Regular Council - Land Use Agenda - Addendum #1

Council Chambers
City Hall
13450 - 104 Avenue
Surrey, B.C.
Live Streamed at surrey.ca
MONDAY, SEPTEMBER 23, 2024
Time: 5:30 p.m.

Live streamed via the City's website www.surrey.ca

E. OTHER BUSINESS

BYLAWS WITH PERMITS

1. Planning Report - Application No. 7921-0264-00, 7921-0264-01
6617 - 181 Street; 6618 - 180 Street

Owners: H. Kooner, M. Kooner, G. Kooner, C. Kooner
Agent: Gursimer Design & Management Inc. (Nirvair Singh)

To redesignate the site from Suburban to Urban and to rezone the site from Acreage Residential Zone to Small Lot Residential Zone in order to subdivide into thirteen small residential lots and one riparian open space (park) lot. In addition, the proposal includes a Development Variance Permit to reduce the minimum distance (streamside setback area) from top of bank for a Natural Class A Stream; to reduce the minimum distance (streamside setback area) from top of bank for a Natural Class B Stream; to reduce the minimum lot depth of an Interior Type I lot for proposed Lots 3 and 4; to reduce the minimum lot depth of an Interior Type II lot for proposed Lot 6; to reduce the minimum lot depth of an Interior Type II lot for proposed Lot 7; to reduce the minimum lot depth of an Interior Type I lot for proposed Lot 8; to reduce the minimum lot width of a Corner Lot Type I for proposed Lot 13; and to permit front accessed side-by-side double garage for proposed Lots 1, 3-5 and 8-12, and on a Type I corner lot for proposed Lot 13. The Development Permit is for Hazard Lands, and Sensitive Ecosystems.

"Surrey Official Community Plan Bylaw, 2013, No. 18020, Amendment Bylaw, 2023, No. 20992"

Final Adoption

"Surrey Zoning By-law, 1993, No. 12000, Amendment Bylaw, 2024, No. 21332"

Final Adoption

Development Variance Permit No. 7921-0264-01

That Council authorize the issuance of Development Variance Permit No. 7921-0264-01.

Development Permit No. 7921-0264-00

That Council authorize the issuance of Development Permit No. 7921-0264-00.

CITY OF SURREY
the future lives here.

INTER-OFFICE MEMO

TO: **City Clerk, Legislative Services Division**

FROM: **Director of Development Planning**
Planning & Development Department

DATE: **September 18, 2024** FILE: **7921-0264-00**

RE: **By-law No. 21332 and By-law No. 20992**
Development Application No. 79 21-0264-00

ADDRESS: 6617 - 181 Street
6618 - 180 Street

OWNERS: C. Kooner
G. Kooner
M. Kooner
H. Kooner

AGENT: Nirvair Singh Gursimer Design & Management Inc.
8686 - 166 Street
Surrey, BC V4N 5B2

PROPOSAL: OCP Amendment to redesignate the site from Suburban to Urban.

Rezoning from Acreage Residential Zone (RA) to Small Lot Residential Zone (R4).

Development Permit No. 7921-0264-00.

Development Variance Permit No. 7921-0264-01 (presented under CR-R147).

To permit subdivision into thirteen (13) single family small lots and one (1) riparian open space (park) lot.

OCP Amendment By-law No. 20992 **received** Third **Reading on July 24, 2023.** Rezoning By-law No. 21332 received Third Reading on September 9, 2024.

All conditions of approval with respect to these By-laws have been completed.

It is in order for Council to grant Final Adoption to these By-laws.

Staff was authorized to draft Development Permit No. 7921-0264-00 on July 10, 2023.

Development Permit No. 7921-0264-00 is running in conjunction with Development Variance Permit No. 7921-0264-01 which, after Public Notification, was supported by Council on September 9, 2024.

As a result of changes to Surrey Zoning Bylaw, No. 12000, 1993, as amended, to support small-scale multi-unit housing updates, Rezoning By-law No. 20993 and Development Variance Permit No. 7921-0264-00, which proposed rezoning to the old "Single Family Residential (13) Zone (RF-13) Zone", and varied provisions to that zone, are no longer valid. Corporate Report No. R147, dated July 18, 2024, was brought forward at the July 22, 2024, Regular Council – Land Use meeting for consideration of filing of Rezoning By-law No. 20993, sending a new Rezoning By-law No. 21332, which updates the zoning from RF-13 to the new "Small Lot Residential Zone (R4)", and to send the revised Development Variance Permit No. 7921-0264-01, which updates the zoning from RF-13 to the new "Small Lot Residential Zone (R4)" to Public Notification.

If Council issues Development Variance Permit No. 7921-0264-01, it is in order for Council to issue Development Permit No. 7921-0264-00 and to authorize the Mayor and Clerk to execute the Development Permit.

Note: If the Development Permit, as presented, is not acceptable to Council in relation to the appropriateness of the proposed development of Hazard Lands and the protection of Sensitive Ecosystems, Council may refer the Development Permit application back to staff with direction regarding these matters.

Legislative Services is requested to hold registration of the Notice on Title with respect to this Development Permit at Land Title Office, pending a new legal description for the property.

Shawn Low
Director of Development Planning
E1M

CITY OF SURREY

BYLAW NO. 21332

A bylaw to amend Surrey Zoning By-law, 1993, No. 12000, as amended.

.....

The Council of the City of Surrey ENACTS AS FOLLOWS:

1. Surrey Zoning By-law, 1993, No. 12000, as amended, is hereby further amended pursuant to the provisions of Section 479 of the *Local Government Act*, R.S.B.C. 2015, c.1, as amended, by changing the classification of the following parcels of land, presently shown upon the maps designated as the Zoning Maps and marked as Schedule A under Part 3 of Surrey Zoning By-law, 1993, No. 12000, as amended, as follows:

FROM: ACREAGE RESIDENTIAL ZONE (RA)
TO: SMALL LOT RESIDENTIAL ZONE (R4)

PID: 003-036-189
Lot 37 Section 17 Township 8 New Westminster District Plan 62186

(6617 – 181 Street)

PID: 003-036-197
Lot 38 Section 17 Township 8 New Westminster District Plan 62186

(6618 – 180 Street)

2. This Bylaw shall be cited for all purposes as "Surrey Zoning By-law, 1993, No. 12000, Amendment Bylaw, 2024, No. 21332".

PASSED FIRST READING on the 9th day of September, 2024.
PASSED SECOND READING on the 9th day of September, 2024.
PASSED THIRD READING on the 9th day of September, 2024.

RECONSIDERED AND FINALLY ADOPTED, signed by the Mayor and Clerk, and sealed with the Corporate Seal on the th day of , 20 .

_____MAYOR

_____CLERK

CITY OF SURREY

BYLAW NO. 20992

A bylaw to amend the provisions of Surrey Official Community Plan Bylaw, 2013, No. 18020, as amended.

.....

The Council of the City of Surrey ENACTS AS FOLLOWS:

1. Surrey Official Community Plan Bylaw, 2013, No. 18020, as amended, is hereby further amended by modifying "Figure 3, General Land Use Designations" of the Land Uses and Densities Section by changing the land use designation for the area shown shaded on the plan labeled Schedule A, attached hereto as follows:

FROM: SUBURBAN (SUB)

TO: URBAN (URB)

PID: 003-036-189
Lot 37 Section 17 Township 8 New Westminster District Plan 62186

(6617 – 181 Street)

PID: 003-036-197
Lot 38 Section 17 Township 8 New Westminster District Plan 62186

(6618 – 180 Street)

2. This Bylaw shall be cited for all purposes as "Surrey Official Community Plan Bylaw, 2013, No. 18020, Amendment Bylaw, 2023, No. 20992".

PASSED FIRST READING on the 10th day of July, 2023.

PASSED SECOND READING on the 10th day of July, 2023.

PUBLIC HEARING HELD thereon on the 24th day of July, 2023.

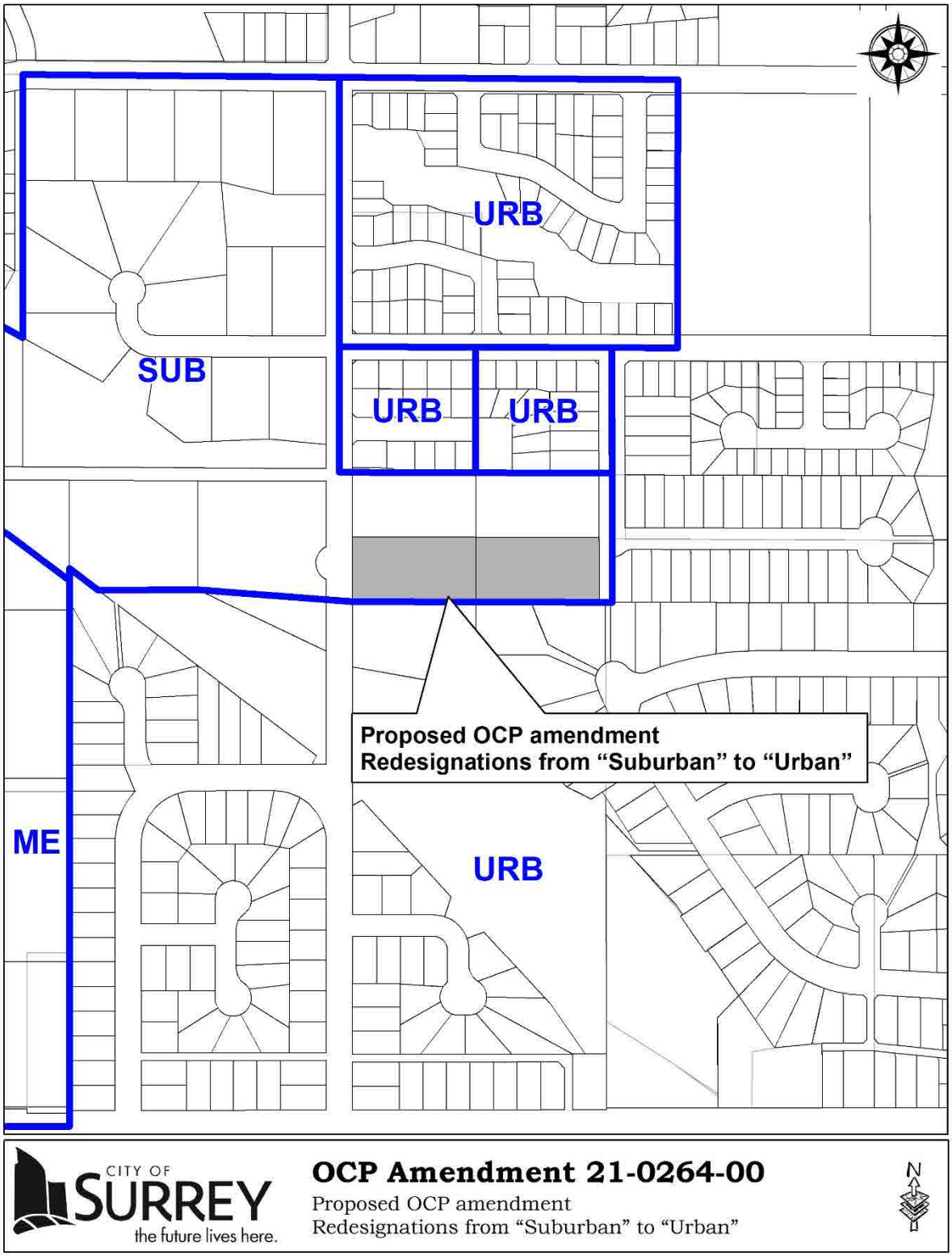
PASSED THIRD READING on the 24th day of July, 2023.

RECONSIDERED AND FINALLY ADOPTED, signed by the Mayor and Clerk, and sealed with the Corporate Seal on the th day of , 20__.

_____MAYOR

_____CLERK

SCHEDULE A


URB
SUB
URB
URB
Proposed OCP amendment
Redesignations from "Suburban" to "Urban"
ME
URB
CITY OF SURREY
the future lives here.
OCP Amendment 21-0264-00
Proposed OCP amendment
Redesignations from "Suburban" to "Urban"
N

B. DELEGATIONS - PUBLIC HEARING

5. "Surrey Official Community Plan Bylaw, 2013, No. 18020, Amendment Bylaw, 2023, No. 20992"
"Surrey Zoning By-law, 1993, No. 12000, Amendment Bylaw, 2023, No. 20993"
Application No. 7921-0264-00

CIVIC ADDRESS: 6617 - 181 Street; 6618 - 180 Street

APPLICANT: Owners: H. Kooner, M. Kooner, G. Kooner, C. Kooner
Agent: Gursimer Design & Management Inc. (Nirvair Singh)

PURPOSE: The applicant is requesting to amend the Official Community Plan (OCP) Figure 3: General Land Use Designations for the subject site from Suburban to Urban. The proposal also includes rezoning the same site from One-Acre Residential Zone to Single Family Residential (13) Zone in order to facilitate subdivision into thirteen single family small lots and one riparian open space (park) lot. In addition, the proposal includes a Development Variance Permit to:

- Reduce the minimum streamside setback area, measured from top of bank, for a Natural Class A Stream from 30 metres to no less than 20 metres;
- Reduce the minimum streamside setback area, measured from top of bank, for a Natural Class B Stream from 15 metres to no less than 10 metres;
- Reduce the minimum lot depth of Type I lots from 28 metres to 26.9 metres for proposed Lots 3 and 4;
- Reduce the minimum lot depth of Type II lots from 24 metres to 18.4 metres for proposed Lot 6;
- Reduce the minimum lot depth of Type II lots from 24 metres to 21 metres for proposed Lot 7;
- Reduce the minimum lot depth of Type I lots from 28 metres to 25.6 metres for proposed Lot 8;
- Reduce the minimum lot width of Type I corner lots from 14 metres to 12 metres for proposed Lot 13; and
- Permit front accessed double side-by-side garages on a lot less than 13.4 metres in width for proposed Lots 1 ,3-5 and 8-12, and on a Type I corner lot for proposed Lot 13.

The Notice of the Public Hearing was read by the City Clerk.

Mayor Locke and Councillor Kooner declared a conflict of interest and left the meeting at 7:31 p.m. Councillor Nagra assumed the position of Chair as Acting Mayor.

R. Landale, Fleetwood: The delegation expressed opposition to the proposal citing tree removal, parkland, riparian ecosystem, fees, and geotechnical report.

D. Jack, Surrey Environmental Partners: The delegation spoke to tree removal, riparian setbacks, Official Community Plan, and reduced water courses.

A. Kaps, North Surrey: The delegation spoke to variances to stream setbacks.

C. Brigelson, Surrey: The delegation spoke in opposition to the proposal citing the narrow street, parking, density, overcrowded schools, and lot size.

Written submissions were received as follows:

- R. Landale expressing opposition for the proposal citing trees, ecosystem, road, ground stability, park, character, social services and amenities.
- Petition received on July 24, 2023. 10 petition signatures in support for the proposal.
- C. Walashek expressing opposition for the proposal citing trees, ecosystem, road, ground stability, park, character, social services and amenities.
- S. Soo expressing opposition for the proposal citing trees, ecosystem, road, ground stability, park, character, social services and amenities.
- E. Pereira expressing opposition for the proposal citing potential flooding and trees.
- N. Connor expressing concerns for the proposal citing loss of quiet and private backyard, trees, wildlife habitat and fence.

Mayor Locke and Councillor Kooner rejoined the meeting at 7:45 p.m. and the Mayor re-assumed the position of Chair.

Councillor Hepner left the meeting at 7:46 p.m.

CITY OF SURREY

(the "City")

DEVELOPMENT VARIANCE PERMIT

NO.: 7921-0264-01

Issued To:

("the Owners")

Address of Owners:

Issued To:

("the Owners")

1. This development variance permit is issued subject to compliance by the Owner with all statutes, by-laws, orders, regulations or agreements, except as specifically varied by this development variance permit.

2. This development variance permit applies to that real property including land with or without improvements located within the City of Surrey, with the legal description and civic address as follows:

Parcel Identifier: 003-036-189
Lot 37 Section 17 Township 8 New Westminster District Plan 62186
6617 - 181 Street

Parcel Identifier: 003-036-197
Lot 38 Section 17 Township 8 New Westminster District Plan 62186
6618 - 180 Street

(the "Land")

3. (a) As the legal description of the Land is to change, the City Clerk is directed to insert the new legal description for the Land once title(s) has/have been issued, as follows:

Parcel Identifier:

_____

(b) If the civic address(es) change(s), the City Clerk is directed to insert the new civic address(es) for the Land, as follows:

_____

4. Surrey Zoning By-law, 1993, No. 12000, as amended is varied as follows:

(a) In Section B.1 of Part 7A "Streamside Protection", the minimum distance (streamside setback area) from top of bank for a "Natural Class A Stream" is reduced from 30 metres to 20 metres;

(b) In Section B.1 of Part 7A "Streamside Protection", the minimum distance (streamside setback area) from top of bank for a "Natural Class B Stream" is reduced from 15 metres to 10 metres;

(c) In In sub-Section C.2 of Part 16 “Small Lot Residential Zone (R4)” the minimum lot depth of the R4 (Interior Type I) is reduced from 28 metres to 26.9 metres for proposed Lots 3 and 4;

(d) In sub-Section C.2 of Part 16 “Small Lot Residential Zone (R4)” the minimum lot depth of the R4 (Interior Type II) is reduced from 24 metres to 18.4 metres for proposed Lot 6;

(e) In sub-Section C.2 of Part 16 “Small Lot Residential Zone (R4)” the minimum lot depth of the R4 (Interior Type II) is reduced from 24 metres to 21 metres for proposed Lot 7;

(f) In sub-Section C.2 of Part 16 “Small Lot Residential Zone (R4)” the minimum lot depth of the R4 (Interior Type I) is reduced from 28 metres to 25.6 metres for proposed Lot 8;

(g) In sub-Section C.2 of Part 16 “Small Lot Residential Zone (R4)” the minimum lot width of the R4 (Corner Lot Type I) is reduced from 14 metres to 12 metres for proposed Lot 13; and

(h) In sub-section H.4(a) Off-Street Parking of Part 16 “Small Lot Residential Zone (R4)” a front access, side-by-side double garage shall be permitted on a lot less than 13.4 metres in width for proposed Lots 1, 3-5 and 8-12, and on a Type I corner lot for proposed Lot 13.

5. This development variance permit applies to only the portion of the Land shown on Schedule A which is attached hereto and forms part of this development variance permit.

This development variance permit does not apply to additions to, or replacement of, any of the existing buildings shown on attached Schedule A, which is attached hereto and forms part of this development variance permit.

6. The Land shall be developed strictly in accordance with the terms and conditions and provisions of this development variance permit.

7. This development variance permit shall lapse unless the subdivision, as conceptually shown on Schedule A which is attached hereto and forms part of this development variance permit, is registered in the New Westminster Land Title Office within three (3) years after the date this development variance permit is issued.

8. The terms of this development variance permit or any amendment to it, are binding on all persons who acquire an interest in the Land.

9. This development variance permit is not a building permit.

AUTHORIZING RESOLUTION PASSED BY THE COUNCIL, THE DAY OF , 20 .
ISSUED THIS DAY OF , 20 .

_____
Mayor – Brenda Locke

_____
City Clerk – Jennifer Ficocelli

Schedule A

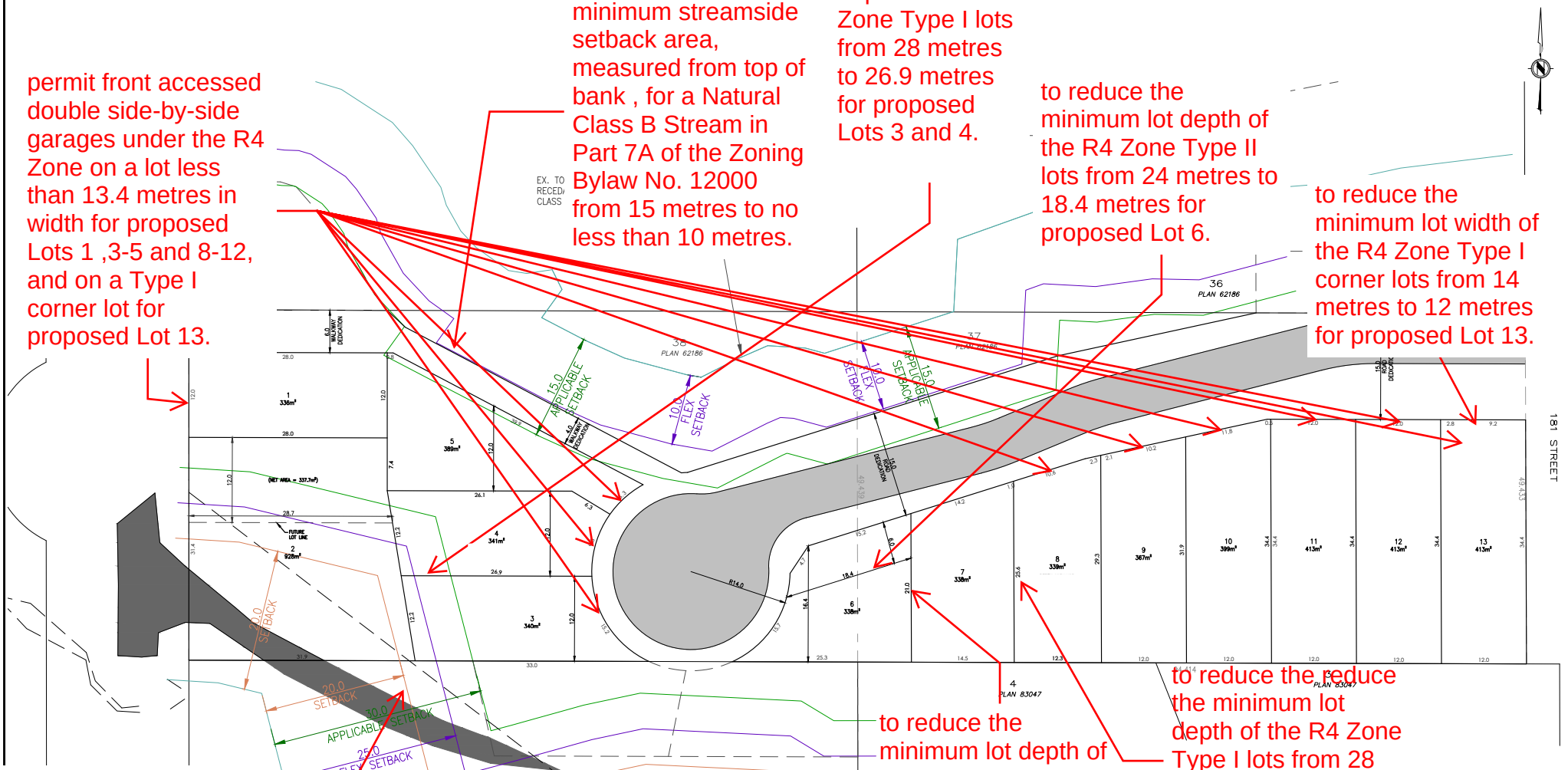
permit front accessed double side-by-side garages under the R4 Zone on a lot less than 13.4 metres in width for proposed Lots 1 ,3-5 and 8-12, and on a Type I corner lot for proposed Lot 13.

to reduce the minimum streamside setback area, measured from top of bank , for a Natural Class B Stream in Part 7A of the Zoning Bylaw No. 12000 from 15 metres to no less than 10 metres.

to reduce the minimum lot depth of the R4 Zone Type I lots from 28 metres to 26.9 metres for proposed Lots 3 and 4.

to reduce the minimum lot depth of the R4 Zone Type II lots from 24 metres to 18.4 metres for proposed Lot 6.

to reduce the minimum lot width of the R4 Zone Type I corner lots from 14 metres to 12 metres for proposed Lot 13.



to reduce the minimum lot depth of the R4 Zone Type II lots from 24 metres to 21 metres for proposed Lot 7.

to reduce the reduce the minimum lot depth of the R4 Zone Type I lots from 28 metres to 25.6 metres for proposed Lot 8.

to reduce the minimum streamside setback area, measured from top of bank, for a Natural Class A Stream in Part 7A of the Zoning Bylaw No. 12000 from 30 metres to no less than 20 metres.

CITY OF SURREY

(the "City")

DEVELOPMENT PERMIT

NO.: 7921-0264-00

Issued To:

("the Owners")

Address of Owners:

("the Owners")

A. General Provisions

1. This development permit is issued subject to compliance by the Owner with all statutes, by-laws, orders, regulations or agreements, except as specifically varied by this development permit.

2. This development permit applies to that real property including land with or without improvements located within the City of Surrey, with the legal description and civic address as follows:

Parcel Identifier: 003-036-189
Lot 37 Section 17 Township 8 New Westminster District Plan 62186
6617 - 181 Street

Parcel Identifier: 003-036-197
Lot 38 Section 17 Township 8 New Westminster District Plan 62186
6618 - 180 Street

(the "Land")

3. As the legal description of the Land will change, the City Clerk is directed to insert the new legal description for the Land once title(s) has/have been issued, as follows:

Parcel Identifier:_____

_____**LEGAL**

4. If the civic address(es) of the Land change(s), the City Clerk is directed to insert the new civic address(es) for the Land, as follows:

_____**CIVIC**

5. This development permit applies to only the portion of the Land shown on Schedule A which is attached to and forms part of this development permit.

6. The Land has been designated as a development permit area in Surrey Official Community Plan, 2013, No. 18020, as amended.

B. Hazard Lands

1. Development shall occur strictly in accordance with the Geotechnical Report prepared by Stuart Hrysio, P. Eng., of Braun Geotechnical Consultants Ltd., dated June 28, 2023, attached to this development permit as Schedule B (the "Geotechnical Report").

2. Geotechnical specifications, including erosion, slope stability and soil detention shall be implemented, monitored and inspected in accordance with the approved grading lot plan attached as Schedule C (the "Lot Grading Plan").

3. Erosion and Sediment Control shall be installed, monitored and inspected in conformance with the City's Erosion and Sediment Control By-law, as may be amended or replaced from time to time.

4. Lot site grading shall occur only in accordance with the grading plan attached, as Schedule C, and the geotechnical recommendations contained within the report prepared by Stuart Hrysio, P. Eng., of Braun Geotechnical Consultants Ltd., dated June 28, 2023, attached to this development permit as Schedule B (the "Geotechnical Report").

C. Sensitive Ecosystem

1. Development shall occur strictly in accordance with the Ecosystem Development Plan prepared by Remi Masson, R.P.Bio of Red Cedar Environmental Consulting Inc., attached to this development permit as Schedule D (the "Ecosystem Development Plan").

2. The Riparian Protection Area, including the Riparian Setback Area as defined in Surrey Zoning By-law, as may be amended or replaced from time to time, shall be established,

inspected and maintained in accordance with the approved Ecosystem Development Plan attached as Schedule D (the "Ecosystem Development Plan").

3. Tree removal and vegetation disturbance shall be undertaken, monitored, inspected and maintained in accordance with the reports attached. Tree removal and protective fencing shall be undertaken in accordance with the Arborist Report dated February 13, 2024 and prepared by Francis Klimo, ISA Certified Arborist of Klimo and Associates Ltd., attached as Schedule E (the "Arborist Report).

4. Riparian Protection Areas shall remain free of development and left undisturbed.

5. Habitat protection, mitigation, compensation and rehabilitation works shall be completed in accordance with the Ecosystem Development Plan prepared by Remi Masson, R.P.Bio of Red Cedar Environmental Consulting Inc., attached to this development permit as Schedule D (the "Ecosystem Development Plan").

6. Minor changes to the Drawings that do not affect the Riparian Protection Area or Green Infrastructure Protection Area, as identified and forming part of this development permit, site grading, soil stability, building placement, runoff or vegetation on the Land, may be permitted subject to the approval of the City.

D. Landscaping Installation and Maintenance

1. The landscaping shall be constructed, planted, installed and maintained in good order in accordance with the Ecosystem Development Plan.

2. For Form and Character development permits, or for that portion of a development permit pertaining to Form and Character, the Landscaping shall be installed and completed within six (6) months after the date of the final inspection of the buildings and structures.

3. For Hazard Land, Sensitive Ecosystem and Farm Protection development permits, or for that portion of a development permit pertaining to a Hazard Land, Sensitive Ecosystem or Farm Protection, the Landscaping shall be completed PRIOR TO the issuance of a building permit, as identified in Development Permit Procedures and Delegation Bylaw, as may be amended or replaced from time to time.

4. For Form and Character development permits, Landscaping shall be maintained for a minimum of twelve (12) months after the date of substantial completion.

5. For Hazard Land, Sensitive Ecosystem and Farm Protection development permits, or for that portion of a development permit pertaining to Hazard Land, Sensitive Ecosystem or Farm Protection, Landscaping shall be maintained for a minimum of five years after the

date of substantial completion and shall be confirmed "free to grow" at the end of the maintenance period.

E. Security and Inspections

1. Security must be submitted to the City prior to the installation of any Landscaping.

2. For Hazard Land, Sensitive Ecosystem and Farm Protection development permits, security must be submitted prior to the issuance of any Development Permit, Building Permit or Tree-cutting Permit.

3. For Hazard Land, Sensitive Ecosystem or Farm Protection development permits, or that portion of the development pertaining to the Hazard Land, Sensitive Ecosystem or Farm Protection component, the Security amount is for: $58,543.62.

4. Security release will only be considered once installation of the Landscaping has been completed, after final approval of the installation has been given by the City, and after the completion by the Owner of any required maintenance periods identified in this development permit, to the satisfaction of the City.

5. For Hazard Land, Sensitive Ecosystem and Farm Protection development permits, when Landscaping requirements and permit requirements have been substantially completed and approved by the City AND upon successful completion of the MINIMUM FIVE YEAR maintenance period, to the satisfaction of the Qualified Environmental Professional and the City, with Landscaping confirmed at the 'free to grow stage' (as confirmed and approved by the City), and without the City having to use the Security, 100% of the original Security will be returned.

6. If final approval of the Landscaping installation and maintenance is not given by the City, the City has the option of using the Security to compete the Landscaping (or to hire a contractor to complete the work on the City's behalf) with any remaining money returned to the Owner. The Owner authorizes the City or its agent to enter upon the Land to complete the Landscaping.

7. If the City elects not to enter upon the Land to complete the Landscaping and the Owner does not complete the Landscaping, the Security is forfeited to the City five (5) years after the date of the provisional or final inspection of the buildings and structures referred to in the Drawings.

F. Monitoring

1. A Qualified Environmental Professional must be retained by the Owner to ensure completion of the works in accordance with this Development Permit and shall submit monitoring reports and a completion report to the City.

2. Upon completion of the development, the Owner shall provide the City with confirmation from the Qualified Professional(s) that the development is complete in accordance with the terms of this development permit.

3. A Qualified Environmental Professional must be retained by the Owner to ensure completion of the works in accordance with this development permit and shall submit monitoring reports and a completion report to the City.

G. Administration

1. The Land shall be developed strictly in accordance with the terms and conditions and provisions of this development permit.

2. This development permit shall lapse if the Owner does not substantially start any construction with respect to which this development permit is issued within two (2) years after the date this development permit is issued. The terms and conditions of this development permit, and any amendment to it, are binding on any and all persons who acquire an interest in the Land.

3. This development permit is only valid for the development that is described in this development permit. If a change to development is considered, a new development permit or an amendment to this permit is required before any work is started.

4. All reports, documents and drawings referenced in this development permit shall be attached to and form part of this development permit.

5. In addition to this development permit, and in accordance with the Surrey Building Bylaw, as may be amended or replaced from time to time, a restrictive covenant for steep slopes has been registered on the Land for Hazard Lands – Steep Slopes.

6. This development permit is issued subject to compliance by the Owner and the Owner's employees, contractors and agents with all applicable City bylaws, including the Tree Protection Bylaw, Erosion and Sediment Control Bylaw and the Soil Removal and Deposition Bylaw, all as may be amended or replaced from time to time.

7. This development permit is NOT A BUILDING PERMIT.

AUTHORIZING RESOLUTION PASSED BY THE COUNCIL/DELEGATED OFFICIAL, THE

DAY OF , 20 .

ISSUED THIS DAY OF , 20 .

_____

Mayor

City Clerk

IN CONSIDERATION OF COUNCIL APPROVAL OF THIS DEVELOPMENT PERMIT AND OTHER GOOD AND VALUABLE CONSIDERATION, I/WE THE UNDERSIGNED AGREE TO THE TERMS AND CONDITIONS OF THIS DEVELOPMENT PERMIT AND ACKNOWLEDGE THAT WE HAVE READ AND UNDERSTOOD IT.

Owner: (Signature)

H[redacted] KOONER

Name: (Please Print)

Owner: (Signature)

G[redacted] KOONER

Name: (Please Print)

Owner: (Signature)

C[redacted] KOONER

Name: (Please Print)

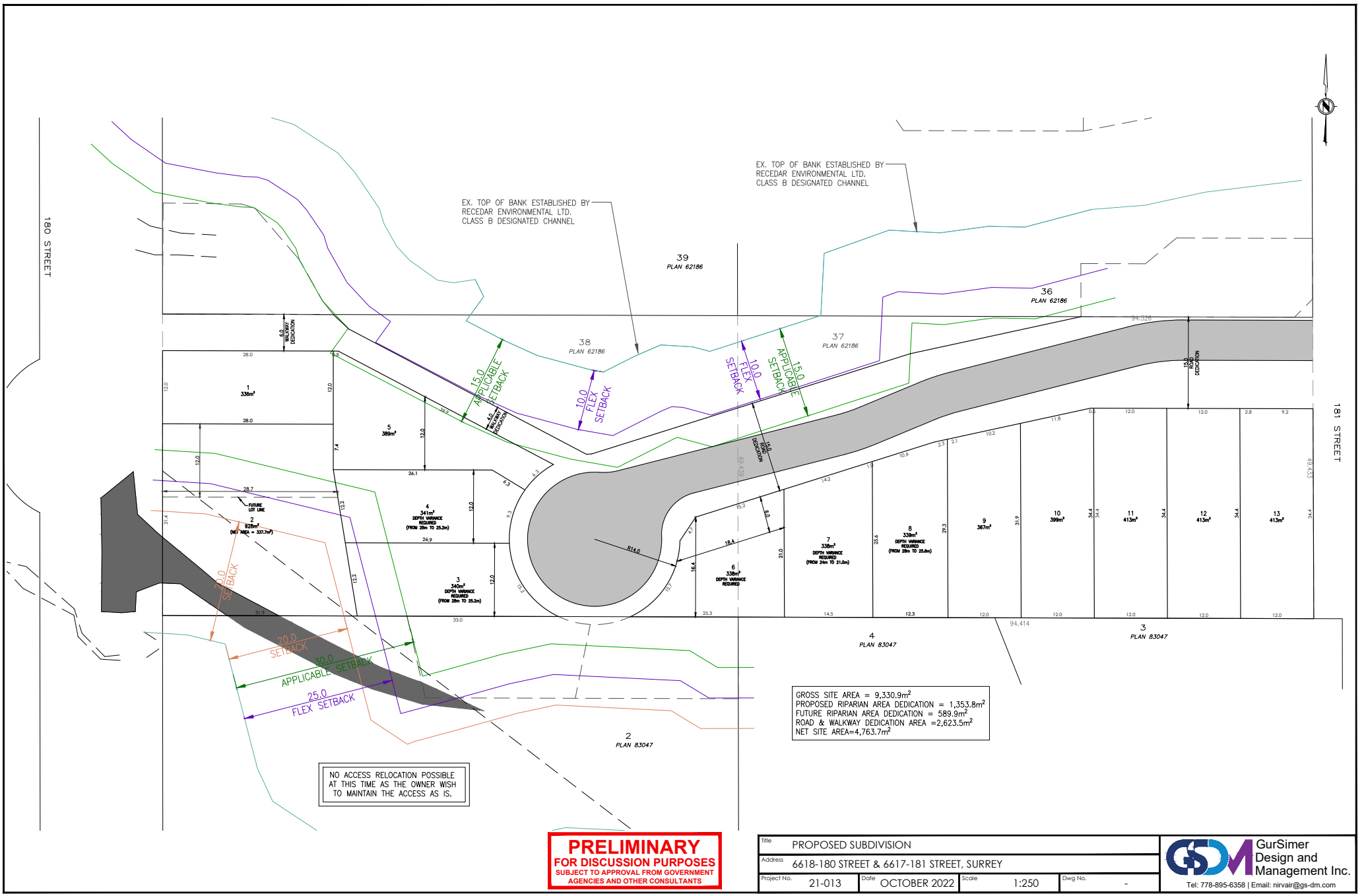
M[redacted] KOONER

Owner: (Signature)

M[redacted] KOONER

Name: (Please Print)

Schedule A



GROSS SITE AREA = 9,330.9m²
PROPOSED RIPARIAN AREA DEDICATION = 1,353.8m²
FUTURE RIPARIAN AREA DEDICATION = 589.9m²
ROAD & WALKWAY DEDICATION AREA =2,623.5m²
NET SITE AREA=4,763.7m²

NO ACCESS RELOCATION POSSIBLE AT THIS TIME AS THE OWNER WISH TO MAINTAIN THE ACCESS AS IS.

PRELIMINARY
FOR DISCUSSION PURPOSES
SUBJECT TO APPROVAL FROM GOVERNMENT AGENCIES AND OTHER CONSULTANTS

Title: PROPOSED SUBDIVISION				
Address: 6618-180 STREET & 6617-181 STREET, SURREY				
Project No.: 21-013	Date: OCTOBER 2022	Scale: 1:250	Dwg No.: -	

GurSimer Design and Management Inc.
Tel: 778-895-6358 | Email: nirvair@gs-dm.com

PTP# 1002594

BRAUN GEOTECHNICAL LTD.

June 28, 2023 (Rev.1)

Our File: 21-9249

Via email: nirvair@gs-dm.com

C[redacted] Kooner
6617 181 Street
Surrey, BC V3V 9A2

Attn: C[redacted] Kooner

Re: Geotechnical Exploration Report
Proposed Subdivision
6618 180 Street & 6617 181 Street, Surrey, BC

1.0 INTRODUCTION

As requested, Braun Geotechnical Ltd. has carried out a geotechnical exploration for the above-referenced project. The geotechnical work has been performed in general accordance with the terms and conditions of the Braun Geotechnical proposal October 18, 2021 (our reference No. P21-7673). The scope of work included onsite subsurface exploration, a geotechnical slope setback assessment, Benkelman Beam testing and provision of offsite pavement recommendations. No consideration has been given to any environmental aspects.

It is understood that the proposed development is located within an identified City of Surrey Hazard Lands Development Permit Area. This report has been prepared in general accordance with the City of Surrey Hazard Lands DP2 Development Permit Guidelines, dated May 29, 2017, and the Engineers & Geoscientists (EGBC) Professional Practice Guideline "Natural Hazards Landslide Assessments in British Columbia" Version 4.1, dated March 1, 2023.

The scope of service was limited to evaluation of geotechnical characteristics at the site and no consideration has been given to any environmental aspects. Braun Geotechnical should be forwarded final project drawings when they become available and be provided the opportunity to review and comment on geotechnical aspects.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site comprised of two parcels located at 6618 180 street & 6617 181 Street, in the City of Surrey, BC. The subject site is approximately rectangular in shape with maximum overall plan dimensions of approximately 49 x 189m. The site slopes down gently to the west/northwest at an overall gradient of approximately 16H:1V (horizontal to vertical) or flatter, with localized over-steepened areas as steep as approximately 9H:1V or flatter. The proposed development area is located immediately south of an existing watercourse (City of Surrey Watercourse 76721) which passes through the northeast section of the of parcel 6618 180 Street.

Details of the proposed development were provided on drawings "Site Grading Plan" dated May 19, 2023 prepared by GurSimer Design and Management Inc. It is

Foundations, Excavation & Shoring Specialists

Braun Geotechnical
102 – 19040 95A Ave.
Surrey, BC
V4N 4P3
Tel: 604-513-4190
Fax: 604-513-4195
info@braungeo.com

www.braungeo.com

understood that the site would be developed into 13 Single Family Dwelling (SFD) residential lots. It is understood that offsite roadworks for the proposed development include upgrade/widening of 180 Street and 181 Street along development frontage as required. Onsite road construction is proposed to service lots from 181 Street.

It is understood that 180 Street, 181 Street, and the proposed onsite roadway and Laneway are classified by the City of Surrey as Local, in the vicinity of the proposed development.

It is understood that a minimum10m environmental setback from the top of bank of Watercourse 76721 is proposed.

At the time of the geotechnical exploration and a follow up site reconnaissance completed on June 23, 2023 each land parcel was occupied by an existing SFD with associated driveways, landscaped areas, large trees and low underbrush type vegetation.

3.0 SITE EXPLORATION

Six test pits (TP21-01 to TP21-06) were excavated on November 18, 2021 using a tracked excavator under subcontract to Braun Geotechnical to depths of 1.8 to 2.6m. Two shallow hand pits, HP21-01 and HP21-02 were also excavated adjacent to the northbound lane of 180 Street and southbound lane of 181 Street on November 9, 2023 for offsite pavement rehabilitation considerations. Subsurface conditions were logged in the field by Braun Geotechnical and representative soil samples were returned for further classification. Approximate test pit and hand pit locations are shown on the attached Location Plan (Dwg. 21-9249-SEC-01).

4.0 SOIL AND GROUNDWATER CONDITIONS

Review of available published and in-house geological information indicated that the study site area is underlain by Capilano sediments, comprising mainly marine silt loam to clay loam with minor sand, silt, and stony glaciomarine material and/or Vashon Drift and Capilano Sediments comprising lodgment and minor flow till, lenses and interbeds of substratified glaciofluvial sand to gravel and lenses and interbeds of glaciolacustrine laminated stony silt. The findings of the test pit exploration were generally consistent with the regional geological information.

The findings of the test pit exploration are detailed on the attached test pit logs. A generalized subsoil profile based on the test pits is summarized below.

FILL/ORGANICS
Dark-Brown, damp, soft to firm SILT to loose silty SAND, with some organics, trace to some gravel, occasional cobbles, and occasional root/rootlets encountered within each test pit to depths of approximately 0.1 to 0.5m. This surficial soil type was inferred to be disturbed/re-graded natural surficial organics and/or import landscape type fill.

SAND
Brown, damp, compact silty SAND, with occasional organics was encountered in TP21-01 and TP21-04 to approximate depths of 0.8 and 0.6m, respectively.

SILT
Grey-brown to grey, occasionally rust mottled, damp, stiff to very stiff SILT with some sand to sandy SILT, with occasional zones of trace to some gravel and occasional cobbles was encountered within each test to depth of test pit exploration.

GROUNDWATER
Static groundwater and/or significant sidewall seepage was not encountered within the test pits at the time of exploration. Depending on the season and/or weather conditions,

near-surface seepage flows should be anticipated within soil layers overlying the relatively low permeable stiff to very stiff natural soils. Groundwater levels and near-surface run-off flows are expected to fluctuate seasonally, and with drainage conditions.

The subsurface conditions described above were encountered at the test pit locations only. Subsurface conditions at other locations could vary.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

It is considered that the proposed residential structures can be supported on the underlying natural stiff to very stiff soils, and/or on structural fills placed thereon, using conventional shallow strip and pad footings. The following sections provide our geotechnical recommendations for site preparation and foundation design.

5.2 Site Preparation

Site preparation below the proposed structures, roadway widening areas, asphalt paved areas subject to traffic load, and areas proposed for site grading fill, should include removal of all vegetation, organic soils, soft disturbed soils, soft to firm/loose to compact soils, existing fill and other deleterious material down to the natural, undisturbed stiff to very stiff silt.

Stripped surfaces should be reviewed by a qualified Geotechnical Engineer prior to placing foundations or structural fills.

Drainage measures should be implemented to reduce potential for water ponding on exposed subgrades. Temporary and final grades should be established so as to avoid uncontrolled offsite discharge of surface and/or near-surface run-off flows. Note that large boulders may be encountered during site preparation activities which could require additional excavation measures such as blasting or rock splitting.

5.3 Structural Fill & Trench Backfill

Subgrade restoration fills & general trench backfills below roadway areas should consist of structural fill comprised of MMCD compliant subbase material with less than 5% fines (percent passing the #200 sieve). Structural fill should be placed and compacted in maximum 300mm loose lifts with each lift compacted to at least 95% MPD. For confined areas, structural fill placed under building and roadway pavements should extend horizontally beyond by a distance equal to at least the thickness of structural fill. Unconfined fills should typically extend horizontally by a distance equal to 2 times the thickness of structural fill.

Density testing should be carried out during fill placement on a regular basis to confirm adequacy of compaction, and the results forwarded to Braun Geotechnical for review. Braun Geotechnical should also be contacted to review fill quality, and placement and compaction procedures.

Excavated site soils would generally not be considered re-usable as structural fill.

5.4 Slopes

5.4.1 Temporary Cut Slopes and Utility Trenches

Temporary excavations for worker entry may be slope cut, or alternatively suitable support systems should be provided. It is anticipated that proposed utility excavations could be achieved using conventional excavation and/or trench box methods dewatered using conventional pumping sumps.

In general, excavations up to 1.2 m deep can be cut near vertical in accordance with WorkSafeBC regulations. Deeper unsupported excavation cuts should be sloped at 1H:1V in fill, soft to firm soils and overburden materials, and 3H:4V in stiff to very stiff natural soils. These recommended cut slopes should be reviewed by a Geotechnical Engineer during excavation and may require modification based on actual site conditions. Flatter slopes may be required if poor soil conditions or heavy seepage is encountered.

5.4.2 Permanent Slopes

The recommended maximum permanent cut slope angle is 2H:1V. Fill slopes consisting of suitably compacted native mineral or import granular soils should be constructed at gradients no steeper than 2.5H:1V. Permanent slopes should typically be planted or otherwise protected from erosion as soon as practical.

5.5 Residential House Foundations

It is recommended that foundations for the proposed SFDs be supported on natural, undisturbed, stiff to very stiff soils, and/or structural fills placed thereon. Basement levels would be feasible for geotechnical considerations. The following soil resistance (bearing) values should be adopted for preliminary foundation design:

Foundation Subgrade	**Limit States Design**		**Working Stress Design**
	Factored Ultimate Bearing Resistance	**Serviceability Limit State**	**Allowable Bearing Pressure DL + LL**
Natural Stiff to Very Stiff Soils and/or Compacted Structural Fill	144 kPa (3000 psf)	96 kPa (2000 psf)	96 kPa (2000 psf)

Note: Larger bearing values may be feasible for specific foundation configurations and can be reviewed upon request.

The above design bearing pressures for soil subgrade assume the following:

- Strip and pad footings have minimum widths of 450mm (18") and 600mm (24"), respectively.
- Footings are founded at least 450mm (18") below final finished adjacent grade.
- Site preparation is completed as indicated above and load-bearing surfaces are reviewed and approved by the Geotechnical Engineer.
- Foundation bearing surfaces are no higher than 2H:1V (Horizontal to Vertical) from the base or toe of adjacent walls, retaining structures, etc.
- Footings are placed below a 1H:1V line projected up from lower footings or buried structures such as utility lines, sumps, etc.
- Silty subgrade areas are protected immediately after exposure.

Foundation bearing surfaces should be reviewed by a Geotechnical Engineer. Any soft, wet, or deleterious material encountered at bearing surface level should be sub-excavated and replaced with structural fill compacted in maximum 300mm thick lifts to at least 95% MPD.

