



DEVELOPMENT PERMIT NO. DP000800

0948423 BC LTD

Name of Owner(s) of Land (Permittee)

1099 BRUCE AVENUE

Civic Address

1. This development permit is issued subject to compliance with all of the bylaws of the municipality applicable thereto, except as specifically varied or supplemented by this permit.
2. This development permit applies to and only to those lands within the municipality described below, and any and all building structures and other developments thereon:

Legal Description:

LOT A, SECTION 1, NANAIMO DISTRICT, PLAN EPP22207

PID No. 028-927-443

3. The land described herein shall be developed strictly in accordance with the following terms and conditions and provisions of this permit and any plans and specifications hereto which shall form a part thereof.

Schedule A Location Plan
Schedule B Site Plan
Schedule C Slope Analysis
Schedule D Tree Management Plan
Schedule E Landscape Plan
Schedule F Vegetation Management Plan
Schedule G Acoustic Report
**Schedule H Proposed Front Yard Setback, and
Lot Frontage Variances**

- a) If the applicant does not substantially commence the development permitted by this permit within two years of the date of this permit, the permit shall lapse.

4. This permit is not a building permit nor does it constitute approval of any signage. Separate applications must be made for a building permit and sign permit.

5. The City of Nanaimo "ZONING BYLAW 2011 NO. 4500" is varied as follows:

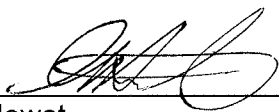
As per Section 6.23.1 of the City of Nanaimo "ZONING BYLAW 2011 NO. 4500", the required front yard setback for lots along the Nanaimo Parkway is 20.0m. The requested front yard setback for lots (Lots 4 – 18 and Lots 23 – 27 of the subject property) along the Parkway is 17.0m, a variance of 3.0m.

Section 7.4.1 of the City of Nanaimo "ZONING BYLAW 2011 NO. 4500" requires a lot frontage for R10-Steep Slope Residential Zone parcels (with minimum lot sizes 600m² or greater) of 15.0m. This permit reduces the lot frontage for nine lots, as follows:

Description	Lot Numbers								
	44	45	46	61	69	70	71	72	73
Lot Frontage (m)	13.5	13.79	13.79	14.5	13.67	13.5	13.5	13.5	13.51
Variance (m)	1.5	1.21	1.21	0.5	1.33	1.5	1.5	1.5	1.49

REVIEWED AND APPROVED ON

2014 Apr. 11
Date


I. Howat

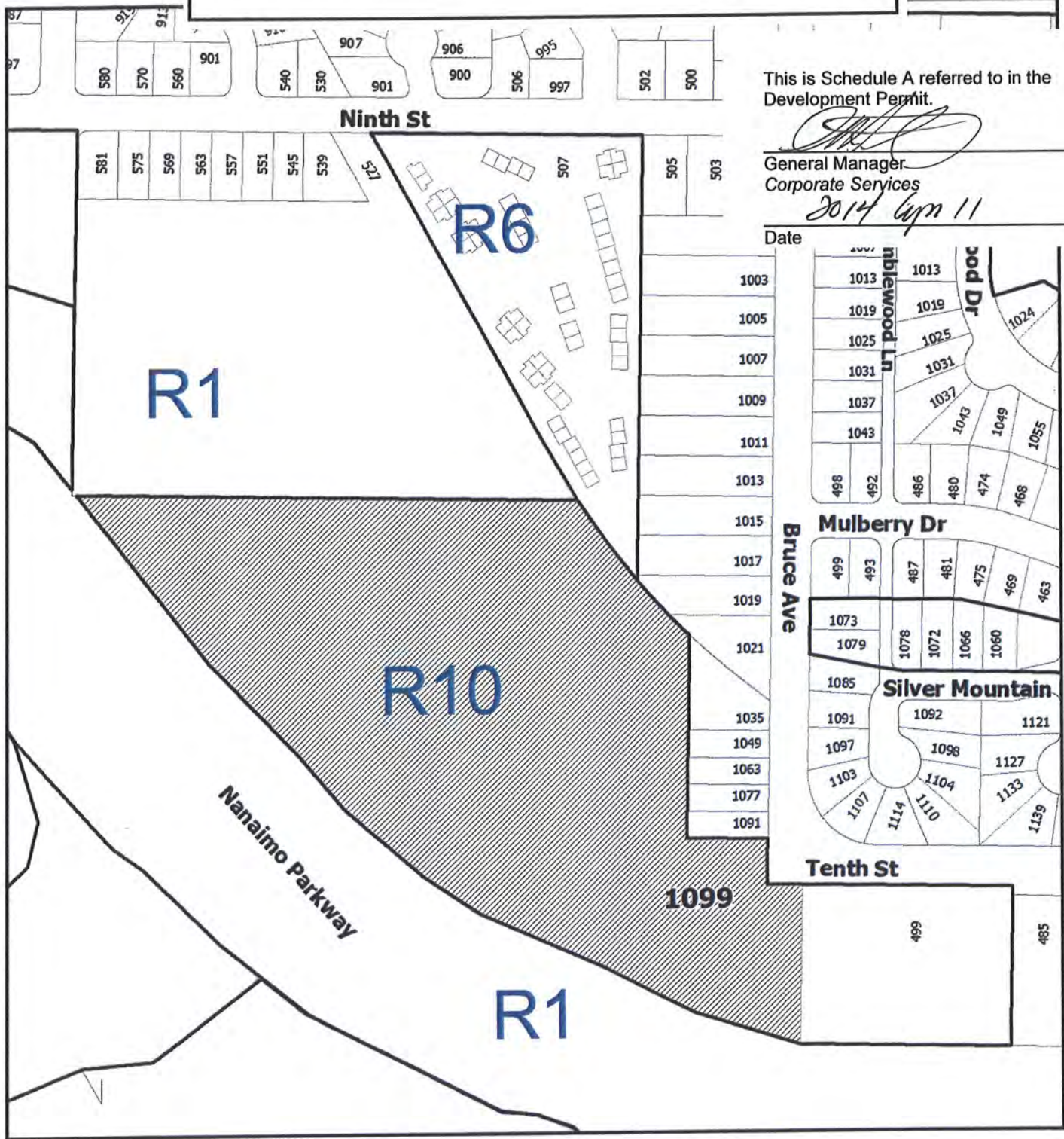
General Manager

Corporate Services

Pursuant to Section 154 (1)(b) of the Community Charter

Development Permit No. DP000800
1099 Bruce Avenue

Schedule A
Location Plan



This is Schedule A referred to in the Development Permit.

[Signature]
General Manager
Corporate Services
2014 Apr 11

Date

1003	1013	1013
1005	1019	1019
1007	1025	1025
1009	1031	1031
1011	1037	1037
1013	1043	1043
1015	498	492
1017	486	480
1019	474	468
1021	1073	1079
1035	1085	1091
1049	1097	1103
1063	1107	1114
1077	1110	1110
1091	1092	1121
	1098	1127
	1104	1133
	1129	1129
	499	485

