 9
REV. 2
MUNICIPAL PROJECT NUMBER
DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

Nov 30 2021 – 8:03am K:\2021\210574-C 10582 Scott Road, Surrey – Wales Industrial\2-Dwgs\5-Civil\1-CURRENT\210574-C-03SS NORTH.dwg/210574-C-03SS NORTH stuartm



STORM MANHOLE INFORMATION

STM MH D1 (1800ø)	STM MH D4 (1050ø)	STM MH D7 (1050ø)
RIM = 3.91± INV.E = 1.49 INV.N = 1.52 INV.S = 1.63	RIM = 4.22± INV.S = 2.84 INV.W = 2.81 INV.NE = 2.96	RIM = 4.42± INV.S = 3.05 INV.N = 3.14 INV.E = 3.14
STM MH D2 (1200ø)	**STM MH D5 (1050ø)**	**STM MH D8 (1200ø)**
RIM = 4.31± INV.N = 2.47 INV.S = 2.50 INV.E = 2.50	RIM = 4.30± INV.N = 3.03 INV.S = 3.10 INV.W = 3.18	RIM = 3.74± INV.W = 1.70 INV.E = 1.67 INV.N = 2.00
STM MH D3 (1050ø)	**STM MH D6 (1500ø)**	**STM MH D21 (1200ø)**
RIM = 4.59± INV.SE = 3.08 INV.N = 2.93	RIM = 3.88± INV.N = 1.73 INV.S = 1.53 INV.W = 1.56	RIM = 4.91± INV.W = 1.34 INV.S = 0.45

NOTES:

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LEGAL DESCRIPTION: LOTS 1 AND 2, EXCEPT: PART ON SRW PLAN LMP20327, SECTION 19, BLOCK 5, NORTH RANGE 2 WEST, NEW WESTMINSTER DISTRICT PLAN 14280 AND PARCEL 'B' (REF. PLAN 4663) FRACTIONAL SECTION 19 EXCEPT: FIRSTLY: PART 208.2 SQUARE METRES (BYLAW PLAN 58239), SECONDLY: PART ON SRW PLAN LMP20327, NEW WESTMINSTER DISTRICT

SURVEY BENCHMARK:ELEVATIONS DERIVED FROM CITY OF SURREY MONUMENT 10H2587 LOCATED AT THE INTERSECTION OF LOD YALE ROAD AND SCOTT ROAD EL.=2.269m (CVD28GVRD2018)

REV.	DATE	DESCRIPTION	BY
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2	2021.11.30	ISSUED FOR PER	SIM
1	2021.11.17	ISSUED FOR REVIEW	SIM

"BY SEALING AND SIGNING THIS DRAWING, I CERTIFY THAT THE INFORMATION CONTAINED IN THESE DRAWINGS ACCURATELY REFLECTS THE ORIGINAL DESIGN, ADDENDA, CHANGE ORDERS AND MATERIAL DESIGN CHANGES MADE DURING CONSTRUCTION AND FIELD REVIEWED BY ME, OR MY REPRESENTATIVE, AND THAT THE AS-CONSTRUCTED WORKS SUBSTANTIALLY COMPLY WITH THE ORIGINAL DESIGN INTENT, HOWEVER, I DO NOT ACCEPT RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE AS-CONSTRUCTED INFORMATION SUPPLIED BY OTHERS CONTAINED IN THESE DRAWINGS."

CONSULTANT

KM Civil CONSULTANTS LTD.

ABBOTSFORD OFFICE
110 - 34077 Gladys Avenue
Abbotsford, BC V2S 2E8
Tel: 604-853-8831 Fax: 604-853-1580

VANCOUVER OFFICE
110 - 2920 Virtual Way
Vancouver, BC V5M 0C4
Tel: 604-294-6662 Fax: 604-294-6665

CLIENT **WALES McLELLAND CONSTRUCTION**
6211 FRASERWOOD PLACE, RICHMOND, B.C., V6W 1J2
ATTENTION: JULIA VIGINI TEL:(604)638-1212

TITLE **SITE SERVICING PLAN: SOUTH**
10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S.L. McGREGOR # 29421 CONSULTING
2021-11-30

SCALE: HOR. 1:500 VERT.
DESIGNED
DRAWN NWP
REVIEWED SIM

DATE (YYYY.MM.DD) AUGUST, 2021
CONSULTANT PROJ. NO. 210574-C
DWG. NO. 4 OF 9
REV. 2

MUNICIPAL PROJECT NUMBER
DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

SITE GRADING LEGEND:

FIRST FLOOR ELEVATION OF BUILDING	3.50
EXISTING SURVEY ELEVATION	3.50+
PROPOSED GRADE ELEVATION	+19.00
FINISHED GROUND AT TOP OF WALL. TOP OF WALL TO BE 0.15m ABOVE FINISHED GROUND.	+19.00 TW
FINISHED GROUND AT BOTTOM OF WALL	+19.00 BW
DIRECTION OF OVERLAND FLOW	
EXISTING GROUND CONTOUR	10
LANDSCAPED AREA – SEE LANDSCAPE ARCHITECTS PLANS DETAILS	
PROPOSED CONCRETE PAVEMENT STRUCTURE PER GEOTECHNICAL RECOMMENDATIONS	
PROPOSED ASPHALT PAVEMENT STRUCTURE PER GEOTECHNICAL RECOMMENDATIONS	
PROPOSED DECORATIVE PAVEMENT – SEE ARCHITECTURAL DRAWINGS FOR DETAILS	
PROPOSED CONCRETE SIDEWALK – SEE ARCHITECTURAL DRAWINGS FOR DETAILS	
CONCRETE CURB & GUTTER – SEE ARCHITECTURAL DRAWINGS FOR DETAILS	
RETAINING WALL	
PROPOSED CATCH BASIN (RIM ELEVATION)	(23.54)
PROPOSED LAWN DRAIN (RIM ELEVATION)	(23.54)
SWALE	
RIDGELINE	

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS ARE METRIC.
2. REFER TO ARCHITECTURAL PLANS FOR DETAILED CURB AND BUILDING ALIGNMENT/LAYOUT, AS WELL AS DETAILS OF CONCRETE SIDEWALKS, STYLES, COLOURING, AND TYPES.