5.6 Backfill

Perimeters backfill and fill for support of exterior residential sidewalks, driveway, patios, etc. should typically consist of relatively clean, well-graded, granular material, placed and compacted in maximum 300mm thick loose lifts to at least 90 % MPD.

Walk behind plate tamper compactors should be used to compact backfill within 1m of foundation walls to avoid excessive buildup of lateral earth stresses against the walls and the lift thickness in these areas should typically be reduced to 200mm.

All backfill should be placed in a manner that avoids damaging the foundation walls, perimeter drains, and damp-proofing or waterproofing on the wall. Proposed grades should slope away from the proposed SFDs to promote flow of surface water runoff away from the SFDs. A 300mm thick layer of relatively low permeable soil should be placed at surface to minimize surface water entering the perimeter fill and, in turn, the perimeter drainage system.

5.7 Slab on Grade

The slab on grade should be underlain by a drainage layer comprising a minimum 100mm (4") thick layer of 20mm clear crushed gravel (no sand, no fines). This drainage layer should have a suitable discharge to the permanent municipal storm system. Polyethylene sheeting should also be provided beneath the floor slab to further reduce potential slab dampness.

Compaction testing should be carried out on underslab fills to confirm that all fill placed below the building has been compacted to at least 95% MPD. Prior to placement of any grade restoration fills, the subgrade should be reviewed by the geotechnical consultant.

5.8 Perimeter Drainage & Use of Roof Leader Splash Pads

Perimeter drainage should consist of perforated 100mm (4") PVC pipe, placed around the building perimeters, with the invert elevation at footing level. The perimeter drain should be surrounded by at least 150mm (6") of 19mm (¾") clear crushed gravel. A 150mm (6") thick layer of birdseye gravel should be placed over the clear crushed gravel to act as a filter layer. The perimeter drainage should be discharged to the permanent municipal storm system.

For geotechnical considerations and if required by others roof leaders may be discharged using splash pads.

5.9 Seismic Considerations

The current BC Building Code classifies a site as Site Class C where the subgrade soils in the upper 30m consist of "Very Dense soil" with average SPT N values greater than 50 and average undrained shear strength (s_u) greater than 100 kPa.

Available subsurface information indicates that very stiff soils are present below a relatively shallow depth, corresponding to Site Class C. The subgrade soil conditions encountered at the site are not considered susceptible to seismically induced liquefaction.

5.10 Lateral Earth Pressures (if required)

A uniform lateral pressure of 20 kPa (400 psf) is recommended for both static (including compaction induced stress) and static + seismic conditions for the design of walls 3.7m (12 feet) or less in height provided that the backfill behind the wall is fully drained.

5.11 Proposed Asphalt Pavements

With subgrade preparation completed in the manner recommended above, the minimum recommended pavement structures for the proposed onsite roadway offsite road improvements including utility trenches is outlined below.

180 Street / 181 Street/Proposed Onsite Roadway/Laneway (Local)[1]	***Material***
85mm	Hot Mix Asphalt Surface (MMCD Hot Mix Asphalt, HMA)
100mm	19mm minus Granular Base
200mm	Granular Subbase (SGSB)

Note: [1]Asphalt surfacing should be placed in two lifts of 50mm and 35mm for the base and surface layers respectively and may comprise MMCD compliant Lower Course #2 and Upper Course #2.

The gradation of the above materials should comply with the appropriate Master Municipal Specifications. Road construction materials should be placed and compacted in compliance with the current MMCD specifications.

Adequate drainage and/or cross falls should be provided to ensure that the base and subbase materials will not become saturated. Pavement restoration within trench backfills for anticipated utility construction should be carried out in general accordance with MMCD Drawing G5.

6.0 HAZARD ASSESSMENT

6.1 General

It is understood that areas within the subject development property fall within the City of Surrey Hazard Lands Development Permit Area (Figure 1).

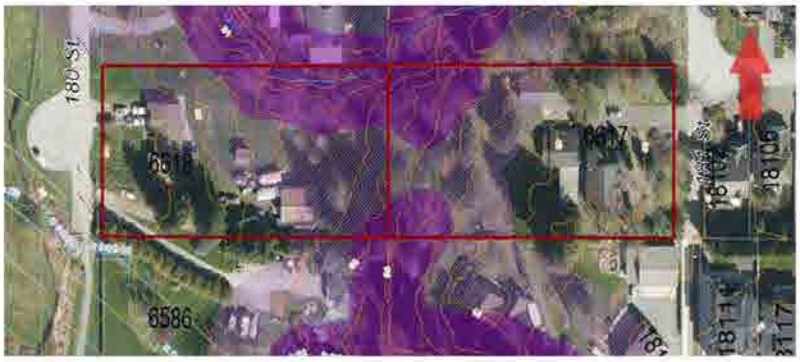


Figure 1: Subject Site relative to City of Surrey Hazard Lands DPA

The following comments have been provided with respect to the hazard assessment, including desk study and site walkover findings:

- Review of available published and in-house geological information indicated that the study site area is underlain by Capilano sediments, mainly marine silt loam to clay loam with minor sand, silt, and stony glaciomarine material and/or Vashon Drift and Capilano

Sediments comprising lodgment and minor flow till, lenses and interbeds of substratified glaciofluvial sand to gravel and lenses and interbeds of glaciolacustrine laminated stony silt.

- Onsite subsurface exploration generally encountered existing organics over stiff to very stiff silt. The findings of the test pit exploration were generally consistent with available geological information.
- The site slopes down gently to the west/northwest at an overall gradient of approximately 16H:1V or flatter, with localized over-steepened areas as steep as approximately 9H:1V or flatter.
- The subject site is located immediately south of an existing watercourse (City of Surrey Watercourse 76721) which also passes through the northeast section of the parcel 6618 180 Street.
- An existing watercourse, St. Gelais Brooke with low height channel slopes is located south of the subject development site. The watercourse right bank (where defined and deeper than 1m) based on City of Surrey Cosmos was setback by at least 30m from the subject site. As such, the Gelais Brooke slope was not considered to be of geotechnical concern to the subject site.
- Historical government air photos available for each decade and dating back to 1940 were reviewed. Obvious visible signs of onsite or offsite (in the immediate vicinity of the subject site) slope instability were not observed in the air photos.
- A review of available geological, geotechnical and site walkover information did not reveal evidence of historical large-scale slope movement in the study site area. In addition, site information did not reveal obvious visible evidence of recent (less than 50 years) small-scale slope movements at the study site.
- Approximate topography and slope gradients were confirmed using topographic information from City of Surrey COSMOS.

6.2 Slope Stability Analysis

The purpose of the slope assessment was to evaluate stability of the subject site relative to the existing shallow slope associated with City of Surrey Watercourse 76721 for static and seismic loading conditions. It is understood that stability analysis figures for static and seismic conditions are required to satisfy City of Surrey report approval requirements regardless of if this analysis is warranted for geotechnical considerations based on site conditions.

Analyses to assess stability of the existing "slope" was carried out using the limit equilibrium software, SLIDE 2018. The slope assessment / analysis was based on the available site information, the site walkover review, and findings from the intrusive test pit exploration.

A single representative section, Section A-A', was selected for analysis as shown on Dwg. 21-9249-SEC-02. For consistency and clarity, the identified horizontal geotechnical setback line is provided from the surveyed top of bank that was determined by the environmental consultant. The proposed geotechnical setback is located horizontally 3.0m behind the identified top of bank. It is understood increased setbacks are proposed to satisfy Environmental requirements.

Stability analyses indicated the computed a static factor of safety to be greater than 1.5 for pre-existing and post development conditions and was satisfactory for geotechnical considerations.

Pseudo-dynamic analysis to assess stability under seismic loading conditions were also run. A design horizontal acceleration of 0.341g associated with an earthquake event with a return period of 1 in 2475 (2% probability in 50 years) was used for the pseudo-dynamic analysis.

Stability analyses indicated the computed a seismic factor of safety to be greater than 1.0 for pre-existing and post development conditions and was satisfactory for geotechnical considerations.

The following table provides the comparison with the existing factor of safety (FoS) and proposed FoS for section A-A' and using GLE Morgenstern-Price:

Section	***Analysis***	***Existing FoS***	***Proposed FoS with Structure located at 3m Geotechnical Setback***	***Minimum Acceptable FoS***
Section A-A'	Static	7.2	4.7	1.5
Section A-A'	Seismic	1.6	1.5	1.0 [(1)]

Note 1 – Displacements less than 15 cm extending for FoS < 1.0 at the building location would be considered acceptable per EGBC Landslide guideline requirements.

It is noted that drained soil conditions during seismic conditions were used in the analysis and are presented above as these resulted in a lower FoS when compared to analysis completed using undrained soil conditions. The above slope stability charts generated from Slide are enclosed to the geotechnical report for completeness.

The proposed development which includes the proposed building to be setback beyond a 3m horizontal distance from the identified top of bank is not expected to adversely affect stability of the slope. Braun Geotechnical confirms that for geotechnical considerations the proposed development is not expected to adversely affect adjacent properties and roadways from a slope stability perspective.

Roof leaders from the proposed residential structures can discharge to splash pads. Rainwater discharging from the splash pads is not expected to adversely impact stability of the slope.

6.3 Applicable Legislation

It is our opinion that the "land may be used safely for the use intended." Safe site used is defined as a Single Family Dwelling residential subdivision, where the development is setback a minimum of 3m from the identified south top of the bank for Watercourse 76721.

Safe use is considered to be in reference to hazard acceptability criteria presented in the government document, "Hazard Acceptability Thresholds for Development Approvals by Local Government, 1993." Geotechnical hazards with potential to impact the project area were considered and included mountain stream erosion, avulsion, debris flows, debris floods, small-scale rock fall and regional-scale landslides.

7.0 PAVEMENT ASSESSMENT

7.1 Existing Pavements

180 Street

HP21-01 was excavated adjacent to the northbound lane of 181 Street. HP21-01 encountered a pavement section comprising 150mm thick ASPHALT over 460 mm brown to rust-brown, moist, dense SAND and GRAVEL with trace to some silt (FILL), underlain by grey, damp, very stiff, clayey silt to the depth of hand pit exploration at 0.7m.

Visually, the asphalt within the test segment was observed to be in fair condition, with areas of low to moderate severity longitudinal cracks and trench patch was observed at the southern end of the test segment.

181 Street

HP21-02 was excavated adjacent to the southbound lane of 181 Street. HP21-02 encountered a pavement section comprising 50mm thick ASPHALT over 175mm of grey-brown, moist, compact to dense SAND and GRAVEL with trace to some silt (FILL) over grey-brown, moist, dense silty SAND with trace to some gravel to the depth of hand pit exploration at 0.8m.

Visually, the asphalt pavement within the test segment of 181 Street was observed to be in fair to poor condition, with areas of moderate to high severity longitudinal and transverse cracks. A new trench patch was observed within the test segment.

7.2 Benkelman Beam Testing

Benkelman Beam testing was carried out on October 28, 2021, along the outer wheel paths of the northbound and southbound lanes of 180 Street and 181 Street, respectively. The Benkelman Beam data was collected to evaluate the structural condition of the existing pavements. A single axle dump truck loaded with 80kN (18Kips) on the rear axle was subcontracted to Braun Geotechnical for the purpose of conducting the survey.

7.3 Survey Findings

The beam testing for 180 Street and 181 Street was carried out at a station spacing of approximately 5m. A Statistical analysis was carried out on the temperature-corrected Benkelman Beam data with a Spring Correction Factor (SCF) of 1.1.

Most Probable Spring Rebound (MPSR) values of 1.10 & 1.94mm were determined for both 180 & 181 street, respectively from the field data. A design MPSR of 1.8mm was adopted for the Local road classification.

7.4 Pavement Rehabilitation

180 Street

Based on the calculated MPSR values from the findings of the Beam testing, the existing road pavements would be considered structurally adequate for the proposed use. Overlay for structural improvement is not required.

Although not required for geotechnical considerations, asphalt overlay for the existing roadway travel areas may be considered a cosmetic overlay for blending and leveling purposes. A partial depth asphalt mill and inlay would also be feasible if grade increases are not considered desirable or feasible. If required minimum overlay/inlay thickness should be at least 35mm.

Crack sealant and/or crack cleaning and filling in accordance with MMCD requirements should be carried out for any minor cracking on the exposed surface prior to overlay paving. Existing medium severity transverse cracked areas and longitudinal cracked areas should be saw-cut and re-constructed with the proposed widening.

181 Street

Based on the high MPSR value, the general condition of the roadway, as well as the reduced existing pavement section encountered within the hand pit, rehabilitation should include full-depth reconstruction completed using the design pavement section.

8.0 GEOTECHNICAL FIELD REVIEWS

Geotechnical field reviews are required by the Geotechnical Engineer of Record and to satisfy the requirements of the Letters of Professional Assurance required for the Building Permit. Field reviews are essential to confirm that the recommendations of the geotechnical report are understood and followed.

Geotechnical field reviews should be arranged by the Contractor to address the following:

Removal of unsuitable materials below building footprint and asphalt pavement areas;

- Suitability of exposed footing subgrade;
- Review and density testing of structural fill placed below footings and slabs;
- Asphalt hot mix field sampling and Marshall Mix Design testing;
- Retrieval of asphalt cores for thickness and density

9.0 CLOSURE

This report is prepared for the exclusive use of C[s. 22(1)] Kooner and their designated representatives and may not be used by other parties without the written permission of Braun Geotechnical Ltd. The City of Surrey may also rely on the findings of this report. If the development plans change, or if during construction soil conditions are noted to be different from those described in this report, Braun Geotechnical should be notified immediately in order that the geotechnical recommendations can be confirmed or modified, as required. Further, this report assumes that field reviews will be completed by Braun Geotechnical during construction.

The site Contractor should make their own assessment of subsurface conditions and select the construction means and methods most appropriate to the site conditions.

This report should not be included in the specifications without suitable qualifications approved by the geotechnical engineer.

The use of this assessment report is subject to the conditions on the attached Report Interpretation and Limitations sheet. The reader's attention is drawn specifically to those conditions, as it is considered essential that they be followed for proper use and interpretation of this report.

We hope the above meets with your requirements. Should any questions arise, please do not hesitate to contact the undersigned.

Yours truly,

Braun Geotechnical Ltd.

Samrath Singh Jakhar, EIT
Geotechnical Engineer

Braun Geotechnical Ltd.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. W. HRYSIO # 30855

Stuart Hrysio, P.Eng.
Geotechnical Engineer
2023-06-28
PTP#1002594

Encl: Report Interpretation and Limitations
Location Plan
Section A-A'
Slide Slope Stability Charts
Test Pit Logs (6)
Hand Pit Logs (2)
EGBC Appendix D: Landslide Assessment Assurance Statement

X:\2021 Projects\21-9249 Proposed Subdivision - 6618 180 Street & 6617 181 Street, Surrey, BC\Report\Rev.1\21-9249 Geotechnical Report 2023-06-19 (Rev.1) SH .docx

REPORT INTERPRETATION AND LIMITATIONS

1. STANDARD OF CARE

Braun Geotechnical Ltd. (Braun) has prepared this report in a manner consistent with generally accepted engineering consulting practices in this area, subject to the time and physical constraints applicable. No other warranty, expressed or implied, is made.

2. COMPLETENESS OF THIS REPORT

This Report represents a summary of paper, electronic and other documents, records, data and files and is not intended to stand alone without reference to the instructions given to Braun by the Client, communications between Braun and the Client, and/or to any other reports, writings, proposals or documents prepared by Braun for the Client relating to the specific site described herein.

This report is intended to be used and quoted in its entirety. Any references to this report must include the whole of the report and any appendices or supporting material. Braun cannot be responsible for use by any party of portions of this report without reference to the entire report.

3. BASIS OF THIS REPORT

This report has been prepared for the specific site, development, design objective, and purpose described to Braun by the Client or the Client's Representatives or Consultants. The applicability and reliability of any of the factual data, findings, recommendations or opinions expressed in this document pertain to a specific project at described in this report and are not applicable to any other project or site, and are valid only to the extent that there has been no material alteration to or variation from any of the descriptions provided to Braun. Braun cannot be responsible for use of this report, or portions thereof, unless we were specifically requested by the Client to review and revise the Report in light of any alterations or variations to the project description provided by the Client.

If the project does not commence within 18 months of the report date, the report may become invalid and further review may be required.

The recommendations of this report should only be used for design. The extent of exploration including number of test pits or test holes necessary to thoroughly investigate the site for conditions that may affect construction costs will generally be greater than that required for design purposes. Contractors should rely upon their own explorations and interpretation of the factual data provided for costing purposes, equipment requirements, construction techniques, or to establish project schedule.

The information provided in this report is based on limited exploration, for a specific project scope. Braun cannot accept responsibility for independent conclusions, interpretations, interpolations or decisions by the Client or others based on information contained in this Report. This restriction of liability includes decisions made to purchase or sell land.

4. USE OF THIS REPORT

The contents of this report, including plans, data, drawings and all other documents including electronic and hard copies remain the copyright property of Braun Geotechnical Ltd. However, we will consider any reasonable request by the Client to approve the use of this report by other parties as "Approved Users." With regard to the duplication and distribution of this Report or its contents, we authorize only the Client and Approved Users to make copies of the Report only in such quantities as are reasonably necessary for the use of this Report by those parties. The Client and "Approved Users" may not give, lend, sell or otherwise make this Report or any portion thereof available to any other party without express written permission from Braun. Any use which a third party makes of this Report – in its entirety or portions thereof – is the sole responsibility of such third parties. BRAUN GEOTECHNICAL LTD. ACCEPTS NO RESPONSIBILITY FOR DAMAGES SUFFERED BY ANY PARTY RESULTING FROM THE UNAUTHORIZED USE OF THIS REPORT.

Electronic media is susceptible to unauthorized modification or unintended alteration, and the Client should not rely on electronic versions of reports or other documents. All documents should be obtained directly from Braun.

5. INTERPRETATION OF THIS REPORT

Classification and identification of soils and rock and other geological units, including groundwater conditions have been based on exploration(s) performed in accordance with the standards set out in Paragraph 1. These tasks are judgemental in nature; despite comprehensive sampling and testing programs properly performed by experienced personnel with the appropriate equipment, some conditions may elude detection. As such, all explorations involve an inherent risk that some conditions will not be detected.

Further, all documents or records summarizing such exploration will be based on assumptions of what exists between the actual points sampled at the time of the site exploration. Actual conditions may vary

significantly between the points investigated and all persons making use of such documents or records should be aware of and accept this risk.
The Client and "Approved Users" accept that subsurface conditions may change with time and this report only represents the soil conditions encountered at the time of exploration and/or review. Soil and ground water conditions may change due to construction activity on the site or on adjacent sites, and also from other causes, including climactic conditions.
The exploration and review provided in this report were for geotechnical purposes only. Environmental aspects of soil and groundwater have not been included in the exploration or review, or addressed in any other way.
The exploration and Report is based on information provided by the Client or the Client's Consultants, and conditions observed at the time of our site reconnaissance or exploration. Braun has relied in good faith upon all information provided. Accordingly, Braun cannot accept responsibility for inaccuracies, misstatements, omissions, or deficiencies in this Report resulting from misstatements, omissions, misrepresentations or fraudulent acts of persons or sources providing this information.

6. DESIGN AND CONSTRUCTION REVIEW

This report assumes that Braun will be retained to work and coordinate design and construction with other Design Professionals and the Contractor. Further, it is assumed that Braun will be retained to provide field reviews during construction to confirm adherence to building code guidelines and generally accepted engineering practices, and the recommendations provided in this report. Field services recommended for the project represent the minimum necessary to confirm that the work is being carried out in general conformance with Braun's recommendations and generally accepted engineering standards. It is the Client's or the Client's Contractor's responsibility to provide timely notice to Braun to carry out site reviews. The Client acknowledges that unsatisfactory or unsafe conditions may be missed by intermittent site reviews by Braun. Accordingly, it is the Client's or Client's Contractor's responsibility to inform Braun of any such conditions.
Work that is covered prior to review by Braun may have to be re-exposed at considerable cost to the Client. Review of all Geotechnical aspects of the project are required for submittal of unconditional Letters of Assurance to regulatory authorities. The site reviews are not carried out for the benefit of the Contractor(s) and therefore do not in any way effect the Contractor(s) obligations to perform under the terms of his/her Contract.

7. SAMPLE DISPOSAL

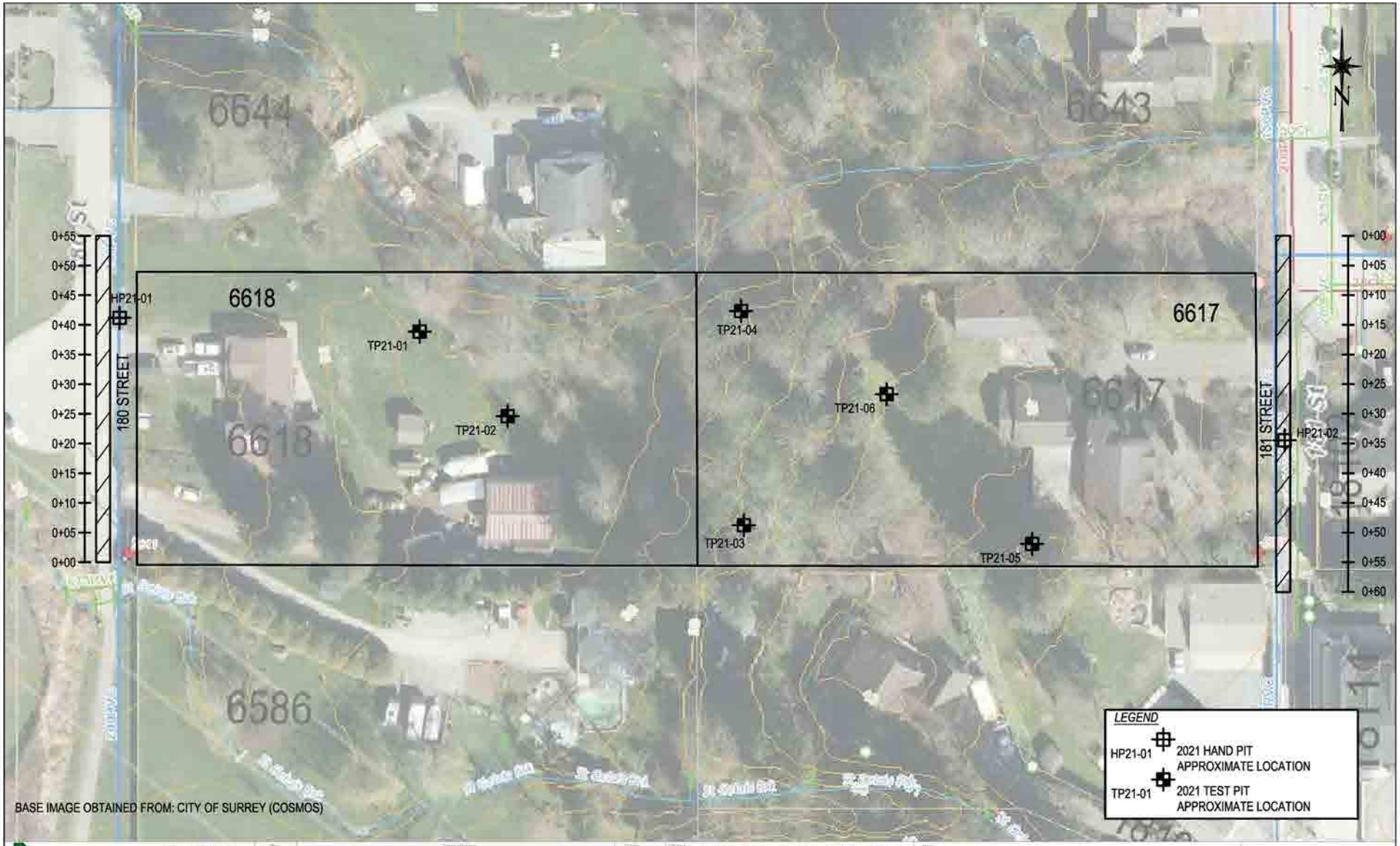
Braun will dispose of all samples 3 months after issuance of this report, or after a longer period of time at the Client's expense if requested by the Client. All contaminated samples remain the property of the Client and it will be the Client's responsibility to dispose of them properly.

8. SUBCONSULTANTS AND CONTRACTORS

Engineering studies frequently requires hiring the services of individuals and companies with special expertise and/or services which Braun Geotechnical Ltd. does not provide. These services are arranged as a convenience to our Clients, for the Client's benefit. Accordingly, the Client agrees to hold the Company harmless and to indemnify and defend Braun Geotechnical Ltd. from and against all claims arising through such Subconsultants or Contractors as though the Client had retained those services directly. This includes responsibility for payment of services rendered and the pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. These conditions apply to specialized subconsultants and the use of drilling, excavation and laboratory testing services, and any other Subconsultant or Contractor.

9. SITE SAFETY

Braun Geotechnical Ltd. assumes responsibility for site safety solely for the activities of our employees on the jobsite. The Client or any Contractors on the site will be responsible for their own personnel. The Client or his representatives, Contractors or others retain control of the site. It is the Client's or the Client's Contractors responsibility to inform Braun of conditions pertaining to the safety and security of the site – hazardous or otherwise – of which the Client or Contractor is aware.
Exploration or construction activities could uncover previously unknown hazardous conditions, materials, or substances that may result in the necessity to undertake emergency procedures to protect workers, the public or the environment. Additional work may be required that is outside of any previously established budget(s). The Client agrees to reimburse Braun for fees and expenses resulting from such discoveries. The Client acknowledges that some discoveries require that certain regulatory bodies be informed. The Client agrees that notification to such bodies by Braun Geotechnical Ltd. will not be a cause for either action or dispute.



PTP# 1002594

BRAUN GEOTECHNICAL LTD.

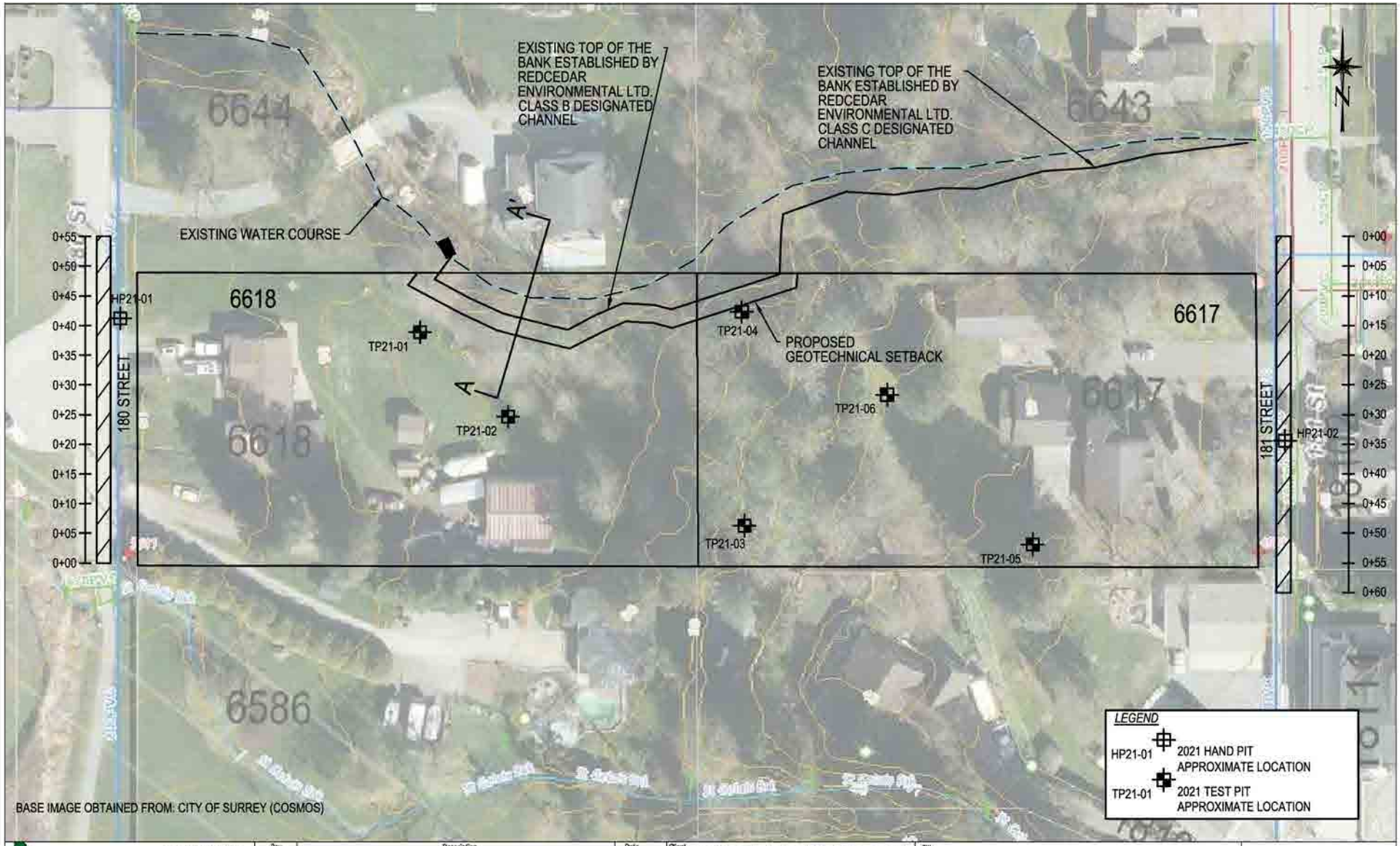
Rev.	Description	Date

Client: Chanpreet Kooner c/o Gursimer Design & Management

Project: Proposed Subdivision
6618 180 Street & 6617 181 Street, Surrey, BC

Title: LOCATION PLAN

Project no.	Drawn	Design	Checked	Date	Scale	Drawing no.
21-9249	RG	AC	HD	October 20. 2021	1:600	21-9249-01



BRAUN GEOTECHNICAL LTD.

PTP# 1002594

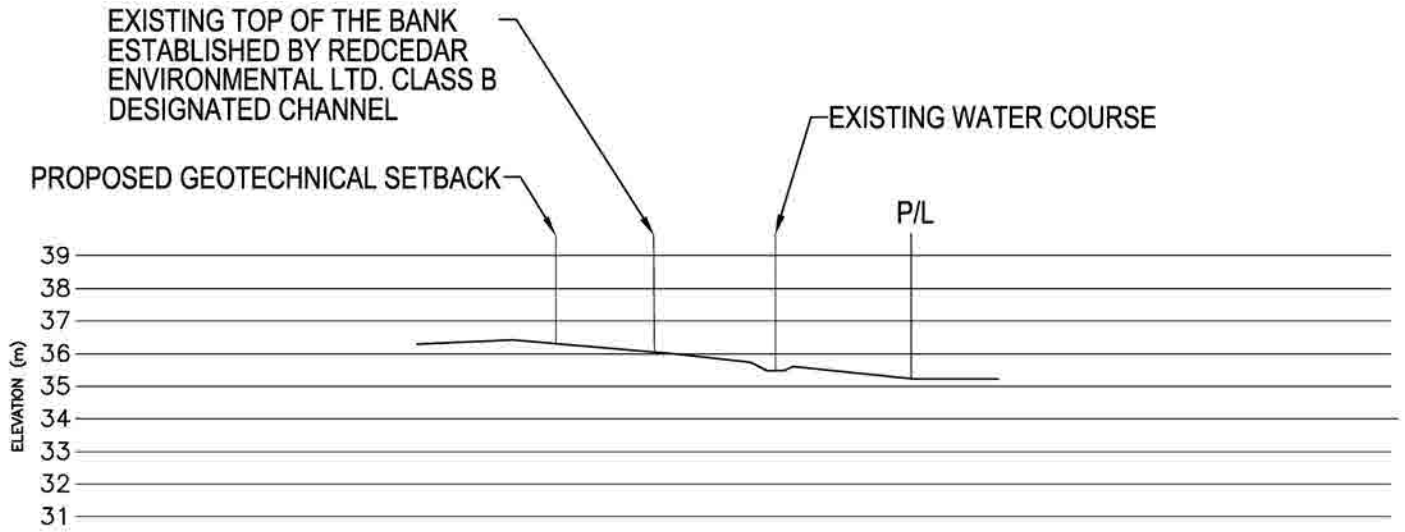
Rev.	Description	Date

Client: Chanpreet Kooner c/o Gursimer Design & Management

Project: Proposed Subdivision
6618 180 Street & 6617 181 Street, Surrey, BC

Title: LOCATION PLAN

Project no.	Drawn	Design	Checked	Date	Scale	Drawing no.
21-9249	RG	SJ	HD/SH	December 21, 2021	1:600	21-9249-SEC-01



SECTION A–A'

PTP# 1002594

BRAUN GEOTECHNICAL LTD.

Rev.	Description	Date

Client: Chanpreet Kooner c/o Gursimer Design & Management

Project: Proposed Subdivision
6618 180 Street & 6617 181 Street, Surrey, BC

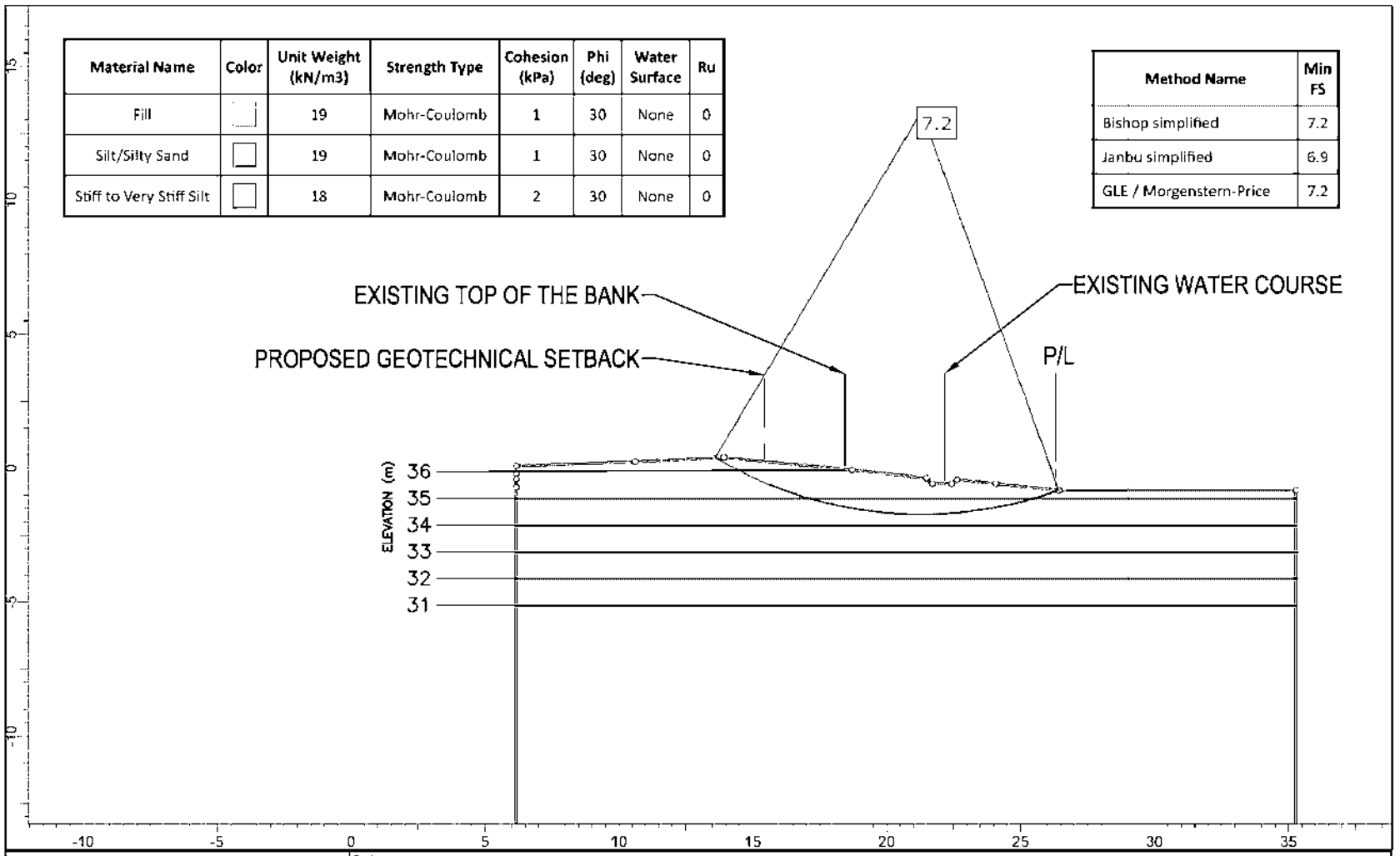
Project no.	Drawn	Design	Checked
21-9249	RG	SJ	HD/SH

Title: SECTION
A - A'

Date	Scale	Drawing no.
December 21, 2021	1:150	21-9249-SEC-02

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Fill		19	Mohr-Coulomb	1	30	None	0
Silt/Silty Sand		19	Mohr-Coulomb	1	30	None	0
Stiff to Very Stiff Silt		18	Mohr-Coulomb	2	30	None	0

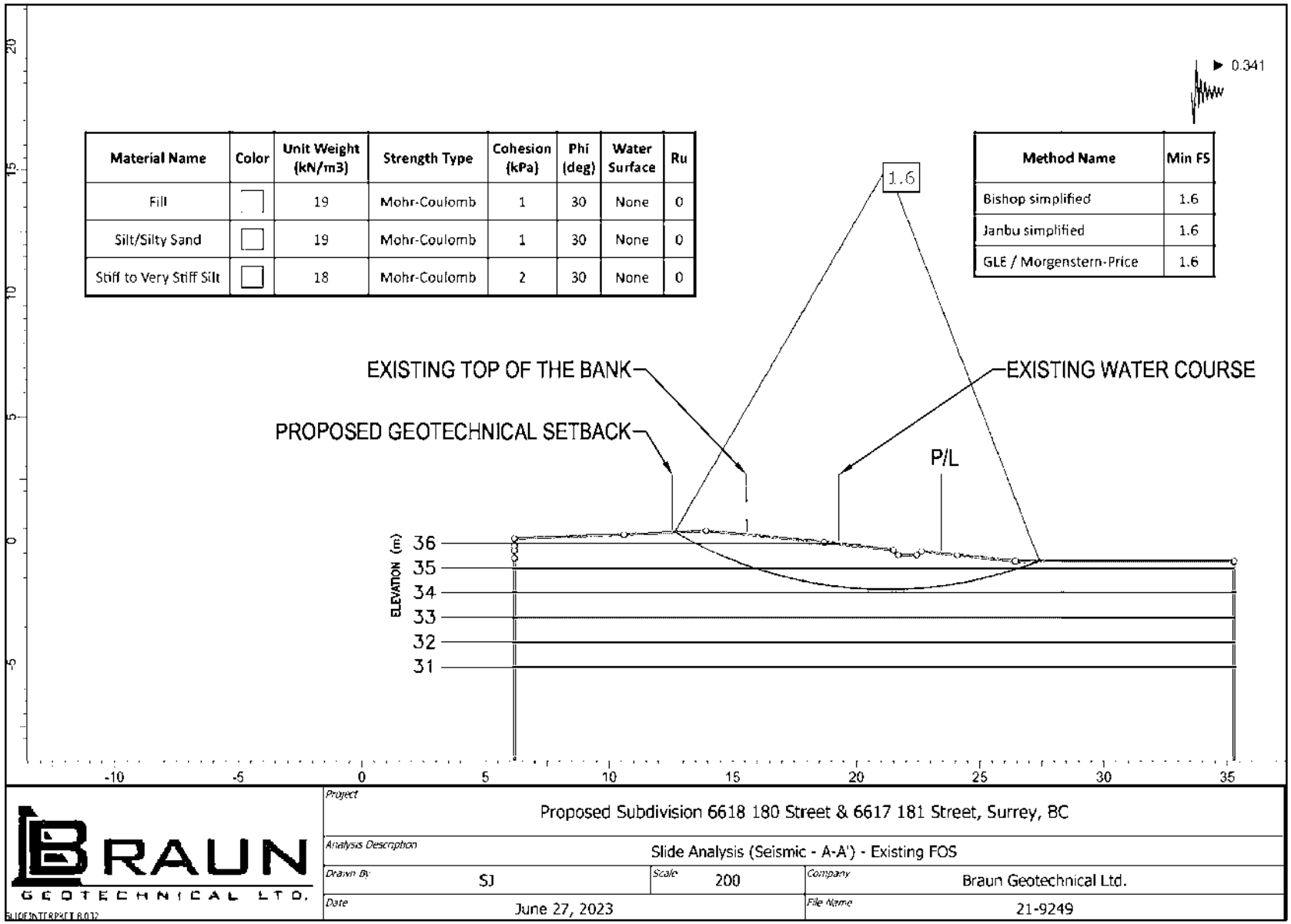
Method Name	Min FS
Bishop simplified	7.2
Janbu simplified	6.9
GLE / Morgenstern-Price	7.2



BRAUN GEOTECHNICAL LTD.

SLIDEINTERPRET 8.032

Project	Proposed Subdivision 6618 180 Street & 6617 181 Street, Surrey, BC		
Analysis Description	Slide Analysis (Static - A-A') - Existing FOS		
Drawn By	SJ	Scale 200	Company Braun Geotechnical Ltd.
Date	June 27, 2023		File Name 21-9249



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Fill		19	Mohr-Coulomb	1	30	None	0
Silt/Silty Sand		19	Mohr-Coulomb	1	30	None	0
Stiff to Very Stiff Silt		18	Mohr-Coulomb	2	30	None	0

Method Name	Min FS
Bishop simplified	1.6
Janbu simplified	1.6
GLE / Morgenstern-Price	1.6

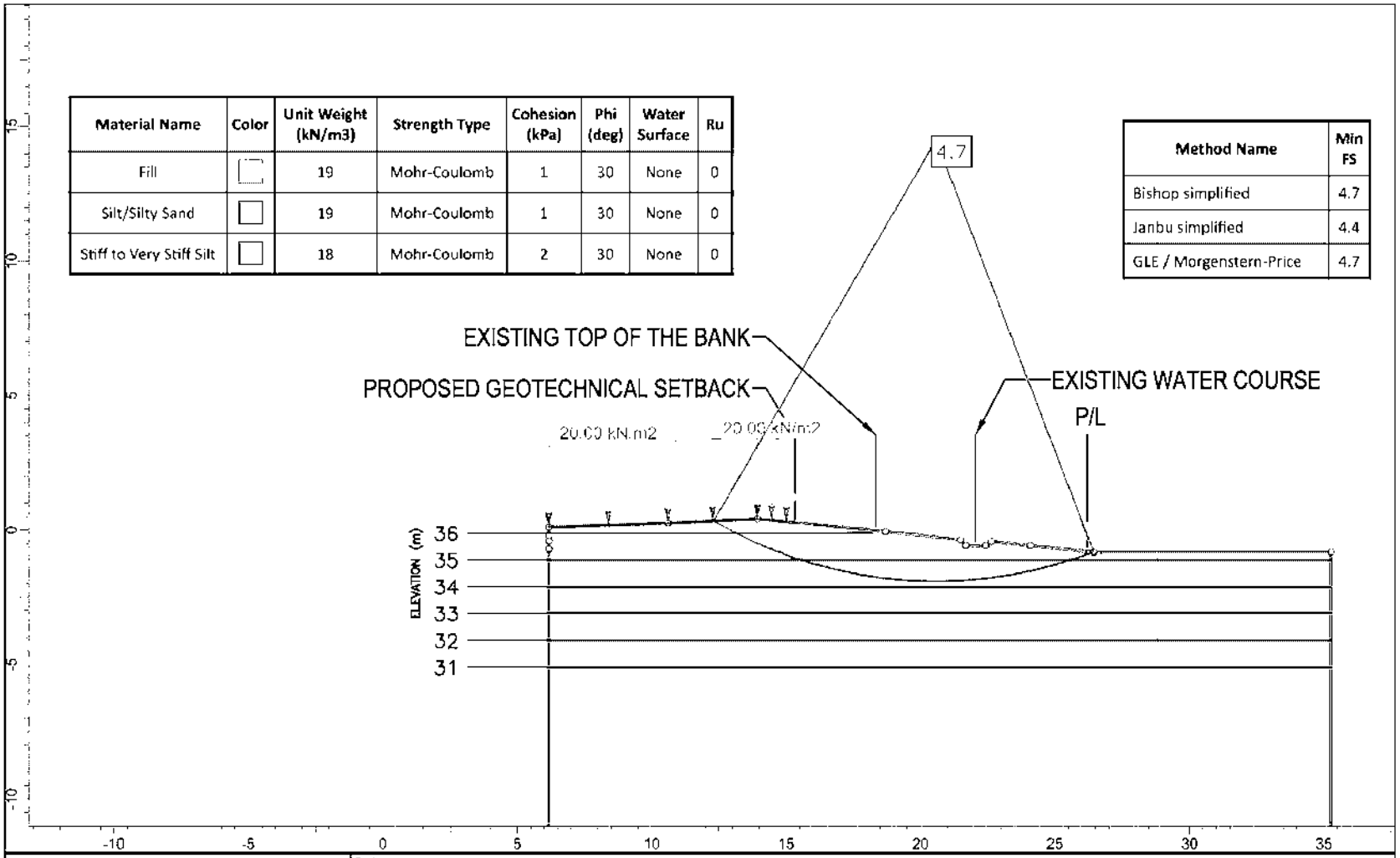
BRAUN GEOTECHNICAL LTD.