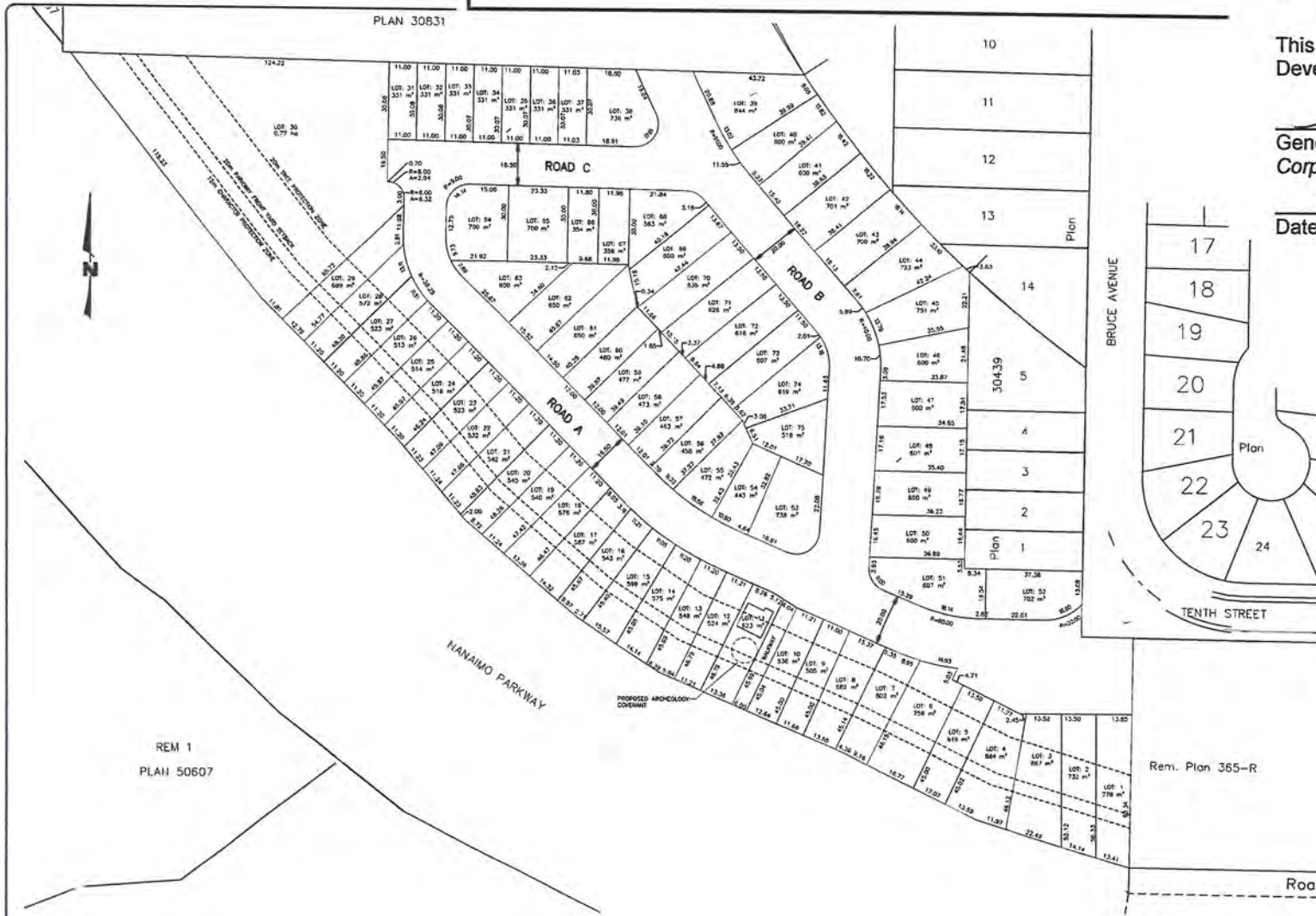
DEVELOPMENT PERMIT NO. DP000800

LOCATION PLAN

Civic: 1099 Bruce Avenue
Lot A, Section 1, Nanaimo District,
Plan EPP22207



 **Subject Property**

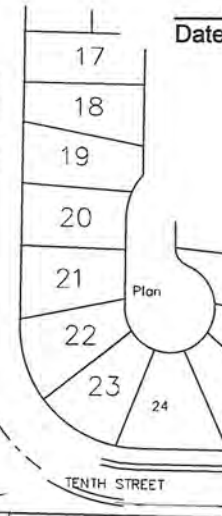


This is Schedule B referred to in the Development Permit.

General Manager
Corporate Services

Date

2014 Apr 11



REM 1
PLAN 50607

Rem. Plan 365-R

Road



LEGAL DESCRIPTION	SUBDIVISION OF LOT 1, SECTION 1, NANAIMO DISTRICT, PLAN 50607, EXCEPT PART IN PLANS YP61106 AND YP64965				JURISDICTION CITY OF NANAIMO	EQUIP 0766010 BC LTD	
	PROJECT DATUM	ELEVATIONS ARE GEODETIC AND TO MADS3					SCALE: 1:750 HORIZ. 1:500 VERT.
LEGEND		2	REVISED FOR APPROVAL	FEB 16/14	DESIGN: JMT	DRAWING NO. 87417 01 SA4	
		1	ISSUED FOR APPROVAL	FEB 3/13	DRAWING: JMT		
		NO.	REVISION DESCRIPTION	DATE	CHECK	APPR.	MAN. FILE
							SHEET 1 OF 1

JEA J.E. ANDERSON & ASSOCIATES
SURVEYORS -- ENGINEERS
1A - 3411 SHENTON ROAD, NANAIMO, B.C. V9T 2H1
TEL. 250 - 758 - 4531 FAX: 250 - 758 - 4560
E-MAIL: nanaimo@janderson.com

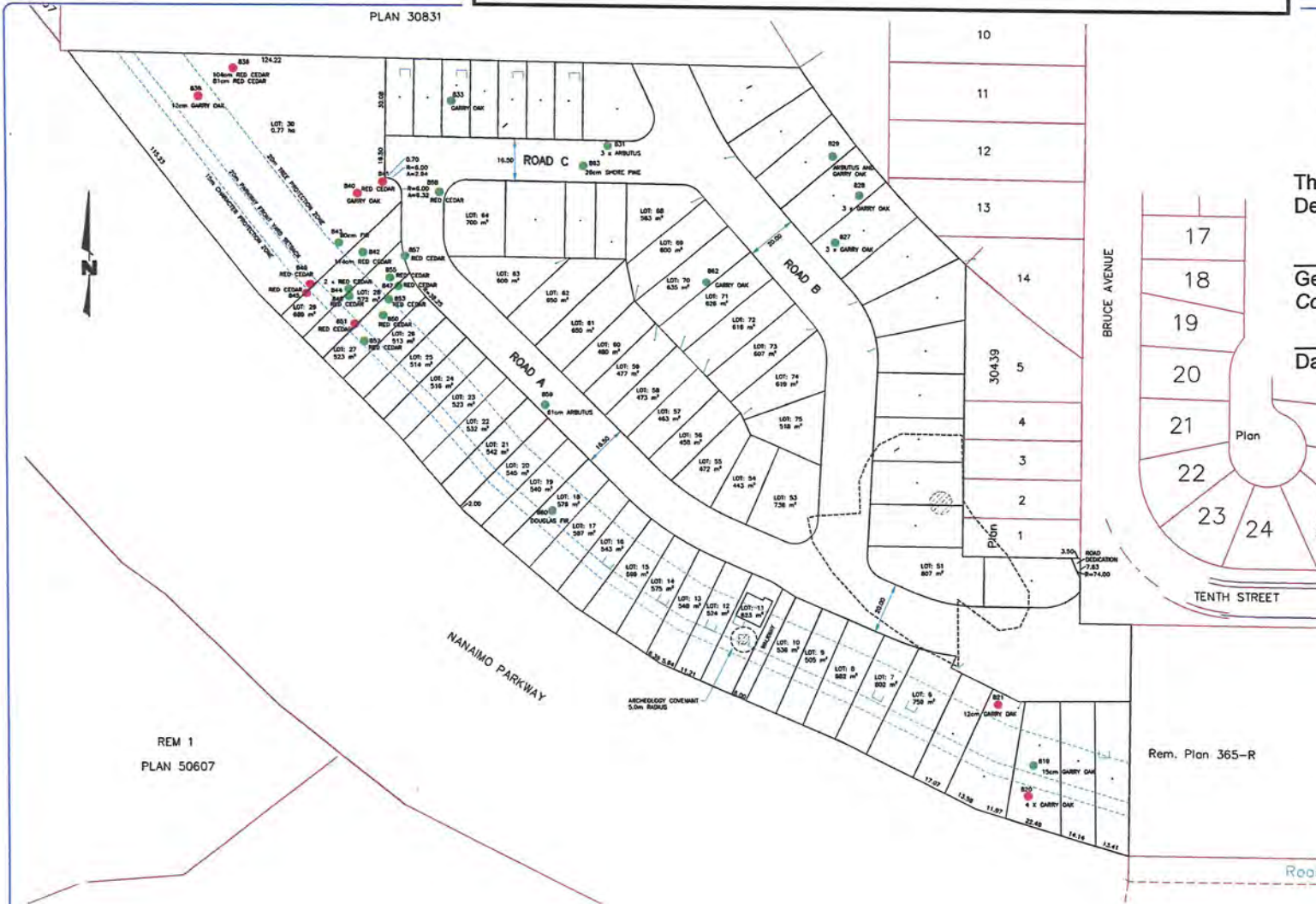
REFER TO THE FOLLOWING DOCUMENTS:
TETH AND ASSOCIATES ENVIRONMENTAL SERVICES - SOFTLIGHT TREE SURVEY AND RAPTOR PERCH USE ASSESSMENT ON 1099 BRUCE AVENUE, NANAIMO - DATED JULY 6, 2013
ANDREWS ENVIRONMENTAL SERVICES LTD - ARCHEOLOGICAL IMPACT ASSESSMENT FOR 1099 BRUCE AVE., NANAIMO, BC DATED MARCH 4, 2013
BRIEFFIELD ASSOCIATES - 1099 BRUCE AVENUE, NANAIMO - PROPOSED RESIDENTIAL DEVELOPMENT ASSESSMENT OF ROAD & RAIL HOUSING DATED OCTOBER 24, 2013
KELISE CHAMBERLAIN LANDSCAPE DESIGN AND CONSULTING - LANDSCAPE PLAN L1 DATED NOVEMBER 2013

