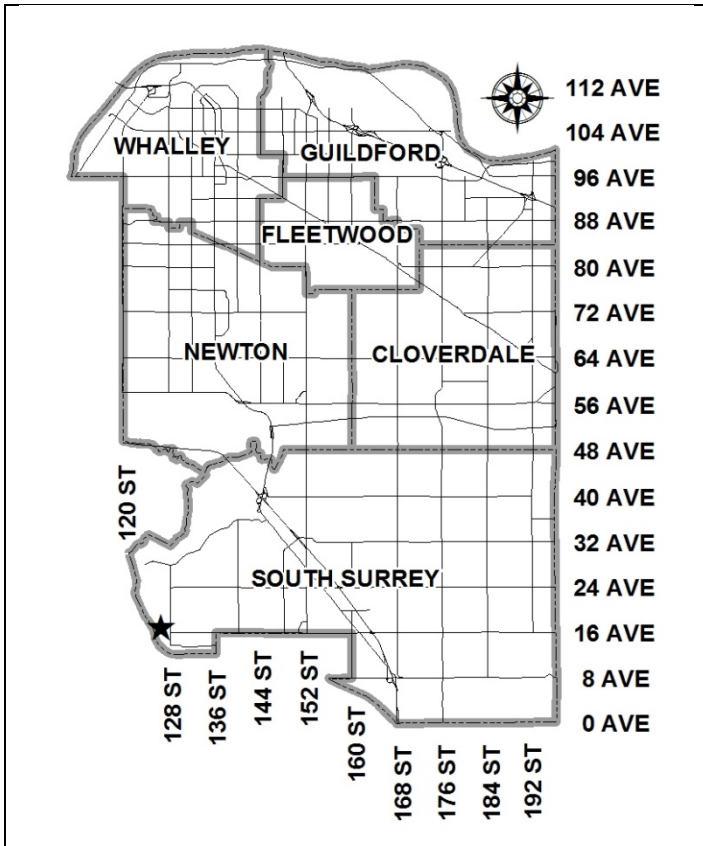


City of Surrey
PLANNING & DEVELOPMENT REPORT

File: 7913-0225-00

Planning Report Date: July 7, 2014



PROPOSAL:

- **Rezoning** from RF to RF-O.

in order to permit the development of a single family dwelling on an oceanfront lot.

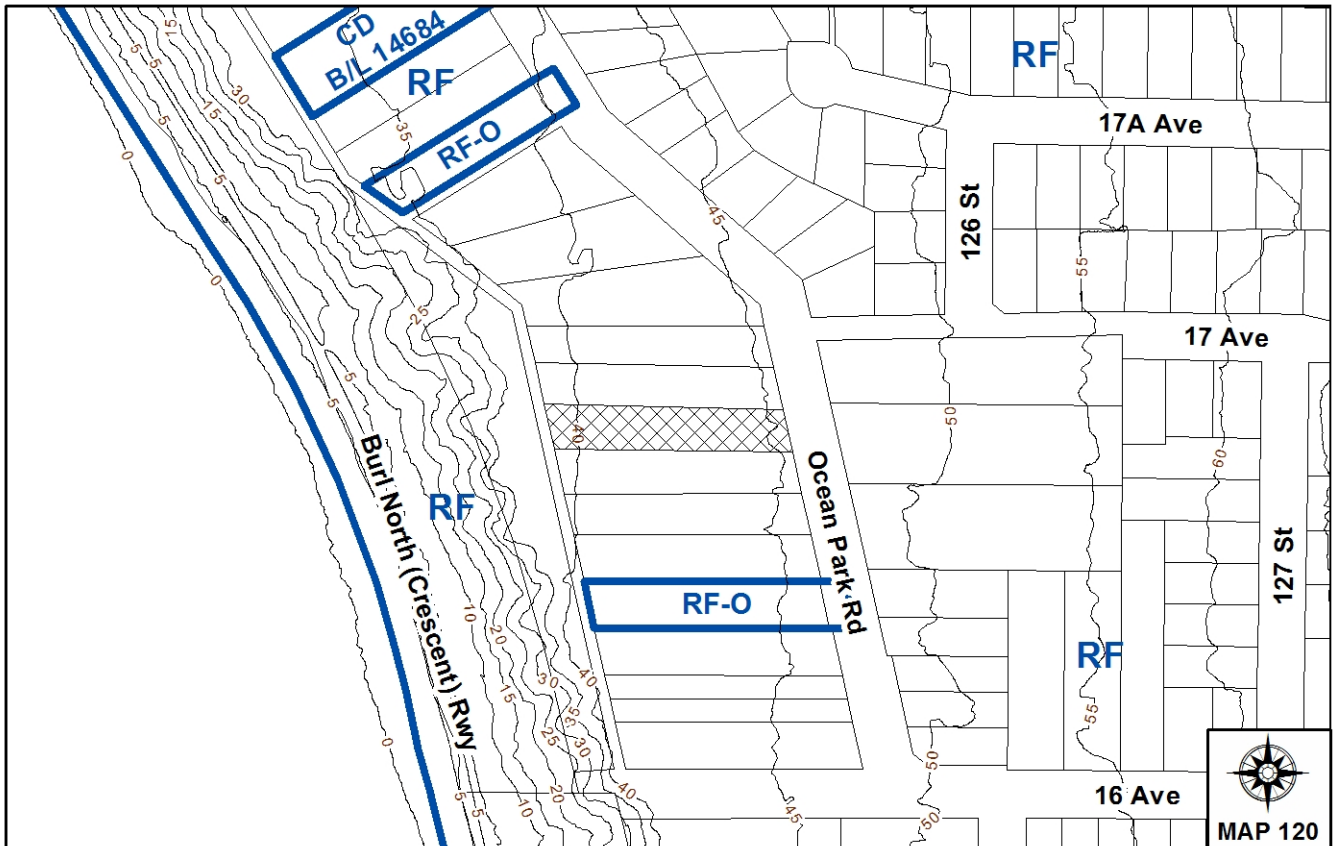
LOCATION: 1681 - Ocean Park Road

OWNER: Luay F. Dindo
 Catherine M. Dindo

ZONING: RF

OCP DESIGNATION: Urban

LAP DESIGNATION: Urban Residential



RECOMMENDATION SUMMARY

- By-law Introduction and set date for Public Hearing for Rezoning.

DEVIATION FROM PLANS, POLICIES OR REGULATIONS

- None.

RATIONALE OF RECOMMENDATION

- Complies with OCP Designation.
- Complies with LAP Designation.
- The proposed development complies with the criteria of the RF-O Zone.