BEFORE YOU DIG

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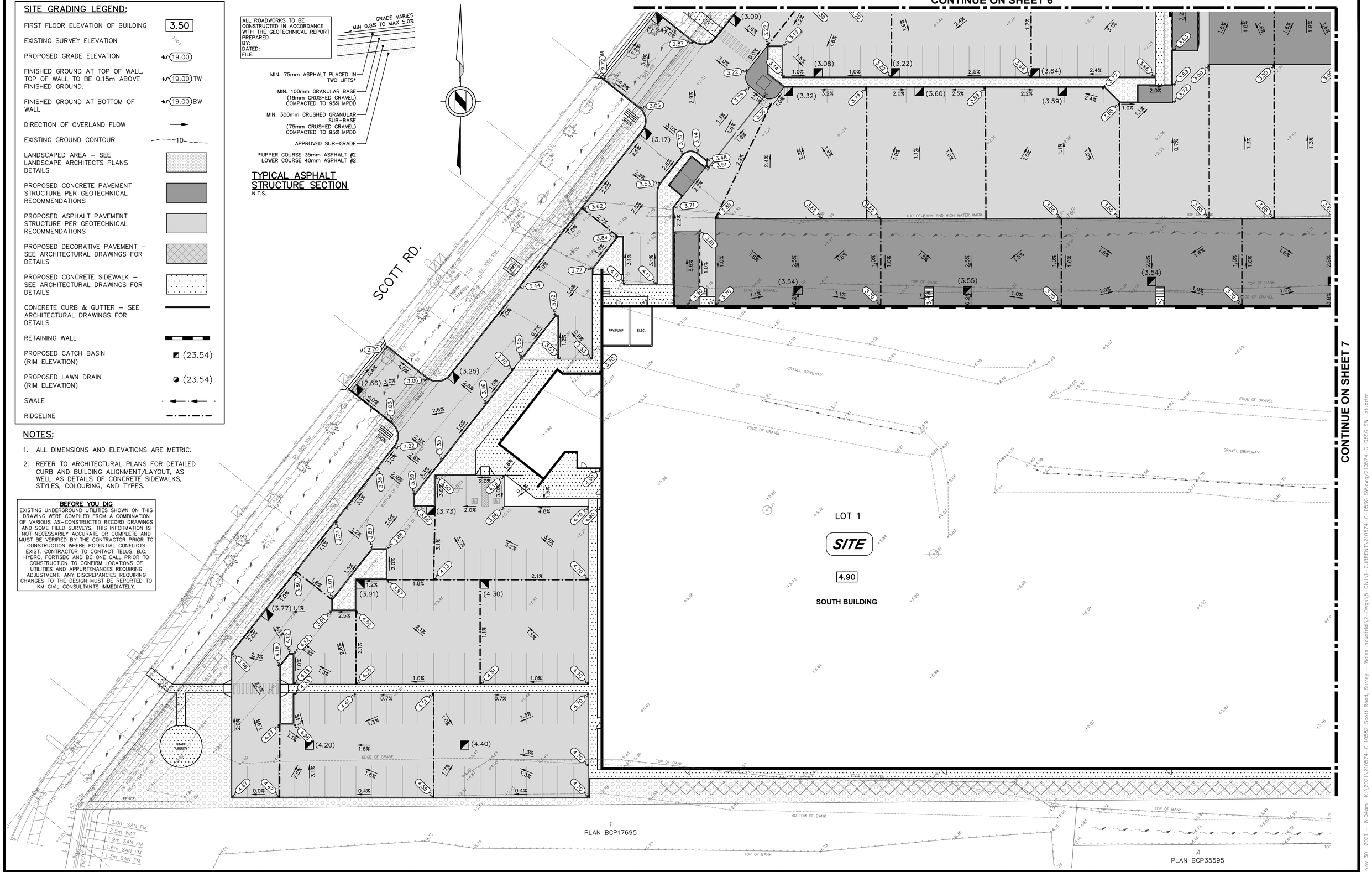
ALL ROADWORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT PREPARED
BY:
DATED:
FILE:

GRADE VARIES MIN 0.8% TO MAX 5.0%

MIN. 75mm ASPHALT PLACED IN TWO LIFTS*
MIN. 100mm GRANULAR BASE (19mm CRUSHED GRAVEL) COMPACTED TO 95% MPDD
MIN. 300mm CRUSHED GRANULAR SUB-BASE (75mm CRUSHED GRAVEL) COMPACTED TO 95% MPDD
APPROVED SUB-GRADE

*UPPER COURSE 35mm ASPHALT #2
LOWER COURSE 40mm ASPHALT #2

TYPICAL ASPHALT STRUCTURE SECTION
N.T.S.



LEGAL DESCRIPTION: LOTS 1 AND 2, EXCEPT: PART ON SRW PLAN LMP20327, SECTION 19, BLOCK 5, NORTH RANGE 2 WEST, NEW WESTMINSTER DISTRICT PLAN 14280 AND PARCEL 'B' (REF. PLAN 4663) FRACTIONAL SECTION 19 EXCEPT: FIRSTLY: PART 208.2 SQUARE METRES (BYLAW PLAN 58239), SECONDLY: PART ON SRW PLAN LMP20327, NEW WESTMINSTER DISTRICT

SURVEY BENCHMARK:ELEVATIONS DERIVED FROM CITY OF SURREY MONUMENT 10H2587 LOCATED AT THE INTERSECTION OF LOD YALE ROAD AND SCOTT ROAD EL.=2.269m (CVD28GVRD2018)

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CLIENT **WALES McLELLAND CONSTRUCTION**
6211 FRASERWOOD PLACE, RICHMOND, B.C., V6W 1J2
ATTENTION: JULIA VIGINI TEL:(604)638-1212

TITLE **SITE GRADING PLAN: SOUTHWEST**
10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. J. McGREGOR # 29491 CONSULTING
2021-11-30