SLIDEINTERPRET 8.012

Project	Proposed Subdivision 6618 180 Street & 6617 181 Street, Surrey, BC		
Analysis Description	Slide Analysis (Seismic - A-A') - Existing FOS		
Drawn By: SJ	Scale 200	Company	Braun Geotechnical Ltd.
Date June 27, 2023		File Name	21-9249

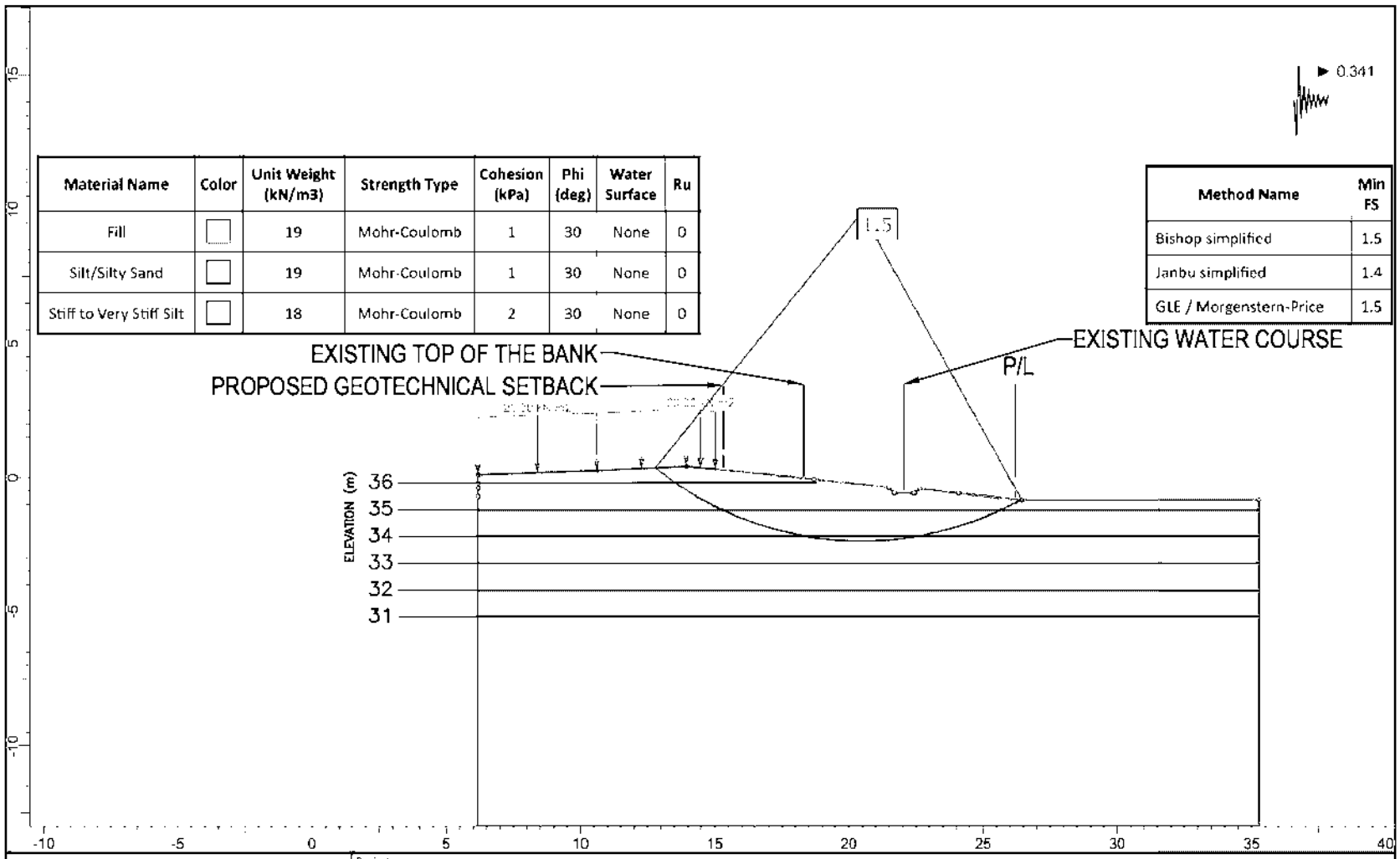
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Fill		19	Mohr-Coulomb	1	30	None	0
Silt/Silty Sand		19	Mohr-Coulomb	1	30	None	0
Stiff to Very Stiff Silt		18	Mohr-Coulomb	2	30	None	0

Method Name	Min FS
Bishop simplified	4.7
Janbu simplified	4.4
GLE / Morgenstern-Price	4.7



BRAUN GEOTECHNICAL LTD.

Project	Proposed Subdivision 6618 180 Street & 6617 181 Street, Surrey, BC		
Analysis Description	Slide Analysis (Static - A-A') - Proposed FOS		
Drawn By: SJ	Scale: 200	Company: Braun Geotechnical Ltd.	
Date: June 27, 2023		File Name: 21-9249	



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Fill		19	Mohr-Coulomb	1	30	None	0
Silt/Silty Sand		19	Mohr-Coulomb	1	30	None	0
Stiff to Very Stiff Silt		18	Mohr-Coulomb	2	30	None	0

Method Name	Min FS
Bishop simplified	1.5
Janbu simplified	1.4
GLE / Morgenstern-Price	1.5

BRAUN GEOTECHNICAL LTD.

SLIDEINTERPRET 6.032

Project	Proposed Subdivision 6618 180 Street & 6617 181 Street, Surrey, BC		
Analysis Description	Slide Analysis (Seismic - A-A') - Proposed FOS		
Drawn By: SJ	Scale: 200	Company: Braun Geotechnical Ltd.	
Date: June 27, 2023		File Name: 21-9249	

Test Pit Log: TP21-01

PTP# 1002594

File: 21–9249
Project: Proposed Subdivision
Client: Cs. 22(1) Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0		O	dark-brown, damp, loose, silty SAND, some organics, occasional roots/rootlets (FILL)	S1	48%	
1				brown, damp, compact silty SAND, trace organics			
			O		S2	40%	
2							
				grey-brown, occasionally rust-mottled, damp, stiff SILT, some sand			
3	1		O		S3	38%	
4							
5							
6							
	2		O		S4	28%	
7							
8							
			O		S5	35%	
				End of Test Pit @ 2.6m			
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP01
Page: 1 of 1

Test Pit Log: TP21-02

PTP# 1002594

File: 21–9249
Project: Proposed Subdivision
Client: Ch[redacted] Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark-brown, damp, soft to firm SILT, some sand, some organics, occasional roots/rootlets			
			O		S1	35%	
1				grey-brown, occasionally rust-mottled, damp, stiff SILT, some sand			
2			O		S2	57%	
3	1						
4			O		S3	27%	
5				- grey below 1.5m			
6				grey, damp, very stiff SILT, some sand			
7	2		O		S4	47%	
8				End of Test Pit @ 2.4m			
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP02
Page: 1 of 1

Test Pit Log: TP21-03

PTP# 1002594

File: 21–9249
Project: Proposed Subdivision
Client: Chs. 22(1) Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark-brown, damp, firm SILT, some gravel, some organics, trace sand			
			O		S1	47%	
1				grey-brown, occasionally rust-mottled, damp, stiff SILT, some sand, trace to some gravel			
			O		S2	28%	
2							
3	1						
4			O		S3	26%	
				grey-brown, damp, very stiff SILT, some sand, trace to some gravel, occasional cobbles			
5			O		S4	28%	
6				End of Test Pit @ 1.8m			
	2						
7							
8							
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP03
Page: 1 of 1

Test Pit Log: TP21-04

PTP# 1002594

File: 21–9249
Project: Proposed Subdivision
Client: Cl[redacted] Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark brown, damp, soft to firm SILT, some sand, some gravel, some organics			
				brown, damp, compact silty SAND			
1			O		S1	27%	
2				grey-brown, damp, very stiff SILT, some sand, occasional cobbles			
3	1		O		S2	29%	
4							
5							
6	2						
7			O		S3	32%	
8				End of Test Pit @ 2.4m			
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP04
Page: 1 of 1

Test Pit Log: TP21-05

PTP# 1002594

File: 21–9249
Project: Proposed Subdivision
Client: Cs. 22(1) Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark-brown, damp, loose to compact silty SAND, some silt, some gravel, occasional cobbles, occasional roots/rootlets (FILL)			
			O		S1	29%	
1				grey-brown, occasionally rust-mottled, damp, stiff sandy SILT, occasional cobbles			
2							
			O		S2	29%	
3	1						
4			O		S3	20%	
5							
6			O		S4	28%	
				End of Test Pit @ 1.8m			
	2						
7							
8							
9							
	3						
10							

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP05
Page: 1 of 1

Test Pit Log: TP21-06

PTP# 1002594

File: 21–9249
Project: Proposed Subdivision
Client: [redacted] Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark-brown, damp, soft to firm SILT, some sand, some organics, occasional wood pieces (FILL)			
1			O		S1	27%	
2				grey-brown, damp, stiff to very stiff SILT, trace to some sand			
3	1						
4							
5							
6			O		S2	28%	
				End of Test Pit @ 1.8m			
7	2						
8							
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP06
Page: 1 of 1

Hand Pit Log: HP21-01

PTP# 1002594

File: 21–9249
Project: Proposed Subdivision
Client: Chs. 22(1) Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0 ft / 0 m	150		ASPHALT			
	460	○	brown, moist, dense SAND & GRAVEL, trace to some silt (FILL)	S1		
1			rust-brown below @ 0.4m			
0.5		○		S2		
2		○	grey, damp, very stiff, clayey SILT	S3		
			End of Test Hole @ 0.7m			
3						
1						
4						
1.5						
5						

Equipment: Shovel
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered
(at time of drilling)

Logged By: AP
Exploration Date: November 9, 2021
Dwg No.: 21-9249-TH01
Page: 1 of 1

Hand Pit Log: HP21-02

PTP# 1002594

File: 21-9249
Project: Proposed Subdivision
Client: [redacted] Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft / m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0 / 0	50		ASPHALT			
	175	O	grey-brown, moist, compact to dense SAND & GRAVEL, trace to some silt (FILL)	S1		
1 / 0.5		O	grey-brown, moist, dense, silty SAND, trace to some gravel -occasional clumps of occasionally rust mottled SILT	S2		
3 / 1			End of Test Hole @ 0.8m			
5 / 1.5						

Equipment: Shovel
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered
(at time of drilling)

Logged By: AP
Exploration Date: November 9, 2021
Dwg No.: 21-9249-TH02
Page: 1 of 1

LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Notes: This statement is to be read and completed in conjunction with the Engineers and Geoscientists BC *Professional Practice Guidelines – Landslide Assessments in British Columbia* ("the guidelines") and the current *BC Building Code* (*BCBC*), and is to be provided for Landslide Assessments (not floods or flood controls), particularly those produced for the purposes of the *Land Title Act*, *Community Charter*, or *Local Government Act*. Some jurisdictions (e.g., the Fraser Valley Regional District or the Cowichan Valley Regional District) have developed more comprehensive assurance statements in collaboration with Engineers and Geoscientists BC. Where those exist, the Qualified Professional is to fill out the local version only. Defined terms are capitalized; see the Defined Terms section of the guidelines for definitions.

To: The Approving Authority (or Client) Date: 2023 JUNE 28

CITY OF SURREY

Jurisdiction/name and address

With reference to (CHECK ONE):

- [x] A. *Land Title Act* (Section 86) – Subdivision Approval
- [ ] B. *Local Government Act* (Sections 919.1 and 920) – Development Permit
- [ ] C. Community Charter (Section 56) – Building Permit
- [ ] D. Non-legislated assessment

For the following property (the "Property"):

6618 180 STREET & 6617 181 STREET

Civic address of the Property

The undersigned hereby gives assurance that they are a Qualified Professional and a professional engineer or professional geoscientist who fulfils the education, training, and experience requirements as outlined in the guidelines.

I have signed, authenticated, and dated, and thereby certified, the attached Landslide Assessment Report on the Property in accordance with the guidelines. That report must be read in conjunction this statement.

In preparing that report I have:

[CHECK TO THE LEFT OF APPLICABLE ITEMS]

- ✓ 1. Collected and reviewed appropriate background information
- ✓ 2. Reviewed the proposed Residential Development or other development on the Property
- ✓ 3. Conducted field work on and, if required, beyond the Property
- ✓ 4. Reported on the results of the field work on and, if required, beyond the Property
- ✓ 5. Considered any changed conditions on and, if required, beyond the Property
- 6. For a Landslide Hazard analysis or Landslide Risk analysis, I have:
  - ✓ 6.1 reviewed and characterized, if appropriate, any Landslide that may affect the Property
  - ✓ 6.2 estimated the Landslide Hazard
  - ✓ 6.3 identified existing and anticipated future Elements at Risk on and, if required, beyond the Property
  - ✓ 6.4 estimated the potential Consequences to those Elements at Risk
- 7. Where the Approving Authority has adopted a Level of Landslide Safety, I have:
  - ___ 7.1 compared the Level of Landslide Safety adopted by the Approving Authority with the findings of my investigation
  - ___ 7.2 made a finding on the Level of Landslide Safety on the Property based on the comparison
  - ___ 7.3 made recommendations to reduce Landslide Hazards and/or Landslide Risks

8. Where the Approving Authority has **not** adopted a Level of Landslide Safety, or where the Landslide Assessment is not produced in response to a legislated requirement, I have:

- ✓ 8.1 described the method of Landslide Hazard analysis or Landslide Risk analysis used
- ✓ 8.2 referred to an appropriate and identified provincial, national, or international guideline for Level of Landslide Safety
- ✓ 8.3 compared those guidelines (per item 8.2) with the findings of my investigation
- ✓ 8.4 made a finding on the Level of Landslide Safety on the Property based on the comparison
- ✓ 8.5 made recommendations to reduce Landslide Hazards and/or Landslide Risks

✓ 9. Reported on the requirements for future inspections of the Property and recommended who should conduct those inspections

Based on my comparison between:

[CHECK ONE]

☐ the findings from the investigation and the adopted Level of Landslide Safety (item 7.2 above)

☑ the appropriate and identified provincial, national, or international guideline for Level of Landslide Safety (item 8.4 above)

Where the Landslide Assessment is not produced in response to a legislated requirement, I hereby give my assurance that, based on the conditions[1] contained in the attached Landslide Assessment Report:

A. SUBDIVISION APPROVAL

☑ For subdivision approval, as required by the *Land Title Act* (Section 86), "the land may be used safely for the use intended"

[CHECK ONE]

- ☑ with one or more recommended additional registered Covenants
- ☐ without an additional registered Covenant(s)

B. DEVELOPMENT PERMIT

☐ For a development permit, as required by the *Local Government Act* (Sections 488 and 491), my report will "assist the local government in determining what conditions or requirements it will impose under subsection (2) of [Section 491]"

[CHECK ONE]

- ☐ with one or more recommended additional registered Covenants
- ☐ without an additional registered Covenant(s)

C. BUILDING PERMIT

☐ For a building permit, as required by the *Community Charter* (Section 56), "the land may be used safely for the use intended"

[CHECK ONE]

- ☐ with one or more recommended additional registered Covenants
- ☐ without any additional registered Covenant(s)

[1] When seismic slope stability assessments are involved, Level of Landslide Safety is considered to be a "life safety" criteria, as described in Commentary JJJ of the *National Building Code of Canada (NBC) 2015*, Structural Commentaries (User's Guide – NBC 2015: part 4 of division B). This states:

> "The primary objective of seismic design is to provide an acceptable level of safety for building occupants and the general public as the building responds to strong ground motion; in other words, to minimize loss of life. This implies that, although there will likely be extensive structural and non-structural damage, during the DGM (design ground motion), there is a reasonable degree of confidence that the building will not collapse, nor will its attachments break off and fall on people near the building. This performance level is termed 'extensive damage' because, although the structure may be heavily damaged and may have lost a substantial amount of its initial strength and stiffness, it retains some margin of resistance against collapse."

LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

STUART HRYSIO
Name (print)

2023 JUNE 28
Date

102-19049 95A AVE
Address

SURREY, BC V4M 4P3

604 513 4190
Telephone

STUART@BRAMGEO.COM
Email

(Affix PROFESSIONAL SEAL and signature here)

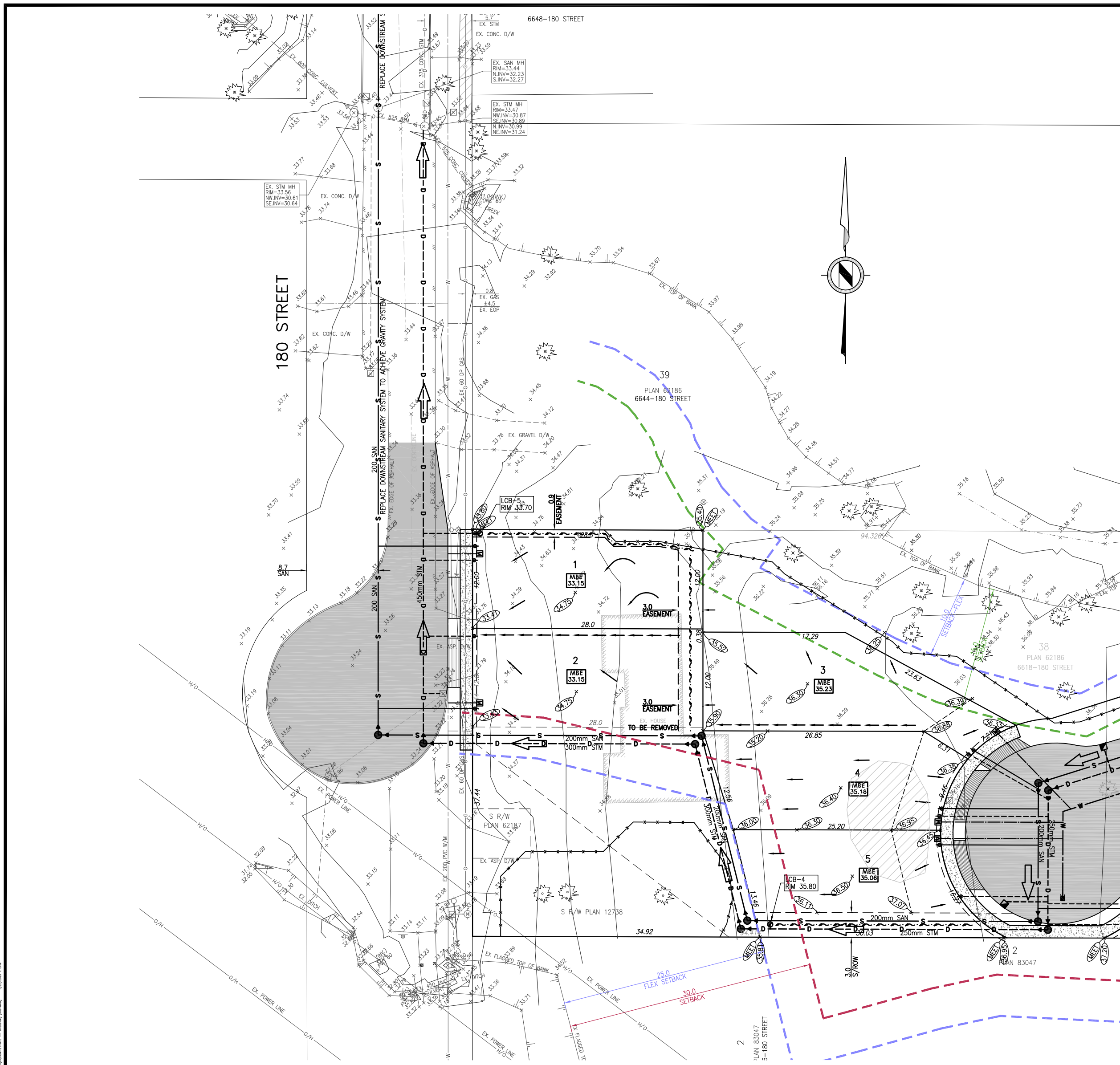
The Qualified Professional, as a registrant on the roster of a registrant firm, must complete the following:

I am a member of the firm BRAM GEOMECHANICAL LTD.
(Print name of firm)

with Permit to Practice Number 1002594
(Print permit to practice number)

and I sign this letter on behalf of the firm.

Schedule C

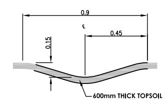


LOT GRADING LEGEND

1	LOT NUMBER
MBE 39.80	MINIMUM BUILDING ELEVATION BASED ON FRONT SERVICE CONNECTION
× 67.76	EXISTING GROUND SURFACE ELEVATION
67.5	EXISTING GROUND SURFACE CONTOUR
	EXISTING SWALE
67.60	FINISHED GRADE ELEVATION (WHERE DIFFERS FROM EX. GRADE ELEVATION)
MEET	MEET EXISTING GROUND SURFACE ELEVATION
	SWALE BY BUILDER DENOTING DIRECTION OF FLOW FOR SURFACE RUNOFF AND SIDEYARD SWALES
	DIRECTION OF SURFACE FLOW
	100 YR. FLOOD PATH IN PIPE
	100 YR. FLOOD PATH BELOW GROUND SURFACE
	100 YR. FLOOD PATH OVERLAND
	FILL IN EXCESS OF 0.5m
	PROPOSED SIDEWALK
	EXISTING TREE TO BE REMOVED
	EXISTING TREE TO BE RETAINED
	TEMPORARY TREE PROTECTION BARRIER FENCE
	PROPOSED CATCH BASIN
	PROPOSED LAWN DRAIN
	PROPOSED ASPHALT PAVEMENT PER GEOTECHNICAL REQUIREMENTS

LOT GRADING NOTES:

1. ALL WORK SHOWN (MINUS SWALES BY HOME BUILDERS) TO BE PERFORMED BY THE DEVELOPER'S CIVIL CONTRACTOR.
2. THE DEVELOPER'S CIVIL CONTRACTOR AND THE HOME BUILDERS SHALL STRICTLY COMPLY WITH THE CITY OF SURREY'S EROSION AND SEDIMENT CONTROL BYLAW.
3. M.B.E. – THE MINIMUM BUILDING ELEVATION AND IS THE LOWEST LEVEL TO WHICH THE CRAWL SPACE SKIM COAT, BASEMENT SLAB, AND/OR SLAB ON GRADE SHALL BE SET AND SHALL NOT BE LOWER THAN THAT ELEVATION SHOWN.
4. ALL ROOF RAIN WATER LEADERS TO DISCHARGE SPLASH PADS THAT ARE DIRECTED TOWARDS LANDSCAPE AREAS.
5. ALL LAWN BASIN LEADS SHALL BE 150mm DIAMETER.
6. ROUGH LOT GRADING IS TO BE COMPLETED BY THE DEVELOPER AND THE FINISHED GRADING IS TO BE DONE BY THE HOUSE BUILDER.THE DEVELOPER'S CIVIL ENGINEER TO CERTIFY THE ROUGH LOT GRADING PRIOR TO BUILDING PERMIT ISSUANCE. THE DEVELOPER'S CIVIL CONTRACTOR TO PROVIDE THE ENGINEER A CERTIFIED LOT GRADING AS-CONSTRUCTED SURVEY. CERTIFIED AS-CONSTRUCTED SURVEY MEANS SIGNED AND SEALED BY A P.ENG. OR B.C.L.S.
7. NO LOW SPOTS OR DEPRESSIONS SHALL BE CREATED. UNIFORMLY GRADE THE LOTS TO CREATE A GROUND CONTOUR FOR SURFACE WATER TO RUNOFF TO A STORM DRAINAGE SYSTEM.
8. ALL SWALES TO BE GRADED AT A 1% MIN.
9. THE HOME BUILDERS ARE RESPONSIBLE FOR FINAL LOT GRADING WHICH INCLUDES THE INDIVIDUAL SWALES ON LOTS AS IDENTIFIED.



TYPICAL SWALE DETAIL
N.T.S.

LEGAL DESCRIPTION: LOT 37, SEC 17, TOWNSHIP 8, NWD PLAN 62186

SURVEY BENCHMARK: MON: 5934 LOCATED AT #6685 184 ST — SCALE FACTOR: ELEV. 68.740m

REV.	DATE	DESCRIPTION	BY
5			
4			
3			
2	MAY 19/23	REVISE LOT LAYOUT, ADDRESS MUNICIPAL COMMENTS	NS
1	MAR 28/23	ADDRESS MUNICIPAL COMMENTS	NS

PRELIMINARY
FOR DISCUSSION PURPOSES

CONSULTANT
GurSimer Design and Management Inc.
Tel: 778-895-6358 | Email: nirvair@gs-dm.com

CITY OF SURREY

CLIENT
C[redacted] KOONER
[redacted] STREET
SURREY
TEL: 604–551–7677

TITLE
SITE GRADING PLAN
6617 – 181 STREET

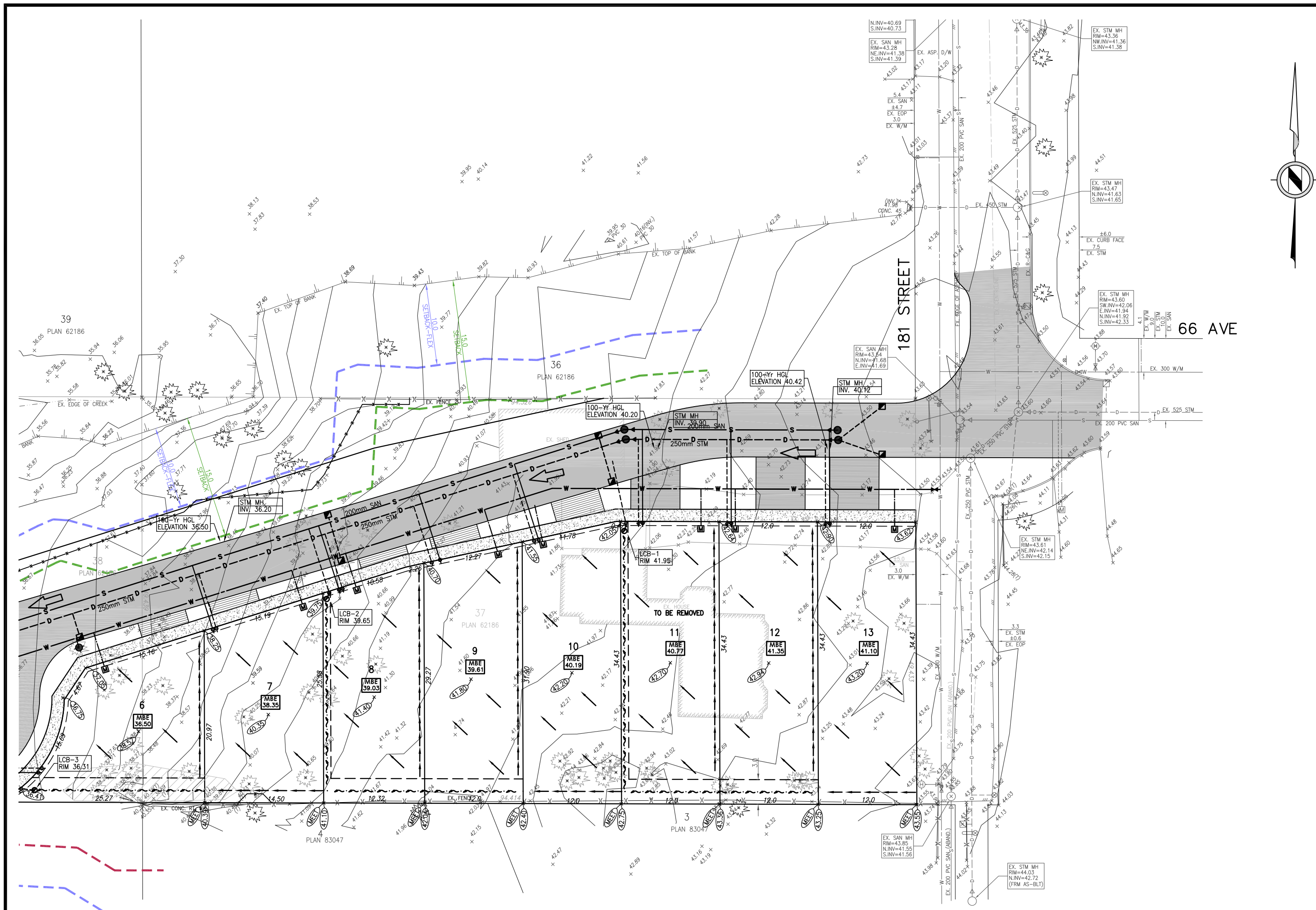
SEAL
May 19, 2023

SCALE: HOR. 1:250 VERT. –
DESIGNED NS
DRAWN NS
REVIEWED NS

DATE (YYYY.MM.DD) 2021.04.09
CONSULTANT PROJ. NO. 21–013
DWG. NO. 05 — REV. 2

SURREY PROJECT NUMBER **7921-0264-00**
DRAWING TYPE **SITE GRADING-WEST**

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

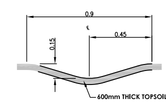


LOT GRADING LEGEND

- 1 — LOT NUMBER
- MBE 39.80 — MINIMUM BUILDING ELEVATION. SUBJECT TO CHANGE AT DETAILED DESIGN STAGE
- EXISTING GROUND SURFACE ELEVATION
- EXISTING GROUND SURFACE CONTOUR
- EXISTING SWALE
- FINISHED GRADE ELEVATION (WHERE DIFFERS FROM EX. GRADE ELEVATION)
- MEET EXISTING GROUND SURFACE ELEVATION
- SWALE BY BUILDER DENOTING DIRECTION OF FLOW FOR SURFACE RUNOFF AND SIDEYARD SWALES
- DIRECTION OF SURFACE FLOW
- 100 YR. FLOOD PATH IN PIPE
- 100 YR. FLOOD PATH BELOW GROUND SURFACE
- 100 YR. FLOOD PATH OVERLAND
- FILL IN EXCESS OF 0.5m
- PROPOSED SIDEWALK
- EXISTING TREE TO BE REMOVED
- EXISTING TREE TO BE RETAINED
- TEMPORARY TREE PROTECTION BARRIER FENCE
- PROPOSED CATCH BASIN
- PROPOSED LAWN DRAIN
- PROPOSED ASPHALT PAVEMENT PER GEOTECHNICAL REQUIREMENTS

LOT GRADING NOTES:

1. ALL WORK SHOWN (MINUS SWALES BY HOME BUILDERS) TO BE PERFORMED BY THE DEVELOPER'S CIVIL CONTRACTOR.
2. THE DEVELOPER'S CIVIL CONTRACTOR AND THE HOME BUILDERS SHALL STRICTLY COMPLY WITH THE CITY OF SURREY'S EROSION AND SEDIMENT CONTROL BYLAW.
3. M.B.E. – THE MINIMUM BUILDING ELEVATION AND IS THE LOWEST LEVEL TO WHICH THE CRAWL SPACE SKIM COAT, BASEMENT SLAB, AND/OR SLAB ON GRADE SHALL BE SET AND SHALL NOT BE LOWER THAN THAT ELEVATION SHOWN.
4. ALL ROOF RAIN WATER LEADERS TO DISCHARGE SPLASH PADS THAT ARE DIRECTED TOWARDS LANDSCAPE AREAS.
5. ALL LAWN BASIN LEADS SHALL BE 150mm DIAMETER.
6. ROUGH LOT GRADING IS TO BE COMPLETED BY THE DEVELOPER AND THE FINISHED GRADING IS TO BE DONE BY THE HOUSE BUILDER.THE DEVELOPER'S CIVIL ENGINEER TO CERTIFY THE ROUGH LOT GRADING PRIOR TO BUILDING PERMIT ISSUANCE. THE DEVELOPER'S CIVIL CONTRACTOR TO PROVIDE THE ENGINEER A CERTIFIED LOT GRADING AS-CONSTRUCTED SURVEY. CERTIFIED AS-CONSTRUCTED SURVEY MEANS SIGNED AND SEALED BY A P.ENG. OR B.C.L.S.
7. NO LOW SPOTS OR DEPRESSIONS SHALL BE CREATED. UNIFORMLY GRADE THE LOTS TO CREATE A GROUND CONTOUR FOR SURFACE WATER TO RUNOFF TO A STORM DRAINAGE SYSTEM.
8. ALL SWALES TO BE GRADED AT A 1% MIN.
9. THE HOME BUILDERS ARE RESPONSIBLE FOR FINAL LOT GRADING WHICH INCLUDES THE INDIVIDUAL SWALES ON LOTS AS IDENTIFIED.



TYPICAL SWALE DETAIL

N.T.S.

LEGAL DESCRIPTION: LOT 37, SEC 17, TOWNSHIP 8, NWD PLAN 62186

SURVEY BENCHMARK: MON:5934 LOCATED AT #6685 184 ST — SCALE FACTOR: ELEV. 68.740m

REV.	DATE	DESCRIPTION	BY
5			
4			
3			
2	MAY 19/23	REVISE LOT LAYOUT, ADDRESS MUNICIPAL COMMENTS	NS
1	MAR 28/23	ADDRESS MUNICIPAL COMMENTS	NS

PRELIMINARY
FOR DISCUSSION PURPOSES

CONSULTANT: GurSimer Design and Management Inc.
Tel: 778-895-6358 | Email: nirvair@gs-dm.com

CITY OF SURREY

CLIENT: CH[redacted] s. 22(1) KOONER
6617–181 STREET
SURREY
TEL: 604–551–7677

TITLE: **SITE GRADING PLAN**
6617 – 181 STREET

SEAL
May 19, 2023

SCALE: HOR. 1:250 VERT. –
DATE (YYYY.MM.DD) 2021.04.09
SURREY PROJECT NUMBER 7921-0264-00
CONSULTANT PROJ. NO. 21-013
DESIGNED NS
DRAWN NS
REVIEWED NS
DWG. NO. 06
REV. 2
DRAWING TYPE: **LOT GRADING-EAST**

DESTROY ALL PRINTS BEARING PREVIOUS NUMBER

May 24, 2024

Report – Sensitive Ecosystem Development Plan

File #: 21-045R

Subject Properties:

6617 181 Street & 6618 180 Street, Surrey, BC

Prepared for:

C s. 22(1)Kooner

c/o

Nirvair Singh

Prepared by:

Amber Burnett, B.Sc., Dipl. Tech

Rémi Masson, B.Sc., R.P.Bio.

201-45269 Keith Wilson Road

Chilliwack BC V2R 5S1

ATTACHMENTS

1. Figures
2. Selected Site Photographs
3. Tables
4. Impact Mitigation Plan
5. CEMP
6. Geotechnical Report
7. RAPR Assessment Report

ECOSYSTEM DEVELOPMENT PLAN

The developer is planning to subdivide the subject properties located at 6617 181 Street and 6618 180 Street, Surrey, BC into 13 lots. Works will include construction of a new lane and cul de sac as well as lot grading and site servicing. A City walkway will connect the new cul de sac to the existing one at 180 Street. The subject properties include two streamside areas with streams flowing east to west through the neighbouring lots to the north and south.

The northern streamside area will be conveyed to the City under a P15 agreement.

Redcedar Environmental Consulting Inc. (Redcedar Environmental) completed site assessments on February 1, June 3, and June 9 of 2021.

This Ecosystem Development Plan is provided as part of the Sensitive Ecosystem Development Permit Process. This submission includes a proposed variance to the streamside protection areas required per Part 7A of the Zoning Bylaw; as such, and Impact Mitigation Plan (IMP) is appended to this report. As a variance has been sought, the Flexing Provisions do not apply.

i) Consultant Qualifications

23. All registered professionals involved in this development proposal have demonstrated education, expertise, accreditation, and knowledge of sensitive environments, ecosystems, and/or streamside management.

The registered professionals associated with this project have the education, expertise, accreditation, and knowledge of sensitive environments (as applicable to their respective fields) that is required to undertake the assessments and reports they have provided.

24. All arborists who will be involved in the development proposal shall be registered and certified with the International Society of Arboriculture (ISA).

Arborists associated with this development proposal area accredited through the ISA.

25. Supply a list and written statement, including all documentation, verifying the qualifications of the QEPs and/or ISA Certified Arborists responsible for preparing report submissions or involved in monitoring site conditions for Sensitive Ecosystems Development Permit applications.

The list of QEPs and arborists involved in this project are included below:

- Rémi Masson, R.P.Bio. #2693, ISA Certified Arborist®[1]
- Francis Klimo, ISA Certified Arborist® (#PN-8149A), ISA Certified Tree Risk Assessor

[1] Remi Masson is not the acting arborist on this project.

- Stuart Hrysio, P. Eng, Geotechnical Engineer

26. Where more than one QEP is required, submit a written statement identifying the primary QEP for the entire development.

The primary QEP on this project will be Rémi Masson, R.P.Bio. He has ensured that all reports have been prepared by qualified professionals and coordinated in content and execution.

ii) Protection Areas

27a. Zoning Bylaw: Part 7A, Streamside Protection of Surrey's Zoning Bylaw is to be used to determine the Area of Protection required for development adjacent to streams.

Streamside Setbacks have been determined in accordance with Part 7A of the Zoning Bylaw.

Two watercourses and one ditch were identified on or near the subject property: Watercourse 1 (WC1), Watercourse 2 (WC2) and Ditch 1.

Ditch 1

Ditch 1 was located to the north of the subject property.

Ditch 1 originated from a stormwater outfall and drained west in a constructed ditch on the west side of 181 Street. Although a minor volume of flow was observed, there was limited evidence of scour, erosion, or rafted debris. There was no evidence of natural headwaters or springs at this location. At the time of the field assessment a moderately thick layer of leaf litter was present throughout the channel.

The potential for fish presence was considered; however, given the absence of habitat, marginal water flow, extensive piping upstream and downstream and the absence of fish habitat downstream (WC1) the likelihood for fish presence in Ditch 1 was rated as nil.

The City of Surrey Online Mapping System (COSMOS) had previously classified Ditch 1 as a Class C (green-coded) ditch. This was generally consistent with observations made in the field.

As Ditch 1 did not show any evidence of fluvial erosion despite the presence of readily erodible substrate, it was not considered to provide a significant source of base flows to WC1. As such, it would not have the capacity to provide an appreciable amount of food or nutrients to that system and would not be considered to constitute fish habitat. As the provision for fish habitat is key to the definition provided in the Zoning Bylaw, this ditch would not be considered a stream per that bylaw. This conclusion is consistent with the green-coded classification on the COSMOS.

Despite the above, application of ditch protection measures outlined in the Zoning Bylaw is advised based on the precautionary principle. As a due diligence measure, a 7 m streamside setback has been

applied to this watercourse and a default classification of Class B Ditch has been applied. This setback does not reach the subject property. Classification is subject to revision if necessary in the future.

Classification as per the *Water Sustainability Act* has not been completed as it would not alter the recommendations made in this report.

Watercourse 1

Ditch 1 transitions to a Class B stream north of the subject property where ground water seepage entered the channel. Watercourse 1 (WC1) then flowed in a westerly direction across the adjacent northern properties dipping south for a short extent to flow through the subject property at 6618 180 Street before flowing north and west to 180 Street.

The watercourse flowed under 180 Street through pipes and according to local GIS mapping, WC1 continues flowing through an open channel west of 180 Street before draining into St. Gelais Brook, a fish-bearing stream known to support cutthroat trout (*Oncorhynchus clarkii*) (BC Habitat Wizard).

Near the subject property WC1 flowed through a shallow channel with substrate consisting predominantly of sand and organics. The water depth was approximately 5-10 cm and the channel lacked large woody debris, overhanging banks, pools, and large substrate materials.

The City of Surrey COSMOS identified this stream as non-fish bearing (Class B). Fish sampling has not been completed on this stream; however, the non-fish bearing classification is believed to be accurate.

The piping and topography at 180 Street were reviewed for the reasonable potential for fish passage. Per the Zoning Bylaw, a watercourse is classified as non-fish bearing (Class B) when it provides "a significant source of food and nutrient value to downstream fish populations with no documented fish presence and no *reasonable* potential for fish presence" (emphasis added). The pipe draining this watercourse is approximately 35 m long. Per the as-built drawings, the lower 14 m portion of the pipe has a gradient of 3.14%. There was no clear information on the gradient of the upper portions. Culvert slope should not exceed 0.5% for a culvert without baffles and greater than 24 m long, 1.0% for a culvert without baffles and less than 24 m. On its own, the piping of this system is very likely a barrier to fish passage.

In the unlikely event that a future habitat restoration plan removes the piping under 180 Street, it is probable that a bridge would be required to allow fish passage due to the length of the channel under the road. This would entail significant works at 180 Street. If a restoration project were to proceed despite the challenges above, the habitat east (upstream) of 180 Street would be characterized as marginal based on the absence of suitable spawning, rearing, and holding habitat (Ministry of Environment and Ministry of Forests, 2012). The expense required to restore fish to this habitat is not justified by the potential increase in fish-bearing habitat.

Based on the above, the portion of WC1 above 180 Street was classified as non-fish bearing.

As WC1 did not show any evidence of being potentially inhabited by fish with no documented fish presence but did provide a significant source of food and nutrient value to downstream fish populations, this stream would be considered a Class B stream per the Zoning Bylaw. This conclusion is consistent with the stream classification on the COSMOS.

Per Part 7a of the Zoning Bylaw, **the natural portion of the watercourse would require a 15 m wide setback measured from top of bank. A variance for a variable setback has been proposed along this stream where the setback will not be less than 10 m or more than 20.2 m measured from the top of bank** (See Attached Site Plan and IMP).

Watercourse 2 (St. Gelais Brook)

Watercourse 2 (WC2) was present on the adjacent properties to the south. According to COSMOS WC2 flows from the southeast in a narrow ravine to 18102 Claytonwood Crescent (south of the subject property) where it turns west to drain across 18102 Claytonwood Crescent and 6586 180 Street. Near the west end of 6586 180 Street WC2 flows north and comes in close proximity to the subject property before flowing through a pipe under 180 Street. WC2 then continues to meander in a northwesterly direction away from the subject property eventually draining into the boundary of the lowland areas, where it discharges into the Serpentine River via floodboxes and the Fry's Corner pump station (Kerr Wood Leidal Consulting Engineers, 2016)

Near the subject property WC2 flowed through forested habitat on 18102 Claytonwood Crescent until reaching 6586 180 Street where it flowed through a narrow channel that meandered through a large open grassed lawn beneath a power line tower.

The substrate was predominantly gravels and cobbles and water depth was approximately 5-10 cm during the June 9 field assessment.

Fish sampling was not conducted; however, per the SHIM Atlas WC2 is of unknown fish-bearing status near the subject properties and becomes fish bearing approximately 725 m downstream. Per the COSMOS this stream is fish-bearing downstream from the east end of 6586 180 Street. The BC Habitat Wizard has a report of cutthroat trout observed 200 m downstream from the subject property (2017).

As there are no known barriers to fish downstream of the subject properties, **WC2 was classified as a fish-bearing stream. Per Part 7a of the Zoning Bylaw, WC2 would require a 30 m wide setback measured from top of bank, a variance is proposed for WC2. A minimum width of 22.6 m has been proposed for this watercourse** (See Attached Site Plan).

An existing driveway to the house on the property to the south lies within the setback for this stream. This area is proposed to be removed and rehabilitated as part of a future application. The remainder of the setback area on the subject property is proposed to be rehabilitated as part of this application.

27b. Biodiversity Conservation Strategy: the Biodiversity Management Areas, Green Infrastructure Network (GIN) and Appendix J of the Biodiversity Conservation Strategy are to be used to determine the Area of Protection required for development within a Green Infrastructure Area.

The Biodiversity Conservation Strategy (BCS) identifies GIN ID 143 as located approximately 17 m from the subject property. The GIN is separated from the subject property by WC2, as there is a 30 m wide setback applied to this watercourse any activities undertaken on the subject property will not affect GIN 143. As such this GIN will not be further discussed within this report. A summary of the description of GIN 143, provided by Appendix J of the BCS is provided in the following table:

Table 1. Summary of description of GIN 143.

ID	Risk of Development	Ecological Value	Corridor Type	Target Width (M)	Recommendations
143	Low	Low	Local	50	Hydro right of way. This right of way includes a range of habitat features. It provides the only continuous corridor throughout this highly developed landscape. Establish hedgerows and shrub pockets. Create wetlands in lowland areas. Traffic calming and signage at 64 Ave, 60 Ave, 184 St and 188 St. Provide a movement corridor under Highway 10.

28. Maximum safeguarding: conveyance of the protection area to the City of Surrey.

Maximum safeguarding is proposed for the SPA associated with WC1. A proposed rehabilitation plan and cost estimate is provided within the IMP. This area will be conveyed to the City under a P-15 agreement.

29. Minimum safeguarding

Minimum safeguarding is proposed for the SPA associated with WC2. As a variance is proposed for this SPA, a rehabilitation plan and cost estimate has been included in the attached IMP.

30. Identify all existing on site buildings, structures, including paved and landscaped areas, and any other disturbed beyond its original condition.

Existing buildings on the subject property located at 6617 181 Street included one house and one garage and paved areas included a driveway and a walkway leading to the house. Based on a review of historical aerial imagery available on the City of Surrey COSMOS and per BC Assessment, the house was constructed in 1981 and the property has been used as a single-family lot since that time.

Landscaped habitat occurred directly behind the house to the west and in front of the house to the east. The area behind the house consisted of a well-maintained lawn and mature trees such as western redcedar (*Thuja plicata*). The area in front of the house consisted of gravel, and ornamental shrubs were located within the gravel area and near the house.

Existing buildings on the subject property located at 6618 180 Street included one house and three outbuildings. Paved areas included a driveway leading to the house. A portion of an additional driveway leading to the house on the property to the south was also present in the southwest corner of the subject property. Based on a review of historical aerial imagery available on the City of Surrey COSMOS and per BC Assessment, the house was constructed in 1982 and the property has been used as a single-family lot since that time.

At the time of the assessment, except for near WC1 and the rear of the lot, most of the property consisted of a well-maintained lawn.

31. Perform a slope analysis and identify existing topography features including geological and hydrogeological soil conditions, particularly areas of unstable or sensitive soils.

Redcedar Environmental is not qualified to undertake this assessment and understands that given the flat nature of the site, a detailed assessment was not necessary.

Redcedar Environmental did complete superficial observations of site conditions that would indicate presence of wetlands (e.g. saturated or moist site conditions, facultative or obligate hydrophytes). None were observed.

32. Identify and detail existing vegetation and trees (including trees defined in the Surrey Tree Protection Bylaw) and submit an arborist Assessment Report.

A complete list of the plant species identified on site are available in Attachment 3.

Two general vegetation polygons were present on the subject property:

a) A landscaped vegetation polygon; and
b) A forested vegetation polygon.

Landscaped vegetation is summarized under Item 30 above.

Forested habitat occurred between the two residences at the rear of each property and along WC1. This area included mature native trees such as western redcedar, paper birch (*Betula papyrifera*), red alder (*alnus rubra)*, and bigleaf maple (*Acer macrophyllum*). Shrub species present included osoberry (*Oemleria*

cerasiformis), salmonberry (*Rubus spectabilis*), English ivy (*Hedera helix*), and Himalayan blackberry (*R. armeniacus*).

See the attached arborist report.

33. Identify Schedule 1, federally protected species at risk or provincial red or blue listed plant species and their critical habitats including shrub and ground cover communities and any species or habitat feature, identified as requiring year-round protection as identified in the *Wildlife Act*.

A review of online databases documenting Federal and Provincial protected species and wildlife habitat values was completed for species-at-risk. The following databases were reviewed: British Columbia Conservation Data Centre (BC CDC), Fisheries Inventory Data Queries, and Habitat Wizard.

The subject property did not contain any critical habitat for species at risk identified in the *Species at Risk Act* (SARA), and there were no known occurrences of species at risk within the subject property. The closest known occurrence record of a species at risk (mountain beaver; *Aplodontia rufa*) was historical in nature (last documented in 1969) and the subject properties were too dry to support mountain beaver. This species was considered to have a nil likelihood of occurrence.

Following is a description of available habitat and the associated likelihood of occurrence of species at risk.

The subject property is located in the Cloverdale Neighbourhood and has a total area of approximately 0.94 hectares. 181 Street runs north to south to the east of the properties and is a single lane road that receives limited traffic. 180 Street is a dead-end road that runs north to south to the west of the properties. Lots to the south and west are currently lower density residential, with medium density residential in the remaining surrounding area. GIN 143, comprising a utility right of way runs southeast to northwest to the south and east of the subject properties.

Per the Biogeoclimatic Ecosystem Classification Subzone/Variant Map for the Chilliwack Resource District, the subject property is located within the Coastal Western Hemlock dry maritime (CWHxm1) subzone, and per the City of Surrey COSMOS is located at an elevation of approximately 34 m to 43 m, with land generally sloping to the northwest.

The subject properties are located within a first order watershed with a total area of approximately 106.7 hectares (watershed code: 900-005473-636683-355554-114464). The Habitat Wizard Streams Report has records of cutthroat trout occurring within the watershed as recently as 2017.

Based on the habitat context and the developed nature of the lot, habitat values on the subject property were considered to be relatively low. GIN 143 provides the only continuous corridor throughout this highly developed landscape and the developed nature of the area generally would limit the value of existing habitat on the properties.