RECOMMENDATION

The Planning & Development Department recommends that:

1. a By-law be introduced to rezone the subject site from "Single Family Residential Zone (RF)" (By-law No. 12000) to "Single Family Residential Oceanfront Zone (RF-O)" (By-law No. 12000) and a date be set for Public Hearing.
2. Council instruct staff to resolve the following issues prior to final adoption:
 - (a) ensure that all engineering requirements and issues including restrictive covenants, dedications, and rights-of-way where necessary, are addressed to the satisfaction of the General Manager, Engineering;
 - (b) submission of a finalized tree survey and a statement regarding tree preservation to the satisfaction of the City Landscape Architect;
 - (c) the applicant satisfy the deficiency in tree replacement on the site, to the satisfaction of the City Landscape Architect;
 - (d) demolition of existing buildings and structures to the satisfaction of the Planning and Development Department;
 - (e) registration of a Restrictive Covenant to ensure the proposed dwelling complies with the approved house design plans;
 - (f) registration of a Section 219 Restrictive Covenant to ensure future house construction is in accordance with the recommendations in the approved geotechnical report;
 - (g) registration of a Section 219 Restrictive Covenant to ensure tree protection; and
 - (h) registration of a Section 219 Restrictive Covenant to indicate the requirement of a Nest Management Plan pertaining to the existing bald eagle nest on the site.

REFERRALS

Engineering: The Engineering Department has no objection to the project subject to the completion of Engineering servicing requirements as outlined in Appendix III.

SITE CHARACTERISTICS

Existing Land Use: Single family dwelling

Adjacent Area:

Direction	Existing Use	OCP/LAP Designation	Existing Zone
North and South:	Single family residential	Urban/Urban Residential	RF
East (Across Ocean Park Road):	Single family residential	Urban/Urban Residential	RF
West:	An unconstructed lane, a vacant parcel and the Burlington Northern Railway right of way	Urban/Open Space	RF

DEVELOPMENT CONSIDERATIONSSite Context

- The subject property is located on the west side of Ocean Park Road, north of 16 Avenue backing onto the Burlington Northern Santa Fe Rail right of way overlooking Boundary Bay in South Surrey. The property is designated "Urban" in the Official Community Plan (OCP) and "Urban Residential" in the Semiahmoo Peninsula Local Area Plan (LAP).
- The property is currently zoned "Single Family Residential Zone (RF)".
- The subject property currently has an inactive bald eagle nest located within the east portion of the property. The nest is located within the crown of a mature grand fir standing approximately 40.5 metres tall.

Current Proposal

- The applicant is proposing a rezoning from "Single Family Residential Zone (RF)" to "Single Family Residential Oceanfront Zone (RF-O)" to permit construction of a larger, oceanfront single family dwelling.
- The proposed development complies with the criteria of the RF-O Zone as follows:
 - The property is an oceanfront lot located such that no residential lots exist between the subject property and the ocean water front;
 - The subject property is 18 metres (60 feet) wide, 101 metres (331 feet) deep, and has a total area of 1,954 square metres (21,033 square feet) and meets the minimum required lot dimensions of the RF-O Zone; and
 - The proposed floor area for the new dwelling is within the maximum floor area ratio (FAR) of 0.32 and the permitted lot coverage of 25%.

- The current RF Zone limits the allowable floor area at 465 square metres (5,000 square feet) and lot coverage of 18%. Therefore, the applicant is proposing to rezone to RF-O to permit construction of a larger dwelling with a floor area of 594.6 square metres (6,400 square feet) and lot coverage of 23.6%.

Building Design

- The proposed house is a contemporary two-storey executive-style home with a lower level partially in-ground with a rear walk out. A partially covered deck is also proposed to extend from the main floor at the rear of the house.
- The architectural form of the residence is articulated through simple gable forms, flared roof lines, arched roofs all set within the unique form of encompassing raised 'horn' peaks on the upper roof. The exterior is a mix of a bold stucco finish within a large massing of 'old world stone' and a roof with high-grade asphalt shingle. An open floor plan on the main floor allows the living spaces expansive views of the surrounding nature, including an extension out to a partially covered deck. A private walkout deck overlooking the ocean is also proposed on the second storey.
- The garage is proposed to be projected off of the front of the house oriented to face the interior of the lot to the south. The house is proposed to be set back 42 metres (138 feet) from Ocean Park Road and will be heavily screened by existing forest cover being retained.
- The building plans will include siting provisions to ensure ocean views of adjacent neighbours are protected appropriately. The building plans will be registered on title to ensure that the final construction complies with the approved building plans.

Geotechnical Report

- The geotechnical study was prepared by GeoPacific Consultants Ltd. to evaluate the slope stability for the proposed single family dwelling. The subject property is slightly sloped east to west. The crest of the ocean bluff (i.e. top of bank) lies approximately 40 metres (131 feet) west of the existing dwelling abutting the unopened lane adjacent to the Northern Railway Property.
- The proposed single family dwelling is to be located beyond the 2 Horizontal: 1 Vertical line by a minimum of 9.4 metres (31 feet), as measured from the base of the slope (the 2H:1V line is drawn by moving 2 units horizontally for every 1 unit vertically from the base of the slope). GeoPacific confirms that the proposed development is satisfactorily setback beyond the stipulated slope setback. The Building Division has reviewed the geotechnical study and has found it satisfactory.
- The locational requirements and geotechnical report will be registered on title. At Building Permit stage, the Building Division will require Letters of Assurance from a geotechnical engineer to ensure that building plans comply with the recommendations in the approved geotechnical report.

Trees & Landscaping

- Mike Fadum, ISA Certified Arborist of Mike Fadum and Associates Ltd. prepared an Arborist Assessment for the subject property. The table below provides a summary of the tree retention and removal by tree species:

Table 1: Summary of Tree Preservation by Tree Species:

Tree Species	Existing	Remove	Retain
Alder and Cottonwood Trees			
Alder	-	-	-
Cottonwood	-	-	-
Deciduous Trees (excluding Alder and Cottonwood Trees)			
Apple	2	1	1
Maple, Bigleaf	2	2	0
Coniferous Trees			
Douglas Fir	2	0	2
Grand Fir	2	0	2
Falsecypress	1	0	1
Western Red Cedar	15	2	13
Total (excluding Alder and Cottonwood Trees)	24	5	19
Total Replacement Trees Proposed (excluding Boulevard Street Trees)		10	
Total Retained and Replacement Trees		29	
Contribution to the Green City Fund		Nil	

- The Arborist Assessment states that there are a total of twenty-four (24) protected trees on the site. There are no Alder and Cottonwood trees on the site. It was determined that nineteen (19) trees can be retained as part of this development proposal. The proposed tree retention was assessed taking into consideration the location of building footprints, lot lines and tree survey.
- For those trees that cannot be retained, the applicant will be required to plant trees on a 2 to 1 replacement ratio. This will require a total of ten (10) replacement trees on the site. Since all replacement trees will be accommodated on the site, no cash-in-lieu payment to the Green City Fund, in accordance with the City's Tree Protection By-law will be required.