SCALE: HOR. 1:300 VERT.
DESIGNED
DRAWN NWP
REVIEWED SIM

DATE (YYYY.MM.DD) AUGUST, 2021
CONSULTANT PROJ. NO. 210574-C
DWG. NO. 5 OF 9
REV. 2

MUNICIPAL PROJECT NUMBER
DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

SITE GRADING LEGEND:

FIRST FLOOR ELEVATION OF BUILDING	3.50
EXISTING SURVEY ELEVATION	3.50+
PROPOSED GRADE ELEVATION	+19.00
FINISHED GROUND AT TOP OF WALL. TOP OF WALL TO BE 0.15m ABOVE FINISHED GROUND.	+19.00 TW
FINISHED GROUND AT BOTTOM OF WALL	+19.00 BW
DIRECTION OF OVERLAND FLOW	→
EXISTING GROUND CONTOUR	10
LANDSCAPED AREA – SEE LANDSCAPE ARCHITECTS PLANS DETAILS	
PROPOSED CONCRETE PAVEMENT STRUCTURE PER GEOTECHNICAL RECOMMENDATIONS	
PROPOSED ASPHALT PAVEMENT STRUCTURE PER GEOTECHNICAL RECOMMENDATIONS	
PROPOSED DECORATIVE PAVEMENT – SEE ARCHITECTURAL DRAWINGS FOR DETAILS	
PROPOSED CONCRETE SIDEWALK – SEE ARCHITECTURAL DRAWINGS FOR DETAILS	
CONCRETE CURB & GUTTER – SEE ARCHITECTURAL DRAWINGS FOR DETAILS	
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PROPOSED CATCH BASIN (RIM ELEVATION)	(23.54)
PROPOSED LAWN DRAIN (RIM ELEVATION)	(23.54)
SWALE	
RIDGELINE	

NOTES:

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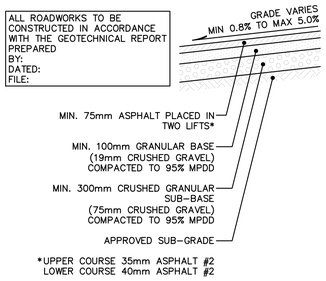
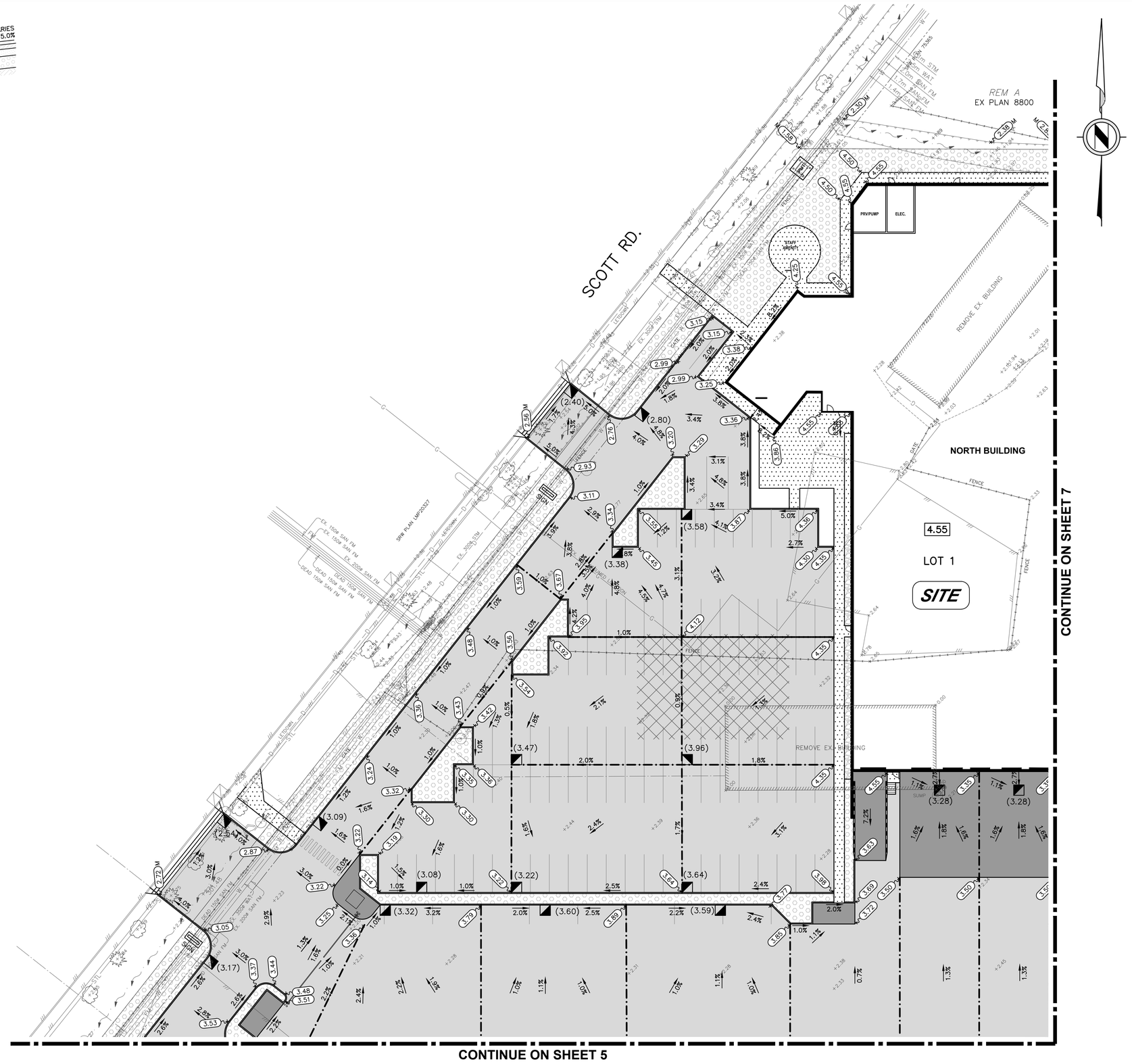
ALL ROADWORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT PREPARED
BY:
DATED:
FILE:



*UPPER COURSE 35mm ASPHALT #2
LOWER COURSE 40mm ASPHALT #2

TYPICAL ASPHALT STRUCTURE SECTION

N.T.S.



