



Lewkovich Engineering Associates Ltd.
geotechnical • environmental, health & safety • materials testing

Insight Holdings Ltd.
c/o Sincana Land Corp
1 – 3179 Barons Road
Nanaimo, BC
V9T 5W5

File Number: F7511.01
Date: March 18th, 2020

Attention: Mr. Darwin Mahlum

PROJECT: PROPOSED MULTI-FAMILY DEVELOPMENT, NANAIMO, BC

- 5757 TURNER ROAD (LOT 11 – 3.425 ACRES);
- 6020 LINLEY VALLEY DRIVE (LOT 12 – 2.669 ACRES);
- 6010 LINLEY VALLEY DRIVE (LOT 13 – 2.218 ACRES);
- 6033 NELSON ROAD (LOT A - 5.36 ACRES)

SUBJECT: GEOTECHNICAL HAZARD ASSESSMENT

LEGAL ADDRESSES:

LOT 11, DISTRICT LOT 30, WELLINGTON DISTRICT, PLAN VIP65104
LOT 12, DISTRICT LOT 30, WELLINGTON DISTRICT, PLAN VIP65104
LOT 13, DISTRICT LOT 30, WELLINGTON DISTRICT, PLAN VIP65104
LOT A, DISTRICT LOT 30, WELLINGTON DISTRICT, PLAN 14190

Dear Mr. Mahlum:

1. INTRODUCTION

As requested, Lewkovich Engineering Associates Ltd. (LEA) has carried out a geotechnical assessment of the above referenced properties with respect to the proposed multi-family development. This report provides a summary of our findings and recommendations.

2. BACKGROUND

- a. We understand that the proposed development will consist of two (2) apartment buildings 4 to 6 storeys in height that will include below grade parking (parkade), as well as the creation of twenty (20) townhouse residential lots¹. The development will also include surface pavements, as well as the installation of associated on and off-site civil works and services.
- b. We understand that this will be a two step subdivision of land:
 - One; create Lots 1 to 3,
 - Two; after rezoning add in existing Lot A with new Lot 2 to create new Lots A and B

See attached Plans from Williamson and Associates, File 10254-28 “PLA/SUBDIVISION – PHASE 1 and File 10254-20, “PLA/SUBDIVISION – PHASE 2

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- c. We examined the Official Community Plan (OCP) to determine whether the proposed development lies within any Environmentally Sensitive Area (ESA), Natural Hazard Area (NHA) or Development Permit Area (DPA). The OCP indicates that there is a wetland to the south of the subject site, as well as a watercourse (Molecey Creek) drawing from the wetland that bisects the lower portion of each property; which places the development property within a Development Permit Area DPA1 “Watercourses” (Form and Character).

3. ASSESSMENT OBJECTIVES

Our assessment, as summarized within this report, is intended to meet the following objectives:

- i. Determine whether the property is considered safe for the use intended (defined for the purposes of this report as a multi-family development), with the probability of a geotechnical failure resulting in property damage of less than:
 - 2% in 50 years for geotechnical hazards due to seismic events, including slope stability; and,
 - 10% in 50 years for all other geotechnical hazards.
- ii. Identify any geotechnical deficiency that might impact the design and construction of the development, and prescribe the geotechnical works and any changes in the standards of the design and construction of the development that are required to ensure the land, buildings, and works and services are developed and maintained safely for the use intended.
- iii. Acknowledge that Approving and/or Building Inspection Officers may rely on this report when making a decision on applications for the development of the land.

4. ASSESSMENT METHODOLOGY

- a. Our assessment included a desktop review of relevant background information, including,

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aerial photographs, topography and geology mapping, as well as previous soil investigations completed by LEA within the vicinity of the subject area. We have also referenced the EGBC, Guidelines for Legislated Landslide Assessments for proposed residential developments in BC, May 2010 in the preparation of this report.

- b. A site reconnaissance was conducted on September 19, 2019 to visually assess current site conditions. A subsurface investigation was not carried out due to access constraints (large trees).