- There is an inactive bald eagle's nest located in a tree in the east half of the subject property. Consistent with Ministry of Environment standards and the provincial *Wildlife Act*, the City has identified a 300 metre (1,000 feet) radius 'noise buffer' for habitat protection. The applicant has submitted a Nest Management Plan and Windthrow Assessment, and will be required to have a qualified environmental professional conduct routine inspections during construction to ensure that no nest disturbances occur. The recommended measures to protect the nest during and following site development outlined in the Nest Management Plan will be made as conditions to issuing the building permit, tree cutting, and preparing the drainage site servicing.
- Ministry of Environment regulations restrict construction activity to non-nesting seasons (September to February). The City's Environmental Coordinator has reviewed the Nest Management Plan and Windthrow Assessment and found both to be acceptable.

PRE-NOTIFICATION

Pre-notification letters were sent on December 18, 2013 advising property owners in the area of the proposed rezoning. Staff received the following comments:

- One caller inquired about the siting of the new dwelling and expressed concern of new dwellings on the oceanfront being situated closer to the bluffs and impacting oceanfront views.

(The minimum rear yard setback of the RF-O Zone is 10 metres [33 feet]; the new dwelling is proposed to be situated 17.9 metres [59 feet] from the rear property line. The existing dwelling is located 20.6 metres [67 feet] from the rear property line. The proposed dwelling will be sited in line with neighbouring properties to ensure ocean views are protected.)

INFORMATION ATTACHED TO THIS REPORT

The following information is attached to this Report:

Appendix I.	Lot Owners, Action Summary and Project Data Sheets
Appendix II.	Site Plan, Floor Plans and Building Elevations
Appendix III.	Engineering Summary
Appendix IV.	Summary of Tree Survey and Tree Preservation

INFORMATION AVAILABLE ON FILE

- Geotechnical Study Prepared by GeoPacific Consultants Ltd., Dated May 1, 2014
- Bald Eagle Nest Management Plan Prepared by Envirowest Consultants Inc., Dated February 17, 2014
- Windthrow Assessment Prepared by Stickleback Environmental, Dated January 2014

Original signed by Nicholas Lai

Jean Lamontagne
General Manager
Planning and Development

DH/da

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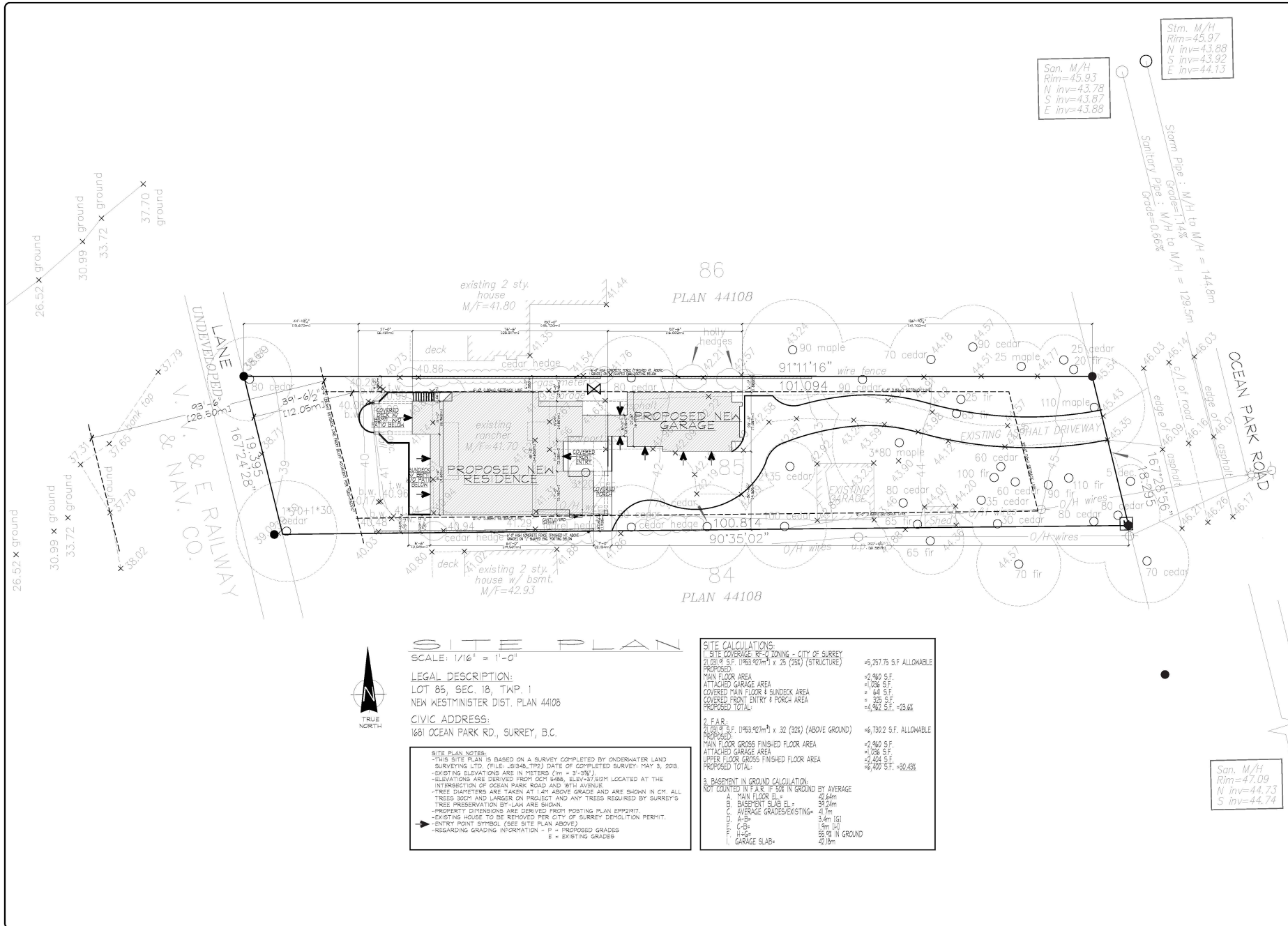
DEVELOPMENT DATA SHEET