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3			
2	2021.11.30	ISSUED FOR PER	SIM
1	2021.11.17	ISSUED FOR REVIEW	SIM

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CONSULTANT

KM Civil CONSULTANTS LTD.

ABBOTSFORD OFFICE
110 - 34077 Gladys Avenue
Abbotsford, BC V2S 2E8
Tel: 604-853-8831 Fax: 604-853-1580

VANCOUVER OFFICE
110 - 2920 Virtual Way
Vancouver, BC V5M 0C4
Tel: 604-294-6662 Fax: 604-294-6665

CLIENT **WALES McLELLAND CONSTRUCTION**

6211 FRASERWOOD PLACE, RICHMOND, B.C., V6W 1J2
ATTENTION: JULIA VIGINI TEL:(604)638-1212

TITLE **SITE GRADING PLAN: NORTHWEST**

10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. I. McGREGOR # 22651 ENGINEERING

2021-11-30

SCALE: HOR. 1:300 VERT.

DESIGNED

DRAWN NWP

REVIEWED SIM

DATE (YYYY.MM.DD) AUGUST, 2021

CONSULTANT PROJ. NO. 210574-C

DWG. NO. 6 OF 9

REV. 2

MUNICIPAL PROJECT NUMBER

DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

Nov 30 2021 - 8:04am K:\2021\210574-C 10582 Scott Road, Surrey - Wales Industrial\2-Dwgs\5-Civil\1-CURRENT\210574-C-0SS0 NW.dwg stuartm

REM A
EX PLAN 8800

REM 4
PLAN 3987

REM 3
PLAN 3987

REM 2
PLAN 3987

FENCE

311.27

ALL ROADWORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT PREPARED
BY:
DATED:
FILE:

GRADE VARIES MIN 0.8% TO MAX 5.0%

MIN. 75mm ASPHALT PLACED IN TWO LIFTS*

MIN. 100mm GRANULAR BASE (19mm CRUSHED GRAVEL) COMPACTED TO 95% MPDD

MIN. 300mm CRUSHED GRANULAR SUB-BASE (75mm CRUSHED GRAVEL) COMPACTED TO 95% MPDD

APPROVED SUB-GRADE

*UPPER COURSE 35mm ASPHALT #2
LOWER COURSE 40mm ASPHALT #2

TYPICAL ASPHALT STRUCTURE SECTION

N.T.S.

4.55

LOT 1

SITE

NORTH BUILDING

SITE GRADING LEGEND:

- FIRST FLOOR ELEVATION OF BUILDING — 3.50
- EXISTING SURVEY ELEVATION — +x.xx
- PROPOSED GRADE ELEVATION — +x (19.00)
- FINISHED GROUND AT TOP OF WALL. TOP OF WALL TO BE 0.15m ABOVE FINISHED GROUND. — +x (19.00) TW
- FINISHED GROUND AT BOTTOM OF WALL — +x (19.00) BW
- DIRECTION OF OVERLAND FLOW
- EXISTING GROUND CONTOUR — 10
- LANDSCAPED AREA – SEE LANDSCAPE ARCHITECTS PLANS DETAILS
- PROPOSED CONCRETE PAVEMENT STRUCTURE PER GEOTECHNICAL RECOMMENDATIONS
- PROPOSED ASPHALT PAVEMENT STRUCTURE PER GEOTECHNICAL RECOMMENDATIONS
- PROPOSED DECORATIVE PAVEMENT – SEE ARCHITECTURAL DRAWINGS FOR DETAILS
- PROPOSED CONCRETE SIDEWALK – SEE ARCHITECTURAL DRAWINGS FOR DETAILS
- CONCRETE CURB & GUTTER – SEE ARCHITECTURAL DRAWINGS FOR DETAILS
- RETAINING WALL
- PROPOSED CATCH BASIN (RIM ELEVATION) — (23.54)
- PROPOSED LAWN DRAIN (RIM ELEVATION) — (23.54)
- SWALE
- RIDGELINE

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS ARE METRIC.
2. REFER TO ARCHITECTURAL PLANS FOR DETAILED CURB AND BUILDING ALIGNMENT/LAYOUT, AS WELL AS DETAILS OF CONCRETE SIDEWALKS, STYLES, COLOURING, AND TYPES.

BEFORE YOU DIG

EXISTING UNDERGROUND UTILITIES SHOWN ON THIS DRAWING WERE COMPILED FROM A COMBINATION OF VARIOUS AS-CONSTRUCTED RECORD DRAWINGS AND SOME FIELD SURVEYS. THIS INFORMATION IS NOT NECESSARILY ACCURATE OR COMPLETE AND MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION WHERE POTENTIAL CONFLICTS EXIST. CONTRACTOR TO CONTACT TELUS, B.C. HYDRO, FORTISBC AND BC ONE CALL PRIOR TO CONSTRUCTION TO CONFIRM LOCATIONS OF UTILITIES AND APPURTENANCES REQUIRING ADJUSTMENT. ANY DISCREPANCIES REQUIRING CHANGES TO THE DESIGN MUST BE REPORTED TO KM CIVIL CONSULTANTS IMMEDIATELY.

25.00m SETBACK

18.29m R.O.W.