5. SITE CONDITIONS

5.1 General

- a. This report speaks to four (4) properties that are all part of the development, namely: 5757 Turner Road (**Lot 11**), 6010 Linley Valley Drive (**Lot 13**), 6020 Linley Valley Drive (**Lot 12**), and 6033 Nelson Road (**Lot A**).
- b. The proposed development is located in the northwest region of the City of Nanaimo and is situated between Linley Valley Drive, Turner Road, and Nelson Road (See Figure 1).



Figure 1: Site Location

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- c. The terrain across each property varies. Satellite imagery (Google Earth LIDAR) indicates approximately 25m of vertical relief in a southwest direction across the whole development (all properties) starting from the northeast corner. Lots 11 and 12 have approximately 5m of vertical relief declining the same southwesterly direction. Lot 13 is slightly steeper with approximately 15m of vertical relief in a southwest/ southerly direction. Lot A is the steepest of the properties, with an estimated vertical relief of approximately 25m in a south/ southwesterly direction with the lowest elevation closest to the wetland area to the south. A steep rock slope with sections up to 45° was observed in throughout the southeast quadrant of Lot A (See Figure 3).

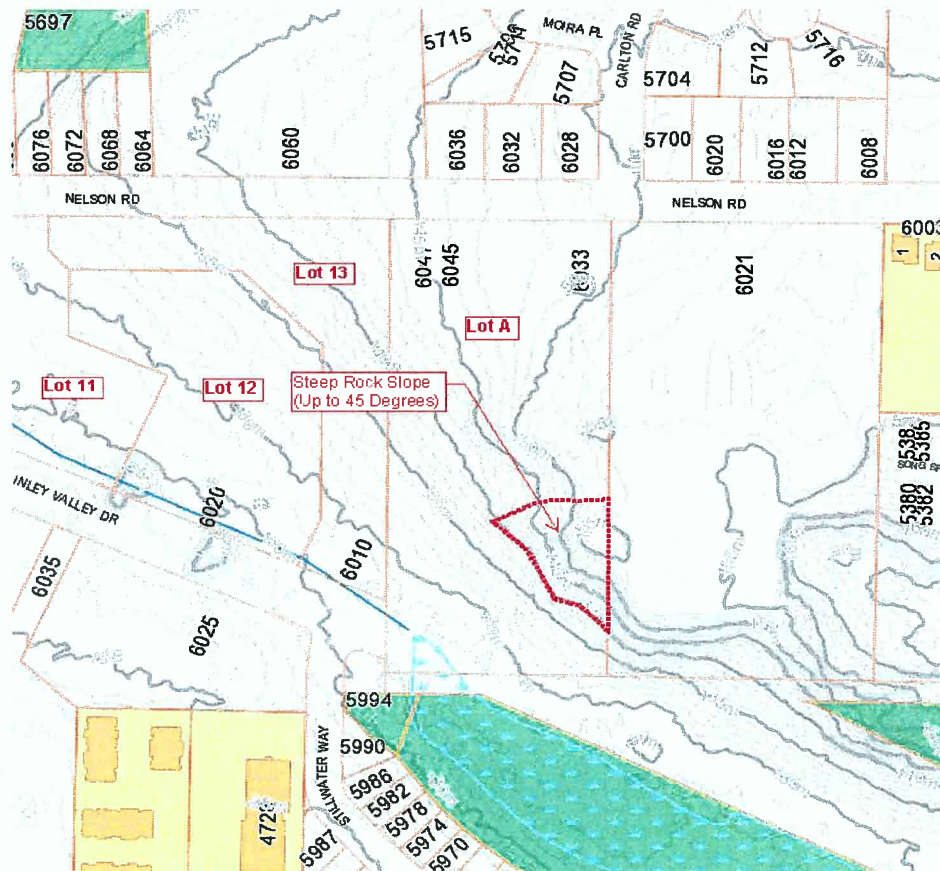


Figure 3: Steep Rock Slope Location

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- d. With the exception of the two (2) existing single-family residences situated throughout the northern extent of Lot A, and the utility corridor spanning across the southern portion of Lots 11 and 12, the properties are all undeveloped and generally covered with dense vegetation including: immature to mature coniferous/ deciduous trees, and low-lying vegetations (ferns, blackberries, tall grasses).
 - e. The properties are all bisected by Molecey Creek along the southern boundary. Creek flows emanate from the wetland area at the southern extent of Lot A and draw into north westerly direction before entering a storm sewer system (headwall) at the northwest corner of Lot 11.