Proposed Zoning: RF-O

Required Development Data	Minimum Required / Maximum Allowed	Proposed
LOT AREA* (in square metres)		
Gross Total		
Road Widening area		
Undevelopable area		
Net Total		1,954 m ²
LOT COVERAGE (in % of net lot area)		
Buildings & Structures		
Paved & Hard Surfaced Areas		
Total Site Coverage	25%	23.6%
SETBACKS (in metres)		
Front	10 m	42 m
Rear	10 m	12.5 m
Side #1 (North)	1.8 m	1.9 m
Side #2 (South)	1.8 m	1.9 m
BUILDING HEIGHT (in metres/storeys)		
Principal	9 m	8.9 m
Accessory	N/A	N/A
NUMBER OF RESIDENTIAL UNITS		
Bachelor		
One Bed		
Two Bedroom		
Three Bedroom +		5
Total		5
FLOOR AREA: Residential	0.32	0.30
TOTAL BUILDING FLOOR AREA		594.6 m ²

** If the development site consists of more than one lot, lot dimensions pertain to the entire site.*

Heritage Site	NO	Tree Survey/Assessment Provided	YES
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San. M/H
Rim=45.93
N inv=43.78
S inv=43.87
E inv=43.88

Stm. M/H
Rim=45.97
N inv=43.88
S inv=43.92
E inv=44.13

Storm Pipe : M/H to M/H = 144.8m
Grade=1.94%
Sanitary Pipe : M/H to M/H = 129.5m
Grade=0.66%

SITE PLAN

SCALE: 1/16" = 1'-0"

LEGAL DESCRIPTION:
LOT 85, SEC. 18, TWP. 1
NEW WESTMINSTER DIST. PLAN 44108

CIVIC ADDRESS:
1681 OCEAN PARK RD., SURREY, B.C.

SITE PLAN NOTES:
- THIS SITE PLAN IS BASED ON A SURVEY COMPLETED BY UNDERWATER LAND SURVEYING LTD. (FILE: 08-04-1799) DATE OF COMPLETED SURVEY: MAY 9, 2018.
- EXISTING ELEVATIONS ARE IN METERS (1m = 3'-03").
- ELEVATIONS ARE DERIVED FROM ICH 8488, ELEV=87.812M LOCATED AT THE INTERSECTION OF OCEAN PARK ROAD AND 18TH AVENUE.
- TREE DIAMETERS ARE TAKEN AT 1.2M ABOVE GRADE AND ARE SHOWN IN CM. ALL TREES 30CM AND LARGER ON PRODUCT AND ANY TREES REQUIRED BY SURREY'S TREE PRESERVATION BY-LAW ARE SHOWN.
- PROPERTY DIMENSIONS ARE DERIVED FROM POSTING PLAN EPP01017.
- EXISTING HOUSE TO BE REMOVED PER CITY OF SURREY DESTRUCTION PERMIT.
- ENTRY POINT SYMBOL (SEE SITE PLAN ABOVE).
- REGARDING GRADING INFORMATION: * = PROPOSED GRADES
E = EXISTING GRADES

SITE CALCULATIONS:

1. SITE COVERAGE BY 3 ZONING - CITY OF SURREY
2.108.8 S.F. (198.92m²) x .25 (25%) (STRUCTURE)
PROPOSED: +6,290 S.F.
MAIN FLOOR AREA +1,208 S.F.
ATTACHED GARAGE AREA +64 S.F.
COVERED FRONT ENTRY & PORCH AREA +6,018 S.F.
PROPOSED TOTAL: +12,380 S.F. +23.6%

2. F.A.R.
2.108.8 S.F. (198.92m²) x .32 (32%) (ABOVE GROUND)
PROPOSED: +6,302 S.F. ALLOWABLE
MAIN FLOOR GROSS FINISHED FLOOR AREA +2,960 S.F.
ATTACHED GARAGE AREA +108 S.F.
UPPER FLOOR GROSS FINISHED FLOOR AREA +3,234 S.F.
PROPOSED TOTAL: +6,302 S.F. +30.6%

3. BASEMENT IN GROUND CALCULATION:
NOT COUNTED IN F.A.R. IF 50% IN GROUND BY AVERAGE

A MAIN FLOOR EL.±	42.64m
B BASEMENT SLAB EL.±	39.24m
AVERAGE GRADES/EXISTING	41.7m
A-B	3.4m (G)
C-B	1.9m (H)
H-G	55.9% IN GROUND
L GARAGE SLAB±	42.16m

San. M/H
Rim=47.09
N inv=44.73
S inv=44.74

Bill Daniels Designers
CREATED BY: KELOWNA, BC
CITY OF SURREY: 1,280,333,325
EMAIL: cdb@billdanielsdesigners.com

Chris Blanchard
DESIGNER
TEL: 604-271-2201
FAX: 604-271-2201
WWW: billdanielsdesigners.com

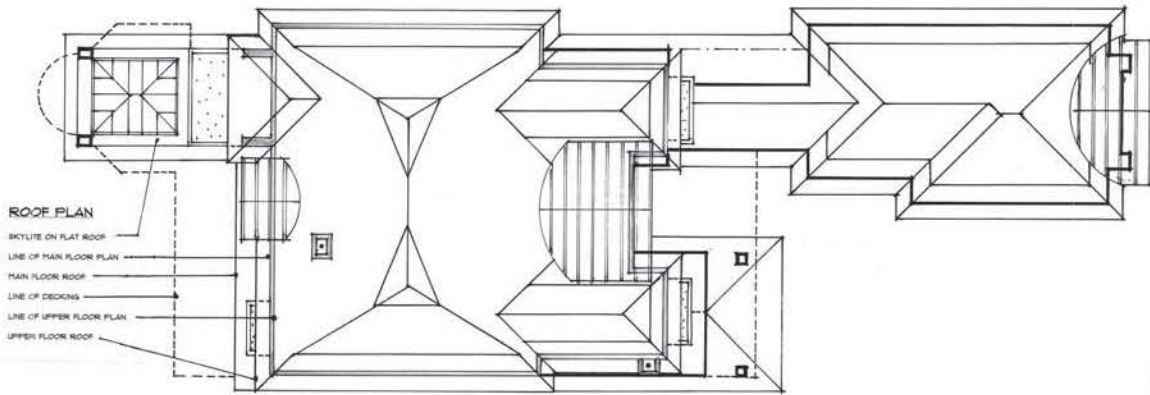
DATE: APR 20, 2014
DRAWN BY: CDB
SCALE: 1/16" = 1'-0"
SHEET: 1 OF 1
PROJECT: 01-006-13-006