The landscaped areas did not contain naturalized shrubs or habitat features generally associated with high wildlife use (e.g. coarse woody debris, wildlife trees, cover). Existing trees and shrubs on the subject property are expected to provide habitat for common species habituated to disturbance, and most notably to songbirds species common to the area.

The forested area on the subject property included abundant cover in the form of mature and immature trees.

Based on the above, predominant wildlife use of the subject property is expected to consist of smaller bodied mammals such as bats, shrews, moles, rodents and lagomorphs (rabbits and hares). Foraging songbirds and raptors would also be expected at all times of year, and potential nesting sites were observed in the trees and shrubs located throughout the site.

Based on the generally low value of the habitat on the subject property, and the history of disturbance of the site, the likelihood of species at risk present in the general area was rated as low. Most likely species at risk to be present were flighted and included bats and birds. As the habitat on the property was generally low value, presence of listed birds or bats was considered most likely to be infrequent, occasional, and for short duration. Application of mitigation measures as described in this report are considered to be sufficient to avoid direct impact to these species.

Trowbridge's shrew, an endangered small mammal is relatively common south of the Fraser River, but prefers low elevation forests (Zuleta and Galindo Leal, 1994). This type of habitat was very restricted in and around the subject property; and while this species could be present, the likelihood was rated as low.

The likelihood of sensitive plant species occurring on the property was considered to be virtually nil. Current residential use, and growth of invasive species would make colonization by rare or sensitive species very unlikely. Most of the plant species observed are common to disturbed sites, suggesting that the site had naturally re-colonized from locally common species.

34. Drainage: Identify the Streamside Protection Area and stream locations, including top of bank, and stream classifications as defined in the Zoning Bylaw.

See attached plan and Item 27a, above.

35. Drainage: Identify the existing site drainage conditions in accordance with the Integrated Stormwater Management Plan (ISMP) relevant to the site location.

Refer to Section 27a for a description of onsite and near-site watercourses.

The property is located within the catchment of the North Creek ISMP. The main drainage corridors relevant to the subject properties include St. Gelais Brook and its tributaries (Kerr Wood Leidal Consulting Engineers, 2016).

36. Drainage: Detail existing site drainage conditions in accordance with the ISMP.

No surface water pooling was observed at the time of the site visits. Following rainfall events, saturated soils appeared to be efficiently draining to ground.

More detailed site drainage conditions were not investigated as part of this site assessment.

37a. Identify the Streamside Protection Area and how it is situated with the development.

The Streamside Protection Area is situated along the north side of the site and in the southwest corner of the western lot. A variance has been proposed for WC1 and WC2.

The proposed variance would result in a net loss of 370.2 m^2 (552.3 m^2(loss) – 182.1 m^2(gain)). Approximately 330 m^2 will be rehabilitated (See Attached Site Plan).

39. Building and Construction: Detail construction specifications including materials, timing, technologies and techniques proposed as a means to mitigate and reduce the ecological impacts of development on the identified streamside protection area.

The proposed development includes the subdivision of two residential lots into 13 single family lots on the subject parcel.

The development will include construction of lots, roads, and a cul-de-sac.

A layout for the proposed development is included as an attachment to this report.

It is anticipated that virtually all of the habitat available on the property will be converted for use as a residential site.

Impacts will be avoided by maintaining distance from the stream and by adherence to best practices during construction.

40. Building and Construction: Explain how the proposed development conforms to the City of Surrey's Drainage Regulation and Charges Bylaw, as amended, as well as policies in Secondary Plans, ISMPs, and the Zoning Bylaw.

The ISMP identifies the following drainage mitigation measures:

- Volume reduction;
- Detention;
- Increased pump station capacity;
- Infiltration; and
- Ensuring groundwater connectivity through corridor preservation.

Infiltration and detention will be used to the extent feasible on this project.

41. Building and Construction: Detail the location of all proposed buildings, structures, and impervious surfaces.

See the attached plan.

42. Building and Construction: Detail the timing and scheduling of all proposed development activities.

A QEP will be required to confirm that ESC facilities are installed prior to commencement of works.

The subject property contains nesting habitat in the form of trees, shrubs, and buildings. Demolition activities and tree and shrub removal works should occur between August 16 and March 14 of any given year to avoid incidental take of any birds' nests or eggs; however, tree clearing is possible at any time if birds' nests are confirmed to be absent. It should be noted that it would be nearly impossible to confirm that nests are absent from the blackberry thickets during the nesting season. A qualified environmental professional should undertake a bird nest survey ahead of any development activity with the potential to disturb birds or their nests, regardless of season. The purpose of the survey would be to reduce the likelihood that birds or their nests and eggs will not be negatively affected by the works.

Some raptors' nests are protected year-round, regardless of occupation. A raptors' nest survey should be completed in advance of tree clearing or building demolition on the subject property.

The subject property may contain bats during the warmer seasons, but lacked suitable hibernation habitat. Clearing of vegetation in the winter is preferred to avoid potential impacts to bats.

The subject property was not located within or adjacent to a large tract of intact forest or similar habitat. As such, this report cannot make recommendations to maintain habitat connectivity.

43. Soils: Provide site grading plans illustrating the area and extent of soil disturbance including slope grades and any proposed retaining wall heights, locations and materials used. Detail how slope or soil stability will be ensured and how erosion and increased sedimentation risks will be reduced.

The subject property is located within a Steep Slope – Hazard Lands Development Permit Area Buffer, which is subject to a DP2 Hazard Land Assessment. Some of the area will be protected within the SPA of WC1.

Site grading plans have been submitted separately.

44. Trees and Vegetation: Identify how existing trees, shrubs, and groundcover will be retained and protected including details and specifications on the replanting, restoration, and management of vegetated areas and the maintenance of short-term and long-term hydraulic regimes.

It is expected that all areas outside of the Streamside Protection Area will be converted to residential use. The Streamside Protection Areas are to be protected.

Encroachment is not permitted at any time during construction, unless directed by a Qualified Environmental Professional (QEP) and with the approval of the City of Surrey. A temporary fence must be placed at the SPA boundary for the duration of construction. Fencing to be installed along the proposed parks PL.

A permanent fence is to be installed along the proposed parks property line upon substantial completion of works. Signs indicating the sensitive nature of the SPA are to be installed at 15 m intervals along the length of the fence.

Per City comments barriers along the P15 area will be per Parks Construction Standard SSD-PK6112. Barriers must be built as per Parks Standard Construction Document dated Spring 2011.

A gate must be installed to allow access to the rehabilitation area. The gate must only be wide enough for foot-entry.

Placement of functional yard space is preferred adjacent to the SPA. The width of the yard space should be 4.5 m for rear yards and 3.0 m for side yards.

Also refer to the arborist report for this project.

45. Trees and Vegetation: Identify individual tree retention and removal as well as areas of structured landscaping, including plant species, size, and locations.

See the arborist report.

46. Trees and Vegetation: Provide details on how the Streamside Protection Area management of objectives will be met. Where restoration work IS NOT required, maintenance and monitoring shall be for a minimum of ONE year; and where restoration work IS required, maintenance and monitoring shall be for a minimum of FIVE years.

A QEP will be required to monitor the proposed development and ensure the recommendations made in this report are respected.

Environmental monitoring is anticipated to include (but is not necessarily limited to):

- Nesting bird surveys and reporting ahead of land clearing or demolition.
- Erosion and sediment control monitoring in accordance with the local bylaw.

A letter of comfort will be required to confirm to the satisfaction of the City of Surrey that:

- Tree protection measures are in place.
- Erosion and sediment controls are in place and adequately installed.

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com
Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

The letter of comfort would be required in advance of the issuance of a building permit.

Five years of monitoring are required to ensure that the SPA protection measures are undertaken as required. A cost for bonding purposes is provided in the attached Impact Mitigation Plan.

47. Trees and Vegetation: Provide a restoration, maintenance, and cost estimate plan consistent with the development requirements identified in the Ecosystem Management Plan.

The WC1 SPA is proposed to be a maximum safeguarding area. As such, this area would be conveyed to the City of Surrey and rehabilitated through a P15. A rehabilitation plan for this area is provided in the attached IMP.

The WC2 SPA is proposed to be a minimum safeguarding area. As such, a restoration plan and cost estimate including a 5-year monitoring and maintenance plan are required. These items are included in the attached IMP for this project.

50. Drainage: Identify post-development drainage site conditions in accordance with the ISMP.

See also item 40.

WC1 and WC2 will be preserved within a Streamside Protection Area and changes to drainage patterns will be mitigated by use of permeable surfaces where feasible and use of detention.

51. Drainage: Detail how flooding risk and water quality degradation will be mitigated including specific measures that will be taken to prevent channel erosion and prevent fouling of streams, wetlands, and drainage conveyance corridors.

There are no proposed changes to existing drainage patterns. It is understood that the development will be tied-into the existing municipal stormwater infrastructure.

LIMITATIONS

This assessment report has been prepared specifically for the development proposal and was based on the best available information at the time of completion, and on work undertaken per standard industry practice.

This assessment report has been prepared for the sole use of the developer named on this report and the local government. The recommendations made in this assessment are considered valid for a period of five years.

This report should be reviewed and/or updated after a period of five years, and/or in the event the development is not complete within a period of five years; in the event there is a substantial change in the condition of the subject property not described in this report; or in the event that there are changes to applicable legislation.

CLOSING

Two watercourses were identified immediately north and south of the proposed development. The northern watercourse was assessed to be a Class B stream and was prescribed a 15 m setback. The southern watercourse was assessed to be a Class A watercourse and was prescribed a 30 m setback. A variance has been proposed along both watercourses. An Impact Mitigation Plan has been included in this submission for the proposed variance.

In general, the subject property was considered to contain low value wildlife habitat and very unlikely to contain species of management concern. With application of best practices recommended above, it is anticipated that environmental impacts associated with this project can be avoided.

REFERENCES

Kerr Wood Leidal Consulting Engineers, 2016. Fleetwood Greenway North Creek ISMP.

Zuleta, G., Galindo Leal, C., 1994. Distribution and abundance of small mammals at risk in a fragmented landscape., Wildlife Working Report N° WR-64.

Attachment 1 - Figures

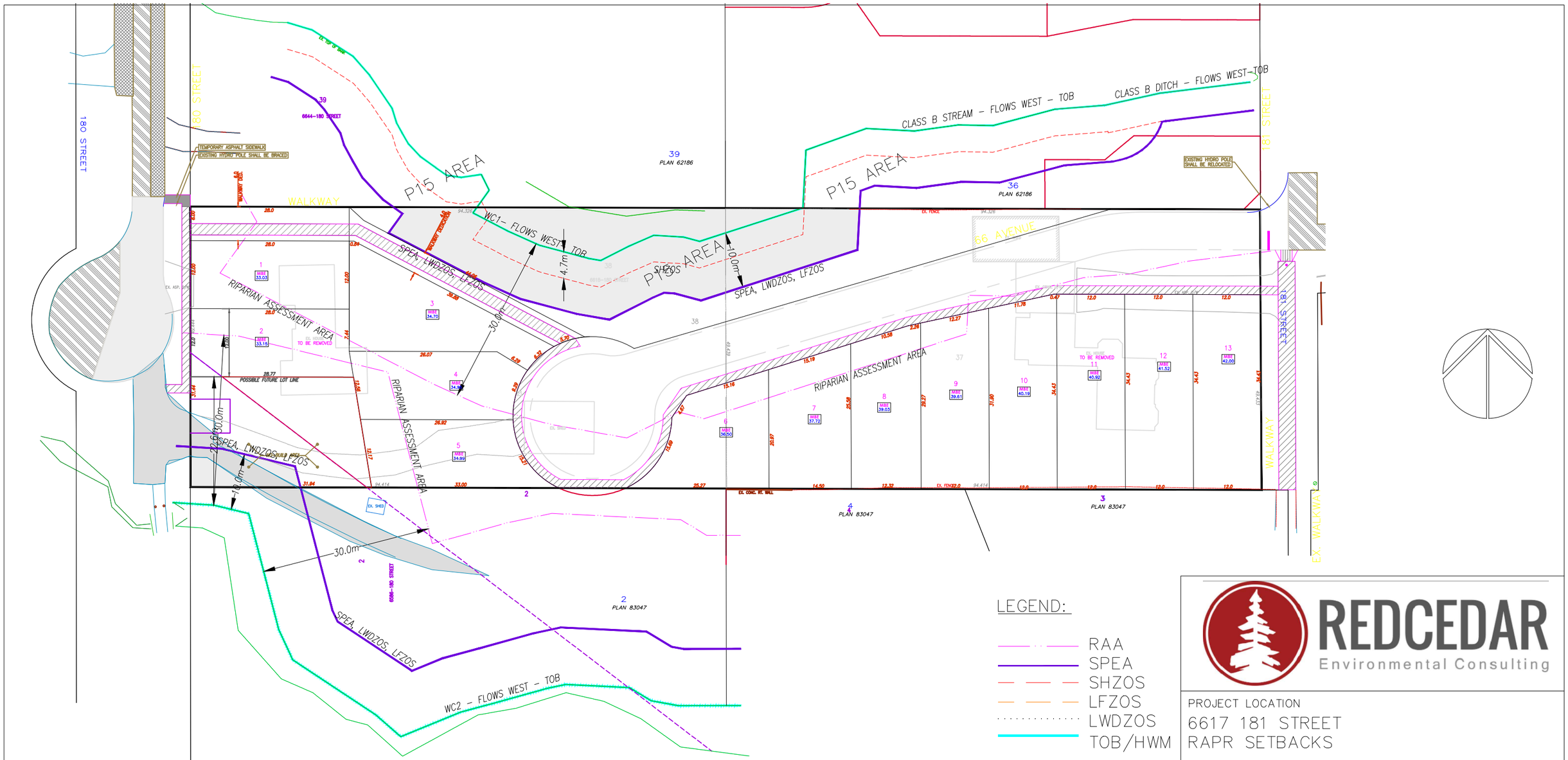
t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Figure 1. Annotated aerial photograph of the subject properties (white outline). Ditch 1 is shown in green for clarity, and the streams are shown in orange (Class B) and red (Class A).

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1



LEGEND:

- RAA
- SPEA
- SHZOS
- LFZOS
- LWDZOS
- TOB/HWM

SETBACK TABLE

	Ditch 1	WC1 (north)	WC2 (south)	
LWDZOS	5.0	10.0	10.0	Large Woody Debris and Bank Stability Zone of Sensitivity
LFZOS	5.0	10.0	10.0	Litter Fall and Insect Drop Zone of Sensitivity
SHZOS*	5.0	4.7	1.8	Shade Zone of Sensitivity
SPEA	5.0	10.0	10.0	Streamside Protection and Enhancement Area
RAA	30.0	30.0	30.0	Riparian Assessment Area

*DUE SOUTH OF HWM

REDCEDAR
Environmental Consulting

PROJECT LOCATION
6617 181 STREET
RAPR SETBACKS

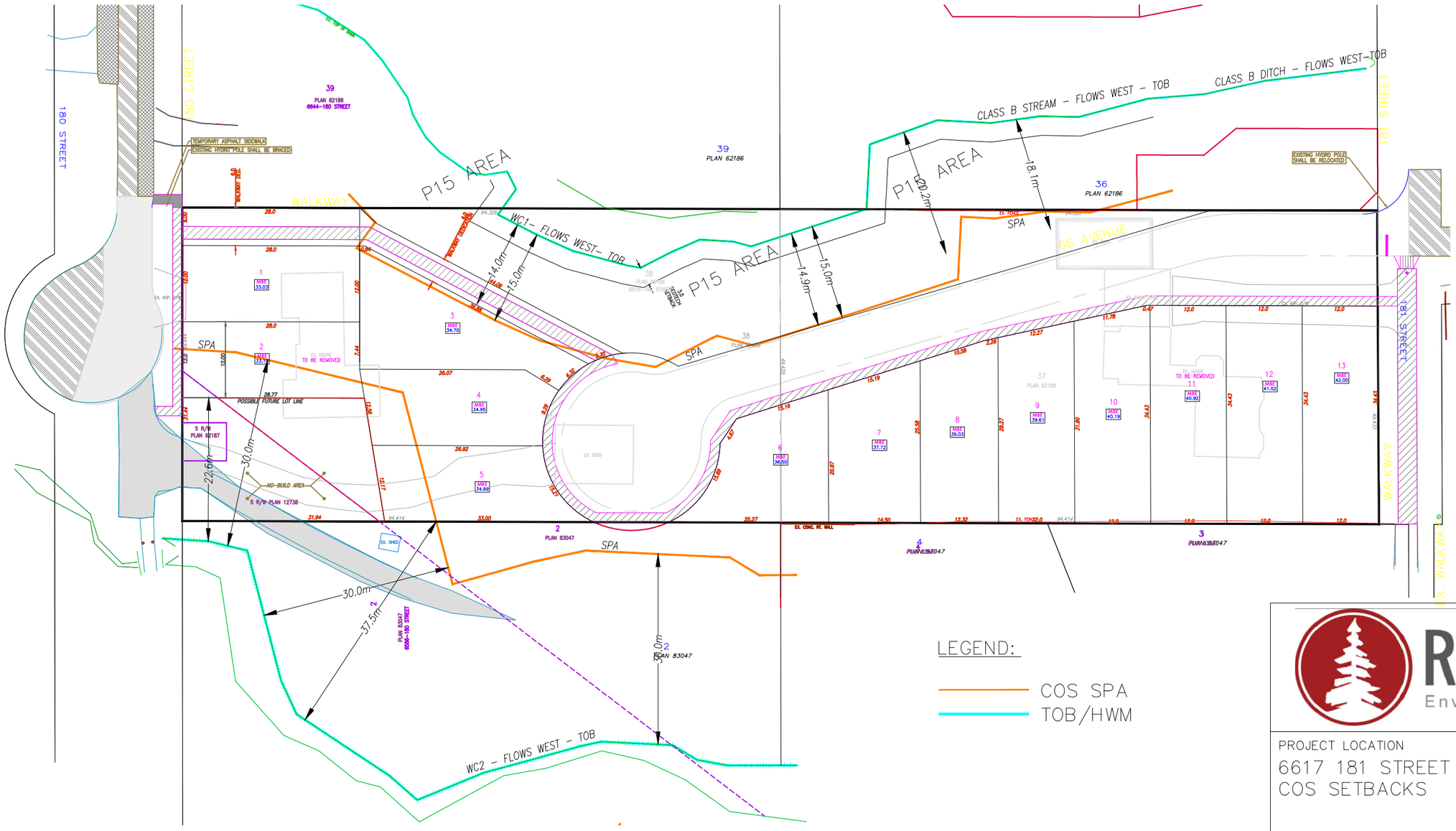
PROJECT NUMBER
21–045R

DRAWN BY:
BRITTANY FEAVER

DATE:
MAY 22 2024

SHEET:
1

SCALE:
NTS



LEGEND:

COS SPA

TOB/HWM

SETBACK TABLE				
	Ditch 1	**WC1 (north)**	**WC2 (south)**	
LWDZOS	5.0	10.0	10.0	Large Woody Debris and Bank Stability Zone of Sensitivity
LFZOS	5.0	10.0	10.0	Litter Fall and Insect Drop Zone of Sensitivity
SHZOS*	5.0	4.7	1.8	Shade Zone of Sensitivity
SPEA	5.0	10.0	10.0	Streamside Protection and Enhancement Area
RAA	30.0	30.0	30.0	Riparian Assessment Area
SPA	15.0	15.0	30.0	PART 7A SETBACK - STREAMSIDE PROTECTION AREA
*DUE SOUTH OF HWM				

REDCEDAR Environmental Consulting

PROJECT LOCATION
6617 181 STREET
COS SETBACKS

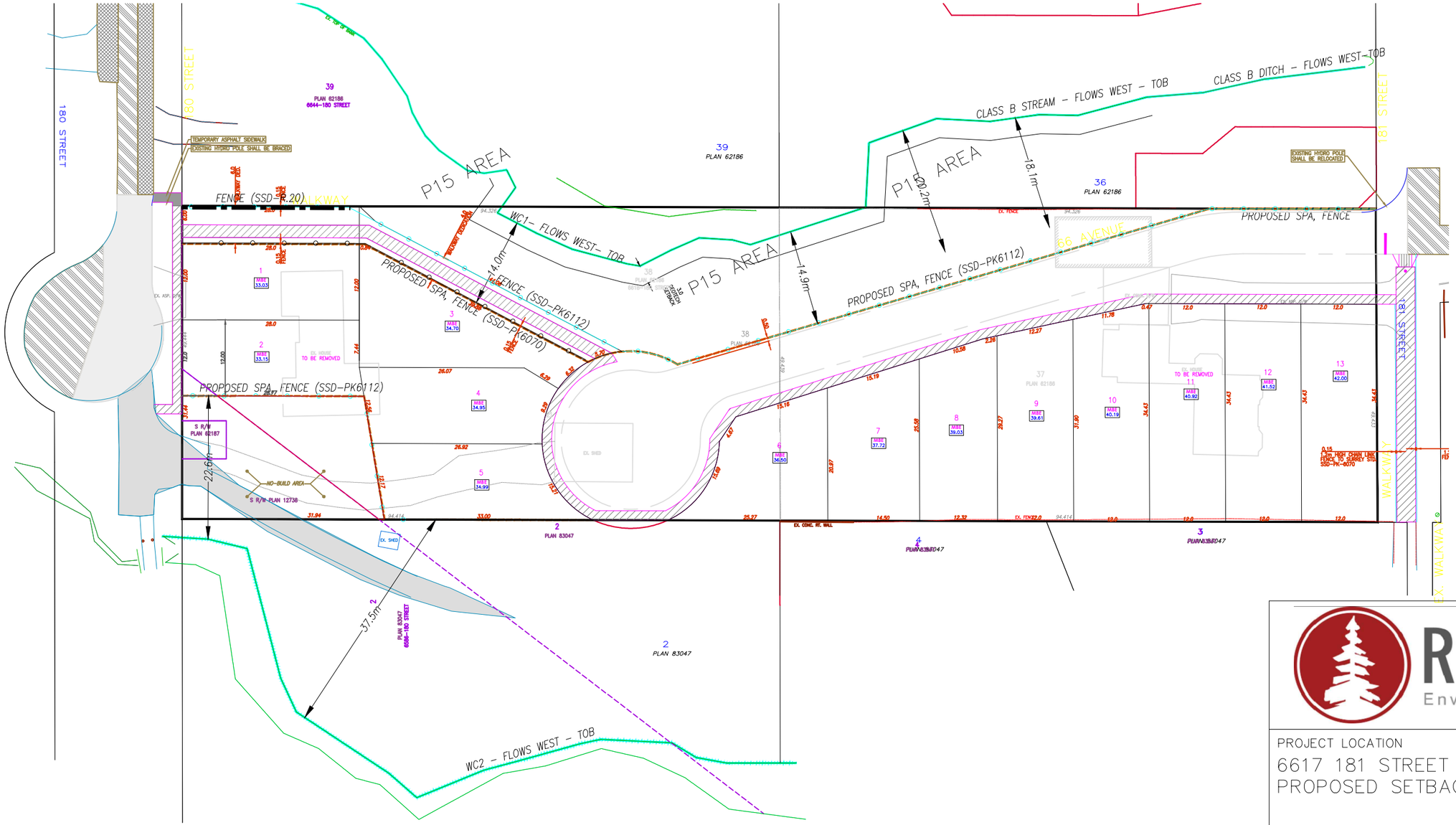
PROJECT NUMBER
21–045R

DRAWN BY:
BRITTANY FEAVER

DATE:
MAY 22 2024

SHEET:
1

SCALE:
NTS



LEGEND:

- PROPOSED SPA
- TOB/HWM
- SPLIT RAIL FENCE

REDCEDAR
Environmental Consulting

PROJECT LOCATION
6617 181 STREET
PROPOSED SETBACKS

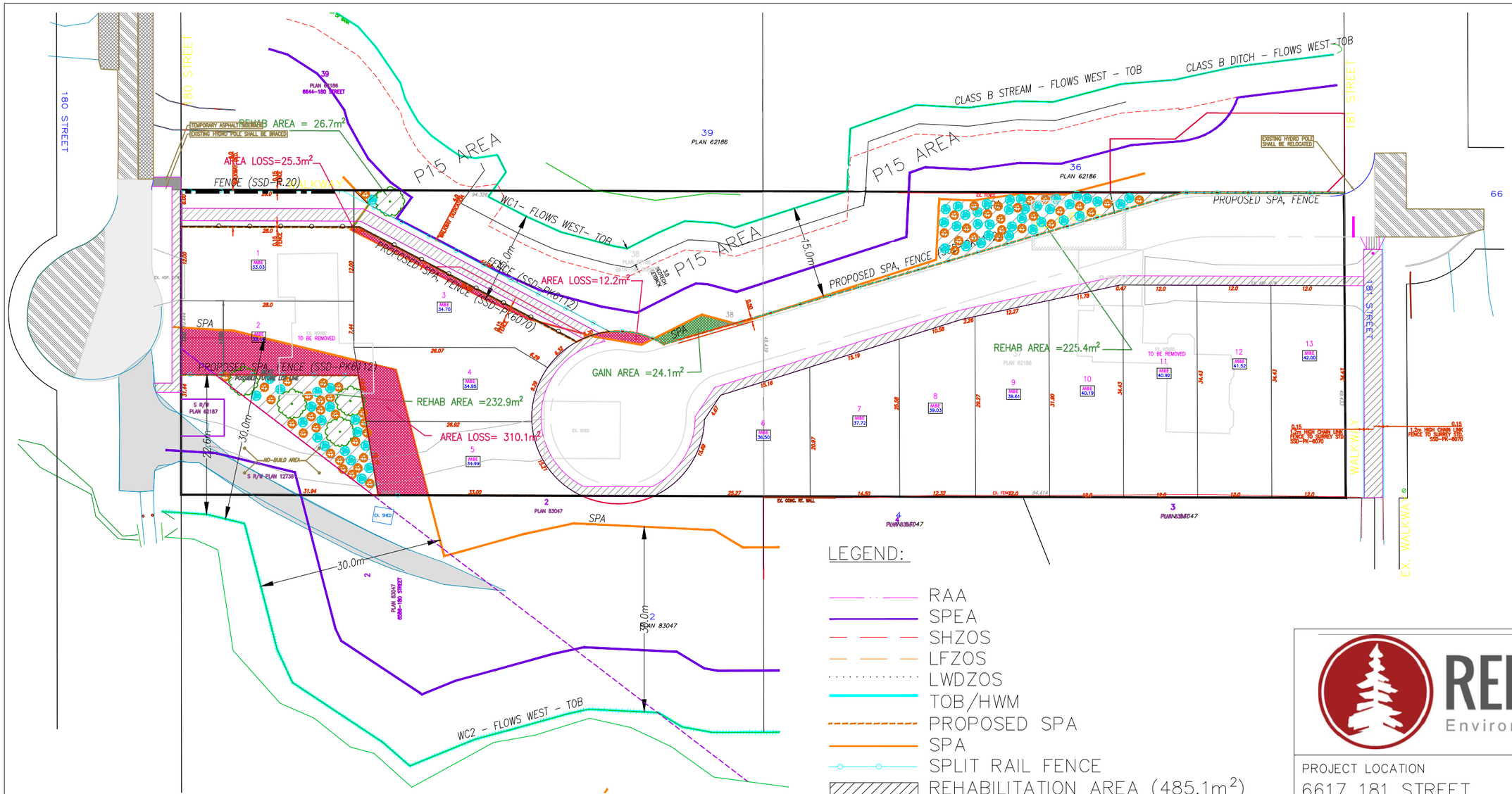
PROJECT NUMBER
21-045R

DRAWN BY:
BRITTANY FEAVER

DATE:
MAY 22 2024

SHEET:
1

SCALE:
NTS



LEGEND:

- RAA
- SPEA
- SHZOS
- LFZOS
- LWDZOS
- TOB/HWM
- PROPOSED SPA
- SPA
- SPLIT RAIL FENCE
- REHABILITATION AREA (485.1m²)
- GAIN (24.1m²)
- LOSS (347.6m²)

SETBACK TABLE

	Ditch 1	WC1 (north)	WC2 (south)	
LWDZOS	5.0	10.0	10.0	Large Woody Debris and Bank Stability Zone of Sensitivity
LFZOS	5.0	10.0	10.0	Litter Fall and Insect Drop Zone of Sensitivity
SHZOS*	5.0	4.7	1.8	Shade Zone of Sensitivity
SPEA	5.0	10.0	10.0	Streamside Protection and Enhancement Area
RAA	30.0	30.0	30.0	Riparian Assessment Area
SPA	15.0	15.0	30.0	PART 7A SETBACK - STREAMSIDE PROTECTION AREA

*DUE SOUTH OF HWM

REDCEDAR Environmental Consulting

PROJECT LOCATION
6617 181 STREET
REHABILITATION PLAN

PROJECT NUMBER
21–045R

DRAWN BY:
BRITTANY FEAVER

DATE:
MAY 22 2024

SHEET:
1

SCALE:
NTS

Attachment 2 - Selected Site Photographs

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Photograph 1. View of WC1, a Class B stream. Aside from overhanging vegetation, the channel was virtually absent of cover for fish including a lack of large woody debris, overhanging banks, pools, and large substrate materials. (Photograph taken February 1, 2021).

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Photograph 2. View of Ditch 1 facing east. The transition to the Class B stream (not pictured) is located just to the west of this location (Photograph taken February 1, 2021).

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Photograph 3. View of habitat from within the proposed SPA of WC1, facing south. An outbuilding on the subject property can be seen at the rear of the photo. This area would provide some habitat value for local songbirds (Photograph taken February 1, 2021).

Photograph 4. View of WC1 stream facing north on the adjacent property. Himalayan blackberry is visible growing along the bank of the stream. This area can be rehabilitated with removal of invasive species and installation of native plants. (Photograph taken February 1, 2021).

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Photograph 5. View of WC2, facing east, on the neighbouring property. The channel is not visible under the long grass. The proposed variance to the setback is located on the other side of the fence to the left of the frame. The area pictured would remain unchanged (Photograph taken June 3, 2021).

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Photograph 6. View of WC2 facing east. This location is where the watercourse leaves the neighbouring property and flows through two pipes under a pedestrian path before flowing across the utility ROW to the west of the subject properties.

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Photograph 7. View of western subject property from behind the house, facing southwest. WC1 flows to the right of the frame (not pictured). The low cut grasses provided low value habitat, and would likely only provide foraging habitat for a few species of songbirds (Photo taken June 3, 2021).

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Attachment 3 - Tables

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Table 3. List of plant species present on the subject property. Survey conducted on February 1, 2021.

	Species	
	Common name	**Latin name**
Trees	Bigleaf maple	*Acer macrophyllum*
	Paper birch	*Betula papyrifera*
	Spruce	*Picea* sp.
	Red alder	*Alnus rubra*
	Oak	*Quercus* spp.
	Misc. ornamentals	
	Western redcedar	*Thuja plicata*
Shrubs	Vine maple	*Acer circinatum*
	Osoberry	*Oemleria cerasiformis*
	Beaked hazelnut	*Corylus cornuta*
	Black raspberry	*Rubus leucodermis*
	Red huckleberry	*Vaccinium parvifolium*
	Rhododendron	*Rhododendron* sp.
	Common snowberry	*Symphoricarpos albus*
	Salmonberry	*Rubus spectabilis*
	Himalayan blackberry	*Rubus armeniacus*
	English holly	*Ilex aquifolium*
	English ivy	*Hedera helix*
Herbs	Lady fern	*Athyrium filix-femina*
	Creeping Buttercup	*Ranunculus repens*
	Grass Sp.	*n/a*
	Periwinkle	*Catharanthus* sp.
	Policeman's helmet	*Impatiens glandulifera*
	Bindweed	*Convolvulus* sp.
	Fringecup	*Tellima grandiflora*
	Reed canarygrass	*Phalaris arundinacea*
	Sword fern	*Polystichum munitum*
	Yellow archangel	*Lamium galeobdolon*

Attachment 4 – Impact Mitigation Plan

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

July 25, 2024

Impact Mitigation Plan

File #: 21-045R

Subject Properties:

6617 181 Street & 6618 180 Street, Surrey, BC

Prepared for:

C s. 22(1)Kooner

c/o

Nirvair Singh

Prepared by:

Rémi Masson, B.Sc., R.P.Bio. ISA Certified Arborist ®

201-45269 Keith Wilson Road
Chilliwack, BC, V2R 5S1

IMPACT MITIGATION PLAN

52. An IMPACT MITIGATION PLAN is required to determine the appropriateness of requests to reduce the Streamside Protection Area (through the use of a Development Variance Permit) as defined in Surrey's Zoning Bylaw, Part 7a. The IMPACT MITIGATION PLAN, where relevant to the site (determined by City of Surrey), shall include the following:

52a. Overall Site: A detailed explanation why a variance is being sought and why the required Streamside Protection Area is not being met.

A variance is being sought to allow for a development on the above mentioned subject properties. This Impact Mitigation Plan (IMP) proposes a variable Streamside Protection Area (SPA) for WC1. The setback will not be less than 10 m or more than 25 m measured from the top of bank. The total area loss is proposed to be 37.5 m^2. A City walkway will run through a portion of the proposed SPA in the northwest. The walkway has not been included in gain/loss calculations.

This IMP also proposes to reduce the SPA for WC2 from 30 m to no less than 22.6 m measured from the top of bank. The total area loss of WC2 is proposed to be 310.1 m^2.

The total area loss for this project is proposed to be 347.6 m^2. The net loss proposed is 323.5 m^2.

The current Zoning Bylaw requires a minimum setback of 30 metres from top-of-bank for Class A (red-coded) natural streams and a minimum setback of 15 m from top-of-bank for Class B (yellow-coded) natural streams. A variance to the streamside setback requirement in the Zoning Bylaw is required for this project.

The proposed setback meets/exceeds the minimum provincial 10 m required setback which was determined following the Riparian Areas Protection Regulation (RAPR) Detailed Assessment Methodology.

The northern watercourse (WC1) is proposed to be conveyed to the City and rehabilitated through a P15 agreement (it is understood that this would be accepted by the Parks Department). A walkway is proposed within the SPA of WC1 in the northwest as shown on the attached plans.

The minimum RAPR riparian setback is intended to protect the riparian features, function, and conditions that support fish life. As such, the proposed streamside setback variance will not have any direct impact on the creek, its water quality or quantity, or habitat value for fish, or to the existing riparian vegetation in the long term.

The municipality has also indicated that this variance will result in a net benefit for the community.

Overall Site: A detailed Riparian assessment report, following the Provincial methods specified in the Riparian Areas Regulation, B.C. Reg. 376/2004, identifying the regulatory Streamside Protection and Enhancement Area and associated measures.

A detailed RAPR Assessment report has been submitted to the province (#7425). The regulatory Streamside Protection and Enhancement Area (SPEA) is 10 m from the natural boundary/high water mark for both WC1 and WC2. The proposed streamside protection areas would satisfy and exceed the RAPR requirements along the length of the streams.

Overall Site: An assessment report indicating any expected changes and modifications to streams and aquatic and riparian areas, including any expected water quality reductions, water quantity changes, or fish and wildlife habitat degradation, with a particular focus on salmonid habitat and healthy tree retention, as a result of the proposed Streamside Setback Area variance.

This development is not anticipated to result in modifications to streams, aquatic habitat, existing functional riparian habitat, or to result in habitat degradations.

All existing functional habitat within the SPA will be protected and enhanced.

Building and Construction: Details demonstrating how the City of Surrey can reasonably access the stream to maintain drainage conveyance including illustrating the location of a required minimum 5 m wide access corridor that is geotechnically-stable and located outside of the Streamside Protection and Enhancement Area, as defined in Riparian Areas Regulation, B.C. Reg. 376/2004, as amended.

See attached plan.

The proposed development leaves room for access to the streams where they are present on the subject property.

Building and Construction: Details on how public and maintenance access will be accommodated where there is a park trail proposed within the proposed adjusted Streamside Setback Area.

A City walkway is proposed along the northwest SPA of WC1 as shown on the plans. This walkway may be accessed from the roads.

Soils: Provide a geotechnical report that assesses the impacts of the adjustments and recommends how to protect stream bank stability. The report will provide detailed information on stream hydraulics, erosion, sedimentation, and top of bank conditions (e.g. top loading or slope undercutting effects). The report will also include a seismic assessment addressing impacts for both structural and human usage.

See geotechnical report by Braun Geotechnical Ltd. dated December 21, 2021. The proposed setbacks would adhere to and exceed geotechnical setbacks recommended in the report.

Trees and Vegetation: A vegetation accounting report including the effects of any biomass and habitat removal, or any other disturbances as a result of the proposed Streamside Setback Area variance.

Per the arborist report for this project, no additional trees will be removed as a result of the proposed variance. Additional biomass to be removed included shrubs, landscape areas and permanent structures (i.e. existing house, shed).

Habitat: A riparian restoration plan specifying the following: invasive species management; abatement of hazard trees; appropriate native species proposed to be used in any restoration work; details on any removal of anthropomorphic habitat debris; and how stream complexing and drainage conveyance will be undertaken (to the satisfaction of the City of Surrey).

The following includes a rehabilitation plan for three areas within the SPA per the attached site plan (Attachment 1).

Invasive species management

Vegetation within the rehabilitation areas consisted predominantly of grassed lawn. Minor amounts of Himalayan blackberry may be present within the northwest rehabilitation area. The southern rehabilitation area consisted of three mature western redcedar (*Thuja plicata*) trees, grassed lawn and ornamental shrubs. Invasive plant species, and ornamental grass and shrubs will be removed from each rehabilitation area and replaced with native plant species per the plan below.

Abatement of hazard trees

The arborist report includes recommendations for hazard trees.

Native species to be used

Native species to be used in any restoration work (as described in the following section) should be chosen based on soil, moisture, and shade requirements and the overall post-construction site hydrology. Native species to be used are outlined in Table 1 in the Planting Specification section below.

Removal of anthropomorphic debris

Anthropomorphic debris was not observed within the channel at the time of the assessment; as such a plan for removal has not been provided at this time.

Stream complexing and drainage conveyance

The stream was not located on the subject property, as such, recommendations for complexing are not proposed.

Drainage: An assessment report on any expected flooding or increase in flooding or impacts, positive or negative, affecting groundwater as a result of the proposed Streamside Setback Area variance.

No expected flooding or increase in flood risk would be expected as a result of the proposed setback area variance. The streams were moderately incised and flows are not expected to top the banks in typical conditions.

Drainage: An assessment report of the stream and how the proposed adjustment to the Streamside Setback Area will not create a vulnerability from beaver activities for the development site.

Potential beaver activity (chewed deciduous stems) was not observed on the subject property. This channel is also narrow and not anticipated to be suitable for beavers.

Overall Site: A restoration plan and cost estimate for the items submitted with the Impact Mitigation Plan. This restoration plan shall also be used to determine landscaping bonding and security requirements for installation, monitoring and maintenance purposes.

REHABILITATION PLAN

Approximately 252 m^2 of rehabilitation is proposed for the WC1 SPA. Approximately 233 m^2 of rehabilitation is proposed within the WC2 SPA on the subject property.

It is noted that a BC Hydro right of way is present within the WC2 SPA – planting will not occur within this right of way and this area has not been included in the rehabilitation calculations.

A permanent fence is to be installed on the SPA boundary upon substantial completion of works. Signs indicating the sensitive nature of the SPA are to be installed at 15 m intervals along the length of the fence.

Per City comments barriers along the P15 area will be per Parks Construction Standard SSD-PK6112. Barriers must be built as per Parks Standard Construction Document dated Spring 2011.

The purpose of this rehabilitation plan is to rehabilitate lands within the SPA. Table 3 below identifies the rehabilitation schedule.

Table 1. Suggested timing of works.

Item	Timing
Removal of invasives/ornamentals/grass	Prior to planting
Soil preparation	Prior to planting
Planting	September/October
Installation of fencing	Following planting
Maintenance	Spring and fall, ongoing

Rehabilitation Areas

Disturbed areas in the SPA on the subject property will be rehabilitated. A shed and grass lawn will be removed from the northeast SPA portion (225 m^2) and will be planted with native vegetation. The northwest portion (26.7 m^2) will be planted with native vegetation.

The WC2 rehabilitation area (233 m^2) on the subject property will be rehabilitated per the attached site plan. Planting will only occur outside of the BC Hydro right of way. A portion of the existing house and driveway will be removed. The driveway access to the property to the south will remain at this time. All remaining areas within the SPA will be planted with native vegetation.

Timing

Planting may occur at any time in the growing season provided irrigation is supplied, but highest survival would be expected if planting is completed in the fall (i.e. September/October). Fall planting is also recommended where irrigation will not be provided.

Site preparation

Removal of ornamental vegetation and permanent structures must be completed prior to commencement of rehabilitation works. Minimal invasive vegetation was observed in the proposed planting areas at the time of the assessment.

If invasive species such as Himalayan blackberry (*Rubus armeniacus*) have encroached into the planting area, these species should be removed ahead of planting.

Removal of Himalayan blackberry and other invasive species can occur throughout winter and spring. Mechanical removal of these plants is generally preferred.

All invasive plant material is to be removed to a suitable facility (e.g. Net Zero Waste).

Invasive vegetation is anticipated to regrow in the spring after the initial season of treatment. Continued removal of blackberry will be required until the species is eradicated. Use of glyphosate on regrowth is permissible, provided adherence with the applicable legislation and regulation.

Topsoil may be required in areas where permanent structures are to be removed (e.g. driveway, house). Topsoil must be imported into the planting area. Topsoil is anticipated to be salvaged from the site outside of the SPA for use in the SPA. Any imported topsoil must meet Landscaping Standards.

It is recommended that wood mulch be added to the soil prior to planting at a depth of 5 to 10 cm. Mulch will be sourced from the trees cut outside of the SPA as per the arborist report. This will improve soil moisture retention and temperature regulation, reduce the growth of invasive plants, and may ultimately increase the success of plant growth (Bulmer et al., 2007).

If available and practical, large woody debris can be placed in the rehabilitation area under the supervision of Redcedar Environmental.

Planting specifications

A total of approximately 485 m^2 of planting space is present within the rehabilitation area outside of naturally vegetated areas and the BC Hydro Right of Way. Per the arborist report three mature western redcedar trees

are to be retained in the WC2 SPA and a number of trees will be retained in the central portion of the WC1 SPA.

The WC2 rehabilitation area (233 m^2) will be planted with a native grass seed reclamation mix and a minimum of two trees in the setback area per comment by City of Surrey Trees & Landscaping; as such there would 252 m^2 of available planting area for additional trees and shrubs.

A total of 36 trees and 215 shrubs will be installed within the planting area along with approximately 230 m^2 seeded with riparian grass seed blend (within the WC2 SPA). The proposed planting density is anticipated to be sufficient to amply vegetate the rehabilitation area.

Salal is to be planted in shaded spots (e.g. near the driplines of trees). All other species can be evenly distributed across the planting areas.

A list of the recommended plant species is provided in the table below. Plant species have been chosen based on local conditions and species existing on site. The recommended plant species can be changed based on plant availability or upon recommendation of the planting contractor, with the approval of Redcedar Environmental.

Table 2. Recommended plant species to be installed in Planting Area.

	Common Name	Latin Name	Count	Pot size
Trees	Bigleaf maple	*Acer macrophyllum*	12	#5
	Bitter cherry	*Prunus emarginata*	12	#5
	Western redcedar	*Thuja plicata*	12	#5
Shrubs	Salal	*Gaultheria shallon*	20	#2
	Osoberry	*Oemleria cerasiformis*	65	#2
	Common snowberry	*Symphoricarpos albus*	65	#2
	Salmonberry	*Rubus spectabilis*	65	#2
Graminoid	Riparian grass seed blend	-	broadcast	-
		Total Plants	**251**	

Re-vegetation plant criteria:

- All plants must be of guaranteed nursery stock.
- Shrubs must be at least No. 2 pot size.

The plants must comply with the B.C. Landscape and Nursery Association standards for nursery stock. The plants must be healthy with well-developed root systems and top growth and free of:

- disease;

- insect infestation;
- broken tops, torn roots, and abrasions of bark on the trunk and branches;
- weak root or branch systems;
- dried out root systems;
- prematurely opened or damaged buds;
- dry, loose, or broken ball of earth;
- damage from heating, freezing, or moulding; and,
- abnormal leaf colour.

Exclusionary fencing

Approximately 275 m of fencing will be required to prevent encroachment into the SPA and rehabilitation areas. This fence is intended to discourage access, mowing of native vegetation, and/or dumping of yard waste. A gate must be installed to allow access. The fence is to be installed at the edge of the planting areas and is to be installed 0.1m offset of setback area.

Maintenance

Regular maintenance is the most cost-effective means of meeting the goal of this rehabilitation plan. Maintenance would consist of the removal of invasive species from the rehabilitation area. Invasive brushing should occur for five years.

Watering of plants is not typically necessary if plants are installed in the fall. If required to promote survival, watering must conform with local bylaw or policy requirements.

Rehabilitation monitoring

A Qualified Environmental Professional must be on site at the time of site preparation to ensure that all rehabilitation activities will be in compliance with this report.

A QEP responsible for post-construction inspections and reporting shall be assigned by the Proponent at a later date.

A QEP must be on site at the time of site preparation to ensure that all rehabilitation activities will be in compliance with this report.

A total of six monitoring inspections will be required to confirm the success of the rehabilitation works: once following planting, then annually for five years after planting has been completed. Monitoring works are to be completed by a Qualified Environmental Professional.

The goal for planting success is 80%. The Qualified Environmental Professional will confirm that plant density is consistent with the recommendations made in this report. The prevalence of invasive vegetation will be recorded. A Follow-up Inspection Report will be completed each year to summarize current condition of the riparian rehabilitation area, describe maintenance requirements (if any), and confirm the amount of securities

that can be returned to the project owner. The final inspection report will confirm that the rehabilitation works have met the objectives described in this report and confirm that further action/monitoring is not required.

Security Release Schedule for Private Lands

Year 0: Planting occurs; monitoring report indicates successful planting / remediation works. No securities are returned at this time.
Year 1: monitoring report received and approved; 10% of securities returned.
Year 2: monitoring report received and approved; 10% of securities returned.
Year 3: monitoring report received and approved; 10% of securities returned OR, the QEP deems that the property is now 'free to grow' and will not require any further maintenance of monitoring, and the remaining 80% of securities is released.
Year 4: monitoring report received and approved; 10% of securities returned.
Year 5: provided that there has been successful remediation, as determined by the QEP, then the remaining 60% of securities are released. OR If the remediation has failed threshold survival rates, then additional monitoring will be required and remaining securities will be released once the area is free to grow.

Monitoring Report Requirement Details

- Monitoring reports are to follow the Monitoring Report Terms of Reference.
- Monitoring reports are to be submitted once per year during the growing season.
- Monitoring reports are to be submitted by the QEP to treebylaw@surrey.ca
- Security releases will follow if monitoring deems planting successful each year.

Cost Estimate

A cost estimate for the above restoration works is provided in the tables below. Costs have been split between restoration occurring on private lands and those occurring within the P15 Area.

Table 3. Cost estimate for proposed restoration plan at 6617 181 Street & 6618 180 Street, Surrey on Private lands.