5.2 Soil Conditions

- a. A subsurface investigation was not conducted as part of this assessment. LEA has conducted a desktop review of the local soil conditions at other projects in the immediate vicinity. LEA was recently involved with the subdivision construction of the surrounding lands, as well as the construction of a private road near the existing roundabout at the Turner Road/Linley Valley Drive intersection. The recent road construction also included the installation of associated civil works and services. Additionally, we are involved with the current construction phase of the La-Z-Boy development to the immediate south.
- b. In general, the soils encountered during the development of other projects to the immediate south consist of thin topsoil, underlain by compact to dense sands and gravels (or similar), underlain by very dense silty sand (glacially consolidated), underlain by igneous bedrock.
- c. Our desktop field reconnaissance noted outcrops of bedrock throughout Lot A and some throughout Lot 13. Bedrock was not observed throughout the remaining lots; however, our involvement with other projects in the vicinity notes that the bedrock profile dips deeper towards the west/ southwest resulting in thicker mantles of glacially consolidated soils (glacial till).

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5.3 Groundwater

- a. A shallow perched groundwater table is typically present during the “wet” season in this area. We expect that this seasonal perched condition will be directly related to the volume and frequency of storm events.
- b. Groundwater levels can be expected to fluctuate seasonally with cycles of precipitation. Groundwater conditions at other times and locations can differ from those observed at the time of our assessment.

6. CONCLUSIONS & RECOMMENDATIONS

6.1 General

From a geotechnical point of view, the land is considered safe for the use intended (defined for the purposes of this report as a multi-unit development), with the probability of a geotechnical failure resulting in property damage of less than:

- 2% in 50 years for geotechnical hazards due to seismic events, including slope stability; and,
- 10% in 50 years for all other geotechnical hazards.

The site is neither subject to nor in the vicinity of catastrophic events such as landslip, flooding, liquefaction or debris/mudflows. Details of the subsurface soils for design purposes, should be determined prior to the detailed design stage utilizing a series of test pits or boreholes to refusal.

6.2 Steep Slopes and Setbacks

Lot A possesses a steep rock slope throughout the southeast quadrant that orientates in a northwest/ southeast direction. The inclination of the rock slope is approximately 35°, with steeper sections up to 45°. The referenced conceptual layout indicates that no building will

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be sited on or within proximity to the steep slope as the area may be part of the proposed park dedication. There are no other areas across the development property that possess steep slopes (>26°); therefore, no setbacks are required. We understand that there are aquatic setbacks from Molecey Creek; of 7.5m for Lots 11 to 13 and 15m setback for Lot A. See attached Appendix D Landslide Assessment Assurance Statement.

6.3 Seismic Considerations

The desktop review indicates no liquefiable soils are present within the proposed development areas. Based on the 2018 British Columbia Building Code, Division B, Part 4, Table 4.1.8.4.A, "Site Classification for Seismic Site Response," the founding soils would be classified as "Site Class C" (Very Dense Soil or Soft Rock). This should be confirmed prior to detailed design stage with a field investigation utilizing testpits and boreholes once the site development areas are cleared to allow equipment access.

8. ACKNOWLEDGEMENTS

Lewkowich Engineering Associates Ltd. acknowledges that this report may be requested by the building inspector (or equivalent) of the City of Nanaimo as a precondition to the issuance of a building or development permit. It is acknowledged that the Approving Officers and Building Officials may rely on this report when making a decision on application for development of the land. We acknowledge that this report has been prepared solely for, and at the expense of the Insight Holdings Ltd. We have not acted for or as an agent of the City of Nanaimo in the preparation of this report.

9. LIMITATIONS

The conclusions and recommendations submitted in this report are based upon the information from a visual reconnaissance of the property and a review of the available desktop information. The recommendations given are based on the anticipated subsurface soil conditions, current construction techniques, and generally accepted engineering

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practices. No other warrantee, expressed or implied, is made. If unanticipated conditions become known during construction or other information pertinent to the structure becomes available, the recommendations may be altered or modified in writing by the undersigned.