LEGAL / CIVIC ADDRESS:
LOT 85 SEC. 18 TWP. 1
NID PLAN 44108
1681 OCEAN PARK RD. SURREY, BC

REVISIONS:
REV. # OCT 3, 2013
REV. # JAN 10, 2014
REV. # APR 20, 2014

CUSTOM RESIDENCE FOR:
THE DINDO RESIDENCE

CONTRACT:
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Bill Daniels . Designer

W.R. DANIELS DESIGN

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REFERENCE:

REVISIONS:	DATE:	ITEM REVISED:
	OCT 25 2011	
	05/01/14	GRAFFES

DINDO RESIDENCE
1681 OCEAN PARK ROAD
SOUTH SURREY . BC

SCALE:	DATE DRAWN:
1/8" = 1'-0"	OCT 18/11
DESIGNED BY:	DRAWN BY:
B.D.	B.D.
PROJECT:	LOT NO.:
1681 O.P.R.	350
DRAWING NO.:	SHEET:
060018.02	4 of 4
TITLE:	
ELEVATIONS	

W.R. DANIELS DESIGN

INTER-OFFICE MEMO

**TO: Manager, Area Planning & Development
- South Surrey Division
Planning and Development Department**

FROM: Development Services Manager, Engineering Department

DATE: June 11, 2014 PROJECT FILE: **7813-0225-00**

**RE: Engineering Requirements
Location: 1681 Ocean Park Road**

REZONE***Property and Right-of-Way Requirements***

- Dedicate 1.942 metres on Ocean Park Road for a 24.000 metre Collector Road; and
- Provide 0.500 metres wide Statutory Right-of-Way along Ocean Park Road.

Works and Services

- Construct the west side of Ocean Park Road to the Collector Road standard and provide a minimum 6.0 metre wide concrete letdown (or provide cash-in-lieu if appropriate);
- Service the development in accordance with the Geotechnical and Environmental Reports provided;
- Install water, sanitary, and storm service connections in accordance with current Surrey standards; and
- Pay sanitary latecomer charges.

A Servicing Agreement is required prior to Rezone.



Rémi Dubé, P.Eng.
Development Services Manager

CE

MIKE FADUM AND ASSOCIATES LTD.
VEGETATION CONSULTANTS

Tree Preservation Summary

Surrey Project No: 13-0225-00


Address: 1681 Ocean Park Road

Registered Arborist: Peter Mennel

On-Site Trees	Number of Trees
Protected Trees Identified (on-site and shared trees, including trees within boulevards and proposed streets and lanes, but excluding trees in proposed open space or riparian areas)	24
Protected Trees to be Removed	5
Protected Trees to be Retained (excluding trees within proposed open space or riparian areas)	19
Total Replacement Trees Required: <ul style="list-style-type: none"> - Alder & Cottonwood Trees Requiring 1 to 1 Replacement Ratio 0 X one (1) = 0 - All other Trees Requiring 2 to 1 Replacement Ratio 5 X two (2) = 10 	10
Replacement Trees Proposed	TBD
Replacement Trees in Deficit	TBD
Protected Trees to be Retained in Proposed [Open Space / Riparian Areas]	NA

Off-Site Trees	Number of Trees
Protected Off-Site Trees to be Removed	0
Total Replacement Trees Required: <ul style="list-style-type: none"> - Alder & Cottonwood Trees Requiring 1 to 1 Replacement Ratio 0 X one (1) = 1 - All other Trees Requiring 2 to 1 Replacement Ratio 0 X two (2) = 0 	0
Replacement Trees Proposed	0
Replacement Trees in Deficit	0

Summary report and plan prepared and submitted by: Mike Fadum and Associates Ltd.

Signature of Arborist: 	Date: June 13, 2014
--	---------------------



Mike Fadum and Associates Ltd.
#105, 8277-129 Street, Surrey, BC, V3W 0A6
Phone 778-593-0300 Fax 778-593-0302



Thoroughbred Properties
2083-136A Street
Surrey, B.C.
V4A 9V7

May 1, 2014
File # 11356

Attention: Graham Edwards

Re: Residential Home on Slope - 1681 Ocean Park Road, Surrey, B.C.

1.0 INTRODUCTION

We understand that it is proposed to construct a new single family residential home at the above referenced site. Preliminary architectural design drawings provided by W.R. Daniels Design Corporation on April 30, 2014 for our review show the proposed development consisting of a typical residential home and garage. We expect typical wood framed construction above grade supported on a reinforced concrete basement. Loading from the proposed development is anticipated to be relatively light.

This report presents the results of a geotechnical investigation at the above referenced site and presents design recommendations for the development including building setbacks from the existing slope. It has been prepared exclusively for Thoroughbred Properties, for their use, the use of others on their design and construction team. The report is also prepared for the use of the City of Surrey in the development and permitting process.

We confirm that the property may be safely used for the intended purpose as described above provided that all of the recommendations in this report are incorporated into the design. Our confirmation of the safe use of the property is null and void if any geotechnical related works are completed on the property without the direction and approval of GeoPacific Consultants Ltd. We also accept no responsibility for future impacts to the development property as a result of works completed on other properties by third parties.

2.0 OBSERVATIONS

GeoPacific Consultants Ltd. conducted a field investigation at the above referenced site on May 22nd, 2013. The investigation consisted of three hand excavated test pits to a depth of 0.4m below existing site grades. The test holes were located at the crest, middle, and toe of the slope face. The review was undertaken to characterize the subsurface soil conditions and evaluate the condition of the slope. A site plan and a slope section are shown on drawing G-SP1 and G-SP2 following the text of this report. Photos taken from our field reconnaissance are presented in Appendix A.

The site consists of a single rectangular lot, bounded by Ocean Park Road to the east, two adjacent residential properties to the north and south, and privately owned right of way and slope to the west. At the time of our review the site was occupied by an uninhabited single family home with a detached garage and shed fronting Ocean Park Road. The existing structure was located on the relatively flat upper terrace, which is sloped east to west with an approximate elevation differential of 6.0m. The existing home is setback approximately 43m from the west property line.

Based on the topographic survey completed by Onderwater Land Surveying Ltd. (Their file # JS1348_TP2) on May 16th, 2013, the western slope has a total elevation differential of approximately 35 m and has an average slope angle of approximately 38 degrees.