This is Schedule D referred to in the Development Permit

General Manager
Corporate Services

Date

2014 April - 11



REM 1
PLAN 50607

Rem. Plan 365-R

LEGAL DESCRIPTION	SUBDIVISION OF LOT 1, SECTION 1, NANAIMO DISTRICT, PLAN 50607, EXCEPT PART IN PLANS W91106 AND VPE4985			
PROJECT DATUM	ELEVATIONS ARE GEODETIC AND TO MAD83			
	NO.	REVISION DESCRIPTION	DATE	CHECK APPR.
	4	TREES/ARCHEOLOGY/ACOUSTIC SCREENS - REVISED	FEB 7/14	
	3	TREES/ARCHEOLOGY/ACOUSTIC SCREENS	NOV 28/13	
	2	BUILDING ENVELOPES	OCT 8/13	
	1	ISSUED FOR DEVELOPMENT PERMIT APPLICATION	AUG 16/13	

JEA J.E. ANDERSON & ASSOCIATES SURVEYORS -- ENGINEERS
1A - 5411 SHENKIN ROAD, NANAIMO, B.C. V9T 2H1
TEL: 250 - 756 - 4631 FAX: 250 - 756 - 4660
E-MAIL: nanaimo@jeanderson.com

JURISDICTION	CITY OF NANAIMO	CLIENT	0766010 BC LTD
SCALE	1:750 HORIZ. 1/4" VERT.	PROJECT	1099 BRUCE AVENUE TENTATIVE SUBDIVISION PLAN COMPREHENSIVE OVERLAY
DESIGN	JMT		
DRAWN	JMT		
SHEET FILE	87417 01 SA5		
			SHEET 1 OF 1

Development Permit No. DP000800
1099 Bruce Avenue

Schedule F

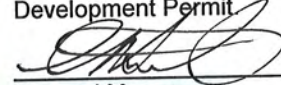
Vegetation Management Plan

1099 Bruce Avenue, Nanaimo BC

March 6, 2014

**Vegetation Management Plan
L2 of 2**

This is Schedule F referred to in the
Development Permit



General Manager
Corporate Services

2014 Apr 11

Date



Prepared by

Keltie Chamberlain, Landscape Design & Consulting

3160 Robin Hood Drive, Nanaimo, BC V9T 1P1

Phone: (250) 802-0436 Fax: (250) 729-0810

Email: keltiecham@shaw.ca



TABLE OF CONTENTS

1.0 INTRODUCTION

- 1.1 Site and Location Description
- 1.2 Goals and Objectives

2.0 VEGETATION COMMUNITIES AT BRUCE

- 2.1 Significant Trees / Tree Survey
- 2.2 Tree Protection
- 2.3 Identified Native Plants
- 2.4 Transplanting / Storage

3.0 NON-NATIVE AND INVASIVE SPECIES MANAGEMENT

- 3.1 Controls and Removal
- 3.2 Monitoring
- 3.3 Schedule of Monitoring

4.0 MANAGEMENT STRATEGIES

- 4.1 Landscape Planting
- 4.2 Soils
- 4.3 Mulches
- 4.4 Parkway Trail

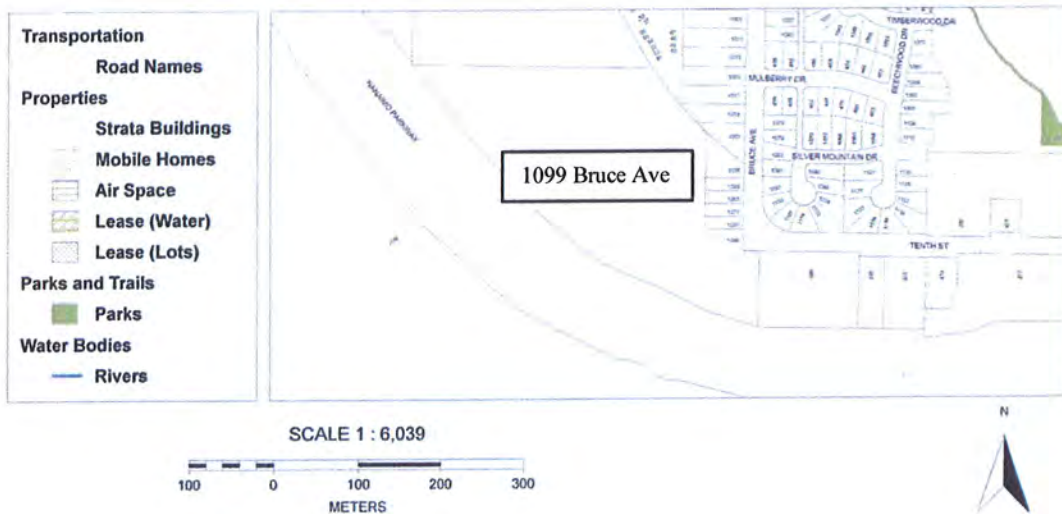
5.0 PLAN AMENDMENT AND REVIEW

1.0 INTRODUCTION

1.1 Site and Location Description

1099 Bruce Avenue is located at the south end of Bruce Avenue. The subject property is adjacent to the Nanaimo Parkway on the southwest border. The Nanaimo Parkway Trail is located between the Parkway and the Nanaimo Parkway Character Protection Zone and it runs the length of the property.

City of Nanaimo



The site has existing trees and under storey of native plants along approximately 85 percent of the Parkway Character Protection Zone. The trees occurring include Western Red Cedar, Douglas Fir, Alders, Cascara, Willow, Arbutus, and Garry Oak which occur in the different microclimates found on the site.



Figure 1. Nanaimo Parkway Trail

The approximate remaining 15 percent of the Parkway Trail frontage has a large berm of un-stratified fill in place.



Figure 2. View to berm with Parkway located behind

There are small sections along the treed portion of the Parkway Trail which have invasive species occurring and areas which have been used as access in the past for small off road vehicles such as ATVs.

1.2 Goals and Objectives

The Vegetation Management Plan (VMP) has been developed in order to provide direction in addressing the existing and proposed vegetation and its establishment in the different microclimates that exist on the site. The microclimates are referred to as wetland area and well drained area on the Landscape Plan.