10. CLOSURE

Lewkowich Engineering Associates Ltd. appreciates the opportunity to be of service on this project. If you have any comments, or additional requirements at this time, please contact us at your convenience.

Respectfully Submitted,
Lewkowich Engineering Associates Ltd.

A blue ink signature of John Hessels, written in a cursive style.

John Hessels, ASCT
Senior Technologist



Chris Hudec, M.A.Sc., P.Eng.
Senior Project Engineer

Attachments:

1. EGBC, Appendix D - Landslide Assessment Assurance Statement
2. dHKarchitects drawing titled "*Site Location Plan, Molecey Creek Development*" drawing No. A1, Page 1 of 8, dated August 13, 2019";
3. Williamson & Associates Professional Surveyors drawing titled "PLA/ Subdivision – Phase 1, Molecey Creek Corridor" file No. 10254-28, sheet 1 of 1, dated October 11, 2018.
4. Williamson & Associates Professional Surveyors drawing titled "PLA/ Subdivision – Phase 2, Molecey Creek Corridor" file No. 10254-21, sheet 1 of 1, dated October 11, 2018.

References:

1. British Columbia Geological Survey (BCGS) Online Geoscience Map
2. EGBC, Guidelines for Legislated Landslide Assessments for proposed residential developments in BC, May 2010

APPENDIX D: LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

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: March 20, 2020 File# F7511

City of Nanaimo

455 Wallace Street, Nanaimo, BC V9R 5J6

Jurisdiction and address

With reference to (check one):

- Land Title Act (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
- British Columbia Building Code 2006 sentences 4.1.8.16 (8) and 9.4 4.4.(2) (Refer to BC Building and Safety Policy Branch Information Bulletin B10-01 issued January 18, 2010)

For the Property: LOT 11, PLAN VIP65104, LOT 12, PLAN VIP65104, LOT 13, PLAN VIP65104, DISTRICT LOT 30, WELLINGTON DISTRICT; 5757 Turner, 6020 Linley Valley, 6010 Linley Valley

Legal description and civic address of the Property

LOT A, DISTRICT LOT 30, WELLINGTON DISTRICT, PLAN 14190, 6033 Nelson

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 the 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
- 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)

I hereby give my assurance that, based on the conditions^[1] contained in the attached *landslide assessment* report,

Check one

- 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.
- without any registered covenant.

- 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, 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, as required by the Local Government Act (Section 910), "the land may be used safely for the use intended".

Chris Hudec, M.A.Sc., P.Eng.

Name (print)

Signature

March 20, 2020

Date

^[1] 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 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".

1900 Boxwood Road, Nanaimo, BC, V9S 5Y2

Address

250 756 0355

Telephone



(Affix Professional seal here)

If the *Qualified Professional* is a member of a firm, complete the following.

I am a member of the firm Lewkowich Engineering Associates Ltd.

and I sign this letter on behalf of the firm.

(Print name of firm)

PROJECT DATA

CIVIC ADDRESS:
 LEGAL DESCRIPTION:
 LOT 13, DISTRICT LOT 30, WELLINGTON DISTRICT, PLAN VIP65104
 LOT A, DISTRICT LOT 30, WELLINGTON DISTRICT, PLAN 14190
 LOT 12, DISTRICT LOT 30, WELLINGTON DISTRICT, PLAN VIP65104

CURRENT ZONING: R1 SINGLE DWELLING RESIDENTIAL
 R6 TOWNHOUSE RESIDENTIAL

PROPOSED ZONING: R8 MEDIUM DENSITY RESIDENTIAL

OCP LAND USE DESIGNATION: CORRIDOR

OVERALL DENSITY:
 PROPOSED: 77 UNITS / HECTARE
 OCP TARGET: 50 - 150 UNITS / HECTARE

TOTAL SITE AREA: +/- 18,682 m² [1.87 HECTARES]

PROPOSED SITE COVERAGE:
 PROPOSED: 19.8% [3,703.3 m²]
 ALLOWABLE R8 ZONE: 40%

POTENTIAL TOTAL FLOOR AREA:
 PROPOSED: +/- 17,287 m² [+/- 186,076 ft²] = 0.93 F.A.R.
 ALLOWABLE R8 ZONE: +/- 23,352 m² [+/- 251,358 ft²] = 1.25 F.A.R.