2023 SEDPA Cost Estimate Table for Securities (Private)					
Date:	**25-Jul-24**				
City of Surrey Project Number:	**21-0264-6618 180 Street**				
Landscape Firm:					
Environmental Consultant (and Company)	**Remi Masson (Redcedar Environmental Consulting Inc.)**				
Area to be remediated (m^2): 233					
	Item	**Quantity**	**Unit Cost**	**Unit**	**Totals**
1	Fencing (Split rail)	275	$ 84.87	l.m.	$23,339.25
	Fencing (Vinyl-coated chain link)	0	$ 106.09	l.m.	$ -
2	Invasive Removal (mechanical - intial prep)	233	$ 12.73	m2	$ 2,966.09
3	Invasive Removal (brushing)	1165	$ 5.30	m2/year (for 5 years)	$ 6,174.50
4	Mulching	0	$ 6.90	m^2	$ -
5	2 gal shrub[1]	0	$ 10.61	shrub	$ -
6	5 gal tree[1]	2	$ 21.22	tree	$ 42.44
7	Forbs[1]	0	$ 2.20	forb (per 0.25 m2)	$ -
8	Riparian grass seed blend (broadcast)[1]	230	$ 0.21	m2	$ 48.30
9	Watering[2]	5592	$ 0.52	(per m2) x 24	$ 2,907.84
10	Planting installation (labour)	233	$ 10.61	m2	$ 2,472.13
12	Other: Monitoring Costs (QEP)	5	$1,000.00	per year	$ 5,000.00
					$ -
					$ -
					$ -
					$ -
				Subtotal	$42,950.55
				Subtotal plus 10% Contingency	$ 4,295.06
				Subtotal	$47,245.61
				5% GST	$ 2,362.28
				Grand Total	$49,607.89
Notes:					
	1. All vegetation species must be 100% native, and selected based on shade, moisture and soil requirements. QEPs are expected to select species that naturally occur within the subject area. Climax species are not usually appropriate for disturbance areas.				
	2. Watering periods are required during drought months for the first two years of establishment.				
	3. Imported topsoil is not a requirement unless substrate has been completely denuded of all topsoil, and the QEP thinks that addition of topsoil amendment would be required. Topsoil must be tested and meet planting and safety requirements for invasive species, heavy metals, organic content and salinity.				

Table 4. Cost estimate for proposed restoration plan at 6617 181 Street & 6618 180 Street, Surrey on P15 Lands.

2023 SEDPA Cost Estimate Table for Securities (P15 area)					
Date:	25-Jul-24				
City of Surrey Project Number:	21-0264-6618 180 Street				
Landscape Firm:					
Environmental Consultant (and Company)	Remi Masson (Redcedar Environmental Consulting Inc.)				
Area to be remediated (m^2): 252					
	Item	**Quantity**	**Unit Cost**	**Unit**	**Totals**
1	Fencing (Split rail)	0	$ 84.87	l.m.	$ -
	Fencing (Vinyl-coated chain link)	0	$ 106.09	l.m.	$ -
2	Invasive Removal (mechanical - intial prep)	252	$ 12.73	m2	$ 3,207.96
3	Invasive Removal (brushing)	1260	$ 5.30	m2/year (for 5 years)	$ 6,678.00
4	Mulching	252	$ 6.90	m^2	$ 1,738.80
5	2 gal shrub[1]	215	$ 10.61	shrub	$ 2,281.15
6	5 gal tree[1]	34	$ 21.22	tree	$ 721.48
7	Forbs[1]	0	$ 2.20	forb (per 0.25 m2)	$ -
8	Riparian grass seed blend (broadcast)[1]	0	$ 0.21	m2	$ -
9	Watering[2]	6048	$ 0.52	(per m2) x 24	$ 3,144.96
10	Planting installation (labour)	252	$ 10.61	m2	$ 2,673.72
12	Other: Monitoring Costs (QEP)	5	$1,000.00	per year	$ 5,000.00
					$ -
					$ -
					$ -
					$ -
				Subtotal	$25,446.07
				Subtotal plus 10% Contingency	$ 2,544.61
				Subtotal	$27,990.68
				5% GST	$ 1,399.53
				Grand Total	$29,390.21
Notes:					
	1. All vegetation species must be 100% native, and selected based on shade, moisture and soil requirements. QEPs are expected to select species that naturally occur within the subject area. Climax species are not usually appropriate for disturbance areas.				
	2. Watering periods are required during drought months for the first two years of establishment.				
	3. Imported topsoil is not a requirement unless substrate has been completely denuded of all topsoil, and the QEP thinks that addition of topsoil amendment would be required. Topsoil must be tested and meet planting and safety requirements for invasive species, heavy metals, organic content and salinity.				

Drainage: Detail and identify post-development drainage site conditions in accordance with the Integrated Stormwater Management Plan (ISMP) relevant to the site location.

It is understood that the civil design for this project will release stormwater at the pre-development rate.

LIMITATIONS

This assessment report has been prepared specifically for the development proposal and was based on the best available information at the time of completion, and on work undertaken per standard industry practice.

This assessment report has been prepared for the sole use of the developer named on this report and the local government. The recommendations made in this assessment are considered valid for a period of five years.

This report should be reviewed and/or updated after a period of five years, and/or in the event the development is not complete within a period of five years; in the event there is a substantial change in the condition of the subject property not described in this report; or in the event that there are changes to applicable legislation.

CLOSING

The proposed variance is not anticipated to reduce habitat values in the riparian areas of WC1 or WC2. Rehabilitation of the protected areas will benefit native wildlife and vegetation species and will further enhance riparian habitat values. The subject property was unlikely to contain species of management concern. With application of the restoration plan outlined above, it is anticipated that habitat values within the proposed setback will be improved.

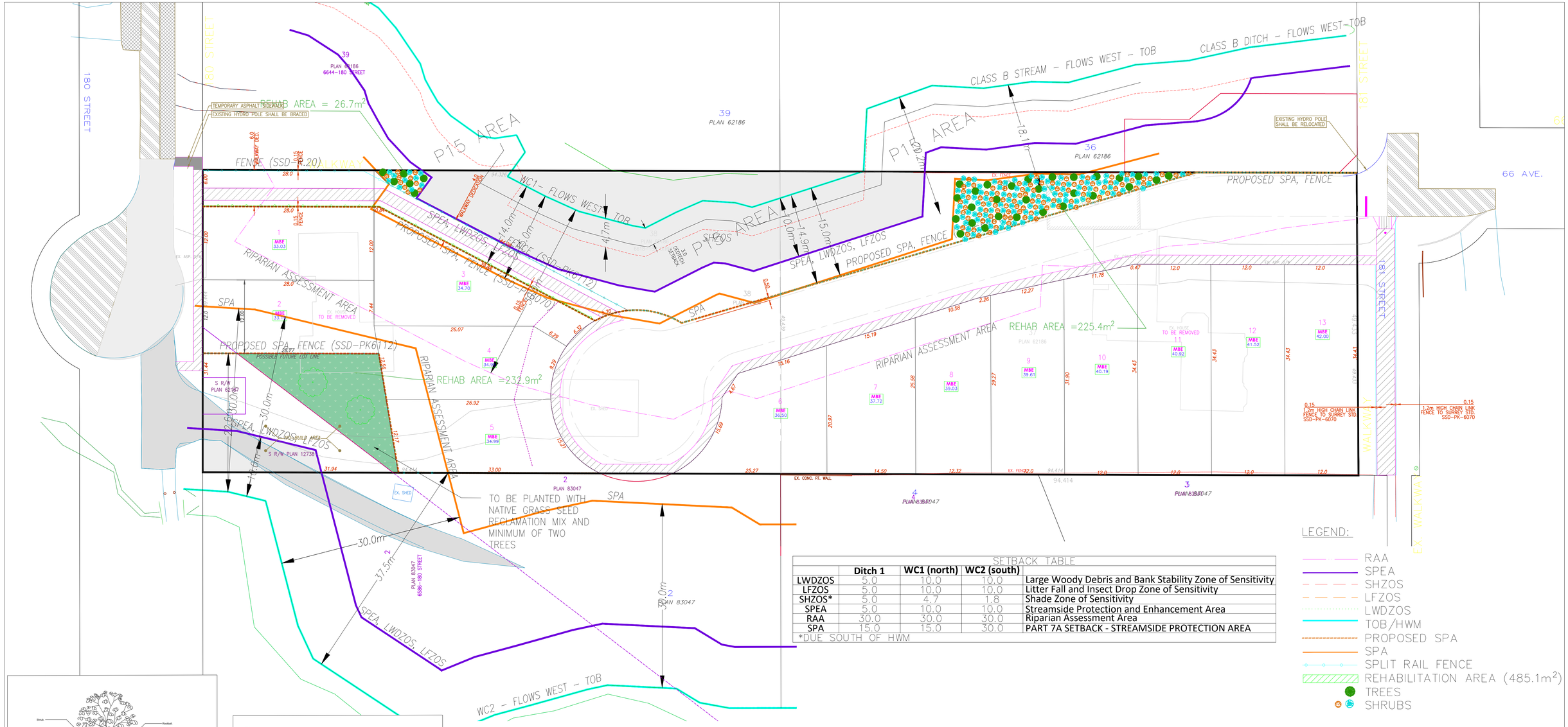
Attachments:

1. Landscape Plan

REFERENCES

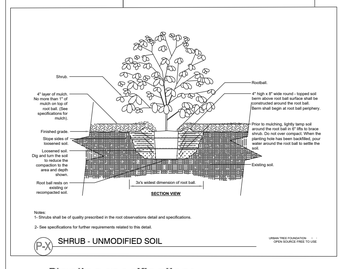
(BC CDC) B.C. Conservation Data Centre. 1995. Species Summary: Castor canadensis. B.C. Minist. of Environment. Available: https://a100.gov.bc.ca/pub/eswp/ (accessed Aug 19, 2021).

Bulmer, C., Venner, K., Prescott, C., 2007. Forest soil rehabilitation with tillage and wood waste enhances seedling establishment but not height after 8 years. Can. J. For. Res. 37, 1894–1906. https://doi.org/10.1139/X07-063



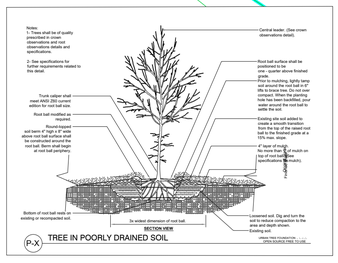
SETBACK TABLE				
	Ditch 1	**WC1 (north)**	**WC2 (south)**	
LWDZOS	5.0	10.0	10.0	Large Woody Debris and Bank Stability Zone of Sensitivity
LFZOS	5.0	10.0	10.0	Litter Fall and Insect Drop Zone of Sensitivity
SHZOS*	5.0	4.7	1.8	Shade Zone of Sensitivity
SPEA	5.0	10.0	10.0	Streamside Protection and Enhancement Area
RAA	30.0	30.0	30.0	Riparian Assessment Area
SPA	15.0	15.0	30.0	PART 7A SETBACK - STREAMSIDE PROTECTION AREA

*DUE SOUTH OF HWM



Planting specifications

Recommended plant species to be installed in Planting Areas.



	Common Name	Latin Name	Count	Pot size
Trees	Bigleaf maple	*Acer macrophyllum*	12	#5
	Bitter cherry	*Prunus emarginata*	12	#5
	Western redcedar	*Thuja plicata*	12	#5
Shrubs	Salal	*Gaultheria shallon*	20	#2
	Osoberry	*Oemleria cerasiformis*	65	#2
	Common snowberry	*Symphoricarpos albus*	65	#2
	Salmonberry	*Rubus spectabilis*	65	#2
Graminoid	Riparian grass seed blend	-	broadcast	-
		Total Plants	**251**	

Re-vegetation plant criteria:

- All plants must be of guaranteed nursery stock.
- Shrubs must be at least No. 2 pot size.

The plants must comply with the B.C. Landscape and Nursery Association standards for nursery stock. The plants must be healthy with well-developed root systems and top growth and free of:

- disease;
- insect infestation;
- broken tops, torn roots, and abrasions of bark on the trunk and branches;
- weak root or branch systems;
- dried out root systems;
- prematurely opened or damaged buds;
- dry, loose, or broken ball of earth;
- damage from heating, freezing, or moulding; and,
- abnormal leaf colour.

Plant species have been chosen based on local conditions and species existing on site. The recommended plant species can be changed based on plant availability or upon recommendation of the planting contractor, with the approval of Redcedar Environmental. Salal is to be planted in shaded spots (e.g. near the driplines of trees). All other species can be evenly distributed across the planting areas.

Timing

Planting may occur at any time in the growing season provided irrigation is supplied, but highest survival would be expected if planting is completed in the fall (i.e. September/October). Fall planting is also recommended where irrigation will not be provided.

Site preparation

Removal of ornamental vegetation and permanent structures must be completed prior to commencement of rehabilitation works. Minimal invasive vegetation was observed in the proposed planting areas at the time of the assessment.

If invasive species such as Himalayan blackberry (Rubus armeniacus) have encroached into the planting area, these species should be removed ahead of planting.

Removal of Himalayan blackberry and other invasive species can occur throughout winter and spring. Mechanical removal of these plants is generally preferred.

All invasive plant material is to be removed to a suitable facility (e.g. Net Zero Waste).

Invasive vegetation is anticipated to regrow in the spring after the initial season of treatment. Continued removal of blackberry will be required until the species is eradicated. Use of glyphosate on regrowth is permissible, provided adherence with the applicable legislation and regulation.

Topsoil may be required in areas where permanent structures are to be removed (e.g. driveway, house). Topsoil must be imported into the planting area. Topsoil is anticipated to be salvaged from the site outside of the SPA for use in the SPA. Any imported topsoil must meet landscape standards.

It is recommended that wood mulch be added to the soil prior to planting at a depth of 5 to 10 cm. Mulch will be sourced from the trees cut outside of the SPA as per the arborist report. This will improve soil moisture retention and temperature regulation, reduce the growth of invasive plants, and may ultimately increase the success of plant growth (Bulmer et al., 2007).

If available and practical, large woody debris can be placed in the rehabilitation area under the supervision of Redcedar Environmental.

Exclusionary fencing

Fencing to be installed 0.1m offset of setback area.

ZONING:

REDCEDAR Environmental Consulting

PROJECT LOCATION
6617 181 ST
STREAMSIDE PROTECTION AREA
LANDSCAPE PLAN

PROJECT NUMBER
21–045R

DRAWN BY:
BRITTANY FEAVER

DATE:
AUG 15 2024

SHEET:
1

SCALE:
NTS

Attachment 5 – CEMP

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

October 27, 2023

Construction Environmental Management Plan

File #: 21-045R

Subject Property:

6617 181 Street & 6618 180 Street, Surrey, BC

Prepared for:

C[redacted] Kooner

c/o

Nirvair Singh

Prepared by:

Rémi Masson, B.Sc., R.P.Bio.

Redcedar Environmental Consulting Inc.
201-45269 Keith Wilson Road
Chilliwack, BC
V2R 5S1

TABLE OF CONTENTS

1.0 INTRODUCTION

This Construction Environmental Management Plan has been prepared for the development of the subject property at 6617 181 Street & 6618 180 Street, Surrey, BC.

The subject property includes sensitive environmental features that must be protected as part of the Sensitive Environment Development Permit (SEDP) process on the subject property.

The purpose of this Construction Environmental Management Plan (EMP) is to briefly describe the environmental sensitivities, project components that could result in adverse environmental impacts, and how these risks can be prevented or minimized through task management and mitigation measures. The mitigation measures outlined in this EMP are to be followed by the project owner/contractor in coordination with the Environmental Monitor. It is the responsibility of the contractor to be familiar with the EMP and implement measures within this EMP.

This report is intended to be an iterative document. Edits and updates may occur as project components change or are upgraded, or in the event that there are changes to regulatory requirements.

1.1 Key Personnel Contact Information

The following is contact for key personnel involved with this project.

Organization	Role	Name	Office #	Cellular #	24 Hour (y/n)
n.a	Owner	C s. 22(1) Kooner			N
Redcedar Environmental Consulting Inc.	Environmental Monitor/QEP/Arborist	Rémi Masson	604.621.9811	604.621.9811	Y
Francis Klimo	Project Arborist	Francis Klimo	TBD	604.358.5562	N

2.0 PERMITTING

All works must be completed in accordance with the Sensitive Environment Development Permit. Permitting via senior governmental organizations is not anticipated to be required.

3.0 SCOPE AND LOCATION OF WORK

The proposed development consists of a 13-lot subdivision.

Timing of development activities has not been finalized and cannot be confirmed until a development permit is issued. It is anticipated that the work schedule will generally follow the schedule:

- Delineation of proposed streamside protection area (SPA);
- Clearing and grubbing;
- Preparation of the Streamside Protection and Enhancement Area (SPA);
- Construction.

4.0 CONSTRUCTION TIMING WINDOW

The works are proposed to occur during dry weather conditions in the summer of 2024.

Invasive species management must occur in the 2024 growing season

Revegetation works must occur in October 2024.

5.0 ENVIRONMENTAL MONITORING

A qualified environmental professional (QEP) is to be retained by the project owner to act as the environmental monitor (EM) for the project. The role of the environmental monitor is to monitor activities at the project site for adherence to the EMP, Municipal bylaws, Provincial Regulations/Legislation or Federal Legislation. The EM will also provide onsite environmental mitigation guidance and erosion and sediment control direction. However, it remains the project contractor and owner's responsibility to ensure environmental compliance.

In addition to the above, geotechnical and/or civil engineering monitors will be required to confirm that project activities are completed safely and per the best practices in those fields. This EMP is not intended to provide guidance or direction in those fields.

The EM must be kept apprised of the project schedule to ensure that sufficient time has been allotted for permitting and treatment of noxious weeds.

The EM must be notified a minimum of one week prior to the start of ground disturbing activities and three weeks prior to the start of aquatic activities. An onsite preconstruction meeting must be held amongst the EM, project owner and contractor(s) prior to construction of work.

Inspection memos will be prepared at the end of each monitoring day.

A pre-construction meeting between the contractor, geotechnical engineer, and environmental monitor will be completed prior to instream activities.

Instream works are not anticipated to be required for this project. However the following has been included as a due diligence measure.

All instream works are to be monitored as per the Standards and Best Practices for Instream Works (2004). If works will include an active bypass or any instream activities, full-time monitoring is recommended for all instream works unless bypass measures are proven to be effective and stable.

Turbidity measurements will be collected downstream of the project area to determine if the works are resulting in adverse impacts to the downstream environment. Works will be deemed in compliance if turbidity does not exceed 25 NTUs downstream of the project area. It should be noted that certain activities (e.g. excavation of a sump for the dewatering pump, placement/removal of flow isolation measures) will result in a plume of sediment-laden water. The extent and duration of any plume will be recorded, as will any employed mitigation measures.

The Environmental Monitor will identify and report any emerging environmental issues and or activities that are not compliant with the EMP, permits, or best practices.

The EM will conduct daily site inspections of the riparian works during rainfall events (i.e. >25 mm in 24 hours) and weekly inspections at all other times until erosion control measures are fully installed and confirmed effective. While, as identified above, it is the project contractor and owner's responsibility for environmental compliance, the EM is to be provided with written authority to halt construction or modify their method(s) of construction as required to prevent adverse impacts to the environment and to ensure compliance with this EMP and any regulatory approvals/permits.

The Environmental Monitor will consider the project complete and in compliance with this EMP once all recommendations have been appropriately implemented.

Monitoring requirements are specified below for each project step:

1. Tree felling: Arborist to be on site during tree felling. Qualified Environmental Professional to complete bird nest survey.
2. Fencing: Arborist to confirm tree protection fencing is installed appropriately. Qualified Environmental Professional to confirm SPEA fence is installed appropriately. Comfort letter to be provided to the City.
3. Riparian Works: Qualified Environmental Professional/Arborist to be on site full-time during works in the SPA.
4. Follow-up monitoring as required by Qualified Environmental Professional/Arborist.

6.0 MITIGATION MEASURES

Redcedar Environmental has developed the following project specific measures for environmental protection in an effort to meet both Federal and Provincial environmental protection measures development guidelines as identified in DFO's Land Development Guidelines for the Protection of Aquatic Life, and the Standards and Best Practices for Instream Works (2004).

6.1 General Mitigation Requirements

The general requirements for the proposed works include (but are not limited to) the following.

a) Construction areas are to be kept clean during construction and all construction waste must be removed from the site at the conclusion of the project.
b) Prior to any site work the work area boundaries must be clearly delineated.
c) Effort will be made to prevent unnecessary damage or removal of vegetation other than that designed and approved through the project development plans.
d) Restrict the use of heavy machinery and vehicles to the approved work areas.
e) Construction activities will be conducted to prevent discharge of sediment, sediment laden water or any prohibited material to watercourses.
f) Erosion and sediment control measures (grass seed, erosion control blanket, straw) must be available and ready for use on site.
g) The Contractor will follow the requirements for spill prevention and containment as identified in this EMP.
h) If potential danger trees have been identified on the subject property near the proposed work area these are to be assessed by a qualified danger tree assessor prior to removal.
i) The crown of any trees removed from the site should be removed, the trunk and larger (i.e. >20 cm diameter) branches may be retained for use as coarse woody debris per the guidance of the environmental monitor.

6.2 Mitigation Pertaining to Riparian Disturbance

Disturbance to riparian habitat is not anticipated to be required. Following are recommendations in the event riparian disturbance is required.

The Environmental Monitor must be on site during disturbance to riparian vegetation.

a) Where practical, shrubs must be cut at the base of the stem to preserve the root system intact to allow regeneration and to stabilize soils.
b) All crews must have a clear understanding of approved work areas.
c) These areas are to be re-vegetated upon completion of works.
d) Coarse woody debris found or generated on the site may be applied to this area under the direction of the environmental monitor.
e) Erosion control measures are provided below.

6.3 Mitigation pertaining to erosion and sediment control

a) Silt fencing around the project area is required.
b) Stockpiles must be stored sufficiently distant from the top of bank and in a manner such that there is no risk of sloughing material falling over the top of bank.

c) The erosion control plan for this project must be fully implemented and adapted as necessary to prevent erosion.
d) Swales must be lined with filter fabric and gravel.
e) Detention ponds (if needed) must be lined with filter fabric and gravel.
f) Works are to be conducted during dry weather conditions to the extent practical.
g) Works are to be undertaken in such a manner as to prevent the discharge of sediment-laden water from the site.
h) Sufficient quantities of straw bales and erosion control blankets must be on site prior to commencement of works.
i) The project Environmental Monitor will make recommendations for standard erosion control practices for the duration of works.
j) Major earthworks should be postponed in the event of heavy rainfall.

6.3.1 Mitigation pertaining to machinery and equipment

Heavy equipment or machinery used for site preparation has the potential for accidental release of hazardous materials and contaminants, and the ability to cause unexpected impacts to sensitive habitats. The following mitigation measures and work practices are to be implemented by the contractor.

a) All equipment must be cleaned and inspected by the Contractor for leaks prior to mobilization to the site. Equipment with fuel or fluid leaks, or excess oil or grease will not be permitted to enter the work site.
b) The Contractor must maintain all equipment in good operating condition to minimize losses of hydraulic fluids, lubricants or fuels. This will include daily inspections of fuel and hydraulic lines.
c) Machinery is to be operated above the top of bank and in a manner that avoids disturbance to the banks and riparian vegetation of watercourse located on or adjacent to the subject property. Operators must be aware of the limits of construction and must not cause unnecessary disturbance to vegetation.
d) Operators will be held responsible to ensure that oil, grease or other deleterious substances do not enter any environmentally sensitive area.
e) All heavy machinery and crew trucks onsite are to be equipped with portable spill kits for primary spill response. Spill kits must be equipped with materials appropriate to the machinery and potential spill volume.
f) Refueling, servicing and washing of machinery will be conducted only in a designated staging area above the top of bank. Spill kits are to be located in refueling locations. All servicing waste (including fuels) must be disposed of in spill-proof containers and discarded at an approved facility.

7.0 EMERGENCY RESPONSE PLAN

7.1 Spill Prevention and Containment

Accidents like hydrocarbon spills can happen on the work site. Spills of fuel, oil, or hydraulic fluid can negatively impact terrestrial and aquatic habitats. It is important that a proper response to spill is undertaken. The following mitigation measures and actions are to be implemented by the contractor.

a) Contractors operating equipment with the potential to result in onsite spills are to be trained in spill kit location and use. In the event of a spill the contractor is responsible for spill response and environmental protection measures.

b) All equipment used below the top of bank must be mechanically sound, clean, and free of leaks or excessive oil and grease.

c) Hazardous or toxic products must not be stored within 10 m of the top of bank.

d) Refueling or servicing of equipment must not be completed below the top of bank.

e) All fuels, lubricants and toxic substances must be stored in locked structures during non-work hours.

f) Fuel storage containers greater than 250 litres are not to be located within 30 m of the top of bank. Any onsite fuel or oil storage should be located such that it is not accessible to common vehicular access to prevent accidental collision.

g) Fuel storage tanks exceeding 250 L volumes must be double-walled and equipped with auto shutoff valves. Secondary containment works should include spill control measures for preventing petroleum products from entering natural waterways, storm drains and sanitary sewers. A containment berm will be used sufficient to contain the volume of the tank plus 10%. Accumulated precipitation within the containment berm must be removed regularly.

h) Small fuel containers (i.e. jerry cans, canisters, pails) will be placed designated contained areas when not in use.

i) Secondary containment must be provided for all small equipment (pumps, generators, etc.) used below the top of bank.

j) All equipment onsite is to have portable spill kits for primary spill response.

k) Spill kits with materials for large spills must be kept onsite and readily accessible. All material and equipment needed to contain and clean up releases of any deleterious substance must be kept onsite and readily accessible for the duration of the work

8.0 ENVIRONMENTAL INCIDENT RESPONSE AND REPORTING

In the event of a spill of a deleterious substance health and safety are of the first importance, followed by minimizing the extent and impact of the spill. Following determination of health and safety the following is to be followed.

a) Control or stop the source of flow.
b) Secure the area.
c) Contain the spill, e.g. deploy booms, pads, sand or sorbent products, seal storm drains.
d) Report the spill immediately to the Environmental Monitor. Spills of any deleterious substance (including oil, fuels, hydraulic fluids or any chemical) to water, regardless of volume, must be reported to the EM.
e) Report to the spill to the Provincial Emergency Program 24 hour phone line at 1-800-663-3456. All spills to water are reportable. Any spill of a substance toxic to aquatic life of reportable quantities is to be immediately reported. These volumes are as follows.
    - Flammable Liquid, Class 3 – 100 L
    - Oil – 100 L.
    - Corrosive Liquid, Class 5 – 5 L or 5 Kg.
    - Flammable Gas – 10 Kg or 10 minutes.
f) Clean up the spill. Used sorbent materials and contaminated soils is to be stored in labeled and sealed drums.

When reporting be prepared to include the following:

a) Name and phone number of person reporting the spill
b) Name and phone number of person involved with the spill
c) Location and time of the spill
d) Type and quantity of material spilled
e) Cause and effect of spill
f) Details of action taken or proposed to contain the spill and minimize its effect
g) Names of agencies on the scene
h) Names of other persons or agencies advised

9.0 WASTE MANAGEMENT AND DISPOSAL

9.1 Non-hazardous Waste

Refuse generated during the works must be disposed of at an approved offsite waste disposal facility. The Contractor and Project Owner are responsible for the proper disposal of solid waste generated from the project. Non-recyclable construction related materials will require approval from the disposal

facility prior to disposal. Only disposal facilities approved to accept construction related waste materials will be used.

All recyclables are to be separated and disposed of at an appropriate recycling facility. The Contractor is to provide separate refuse containers in an effort to separate the recyclables and non-recyclable solid waste streams.

9.2 Hazardous Waste

It is the contractor's responsibility to determine whether any waste generated with the works has any hazardous or toxic characteristics, or is identified as a Hazardous Waste by the MoF, Environment Canada, or any other authority having jurisdiction, and to treat this material appropriately.

In the event that material believed to be hazardous is identified during works, the EM must be notified immediately. In the event, hazardous waste that is considered stable and does not pose an immediate threat is identified, works should be stopped until the EM and Contractor identify and appropriate work plan for removal and disposal of the materials. If an immediate risk resultant from the hazardous waste is identified the above spill response plan should be followed.

The Contractor(s) shall review and become familiar with the list of Hazardous Wastes, as defined by the MoF and Environment Canada to be able to determine if waste generated onsite would be considered hazardous. All hazardous waste generated during the works must be transported, stored and disposed of in accordance to the Hazardous Waste Regulation of the *Environmental Management Act* and other appropriate legislation. The Contractor or Project Owner is responsible for securing the necessary permits or approvals related to the generation, transportation or disposal of hazardous waste.

9.3 Contaminated Soil and Water Management

Management of contaminated soil, and/or water is the responsibility of the Contractor and Project Owner. Both the Contractor and the Project Owner should be aware of the potential to encounter contaminated soil or water on the project site. If encountered, contaminated soils or water must not be deposited elsewhere on the site, but instead contained in the location of discovery. If encountered, a QEP familiar with the treatment and disposal of contaminated soil or water should be retained for direction. Disposal of contaminated soils must be incompliance with the *Environmental Management Act*, requiring soil analysis and comparison to numerical standards as identified in the Schedules of the Contaminated Sites Regulation.

9.4 Noxious Weeds

Noxious weeds were not identified on site. However, if noxious weed are identified, they are to be removed from site to a proper disposal or treatment facility. Identification of the disposal location to the Environmental Monitor must be completed prior to removing noxious weeds from the site. Removal and disposal actions must be documented and available for review. Disposal receipts or slips will be required for review.

9.5 Sanitary Waste

Portable sanitary facilities must be available onsite at the onset of demolition, and for the duration of the project. Facilities must be kept a minimum of 30 from a watercourse.

10.0 LIMITATIONS

This assessment report has been prepared specifically for the development proposal and was based on the best available information at the time of completion, and on work undertaken per standard industry practice.

This assessment report has been prepared for the sole use of the developer named on this report and the local government. Provincial species at risk legislation is being drafted in BC. This report should be reviewed or updated if/when changes to legislation have an effect on the recommendations presented herein. The recommendations made in this assessment are considered valid for a period of five years.

This report should be reviewed and/or updated after a period of five year, and/or in the event the development is not complete within a period of five years; in the event there is a substantial change in the condition of the subject property not described in this report; or in the event that the subject property is sold to another party.

Attachment 6 – Geotechnical Report

PTP# 1002594

BRAUN GEOTECHNICAL LTD.

Foundations, Excavation & Shoring Specialists

December 21, 2021

Our File: 21-9249

Via email: nirvair@gs-dm.com

C[s. 22(1)] Kooner
6617 181 Street
Surrey, BC V3V 9A2

Attn: C[s. 22(1)] Kooner

Re: Geotechnical Exploration Report
Proposed Subdivision
6618 180 Street & 6617 181 Street, Surrey, BC

Braun Geotechnical
102 – 19040 95A Ave.
Surrey, BC
V4N 4P3
Tel: 604-513-4190
Fax: 604-513-4195
info@braungeo.com

www.braungeo.com

Foundations

Excavation & Shoring

Slope Stability

Natural Hazards

Pavement Design and Management

Reinforced Soil Walls and Slopes

1.0 INTRODUCTION

As requested, Braun Geotechnical Ltd. has carried out a geotechnical exploration for the above-referenced project. The geotechnical work has been performed in general accordance with the terms and conditions of the Braun Geotechnical proposal October 18, 2021 (our reference No. P21-7673). The scope of work included onsite subsurface exploration, slope setback assessment, Benkelman Beam testing and provision of offsite pavement recommendations. No consideration has been given to any environmental aspects.

The slope assessment work was carried out in general accordance with relevant design methods and selected hazard acceptability criteria discussed in the APEGBC (now EGBC) document, "Guidelines for Legislated Landslide Assessment for Proposed Residential Developments in BC (May 2010). The APEGBC guidelines were developed to assist designers and approving authorities in defining "safe site use" in accordance with provincial and municipal regulatory requirements.

The scope of service was limited to evaluation of geotechnical characteristics at the site and no consideration has been given to any environmental aspects. Braun Geotechnical should be forwarded the final architectural, structural, and civil drawings when they become available and be provided the opportunity to comment on geotechnical aspects.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site comprised of two parcels located at 6618 180 street & 6617 181 Street, in the City of Surrey, BC. The subject site is approximately rectangular in shape with maximum overall dimensions of approximately 49 x 189m. The site slopes down gently to the west/northwest at an overall gradient of approximately 16H:1V (horizontal to vertical) or flatter, with localized over-steepened areas as steep as approximately 9H:1V or flatter. The subject site is located immediately south of an existing watercourse (City of Surrey Watercourse 76721) which also passes through the northeast section of the of parcel 6618 180 Street.

It is understood that the site may be developed into 14 Single Family Dwelling (SFD) residential lots. It is understood that offsite roadworks for the proposed development may include upgrade/widening of 180 Street and 181 Street along

development frontage, with onsite extension of 180 and 181 Street, and onsite construction of an existing roadway and Laneway.

It is understood that 180 Street, 181 Street, and the proposed onsite roadway and Laneway are classified by the City of Surrey as Local, in the vicinity of the proposed development.

It is understood that a minimum environmental setback of 10m from the top of bank of Watercourse 76721 is proposed.

At the time of geotechnical exploration, each parcel was occupied by an existing SFD with associated driveways, landscaped area, large trees and low underbrush type vegetation.

3.0 SITE EXPLORATION

Six test pits (TP21-01 to TP21-06) were excavated on November 18, 2021 using a tracked excavator under subcontract to Braun Geotechnical to depths of 1.8 to 2.6m. Two hand pits, HP21-01 and HP21-02 were excavated adjacent to the northbound lane of 180 Street and southbound lane of 181 Street for pavement considerations to depths of 0.7 to 0.8m respectively. Subsurface conditions were logged in the field by Braun Geotechnical and representative soil samples were returned for further classification. Test pit and hand pit locations are shown on the attached plan (Dwg. 21-9249-01).

4.0 SOIL AND GROUNDWATER CONDITIONS

A review of available published and in-house geological information indicated that the study site area is underlain by Capilano sediments, comprising mainly marine silt loam to clay loam with minor sand, silt, and stony glaciomarine material and/or Vashon Drift and Capilano Sediments comprising lodgment and minor flow till, lenses and interbeds of substratified glaciofluvial sand to gravel and lenses and interbeds of glaciolacustrine laminated stony silt. The findings of the test pit exploration were generally consistent with the regional geological information.

The findings of the test pit exploration are detailed on the attached test pit logs. A generalized subsoil profile based on the test pits is summarized below.

FILL/ORGANICS
Dark-Brown, damp, soft to firm SILT with trace to some sand to loose to compact silty SAND, with some organics, trace to some gravel, occasional cobbles, and occasional root/rootlets was encountered within each test pit to depths of 0.1 to 0.3m. This zone was inferred to be the disturbed/re-graded natural surficial organic rich horizon and/or import organic rich fill.

SAND
Brown, damp, compact silty SAND, with occasional organics was encountered in TP21-01 and TP21-04 to the depth of 0.8 to 0.6m, respectively.

SILT
Grey-brown to grey, occasionally rust mottled, damp, stiff to very stiff SILT with some sand to sandy SILT, with occasional zones of trace to some gravel and occasional cobbles was encountered within each test to depth of test pit exploration.

GROUNDWATER
Static groundwater and/or sidewall seepage were not encountered within the test pits at the time of exploration. Depending on the season and/or weather conditions, near-surface seepage flows should be anticipated within soil layers overlying the relatively low

permeable stiff to very stiff soils. Groundwater levels and near-surface run-off flows are expected to fluctuate seasonally, and with drainage conditions.

The subsurface conditions described above were encountered at the test pit locations only. Subsurface conditions at other locations could vary.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

It is considered that the proposed light wood frame residential structures can be supported on the underlying natural stiff to very stiff soils, and/or on structural fills placed thereon, using conventional shallow strip and pad footings.

The following sections provide our geotechnical recommendations for site preparation and foundation design.

5.2 Site Preparation

Site preparation below the proposed structures, roadway widening areas, asphalt paved areas subject to traffic load, and areas proposed for site grading fill, should include removal of all vegetation, organic soils, soft disturbed soils, soft to firm/loose to compact soils, existing fill and other deleterious material down to the natural, undisturbed stiff to very stiff silt.

Stripped surfaces should be reviewed by the Geotechnical Engineer prior to placing foundations or structural fills.

Drainage measures should be implemented to reduce potential for water ponding on exposed subgrades. Temporary and final grades should be established so as to avoid uncontrolled offsite discharge of surface and/or near-surface run-off flows.

Note that large boulders may be encountered during site preparation activities which could require additional excavation measures such as blasting or rock splitting.

5.3 Structural Fill & Trench Backfill

Subgrade restoration fills & general trench backfills below roadway areas should consist of structural fill comprised of MMCD compliant subbase material with less than 5% fines (percent passing the #200 sieve). Structural fill should be placed and compacted in maximum 300mm loose lifts with each lift compacted to at least 95% MPD. For confined areas, structural fill placed under building and roadway pavements should extend horizontally beyond by a distance equal to at least the thickness of structural fill. Unconfined fills should typically extend horizontally by a distance equal to 2 times the thickness of structural fill.

Density testing should be carried out during fill placement on a regular basis to confirm adequacy of compaction, and the results forwarded to Braun Geotechnical for review. Braun Geotechnical should also be contacted to review fill quality, and placement and compaction procedures.

Excavated site soils would generally not be considered re-usable as structural fill.

5.4 Slopes

5.4.1 Temporary Cut Slopes and Utility Trenches

Temporary excavations for worker entry may be slope cut, or alternatively suitable support systems should be provided. It is anticipated that proposed utility excavations could be achieved

using conventional excavation and/or trench box methods. It is anticipated that excavations can be kept free of standing water using conventional pumping sumps.

In general, excavations up to 1.2 m deep can be cut near vertical in accordance with WorkSafeBC regulations. Deeper unsupported excavation cuts should be sloped at 1H:1V in fill, soft to firm soils and overburden materials, and 3H:4V in stiff to very stiff natural soils. These recommended cut slopes should be reviewed by Braun Geotechnical during excavation and may require modification based on actual site conditions. Flatter slopes may be required if poor soil conditions or significant seepage is encountered.

5.4.2 Permanent Slopes

The recommended maximum permanent cut slope angle is 2H:1V. Fill slopes consisting of suitably compacted native mineral or import granular soils should be constructed at gradients no steeper than 2.5H:1V. Permanent slopes should typically be planted or otherwise protected from erosion as soon as practical.

5.5 Residential House Foundations

It is recommended that foundations for the proposed SFDs be supported on natural, undisturbed, stiff to very stiff soils, and/or structural fills placed thereon. Basement levels would be feasible for geotechnical considerations.

The following soil resistance (bearing) values may be adopted for preliminary foundation design:

Foundation Subgrade	**Limit States Design**		**Working Stress Design**
	Factored Ultimate Bearing Resistance	**Serviceability Limit State**	**Allowable Bearing Pressure DL + LL**
Natural Stiff to Very Stiff Soils and/or Compacted Structural Fill	144 kPa (3000 psf)	96 kPa (2000 psf)	96 kPa (2000 psf)

Note: Larger bearing values may be feasible for specific foundation configurations and can be reviewed upon request.

The above design bearing pressures for soil subgrade assume the following:

- Strip and pad footings have minimum widths of 450mm (18”) and 600mm (24”), respectively.
- Footings are founded at least 450mm (18”) below final finished adjacent grade.
- Site preparation is completed as indicated above and load-bearing surfaces are reviewed and approved by the Geotechnical Engineer.
- Foundation bearing surfaces are no higher than 2H:1V (Horizontal to Vertical) from the base or toe of adjacent walls, retaining structures, etc.
- Footings are placed below a 1H:1V line projected up from lower footings or buried structures such as utility lines, sumps, etc.
- Silty subgrade areas are protected immediately after exposure.

Foundation bearing surfaces should be reviewed by a Geotechnical Engineer. Any soft, wet, or deleterious material encountered at bearing surface level should be sub-excavated and replaced with structural fill compacted in maximum 300mm thick lifts to at least 95% MPD.

5.6 Backfill

Perimeters backfill and fill for support of exterior residential sidewalks, driveway, patios, etc. should typically consist of relatively clean, well-graded, granular material, placed and compacted in maximum 300mm thick loose lifts to at least 90 % MPD.

Walk behind plate tamper compactors should be used to compact backfill within 1m of foundation walls to avoid excessive buildup of lateral earth stresses against the walls and the lift thickness in these areas should typically be reduced to 200mm.

All backfill should be placed in a manner that avoids damaging the foundation walls, perimeter drains, and damp-proofing or waterproofing on the wall. Proposed grades should slope away from the proposed SFDs to promote flow of surface water runoff away from the SFDs. A 300mm thick layer of relatively impermeable soil should be placed at surface to minimize surface water entering the perimeter fill and, in turn, the perimeter drainage system.

5.7 Slab on Grade

The slab on grade should be underlain by a drainage layer comprising a minimum 100mm (4") thick layer of 20mm clear crushed gravel (no sand, no fines). This drainage layer should have a suitable discharge to the permanent storm system. Polyethylene sheeting should also be provided beneath the floor slab to further reduce potential slab dampness.

Compaction testing should be carried out on underslab fills to confirm that all fill placed below the building has been compacted to at least 95% MPD. Prior to placement of any grade restoration fills, the subgrade should be reviewed by the geotechnical consultant.

5.8 Perimeter Drainage

Perimeter drainage should consist of perforated 100mm (4") PVC pipe, placed around the building perimeters, with the invert elevation at footing level. The perimeter drain should be surrounded by at least 150mm (6") of 19mm (¾") clear crushed gravel. A 150mm (6") thick layer of birdseye gravel should be placed over the clear crushed gravel to act as a filter layer.

5.9 Seismic Considerations

The current BC Building Code classifies a site as Site Class C where the subgrade soils in the upper 30m consist of "Very Dense soil" with average SPT N values greater than 50 and average undrained shear strength (s_u) greater than 100 kPa.

Available subsurface information indicates that very stiff soils are present below a relatively shallow depth, corresponding to Site Class C. The subgrade soil conditions encountered at the site are not considered susceptible to seismically induced liquefaction.

5.10 Lateral Earth Pressures (if required)

A uniform lateral pressure of 20 kPa (400 psf) is recommended for both static (including compaction induced stress) and static + seismic conditions for the design of walls 3.7m (12 feet) or less in height provided that the backfill behind the wall is fully drained.

5.11 Proposed Asphalt Pavements

With subgrade preparation completed in the manner recommended above, the minimum recommended pavement structures for the proposed onsite roadway and roadway widening sections is outlined below.

180 Street / 181 Street/Proposed Onsite Roadway/Laneway (Local)[1]	***Material***
85mm	Hot Mix Asphalt Surface (MMCD Hot Mix Asphalt, HMA)
100mm	19mm minus Granular Base
200mm	Granular Subbase (SGSB)

Note: [1]Asphalt surfacing should be placed in two lifts of 50mm and 35mm for the base and surface layers respectively and may comprise MMCD compliant Lower Course #2 and Upper Course #2.

The gradation of the above materials should comply with the appropriate Master Municipal Specifications. Road construction materials should be placed and compacted in compliance with the current MMCD specifications.

Adequate drainage and/or cross falls should be provided to ensure that the base and subbase materials will not become saturated. Pavement restoration within trench backfills for anticipated utility construction should be carried out in general accordance with MMCD Drawing G5.

6.0 HAZARD ASSESSMENT

6.1 General

It is understood that areas within the subject property fall within the City of Surrey Hazard Lands Development Permit Area (Figure 1), including "Steep Slope 10-30 meter Buffer Area."

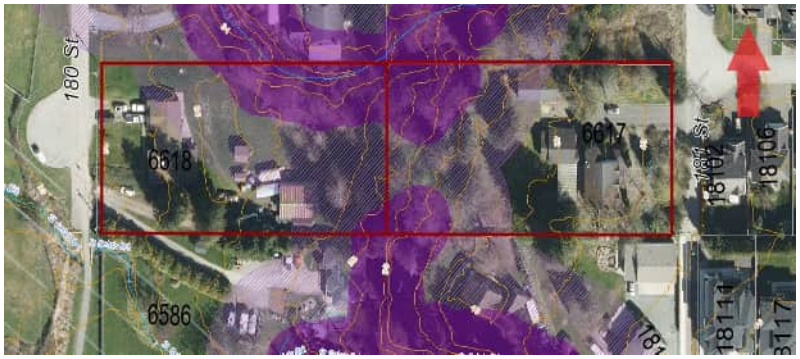


Figure 1: Subject Site relative to City of Surrey Hazard Lands DPA

The following comments have been provided with respect to the hazard assessment, including desk study and site walkover findings:

- A review of available published and in-house geological information indicated that the study site area is underlain by Capilano sediments, mainly marine silt loam to clay loam with minor sand, silt, and stony glaciomarine material and/or Vashon Drift and Capilano Sediments comprising lodgment and minor flow till, lenses and interbeds of substratified glaciofluvial sand to gravel and lenses and interbeds of glaciolacustrine laminated stony silt.

- Onsite subsurface exploration generally encountered existing organics over stiff to very stiff silt. The findings of the test pit exploration were generally consistent with the regional geological information.
- The site slopes down gently to the west/northwest at an overall gradient of approximately 16H:1V or flatter, with localized over-steepened areas as steep as approximately 9H:1V or flatter.
- The subject site is located immediately south of an existing watercourse (City of Surrey Watercourse 76721) which also passes through the northeast section of the parcel 6618 180 Street
- An existing watercourse, St. Gelais Brooke is located within the properties south of the subject site. The watercourse right bank (where defined and deeper than 1m) was noted (from City of Surrey Cosmos) to comprise a maximum 2m high slope, with a maximum overall slope gradient of approximately 2H:1V or flatter. Additionally, where the right bank was greater than 1m in depth was a minimum distance of 30m from the subject site. As such, the Gelais Brooke right bank was not considered to be of geotechnical concern to the subject site.
- Historical government air photos available for each decade and dating back to 1940 were reviewed. Obvious visible signs of onsite or offsite (in the immediate vicinity of the subject site) slope instability were not observed in the air photos.
- A review of available geological, geotechnical and site walkover information did not reveal evidence of historical large-scale slope movement in the study site area. In addition, site information did not reveal obvious visible evidence of recent (less than 50 years) small-scale slope movements at the study site.
- Approximate topography and slope gradients were confirmed using the contour information from City of Surrey COSMOS.

6.2 Factor of Safety Discussion

Current BC Building Code (2018) requires a clear and simple distinction between stable and unstable slope conditions for structures, expressed as a computed value of the factor of safety. Further, the current BC Building Code requires that slope performance under both static and seismic conditions be addressed as part of foundation designs, and that the seismic hazard probability with a 2% probability of exceedance in 50 years (~1:2475 return) should be considered in seismic slope stability assessment.

Minimum acceptable factors of safety are presented in the building code reference document and 2006 Canadian Foundation Engineering Manual, and indicate that for slopes in static condition the factor of safety should be at least 1.5.

6.3 Slope Stability Analysis

The purpose of the slope assessment was to evaluate stability of the subject site relative to the onsite existing watercourse (City of Surrey Watercourse 76721) for static and seismic loading conditions. The slope assessment was based on the available site information, the site walkover review, and the findings from the intrusive test pit exploration. The assessment considered existing onsite/offsite topography.