The soil profile at the top and bottom of the slope was noted to consist of approximately 0.3m of TOPSOIL with organics overlying very dense GLACIAL DEPOSITS (TILL) of grey silty sand and gravel with some cobbles. Till is also exposed midway up the slope where there is a lack of a vegetative cover.

The majority of the slope is heavily vegetated primarily with medium to large evergreen and deciduous trees, taller grasses, shrubs, and blackberry bushes. The isolated area midway up the slope lacking vegetative cover is indicative of a past surficial slump and/or erosion likely contributed to by the minor seepage observed during our review. The slump appears to be surficial and is located well away from any existing structures.

3.0 DISCUSSION

3.1 Slope Stability

The results of our review indicate that the factor of safety under both static and seismic conditions of deep seated failure impacting the proposed development is in excess of 1.5. This level of stability meets the required minimum stability criteria in commonly referenced design manuals including the 2006 Canadian Foundation Engineering Manual and the US Army Corp of Engineers Slope Stability Engineering Manual (EM 1110-2-1902) and thus, in our opinion, is considered satisfactory for the proposed development.

While our analyses show this slope to be stable, including under seismic conditions, we recommend that the home owner review our restrictions of disturbance on and around the slope as noted in our recommendations in Section 4.0. In particular drainage alterations, grade alterations, and retaining wall construction should only be completed under the advice and recommendations of a geotechnical engineer with experience in slope stability evaluations.

GeoPacific has also completed a cursory visual review of the conditions on adjoining properties and have observed no indications of recent or ongoing stability issues. However, GeoPacific has not been commissioned to investigate the neighboring properties by those owners and therefore we provide no assurances with respect to those properties.

For the proposed structure constructed in accordance with our recommendations in Section 4.0, the property meets the requirements for development established in APEGBC's "Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC" (Revised May 2010).

4.0 RECOMMENDATIONS FOR BUILDINGS

4.1 Building Slope Set Back

We confirm that the minimum setback defined by a 2H:1V projection measured from the base of the slope is suitable from a slope stability point of view and satisfactory for the development contemplated. This translates into a minimum 9.4 m setback from the west property line. The surface projection of our setback is shown on plan on drawing No: G-SP1 and G-SP2. The preliminary architectural information has also been incorporated into our plan and sections and show that the proposed development is setback beyond our stipulated slope setback and from a geotechnical perspective is satisfactory.

4.2 Site Preparation

Prior to construction of foundations, grade supported slabs, and pavement structures; all materials considered to compromise the design recommendations provided herein are to be removed. These materials include, but may not be limited to, vegetation, other organics, topsoil, fill, and loose or otherwise disturbed materials.

Based on our investigation, the minimum stripping depth is expected to be upwards of 0.9m around the building envelope. Some variations in stripping depth across the site should be expected.

Grade reinstatement can be achieved through the placement and compaction of “engineered fill”. In the context of this report, engineered fill is defined as sand or sand and gravel fill, compacted in 300mm lifts to a minimum of 95% modified proctor density (ASTM 1557) with a moisture content 2% of optimum for compaction.

Where grade reinstatement is not required the subgrade should be blinded with 100 mm of 19 mm clear crush gravel for protection. Ponded water can also cause deterioration of the exposed subgrade and should be pumped from the building envelope.

Site stripping and fill compaction must be reviewed by GeoPacific Consultants Ltd.

4.3 Building Foundation

Foundations which are placed on dense, undisturbed glacial till, described in section 2.0, may be designed on the basis of a serviceability limit state (SLS) bearing pressure of 200 kPa for pad and strip footings.

Foundations placed on engineered fill, as described in section 4.2, can be designed on the basis of an SLS pressure of 150 kPa for pad and strip footings.

Irrespective of allowable bearing pressures given, pad footings should not be less than 600 mm by 600 mm and strip footings should not be less than 450 mm in width. Footings should also be buried a minimum of 450mm below the surface for frost protection.

We estimate, provided the above recommendations, settlements will not exceed 25 mm total and 20 mm in a 10 metre differential span.

Factored ultimate limit state (ULS) bearing pressures may be assumed to be twice (2x) the SLS bearing pressures.

Foundation subgrades are to be reviewed by GeoPacific Consultants Ltd. prior to footing construction.

4.4 Slab-On-Grade Floors

In order to provide suitable support for slab-on-grade floors we recommend that any fill placed under the slab should be granular and have a maximum of 5%, by weight, passing the #200 sieve. In addition, this granular fill must be compacted to a minimum of 98% Standard Proctor (ASTM D698) dry density with water content within 2% of optimum for compaction.

Floor slabs should be underlain by a minimum of 150 mm of a free draining granular material. A moisture barrier should underlie the slab directly above the free draining granular material.

4.5 Seismic Considerations

The Seismic Site Class as defined in Table 4.1.8.4A of the 2012 BC Building Code (BCBC) is Site Class C.

The soils on-site are not liquefiable during the design earthquake defined in BCBC 2012.

4.6 Earth Pressure on Basement Walls

We recommend the foundation walls be designed to resist a triangular soil pressure of $5.3H$ (kPa) and an inverted triangular soil pressure distribution of $6.5 H$ (kPa), where H is equal to the total wall height in metres. For this condition, we have assumed a free draining backfill with a unit weight of 18kN/m^3 and an angle of friction of 33° with no accumulated hydrostatic pressures. The use of a heavier backfill or backfill with a lower friction angle will result in higher soil pressures.

All earth pressures are based upon unfactored soil parameters and should be assumed to be unfactored loads.

4.7 Permanent and Temporary Lot Grading

We recommend that all exterior finished grades, as well as hard surfaces, such as patios or slabs, be graded such that all water runoff is directed away from the crest of the slope and into catch basins. Runoff should be discharged to the site's storm water disposal system. Under no circumstance is water to be discharged to the slope to the west.

Storage of temporary fills and excavated soils should be kept a minimum of 10 m from the crest of the slope. Furthermore, stockpiles should be covered with poly sheeting to prevent erosion. All permanent fills should also be placed a minimum of 10 m from the top of the existing slope.

We understand that the City of Surrey will require submission of a lot grading plan by your civil designer. Permanent lot grading is to be reviewed by GeoPacific Consultants Ltd.