BUILDING HEIGHT:
 PROPOSED: 6 STOREYS RESIDENTIAL OVER TWO STOREY TOWNHOUSES AND PARKADE
 R10 ZONE: 14m

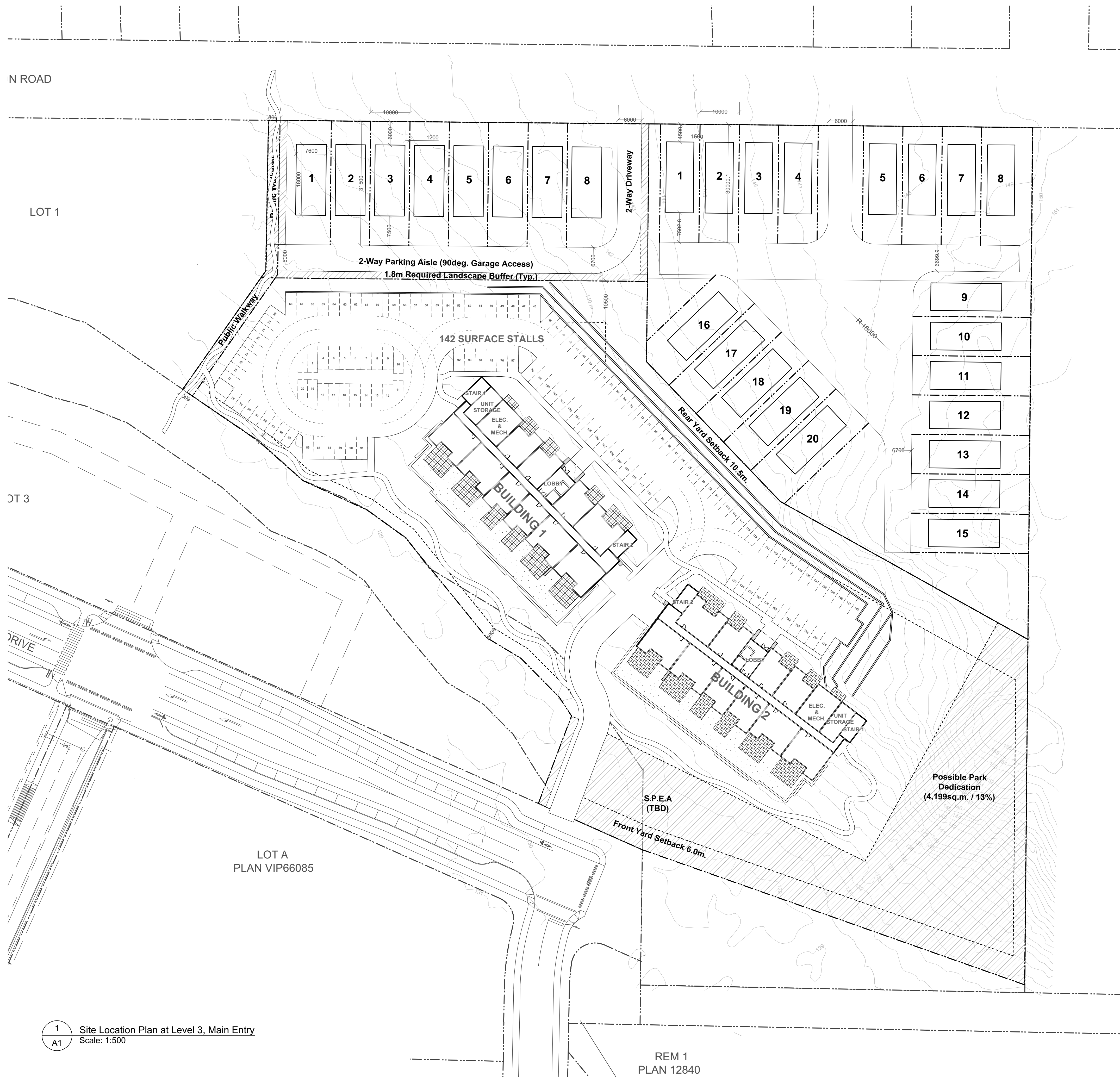
SETBACKS:
 FRONT: 6.0m
 REAR: 10.5m
 EXTERIOR: 4.0m
 INTERIOR: 3.0m