6.1m GAS

SRW PLAN 17072

EX. 457# TP GAS

TREELINE

TOP OF BANK

BOTTOM OF BANK

MONITORING WELL

STAFF AMENITY

CONTINUE ON SHEET 6

CONTINUE ON SHEET 8

LEGAL DESCRIPTION: LOTS 1 AND 2, EXCEPT: PART ON SRW PLAN LMP20327, SECTION 19, BLOCK 5, NORTH RANGE 2 WEST, NEW WESTMINSTER DISTRICT PLAN 14280 AND PARCEL 'B' (REF. PLAN 4663) FRACTIONAL SECTION 19 EXCEPT: FIRSTLY: PART 208.2 SQUARE METRES (BYLAW PLAN 58239), SECONDLY: PART ON SRW PLAN LMP20327, NEW WESTMINSTER DISTRICT

SURVEY BENCHMARK: ELEVATIONS DERIVED FROM CITY OF SURREY MONUMENT 10H2587 LOCATED AT THE INTERSECTION OF LOD YALE ROAD AND SCOTT ROAD EL.=2.269m (CVD28GVRD2018)

REV.	DATE	DESCRIPTION	BY
5			
4			
3			
2	2021.11.30	ISSUED FOR PER	SIM
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CLIENT **WALES McLELLAND CONSTRUCTION**

6211 FRASERWOOD PLACE, RICHMOND, B.C., V6W 1J2
ATTENTION: JULIA VIGINI TEL:(604)638-1212

TITLE **SITE GRADING PLAN: NORTHEAST**

10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — S. J. McGREGOR — 2021-11-30

SCALE: HOR. 1:300 VERT.

DESIGNED

DRAWN NWP

REVIEWED SIM

DATE (YYYY.MM.DD) AUGUST, 2021

CONSULTANT PROJ. NO. 210574-C

DWG. NO. 7 OF 9

REV. 2

MUNICIPAL PROJECT NUMBER

DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

CONTINUE ON SHEET 7

CONTINUE ON SHEET 5

(3.48)

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS ARE METRIC.
2. REFER TO ARCHITECTURAL PLANS FOR DETAILED CURB AND BUILDING ALIGNMENT/LAYOUT, AS WELL AS DETAILS OF CONCRETE SIDEWALKS, STYLES, COLOURING, AND TYPES.

SITE GRADING LEGEND:

- FIRST FLOOR ELEVATION OF BUILDING — 3.50
- EXISTING SURVEY ELEVATION — 3.50+
- PROPOSED GRADE ELEVATION — +(19.00)
- FINISHED GROUND AT TOP OF WALL. TOP OF WALL TO BE 0.15m ABOVE FINISHED GROUND. — +(19.00) TW
- FINISHED GROUND AT BOTTOM OF WALL — +(19.00) BW
- DIRECTION OF OVERLAND FLOW
- EXISTING GROUND CONTOUR — 10
- LANDSCAPED AREA – SEE LANDSCAPE ARCHITECTS PLANS DETAILS
- PROPOSED CONCRETE PAVEMENT STRUCTURE PER GEOTECHNICAL RECOMMENDATIONS
- PROPOSED ASPHALT PAVEMENT STRUCTURE PER GEOTECHNICAL RECOMMENDATIONS
- PROPOSED DECORATIVE PAVEMENT – SEE ARCHITECTURAL DRAWINGS FOR DETAILS
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- CONCRETE CURB & GUTTER – SEE ARCHITECTURAL DRAWINGS FOR DETAILS
- RETAINING WALL
- PROPOSED CATCH BASIN (RIM ELEVATION) — (23.54)
- PROPOSED LAWN DRAIN (RIM ELEVATION) — (23.54)
- SWALE
- RIDGELINE

LOT 1

SITE

SOUTH BUILDING

4.90

ALL ROADWORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT PREPARED
BY:
DATED:
FILE:

GRADE VARIES MIN 0.8% TO MAX 5.0%

- MIN. 75mm ASPHALT PLACED IN TWO LIFTS*
- MIN. 100mm GRANULAR BASE (19mm CRUSHED GRAVEL) COMPACTED TO 95% MPDD
- MIN. 300mm CRUSHED GRANULAR SUB-BASE (75mm CRUSHED GRAVEL) COMPACTED TO 95% MPDD
- APPROVED SUB-GRADE

*UPPER COURSE 35mm ASPHALT #2
LOWER COURSE 40mm ASPHALT #2

TYPICAL ASPHALT STRUCTURE SECTION
N.T.S.

BEFORE YOU DIG
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122 ST.

A
PLAN BCP35595

STRATA
PLAN LMS354

SRW PLAN LMP3120

SRW PLAN 17972

SRW PLAN 3121

LEGAL DESCRIPTION: LOTS 1 AND 2, EXCEPT: PART ON SRW PLAN LMP20327, SECTION 19, BLOCK 5, NORTH RANGE 2 WEST, NEW WESTMINSTER DISTRICT PLAN 14280 AND PARCEL 'B' (REF. PLAN 4663) FRACTIONAL SECTION 19 EXCEPT: FIRSTLY: PART 208.2 SQUARE METRES (BYLAW PLAN 58239), SECONDLY: PART ON SRW PLAN LMP20327, NEW WESTMINSTER DISTRICT

SURVEY BENCHMARK:ELEVATIONS DERIVED FROM CITY OF SURREY MONUMENT 10H2587 LOCATED AT THE INTERSECTION OF LOD YALE ROAD AND SCOTT ROAD EL.=2.269m (CVD28GVRD2018)

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CLIENT **WALES McLELLAND CONSTRUCTION**
6211 FRASERWOOD PLACE, RICHMOND, B.C., V6W 1J2
ATTENTION: JULIA VIGINI TEL:(604)638-1212

TITLE **SITE GRADING PLAN: SOUTHEAST**
10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL
PROFESSIONAL ENGINEER — S. J. McGREGOR — 41267 — REGISTERED — PROFESSIONAL ENGINEER
2021-11-30

SCALE: HOR. 1:300 VERT.
DESIGNED
DRAWN NWP
REVIEWED SIM

DATE (YYYY.MM.DD) AUGUST, 2021
CONSULTANT PROJ. NO. 210574-C
DWG. NO. 8 OF 9
REV. 2

MUNICIPAL PROJECT NUMBER
DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

CITY OF SURREY STORMWATER CALCULATION SHEET

PROJECT NUMBER: | **KM CIVIL FILE No.:** 210574-C

PROJECT LOCATION: 10582 SCOTT ROAD | **MANNING'S 'n':** 0.013 CONCRETE, PVC / 0.024 CSP

DATE: 2021.11.10 | **Q5 / Q100 = RiA** | **IDF CURVE:** KWANTLEN PARK (APR 2020)