The goal of VMP in the Parkway Character Protection Zone is to ensure the protection and the perpetuation of the diverse naturally occurring vegetation. The Character Protection Zone of the Nanaimo Parkway is to remain a wooded area and where the existing landscaping is deficient the new infill planting will reinforce this character.

The existing vegetation is to be restored, and where necessary protected during future development. The VMP helps to eliminate and reduce the threat of invasive exotic species, including Himalayan Blackberry, Scotch Broom, and Daphne.

A further objective is to reduce pedestrian hazard associated with vegetation and provide safe connectivity to the existing Nanaimo Parkway Trail. CPTED principals have been used to balance safety with a livable neighbourhood through vegetation.

2.0 VEGETATION COMMUNITIES AT 1099 BRUCE AVE

2.1 Significant Trees and Tree Survey

There are twelve significant trees located in the Parkway Character Protection Zone which are noted in Toth and Associate's Environmental Services report. The additional remaining significant trees are noted as well and replaced with new plantings in the Landscape Plan.



Figure 3. Toth and Associates Environmental Services – Significant Tree locations

2.2 Tree Protection

Significant trees shall remain in place in the Parkway Character Protection zone. Fencing is to be placed to enclose tree root zones where grading is to occur in adjacent spaces during future development.

2.3 Identified Native Plants

The site includes the following native trees and understory in the existing vegetation.

Common Name	Scientific Name
Douglas Fir	<i>Psuedotsuga menziesii</i>
Arbutus	<i>Arbutus menziesii</i>
Western Red Cedar	<i>Thuja plicata</i>
Big Leaf Maple	<i>Acer macrophyllum</i>
Red Alder	<i>Alnus rubra</i>
Garry Oak	<i>Quercus garryana</i>
Shore Pine	<i>Pinus contorta</i> var. <i>Contorta</i>
Black Cottonwood	<i>Populus balsamifera</i>
Willow	<i>Salix</i> ssp.
Cascara	<i>Rhamnus purshiana</i>
Salal	<i>Gaultheria shallon</i>
Dull Oregon Grape	<i>Mahonia nervosa</i>
Tall Oregon Grape	<i>Mahonia aquifolium</i>
Ocean Spray	<i>Holidiscus discolor</i>
Sword Fern	<i>Polystichum munitum</i>
Bracken Fern	<i>Pteridium aquilinum</i>
Thimble Berry	<i>Rubus parviflorus</i>
Salmon Berry	<i>Rubus spectabilis</i>
Red Huckleberry	<i>Vaccinium parvifolium</i>
Red Osier Dogwood	<i>Cornus stolonifera</i>
Stink Currant	<i>Ribes bracteosum</i>
Hardhack	<i>Spiraea douglasii</i> ssp.
Saskatoon	<i>Amelanchier alnifolia</i>
Indian Plum	<i>Oemleria cerasiformis</i>
Pacific Ninebark	<i>Physocarpus capitatus</i>
Red Elderberry	<i>Sambucus racemosa</i>
Common Snowberry	<i>Symphoricarpos albus</i>

The zone contains a variety of herbaceous terrestrial plants including Camas bulbs, Camassia, in the open meadow areas which are located in Madrone's report pertaining to the ecological assessment (2008) and noted as H30 in P23. The Madrone report is included in Toth and Associates Significant Tree survey, 2012. Ecosystem mapping produced by Madron for the property is included as Figure 4 below.

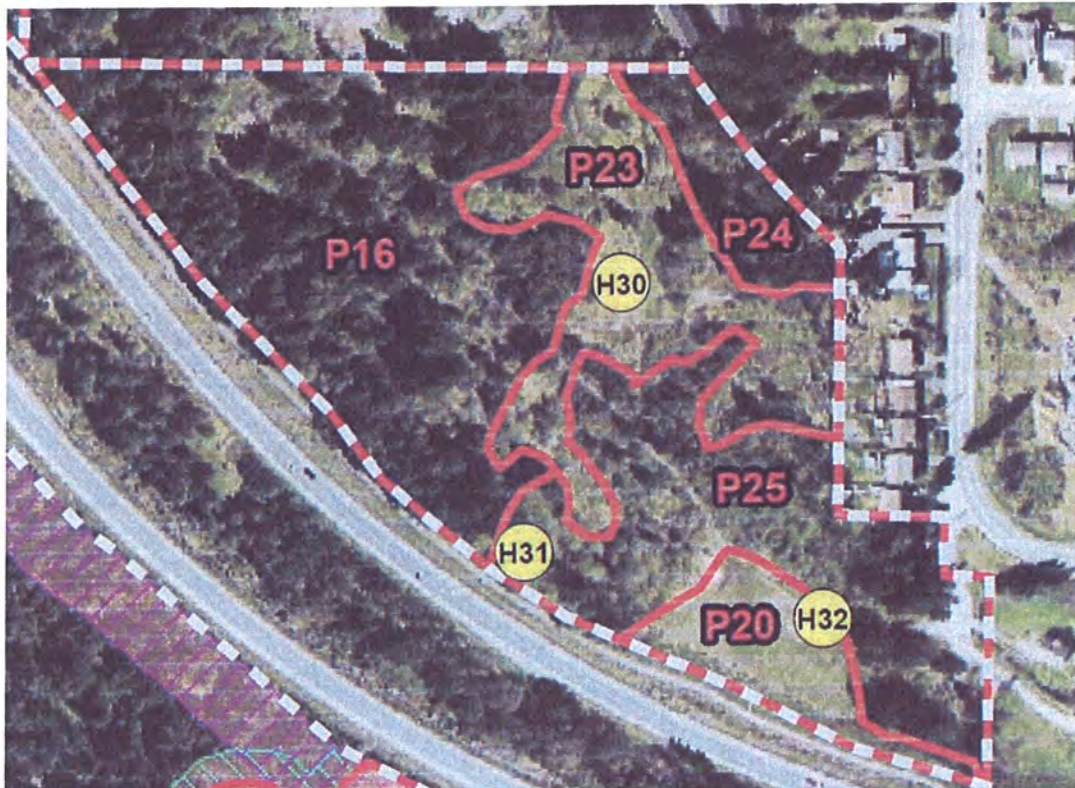


Figure 4 Madrone Environmental Services Ltd ecology assessment

2.4 Transplanting and Storage

The proposed development contains young native trees, shrubs, and herbaceous plant material that are to be transplanted to the open bermed area for naturalization and restoration.

The plant salvage is to take place in the fall, early dormant season, or late winter in order to avoid the excessive stress of transplanting.

The area H30 in Figure 4 contains shallow soil on bedrock. The Camas bulbs within H30 shall be salvaged and transplanted and the remaining soil is to be removed by

machine scraping in order to retain any further Camas bulbs. The soil will be placed on the slopes of the berm to re-vegetate with the native plant material.

3.0 NON-NATIVE AND INVASE SPECIES MANAGEMENT

3.1 Controls and Removal

Non-Native species identified in Character Protection Zone

Common Name	Scientific Name
Himalayan Blackberry	Rubus discolor
Scotch Broom	Cytisus scoparius
Domestic Cherry	Prunus ssp
Common Hawthorn	Crataegus monogyna
Spruce Laurel	Daphne

Himalayan Blackberry

Young plants can be removed with a spade, making certain to remove all of the root system. Remove the plants before seeding. More mature plants need to be pruned and cut back in order to remove the root system with a spade. Repeat as re-sprouting can occur. Remove cut material. July is a good month for removal.



Scotch Broom

Best: Control young plants before flowering in order to prevent seed development. Pull small plants out of the ground taking care not to lift the soil in roots. Large plants should be cut off at ground level. Do not drop seeds into planting area.



Common Hawthorn

Pull young seedlings by hand when the soil is moist. Older trees should be cut down at the base. Do not cut when fruit / berries have set. Roots and cuttings should be removed from site.