OFF STREET PARKING:
 BUILDING 1 PARKADE 35 STALLS
 BUILDING 1 PARKADE 35 STALLS
 SURFACE PARKING 142 STALLS
 TOTAL REQUIRED: 208 STALLS
 TOTAL PROVIDED: 212 STALLS

GROSS FLOOR AREA DATA

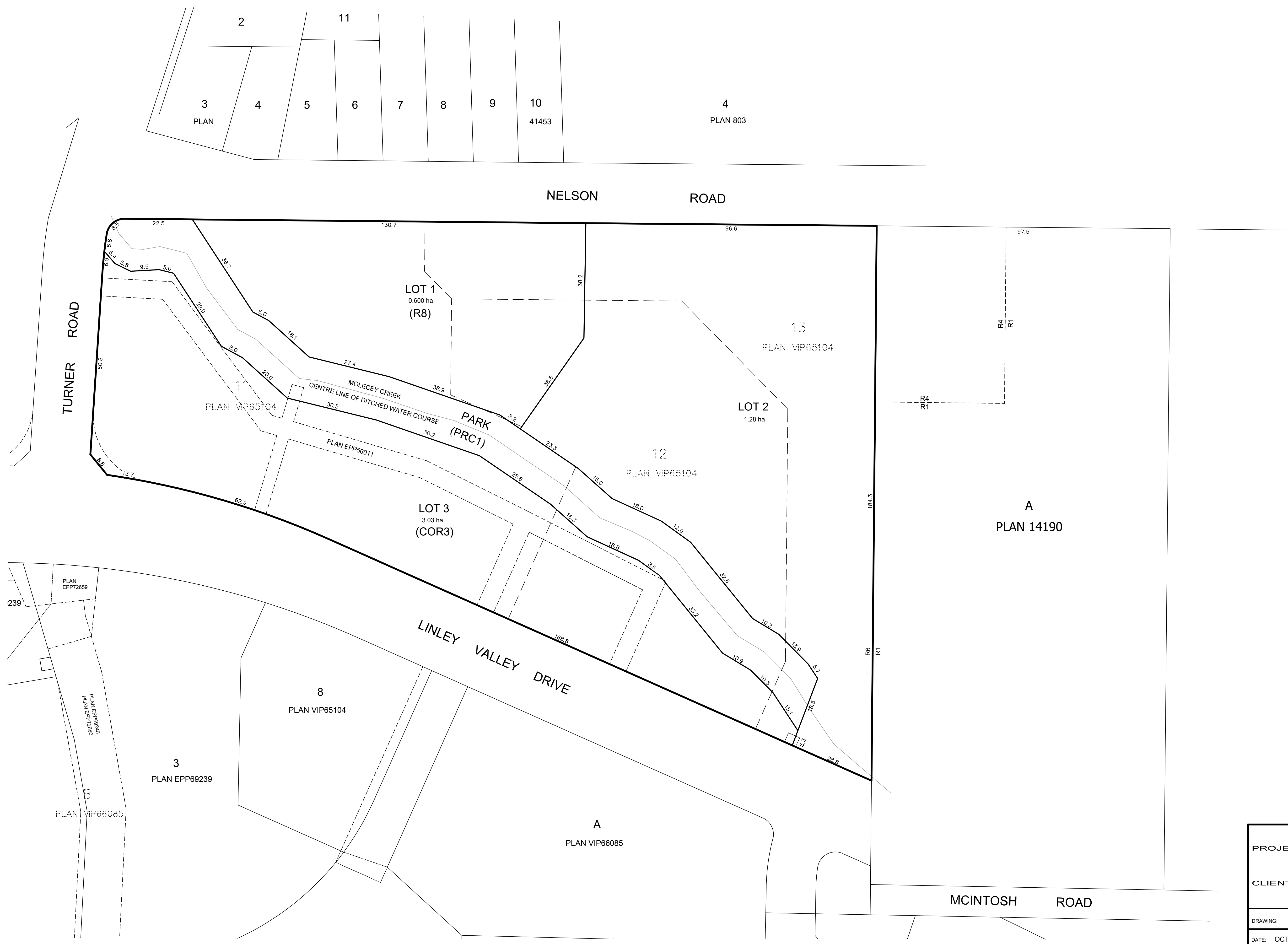
LEVEL	GROSS FLOOR AREA AREA (m ²)	LIMITED COMMON PROPERTY AREA (m ²)	PERCENT	LEASABLE AREA AREA (m ²)	PERCENT
1	459.89	8.175	2%	451.716	98%
2	1637.60	1185.887	72%	451.716	28%
3	1105.92	335.673	30%	770.25	70%
4	1091.14	253.945	23%	837.194	77%
5	1091.14	253.945	23%	837.194	77%
6	1091.14	253.945	23%	837.194	77%
7	1083.36	246.162	23%	837.194	77%
8	1083.36	246.162	23%	837.194	77%
TOTAL	8643.55	2783.89	27%	5859.65	73%