A single representative sections, Section A-A', was developed to assess the stability of the site (Dwg. 21-9249-02), representing a 1.2m high slope with a maximum gradient of 12.3H:1.2V.

A nominal 3m setback from the top of bank would result in a minimum projection of 11H:1V or shallower from the toe of slope. For a shallow slope (1.2m max. height) and for soil conditions encountered within the test pits, a 11H:1V projection is considered stable with respect to global stability for static and design seismic (horizontal acceleration of 0.341g associated with an earthquake event with a return period of 1 in 2475 years) conditions, and is considered to meet life safety criteria.

Life-safety condition means that the structure will maintain sufficient resistance in the design earthquake event such that it will not collapse (or parts of the structure will not break off and fall), and that occupants are able to egress. However, the structure may be severely damaged such that substantial repairs or total reconstruction of the structure may be required.

In view of the above, a geotechnical setback of 3m from the identified top of the bank is considered suitable for static and design seismic considerations and is shown on the attached plan (Dwg. 21-9249-01). Building structures beyond the geotechnical setback are considered to meet "life safety" criteria defined in the National Building Code of Canada and adopted by the 2010 APEGBC Task Force.

Note that placement of additional landscape fills within the defined slope setback areas should be limited to a thickness of 0.3m. Deeper fills should be avoided unless carried out under the review of a qualified geotechnical engineer. This requirement includes construction of hard landscape structures (sheds, pools, retaining walls, etc.).

Where subsurface conditions are encountered at the time of site development vary from those described in the geotechnical report, further analysis may be required to revise susceptibility of slope areas to undergo deformation under static and design seismic conditions.

7.0 PAVEMENT ASSESSMENT

7.1 Existing Pavements

180 Street

HP21-01 was excavated adjacent to the northbound lane of 181 Street. HP21-01 encountered a pavement section comprising 150mm of ASPHALT over 460 mm brown to rust-brown, moist, dense SAND and GRAVEL with trace to some silt (FILL), underlain by grey, damp, very stiff, clayey silt to the depth of hand pit exploration at 0.7m.

Visually, the asphalt within the test segment was observed to be in fair condition, with areas of low to moderate severity longitudinal cracks and trench patch was observed at the southern end of the test segment.

181 Street

HP21-02 was excavated adjacent to the southbound lane of 181 Street. HP21-02 encountered a pavement section comprising 50mm of ASPHALT over 175mm of grey-brown, moist, compact to dense SAND and GRAVEL with trace to some silt (FILL) over grey-brown, moist, dense silty SAND with trace to some gravel to the depth of hand pit exploration at 0.8m.

Visually, the asphalt pavement within the test segment of 181 Street was observed to be in fair to poor condition, with areas of moderate to high severity longitudinal and transverse cracks. A new trench patch was observed within the test segment.

7.2 Benkelman Beam Testing

Benkelman Beam testing was carried out on October 28, 2021, along the outer wheel paths of the northbound and southbound lanes of 180 Street and 181 Street, respectively. The Benkelman Beam data was collected to evaluate the structural condition of the existing pavements. A single axle dump truck loaded with 80kN (18Kips) on the rear axle was subcontracted to Braun Geotechnical for the purpose of conducting the survey.

7.3 Survey Findings

The beam testing for 180 Street and 181 Street was carried out at a station spacing of approximately 5m. A Statistical analysis was carried out on the temperature-corrected Benkelman Beam data with a Spring Correction Factor (SCF) of 1.1.

Most Probable Spring Rebound (MPSR) values of 1.10 & 1.94mm were determined for both 180 & 181 street, respectively from the field data. A design MPSR of 1.8mm was adopted for the Local road classification.

7.4 Pavement Rehabilitation

180 Street

Based on the calculated MPSR values from the findings of the Beam testing, the existing road pavements would be considered structurally adequate for the proposed use. Overlay for structural improvement is not required.

Although not required for geotechnical considerations, asphalt overlay for the existing roadway travel areas may be considered a cosmetic overlay for blending and leveling purposes. A partial depth asphalt mill and inlay would also be feasible if grade increases are not considered desirable or feasible. If required minimum overlay/inlay thickness should be at least 35mm.

Crack sealant and/or crack cleaning and filling in accordance with MMCD requirements should be carried out for any minor cracking on the exposed surface prior to overlay paving. Existing medium severity transverse cracked areas and longitudinal cracked areas should be saw-cut and re-constructed with the proposed widening.

181 Street

Based on the calculated MPSR values from the findings of the Benkelman beam testing the existing road pavement would not be considered structurally adequate for the proposed use.

Based on the high MPSR value, the general condition of the roadway, as well as the reduced existing pavement section encountered within the hand pit, rehabilitation should include full-depth re-construction with the proposed widening (asphalt pavement as above in Section 5.11).

8.0 APPLICABLE LEGISLATION

It is our opinion that the "land may be used safely for the use intended." Safe site used is defined as a Single Family Dwelling residential subdivision, setback a minimum of 3m from the top of the bank of the left bank of Watercourse 76721. Safe use is considered to be in reference to hazard acceptability criteria presented in the government document, "Hazard Acceptability Thresholds for Development Approvals by Local Government, 1993." Geotechnical hazards with potential to impact the project area were considered and included mountain stream erosion, avulsion, debris flows, debris floods, small-scale rock fall and regional-scale landslides.

In accordance with Section 86 of the Land Title Act, and Section 56 of the Community Charter this report has been signed and sealed by a Professional Engineer and as such is considered a "certified report" (APEGBC, 2010).

9.0 GEOTECHNICAL FIELD REVIEWS

Geotechnical field reviews are required by the Geotechnical Engineer of Record and to satisfy the requirements of the Letters of Professional Assurance required for the Building Permit. Field reviews are essential to confirm that the recommendations of the geotechnical report are understood and followed.

Geotechnical field reviews should be arranged by the Contractor to address the following:

Removal of unsuitable materials below building footprint and asphalt pavement areas;

- Suitability of exposed footing subgrade;
- Review and density testing of structural fill placed below footings and slabs;
- Asphalt hot mix field sampling and Marshall Mix Design testing;
- Retrieval of asphalt cores for thickness and density

10.0 CLOSURE

This report is prepared for the exclusive use of Ch[s. 22(1)] Kooner and their designated representatives and may not be used by other parties w[ ]he written permission of Braun Geotechnical Ltd. The City of Surrey may also rely on the findings of this report. If the development plans change, or if during construction soil conditions are noted to be different from those described in this report, Braun Geotechnical should be notified immediately in order that the geotechnical recommendations can be confirmed or modified, as required. Further, this report assumes that field reviews will be completed by Braun Geotechnical during construction.

The site Contractor should make their own assessment of subsurface conditions and select the construction means and methods most appropriate to the site conditions.

This report should not be included in the specifications without suitable qualifications approved by the geotechnical engineer.

The use of this assessment report is subject to the conditions on the attached Report Interpretation and Limitations sheet. The reader's attention is drawn specifically to those conditions, as it is considered essential that they be followed for proper use and interpretation of this report.

We hope the above meets with your requirements. Should any questions arise, please do not hesitate to contact the undersigned.

Yours truly,

We hope the above meets with your requirements. Should any questions arise, please do not hesitate to contact the undersigned.

Yours truly,

Braun Geotechnical Ltd.

Samrath Singh Jakhar, EIT
Geotechnical Engineer

Braun Geotechnical Ltd.

Harman Dhillon, P.Eng.
Geotechnical Engineer

Reviewed By

Stuart Hrysio, P.Eng.
Geotechnical Engineer

Encl: Report Interpretation and Limitations
Location Plan
Section A-A'
Test Pit Logs (6)
Hand Pit Logs (2)
APEGBC Appendix D: Landslide Assessment Assurance Statement

X:\2021 Projects\21-9249 Proposed Subdivision - 6618 180 Street & 6617 181 Street, Surrey, BC\Report\21-9249 Geotechnical Report 2021-11-29.docx

REPORT INTERPRETATION AND LIMITATIONS

1. STANDARD OF CARE

Braun Geotechnical Ltd. (Braun) has prepared this report in a manner consistent with generally accepted engineering consulting practices in this area, subject to the time and physical constraints applicable. No other warranty, expressed or implied, is made.

2. COMPLETENESS OF THIS REPORT

This Report represents a summary of paper, electronic and other documents, records, data and files and is not intended to stand alone without reference to the instructions given to Braun by the Client, communications between Braun and the Client, and/or to any other reports, writings, proposals or documents prepared by Braun for the Client relating to the specific site described herein.

This report is intended to be used and quoted in its entirety. Any references to this report must include the whole of the report and any appendices or supporting material. Braun cannot be responsible for use by any party of portions of this report without reference to the entire report.

3. BASIS OF THIS REPORT

This report has been prepared for the specific site, development, design objective, and purpose described to Braun by the Client or the Client's Representatives or Consultants. The applicability and reliability of any of the factual data, findings, recommendations or opinions expressed in this document pertain to a specific project at described in this report and are not applicable to any other project or site, and are valid only to the extent that there has been no material alteration to or variation from any of the descriptions provided to Braun. Braun cannot be responsible for use of this report, or portions thereof, unless we were specifically requested by the Client to review and revise the Report in light of any alterations or variations to the project description provided by the Client.

If the project does not commence within 18 months of the report date, the report may become invalid and further review may be required.

The recommendations of this report should only be used for design. The extent of exploration including number of test pits or test holes necessary to thoroughly investigate the site for conditions that may affect construction costs will generally be greater than that required for design purposes. Contractors should rely upon their own explorations and interpretation of the factual data provided for costing purposes, equipment requirements, construction techniques, or to establish project schedule.

The information provided in this report is based on limited exploration, for a specific project scope. Braun cannot accept responsibility for independent conclusions, interpretations, interpolations or decisions by the Client or others based on information contained in this Report. This restriction of liability includes decisions made to purchase or sell land.

4. USE OF THIS REPORT

The contents of this report, including plans, data, drawings and all other documents including electronic and hard copies remain the copyright property of Braun Geotechnical Ltd. However, we will consider any reasonable request by the Client to approve the use of this report by other parties as "Approved Users." With regard to the duplication and distribution of this Report or its contents, we authorize only the Client and Approved Users to make copies of the Report only in such quantities as are reasonably necessary for the use of this Report by those parties. The Client and "Approved Users" may not give, lend, sell or otherwise make this Report or any portion thereof available to any other party without express written permission from Braun. Any use which a third party makes of this Report – in its entirety or portions thereof – is the sole responsibility of such third parties. BRAUN GEOTECHNICAL LTD. ACCEPTS NO RESPONSIBILITY FOR DAMAGES SUFFERED BY ANY PARTY RESULTING FROM THE UNAUTHORIZED USE OF THIS REPORT.

Electronic media is susceptible to unauthorized modification or unintended alteration, and the Client should not rely on electronic versions of reports or other documents. All documents should be obtained directly from Braun.

5. INTERPRETATION OF THIS REPORT

Classification and identification of soils and rock and other geological units, including groundwater conditions have been based on exploration(s) performed in accordance with the standards set out in Paragraph 1. These tasks are judgemental in nature; despite comprehensive sampling and testing programs properly performed by experienced personnel with the appropriate equipment, some conditions may elude detection. As such, all explorations involve an inherent risk that some conditions will not be detected.

Further, all documents or records summarizing such exploration will be based on assumptions of what exists between the actual points sampled at the time of the site exploration. Actual conditions may vary

significantly between the points investigated and all persons making use of such documents or records should be aware of and accept this risk.
The Client and "Approved Users" accept that subsurface conditions may change with time and this report only represents the soil conditions encountered at the time of exploration and/or review. Soil and ground water conditions may change due to construction activity on the site or on adjacent sites, and also from other causes, including climactic conditions.
The exploration and review provided in this report were for geotechnical purposes only. Environmental aspects of soil and groundwater have not been included in the exploration or review, or addressed in any other way.
The exploration and Report is based on information provided by the Client or the Client's Consultants, and conditions observed at the time of our site reconnaissance or exploration. Braun has relied in good faith upon all information provided. Accordingly, Braun cannot accept responsibility for inaccuracies, misstatements, omissions, or deficiencies in this Report resulting from misstatements, omissions, misrepresentations or fraudulent acts of persons or sources providing this information.

6. DESIGN AND CONSTRUCTION REVIEW

This report assumes that Braun will be retained to work and coordinate design and construction with other Design Professionals and the Contractor. Further, it is assumed that Braun will be retained to provide field reviews during construction to confirm adherence to building code guidelines and generally accepted engineering practices, and the recommendations provided in this report. Field services recommended for the project represent the minimum necessary to confirm that the work is being carried out in general conformance with Braun's recommendations and generally accepted engineering standards. It is the Client's or the Client's Contractor's responsibility to provide timely notice to Braun to carry out site reviews. The Client acknowledges that unsatisfactory or unsafe conditions may be missed by intermittent site reviews by Braun. Accordingly, it is the Client's or Client's Contractor's responsibility to inform Braun of any such conditions.
Work that is covered prior to review by Braun may have to be re-exposed at considerable cost to the Client. Review of all Geotechnical aspects of the project are required for submittal of unconditional Letters of Assurance to regulatory authorities. The site reviews are not carried out for the benefit of the Contractor(s) and therefore do not in any way effect the Contractor(s) obligations to perform under the terms of his/her Contract.

7. SAMPLE DISPOSAL

Braun will dispose of all samples 3 months after issuance of this report, or after a longer period of time at the Client's expense if requested by the Client. All contaminated samples remain the property of the Client and it will be the Client's responsibility to dispose of them properly.

8. SUBCONSULTANTS AND CONTRACTORS

Engineering studies frequently requires hiring the services of individuals and companies with special expertise and/or services which Braun Geotechnical Ltd. does not provide. These services are arranged as a convenience to our Clients, for the Client's benefit. Accordingly, the Client agrees to hold the Company harmless and to indemnify and defend Braun Geotechnical Ltd. from and against all claims arising through such Subconsultants or Contractors as though the Client had retained those services directly. This includes responsibility for payment of services rendered and the pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. These conditions apply to specialized subconsultants and the use of drilling, excavation and laboratory testing services, and any other Subconsultant or Contractor.

9. SITE SAFETY

Braun Geotechnical Ltd. assumes responsibility for site safety solely for the activities of our employees on the jobsite. The Client or any Contractors on the site will be responsible for their own personnel. The Client or his representatives, Contractors or others retain control of the site. It is the Client's or the Client's Contractors responsibility to inform Braun of conditions pertaining to the safety and security of the site – hazardous or otherwise – of which the Client or Contractor is aware.
Exploration or construction activities could uncover previously unknown hazardous conditions, materials, or substances that may result in the necessity to undertake emergency procedures to protect workers, the public or the environment. Additional work may be required that is outside of any previously established budget(s). The Client agrees to reimburse Braun for fees and expenses resulting from such discoveries. The Client acknowledges that some discoveries require that certain regulatory bodies be informed. The Client agrees that notification to such bodies by Braun Geotechnical Ltd. will not be a cause for either action or dispute.

PTP# 1002594

BRAUN GEOTECHNICAL LTD.

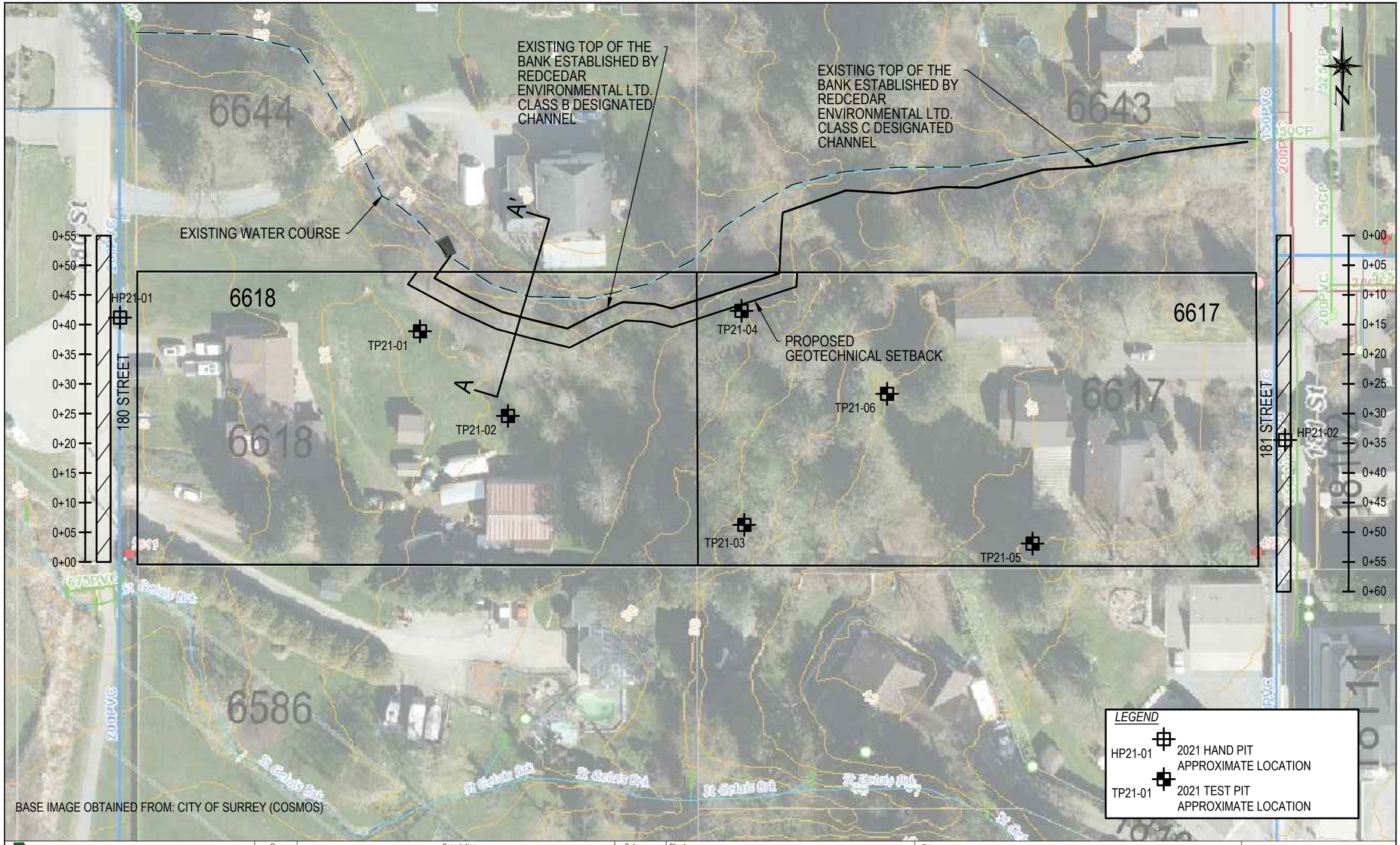
Rev.	Description	Date

Client: C S. 22(1) Kooner c/o Gursimer Design & Management

Project: Proposed Subdivision
6618 180 Street & 6617 181 Street, Surrey, BC

Title: LOCATION PLAN

Project no.	Drawn	Design	Checked	Date	Scale	Drawing no.
21-9249	RG	AC	HD	October 20. 2021	1:600	21-9249-01



PTP# 1002594

BRAUN GEOTECHNICAL LTD.

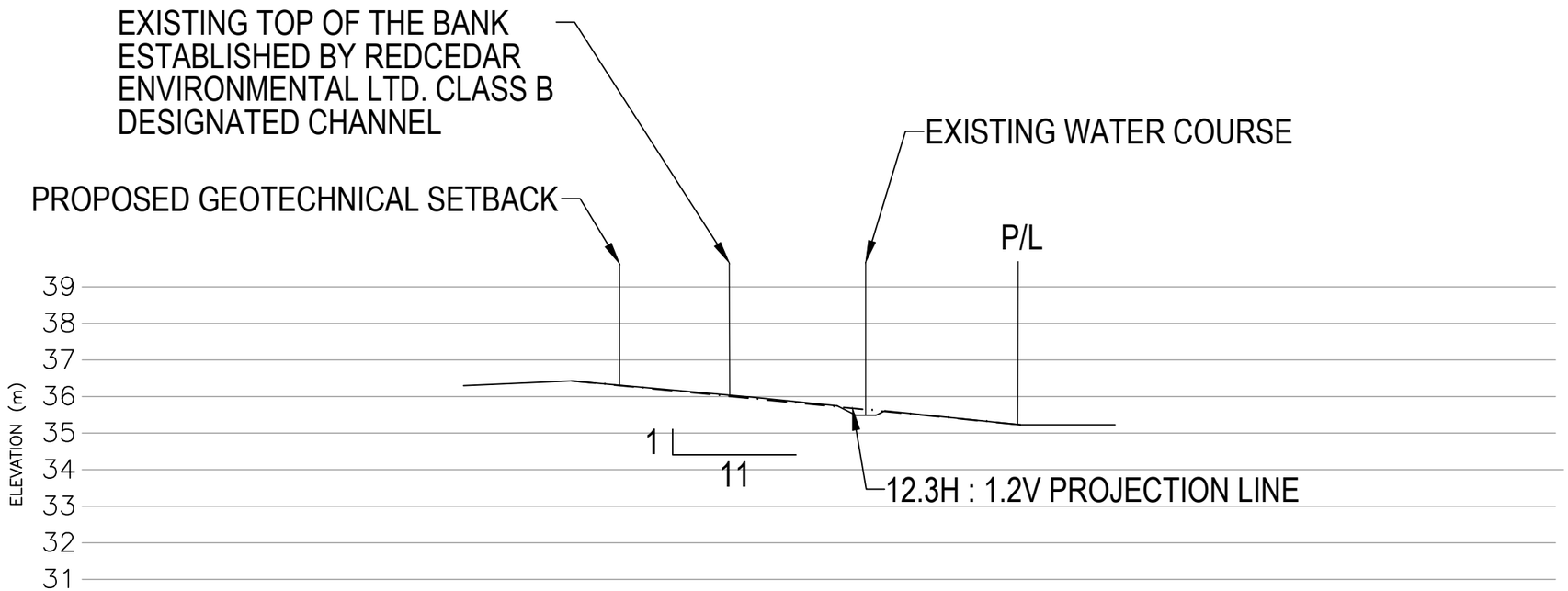
Rev.	Description	Date

Client: C[redacted] Kooner c/o Gursimer Design & Management

Project: Proposed Subdivision
6618 180 Street & 6617 181 Street, Surrey, BC

Title: LOCATION PLAN

Project no.	Drawn	Design	Checked	Date	Scale	Drawing no.
21-9249	RG	SJ	HD/SH	December 21, 2021	1:600	21-9249-SEC-01



SECTION A–A'

TOPGRAPHY FROM "SITE GRADING PLAN BY GURSIMER DESIGN & MANAGEMENT INC" (2021-04-09).

BRAUN GEOTECHNICAL LTD.

PTP# 1002594

Rev.	Description	Date

Client: s. 22(1) Kooner c/o Gursimer Design & Management

Project: Proposed Subdivision
6618 180 Street & 6617 181 Street, Surrey, BC

Project no.	Drawn	Design	Checked
21-9249	RG	SJ	HD/SH

Title: SECTION A - A'

Date	Scale	Drawing no.
December 21, 2021	1:150	21-9249-SEC-02

Test Pit Log: TP21-01

PTP# 1002594

File: 21-9249
Project: Proposed Subdivision
Client: Chanpreet Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark-brown, damp, soft to firm SILT, some sand, some organics, occasional roots/rootlets			
			○		S1	48%	
1				brown, damp, compact silty SAND, occasional organics			
			○		S2	40%	
2				grey-brown, occasionally rust-mottled, damp, stiff SILT, some sand			
3	1		○		S3	38%	
4							
5							
6							
	2		○		S4	28%	
7							
8							
			○		S5	35%	
				End of Test Pit @ 2.6m			
9							
	3						
10							

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP01
Page: 1 of 1

Test Pit Log: TP21-02

PTP# 1002594

File: 21-9249
Project: Proposed Subdivision
Client: Chanpreet Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark-brown, damp, soft to firm SILT, some sand, some organics, occasional roots/rootlets			
			○		S1	35%	
1				grey-brown, occasionally rust-mottled, damp, stiff SILT, some sand			
2			○		S2	57%	
3	1						
4			○		S3	27%	
5				- grey below 1.5m			
6				grey, damp, very stiff SILT, some sand			
7	2		○		S4	47%	
8				End of Test Pit @ 2.4m			
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP02
Page: 1 of 1

Test Pit Log: TP21-03

PTP# 1002594

File: 21–9249
Project: Proposed Subdivision
Client: Chanpreet Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0 ft / 0 m			dark-brown, damp, firm SILT, some gravel, some organics, trace sand			
		○		S1	47%	
1			grey-brown, occasionally rust-mottled, damp, stiff SILT, some sand, trace to some gravel			
2		○		S2	28%	
3 / 1						
4		○		S3	26%	
			grey-brown, damp, very stiff SILT, some sand, trace to some gravel			
5		○		S4	28%	
6			End of Test Pit @ 1.8m			
2						
7						
8						
9						
10 / 3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP03
Page: 1 of 1

Test Pit Log: TP21-04

PTP# 1002594

File: 21-9249
Project: Proposed Subdivision
Client: Chanpreet Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark brown, damp, soft to firm SILT, some sand, some gravel, some organics			
				brown, damp, compact silty SAND			
1			○		S1	27%	
2							
3	1		○		S2	29%	
4							
5				grey-brown, damp, very stiff SILT, some sand, occasional cobbles			
6	2						
7			○		S3	32%	
8				End of Test Pit @ 2.4m			
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP04
Page: 1 of 1

Test Pit Log: TP21-05

PTP# 1002594

File: 21-9249
Project: Proposed Subdivision
Client: Chanpreet Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark-brown, damp, loose to compact silty SAND, some silt, some gravel, occasional cobbles, occasional roots/rootlets			
			○		S1	29%	
1				grey-brown, occasionally rust-mottled, damp, stiff sandy SILT, occasional cobbles			
2			○		S2	29%	
3	1						
4			○		S3	20%	
5							
6			○		S4	28%	
				End of Test Pit @ 1.8m			
7	2						
8							
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP05
Page: 1 of 1

Test Pit Log: TP21-06

PTP# 1002594

File: 21-9249
Project: Proposed Subdivision
Client: Chanpreet Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth (ft)	Depth (m)	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0	0			dark-brown, damp, soft to firm SILT, some sand, some organics			
1			○		S1	27%	
				grey-brown, damp, stiff to very stiff SILT, trace to some sand			
2							
3	1						
4							
5							
			○		S2	28%	
6				End of Test Pit @ 1.8m			
	2						
7							
8							
9							
10	3						

Equipment: Tracked Excavator
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered

Logged By: SJ
Exploration Date: November 18, 2021
Dwg No.: 21-9249-TP06

Hand Pit Log: HP21-01

PTP# 1002594

File: 21-9249
Project: Proposed Subdivision
Client: Chanpreet Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0 ft / 0 m	150		ASPHALT			
	460	○	brown, moist, dense SAND & GRAVEL, trace to some silt (FILL)	S1		
1			rust-brown below @ 0.4m			
0.5		○		S2		
2		○	grey, damp, very stiff, clayey SILT	S3		
			End of Test Hole @ 0.7m			
3						
1						
4						
1.5						
5						

Equipment: Shovel
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered
(at time of drilling)

Logged By: AP
Exploration Date: November 9, 2021
Dwg No.: 21-9249-TH01
Page: 1 of 1

Hand Pit Log: HP21-02

PTP# 1002594

File: 21-9249
Project: Proposed Subdivision
Client: Chanpreet Kooner c/o Gursimer Design & Management
Location: 6618 180 Street & 6617 181 Street, Surrey, BC

BRAUN GEOTECHNICAL LTD.

Depth	Thickness (mm)	Sample	Soil Description	Sample #	Water cont.	Remarks
0 ft / 0 m	50		ASPHALT			
	175	○	grey-brown, moist, compact to dense SAND & GRAVEL, trace to some silt (FILL)	S1		
1 ft / 0.5 m		○	grey-brown, moist, dense, silty SAND, trace to some gravel -occasional clumps of occasionally rust mottled SILT	S2		
3 ft / 1 m			End of Test Hole @ 0.8m			
5 ft / 1.5 m						

Equipment: Shovel
Sampling Method: Lump Sample

Datum: Ground Surface
Water Depth: Not Encountered
(at time of drilling)

Logged By: AP
Exploration Date: November 9, 2021
Dwg No.: 21-9249-TH02
Page: 1 of 1

APPENDIX D: LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Our File: 21-9249

Bldg Dept Fax: (604) 591-2507

Note: This Statement is to be read and completed in conjunction with the "APEGBC Guidelines for Legislated Landslide Assessments for Proposed Residential Development in British Columbia", March 2006 / Revised September 2008 ("APEGBC Guidelines") and the "2006 BC Building Code (BCBC 2006)" and is to be provided for *landslide assessments* (not floods or flood controls) for the purposes of the Land Title Act, Community Charter or the Local Government Act. Italicized words are defined in the APEGBC Guidelines.

To: The *Approving Authority* Date: December 21, 2021

CITY OF SURREY
13450 104 Avenue
Surrey, BC V3T 1V8
Jurisdiction and address

With reference to (check one):

- ☑ Land title (Section 86) Subdivision Approval
- ☐ Local Government Act (Sections 919.1 and 920) - Development Permit
- ☐ Community Charter (Section 56) - Building Permit
- ☐ Local Government Act (Section 910) - Flood Plain Bylaw Variance
- ☐ Local Government Act (Section 910) - Flood Plain Bylaw Exemption
- ☐ Local Government Act (Section 692 (D)) - Provincial Regulation M268, Geotechnical Slope Stability (Seismic) Regulation

For the Property:

6618 180 Street & 6617 181 Street, Surrey, BC
Legal description and civic address of the Property

The undersigned hereby gives assurance that he/she is a Qualified Professional and is a *Professional Engineer* or *Professional Geoscientist*.

I have signed, sealed,and dated, and thereby certified, the attached *landslide assessment* report on the Property in accordance with the APEGBC Guidelines. That report must be read in conjunction with this Statement. In preparing that report I have:

Check to the left of applicable items

- ☑ 1. Collected and reviewed appropriate background information
- ☑ 2. Reviewed and proposed *residential development* on the Property
- ☑ 3. Conducted field work on and, if required, beyond the Property
- ☑ 4. Reported on the results of the field work on, and if required, beyond the Property
- ☑ 5. Considered any changed conditions on and, if required, beyond the Property
- 6. For a landslide hazard analysis or *landslide risk analysis* I have:
  - ☑ 6.1 reviewed and characterized, if appropriate, any *landslide* that may affect the Property
  - ☑ 6.2 estimated the *landslide hazard*
  - ☑ 6.3 identified existing and anticipated future *elements at risk* on and, if required, beyond the Property
  - ☑ 6.4 estimated the potential *consequences* to those *elements at risk*
- 7. Where the *Approving Authority* has adopted a level of landslide safety I have:
  - ☐ 7.1 compared the *level of landslide safety* adopted by the Approving Authority with the findings of my investigation
  - ☐ 7.2 made a finding on the *level of landslide safety* on the Property based on the comparison
  - ☐ 7.3 made recommendations to reduce *landslide hazards* and/or *landslide risks*
- 8. Where the Approving Authority has **not** adopted a level of landslide safety I have:
  - ☑ 8.1 described the method of *landslide hazard analysis* or *landslide risk analysis* used
  - ☑ 8.2 referred to an appropriate and identified provincial, national or international guideline for *level of landslide safety*
  - ☑ 8.3 compared this guideline with the findings of my investigation

- [x] 8.4 made a finding on the *level of landslide safety* on the Property based on my comparison
- [x] 8.5 made recommendations to reduce *landslide hazards* and/or *landslide risks*
- [x] 9. Reported on the requirements for future inspections of the Property and recommended who should conduct those inspections

Based on my comparision between

Check one

- [ ] the findings from the investigation and the adopted *level of landslide safety* (item 7.2 above)
- [x] the appropriate and identified provincial, national or international guideline for *level of landslide safety* (item 8.4 above)

I hereby give my assurance based on conditions[18] contained in the attached *landslide assessment* report

Check one or more where appropriate

- [x] for subdivision approval, as required by the Land Title Act (Section 86), "that the land may be used safely for the use intended

Check one

- [ ] with one or more recommended registered *covenants*.
- [x] without any registered *covenant*.

- [x] for a development permit, as required by the Local Government Act (Sections 919.1 and 920), my report will "assist the *local government* in determining what conditions or requirements under (Section 920) subsection (7.1) it will impose in the permit."
- [ ] for a building permit, as required by the Community Charter (Section 56), "the land may be used safely for the use intended"

Check one

- [ ] with one or more recommended registered *covenants*.
- [ ] without any registered *covenant*.

- [ ] for flood plain bylaw variance (for debris flows only), as required by the "Flood Hazard Area Land Use Management Guidelines" associated with the Local Government Act (Section 910), "the development may occur safely."
- [ ] for flood plain bylaw exemption (for debris flows only), as required by the Local Government Act (Section 910), "the land may be used safely for the use intended."

Harman Dhillon, P.Eng.
Name (print)

Signature

102-19049 95A Avenue
Address (Print)

Surrey, BC, V5N 4C7

604-513-4190
Phone

December 21, 2021
Date

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA H. DHILLON #29484

(Affix Professional Seal here)

If the Qualified Professional is a member of a firm, complete the following.

I am a member of the firm Braun Geotechnical Ltd.
and I sign this letter on behalf of the firm. (Print name of firm)

[18] When seismic slope stability assessments are involved, level of landslide safety is considered to be a "life safety" criteria as described in the National Building Code of Canada (NBCC 2005), Commentary on Design for Seismic effects in the User's Guide, Structural Commentaries, Part 4 of division B. This states:

"The primary objective of seismic design is to provide an acceptable level of safety for building occupants and the general public as the building responds to strong ground motion; in other words, to minimize loss of life. This implies that, although there will likely be extensive structural and non-structural damage, during the DGM (design ground motion), there is a reasonable degree of confidence that the building will not collapse nor will its attachments break off and fallon people near the building. This performance level is termed 'extensive damage' because, although the structure may be heavily damaged and may have lost a substantial amount of its initial strength and stiffness, it retains some margin of resistance against collapse".

Attachment 7 – Riparian Areas Protection Regulation Assessment Report

t: (604) 621 9811
e: remi@redcedarenvironmental.com
w: redcedarenvironmental.com

Redcedar Environmental Consulting Inc.
Unit 201 - 45269 Keith Wilson Road
Chilliwack BC, V2R 5S1

Assessment report #7425 has been issued a notification

1 message

Riparian Areas FLNR:EX <RiparianAreas@victoria1.gov.bc.ca> Wed, Mar 30, 2022 at 9:31 AM
To: "Riparian Areas FLNR:EX" <RiparianAreas@victoria1.gov.bc.ca>, "remi@redcedarenvironmental.com" <remi@redcedarenvironmental.com>, "Riparian Areas, Region 2 FLNR:EX" <RARReg2@gov.bc.ca>, "DFO_EPMP@PAC.DFO-MPO.GC.CA" <DFO_EPMP@pac.dfo-mpo.gc.ca>
Cc: "Surrey, City of" <RAR-NOTIFICATIONS@surrey.ca>

RAPR Assessment report #7245 has been received and selected for exclusion from formal Ministry review (Section 6 (4) of the Regulation) based on an evaluation of the risk of non-compliance with Regulatory standards. Under Professional Reliance, the QEP's certification of the assessment report indicates that the proposed development, inclusive of the entire scope of works, will meet the Riparian Protection Standard (as defined in Section 10 of the Regulation). This notification is provided to the local government as per section 6 of the regulation; they may now allow the development based on the QEP's certification (Section 5). It is the proponent and QEP's responsibility to ensure compliance with any other applicable Municipal, Provincial or Federal legislation.

From: RiparianAreas@Victoria1.gov.bc.ca <RiparianAreas@Victoria1.gov.bc.ca>
Sent: January 28, 2022 3:53 PM
To: remi@redcedarenvironmental.com; Riparian Areas, Region 2 FLNR:EX <RARReg2@gov.bc.ca>; Riparian Areas FLNR:EX <RiparianAreas@Victoria1.gov.bc.ca>; DFO_EPMP@PAC.DFO-MPO.GC.CA
Subject: Assesment 7425 has been created

This assessment has been created. This notification is sent to you, Fisheries and Oceans Canada (DFO)and the BC Ministry of Environment.
Details of this assessment are included in this notification.

Assessment Details

Assessment ID:: 7425 **Creation Date:** 2022-01-28

Status: created **Last Modified:** 2022-01-28

Development Details

Development Type:	Subdivision - > 6 lot Single Family	**Proposed Start Date:**	2022-06-01
Area of Development (hectares):	.940	**Proposed End Date:**	2023-12-31
Lot Area (hectares):	.940	**Nature of Development:**	New
Riparian Length:	187.00	**Section 9 Part 7 Activities:**	N

Location Details

Local Government:	Surrey, City of	**DFO Area:**	Lower Fraser Area
Region:	Lower Mainland	**Stream/River Type:**	Stream and Ditch
Parcel Identification (PID)/ Parcel Identification Number (PIN):	003-036-189 & 003-036-197	**Stream/River Name:**	St Gelais Brook
Address Line 1:	6617 181 Street & 6618 180 Street	**Watershed Code:**	900-005473-636683-355554-114464
Address Line 2:		**Postal Code:**	
Latitude:	49°7'22"	**Longitude:**	122°43'19"

Developer Details

Contact First Name: HCM Development BC Ltd. **Address Line 1:** 6617 181 Street

Contact Middle Name:		**Address Line 2:**	
Contact Last Name:		**City:**	Surrey
Province/State:	BC	**Postal/Zip Code:**	V3S 9A2
Email Address:	nirvair@gs-dm.com	**Country:**	Canada
Company Name:		**Phone #:**	

Primary QEP Details

Contact First Name:	Remi	**Address Line 1:**	520-45715 Hocking Avenue
Contact Middle Name:		**Address Line 2:**	
Contact Last Name:	Masson	**City:**	Chilliwack
Designation:	Biologist	**Province/State:**	BC

Registration #:	2693	**Postal/Zip Code:**	V2P 6Z6
Email Address:	remi@redcedarenvironmental.com	**Country:**	Canada
Company Name:	Redcedar Environmental Consulting	**Phone #:**	6046219811

Secondary QEP Details

Name:	Company	Address	Email	Phone

Riparian Areas Protection Regulation: Assessment Report

Please refer to submission instructions and assessment report guidelines when completing this report.

Date: January 28, 2022

I. Primary QEP Information

First Name	Remi	Middle Name	
Last Name	Masson		
Designation	R.P.Bio./Danger Tree Assessor	Company	Redcedar Environmental Consulting Inc.
Registration #	2693	Email	remi@redcedarenvironmental.com
Address	520-45715 Hocking Avenue		
City	Chilliwack	Postal/Zip V2P 6Z6	Phone # 604.621.9811
Prov/state	BC	Country Canada	

II. Secondary QEP Information (use **Form 2** for other QEPs)

First Name		Middle Name	
Last Name			
Designation		Company	
Registration #		Email	
Address			
City		Postal/Zip	Phone #
Prov/state		Country	

III. Developer Information

First Name		Middle Name	
Last Name			
Company	HCM Development BC Ltd.		
Phone #	778-895-6358	Email	Nirvair@gs-dm.com
Address	6617 181 Street, Surrey, BC		
City	Surrey	Postal/Zip	V3S 9A2
Prov/state	BC	Country	Canada

IV. Development Information

Development Type	Subdivision: > 6 lot Single Family		
Area of Development (ha)	0.94	Riparian Length (m)	~187
Lot Area (ha)	0.94	Nature of Development	Redevelopment
Proposed Start Date	Oct 2021	Proposed End Date	December 2022

V. Location of Proposed Development

Street Address (or nearest town)	6617 181 Street & 6618 180 Street						
Local Government	City of Surrey			City	Surrey		
Stream Name	Unnamed & St. Gelais Brook						
Legal Description (PID)	003-036-189 & 003-036-197			Region	Lower Mainland		
Stream/River Type	Stream			DFO Area	South Coast		
Watershed Code	900-005473-636683-355554-114464						
Latitude	49°	7’	22”	Longitude	122°	43’	19”

Completion of Database Information includes the Form 2 for the Additional QEPs, if needed. Insert that form immediately after this page.

Table of Contents for Assessment Report

Section 1. Description of Fisheries Resources Values and a Description of the Development proposal

(Provide as a minimum: Species present, type of fish habitat present, description of current riparian vegetation condition, connectivity to downstream habitats, nature of development, specific activities proposed, timelines)

Background

Redcedar Environmental Consulting Inc. was retained by the developer to complete a Riparian Areas Protection Regulation (RAPR) detailed assessment on the subject properties located at 6617 181 Street and 6618 180 Street, Surrey, BC.

The proposed development will consist of the subdivision of the properties into 14 single-family parcels and includes a new cul de sac. The proposed development will respect the City of Surrey Zoning Bylaw streamside protection requirements, which are equal to greater to those required by the RAPR. There are no plans for physical works at this time; however, this submission is required to proceed through the application process.

Two site plans are attached: one showing only the RAPR SPEAs, and one showing the proposed development layout. This development will not result in undevelopable lots; lands between the RAPR SPEA and the proposed development will be contained within the municipal streamside setbacks.

This report describes the appropriate SPEA setback widths for streams on and adjacent to the subject property. As the City of Surrey has streamside protection requirements that exceed those presented in the RAPR, this report recommends a proposed SPEA that is no less than the SPEA required per the RAPR.

Aquatic habitat assessment methods

The following fisheries resources were assessed on and adjacent to the subject watercourses as per Section 1.2.1 of the RAPR Technical Assessment Manual:

a. fish species presence;

b. description of instream fish habitat; and,

c. description of riparian condition.

Prior to the field assessment, a literature search was conducted to review the local watershed context, existing stream mapping, and general site characteristics. Redcedar Environmental Consulting Inc. referred to the Community Mapping Network's Sensitive Habitat Inventory Mapping (SHIM), the provincial Fisheries Inventory Data Queries (FIDQ), the provincial Habitat Wizard program and the local government GIS software to identify existing information relating to known streams and fish presence/absence on or near the subject property.

The field study area included the subject property, and portions of neighbouring parcels within 30 m of the subject property to identify any streams that would require a SPEA. Where access to neighbouring properties is not granted and where streams are expected to occur (i.e. based on observation and review of available mapping), these are described in the report.

Streams included any of the following:

a. a watercourse or body of water, whether or not usually containing water, and

b. any of the following that is connected by surface flow to a watercourse or body of water referred to in paragraph (a):

- a ditch, whether or not usually containing water;
- a spring, whether or not usually containing water;

- a wetland.

Per the RAPR, “fish” was considered to include “means all life stages of salmonids, game fish, and fish that are listed in Schedule 1, 2 or 3 of the *Species at Risk Act* (Canada)”. All references to fish in this report, unless specified otherwise, use only the definition above. To be considered fish habitat, watercourses were assessed to determine 1) if they contained fish or 2) had a surface connection to fish bearing habitat and provided a significant contribution of base flow, food, and nutrients to fish habitat.

Watercourses were identified by physical features that could be delineated in the field. To be classified as streams as defined above, watercourses had to show evidence of regular flows sufficient to mark on the soil of the bed of the stream a character distinct from that of its banks, in vegetation, as well as in the nature of the soil itself; and have a surface connection to fish habitat.

Physically identifiable features of streams (i.e., creeks and brooks) were defined per the Fish-stream Identification Guidebook, Version 2.1 (1998). Per the Fish-stream Identification Guidebook, watercourses were assessed for the presence of a continuous channel bed, whether or not portions were obscured by bridging vegetation, with evidence of scour, rafted debris, and deposits of mineral alluvium. Scour had to be sufficient to erode at least some portion of the channel bed down to the mineral substrate. In lower energy systems where flows might not be sufficient to consistently erode surface soils, streams were identified by the presence of a continuous channel bed with evidence of regular inundation (e.g. absence of upland vegetation; presence of obligate hydrophytes).

Physical stream characteristics were made using the:

- Fish-stream Identification Guidebook; and
- Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures, Version 2.0.

Field measurements (i.e. stream widths and gradient) were made using a Leica E7400x range finder. Property boundaries were identified using available aerial photographs, field evidence (e.g. fencing, survey pins, cleared boundaries), and/or a handheld GPS unit.

The potential effects of climate change to onsite watercourses was considered as part of this assessment. It is also noteworthy that future local land-use conversions (e.g. logging, residential development) will likely alter watershed characteristics in a shorter timeframe than climate change. As site specific effects of climate change and land use conversion are not known at this time, recommendations have not been made to mitigate potential future changes to the hydrology and riparian habitat type on the subject property.

Field assessments were completed on February 1, June 3, and June 9, 2021 by Rémi Masson, R.P.Bio., Stephanie Christensen, R.P. Bio., Nathan Loewen, B.A., Dipl. Tech., and Amber Burnett, B.Sc., Dipl. Tech.

Weather at the time of the February assessment was rainy, weather at the time of both June assessments was sunny. Streams were expected to be evident at the time of the assessments.

Site Context

The subject property was located at an elevation of 34 m to 43 m and surrounding lands consisted of low and medium density residential and a utility right of way that runs southeast to northwest to the west. The topography on the subject property remains relatively flat.

Per the Freshwater Atlas the subject property is located in a first order watershed (1:20 000 scale) with an area of approximately 106.7 hectares. Land uses in this watershed are predominantly residential and light industrial.

Riparian Vegetation

Vegetation on the subject property was predominantly native in the riparian areas and landscaped lawn or ornamental species in the remainder of the lots. Monocultures of Himalayan blackberry (*Rubus armeniacus*) were present along WC1 and WC2.

The predominant riparian vegetation included bigleaf maple (*Acer macrophyllum*), western redcedar (*Thuja plicata*), red alder (*Alnus rubra),* osoberry (*Oemleria cerasiformis*), Himalayan blackberry, salmonberry (*Rubus spectabilis*) and vine maple (*Acer circinatum*).

Aquatic Habitat Assessment Results

There was one ditch (Ditch 1) and two streams – Watercourse 1 (WC 1) and Watercourse 2 (WC2) – observed on and near the subject properties.

Ditch 1

Ditch 1 was located on the adjacent property to the north of 6617 181 Street and flowed west in a constructed channel before draining into WC1. Ditch 1 originated from a stormwater outfall under 181 Street and per the City of Surrey Online Mapping System (COSMOS) the water is sourced from underground pipes running south to north on 181 Street. There was no evidence of natural headwaters or springs at this location.

A minor volume of flow was observed in Ditch 1 during the February assessment and there was limited evidence of scour, erosion, or rafted debris. At the time of the field assessment a moderately thick layer of leaf litter was present throughout the channel.

The potential for fish presence was considered; however, given the absence of habitat, marginal water flow, extensive piping upstream and the absence of fish habitat downstream (WC1) the likelihood for fish presence in Ditch 1 was rated as nil.

The COSMOS had previously classified Ditch 1 as a Class C (green-coded) ditch (non-fish habitat). This was generally consistent with observations made in the field.

As Ditch 1 did not have any natural headwaters or springs, it was classified as a ditch per the RAPR. The resultant SPEA will not fall on the subject property.

This ditch is classified as non-fish bearing based on the very low volume of flows, existing classifications, and absence of suitable rearing habitat.