Daphne

Pull small plants by hand wearing gloves. The bark, sap and fruit contain toxins that irritate the skin. Do not disturb or lift the soil in the roots.

Cut larger plants to the ground (in summer) before seeds form and disperse. Re-sprouting can occur and the pruning should be repeated. Used a spade blade to destroy / cut up the remaining stem.



All material removed from site requires proper disposal to reduce the spread of the invasive species.

3.2 Monitoring

An objective of the VMP is to allow for natural processes in the Character Protection Zone to continue. Active management of the existing coniferous forest is not anticipated; however the restored planting areas will have prescriptions implemented and evaluated month by month.

Newly planted areas will be monitored on a monthly basis during the first year and on a quarterly basis the second year of the two-year establishment and maintenance period. See the following 3.3 Schedule of Monitoring.

The required maintenance level in order to remove renewing invasives is Level 5 as according to British Columbia Landscape and Nursery Standards (BCLNA). The reporting is to be reviewed by the Landscape Designer.

3.3 Schedule of Monitoring

Year One

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
R	R	R	R, M	R, M, I	R, M, I	R, M, I	R, M, I	R, M, I	R, M, L	R	R

R = Reporting and monitoring

- Landscape Designer will arrange a May and Oct walk through and inspection with the Owner's Landscape Contractor.

I = Irrigating

M = Maintenance

L = Leaves applied where appropriate

- Monthly monitoring / reporting by Owner's Landscape Contractor to Landscape Designer
- Invasive herbaceous plants removed prior to going to seed during growing season without disturbing soil.
- Native herbaceous plants are left to seed naturally and no pruning will take place.
- Natural processes encouraged. No collection of fallen leaves - the leaves will remain in place for provision of nutrients.
- Removal of invasive plant seedlings by hand.
- Fall application of shredded (mowed) leaves as mulch around tree bases and as added nutrients. Crowns of plants are not to be buried.

Year Two

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		R		M, I	R, M, I	M, I	M, I	R, M, I	M, L		R

R = Reporting and monitoring

- Landscape Designer will arrange a May and Oct walk through and inspection with the Owner's Landscape Contractor.

I = Irrigating

M = Maintenance

L = Leaves applied where appropriate

- Quarterly monitoring / reporting.
- Invasive herbaceous plants removed prior to going to seed without disturbing soil.
- Native seedlings to be identified and left in place. Trained Horticulturist to ensure native plants are encouraged to reproduce and grow/spread. Native herbaceous plants are left to seed naturally and no pruning will take place.
- Natural processes encouraged. No collection of fallen leaves - the leaves will remain in place for provision of nutrients.
- Removal of invasive plant seedlings by hand.
- Fall application of shredded (mowed) leaves as mulch around tree bases and as added nutrients. Crowns of plants are not to be buried.

4.0 MANAGEMENT STRATEGIES

4.1 Landscape Planting

All newly planted areas shall be prepared and executed according to the BC Landscape and Nursery Association Standards, latest edition.

TABLE 14-10: RECOMMENDED MAINTENANCE PROCEDURES & FREQUENCIES Part 5 of 5												
<i>Maintenance Level 5. BACKGROUND</i>												
<i>Procedure</i>	<i>Schedule (Month)</i>						<i>Frequency</i>					
	J	F	M	A	M	J		J	A	S	O	N
General:												
Inspection			/				/					Semi - annually
Litter Removal	•				•			•			•	As necessary
Reporting			/				/					Semi - annually
Soil Testing	•											To diagnose problems
Lawns:												
Fertilize												Not usually required
Lime												Not usually required
Pest Control												Prevent spread to adjacent areas
Repair												Rectify deterioration
Trim												Not usually required
Water												Not usually required
Weed Control												See table 14 -7
Trees / Shrubs:												
Fertilize												Not usually required
Pest Control												Prevent spread to adjacent areas
Prune	•										•	As required, to ensure safety
Water												Not usually required
Weed Control												See table 14 - 7

// indicates required maintenance procedures. ♦♦ indicates maintenance procedures to be done if necessary

Figure 5 BC Landscape and Nursery Association Maintenance Levels

Table 14-7: WEED CONTROL STANDARDS	
<i>Maintenance Level</i>	<i>Standard</i>
1. WELL-GROOMED	No weeds permitted to grow larger than 25 mm (1") in width; remove all weeds when observed. The ability to perform weed control (both mechanical and chemical) must be present during each visit. Weeds to be removed prior to potential seed distribution.
2. GROOMED	No weeds are permitted to grow larger than 50 mm (2") in width. Kill or remove all apparent weeds when observed or at next regular visit (within two weeks). The ability to perform weed control (both mechanical and chemical) must be present during every second visit. Weeds to be released prior to potential seed distribution.
3. MODERATE	Weeding must be done when isolated small weed patches have a width of 150 mm (6"). Weeding (mechanical or chemical) shall kill or remove 90% of weeds or the process shall be repeated within the next two site visits. <i>NOTE: "isolated" means a weed distribution no greater than two patches per 5 M².</i>
4. OPEN SPACE / PLAY	Weeding must be done when isolated weedy patches have a width of 300 mm (12"). Weeding (mechanical or chemical) shall kill or remove 80% of weeds or the process shall be repeated within one month. <i>Note: "isolated" means a weed distribution no greater than four patches per 5 M² (54 square feet).</i>
5. BACKGROUND and 6. SERVICE & INDUSTRIAL	No limitations on weeds, except that spread of weeds and (especially noxious weeds) to adjacent areas must be prevented. Control height and spread to prevent interference with activities. If better appearance is desired upgrade to Level 4.

Figure 6 BC Landscape and Nursery Association Weed Control Standards

1099 Bruce Avenue Plant List

Key	Qty(max)	Botanical Name	Common Name	Spacing	Size
TREES					
A	55	<i>Acer macrophyllum</i>	Big-Leaf Maple	3 m on centre	2 m
Ar	35	<i>Alnus rubra</i>	Red Alder	1 m on centre	2 m
Am	35	<i>Arbutus menziesii</i>	Arbutus	3 m on centre	#3
Cn	25	<i>Cornus nuttallii</i>	Pacific Dogwood	2 m on centre	6 cm
Pcc	60	<i>Pinus contorta</i> var <i>contorta</i>	Shore Pine	3 m on centre	2 m
Pm	60	<i>Pseudotsuga menziesii</i>	Douglas Fir	3m on centre	2 m
Pm	40	<i>Pseudotsuga menziesii</i>	Douglas Fir	3m on centre	#1
Q	30	<i>Quercus garryana</i>	Oregon White Oak	2 m on centre	#3
Tp	30	<i>Thuja plicata</i>	Western Red Cedar	3 m on centre	2 m
Tp	35	<i>Thuja plicata</i>	Western Red Cedar	3m on centre	#1
Sh	55	<i>Salix hookeriana</i>	Hooker's Willow	3 m on centre	#1
SHRUBS – PERENNIALS					
Am	225	<i>Achillea millefolium</i>	Yarrow	450 mm	#1/seed
Aa	125	<i>Amelanchier alnifolia</i>	Saskatoon	1 m on centre	#1
As	Na	<i>Aster subspicatus</i>	Douglas' Aster	Na	Seed
Dp	225	<i>Dicentra Formosa</i>	P. Bleeding Heart	450 mm	10 cm
Gs	125	<i>Gaultheria shallon</i>	Salal	450 mm	#1
Hd	225	<i>Holodiscus discolor</i>	Oceanspray	1 m on centre	#1
Ln	Na	<i>Lupinus nootkatensis</i>	Nootka Lupine	Na	Seed
Ma	125	<i>Mahonia aquifolium</i>	Oregon Grape	1 m on centre	#1
Mn	125	<i>Mahonia nervosa</i>	Dull Oregon Grape	1 m on centre	#1
Pc	75	<i>Physocarpus capitatus</i>	Pacific Ninebark	1 m on centre	# 1
Pm	95	<i>Polystichum munitum</i>	Sword Fern	1 m on centre	#1
Rg	175	<i>Rosa gymnocarpa</i>	Baldhip Rose	1m on centre	#1
Rn	175	<i>Rosa nutkana</i>	Nootka Rose	1 m on centre	#1
Rp	75	<i>Rubus parviflorus</i>	Thimbleberry	1 m on centre	#1
Rs	75	<i>Rubus spectabilis</i>	Salmonberry	1 m on centre	#1
Sa	155	<i>Symphoricarpos albus</i>	Common Snowberry	1 m on centre	#1
Vo	75	<i>Vaccinium ovatum</i>	Evergreen Huckleberry	1 m on centre	#1
Vp	75	<i>Vaccinium parvifolium</i>	Red Huckleberry	1 m on centre	#1

Parkway Character and Tree Protection Zones

Existing native trees and understory are to be left undisturbed in the 15 metre Parkway Character Protection Zone. In the 20 m Tree Protection Zone all significant trees are to be identified (see also Tree Management Plan) and protected throughout development and retained wherever possible.