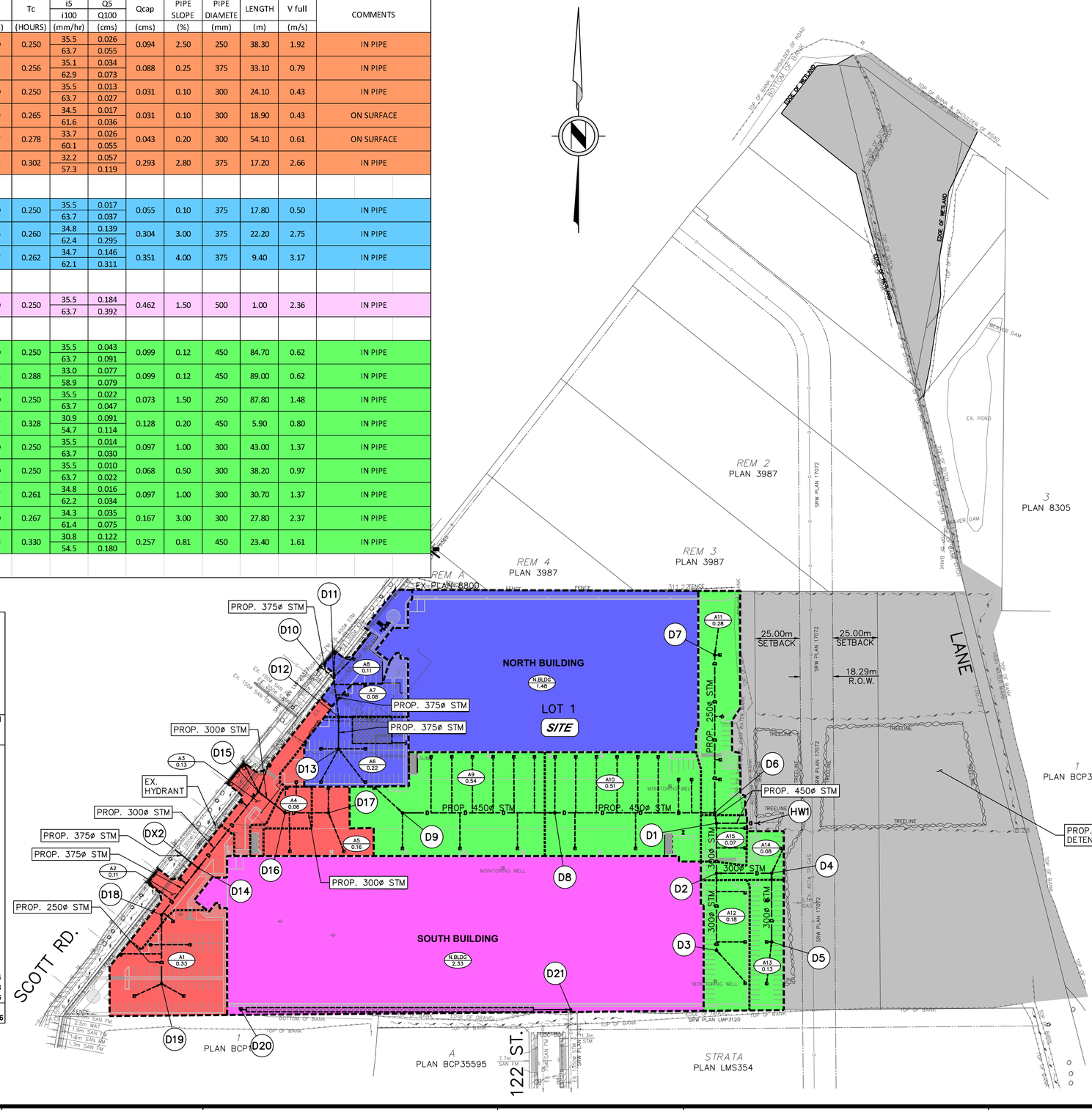
CATCHMENT ID	MANHOLE FROM	MANHOLE TO	AREA, A (ha)	COEFF, R	A x R	Σ(A x R)	Tc (MIN)	Tc (HOURS)	i5 / i100 (mm/hr)	Q5 / Q100 (cms)	Qcap (cms)	PIPE SLOPE (%)	PIPE DIAMETE (mm)	LENGTH (m)	V full (m/s)	COMMENTS
A1	D19	D18	0.330	0.80	0.26	0.26	15.0	0.250	35.5	0.026	0.094	2.50	250	38.30	1.92	IN PIPE
				0.95	0.31	0.31			63.7	0.055						
A2	D18	D14	0.110	0.80	0.09	0.35	15.3	0.256	35.1	0.034	0.088	0.25	375	33.10	0.79	IN PIPE
				0.95	0.10	0.42			62.9	0.073						
A5	D17	D16	0.160	0.80	0.13	0.13	15.0	0.250	35.5	0.013	0.031	0.10	300	24.10	0.43	IN PIPE
				0.95	0.15	0.15			63.7	0.027						
A4	D16	D15	0.060	0.80	0.05	0.18	15.9	0.265	34.5	0.017	0.031	0.10	300	18.90	0.43	ON SURFACE
				0.95	0.06	0.21			61.6	0.036						
A3	D15	D14	0.130	0.80	0.10	0.28	16.7	0.278	33.7	0.026	0.043	0.20	300	54.10	0.61	ON SURFACE
				0.95	0.12	0.33			60.1	0.055						
	D14	DX2	0.000	0.80	0.00	0.63	18.1	0.302	32.2	0.057	0.293	2.80	375	17.20	2.66	IN PIPE
				0.95	0.00	0.75			57.3	0.119						
			Σ0.79													
A6	D13	D12	0.220	0.80	0.18	0.18	15.0	0.250	35.5	0.017	0.055	0.10	375	17.80	0.50	IN PIPE
				0.95	0.21	0.21			63.7	0.037						
A7+N.BLDG	D12	D11	1.570	0.80	1.26	1.43	15.6	0.260	34.8	0.139	0.304	3.00	375	22.20	2.75	IN PIPE
				0.95	1.49	1.70			62.4	0.295						
A8	D11	D10	0.110	0.80	0.09	1.52	15.7	0.262	34.7	0.146	0.351	4.00	375	9.40	3.17	IN PIPE
				0.95	0.10	1.81			62.1	0.311						
			Σ1.9													
S BLDG	D21	DX1	2.330	0.80	1.86	1.86	15.0	0.250	35.5	0.184	0.462	1.50	500	1.00	2.36	IN PIPE
				0.95	2.21	2.21			63.7	0.392						
			Σ2.33													
A9	D9	D8	0.540	0.80	0.43	0.43	15.0	0.250	35.5	0.043	0.099	0.12	450	84.70	0.62	IN PIPE
				0.95	0.51	0.51			63.7	0.091						
A10	D8	D6	0.510	0.80	0.41	0.84	17.3	0.288	33.0	0.077	0.099	0.12	450	89.00	0.62	IN PIPE
				0.95	0.48	0.48			58.9	0.079						
A11	D7	D6	0.280	0.80	0.22	0.22	15.0	0.250	35.5	0.022	0.073	1.50	250	87.80	1.48	IN PIPE
				0.95	0.27	0.27			63.7	0.047						
	D6	D1	0.000	0.80	0.00	1.06	19.7	0.328	30.9	0.091	0.128	0.20	450	5.90	0.80	IN PIPE
				0.95	0.00	0.75			54.7	0.114						
A12	D3	D2	0.180	0.80	0.14	0.14	15.0	0.250	35.5	0.014	0.097	1.00	300	43.00	1.37	IN PIPE
				0.95	0.17	0.17			63.7	0.030						
A13	D5	D4	0.130	0.80	0.10	0.10	15.0	0.250	35.5	0.010	0.068	0.50	300	38.20	0.97	IN PIPE
				0.95	0.12	0.12			63.7	0.022						
A14	D4	D2	0.080	0.80	0.06	0.17	15.7	0.261	34.8	0.016	0.097	1.00	300	30.70	1.37	IN PIPE
				0.95	0.08	0.20			62.2	0.034						
A15	D2	D1	0.070	0.80	0.06	0.37	16.0	0.267	34.3	0.035	0.167	3.00	300	27.80	2.37	IN PIPE
				0.95	0.07	0.44			61.4	0.075						
	D1	HW1	0.000	0.80	0.00	1.43	19.8	0.330	30.8	0.122	0.257	0.81	450	23.40	1.61	IN PIPE
				0.95	0.00	1.19			54.5	0.180						
			Σ1.79													