It is understood that a developer has proposed to in-fill Ditch 1 under a Development Application (#7916-0230-00). As that ditch is on a neighbouring parcel and this development respects the required SPEA, that application has no bearing on this development proposal.

WC1

WC1 originated downstream of Ditch 1 on the adjacent property to the north of 6617 181 Street where ground water seepage entered the channel. WC1 then flowed in a westerly direction across the adjacent northern properties dipping south for a short extent to flow through the subject property at 6618 180 Street before flowing north and west to 180 Street.

The watercourse flowed under 180 Street through pipes and according to local GIS mapping, WC1 continues flowing through an open channel west of 180 Street before draining into St. Gelais Brook, a fish-bearing stream known to support cutthroat trout (*Oncorhynchus clarkii*) (BC Habitat Wizard).

Near the subject property WC1 flowed through a shallow channel with substrate consisting predominantly of sand and organics. The water depth was approximately 5-10 cm and the channel lacked large woody debris, overhanging banks, pools, and large substrate materials.

The COSMOS identified this stream as non-fish bearing (Class B). Fish sampling has not been completed on this stream; however, the non-fish bearing classification is believed to be accurate based on the minor volume of flows observed; limited habitat features for rearing; and the presence of a 30 m long concrete culvert downstream. This culvert has a mean gradient of 5%, and maximum gradients of up to 10% (per the COSMOS). This culvert would not be readily passable by fish. The

As WC 1 provided a significant source of food and nutrient value to downstream fish populations, this stream would require a setback per the RAPR.

WC2 (St. Gelais Brook)

WC2 was present on the adjacent properties to the south. According to local GIS mapping WC2 flows from the southeast through a narrow ravine to 18102 Claytonwood Crescent (south of the subject property) where it turns west to drain across 18102 Claytonwood Crescent and 6586 180 Street. Near the west end of 6586 180 Street WC2 flows north and comes in close proximity to the subject property before flowing through a pipe under 180 Street. WC2 then continues to meander in a northwesterly direction away from the subject property eventually entering the Serpentine River floodplain.

Near the subject property WC2 flowed through forested habitat on 18102 Claytonwood Crescent until reaching 6586 180 Street where it flowed through a narrow channel that meandered through a large open grassed lawn beneath a power line tower.

The substrate was predominantly gravels and cobbles and water depth was approximately 5-10 cm during the June 9 field assessment.

Per the SHIM Atlas WC2 is of unknown fish-bearing status near the subject properties and becomes fish bearing approximately 725 m downstream. Per the COSMOS this stream is fish-bearing downstream from the east end of 6586 180 Street.

Fish sampling was not conducted; however, the presence or absence of fish would not change the recommendations made in this report. WC2 was classified as a fish-bearing stream per the RAPR and would require a setback.

Conclusions

Overall, habitat values on the subject properties were rated as low. Riparian features along WC1 likely contribute a significant source of food and nutrients to downstream fish populations.

Limitations

This assessment report has been prepared specifically for the development described in this report, and in general accordance with the professional practice guidelines for legislated riparian assessments in BC. This assessment report was based on the best available information and on work undertaken per standard industry practice.

This assessment report has been prepared for the sole use of the developer named on this report, the local government, the Ministry of Forests, Lands Natural Resource Operations and Rural Development, and Fisheries and Oceans Canada. The recommendations made in this assessment are considered valid for a period of five years from the date of publication, or until additional development is proposed on the subject property; whichever is shorter.

This report should be reviewed and/or updated in the event the development is not complete within a period of five years; in the event there is a substantial change in the condition of the subject property (e.g. paving, removal of additional vegetation, change of land use) not described in this report; or in the event that the subject property is sold to another party for the purpose of development.

The proposed start and end date of the development listed in this report have been provided to provide a fair window of opportunity for the completion of the development activities. However, it should be noted that the dates provided are approximate and may be subject to change.

If the QEP(s) listed in this report is (are) not retained to undertake field reviews and environmental monitoring, it may not be possible to provide an assurance statement that the measures to protect the SPEA provided in this report were appropriately followed, or to sign and submit a conformance statement.

Use of this report by a third party, or any reliance on or decisions made based on it, are the responsibility of such third parties. Redcedar Environmental Consulting Inc. does not accept

responsibility for any damages suffered by a third party as a result of their use of or reliance on this report.

Section 2. Results of Riparian Assessment (SPEA width)

Attach or insert the Form 3 or Form 4 assessment form(s). Use enough duplicates of the form to produce a complete riparian area assessment for the proposed development

Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: January 28, 2022

Description of Water bodies involved (number, type)	Ditch 1
Stream	
Wetland	
Lake	
Ditch	X
Number of reaches	1
Reach #	1

Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)

	Channel Width(m)		Gradient (%)
starting point	1.0		0
upstream	1.0		
	1.0		
	1.0		
	1.0		
downstream	1.0		
	1.0		
	1.0		
	1.0		
	1.0		
	1.0		0
Total: minus high /low	9.0		
mean	1.0		0
	R/P	C/P	S/P
Channel Type			

I, Remi Masson, hereby certify that:

a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b) I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd. ;

c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Site Potential Vegetation Type (SPVT)

	Yes	No	
SPVT Polygons		X	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)	2.0							
Litter fall and insect drop ZOS (m)	2.0							
Shade ZOS (m) max	2.0	South bank	Yes		No	X		
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				Manmade, no significant headwaters (water source is stormwater)			
Ditch Fish Bearing	Yes	Default	No		If non-fish bearing insert no fish bearing status report		See rationale above. Barrier to fish at west side of 180 Street. No fish habitat and marginal flows in ditch.	
SPEA maximum	**2.0**	(For ditch use table3-7)						

I, Remi Masson , hereby certify that:

a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b) I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd. ;

c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Comments

The SPEA for this ditch does not fall on the subject property.

Section 2. Results of Riparian Assessment (SPEA width)

Attach or insert the Form 3 or Form 4 assessment form(s). Use enough duplicates of the form to produce a complete riparian area assessment for the proposed development

Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: January 28, 2022

Description of Water bodies involved (number, type)	WC1
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	1
Reach #	1

Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)

	Channel Width(m)		Gradient (%)
starting point	~~1~~		3
upstream	1.2		
	2.7		
	1.8		
	1.2		
downstream	2		
	~~3.9~~		
	1.1		
	1		
	1.5		
	1.5		3
Total: minus high /low	14.0		
mean	1.6		3
	R/P	C/P	S/P
Channel Type			

I, Remi Masson, hereby certify that:

e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

f) I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd. ;

g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Site Potential Vegetation Type (SPVT)

	Yes	No	
SPVT Polygons		X	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)	10.0							
Litter fall and insect drop ZOS (m)	10.0							
Shade ZOS (m) max	4.7	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)							
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report	See rationale above.		
SPEA maximum	**10.0**	(For ditch use table3-7)						

I, Remi Masson , hereby certify that:

e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

f) I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd. ;

g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Comments

Only the top of bank was flagged as part of this assessment. The top of bank and natural boundary were relatively close together and the minimum setback allowable in Surrey would be 10 m from the top of bank. As the SPEA measured from the top of bank is wider than the SPEA measured from the natural boundary, this approach was considered to be consistent with the requirements of the RAPR.

Section 2. Results of Riparian Assessment (SPEA width)

Attach or insert the Form 3 or Form 4 assessment form(s). Use enough duplicates of the form to produce a complete riparian area assessment for the proposed development

Results of Detailed Riparian Assessment

Refer to Section 3 of Technical Manual

Date: January 28, 2022

Description of Water bodies involved (number, type)	WC2
Stream	X
Wetland	
Lake	
Ditch	
Number of reaches	1
Reach #	1

Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)

	Channel Width(m)		Gradient (%)
starting point	0.6		4
upstream	0.8		
	0.5		
	0.5		
	~~0.2~~		
downstream	0.5		
	0.7		
	0.7		
	0.6		
	0.6		
	~~1~~		5
Total: minus high /low	5.5		
mean	0.6		4.5
	R/P	C/P	S/P
Channel Type			

I, Remi Masson, hereby certify that:

i) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

j) I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd. ;

k) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

l) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

Site Potential Vegetation Type (SPVT)

	Yes	No	
SPVT Polygons		X	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes

Zone of Sensitivity (ZOS) and resultant SPEA

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons						
LWD, Bank and Channel Stability ZOS (m)	10.0							
Litter fall and insect drop ZOS (m)	10.0							
Shade ZOS (m) max	1.8	South bank	Yes	X	No			
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)							
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report	See rationale above.		
SPEA maximum	**10.0**	(For ditch use table3-7)						

I, Remi Masson , hereby certify that:

i) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

j) I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd. ;

k) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

l) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

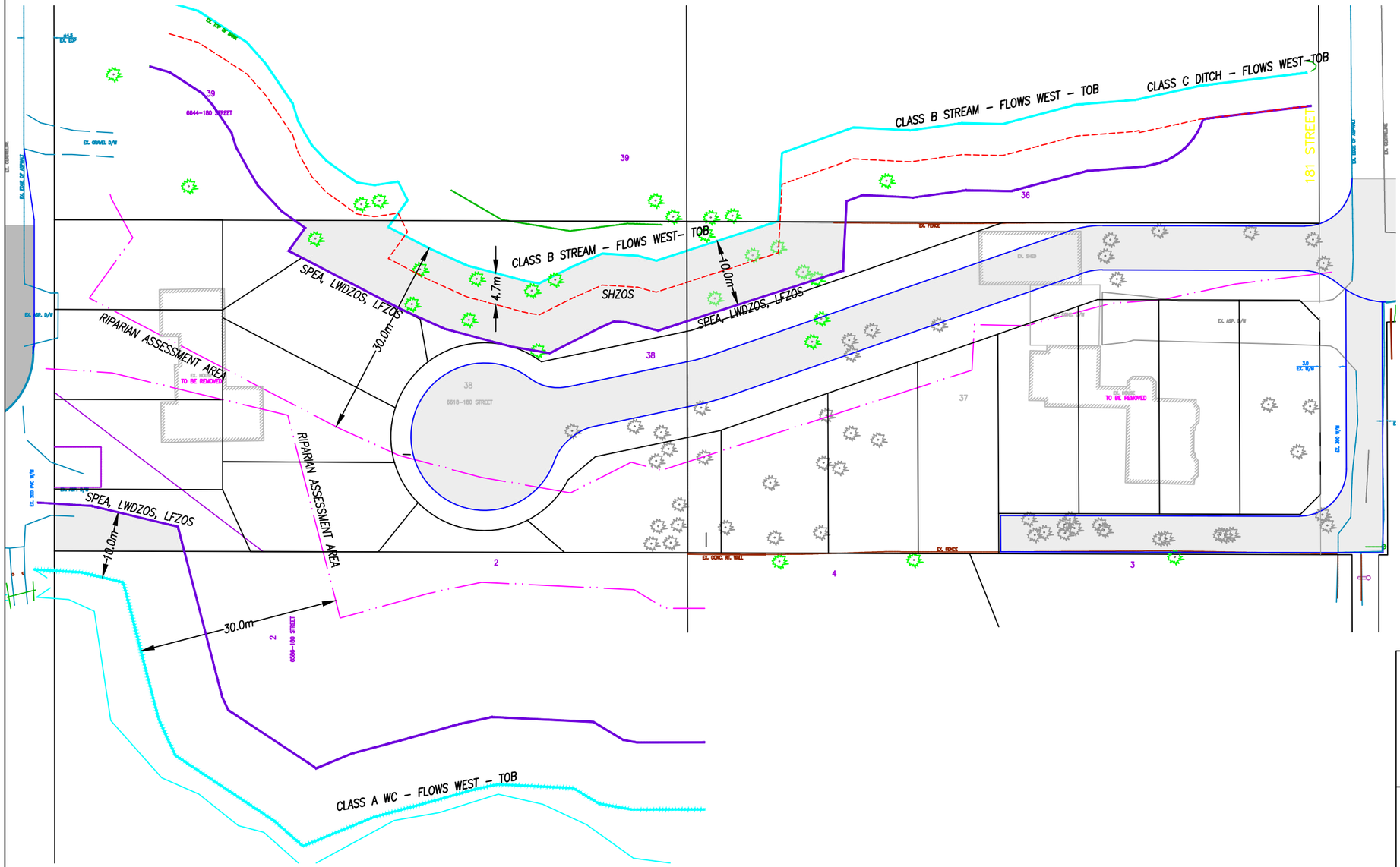
Comments

Only the top of bank was flagged as part of this assessment. The top of bank and natural boundary were relatively close together and the minimum setback allowable in Surrey would be 10 m from the top of bank. As the SPEA measured from the top of bank is wider than the SPEA measured from the natural boundary, this approach was considered to be consistent with the requirements of the RAPR.

The driveway for 6586 180 Street crosses the SPEA on the subject property. This is a grand-parented land use not anticipated to change.

Section 3. Site Plan

Figure 1. Annotated aerial photograph of the subject properties (black outline). Streams are shown in red/orange and ditch 1 is shown in green.



LEGEND:

- RAA
- SPEA
- SHZOS
- LFZOS
- LWDZOS
- TOB

SETBACK TABLE				
	Ditch 1	**WC1 (north)**	**WC2 (south)**	
LWDZOS	5.0	10.0	10.0	Large Woody Debris and Bank Stability Zone of Sensitivity
LFZOS	5.0	10.0	10.0	Litter Fall and Insect Drop Zone of Sensitivity
SHZOS*	5.0	4.7	1.8	Shade Zone of Sensitivity
SPEA	5.0	10.0	10.0	Streamside Protection and Enhancement Area
RAA	30.0	30.0	30.0	Riparian Assessment Area
*DUE SOUTH OF HWM				

REDCEDAR Environmental Consulting

PROJECT LOCATION
6617 181 STREET

PROJECT NUMBER
21-045R

DRAWN BY:
CASSIDY SILBERNAGEL

DATE:
Nov 1 2021

SHEET:
1

SCALE:
NTS

Section 4. Measures to Protect and Maintain the SPEA

This section is required for detailed assessments. Attach text or document files, as need, for each element discussed in Part 4 of the RAPR. It is suggested that documents be converted to PDF *before* inserting into the assessment report. Use your "return" button on your keyboard after each line. You must address and sign off each measure. If a specific measure is not being recommended a justification must be provided.

1. Danger Trees	Danger trees were not observed within the SPEA at the time of the field assessment, as such, specific measures are not required at this time. As the field worked occurred in the summer and there have been significant storms in the fall of 2021, a follow up danger tree assessment is advised prior to land disturbing activities. Dead trees within the SPEA function as a source of large woody debris (LWD) and are to be retained during and following the development phase unless a QEP (Certified Danger Tree Assessor) determines that the trees pose a risk to persons or property (as described in Appendix 2 of the RAPR Assessment Methods). Trees felled in the SPEA should be left as LWD in the SPEA, if advised to do so by a QEP. Recommendations for the retention of LWD within the channel must be made in consideration of the local habitat type. If danger trees are felled in the SPEA, the QEP's report is to be submitted as an addendum to this report prior to the issuance of a development permit.
I, Remi Masson, hereby certify that: m) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*; n) I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd.; o) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	
2. Windthrow	Tree removal will be required south of the SPEA and will create a newly exposed forest edge. However, it is noted that the trees in the SPEA are exposed to winds from the east and west. Exposure to wind is likely to reduce the risk of endemic windthrow following clearing.
I, Remi Masson, hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd.; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.	

3. Slope Stability	This report does not constitute a landslide risk assessment or a risk assessment for the proposed development. Field indicators of slope instability were not observed within the RAA. Specific measures are not required at this time.

I, Remi Masson, hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd.;

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

4. Protection of Trees	Most of the trees in the SPEA are well removed from the proposed development and/or future land disturbing activities. The arborist report prepare for this project recommends specific action for surveyed trees. Any excavation or soil disturbance within 6 m of a tree in the SPEA must be completed under the supervision of a QEP to ensure that the activities in the developable area do not affect trees in the SPEA. Trees within the SPEA (aside from danger trees as identified by a QEP) will be left in place. Trees in the SPEA boundary are to be protected from the development. Impacts to trees within the SPEA can occur through 1) compaction or disturbance to soils; 2) disposal of concrete leachate or other pollutants; or 3) parking of vehicles beneath the drip line. At no time during construction should there be any temporary or permanent storage of construction materials or substrate within the non-encroachment areas described above. It should be noted that tree felling may be subject to additional legislation, bylaws, and/or best practices not covered within this report.

I, Remi Masson, hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd. ;

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

5. Encroachment	Existing areas of human disturbance (e.g. driveways) within the SPEA can continue to be used, provided the nature of the disturbance does not change. The SPEA boundary must be delineated by a qualified professional (e.g., surveyor) based on the location of the stream boundaries as defined in the RAPR (and as identified by a QEP) prior to commencement of works. The SPEA on the subject property is to be designated as a no-encroachment area. The SPEA cannot be used as a staging location or for storage of construction materials. Permanent fencing is recommended for this site. Fencing is to be in accordance with City of Surrey requirements. Current and future landowners must be made aware that onsite aquatic features are environmentally valuable and protected by provincial and federal legislation.

I, Remi Masson, hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd.;

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

6. Sediment and Erosion Control	Sediment or sediment-laden water must not be allowed to enter the SPEA. As the subject property around the SPEA is flat and largely grassed, the risk of sedimentation resulting from this project is considered to be low. A silt-fence must be adequately installed at the SPEA boundary or edge of development as required to prevent entrainment of sediment into the SPEA or into the onsite or near site aquatic features. Exposed soils at the periphery of the development area must be seeded at a rate of 50kg/ha during the growing season if soils are to remain undisturbed for more than 14 days. Use of a hydroseed or similar may be required if exposed soils cannot be adequately stabilized. All exposed soils must be seeded in April and September. Soil stockpiles must not be stored in such a way that they can release sediment to a stream or to the SPEA. These must be covered with poly if not being actively used. Additional erosion and sediment control measures may be required at the recommendations of a QEP.

I, Remi Masson, hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd.;

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

7. Stormwater Management	A detailed stormwater management plan is not yet available for this project and is not required at this stage of the development process. All future development will be required to ensure that stormwater is released from the site at the pre-development rate. Although not contemplated at this time, any new stormwater outfall would require authorization from the senior regulatory agencies.

I, Remi Masson, hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd.

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

8. Floodplain Concerns (highly mobile channel)	Onsite watercourses were confined within clearly defined banks, and there was no evidence of recent or historic flooding. As such, there are no floodplain concerns for the subject property.

I, Remi Masson, hereby certify that:

a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

b. I am qualified to carry out this part of the assessment of the development proposal made by the developer HCM Development BC Ltd.;

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

Section 5. Environmental Monitoring

Attach text or document files explaining the monitoring regimen Use your "return" button on your keyboard after each line. It is suggested that all document be converted to PDF *before* inserting into the PDF version of the assessment report.
Include actions required, monitoring schedule, communications plan, and requirement for a post development report.

The proponent has been informed that in the event of ground disturbing activities, a QEP who is familiar with the project, subject property, the local ecology, erosion and sediment control, and best construction management practices should be retained to provide environmental monitoring for this project. The QEP retained to provide environmental monitoring services must be provided the authority to modify and/or halt any works as necessary for the protection of fish and fish habitat, and to comply with the RAPR.

The measures to protect the SPEA described above should be communicated to the site workers as required to prevent impacts to the SPEA, the onsite watercourses, or the harmful alteration, disturbance, or destruction of fish habitat.

The QEP should provide monitoring as required to ensure that the SPEA and the fish habitat it contains is protected from the development, that the measures to protect the SPEA are respected and have been appropriately implemented and/or observed, and that works are compliant with any applicable legislation or local bylaws.

At a minimum, inspections should occur:

- Immediately prior to soil disturbing activities to ensure that the appropriate mitigation measures have been communicated to the construction team, and to ensure that they have been appropriately installed;
- At the mid-point of construction to determine if the installed mitigation measures are functions as intended, and to determine if additional measures are required to protect the integrity of the SPEA;
- At the substantial completion of construction activities to confirm that the measures implemented were appropriate for the protection of the SPEA, and to make recommendations as required for the long-term protection of the SPEA.

Monitoring frequency can be modified at the QEP's discretion and with consultation with the local government based on observed site conditions, contractor compliance, and weather conditions.

Per Section 5 (a) of the *Riparian Areas Protection Regulation*, a project completion report is required to be completed by a QEP, and submitted to the RAPR Notification System to confirm that the conditions described in this report have been properly implemented.

Section 6. Photos

Provide a description of what the photo is depicting, and where it is in relation to the site plan.

Photograph 1. View of Ditch 1, north of the subject property facing east. The ditch was conveying marginal flows even during a significant rainfall event. (Photo taken February 1, 2021).

Photograph 2. View of WC1. At the time of the June assessment water levels were low. A blackberry monoculture is present at the rear of the photo (Photo taken June 3, 2021).

Photograph 3. View of WC1 during higher flows (Photo taken February 1, 2021).

Photograph 4. View of channel bed of WC2. (Photo taken June 9, 2021).

Photograph 5. View of WC2 facing east. WC2 flows within the longer grassed area (Photo taken June 9, 2021).

Section 7. Professional Opinion

Qualified Environmental Professional opinion on the development proposal's riparian assessment.

Date January 28, 2022

1. I/We: Remi Masson

Please list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.)

hereby certify that:

a) I am/We are qualified environmental professional(s), as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
b) I am/We are qualified to carry out the assessment of the proposal made by the developer HCM Development BC Ltd. , which proposal is described in section 3 of this Assessment Report (the "development proposal"),
c) I have/We have carried out an assessment of the development proposal and my/our assessment is set out in this Assessment Report; and
d) In carrying out my/our assessment of the development proposal, I have/We have followed the specifications of the Riparian Areas Protection Regulation and assessment methodology set out in the minister's manual; AND

2. As qualified environmental professional(s), I/we hereby provide my/our professional opinion that:

a) n/a the site of the proposed development is subject to undue hardship, (**if applicable, indicate N/A otherwise**) and
b) X the proposed development will meet the **riparian protection standard** if the development proceeds as proposed in the report and complies with the measures, if any, recommended in the report.

[NOTE: "Qualified Environmental Professional" means an individual as described in section 21 of the Riparian Areas Protection Regulation.]

Schedule E

KLIMO & ASSOCIATES

CERTIFIED ARBORIST REPORT

PROJECT LOCATION:
6618 180 & 6617 181 St, Surrey

PREPARED FOR:
GurSimer Design and Management Inc.

PREPARED BY:
Klimo & Associates Ltd.
Unit #114 - 4300 N Fraser Way
Burnaby B.C., V5J 5J8

Metro West IMBL **#20020981**
Fraser Valley IMBL **#20020982**

August 18, 2021
1st revision done on August 15, 2022
2nd revision done on November 29, 2022
3rd revision done on May 25, 2023
4th revision done on May 30, 2023
5th revision done on June 30, 2023
6th revision done on February 13, 2024
7th revision done on September 12, 2024

Francis Klimo
ISA Certified Arborist
ISA Certified Tree Risk Assessor
BC Wildlife Danger Tree Assessor

1.0 SCOPE OF WORK

Klimo & Associates Ltd. was contracted by GurSimer Design and Management Inc. to prepare an Arborist report along with a Tree assessment, and Tree management plan in order to support a thirteen (13) lot subdivision application for the project addresses located at 6618 180 & 6617 181 St, Surrey.

We conducted our field inspections on August 18, 2021 at around 11:30am. Our scope of work was to identify all key trees located within the proposed working limits and off-site areas of the subdivision project, assess & document their condition, and recommend measures to either protect the retained trees or to prescribe their removals. The objective of this assessment and report is to identify all on-site & off-site trees that could be impacted by the subdivision project and to ensure that the management of trees are in compliance with the *"Surrey Tree Protection Bylaw, 2006 No. 16100"* and "*Best Management Practices"*.

1.1 Limits of assignment

- Our investigation is based solely on visual inspection of the trees on August 18, 2021 and the analysis of photos taken and tree diagnosis gathered during the inspection.
- Our inspection was conducted from ground level. We did not conduct soil tests or below grade root examination to assess the condition of the root system of the trees.
- We conducted a level 2 assessment.
- Sunny day, no adverse weather conditions.

1.2 Purpose and use of the report

- Meet municipal criteria for Arborist report submissions and to provide documentation pertaining to the management of on/off-site trees in order to supplement the proposed thirteen (13) lot subdivision application being submitted to the City of Surrey for the project address located at 6618 180 & 6617 181 St, Surrey.

2.0 SITE ANALYSIS / PROPOSAL

The project site consists of two (2) individual lots with a combined area of over 2 acres. Located within its site limits, an existing single-family dwelling had been examined to be situated within each of the lots. Observing the overall site and of its site boundary lines, the properties were examined to have consisted of two (2) individual lots and was observed to be bounded by residential properties spanning along its northern and southern lengths, along with 181 St and 180 St observed along their frontage. A proposal has been set forward to subdivide the two (2) properties in order to create thirteen (13) new lots along with having a new lane & Cul de Sac constructed including their lot grading & site servicing related requirements completed.

Located within the limits of the site, the growth of the subject trees had primarily consisted of mature coniferous species developing as part of a forested area spanning within the rear of each of the two (2) lots. Spanning along the eastern section of the lot, the subject trees were examined to have concentrated within a stand formation and had compromised of several other deciduous species. Within the remaining areas of the site, a clear and open topography had been observed to be encompassing near the existing building envelopes.

Figure 1 - Location of subject site - 6618 180 & 6617 181 St, Surrey

3.0 TREE ASSESMENT PROCESS

Our tree inspection process is a systematic procedure for accurately identifying and cataloging trees. Using the site survey as a reference to their locations and the proposed site plans provided by the project planners detailing the proposed subdivision, the specifications to our Tree Protection Requirements were able to be accurately completed. In using the information of the proposed construction requirements, we have produced accurate findings to our recommendations to ensure the use of proper tree protection during the construction phase and as applicable, prescribing tree removal recommendations.

Our assessment of the on-site and off-site trees consists of gathering and documenting sizes (*DBH, LCR, & Crown spread*), condition, species, location, growth form, and other site factors. The data collected has been documented into the inventory in order to convey the identified trees into a simple format. In addition, accurate tree preservation measures could be implemented for the optimal retention and protection of trees throughout the duration and up to the completion of the construction project.

3.1 Health and structure rating

Basic definitions of general tree health in regards to the documented trees as inventoried within the Arborist report have been separated based upon the total amount of trees and has been broken up into five (5) defined health categories as outlined in the table below:

Table 1 - Health & Structure Rating Summary Table

Rating	Retention Suitability	Definition	Total Trees
Good	Suitable	A healthy, vigorous tree, reasonably free of disease, with good structure and form typical of the species.	**3**
Fair / Good	Suitable	Tree is growing well for its species. No overt or identifiable significant defects, and is well suited for retention.	
Fair	Marginal	Subject tree that has an average vigour for its species. Small amount of twig dieback, minor structural defects that could be corrected.	**93**
Fair / Poor	Marginal/ Unsuitable	A tree with moderate to poor vigor, moderate twig and small branch dieback, thinning of crown, poor leaf color, moderate structural defects that may affect its survival considering construction impacts.	
Poor	Unsuitable	A tree in decline, epicormics growth, extensive dieback of medium to large branches, significant structural defects that cannot be abated. And a tree in severe decline, dieback of scaffold branches and or trunk, mostly epicormic growth; extensive structural defects that cannot be abated.	**7**

4.0 SUMMARY OF FINDINGS

On August 18, 2021 & February 13, 2024, Klimo & Associates Ltd. had conducted a site visit & visual inspection of all trees located on and off-site. A total of **seventy-nine (79) trees** were identified within the limits of the proposed subdivision and a total of **twenty-four (24) trees** within 10m of the off-site civil works. The identified trees were measured to have an average DBH of 10cm to 138cm and overall, the subject trees had ranged from being in poor, fair, to good in condition.

The majority of the identified trees were examined to be in conflict with the proposed subdivision as the subject trees had fallen within the limits of the subdivision and of the high disturbance requirement areas pertaining the lot grading & site servicing works.

On-site (*Development site*)	**City** (*Trees on City lot*)	**Off-site** (*Privately owned trees*)	**Total Tree(s)**	
63	23	17	**103**	
48	3		**51**	**Remove**
15	20	17	**52**	**Retain**

Deciduous Tree(s)				**Coniferous Tree(s)**			
Red alder	13	Willow	1	Western redcedar	55	Sitka spruce	1
Bigleaf maple	21	Manitoba maple	1	Western hemlock	1	Scotspine	2
Redbud	5	Pin oak	3				
Total	**44**			**Total**	**59**		

5.0 ON-SITE TREE INVENTORY

Table 1 - On-site Tree Inventory

Klimo & Associates Ltd.

August 18, 2021

6618 180 & 6617 181 St, Surrey

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
801	Yes	On-site	Red alder	*Alnus rubra*	30	40	5	Single stemmed, medium, mature deciduous tree. Limb attachments at 1m. Crown growth influenced by phototropics. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	1.8
802	Yes	On-site	Western redcedar	*Thuja plicata*	50	40	5	Single stemmed, medium, co-dominant mature, coniferous tree. Enlarged base. Limb attachments at 2.2m in height. Crown touching the neighboring tree. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	3.0
825	Yes	On-site	Western redcedar	*Thuja plicata*	60	30	3	Single stemmed, medium, co-dominant mature coniferous tree. Enlarged base. Limb attachments at 2.5m in height. Crown touching neighboring tree. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	3.6
826	Yes	On-site	Western redcedar	*Thuja plicata*	62	70	7	Single stemmed, large, co-dominant mature coniferous tree. Buttressed roots. Pruning marks at first quarter of trunk. Limb attachments at 2m in height. Crown development towards the eastwards. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	3.8
827	Yes	On-site	Western redcedar	*Thuja plicata*	60	30	3	Single stemmed, medium, co-dominant mature coniferous tree. Enlarged base. Limb attachments at 2.2m in height. Crown touching neighboring tree. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	3.6

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
828	Yes	On-site	Western redcedar	*Thuja plicata*	37	70	7	Single stemmed, large, co-dominant mature coniferous tree. Buttressed roots. Pruning marks along the first quarter of its main trunk. Limb attachments at 2m in height. Crown development towards the eastwards. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	2.3
829	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	60	30	3	Single stemmed, medium, co-dominant mature coniferous tree. Enlarged base. Limb attachments at 1.5m in height. Crown touching neighboring tree. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	3.6
830	Yes	On-site	Western redcedar	*Thuja plicata*	62	70	6	Single stemmed, large, co-dominant mature coniferous tree. Buttressed roots. Pruning marks at first quarter of its trunk. Limb attachments at 2m in height. Crown development towards the eastwards. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	3.8
832	Yes	On-site	Western redcedar	*Thuja plicata*	60	30	3	Single stemmed, medium, co-dominant mature coniferous tree. Enlarged base. Limb attachments at 2.2m in height. Crown touching the neighboring tree. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	3.6
833	Yes	On-site	Western redcedar	*Thuja plicata*	35	65	9	Single stemmed, large, co-dominant mature deciduous tree. Enlarged base. Limb attachments at 1.5m in height. Slight lean. Crown development was observed to be dominant. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	2.1
834	Yes	On-site	Western redcedar	*Thuja plicata*	35	65	9	Single stemmed, large, co-dominant mature deciduous tree. Enlarged base. Limb attachments at 2m in height. Slight lean. Crown development was observed to be dominant. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	2.1

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
835	Yes	On-site	Red alder	*Alnus rubra*	58/60	N/A	N/A	Subject tree was examined to be dead standing.	Subject tree is a dead standing tree and will be in direct conflict with the proposed lot grading & site servicing requirements.	Unsuitable	Remove	N/A
836	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	10/11 10	35	7	Multi stemmed, small, co-dominant mature deciduous tree. Enlarged base. Limb attachments from the base. Crown development was examined to be touching the neighboring trees. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	1.9
837	Yes	On-site	Red alder	*Alnus rubra*	48	30	3	Single stemmed, medium, mature deciduous tree. Limb attachments at 1m. Crown growth facing the south. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.9
838	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	42	40	7	Single stemmed, large, co-dominant mature deciduous tree. Enlarged base. Limb attachments at 3m in height. Slight lean. Crown development was observed to be in contact with the neighboring trees. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.6
839	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	20/12 6	35	7	Multi stemmed, small, co-dominant mature deciduous tree. Enlarged base. Limb attachments from the base. Crown development was examined to be touching the neighboring trees. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal / Unsuitable	Retain	2.3
840	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	60/80 38	40	7	Multi stemmed, small, co-dominant mature deciduous tree. Enlarged base. Limb attachments from the base. Slight lean. Crown development in contact with the neighboring trees. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	9.0

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
841	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	13/11 10	30	7	Multi stemmed, small, co-dominant mature deciduous tree. Enlarged base. Limb attachments from the base. Slight lean. Crown development was observed to be in contact with the neighboring trees. No signs of decay. Subject tree is in fair condition	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal / Unsuitable	Retain	2.1
842	Yes	On-site	Red alder	*Alnus rubra*	40	30	3	Single stemmed, medium mature deciduous tree. Due to phototropics, a supressed and an influenced growth form of the subject tree was observed. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.4
859	Yes	On-site	Western redcedar	*Thuja plicata*	138	45	7	Single stemmed structured overall growth form. Large, co-dominant, and mature coniferous tree. The overall growth of the canopy was observed to be dominant. Overall crown was observed to be healthy. Subject tree is in fair to good condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Suitable / Marginal	Remove	8.3
860	No	On-site	Western redcedar	*Thuja plicata*	50	70	7	Single stemmed, large & co-dominant, and mature coniferous tree. The overall growth of the canopy was observed to have been influenced by surrounding trees. Subject tree is in fair to good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing and lot grading works.	Suitable / Marginal	Retain	3.0
861	No	On-site	Western redcedar	*Thuja plicata*	78	70	7	Single stemmed, large & co-dominant, and mature coniferous tree. The overall growth of the canopy was observed to have been influenced by surrounding trees. Subject tree is in fair to good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing and lot grading works.	Suitable / Marginal	Retain	4.7
864	Yes	On-site	Western redcedar	*Thuja plicata*	42	70	7	Single stemmed, large & co-dominant, and mature coniferous tree. The overall growth of the canopy was observed to have been influenced by surrounding trees. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	2.6
865	Yes	On-site	Western redcedar	*Thuja plicata*	109	70	7	Single stemmed, large & co-dominant, and mature coniferous tree. The overall growth of the canopy was observed to have been influenced by surrounding trees. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	6.6

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
866	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	56	40	6	Single stemmed structure with the growth of multiple scaffold stems and leaders forming its overall canopy. Large, co-dominant and mature deciduous tree. The overall growth of its canopy was observed to have a sweep towards the east. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	3.4
867	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	76	50	7	Single stemmed structure with the growth of multiple scaffold stems and leaders forming its overall canopy. Large, co-dominant and mature deciduous tree. The overall growth of its canopy was observed to have a sweep towards the east. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	4.6
868	Yes	On-site	Western redcedar	*Thuja plicata*	86	70	6	Single stemmed structure. Large, co-dominant and mature growth form of a coniferous tree. The overall growth of the tree was observed to have an overall growth form influenced by adjacent trees within the stand. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	5.2
869	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	92	30	10	Single stemmed structure with the growth of multiple scaffold stems and leaders forming its overall canopy. Large, co-dominant and mature deciduous tree. The overall growth of its canopy was observed to have a sweep towards the east. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	5.6
870	Yes	On-site	Western redcedar	*Thuja plicata*	115	70	8	Single stemmed structure. Large, co-dominant and mature growth form of a coniferous tree. The overall growth of the tree was observed to have an overall growth form influenced by adjacent trees within the stand. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	6.9
871	Yes	On-site	Red alder	*Alnus rubra*	51	N/A	N/A	Subject tree was examined to be dead standing.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Unsuitable	Remove	3.1

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
872	Yes	On-site	Red alder	*Alnus rubra*	60	75	8	Single stemmed, medium & mature deciduous tree. Due to phototropics & sunlight suppression, a supressed and influenced growth form of the subject tree was observed. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	3.6
873	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	40	70	11	Single stemmed structure with the growth of multiple scaffold stems and leaders forming its overall canopy. Large, co-dominant and mature deciduous tree. The overall growth of its canopy was observed to have a sweep towards the east. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	2.4
874	Yes	On-site	Red alder	*Alnus rubra*	48	45	5	Single stemmed, medium mature deciduous tree. Due to phototropics, a supressed and influenced growth form of the subject tree was observed. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	2.9
875	Yes	On-site	Western redcedar	*Thuja plicata*	50/16	70	6	Bifurcated stemmed growth form. Large, co-dominant, and mature coniferous tree. The overall growth of the tree was observed to have an overall growth form influenced by adjacent trees within the stand. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	4.0
876	Yes	On-site	Western redcedar	*Thuja plicata*	51	60	5	Bifurcated stemmed growth form. Large, co-dominant, and mature coniferous tree. The overall growth of the tree was observed to have an overall growth form influenced by adjacent trees within the stand. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	3.1
877	Yes	On-site	Western redcedar	*Thuja plicata*	28/60 100	N/A	N/A	Subject tree was examined to be dead standing.	Subject tree was examined to be dead standing and will be in direct conflict with the proposed lane and of its construction requirements.	Unsuitable	Remove	N/A

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
878	Yes	On-site	Western redcedar	*Thuja plicata*	43/100	60	6	Mature and dominant overall growth form. Bifurcated stemmed growth form. The overall growth of the tree was observed to have an overall growth form influenced by adjacent trees within the stand. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	8.6
879	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	17/40	30	5	Bifurcated structured overall growth form. The growth of multiple scaffold stems and leaders forming its overall canopy was observed. The overall growth of its canopy was observed to have a sweep towards the east. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	3.5
880	Yes	On-site	Western hemlock	*Tsuga heterophylla*	45	25	4	Single stem large dominant conifer tree. Buttressed roots. Limb attachments at 2.7m. Pruning marks along the trunk. Crown intermingling with neighbor tree. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.7
881	Yes	On-site	Western redcedar	*Thuja plicata*	100	70	9	Mature and dominant overall growth form was observed. Single stemmed structured overall growth form. The overall growth of the crown was observed to be healthy. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	6.0
882	Yes	On-site	Western redcedar	*Thuja plicata*	48	70	9	Single stemmed overall growth form. The overall growth of the subject tree was observed to have a smaller diameter. The overall growth of its canopy was observed to be limited and influenced by adjacent trees. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal / Unsuitable	Retain	2.9
883	Yes	On-site	Western redcedar	*Thuja plicata*	37	70	9	Single stemmed overall growth form. The overall growth of the subject tree was observed to have a smaller diameter. The overall growth of its canopy was observed to be limited and influenced by adjacent trees. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.3

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
884	Yes	On-site	Western redcedar	*Thuja plicata*	12/226	70	6	Multi stemmed structured overall growth form. The overall growth of its canopy was observed to be limited and influenced by adjacent trees. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.4
0818	Yes	On-site	Western redcedar	*Thuja plicata*	95	70	8	Mature and dominant overall growth form was observed. Single stemmed structured overall growth form. The overall growth of the crown was observed to be healthy. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	5.7
0793	Yes	On-site	Western redcedar	*Thuja plicata*	59	70	6	Single stemmed overall growth form. The overall growth of the subject tree was observed to have a medium sized diameter. The overall growth of its canopy was observed to be limited and influenced by adjacent trees. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	3.6
0744	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	104	50	10	Single stemmed structure with the growth of multiple scaffold stems and leaders forming its overall canopy. Large, co-dominant and mature deciduous tree. The overall growth of its canopy was observed to have a sweep towards the east. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	6.3
0746	Yes	On-site	Western redcedar	*Thuja plicata*	100	70	6	Mature and dominant overall growth form was observed. Single stemmed structured overall growth form. The overall growth of the crown was observed to be healthy. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	6.0
0665	Yes	On-site	Willow	*Salix*	34	75	6	Single stemmed structured overall growth form. The overall growth of the tree was observed to have a smaller sized growth form and overall crown spread. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	2.1

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
0748	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	104	50	15	Single stemmed structured growth form. Large, co-dominant, and mature deciduous tree. Growth of multiple scaffold stems and leaders had formed its overall canopy. The overall growth of its canopy was observed to have a sweep towards the east. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	6.3
886	Yes	On-site	Manitoba maple	*Acer negundo*	12/226	70	6	Multi stemmed structured overall growth from. Extended overall growth of the crown was observed. The canopy was examined to be healthy with no major defects and or signs of stress. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lot grading & site servicing requirements, and will be within the zone of the heaviest grading related requirements.	Marginal	Remove	2.4
658	Yes	On-site	Western redcedar	*Thuja plicata*	76	65	8	Mature and dominant overall growth form was observed. Single stemmed structured overall growth form. The overall growth of the crown was observed to be healthy. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	4.6
659	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	60	25	5	Co dominant structured overall growth form. The growth of multiple scaffold stems & leaders had been observed. Due to suppression from adjacent trees, an overall growth that had been influenced by surrounding trees had been observed. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	3.6
660	Yes	On-site	Red alder	*Alnus rubra*	40	30	5	Single stem co-dominant mature deciduous tree. Limb attachments at 2m in height. Crown development shared with an adjacent tree. Blackberry growth around its base. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal / Unsuitable	Remove	2.4
661	Yes	On-site	Red alder	*Alnus rubra*	20/24	40	6	Bifurcated stemmed, small, co-dominant mature deciduous tree. Buttressed roots. Limb attachments at 2m. Crown development next to the neighboring trees. Blackberry around its lower trunk. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	2.7

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
0832	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	18/20	40	6	Bifurcated stemmed, small, co-dominant mature deciduous tree. Buttressed roots. Limb attachments at 2m. Crown development next to the neighboring trees. Blackberry around its lower trunk. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	2.3
662	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	18/18	40	6	Bifurcated stemmed, small, co-dominant mature deciduous tree. Buttressed roots. Limb attachments at 2m. Crown development next to the neighboring trees. Blackberry around its lower trunk. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	2.2
663	Yes	On-site	Western redcedar	*Thuja plicata*	70	70	3	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Overall crown growth was observed to be supressed and limited. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	4.2
664	Yes	On-site	Western redcedar	*Thuja plicata*	70	70	3	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Overall crown growth was observed to be supressed and limited. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	4.2
665	Yes	On-site	Western redcedar	*Thuja plicata*	90	70	3	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Overall crown growth was observed to be supressed and limited. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	5.4
666	Yes	On-site	Western redcedar	*Thuja plicata*	60	70	3	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Overall crown growth was observed to be supressed and limited. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	3.6

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
667	Yes	On-site	Western redcedar	*Thuja plicata*	60/40	30	3	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Overall crown growth was observed to be supressed and limited. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	6.0
668	Yes	On-site	Bigleaf maple	*Acer macrophyllum*	40	40	6	Deciduous tree situated within a dense growing environment. The overall development of the crown was observed to have been influenced by adjacent trees. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	2.4
669	Yes	On-site	Western redcedar	*Thuja plicata*	70	65	7	Mature coniferous tree. Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Overall crown growth was observed to be supressed and limited. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities.	Marginal	Remove	4.2

5.1 OFF-SITE TREE INVENTORY

Table 2 - Off-site Tree Inventory

6618 180 & 6617 181 St, Surrey

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
OS1	Yes	Off-site	Western redcedar	*Thuja plicata*	60	60	7	Single stemmed, large and mature coniferous tree. The overall growth of the subject tree was observed to have developed in common with its species growth form. No major defects and or signs of stress were to be examined. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	3.6
OS2	Yes	Off-site	Red alder	*Alnus rubra*	60	30	8	Single stemmed co-dominant, mature deciduous tree. Limb attachments at 2m in height. Crown development was observed to be shared with adjacent trees. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	3.6
OS3	Yes	Off-site	Sitka spruce	*Picea sitchensis*	105	40	6	Single stemmed, large, mature co dominant coniferous tree. Buttressed roots. Limb attachments at 7m in height. Slender growth. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	6.3
OS4	Yes	Off-site	Bigleaf maple	*Acer macrophyllum*	91/44	40	6	Single stemmed, co-dominant, mature coniferous tree. Crown development was observed to be shared with adjacent trees. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the lot grading works and of the preparation of the swale.	Marginal	Retain	6.2
OS5	Yes	Off-site	Western redcedar	*Thuja plicata*	68	30	3	Single stemmed, medium, co-dominant, and mature coniferous tree. Enlarged base. Limb attachments at 3m in height. Crown was observed to be touching the adjacent trees. No signs of decay. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing work and of the construction works relating to the new driveway.	Marginal	Retain	4.1

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
OS6	Yes	Off-site	Western redcedar	*Thuja plicata*	60 (*Surveyed*)	65	5	Developing as part of a group. A single stemmed structured growth form was observed to have developed. The overall growth of its crown was examined to have developed in common with its species growth form. No other major defects and or signs of stress were to be examined. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing & lot grading works and of the preparation of the swale.	Marginal	Retain	3.6
OS7	Yes	Off-site	Western redcedar	*Thuja plicata*	60 (*Surveyed*)	50	7	Coniferous tree developing as part of a group. The overall growth of the tree was examined to have a single stemmed structured growth form. The overall development of the subject tree was examined to have been influenced by adjacent trees. Shared crown spread. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing & lot grading works and of the preparation of the swale.	Marginal	Retain	3.6
OS8	Yes	Off-site	Western redcedar	*Thuja plicata*	40 (*Surveyed*)	65	6	Developing as part of a group. The overall growth of the tree was examined to have a single stemmed structured growth form. The overall development of the subject tree was examined to have been influenced by adjacent trees. Shared crown spread. Subject tree is in fair to good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing & lot grading works and of the preparation of the swale.	Marginal	Retain	2.4
OS9	Yes	Off-site	Western redcedar	*Thuja plicata*	30 (*Surveyed*)	45	5	Smaller diameter tree developing as part of a group. The development of a single stemmed structured growth form was examined to have developed. Development of the tree was observed to have a supressed overall growth form. The overall crown was examined to be limited. Subject tree is in fair to good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing & lot grading works and of the preparation of the swale.	Marginal	Retain	1.8
OS10	Yes	Off-site	Western redcedar	*Thuja plicata*	40 (*Surveyed*)	75	6	Developing as part of a group. A single stemmed structured growth form was observed to have developed. The overall growth of its crown was examined to have developed in common with its species growth form. No other major defects and or signs of stress were to be examined. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing & lot grading works and of the preparation of the swale.	Marginal	Retain	2.4

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
OS11	Yes	Off-site	Western redcedar	*Thuja plicata*	30 (*Surveyed*)	70	6	Smaller diameter coniferous tree developing as part of a group. The overall growth of the tree was examined to have a single stemmed structured growth form. The overall development of the subject tree was examined to have been influenced by adjacent trees. Shared crown spread. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing & lot grading works and of the preparation of the swale.	Marginal	Retain	1.8
OS12	Yes	Off-site	Western redcedar	*Thuja plicata*	60 (*Surveyed*)	70	7	Subject tree was examined to have developed a single stemmed structured growth form. Its overall crown development was observed to have been influenced by adjacent trees. General sparseness was examined within its overall canopy. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing & lot grading works and of the preparation of the swale.	Marginal	Retain	3.6
OS13	Yes	Off-site	Western redcedar	*Thuja plicata*	50 (*Surveyed*)	70	7	The development of a single stemmed structured growth form was examined to have developed. Development of the tree was observed to have a supressed overall growth form. The overall crown was examined to be limited. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure. Arborist supervision will be required during the site clearing & lot grading works and of the preparation of the swale.	Marginal	Retain	4.1

5.2 CITY TREE INVENTORY

Table 3 - City Tree Inventory

6618 180 & 6617 181 St, Surrey

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
C1	Yes	City	Western redcedar	*Thuja plicata*	30/40 30	70	12	Multi stemmed, medium, co-dominant mature coniferous tree. Enlarged base. Limb attachments from the base. Crown was in examined to be in contact with the neighboring tree. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities. ***The city's authorization will be required for its removal.***	Marginal	Remove	3.6
C2	Yes	City	Western redcedar	*Thuja plicata*	12/12	80	4	Single stemmed, medium, co-dominant mature coniferous tree. Enlarged base. Limb attachments at 2m in height. Crown was examined to be in contact with the neighboring tree. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities. ***The city's authorization will be required for its removal.***	Marginal	Remove	1.5
C3	Yes	City	Western redcedar	*Thuja plicata*	12/12	80	4	Single stemmed, medium, co-dominant mature coniferous tree. Enlarged base. Limb attachments at 2m in height. Crown was examined to be in contact with the neighboring tree. No signs of decay. Subject tree is in fair condition.	Subject tree will be in direct conflict with the proposed lane and of its construction requirements & and will be within the zone of the heaviest site disturbance & grading related activities. ***The city's authorization will be required for its removal.***	Marginal	Remove	1.5

5.3 OFF-SITE/CITY TREE INVENTORY (*All Tree(s) Within 10m of the Off-site Civil Works*)

Table 4 - City/Off-site Tree Inventory (*All Tree(s) Within 10m of the Off-site Civil Works*)

Klimo & Associates Ltd.