Open Areas on Nanaimo Parkway Trail at the property line included in the 15 m Character Protection Zone are to be re-established with native plant material suitable to the existing and post development microclimates with the addition of possible acoustic fencing at the property line in sections.

- A. Wetland area - Western Red Cedar, Douglas Fir, Willow spp., Alders, Nine Bark, Cascara, Sword Ferns, Tall Oregon Grape, Red Huckleberry
- B. Well drained area – Douglas Fir, Arbutus, Garry Oak, Willow spp., Alders, Ocean Spray, Dull Oregon Grape

The pedestrian walkway is to be located next to the proposed multi-family site which will connect the Nanaimo Parkway Trail to the internal road. The 3 m wide paved walk will be cut through the bermed area. The existing character of the natural environment will be used as a guide to provide a tiered and stacked rock setting that appears as a strata of rock.

Plantings in the pockets of soil within the tiers will include native grasses that will dominate in the establishment period. Once the landscape is established the dominant feature will be the native evergreen and deciduous trees with understory. The strata of rock will be less visible but still a significant visual influence of the landscape.

PLANTING NOTES: Re-vegetated areas on the existing berm are to be irrigated for the establishment period of two years. All plantings are to have established within the two year maintenance period or be replaced. A success rate of 90% is required in the established planting upon inspection of plantings at end of maintenance period. Open areas are to be seeded between plants with native clump-forming grass seed mixture and native perennials.

All planted areas will have a minimum of 150 mm mulch/compost applied. The existing soil and native plants on the semi-exposed rock beds on site are to be used on the existing berm.

4.2 Soils

An on-site representative sample of soils is to be tested by a reputed soil analysis lab. The on-site topsoil is to be modified to meet the requirements set out for Level 7 "Restoration" areas according to BCLNA

4.3 Mulches

The on-site soil may require additional commercially prepared compost incorporated and it is to be free from weed seeds, or other plant reproductive parts

During maintenance (see schedule) an autumn application of shredded leaves will be applied to planting areas to increase nutrients and encourage natural processes.

4.4 Parkway Trail

The 3 metre wide asphalt trail way that connects the internal roads of the future development to the existing Nanaimo Parkway Trail is to be maintained at a higher level. BCLNA weed control standard (see Figure 6) of 3. Moderate will be used to maintain the new pedestrian trail way through the Character Protection Zone.

5.0 PLAN AMENDMENT AND REVIEW

The Vegetation Management Plan for 1099 Bruce may be reviewed as required to make revisions required for changing issues or conditions. Additions which will help to ensure the plantings continue in establishment may be considered at a later date.

Prepared by:



Keltie Chamberlain, Landscape Design & Consulting
March 6, 2014





WakefieldAcoustics
CONSULTING ACOUSTICAL ENGINEERS

File No. 13-1865-1

Date: October 24, 2013

Mr. Alan Steeves

6203 Parktree Ct.
Surrey, BC
V3S 1Z7

This is Schedule G referred to in the
Development Permit


General Manager
Corporate Services

2014 Apr 11
Date

**Regarding: 1099 Bruce Avenue, Nanaimo – Proposed Residential Development
Assessment of Road and Rail Noise**

Dear Mr. Steeves

Further to our proposal of April 26, 2013, a residential noise assessment of the proposed 1099 Bruce Avenue development adjacent the south end of the Nanaimo Parkway (Highway 19) has been completed. The assessment commenced with 24-hour monitoring of road & rail traffic noise at three representative locations within the property. The resulting 24-hour averages have been compared with the widely recognized guidelines for community noise exposures as established by the Canada Mortgage and Housing Corporation (CMHC). The results of this assessment, as well as recommendations, are provided herein to insure outdoor/indoor residential noise exposures within the development meet CMHC guidelines.

CMHC ROAD & RAIL NOISE RECOMMENDATIONS

The CMHC guidelines [1] have been adopted for this project. The guidelines establish maximum indoor residential noise levels based on the average daily noise exposure, or $L_{eq}(24)$, which are:

- $L_{eq}(24)$ 35 dBA for Bedrooms,
- $L_{eq}(24)$ 40 dBA for Living, Dining, Recreation Rooms,
- $L_{eq}(24)$ 45 dBA for Kitchens, Bathrooms, Hallways, Utility Rooms.

CMHC recommends $L_{eq}(24)$ 55 dB for Outdoor Recreation Areas, which in this case could be outdoor patio and porch areas.

The CMHC recommends that road & rail noise control at residences should meet the guidelines over the 10 year design horizon. For residential developments adjacent highways, noise control measures should be based on the Average Annual Daily Traffic (AADT) 10 years into the future.

Where noise levels exceed $L_{eq}(24)$ 55 dBA outside noise sensitive spaces, CMHC requires alternate sources of ventilation to permit residents to close their windows.

NOISE MONITORING AND THE $L_{EQ}(24)$ 'S

Continuous 24-hour noise monitoring was conducted at three key locations (see Figure 1). Site 1 was located at the approximate location of the southwestern facades of a future first row residence behind the 3 m high berm at the south corner of the property (see Figure 1). There was no line-of-sight to Highway 19 traffic except perhaps to the northwest.

Site 2 was located at the approximate location of the southwestern façade of a future first row residence facing directly onto the northbound lanes of Highway 19. There was no line-of-sight to the southbound lanes, which were located beyond a large rocky ridge formation (see Figure 2).

A third monitoring site was located at the approximate location of a second row residence (see Figure 1) with potential rail noise exposure. The Southern Railway of Vancouver Island (SVI) 1 right-of-way (ROW) was located 1300 m to the northeast of the Bruce Avenue side of the property.

Noise monitoring was conducted with three Larson-Davis Community Noise Analyzers (two Model 820's and one Model 812). These digital instruments comply with ANSI S1.4 [1983] standards for Type 1 Sound Level Meters and are capable of sampling the ambient sound level many times per second and storing the resulting sound level data for subsequent analysis and display in user selectable time intervals. These instruments were set to store the equivalent sound level, or L_{eq} , and the maximum sound level, or L_{max} , both expressed in units of A-weighted decibels, or dBA, and both in fifteen-minute and one-minute time intervals. Statistical noise level descriptors, or "Exceedance Levels", e.g. the L_{50} and L_{90} , were also collected in each 15 minute interval. These represent, respectively, the sound levels that were exceeded for 50% and 90% of the time. The L_{50} represents the median sound level while the L_{90} is a measure of the background sound level that exists during the quietest periods.

The Larson-Davis sound level meters were field-calibrated before and after each monitoring period using a Larson-Davis Acoustic Calibrator Model CA200. The error margin of measurements is considered to be ± 0.5 dBA.

The microphones were mounted 1.5 m above local ground level on poles at the setbacks from Highway 19 listed in Table 1.

¹ Formerly the E&N Railway ROW.