4.8 Landscaping

Existing vegetation plays an important role in increasing the stability of the slope and protecting it against shallow instabilities. The vegetation lowers water infiltration rates into the surficial soils and adds cohesion through their root systems. It is recommended that the slope's vegetative cover not be disturbed. We also recommend that the owner notify the Burlington Northern Santa Fe (BNSF) railway so that they may rectify the eroded portion of slope on their property described in Section 2.0. This denuded portion of the slope will not impact the proposed development, even if additional sloughing and erosion occurs. However, the presence of vegetation will assist in the mitigation of these issues.

The addition of large trees to the slope is not recommended as the increased weight would be far more detrimental than any benefit gained by the presence of the root structure.

It is not recommended to dispose of any debris and/or organic wastes on the slopes. The debris increases the loading on the slope while also reducing the drainage capacity of the soil. This can potentially lead to

slope stability problems.

The owner should notify a geotechnical engineer to complete a site review, and provide design directions if necessary, if at any point in the future portions of the westerly slope become denuded of vegetation. This work may require coordination with the BNSF.

As per City requirements, the landscape and geotechnical designs should be coordinated through the coordinating professional for the project.

4.9 Site and Foundation Drainage

We recommend perimeter drainage for the collection of surface water and intermittent flows of perched ground water adjacent to foundation walls. The backfill should consist of a well graded sand to sand and gravel to prevent moisture retention within the backfill.

We expect that all storm water will be pumped to City facilities on Ocean Park Road. We recommend that the mechanical designer include an emergency generator to power the pump in the event of a power failure. We also recommend that at least two pumps be incorporated in the design in the event that one should fail. An alarm should be included in the mechanical design to alert the home owner of a pump failure. We understand that the City of Surrey will not permit an emergency overflow onto the property.

4.10 Temporary Excavations

We expect that the excavations to foundation levels would be sloped where feasible. The temporary cuts should be limited to 2V:1H for the soils observed on this site. Slopes are to be covered with poly sheeting for protection against erosion induced instability. Any temporary cut in excess of 1.2 metres in height requires inspections by a geotechnical engineer in accordance with Worker's Compensation Board guidelines.

Where the excavation encroaches close to property lines and existing structures, shoring may be required. The extent of shoring will depend on the final home design and should be reviewed by GeoPacific well in advance of construction.

Excavations may encounter some perched groundwater within the surficial soils on top of relatively low permeable glacial deposits. Seepage volumes are expected to be light and may be handled by conventional sumps and sump pumps.

Large boulders may be encountered in till deposits and can typically be handled by blasting or splitting to facilitate removal.

GeoPacific should be provided with the finalized designs well in advance of construction to confirm excavation requirements.

5.0 DESIGN REVIEWS AND CONSTRUCTION INSPECTIONS

The preceding sections make recommendations for the design and construction of the proposed residential home. We have recommended the review of certain aspects of the design and construction. It is important that these reviews are carried out to ensure that our intentions have been adequately communicated. It is also important that any contractors working on the site review this document prior to commencing their work.

It is the responsibility of the contractor working on-site to notify GeoPacific at least 48 hours in advance of a required review.

6.0 CLOSURE

We are pleased to be of assistance to you on this project and we trust that our comments and recommendations are both helpful and sufficient for your current purposes. If you would like further details or would like clarification of any of the above, please do not hesitate to call.

For:
GeoPacific Consultants Ltd.


Reviewed By:

MAY 01 2014 A blue circular professional engineer seal for J. G. Carter, #29777, British Columbia. The seal contains the text "PROFESSIONAL ENGINEER OF BRITISH COLUMBIA" around the perimeter and "J. G. CARTER #29777" in the center. A signature is written over the seal, and the date "MAY 01 2014" is stamped to the left.

Michael Mains, B.Eng., E.I.T.
Geotechnical Engineer-in-Training

John Carter, M.Eng., P.Eng.
Principal

Reviewed By:

MAY 01 2014 A blue circular professional engineer seal for K. E. Robinson, British Columbia. The seal contains the text "PROFESSIONAL ENGINEER OF BRITISH COLUMBIA" around the perimeter and "K. E. ROBINSON" in the center. A signature is written over the seal, and the date "MAY 01 2014" is stamped to the left.

Keith Robinson, M.Eng., P.Eng.
Principal Consultant

APPENDIX A – Site Photos



Photo No.01: View of slope crest from existing home

Relatively flat surface between top of slope and existing home



Photo No.02: View of home from top of slope
Existing home



Photo No.03: Overview from top of slope
Slope vegetation consisting of small to medium deciduous and coniferous trees, grasses, shrubs, and blackberry bushes



Photo No.04: Soil conditions at top of slope
Up to 0.3m of topsoil and vegetation overlying glacial till



Photo No.05: evidence of past surficial slump
Evidence of past surficial failure with surface erosion occurring located midway up the slope



Photo No.06: Soil conditions midway up slope
Exposed glacial till with surface water runoff

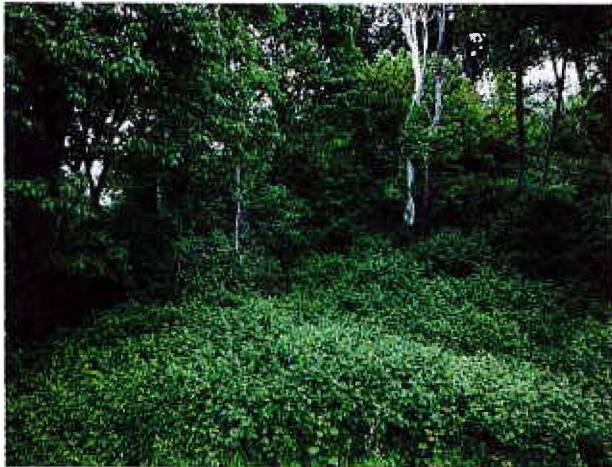
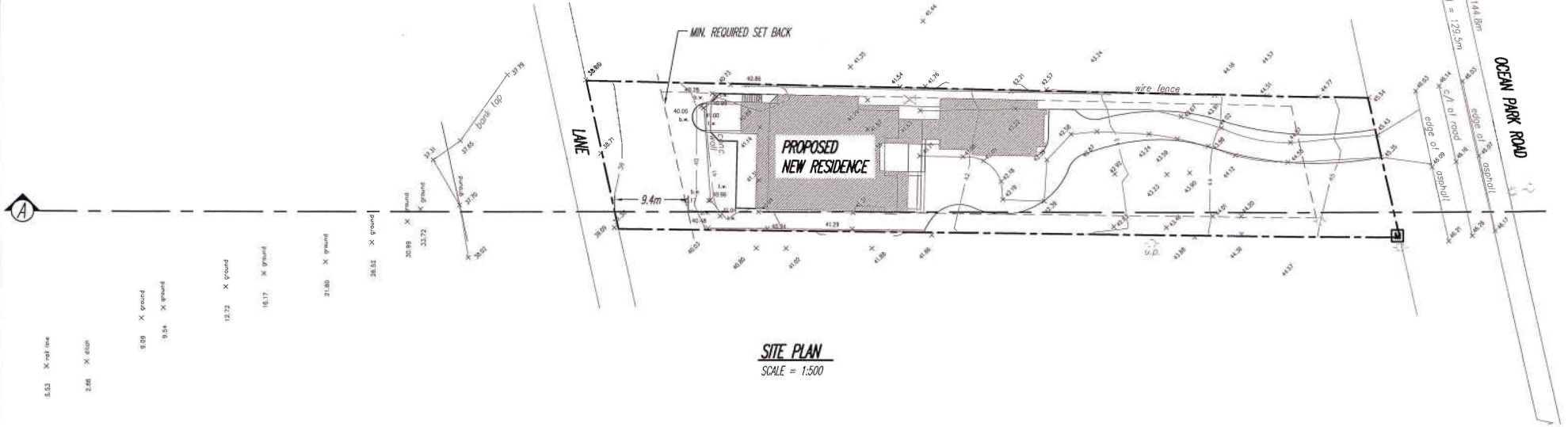
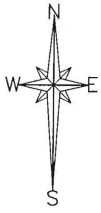