February 13, 2024

6618 180 & 6617 181 St, Surrey

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
T1	Yes	City	Western redcedar	*Thuja plicata*	29	90	5	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Crown growth was observed to be heathy. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.8
T2	Yes	City	Redbud	*Cercis canadensis*	17/13	40	8	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	1.8
T3	Yes	City	Western redcedar	*Thuja plicata*	25	90	5	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Crown growth was observed to be heathy. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.5
T4	Yes	City	Redbud	*Cercis canadensis*	13/9	45	7	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	1.4
T5	Yes	City	Western redcedar	*Thuja plicata*	25	90	5	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Crown growth was observed to be heathy. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.5
T6	Yes	City	Redbud	*Cercis canadensis*	11/13	50	7	Multi stemmed structured overall growth from. Extended overall growth of the crown was observed. The canopy was examined to be healthy with no major defects and or signs of stress. Subject tree is in fair condition	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	1.5
T7	Yes	City	Western redcedar	*Thuja plicata*	26	90	5	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Crown growth was observed to be heathy. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.6
T8	Yes	City	Redbud	*Cercis canadensis*	20	40	6	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	1.2
T9	Yes	City	Western redcedar	*Thuja plicata*	26	90	5	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Crown growth was observed to be heathy. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.6

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
T10	Yes	City	Redbud	*Cercis canadensis*	16/18	60	7	Multi stemmed structured overall growth from. Extended overall growth of the crown was observed. The canopy was examined to be healthy with no major defects and or signs of stress. Subject tree is in fair condition	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.1
T11	Yes	City	Western redcedar	*Thuja plicata*	27	90	5	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Crown growth was observed to be heathy. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.7
T12	Yes	City	Western redcedar	*Thuja plicata*	46	60	8	Subject tree was examined to have a single stemmed structured overall growth form. Crown growth was observed to be healthy with no major defects and or signs of stress. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	2.8
T13	Yes	City	Pin oak	*Quercus palustris*	8/3/3	70	1	Newly established city tree. The overall growth of the tree was observed to have a single stemmed structured development. The overall growth of the crown was observed to have developed in common with its species. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.2
T14	Yes	City	Pin oak	*Quercus palustris*	11/3/3	70	1	Newly established city tree. The overall growth of the tree was observed to have a single stemmed structured development. The overall growth of the crown was observed to have developed in common with its species. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.2
T15	Yes	City	Pin oak	*Quercus palustris*	10/3/3	80	1	Newly established city tree. The overall growth of the tree was observed to have a single stemmed structured development. The overall growth of the crown was observed to have developed in common with its species. Subject tree is in good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	1.2
T16	Yes	Off-site	Scots pine	*Pinus sylvestris*	33	40	7	The overall growth of the tree was observed to have a single stemmed structured development with a slight basal lean towards the west. Main trunk develops into a multi stemmed structured growth form into its crown spread. Several stems were observed to have been pruned in the past. Subject tree is in fair to good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	2.0

ID#	Surveyed Y/N	On-site (ON) Off-site (OFF) City (C)	Common name	Botanical name	DBH (cm)	LCR (%)	Canopy (Dia. M)	Condition	Comments	Retention Suitability	Retain / Remove	TPZ (m)
T17	Yes	Off-site	Scots pine	*Pinus sylvestris*	41	60	8	The overall growth of the tree was observed to have a single stemmed structured development with a slight basal lean towards the west. Main trunk develops into a multi stemmed structured growth form into its crown spread. Several stems were observed to have been pruned in the past. Subject tree is in fair to good condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Suitable	Retain	2.5
T18	Yes	Off-site	Bigleaf maple	*Acer macrophyllum*	21	70	9	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	1.3
T19	Yes	City	Western redcedar	*Thuja plicata*	103	70	7	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	6.2
T20	Yes	City	Red alder	*Alnus rubra*	46	70	7	Native deciduous tree with a phototropic growth form. Single stemmed structured. The overall growth of the canopy was examined to be influenced by the growth of surrounding trees. Main stem was observed to have a basal lean. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.8
T21	Yes	City	Red alder	*Alnus rubra*	40	50	8	Native deciduous tree with a phototropic growth form. Single stemmed structured. The overall growth of the canopy was examined to be influenced by the growth of surrounding trees. Main stem was observed to have a basal lean. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.4
T22	Yes	City	Red alder	*Alnus rubra*	93/20	75	10	Mature, Native deciduous tree with a phototropic growth form. Single stemmed structured. The overall growth of the canopy was examined to be influenced by the growth of surrounding trees. Main stem was observed to have a basal lean. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	6.8
T23	Yes	City	Bigleaf maple	*Acer macrophyllum*	34	50	6	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	2.1
T24	Yes	Off-site	Bigleaf maple	*Acer macrophyllum*	60	60	10	Subject tree was examined to be developing as part of a group. Single stemmed structured overall growth form. Subject tree is in fair condition.	Place Tree Protection barriers to protect its trunk, roots, and structure.	Marginal	Retain	3.6

6.0 TREE RETENTION / REMOVAL RECOMMENDATIONS

A total of **seventy-nine (79) trees** have been found within the limits of the subdivision project and a total of **twenty-four (24) trees** have been found within 10m of the off-site civil works. Based upon the factors that include the pre-existing condition of the subject trees as detailed in the Tree inventory, and the proposed lot grading & civil requirements, the subject trees are proposed to be treated as follows.

TREE RETENTION

Pursuant to the "*Surrey Tree Protection Bylaw, 2006 No. 16100",* the following tree(s) are recommended for Retention as detailed in the Tree Inventory and recommendations as noted below. Information regarding specific recommendations can be found below each of the categorized point and further referenced within the attached Tree Management Plan and within the body of the Arborist report.

On-site & Off-site Tree(s) recommended for Retention,

- **Retained Tree(s)**
  For the duration of the subdivision project, **off-site trees #OS1, #OS2, #OS3, #OS4, #OS5, #OS6, #OS7, #OS8, #OS9, #OS10, #OS11, #OS12, #OS13, and on-site trees #861, #860, #842, #837, #841, #838, #836, #839, #840, #659, #883, #882, #884, #881, and #880** has been recommended to be retained throughout the subdivision process. As the protected trees were examined to be situated near the limits of the proposed construction and of its related works, the subject trees will require the placement of Tree Protection Barriers in order to protect their trunks, roots, and structures.
  The placement of Tree Protection Barriers would be required to be placed along their drip lines or to their specified measurements as outlined within the Tree Inventory (*TPZ Column*) or as per the attached Tree Management Plan and left throughout the duration of the subdivision project.

- **Any other off-site trees & plantings (*All Identified to be Non-Bylaw Sized*)**
  Although several off-site trees as well as existing hedging spanning along the lengths of the northern and southern site boundary lines were examined to be of non-by-law sized, it is the developer's responsibility to ensure that the subdivision does not adversely affect any neighbouring trees and or any other off-site hedging. To avoid a future civil matter, the non-bylaw sized trees, hedges, & any other off-site plantings are recommended to be respected and have measures to protect them throughout the development process. **(*If conflicts arise, it would be the developer's responsibility to obtain the necessary authorization from the neighbor(s)*)**

- **City/Off-site tree(s) Recommended to be retained during the off-site civil works**
  For the duration of the off-site civil works, **trees #T1, #T2, #T3, #T4, #T5, #T6, #T7, #T8, #T9, #T10, #T11, #T12, #T13, #T14, #T15, #T16, #T17, #T18, #T19, #T20, #T21, #T22, #T23, and #T24** has been recommended to be retained throughout the duration of the off-site civil works and of its related activities.
  As the protected trees were examined to be situated near the limits of the proposed civil works, the subject trees will require the continuous placement of Tree Protection Barriers in order to protect their trunks, roots, and structures (*Tree Protection Barriers to be placed along the leading edge or exposed areas facing the off-site civil works, please not that the barriers cannot trespass into the limits of private property*).

  - **Proposed Civil works occurring within the TPZ(s) of protected tree(s),**
    As part of the subdivision process, the proposed off-site site servicing requirements would occur outside of the limits of the **TPZ(s) of all off-site & city tree(s) captured within 10m of the proposed services path** (*path of the service connection has been proposed to occur along the center of 56 Ave*). As encroachment of the works are expected to occur along the edge of the protective areas of the retained trees, Arborist supervision will be required during the various stages of the site servicing related milestones in order to ensure the proper tree protection measures are in place and no further disturbances would occur within their protective areas.

Arborist Supervision Requirements - Site Clearing & Tree Removal Works

- **Removal of trees, bushes, vegetation etc. within the TPZ(s) of the retained tree(s)**
  Several on-site trees along with other bushes, overgrowth etc. are recommended to be removed under Arborist supervision as the site clearing work would encroach into the **TPZ(s) of trees #OS5, #OS6, #OS7, #OS8, #OS9, #OS10, #OS11, #OS12, #OS13, #860, and #861**. The remaining stumps are recommended to be either left in situ or grinded out. (*Please note: the remaining stumps cannot be pulled out by the excavator to ensure the retention of the retained trees*)

- **Removal of existing hardscapes & surrounding features,**
  As part of the demolition process, the existing hardscapes or any other structures encompassing within the **TPZ(s) of trees #860 and #861** has been proposed to be removed. In order to limit the amount of disturbance occurring within the TPZ(s) of the subject trees, the existing landscaping features and surrounding hardscapes located within their protected areas would have to be removed under Arborist supervision and no excavation machinery will be allowed to encroach into their TPZ(s) throughout the demolition & site clearing process.

Arborist Supervision Requirements - Lot Grading Works occurring near tree(s)

- **Grading related works occurring within the new lots,**
  Due to the proposed lot grading requirements, the current grades located along the lengths of the eastern P/L may be required to be manipulated within certain areas in order to allow for the construction of the new dwellings to be constructed. All grading related works occurring along the length of the eastern P/L and within the **TPZ(s) of trees #861, #860, #OS4, #OS5, #OS6, #OS7, #OS8, #OS9, #OS10, #OS11, #OS12, and #OS13** is required to be performed under the direct guidance and supervision of the project Arborist.

  - **Tree Protection Requirements/Remedial measures**
    In order to limit the amount of disturbance encroaching into the TPZ(s) of the subject trees, the line of excavation/grading (*exposed interface*) would be required to be remediated in order to avoid the desiccation of roots (*If roots are exposed*). Furthermore, the extent of the grading works is recommended to be limited in order to clear the TPZ(s) of the retained trees. No major excavation/grading would be allowed when encroaching into the TPZ(s) or near the TPB enclosures of the protected trees and no major compaction of their protective grades is to occur. During the works, no heavy equipment would be allowed to encroach into their TPZ(s) throughout the subdivision process.

- **Proposed swale (*by developer*)**
  The proposed swale running along the length of the site boundary lines of the new lots (*by developer*) will have to be prepared under Arborist supervision as the works would fall within the **TPZ(s) of trees #OS4, #OS5, #OS6, #OS7, #OS8, #OS9, #OS10, #OS11, #OS12, and #OS13.** The preparation of the grades in order to prepare the swale path is required to be completed with approvable methods (*determined at the time of the works*) that are the least invasive towards the protected trees and under the direction of the project Arborist.

Arborist Supervision Requirements - Lane Construction Works occurring within the TPZ(s)

- **Construction requirements for the new rear lane,**
  Encroachment of the proposed rear lane is expected to encroach into the **TPZ(s) of trees #OS5** and of other surrounding off-site non bylaw sized trees/plantings. Due to the encroachment, Arborist supervision will be required during the preparation and construction of the new rear lane. In order to limit the amount of disturbance occurring within the TPZ(s) of the subject trees, the construction of the lane is recommended to be constructed with methods that are approval to the project Arborist during the final stages of the design review.

- **Construction requirements for the new lane & Cul de Sac,**
  Encroachment of the proposed lane along with the construction of the Cul de Sac is expected to encroach into the **TPZ(s) of trees #836, #659, #883, and #880**. Due to the encroachment, Arborist supervision will be required during the preparation and construction of the new lane along with the Cul de Sac.
  In order to limit the amount of disturbance occurring within the TPZ(s) of the subject trees, the construction of the new lane and of its related road works is recommended to be constructed under the project Arborists supervision and their protected areas would have to be respected by remediating their interfaces facing along the edge of the new road by having no excavation machinery encroaching into their TPZ(s) throughout the construction process.

Management of Trees & Protection Requirements

- **Tree Removals**
  During the Removal and/or pruning of existing trees as identified on the landscape plan/Tree Management Plan, shall be undertaken or supervised by a certified arborist and performed in accordance with relevant Best Management Practices produced by ISA and ANSI A-300 Pruning Standards. All Tree work shall comply with all relevant City of Surrey Tree Bylaw.

- **Staging and storage of materials on site discussion (*General for all Trees*)**
  During the construction process, no storage or staging of materials, equipment, or debris can be placed within the TPZ of the protected Trees and or within their TPB enclosure. The proposed construction will require the storage and staging of its materials within the back yard area and will not be required to be placed towards any other areas within the property or near the protected Trees. In order to limit the potential disturbance within the TPZ of the protected Trees, no heavy equipment (If required) will be allowed to encroach, park, or traverse through their TPZ(s).

- **Removal of surrounding invasive growth / Site Clearing work**
  When clearing through the TPZ(s) of the retained trees, all clearing work as well as the grade preparation works are required to be performed by hand and no excavation machinery or any other heavy equipment would be allowed to encroach into their TPZ(s) throughout the clearing process. Larger stumps of removed vegetation are recommended to be either left in situ or grinded out. (*Please note: the remaining stumps cannot be pulled out by heavy machinery in order to ensure the protection of the retained trees*)

- **General Landscaping Methodology within TPZ(s)**
  General landscaping work is proposed and may occur within the TPZ of a few on-site trees. During the landscaping process, no fill and or soil can be deposited within its TPZ and any type of landscaping requiring extensive areas of poured concrete is not acceptable. Permeable surfaces can be placed on the original grade for hardscapes, all to be supervised and guided by an onsite Arborist.

  - As part of the landscaping process, a new wooden fence may be constructed along the lengths of the site boundary lines. The excavation for the main post holes will have to either be placed outside of the trees TPZ(s) or have the individual post holes excavated individually by hand. The new fencing is required to be installed without the use of continuous footings through the TPZ(s) of the retained trees.

  - Ensuring any fill within protected root zone of existing trees does not exceed 4" (10cm) depth of sandy loam will be required and also during the removal and/or pruning of existing trees as identified on the landscape Tree Management Plan, shall be undertaken only by a qualified arborist certified by the International Society of Arboriculture (ISA) and in accordance with relevant Best Management Practices produced by ISA. Tree work shall comply with all relevant City of Surrey Tree Bylaws.

TREE REMOVAL

Pursuant to the "*Surrey Tree Protection Bylaw, 2006 No. 16100*", the following tree(s) are recommended for removal as per the following sections or as detailed in the report.

On-site & City Tree(s) recommended for Removal,

- **Proposed Lot grading, servicing, & building envelope conflicts,**
  On-site trees #835, #834, #864, #830, #828, #827, #833, #832, #859, #865, #869, #866, #867, #871, #872, #874, #870, #873, #864, #886, and #0665 will be in direct conflict with the proposed subdivision as the subject tree would either fall within the footprints of the proposed subdivision (*proposed building envelope*) or would be in direct conflict with the site preparation & grading requirements along with other site servicing requirements occurring within the limits of the site. The subject trees would fall within an area of high disturbance requirements related to the subdivision project that would result in root loss & stability impacts.

  - **Removal of on-site non-bylaw sized trees**
    Several other on-site plantings & non bylaw sized trees located within the limits of the site has been recommended for removal due to conflicts with the site access and of the proposed subdivision. In combing their stems, none of the individual trees or mature shrubs had been identified to be "protected" as categorized in the City of Surrey Tree Bylaw.

- **Lane construction requirement conflicts**
  City tree #C1, #C2, #C3, & on-site trees #802, #801, #0665 #0746, #0744, #0793, #0818, #658, #877, #879, #876, #875, #878, #868, #829, #826, #825, #660, #661, #0832, #0748, #662, #663, #664, #665, #666, #667, #668, and #669 would be in direct conflict with the proposed subdivision as the subject trees would fall within the grading works of the proposed lane, boulevard works, and of other subdivision related activities such as the site servicing requirements occurring along the perimeter of frontage of the new lots. The subject trees fall within an area of high disturbance requirements related to the subdivision project that would result in root loss & stability impacts.

  - ***As trees #C1, #C2, and #C3 were examined to be situated on the city's property, the City of Surrey's (Parks) authorization will be required for their removal.***

7.0 SUMMARY OF TREE PRESERVATION BY TREE SPECIES:

On-site	**Alder and Cottonwood Tree(s)**			
	Tree Species	**Existing**	**Remove**	**Retain**
	Alder/Cottonwood (*Outside Riparian Area*)	9	0	2
	Alder/Cottonwood (*Within Riparian Area*)	0	0	0
	Total	**9**	**0**	**2**
	Deciduous Trees (*Excluding Alder and Cottonwood Tree(s)*)			
	Tree Species	**Existing**	**Remove**	**Retain**
	Bigleaf maple	17	11	6
	Manitoba maple	1	1	0
	Deciduous Subtotal	**18**	**12**	**6**
	Coniferous Tree(s)			
	Tree Species	**Existing**	**Remove**	**Retain**
	Western hemlock	1	0	1
	Western redcedar	34	28	6
	Coniferous Subtotal	**35**	**28**	**7**
	Deciduous & Coniferous Subtotal	**53**	**40**	**13**
	On-site Tree Totals			
	On-site Replacement Trees Proposed	**26**		
	Total On-site Retained & Replacement Trees	**79**		

Off-site	**Alder and Cottonwood Tree(s)**			
	Tree Species	**Existing**	**Remove**	**Retain**
	Alder/Cottonwood (*Outside Riparian Area*)	1	0	1
	Alder/Cottonwood (*Within Riparian Area*)	0	0	0
	Total	**1**	**0**	**1**
	Deciduous & Coniferous Trees (*Excluding Alder and Cottonwood Tree(s)*)			
	Tree Species	**Existing**	**Remove**	**Retain**
	Bigleaf maple	3	0	3
	Scots pine	2	0	2
	Sitka spruce	1	0	1
	Western redcedar	10	0	10
	Deciduous & Coniferous total	**16**	**0**	**16**
	Off-site Tree Totals	**16**	**0**	**16**
	Total Off-site Retained Trees	**16**		

City	**Tree Species**	**Existing**	**Remove**	**Retain**
	Park/City Lot Trees	17	0	17
	Boulevard Trees	6	3	3
	Total	**23**		**20**

8.0 TREE PRESERVATION SUMMARY

Surrey Project No: **N/A**

Address: **6618 180 & 6617 181 St, Surrey**

Registered Arborist: **Francis Klimo**

Date of Report/Revision: September 12, 2024

Arborist signature: Francis Klimo

All trees identified for removal, retention and/or replacement are subject to change prior to final approval of the Arborist report	
On-Site Trees	**Number of Trees**
Existing Bylaw Sized Trees	**63**
Proposed Removed Bylaw Trees	**48**
Proposed Retained Bylaw Trees	**15**
Total Replacement Trees Required: Alder & Cottonwood Trees Requiring 1 to 1 Replacement Ratio Removed — Subtotal 7 X 1 = 7 Alder & Cottonwood Trees Requiring 2 to 1 Replacement Ratio Removed — Subtotal 0 X 2 = 0 All other Trees Requiring 2 to 1 Replacement Ratio Removed — Subtotal 41 X 2 = 82	
Required Replacement Trees	**89**
Proposed Replacement Trees	**26**
Deficit of Replacement Trees	**63**
Total On-site Retained and Replacement Trees	**41**

Off-Site Trees	**Number of Trees**
Existing Bylaw Sized Trees	**13**
Proposed Removed Bylaw Trees	**0**
Proposed Retained Bylaw Trees	**13**
Total Replacement Trees Required: Alder & Cottonwood Trees Requiring 1 to 1 Replacement Ratio Removed — Subtotal 0 X 1 = 0 Alder & Cottonwood Trees Requiring 2 to 1 Replacement Ratio Removed — Subtotal 0 X 2 = 0 All other Trees Requiring 2 to 1 Replacement Ratio Removed — Subtotal 0 X 2 =	
Required Replacement Trees (*to be taken as Cash in Leu*)	**0**
Total Off-site Retained Trees	**0**

City Trees	**Existing**	**Removed**	**Retained**
Park/City Lot Trees	17	0	17
Boulevard Trees	6	3	3
Total	**23**	**3**	**20**

9.0 SITE PHOTOS

Photo 1 - Facing towards on-site trees #662 - #669

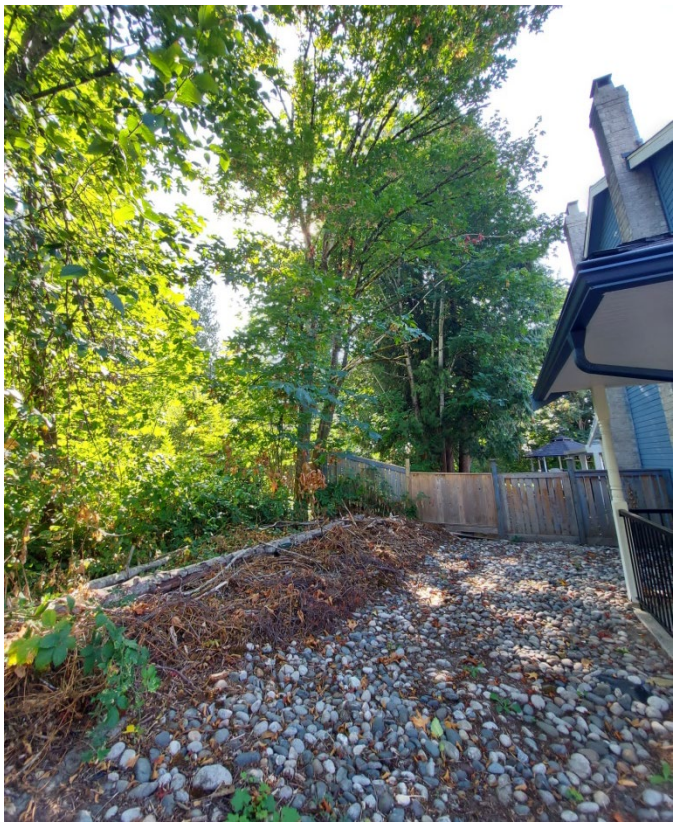


Photo 2 - Facing towards trees #662, #668, #664, and #667

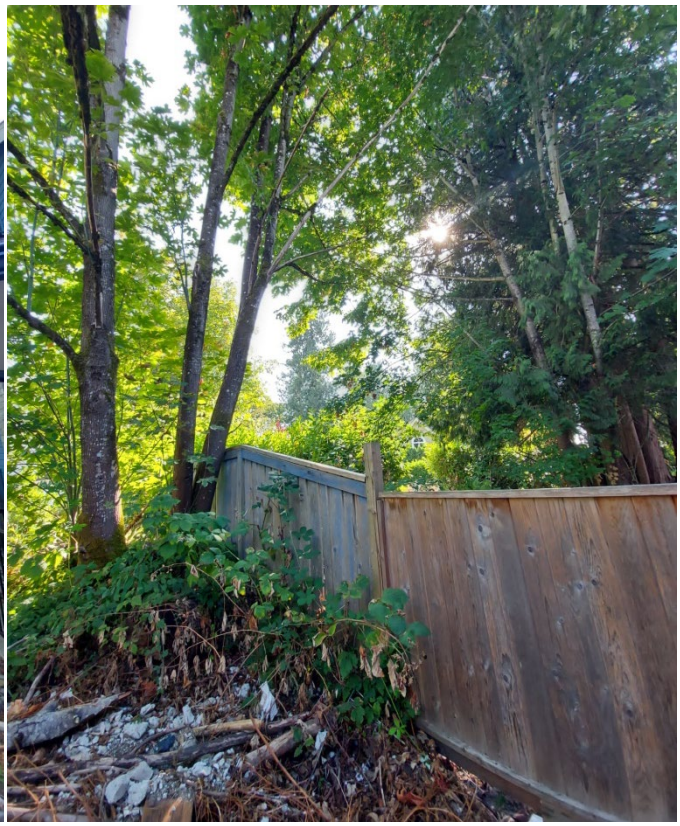


Photo 3 - Facing towards trees #801, #0818, #0793, #0746, and #0744

On-site Trees Situated within Lot #6618 181 St - Photos

Photo 4 - Facing towards the stand of trees encompassing within the eastern section of the lot 6617 181 St

Photo 5 - Facing towards trees #0744, #0746, #0793, and #0818

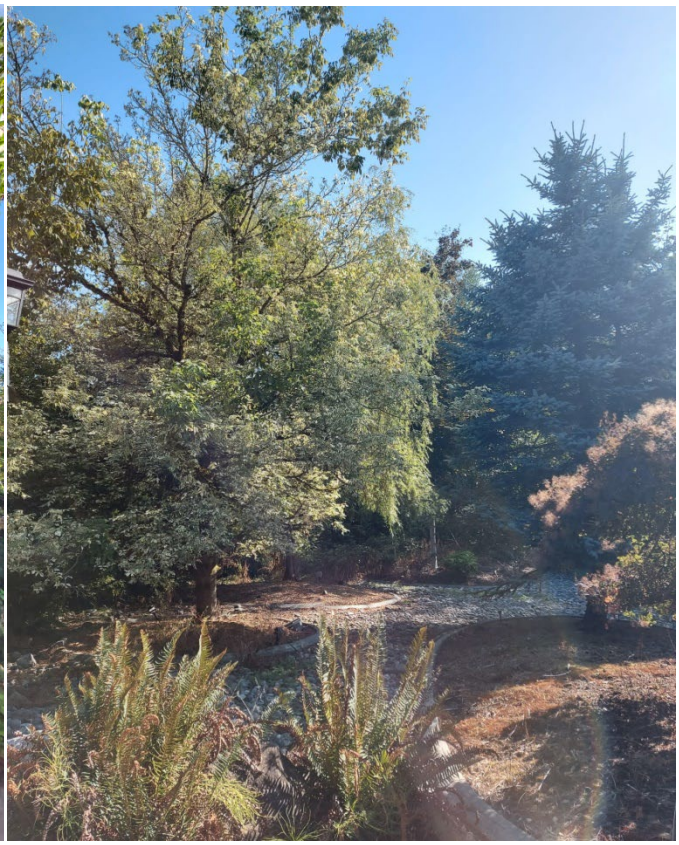


Photo 6 - Facing towards trees #884

On-site Trees #062 - #069, #832, & Off-site Trees - Photos

Photo 7 - Facing towards on-site trees #662 - #669

Photo 8 - Facing towards on-site tree #832

Photo 9 - Facing towards off-site trees #OS2 and #OS3

On-site Trees #874 - #883 - Photos

Photo 10 - Facing towards trees #880, #881, #882, and #883

Photo 11 - Facing towards trees #880 and #881

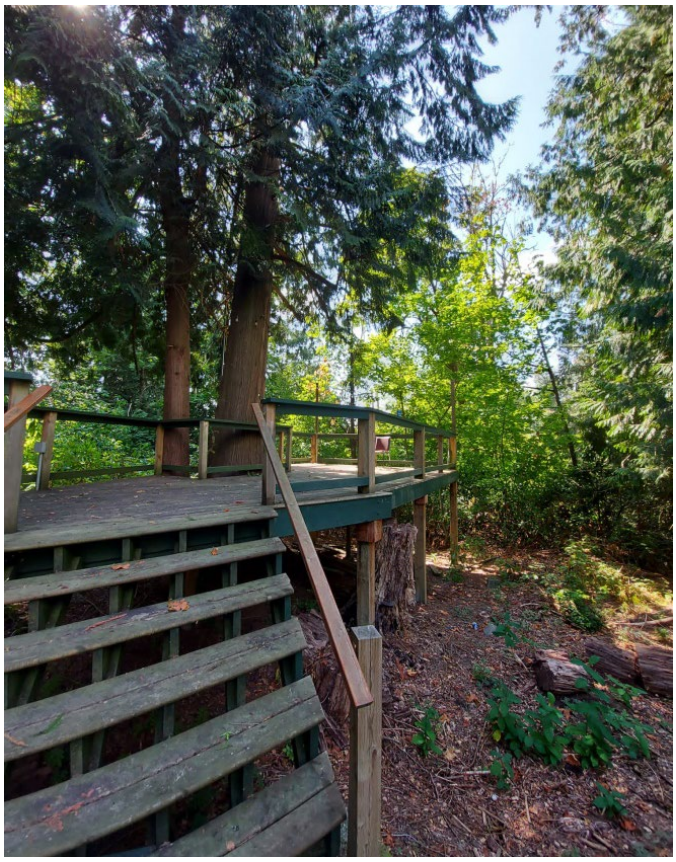


Photo 12 - Facing towards tree #875

Photo 13 - Facing towards trees #877, #876, and #874

On-site Trees Situated on Lot #6618 180 St - Photos

Photo 14 - Facing towards trees #859 and #860

Photo 15 - Facing towards on-site tree #827

Photo 16 - Facing towards on-site trees #825 and #659

On/Off-site Trees Situated Towards the Rear of Lot #6618 180 St - Photos

Photo 17 - Facing towards on-site trees #839, #840, #825, and #659

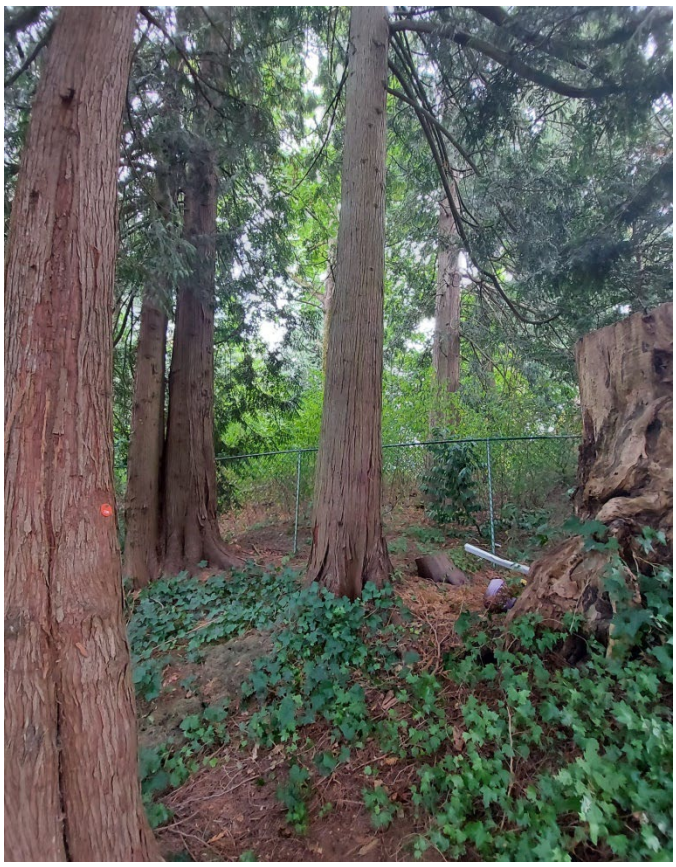


Photo 18 - Facing towards trees #827, #828, and#832

Photo 19 - Facing towards trees #843 and #848

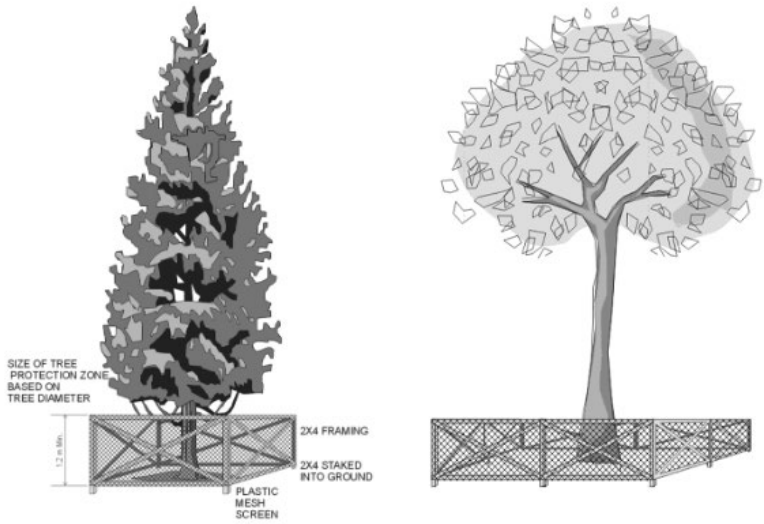
Photo 20 - Facing towards tree #OS4

10.0 TREE PROTECTION BARRIER

Tree Protection Barrier Summary		
Tree number (*Tag #*)	DBH (*cm*)	Minimum tree protection barrier Radial span (*m*)
As per the Tree Management Plan		

All trees identified above will require tree protection barriers to protect and prevent the tree trunk, branches and roots being damaged by any construction activities/operations. Prior to any construction activity on site, tree protection fences must be constructed at the specified distance from the tree trunks. The protection barrier or temporary fencing must be at least 1.2 m in height and constructed of 2 by 4 lumber with orange plastic mesh screening. Structure must be sturdy with vertical posts driven firmly into the ground. This must be constructed prior to excavation or construction and remain intact throughout the entire period of construction. Further standards for fencing construction can be found at: *Surrey Tree Protection Bylaw, 2006 No. 16100*

Page -3-



11.0 TREE REPLACEMENT PLAN

Outlined in the "*Surrey Tree Protection Bylaw, 2006 No. 16100*", the requirement for replacement Trees will be required based upon the Trees being cut or removed. Two (2) trees are to be planted for each permit-sized tree removed (2:1 ratio), except when the tree removed is a black cottonwood (*Populus trichocarpa*) or red alder (*Alnus rubra*), whereupon the replacement ratio is 1:1.

On-Site & Shared Trees (*Including city trees within proposed lanes*)	**Number of Trees**
Protected Trees Identified	**86**
Protected Trees to be Removed	**51**
Protected Trees to be Retained	**35**
Total Replacement Trees Required: Alder & Cottonwood Trees Requiring 1 to 1 Replacement Ratio 7 X one (1) = **7 Trees** All other Trees Requiring 2 to 1 Replacement Ratio 44 X two (2) = **88 Trees**	**7 Trees** **88 Trees**
Total Replacement Trees required	**95**
Replacement Trees Proposed	**26**
Replacement Trees for Cash in leu	**69**

Tree Replacement Species		
Planting(s) should be scheduled for the late winter/ early spring or early fall		
Quantity	Name	Species
13	Ironwood	*Parrotia persica*
13	Nootka cypress	*Chamaecyparis nootkatensis*

Please see map for location Note: Planting cannot be within 3 meters of another significant tree

General Tree Planting Methodology

Replacement trees must meet plant condition and structure requirements as stated in "BC Landscape Standard" of the BCSLA/BCLNA and "Canadian Standards for Nursery Stock" of the CNTA. Also, the Replacement trees must be planted and maintained according to the requirements as stated in the "BC Landscape Standard" of the BCSLA.

It is important to locate your new plantings in accordance with the species' growing habits or tendencies. It is crucial to avoid planting your trees alongside buildings in which root ingress into drainage systems can occur and this can result in costly remedial work, also it is good practice not to plant your tall growing trees under power lines or utility lines as this can lead to pruning that may grossly adulterate the overall form or shape of the tree. Planting trees in the right location is the key to sustaining a balanced urban forest.

The proposed replacement Trees are to be a minimum size of 6cm caliper if deciduous, which is measured at 15 cm above the ground, or 3 m tall if coniferous at the time of planting (*trunk width measured at 15 centimetres above the ground*) At least 1.0 metre away from any site boundary line, at least 3.0 metres away from any principle building or any accessory building or any other structure on or adjacent to the site that may adversely affect the tree and; at least 2.5 metres away from any other tree on or adjacent to the site including driveway or any other hardscape or underground service/utility lines.

12.0 CONCLUSIONS

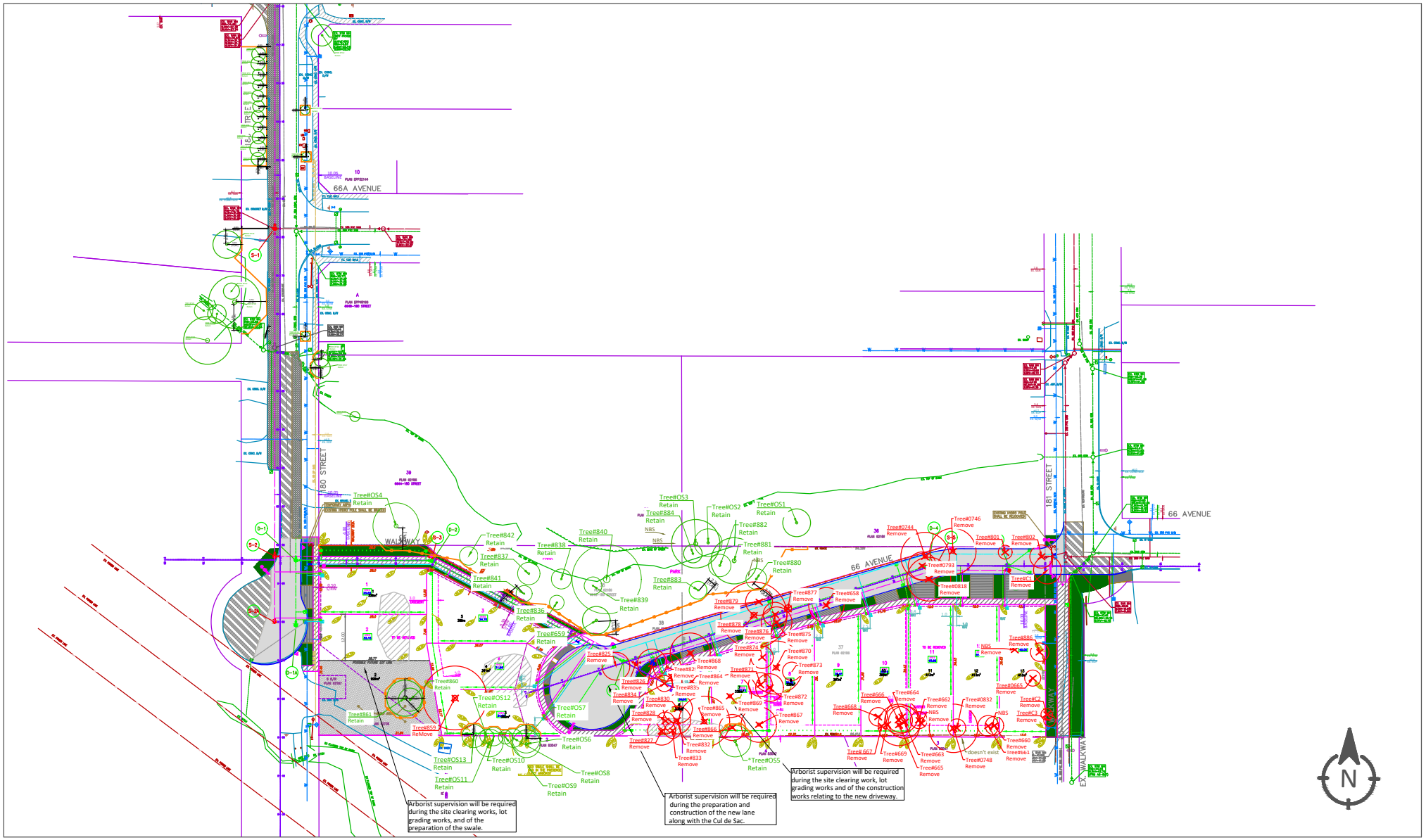
Based upon our findings, a total of **seventy-nine (79) trees** have been identified within the limits of the proposed subdivision and a total of **twenty-four (24) trees** within 10m of the off-site civil works. A total of **fifty-one (51) trees** have been recommended for removal due to conflicts with the proposed subdivision and as the subject trees had fallen within the high disturbance requirement areas relating to the site servicing, boulevard, and other construction related activities occurring within the limits of the site.

A total of **twenty-eight (28) on/off-site trees** and including all **twenty-four (24) of the off-site trees** within 10m of the off-site civil works have been recommended for retention with the requirement of erecting Tree Protection Barriers due to their close proximity towards the proposed construction working limits. Also, in order to ensure the retained trees and of their protection throughout the duration of the construction process, Trigger points have been identified on the Tree Management Plan requiring, Arborist supervision when working inside of their TPZ(s) during a few of the construction milestones.

Thank you for choosing Klimo & Associates Ltd. Any further questions can be forwarded to Francis Klimo at (604)358-5562 or by email at klimofrancis@gmail.com

Regards,

Francis Klimo
ISA Certified Arborist #PN-8149A
ISA Certified Tree Risk Assessor (TRAQ)
BC Wildlife Danger Tree Assessor #7193



TREE MANAGEMENT PLAN

Project Number

Date	Sheet #
Scale 1:600	
Drawn	
Checked	

Francis R. Klimo
ISA Certified Arborist #PN-8149A
ISA Certified Tree Risk Assessor (TRAQ)
BC Wildlife Danger Tree Assessor #7193

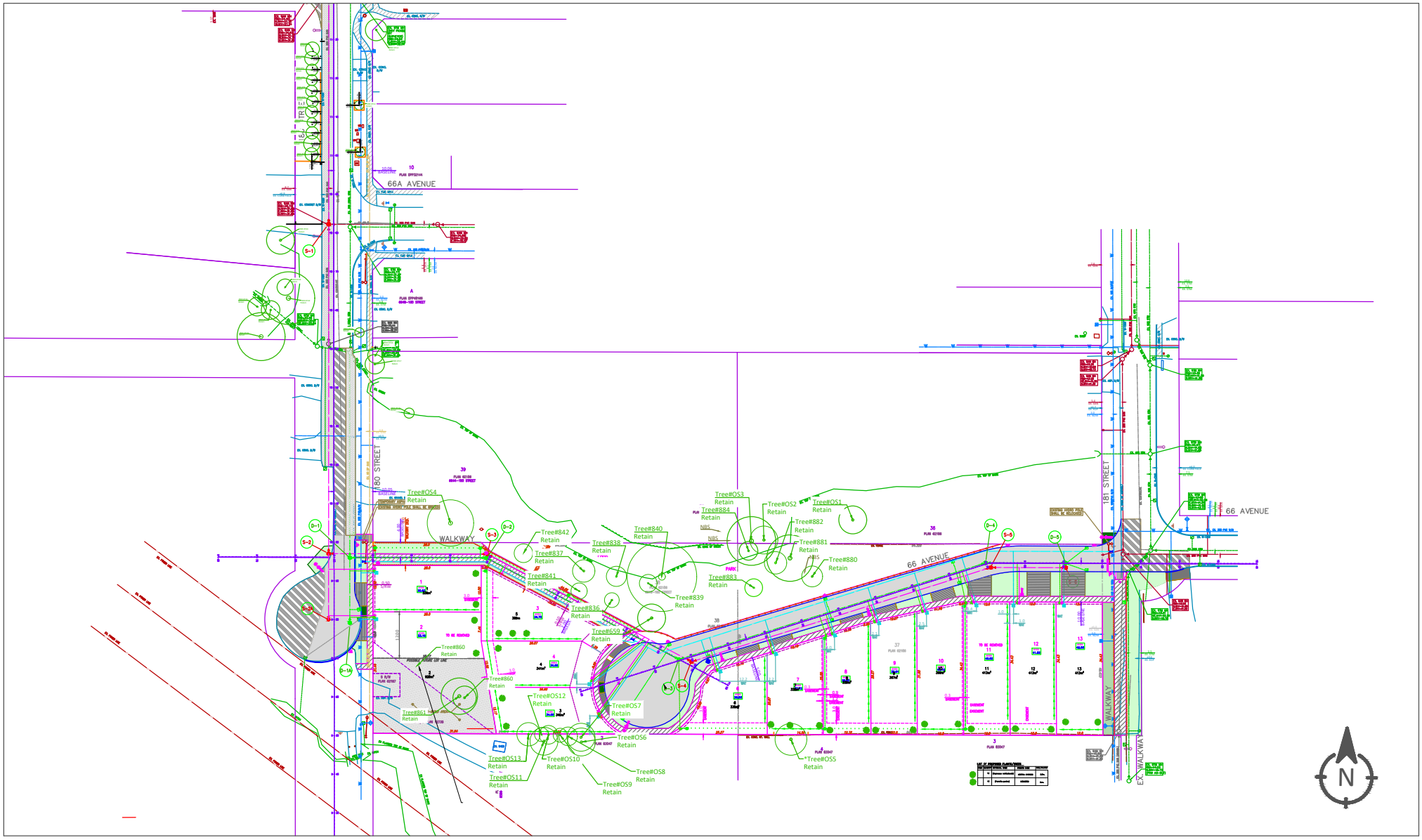
Revisions

No.	Date	
1		November 30, 2022
2		May 25, 2023
3		July 6, 2023
4		January 18, 2024
5		February 13, 2024
6		April 24, 2024

Consultants

6618 180 & 6617 181 St, Surrey.

Klimo & Associates



TREE REPLACEMENT PLAN

Project Number

Date

Sheet #

Scale 1:600

Drawn

Checked

Francis R. Klimo
ISA Certified Arborist #PN-8149A
ISA Certified Tree Risk Assessor (TRAQ)
BC Wildlife Danger Tree Assessor #7193

Revisions

No.	Date	
1		November 30, 2022
2		May 25, 2023
3		January 18, 2024
4		February 13, 2024
5		April 24, 2024

Consultants

6618 180 & 6617 181 St, Surrey.

Klimo & Associates