	GROSS FLOOR AREA	LIMITED COMMON PROPERTY	PERCENT	LEASABLE AREA	PERCENT
BUILDING 1	8643.55	2783.89	27%	5859.65	73%
BUILDING 2	8643.55	2783.89	27%	5859.65	73%
PROJECT TOTAL	17287	5568		11719	



1 Site Location Plan at Level 3, Main Entry
 A1 Scale: 1:500

REM 1
 PLAN 12840



NO.	DATE	REVISION
00	OCT. 11, 2018	FIRST ISSUE
01	DEC. 19, 2018	MINOR REVISIONS
02	JAN. 28, 2019	LOT LINES RESOLVED
03	MAY 24, 2019	ADD PHASE BOUNDARY
04	MAY 27, 2019	REMOVE LOT A, PLAN 14190

PROJECT: MOLECEY CREEK CORRIDOR

CLIENT: INSIGHT HOLDINGS LTD.

DRAWING: PLA / SUBDIVISION - PHASE 1

DATE: OCT. 11/18

SCALE: 1:600

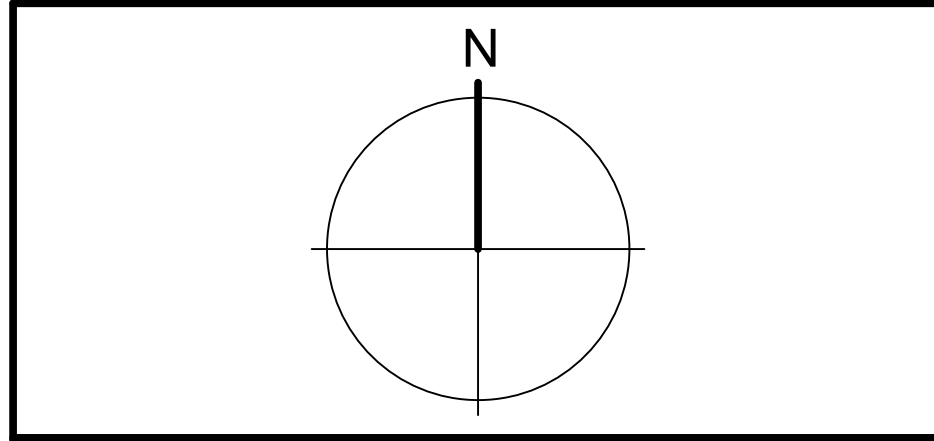