Photo No.07: View from bottom of slope
Slope vegetation consisting of small to medium deciduous and coniferous trees, grasses, shrubs, and blackberry bushes



Photo No.08: Soil conditions at bottom of slope
Approximately 0.3m of topsoil and vegetation over glacial till



SITE PLAN
SCALE = 1:500

LEGEND:

12.72 * - GEODETIC ELEVATION

DRAWING PAPER SIZE: 11"x17"

REFERENCE:
UNDERWATER LAND SURVEYING LTD.
 FILE: JS1348_TP2

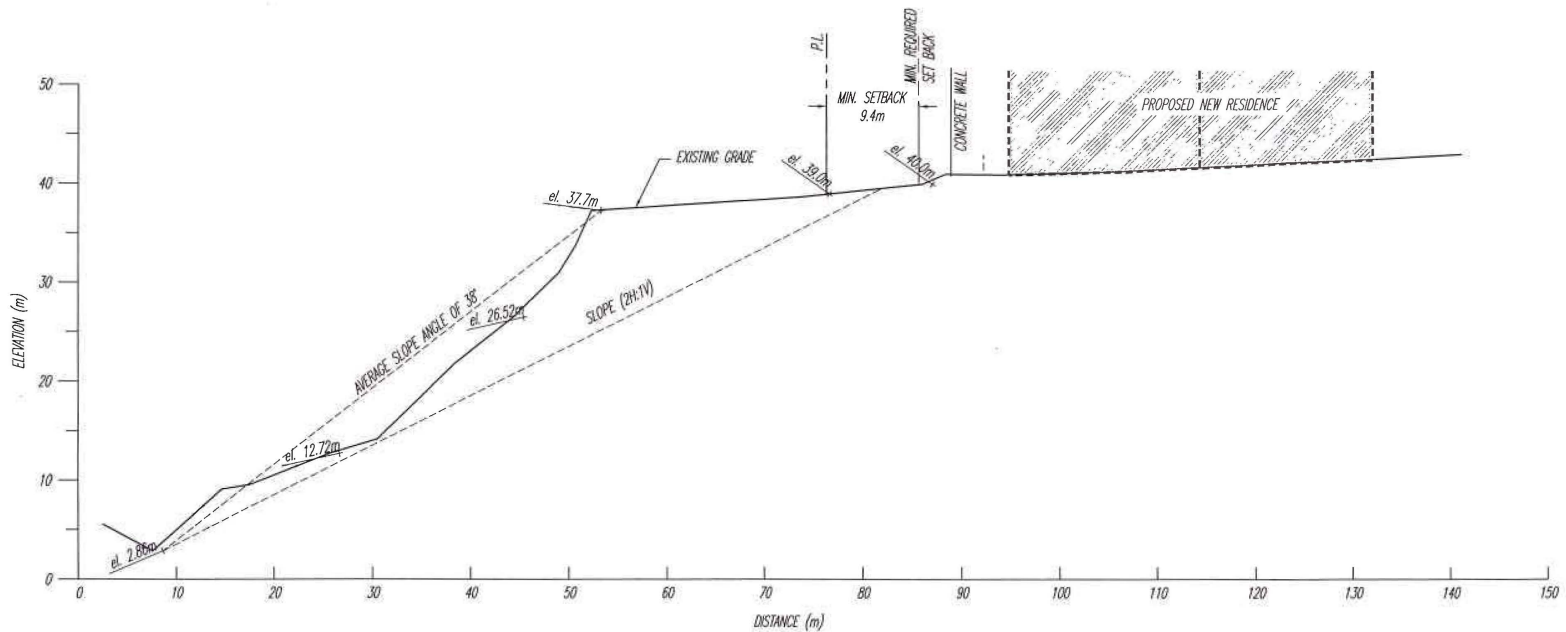
2215-1200 West 73-rd Ave.
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 Fax: (604) 439-9189

DATE: **MAY 27, 2013**
 DRN. BY: **C.T.** APP'D. **M.M.**
 SCALE: **AS SHOWN**

RESIDENTIAL HOME
1681 OCEAN PARK ROAD, SURREY BC
SITE PLAN

FILE NO.: **11356**
 DRG. NO.: **G-SP1**

REVISIONS:
 A. **APRIL 25, 2014**
 B. **APRIL 30, 2014**
 C.



SECTION A
SCALE = 1:500

LEGEND:

el. 40.0m - GEODETIC ELEVATION

ORIGINAL PAPER SIZE: 11"X17"

REFERENCE:	#215-1200 West 73-rd Ave. Vancouver, B.C. Canada V6P 6G5 GeoPacific Consultants Ltd. Ph. (604) 439-0022 Fax (604) 439-9189	DATE: MAY 27, 2013	RESIDENTIAL HOME 1681 OCEAN PARK ROAD, SURREY BC SECTION A	FILE NO.: 11356	REVISIONS:
		DRN. BY: C.T. APP'D: M.M. SCALE: AS SHOWN		DWG. NO.: G-SP2	A. APRIL 25, 2014 B. APRIL 30, 2014 C.