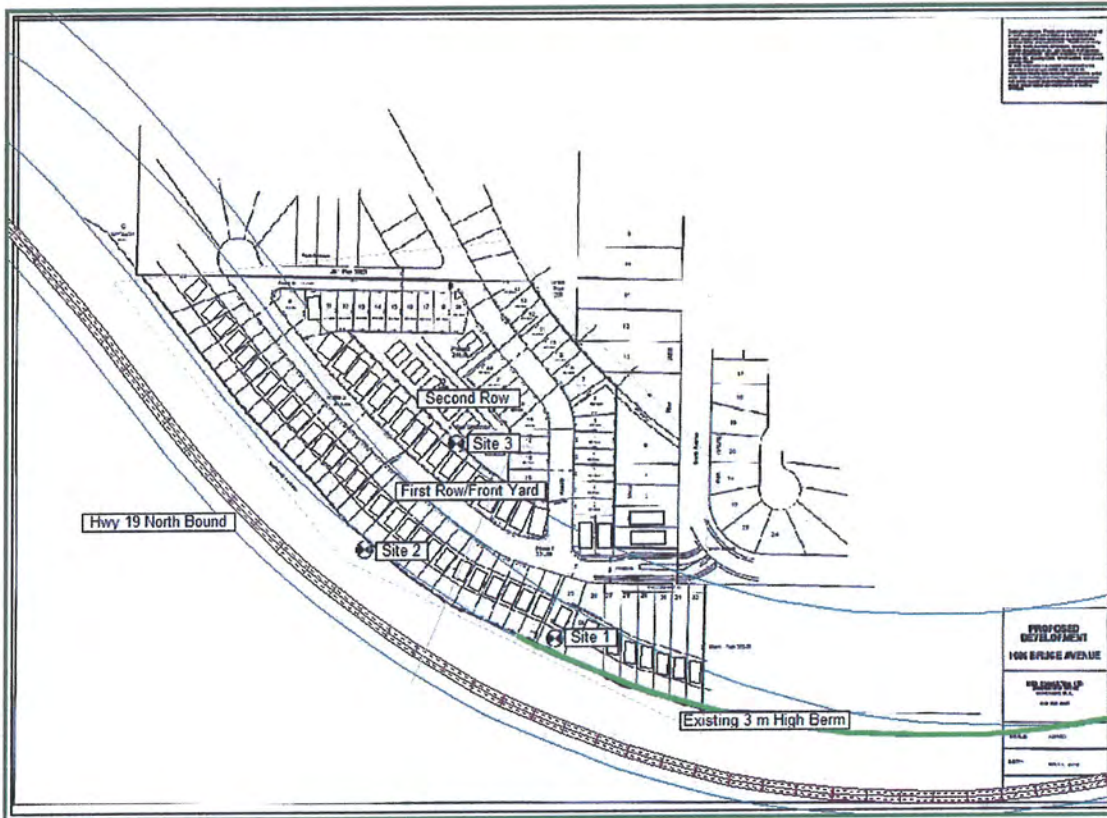


Figure 1: 1099 Bruce Avenue, Nanaimo, B.C.



Figure 2: Photo of the Two Northbound Lanes showing Rocky Ridge Formation Separating the North and Southbound Lanes

NOISE MONITORING RESULTS

2013 Daily Average Noise Levels, the $L_{eq}(24)$'s

The representative average daily noise level monitoring results for Sites 1, 2 and 3 are presented in Table 1.

Table 1: Average Daily Noise Levels Measured May 30 to 31, 2013

Location	Setback (m)	$L_{eq}(24)$ (dBA)
Site 1	29 ¹	57.0
Site 2	50 ²	62.6
Site 3	125 ²	(55.2 ³)

¹ The setback of the monitoring site was measured from the centerline of existing 3 m high berm in southern corner of 1099 Bruce Avenue.

² Setback of monitoring site, measured from the centerline of the northbound curb lane of Highway 19.

³ The $L_{eq}(24)$ at Site 3 was estimated due to an equipment malfunction. The estimate was based on a few hours of data.

The $L_{eq}(24)$'s quantify the noise exposures at the three representative locations. The ambient noise environment was considered dominated by Highway 19 Nanaimo Parkway traffic noise and with no appreciable influence from movements on the SVI.

The SVI is believed to be primarily used by the VIA Rail passenger service a few times a day. Due to the large setback of units on the Bruce Avenue side of the property from the SVI ROW the noise level of potential level crossing warning signals (air horns) was estimated to be only 70 dBA assuming acoustically soft ground [3]. Since the warning horn level is comparable to levels of numerous heavy vehicle pass-bys, the VIA Rail service is considered to have a negligible effect on the $L_{eq}(24)$.

The pre-project noise measurements provided in Table 1 establish a baseline² for the project which is used for noise model calibration purposes in the following section.

CMHC ASSESSMENT

Baseline Noise Modeling

A noise model was prepared for the proposed 1099 Bruce Avenue development using the CadnaATM 3D noise propagation software by Datakustiks and the NMPB-Routes-96 French Method for Road Traffic Noise Prediction. The pre-project noise model was based on the existing traffic data provided in Table 2 in the next section.

The sources of the existing traffic data were as follows:

² The term *baseline* is used interchangeably with *pre-project* in this report.



- The Ministry of Transportation and Infrastructure (MoT&I) provided the 2012 Average Annual Daily Traffic (AADT) from Permanent Count Site P-12-2NS-NY north of Cedar Road/Highway1/Highway19,
- The heavy vehicle mix was estimated from manual traffic counting from 1100 to 1200 hours on Friday May 31, 2013.

The plans of the proposed 1099 Bruce Avenue Development were provided by the design team. Relevant existing horizontal and vertical highway alignments were provided by online orthographic imagery and digital terrain model. The terrain between the highway and the residences was modeled using sample height points for the existing ground provided by the online digital terrain model [2]. The height of the existing berm was estimated in the field.

The ground absorption factor G^3 used in the baseline noise model was adjusted until the model's predicted $L_{eq}(24)$'s were in agreement, to within 0.5 dBA, with the measured $L_{eq}(24)$'s at the three monitoring sites. CadnaA provides user adjustable ground absorption in the range 0 (hard) to 1 (soft). Calibration was achieved with a ground absorption factor of 0.6 selected, consistent with values used on numerous previous highway projects.

Prediction of 2025 $L_{eq}(24)$'s

As required by the CMHC, the future noise model was used to forecast the $L_{eq}(24)$'s for the design horizon year 2025 or 10 years after nominal project completion (2015), accounting for anticipated traffic volume growth and heavy truck mix increases over the decade (see Table 2). The future noise model incorporated first and second row 2-storey single-family detached homes. Windows on the second floor were assumed 4 m above local ground level. Buildings were approximately centered on the lot plans provided.

The future noise model was based on the following traffic conditions (volumes, heavy truck mixes and speeds):

- The forecast 2025 AADT,
- The 2025 heavy truck mix was assumed to remain at 6%,
- No change in the Highway 19 alignment.

It was also assumed that in the horizontal and vertical alignments of Highway 19 would not be altered in the foreseeable future.

³ The ground absorption factor G is used in CadnaA/NMPB to approximate the ground effect component of the excess attenuation. As sound energy propagates outdoors over the ground attenuation occurs in proportion to the inverse square of the distance. This attenuation mechanism is called geometric spreading. However, excess attenuation can also occur by other mechanisms, notably the ground effect. The ground effect occurs when noise source and receiver are close to acoustically soft ground such that a direct sound wave traveling parallel to the ground can recombine with a sound wave that has been reflected from the ground. Attenuation results since the reflected sound wave will be 180 degrees out of phase with the direct sound wave.