DETENTION CALCULATIONS - 100 YEAR (NORTH)

Catchment Area (A): 1.48 ha
Runoff Coefficient: 0.95
Time of Concentration (Tc): 5 min
Storm Frequency: 100 yrs
Maximum Release Rate: 0.037 cms
Peak Flow at Tc (Qp1): 0.4625 cms

No.	Tr (min)	Tr (sec)	i100 (mm/hr)	Peak Flow Qp2 (cms)	Inflow Runoff Volume (cu.m)	Max Release Qrel (cms)	Required Storage (cu.m)
1	5	300	118.4	0.4625	138.75	0.037	127.65
2	6	360	106.8	0.4173	150.23	0.037	136.95
3	7	420	97.9	0.3825	160.67	0.037	145.22
4	8	480	90.8	0.3548	170.30	0.037	152.68
5	10	600	80.1	0.3128	187.70	0.037	165.71
6	15	900	63.7	0.2489	224.00	0.037	191.08
7	20	1200	54.2	0.2116	253.93	0.037	210.06
8	30	1800	43.1	0.1684	303.04	0.037	237.21
9	45	2700	34.3	0.1339	361.63	0.037	262.82
10	60	3600	29.2	0.1139	409.96	0.037	278.12
11	**90**	**5400**	**23.2**	**0.0906**	**489.24**	**0.037**	**291.26**
12	120	7200	19.7	0.0770	554.62	0.037	290.44
13	180	10800	15.7	0.0613	661.86	0.037	265.17
14	240	14400	13.3	0.0521	750.31	0.037	221.01
15	300	18000	11.8	0.0459	826.98	0.037	165.00
16	360	21600	10.6	0.0415	895.40	0.037	100.71
17	480	28800	9.0	0.0352	1015.06	0.037	-45.16
18	600	36000	8.0	0.0311	1118.78	0.037	-207.06
19	720	43200	7.2	0.0280	1211.34	0.037	-380.18
20	840	50400	6.6	0.0257	1295.55	0.037	-561.70
21	960	57600	6.1	0.0238	1373.22	0.037	-749.81
22	1080	64800	5.7	0.0223	1445.58	0.037	-943.26
23	1200	72000	5.4	0.0210	1513.53	0.037	-1141.14
24	1320	79200	5.1	0.0199	1577.75	0.037	-1342.78
25	1440	86400	4.9	0.0190	1638.76	0.037	-1547.66

Required Storage 291.26



DETENTION CALCULATIONS - 100 YEAR (SOUTH BUILDING)

Catchment Area (A): 2.33 ha
Runoff Coefficient: 0.95
Time of Concentration (Tc): 5 min
Storm Frequency: 100 yrs
Maximum Release Rate: 0.058 cms
Peak Flow at Tc (Qp1): 0.7281 cms