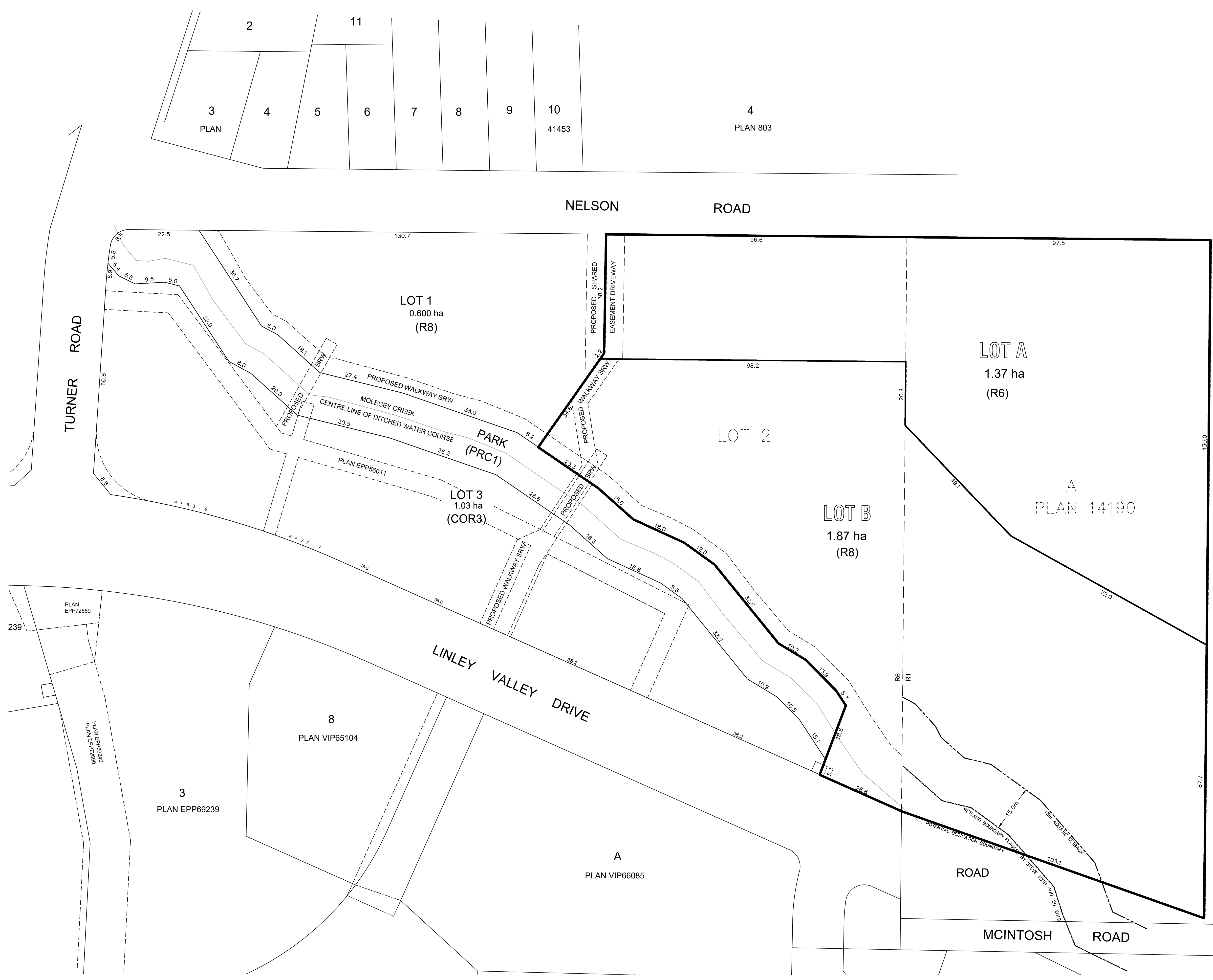
DRAWN: CH

FILE: 10254-28

SHEET: 1 OF 1

WILLIAMSON & ASSOCIATES
PROFESSIONAL SURVEYORS

3088 BARONS ROAD NANAIMO B.C. V9T 4B5
PHONE: (250) 756-7723 FACSIMILE: (250) 756-7724
EMAIL: WAPS@TELUS.NET



NO.	DATE	REVISION
00	OCT. 11, 2018	FIRST ISSUE
01	DEC. 19, 2018	MINOR REVISIONS
02	JAN. 28, 2019	LOT LINES RESOLVED
03	MAY 24, 2019	ADD PHASE BOUNDARY
04	MAY 27, 2019	REMOVE LOT A, PLAN 14190
05	SEPT. 16, 2019	ADD SUBLOT 3 LAYOUT
06	OCT. 23, 2019	ADD PHASE 2 LAYOUT

PROJECT: MOLECEY CREEK CORRIDOR
 CLIENT: INSIGHT HOLDINGS LTD.
 DRAWING: PLA / SUBDIVISION - PHASE 2

DATE: OCT. 11/18
 SCALE: 1:600
 DRAWN: CH
 FILE: 10254-30
 SHEET: 1 OF 1