Table 2: Existing and Future Traffic Data for of the Highway 19

Highway 19 Lanes	Traffic Volume AADT (vpd) ¹		Heavy Truck Mix		Posted Speeds (kph)	
	Existing (2013)	Forecast (2025)	Existing (2013)	Forecast (2025)	Existing (2013)	Forecast (2025)
NBC ³	5300 ²	5950	6%	6%	80	80
NBF ³	5300 ²	5950				
SBC ⁴	_5	_5	_5	_5	_5	_5
SBF ⁴	_5	_5				

¹AADT denotes Annual Average Daily Traffic, vpd denotes vehicles per day.

²Or 220 vehicles per hour, based on the 2012 AADT recorded at Permanent Count Site P-12-2N2-NY220 and an annual growth rate of 1% per year (10% per decade as recorded at P-12-2N2-NY from 2003 to 2012).

³NBC and NBF denote Northbound Curb and Northbound Fast lanes, respectively.

⁴SBF and SBC denote Southbound Fast and Southbound Curb lanes, respectively.

⁵Cells containing a dash, "-", are not relevant since the lanes they relate to are located beyond the rock formation separating the NB and SB lanes (see Figure 2).

RESULTS

The baseline noise model's prediction for Site 2 was $L_{eq}(24)$ 63.5 dBA which was within 0.9 dBA of the measured level of 62.6 dBA indicating that calibration of the noise model was achieved.

The future noise model's predictions of 2025 daily average noise levels at locations of interest are presented in Figure 3.

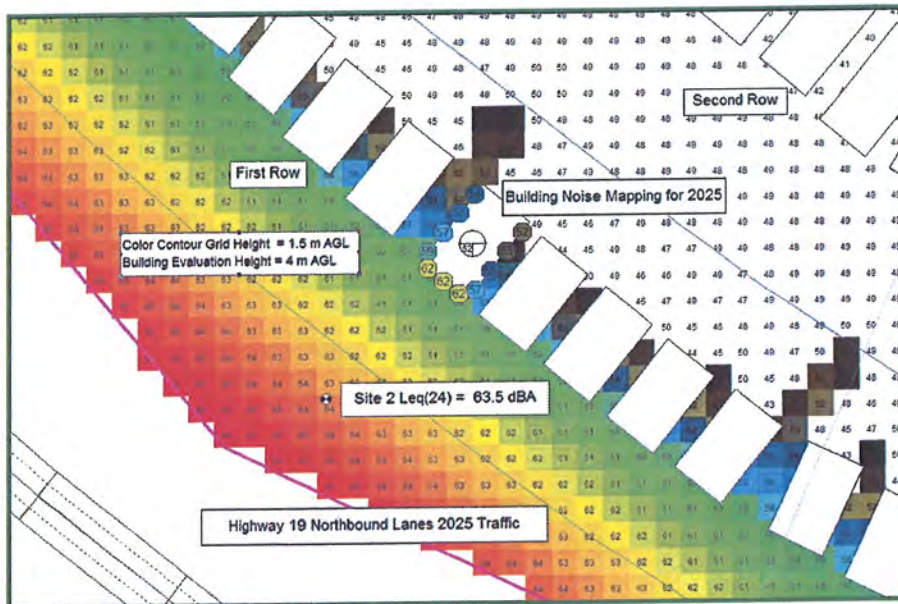


Figure 3: 2025, Building Noise Exposure Map at 4 m AGL and Color Ground Noise Contours at 1.5 m AGL

DISCUSSION OF RESULTS AND RECOMMENDATIONS

Where outdoor levels are found to exceed $L_{eq}(24)$ 55 dBA, the residential building envelope should incorporate assemblies that provide adequate noise insulation to achieve CMHC compliant indoor noise levels. Windows are typically the weakest link in building envelopes.

Operative, i.e. openable, windows are required in most residential applications. This introduces a further challenge and windows with higher than standard STC ratings are often required in meeting the CMHC guidelines.

The 2025 building noise exposure map and color ground noise contours presented in Figure 3 shows that for the southwest façade of the typical first row building evaluated in Figure 3, noise exposures will range from $L_{eq}(24)$ 61 dBA on the ground level floor to $L_{eq}(24)$ 62 dBA on the second floor. Noise exposures on the northwest and southeast facades of the typical building, depicted in Figure 3, were in the mid to upper 50's on the dBA scale.

Based on this forecast, CMHC guidelines would be met with standard envelope construction including:

- Wall sections meeting OITC⁴ 38 or better,
- Operable standard laboratory tested double glazed windows meeting STC⁵ 32 or better,

may be used while meeting the CMHC guidelines.

As mentioned in the introduction, if outdoor noise levels exceed $L_{eq}(24)$ 55 dBA outside noise sensitive spaces, the CMHC requires that home construction provides for an alternate source of ventilation. Vents and other envelope penetrations on southwestern exposures should be acoustically treated.

Future ground level noise levels were found to comply with the CMHC $L_{eq}(24)$ 55 dBA guideline for outdoor recreational areas except for the backyards of the first row units. Noise screens may be employed to create outdoor amenity spaces in backyards. The performance of noise screens has been assessed for the detailed design to ensure that the CMHC $L_{eq}(24)$ 55 dBA is substantially met in such outdoor amenity spaces where feasible (see landscaping plans). It was found that noise screens 2.5 m high x 9.5 m long would largely provide the noise mitigation requirement.

CONCLUSIONS

The existing noise exposures were measured at three representative locations within the propose 1099 Bruce Avenue development site using the CMHC $L_{eq}(24)$ metric. It was found that the noise environment on the property was dominated by the traffic in the northbound lanes of Highway 19. There was negligible influence from the southbound lanes. This would also include rail movements from the SVI ROW.

⁴ OITC stands for Outdoor Indoor Transmission Class.

⁵ STC stands for Sound Transmission Class.

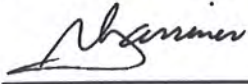


The baseline measurements and MoT&I traffic data were used to prepare a noise exposure forecast for 2025. It was found that the highest noise level of 62 dBA would occur on the southwest exposures of the first row units.

With future outdoor exposure levels in the low 60's on the dBA scale, the degree of noise insulation provided by standard exterior wall assemblies, standard grade windows and doors will be adequate to meet the CMHC guidelines indoors in 2025 at the development. This outcome is believed to be due in part to the shielding of the Highway 19 southbound lanes by the large rocky ridge formation. It is recommended that provisions be made for outdoor amenity spaces of the units as identified in the landscaping plans.

I trust that this has provided the information that you require at this time. Please call me at 250 370-9302 if you have any questions about the above recommendations.

Sincerely,
Wakefield Acoustics Ltd.



Duane Marriner, M.A.Sc., P.Eng.

REFERENCES

- [1] Road and Rail Noise: Effects on Housing, Canadian Mortgage and Housing Corporation (1986).
- [2] Google Earth Nanaimo Image (2009).
- [3] Rail Transit Noise and Vibration, David Towers, HMMH.

**Proposed Front Yard Setback, and
Lot Frontage Variances**

Proposed Parkway Front Yard Setback Variances

Lot Number	Required Front Yard Setback (m)	Proposed Front Yard Setback (m)	Variance (m)
4	20	17	3
5	20	17	3
6	20	17	3
7	20	17	3
8	20	17	3
9	20	17	3
10	20	17	3
11	20	17	3
12	20	17	3
13	20	17	3
14	20	17	3
15	20	17	3
16	20	17	3
17	20	17	3
18	20	17	3
23	20	17	3
24	20	17	3
25	20	17	3
26	20	17	3
27	20	17	3

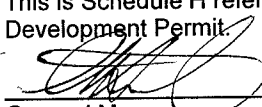
Proposed Lot Frontage Variances

Lot Number	Required Lot Frontage (m)	Proposed Lot Frontage (m)	Variance (m)
44	15	13.5	1.5
45	15	13.8	1.2
46	15	13.8	1.2
61	15	14.5	0.5
69	15	13.7	1.3
70	15	13.5	1.5
71	15	13.5	1.5
72	15	13.5	1.5
73	15	13.5	1.5

This is Schedule H referred to in the Development Permit.

General Manager
Corporate Services

Date


2014 Apr 11