No.	Tr (min)	Tr (sec)	i100 (mm/hr)	Peak Flow Qp2 (cms)	Inflow Runoff Volume (cu.m)	Max Release Qrel (cms)	Required Storage (cu.m)
1	5	300	118.4	0.7281	218.43	0.058	201.03
2	6	360	106.8	0.6570	236.50	0.058	215.70
3	7	420	97.9	0.6022	252.94	0.058	228.73
4	8	480	90.8	0.5586	268.11	0.058	240.48
5	10	600	80.1	0.4925	295.50	0.058	261.04
6	15	900	63.7	0.3918	352.65	0.058	301.04
7	20	1200	54.2	0.3331	399.77	0.058	330.99
8	30	1800	43.1	0.2650	477.08	0.058	373.89
9	45	2700	34.3	0.2109	569.33	0.058	414.43
10	60	3600	29.2	0.1793	645.41	0.058	438.73
11	**90**	**5400**	**23.2**	**0.1426**	**770.22**	**0.058**	**459.86**
12	120	7200	19.7	0.1213	873.14	0.058	459.01
13	180	10800	15.7	0.0965	1041.99	0.058	420.12
14	240	14400	13.3	0.0820	1181.23	0.058	351.49
15	300	18000	11.8	0.0723	1301.93	0.058	264.22
16	360	21600	10.6	0.0653	1409.65	0.058	163.89
17	480	28800	9.0	0.0555	1598.03	0.058	-63.97
18	600	36000	8.0	0.0489	1761.32	0.058	-317.06
19	720	43200	7.2	0.0441	1907.04	0.058	-587.82
20	840	50400	6.6	0.0405	2039.62	0.058	-871.80
21	960	57600	6.1	0.0375	2161.89	0.058	-1166.16
22	1080	64800	5.7	0.0351	2275.81	0.058	-1468.92
23	1200	72000	5.4	0.0331	2382.79	0.058	-1778.65
24	1320	79200	5.1	0.0314	2483.90	0.058	-2094.31
25	1440	86400	4.9	0.0299	2579.94	0.058	-2415.06

Required Storage 459.86

STORM WATER MANAGEMENT LEGEND:

- 100 YEAR OVERLAND FLOW
- 100 YEAR FLOW IN PIPE
- 100 YEAR FLOW BELOW SURFACE
- OVERLAND FLOW
- MAJOR CATCHMENT BOUNDARY LINE
- SUB-CATCHMENT BOUNDARY LINE
- NCP CATCHMENT BOUNDARY LINE
- CATCHMENT AREA (CATCHMENT No. / AREA (ha))
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- FUTURE STORM SEWER
- EXISTING CONTOURS
- EXISTING DITCHES
- MANHOLE IDENTIFIER (MH D)
- 5 Yr SURCHARGE AT MANHOLE (m)

SEE ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND OFF-SETTING PLAN BY KEYSTONE ENVIRONMENTAL

BEFORE YOU DIG

EXISTING UNDERGROUND UTILITIES SHOWN ON THIS DRAWING WERE COMPILED FROM A COMBINATION OF VARIOUS AS-CONSTRUCTED RECORD DRAWINGS AND SOME FIELD SURVEYS. THIS INFORMATION IS NOT NECESSARILY ACCURATE OR COMPLETE AND MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION WHERE POTENTIAL CONFLICTS EXIST. CONTRACTOR TO CONTACT TELUS, B.C. HYDRO, FORTISBC AND BC ONE CALL PRIOR TO CONSTRUCTION TO CONFIRM LOCATIONS OF UTILITIES AND APPURTENANCES REQUIRING ADJUSTMENT. ANY DISCREPANCIES REQUIRING CHANGES TO THE DESIGN MUST BE REPORTED TO KM CIVIL CONSULTANTS IMMEDIATELY.

LEGAL DESCRIPTION: LOTS 1 AND 2, EXCEPT: PART ON SRW PLAN LMP20327, SECTION 19, BLOCK 5, NORTH RANGE 2 WEST, NEW WESTMINSTER DISTRICT PLAN 14280 AND PARCEL 'B' (REF. PLAN 4663) FRACTIONAL SECTION 19 EXCEPT: FIRSTLY: PART 208.2 SQUARE METRES (BYLAW PLAN 58239), SECONDLY: PART ON SRW PLAN LMP20327, NEW WESTMINSTER DISTRICT

SURVEY BENCHMARK:ELEVATIONS DERIVED FROM CITY OF SURREY MONUMENT 10H2587 LOCATED AT THE INTERSECTION OF LOD YALE ROAD AND SCOTT ROAD EL.=2.269m (CVD28GVRD2018)

REV.	DATE	DESCRIPTION	BY
5			
4			
3			
2	2021.11.30	ISSUED FOR PER	SIM
1	2021.11.17	ISSUED FOR REVIEW	SIM

"BY SEALING AND SIGNING THIS DRAWING, I CERTIFY THAT THE INFORMATION CONTAINED IN THESE DRAWINGS ACCURATELY REFLECTS THE ORIGINAL DESIGN, ADDENDA, CHANGE ORDERS AND MATERIAL DESIGN CHANGES MADE DURING CONSTRUCTION AND FIELD REVIEWED BY ME, OR MY REPRESENTATIVE, AND THAT THE AS-CONSTRUCTED WORKS SUBSTANTIALLY COMPLY WITH THE ORIGINAL DESIGN INTENT, HOWEVER, I DO NOT ACCEPT RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE AS-CONSTRUCTED INFORMATION SUPPLIED BY OTHERS CONTAINED IN THESE DRAWINGS."

CONSULTANT

KM Civil CONSULTANTS LTD.

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CLIENT **WALES McLELLAND CONSTRUCTION**

6211 FRASERWOOD PLACE, RICHMOND, B.C., V6W 1J2
ATTENTION: JULIA VIGINI TEL:(604)638-1212

TITLE **STORM WATER MANAGEMENT PLAN**

10566, 10582 AND 10626 SCOTT ROAD, SURREY

SEAL — PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, S. I. McGREGOR # 25691 — 2021-11-30

SCALE: HOR. 1:1250 VERT.
DESIGNED
DRAWN NWP
REVIEWED SIM

DATE (YYYY.MM.DD) AUGUST, 2021
CONSULTANT PROJ. NO. 210574-C
DWG. NO. 9 OF 9
REV. 2

MUNICIPAL PROJECT NUMBER
DRAWING TYPE

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER