AGENDA INFORMATION		Dept. Manager	GM/ Director	CAO
☑ Regular Meeting	Date: May 27, 2019			
☐ Other:	Date:			

The District of North Vancouver

REPORT TO COUNCIL

May 15, 2019
File: 08.3060.20/079.18

AUTHOR: Susan Rogers, Parks Manager
Robyn Hay, Development Planner

SUBJECT: **DEVELOPMENT PERMIT 79.18 - 1044 Edgewood Road (Handsworth Secondary School)**

RECOMMENDATION

THAT Development Permit 79.18 (Attachment A) for the construction of a new Handsworth Secondary School be issued.

REASON FOR REPORT

Development Permit 79.18 was presented to Council for consideration on April 15, 2019 and Council referred the application back to staff requesting a report back on options for the Handsworth Secondary School replacement track and a review of neighbourhood traffic circulation and parking impacts.

SUMMARY

The proposed construction of a new Handsworth Secondary School triggers an environmental and hazard development permit (DP) with variances that requires Council's consideration. See the staff report dated April 3, 2019 in Attachment B for the proposal and assessment details.

In response to Council's direction, staff engaged a consultant to conduct a conceptual track and field study. The study confirmed that a six-lane track with spaces for field events is feasible within the context of the site. DNV staff met with community track and field representatives to discuss the preliminary outcomes of the study and have agreed in principle to the design, with further refinements forthcoming. As the study progresses, DNV staff will continue to collaborate with representatives from track and field user groups, the community, NVRC and NVSD44.

The NVSD44 also hosted a public meeting on Tuesday, May 7, 2019 to discuss the Traffic Management Plan. NVSD44's Traffic Consultant and DNV staff reviewed the proposed Traffic Management Plan in conjunction with the additional neighbour input which resulted in changes to the design outlined further in this report.

TRACK AND FIELD FEASIBILITY

The track and field feasibility study indicates that a six-lane track with space for field events can be accommodated on site while respecting the environmental and geotechnical setback to the east as well as the parking and drive isle to the west. The track has been designed to the Intentional Association of Athletics Federation (IAAF) standard with a synthetic surface and could include run-out for 100m dash and 110m hurdles, long jump, triple jump, high jump, pole vaulting, shot put circle, hammer throw cage, and javelin throw. The design can incorporate a multi-purpose grass field (64m x 104m) and bleachers.

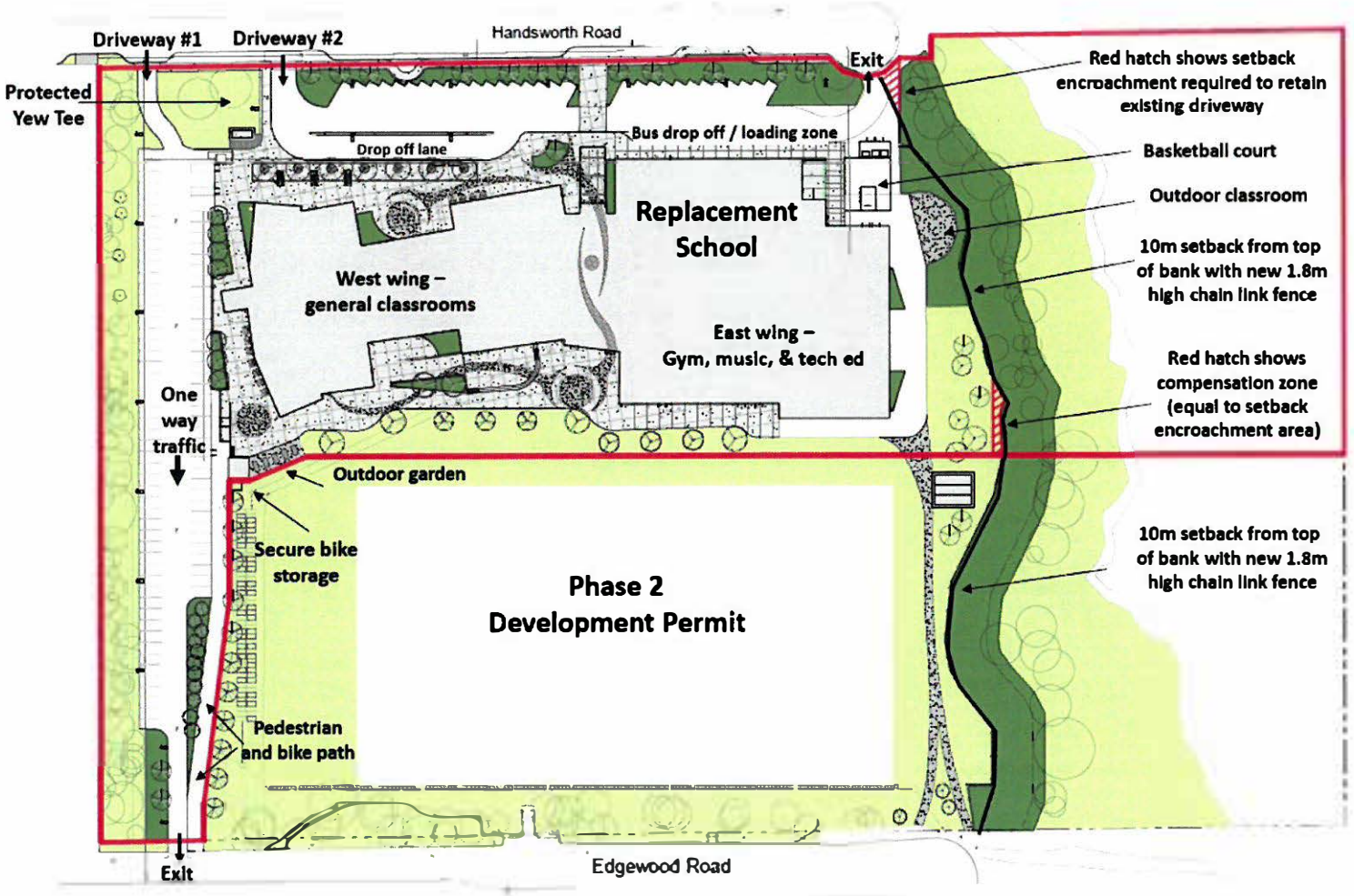
Track and Field Feasibility – Site Context

The potential for external washrooms and equipment storage to serve the community sports user groups was also considered in the feasibility study. Further refinements of the track and field options will be examined and discussed with the community and track representatives. In particular, the cost and space implications for a four-lane track will be explored at the request of track and field representatives.

Due to the proposed new field location, environmental constraints, and steep slopes, an eight-lane track is not feasible.

Timing/Approval Process

DP 79.18 applies only to the area outlined in red (phase one) on the image below. This area includes the building and all parking, circulation and points of access. The south portion of the property, containing the proposed sports field and accommodating space for a track will be subject of a separate development permit at a later date.



The project was separated into two phases so the NVSD44 can start construction of the new school as soon as possible. Construction was scheduled to start in the Fall of 2020 with occupancy in summer 2021 and the new school being ready for the beginning of the school year in September 2021. The NVSD44 has indicated that should occupancy of the new school occur past August 2021, the move-in to the new facility would likely be pushed to the December 2021 holiday break.

Following construction of the new school on the current field site, the old school will be demolished. It is anticipated that the field construction will commence in 2022. Therefore, time is available to resolve the design details and funding approach for phase 2 of the project.

Financial Impacts

At a conceptual level, the capital costs for the track and grass field is approximately 3.5 million dollars including retaining walls, drainage, landscaping, furnishings (i.e. bleachers), irrigation, storage etc.

In the Parks and Open Space Strategic Plan (2012), there is no specific reference to Handsworth Secondary School as a District funded track and field project, however, there is reference to potential partnerships between the District, the City of North Vancouver and School District in addressing the deficiency of sports fields to meet growth of sports. NVSD44 has project funding only for a grass field at this point.

TRAFFIC MANAGEMENT PLAN

Public Input Meeting

The NVSD44 hosted an additional Public Information Meeting to specifically discuss the Traffic Management Plan on May 7, 2019. 170 notices were distributed to homes within a 100 metre radius of the site, via email to all parents of NVSD44 students and residents who signed the petition submitted to Council on April 15, 2019. The meeting was also advertised on two websites (DNV and NVSD44) which have been established for this application.

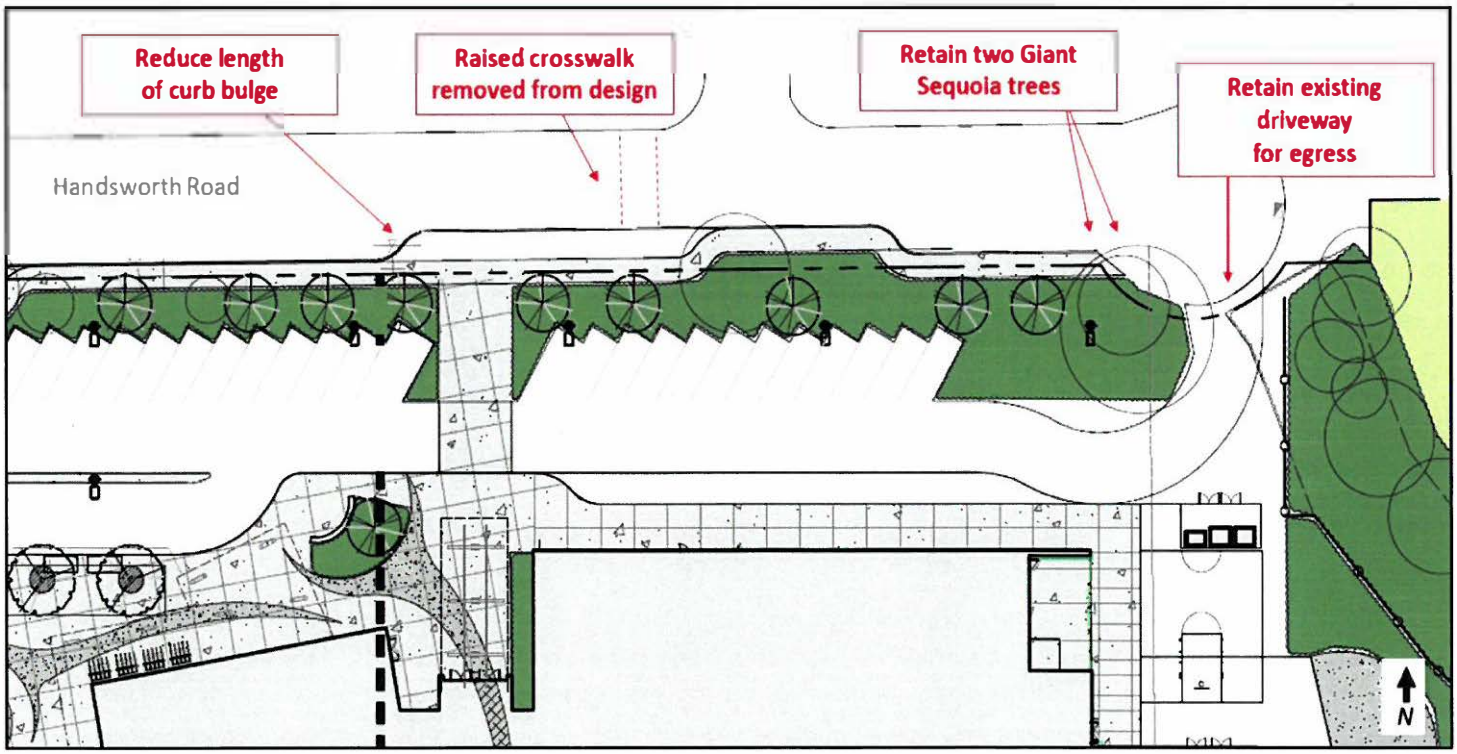
The meeting was attended by approximately 45 people. Fourteen comment sheets have been received. Neighbour comments include:

- Concern over location of exit driveway on Handsworth Road (desire to keep the existing driveway at the end of the cul-de-sac).
- Concern over raised crosswalk at Handsworth Road and Timberline Place intersection.
- Desires for parking restrictions on nearby streets and cul-de-sacs.
- Suggestion to install a traffic signal at Capilano Road and Handsworth Road intersection and the Capilano Road and Edgewood Road intersection.
- Concerns over the three-way stop at Capilano Road and Mount Royal.
- Suggestion to retain some pick-up and drop-off provisions on Edgewood Road.
- Various suggestions for the parking lot parallel to the west property line: provide additional on-site drop-off and pick-up area; provide two-way traffic circulation; retain one-way traffic circulation.
- Concern regarding traffic on local roads.
- Concern that not enough on-site parking is being provided.

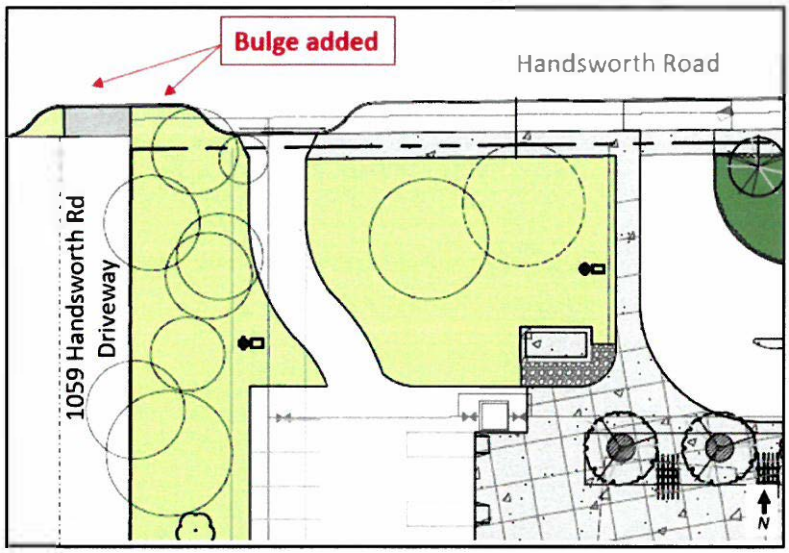
- Questions regarding trades traffic and parking during construction.
- Suggestion to combine the two ingresses on Handsworth Road.
- Questions regarding Handsworth Road width and sidewalks.
- Some residents expressed that the traffic issues were fairly minor and confidence that the traffic issues could be resolved and did not warrant delaying the Development Permit.

In response to the neighbour input the following revisions have been made:

- Retain the existing driveway location at the end of the cul-de-sac on Handsworth Road to reduce potential conflicts points at the Timberline Place intersection (see image below).
    - Note: Approximately 31m^2 (333 sq.ft.) of environmental compensation is required as a condition of DP 79.18. This design also allows for the retention of the two Giant Sequoia trees to the east of the existing driveway.
- Reduce traffic bulges on Handsworth Road to provide more on-street parking (see image below).
- Remove the raised crosswalk at the Handsworth Road and Timberline Place intersection to reduce potential conflict points. Pedestrians can use the crossing located approximately 100m to the west or pedestrian pathway towards the east end of the cul-de-sac (see image below).



- Provide traffic bulge to the west side of the first driveway on Handsworth Road to improve sight lines and prevent drivers from parking too close and blocking the adjacent driveway at 1059 Handsworth Road. It is noted that this will not reduce on street parking as this section of Handsworth Road is already a no parking area with a painted yellow curb (see adjacent image).



- Implement no parking/no stopping restrictions in the Handsworth Road and Edgewood Road cul-de-sacs to improve visibility.
- Maintain and formalise the on-street drop-off/pick-up area on Edgewood Road to reduce pressure on Handsworth Road by serving traffic from the south.
- Capilano Road and Handsworth Road Intersection – traffic at the intersection of Capilano Road and Handsworth Road will be monitored. Traffic signal warrant analysis will be performed annually following completion of the new school. Once warrant criteria is met, this intersection will be converted to a full traffic signal. In the interim a Special Crosswalk (pedestrian activated overhead flashing lights) will be installed.
- Capilano Road and Edgewood Road Intersection – a full traffic signal will be installed at this intersection prior to the completion of the Handsworth School Replacement Project.

A two-way drive isle (in lieu of one-way) and an additional on-site drop-off and pick-up area in the parking lot parallel to the west property line was reviewed by NVSD44 Traffic Consultant and DNV staff but is not recommended due to the increase in potential conflicts, loss of on-site parking and significant tree loss. The trees are required to provide a buffer to the single family properties directly to the west.

Consolidating the two ingress driveways on Handsworth Road was reviewed by NVSD44 Traffic Consultant and DNV staff but is not recommended as this would increase interactions and potential conflicts between pedestrians and vehicles. This would also increase the potential for back-up as any blockage in either parking lots would potentially cause vehicle back-up in the single ingress driveway.

<u>Continued Monitoring</u>

During construction and following completion of the new school, DNV Transportation will monitor traffic patterns, intersection performance, and parking demand, and continue community consultation on the following key items:

- Capilano Road and Montroyal Boulevard Intersection – traffic at the intersection of Capilano Road and Montroyal Boulevard will be monitored. Traffic signal warrant analysis will be performed. Once warrant criteria is met, this intersection will be converted to a full traffic signal.
- Traffic Calming – DNV Transportation will consider additional traffic calming measures to ensure that local roads operate safely, efficiently, and that traffic volumes are within an acceptable range for local road classification.
- Parking Restrictions – DNV Transportation will monitor the appropriateness of parking restrictions, including no stopping zones, drop-off/pick-up zones, and any time restricted zones both on Handsworth, Edgewood, and surrounding local roads. Parking restrictions may also include Resident Parking Policy (RPO) on local roads pending eligibility criteria, and Council approval.
- Vehicle Restrictions – DNV Transportation will monitor traffic circulation patterns along with local road traffic volumes and will consider time of day turning movement restrictions in conjunction with additional traffic calming measures as warranted.

The Handsworth PAC indicated that they would help educate students and drivers on the new traffic circulation and parking arrangement and they encouraged residents to contact the PAC directly to raise any concerns.

On-site Parking

The proposed parking supply (120 spaces) is comparable with existing parking (119 spaces) and is expected to meet the anticipated parking demand. This parking supply is also supported by the Traffic Management Plan. In addition it is noted that:

- The new School is expected to have a capacity of 1400 students, which is comparable with the current enrollment of 1471.
- The total floor area of the building is being decreased by approximately 1,230 m^2 (13,239 sq. ft.).
- The proposal provides 98 bicycle stalls including 14 enclosed secure stalls and end-of-trip facilities with a bike repair area.
- The existing site has a high pedestrian, cycling and transit mode share with almost 50% walking, biking, or taking transit.
- The site is serviced by public transit with route numbers 232, 236 and 247 operating along Capilano Road and route number 247 operating along Highland Boulevard. The respective transit stops are within walking distance to the site.
- Additional parking (beyond the proposed 120 spaces) would remove the opportunity to provide a track.

Overall, the new school is not expected to generate additional traffic or parking demands relative to the existing condition. Additionally, the proposed parking supply of 120 spaces is expected to meet the parking needs of the new school based on observed parking demands.

Timing Consideration

The applicant has advised staff that any further delay in the Development Permit process will have significant financial implications for the NVSD44 due to escalation of construction costs. The construction industry is experiencing escalation costs of approximately 10% annually, which translates to approximately $575,000 per month for Handsworth Secondary Replacement. Should further changes to the traffic circulation be required staff can use a minor development permit if desired by Council.

Conclusion

The project meets the applicable Development Permit Area Guidelines and the variances for building siting and parking are supported by staff. The new school is respectful of the natural environment and will create a quality learning environment for the students.

While the traffic concerns has been raised by the community, it is important to note that the rebuilt school will have less floor area than the existing school, and that enrolment is expected to be consistent with current enrolment. That, combined with improved bicycle end of trip facilities, and improvements to adjacent sidewalks and pedestrian crossings, the proposed Handsworth Secondary School is expected to result in similar or less motor vehicle traffic relative to the existing school. DNV staff will also continue to work with the applicant on Transportation Demand Management (TDM) provisions to further reduce vehicle traffic on the surrounding road network. Changes have been made to the traffic plan to address driveway and crosswalk concerns, add a second drop-off and pick-up area on Edgewood Road, and no parking/no stopping at the adjacent cul-de-sacs.

Following completion of the new school, DNV staff will monitor traffic volumes, parking demand, and the effectiveness of traffic calming measures and parking restrictions including passenger drop-off/pick-up facilities. Staff will also regularly assess intersection performance, and will signalize the Capilano Road/Handsworth Road intersection when warranted.

DNV staff met with community track and field representatives to discuss the preliminary outcomes of the track and field study and have agreed in principle to the design, with further refinements forthcoming. As the study progresses, DNV staff will continue to collaborate with the community track and field representatives and report to Council on funding options.

Development Permit 79.18 is now ready for Council's consideration.

Options

1. Issue Development Permit 79.18 (Attachment A) to allow for the proposed construction (staff recommendation); or

2. Provide direction to staff with respect to Development Permit 79.18.

Respectfully submitted,

Susan Rogers
Parks Manager

Robyn Hay
Development Planner

REVIEWED WITH:

❑ Sustainable Community Dev.	___	❑ Clerk's Office	___	External Agencies:	
❑ Development Services	___	❑ Communications	___	❑ Library Board	___
❑ Utilities	___	❑ Finance	___	❑ NS Health	___
☑ Engineering Operations	___	❑ Fire Services	___	❑ RCMP	___
☑ Parks	___	❑ ITS	___	☑ NVRC	___
❑ Environment	___	❑ Solicitor	___	❑ Museum & Arch.	___
❑ Facilities	___	❑ GIS	___	❑ Other:	___
❑ Human Resources	___	❑ Real Estate	___		

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ATTACHMENT A

DISTRICT OF
NORTH
VANCOUVER

355 West Queens Road
North Vancouver BC V7N 4N5
www.dnv.org
(604) 990-2311

THE CORPORATION OF THE DISTRICT OF NORTH VANCOUVER

DEVELOPMENT PERMIT 79.18

This Development Permit 79.18 is hereby issued by The Corporation of the District of North Vancouver to the registered owner(s) for the construction of a replacement school on the property located at 1044 Edgewood Road, legally described as Lot A Blocks 8 To 10 District Lot 596 Plan 15603, (PID: 007-645-961) subject to the following terms and conditions:

A. The following Zoning Bylaw regulations are varied under Part 14, Division 7, Subsection 490 (1) (a) of the Local Government Act:

1. The Plan Section Page PA/02 setbacks are varied to permit the building footprint as illustrated in the attached plan DP 79.18 – 1, and to permit the construction of the building as illustrated in the attached package (DP 79.18 – 1-10).

2. The minimum number of on-site parking stalls is varied to 120 stalls.

B. The following requirement is imposed under Subsection 490 (1) (c) of the Local Government Act:

1. Substantial construction as determined by the Manager of Permits and Licenses shall commence within two years of the date of this permit or the permit shall lapse.

2. A Construction Management Plan is required prior to issuance of the Building Permit and Excavation Permit, and may require amendments during the course of construction to ensure that construction impacts are minimized.

3. No work shall take place except to the limited extent shown on the attached plans (DP 79.18 – 1-10) and in accordance with the following specifications:

   i. Commitment to demolish existing school upon occupancy permit being granted for new school.

   ii. Confirmation of registration of a section 219 covenant for the protection of the Pacific Yew Tree located in the north west corner of the subject site.

   iii. Confirmation of registration of a statutory right of way (SROW) for:

a. A water service through the proposed parking lot along the west side of the property (from Handsworth Road to Edgewood Road).

b. A widened sidewalk along Handsworth Road.

4. Prior to the issuance of a Building Permit, the following shall be submitted to:

i. Parks Department:

a. Three copies of a final detailed landscape plan prepared by a Landscape Architect registered in British Columbia for the approval of the General Manager of Engineering or their designate.

b. A written landscape estimate in accordance with District format, submitted by the Landscape Architect for approval by the Parks and Engineering Services Department for the installation of all landscaping as shown on the final approved landscape plan.

c. A completed "Permission to Enter" agreement to provide evidence that a Landscape Architect has been retained to supervise the installation of the landscape works and the written authorization for the District or its agents to enter the premises and expend any or all of the deposit monies to complete the landscape works in accordance with the approved landscape plan.

ii. Engineering Department:

a. Finalized civil and electrical engineering plans designed by a Professional Engineer, for review and acceptance by the Engineering Department.

b. An executed Engineering Services Agreement between the property owner and the District related to the required upgrading of off-site facilities on Handsworth Road and Edgewood Road. Upgrades will include, but are not limited to: street lighting, sidewalk, curb gutter, and street improvements.

C. The following requirements are imposed under Subsection 491 (1) of the Local Government Act:

1. No work shall take place except to the limited extent shown on the attached plans (DP 79.18 – 1-10) and in accordance with the following specifications:

i. The site shall be developed in accordance with the recommendations of the Protection of the Natural Environment and Streamside Protection Reports

prepared by Diamond Head dated April 25, 2018 (updated January 24, 2019) and April 24, 2018 (updated February 12, 2019) respectively but revised prior to finalization of the Building Permit to the satisfaction of the General Manager of Planning, Properties and Permits to:

a. Provide recommendations for environmental compensation (approximately 31m^2) within the streamside protection area on the site, required to retain the existing driveway and adjacent trees at the east end of the cul-de-sac on Edgewood Road in accordance with the DP Guidelines.

ii. This permit does not authorize any buildings, structures, paving or other impervious surfaces or alteration of land to be constructed within the Natural Environment or Streamside Protected Area (10m from top of ravine bank) as outlined on the attached plans, except in accordance with the attached site plan and/or as exempted in the Streamside or Natural Environment Protection Sections in Schedule B of the District of North Vancouver Official Community Plan.

iii. A qualified professional shall confirm that the Building Permit drawings meet the recommendations of the Protection of the Natural Environment and Streamside Protection Reports referenced above, or meets an equivalent or higher degree of protection.

iv. No trees or other vegetation shall be disturbed or removed from the Natural Environment or Streamside Protected Area, except as identified on the attached plans.

v. No material of any kind, including grass clippings, compost material or other yard waste shall be placed within the Natural Environment or Streamside Protected Area.

vi. A permanent 1.8 metre high chain link fence (in accordance with District bylaws) must be constructed along the edge of the Natural Environment or Streamside Protected Area.

vii. A detailed arborist report based on a topographical survey of the trees within and within influencing distance of the subject site is required at the demolition and Building Permit stage. The arborist report must schedule all bylaw trees to be removed or pruned and detail any protection requirements for those being retained.

viii. A post construction report by the Registered Qualified Professional(s), stating that the development has been carried out in accordance with all the above mentioned Reports, shall be submitted prior to finalization of the Building Permit and release of security deposit monies held by the District including, but not limited to:

b. Invasive species management has occurred as cited in the Protection of the Natural Environment Report for development within the protected area.

c. Re-planting is to be in accordance with the recommendations of the Protection of the Natural Environment Report.

d. New habitat construction and/or enhancement has been completed in accordance with the recommendations of the Registered Professionals.

e. Construction mitigation measures have been carried out in accordance with the recommendations of the Protection of the Natural Environment Report.

ix. Construction on the site must adhere to all requirements of the *Environmental Protection and Preservation Bylaw* (EPPB), including, but not limited to:

a. During the project extreme care must be taken to ensure that absolutely no cement wash or other substance deleterious to aquatic life enter the creek, creek bank, waterfront, or the storm water system.

b. Soil removal and excavation is permitted on the site for foundation or other approved purpose.

c. Excavated soil is to be removed from the District of North Vancouver or to a site pre-approved by the building inspector.

d. Sediment and erosion control for the site to be as per the standard plan and maintained in compliance with the EPPB at all times.

e. Imported soil and fill for the site must comply with the appropriate contaminant criteria as per the EPPB.

f. DNV equipment called in to clean sediment from the roads will be charged to the project.

g. A copy of the permit to be on site at all times.

D. The following requirements are imposed under Subsections 491 (2) of the Local Government Act:

1. No work shall take place except to the limited extent shown on the attached plans (DP 79.18 – 1-10) and in accordance with the following specifications:

   i. The site shall be developed in accordance with the recommendations of the Slope Hazard Report prepared by EXP Services Inc dated November 27, 2018.

   ii. A qualified professional engineer shall confirm that the Building Permit drawings meet the recommendations of the Slope Hazard Report referenced above, or meets and equivalent or higher degree of protection.

   iii. The site shall be developed in accordance with the recommendations of the Wildfire Report prepared by Diamond Head dated May 5, 2018 (updated January 22, 2019).

   iv. Ongoing building envelope and landscape maintenance shall occur in accordance with the requirements set out within the Wildfire Hazard Assessment Report.

   v. A post construction report by the Registered Qualified Professional(s), stating that the development has been carried out in accordance with all the above mentioned Reports, shall be submitted prior to finalization of the Building Permit and release of security deposit monies held by the District including, but not limited to:

      a. Slope hazard mitigation measures as outlined in the Registered Professional report have been constructed and inspected to the satisfaction of the Registered Professional.

      b. Details on any monitoring of slope conditions, structures or devices associated with the development.

      c. Slope and/or creek restoration including re-planting or enhancement has been completed in accordance with the recommendations of the Registered Professionals.

      d. Building construction has occurred using the building materials as cited in the Wildfire Hazard Assessment Report or their fire resistant equivalents have been implemented to meet the requirements for development within the Wildfire Hazard Development Permit Area.

e. Landscaping is to be in accordance with the recommendations of the Wildfire Hazard Assessment Report.

f. Mitigation measures have been carried out in accordance with the recommendations of the Wildfire Hazard Assessment Report.

E. The following requirements are imposed under Subsections 491 (9) and (10) of the Local Government Act:

1. Prior to issuance of the Building Permit the following is required:

i. Confirmation of the green building features included in the project as per the Sustainability Report dated March 28, 2019 to fulfil the Energy and Water Conservation and Greenhouse Gas Emission Reduction Development Permit Area Guidelines.

F. The following requirements are imposed under Subsection 502 of the Local Government Act:

1. Prior to issuance of the Building Permit the following deposits are required:

i. A security deposit equal to the greater of 125% of the estimated cost of all on-site landscaping, in accordance with the approved cost estimate or $100,000. The deposit must be provided prior to issuance of a Building Permit for the development on the Land and will be held as security for landscaping and environmental works.

ii. Engineering security deposit(s), in an amount specified in the Engineering Services Agreement, to cover the construction and installation of all off-site engineering and landscaping requirements.

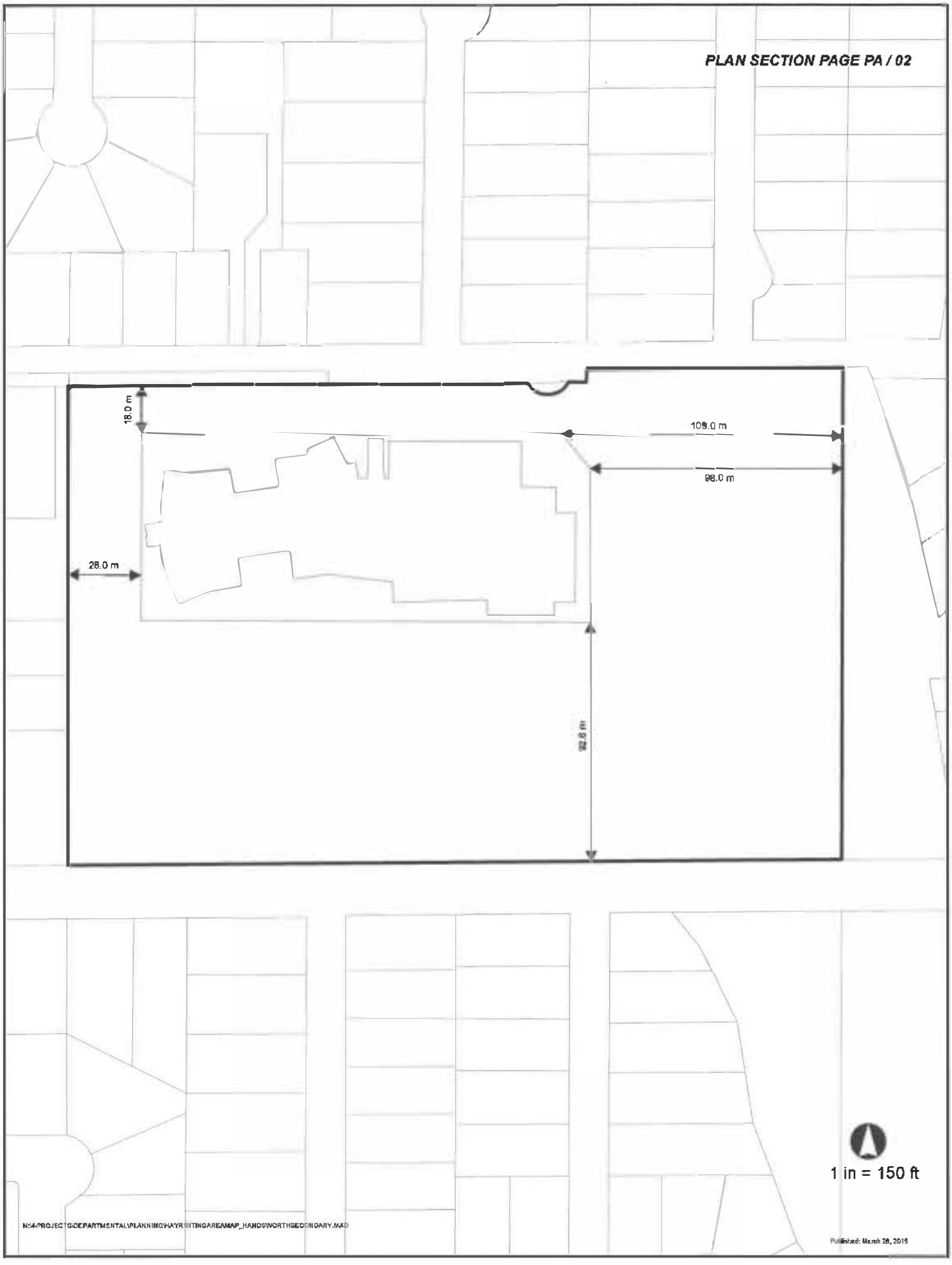
_____

Mayor

_____

Municipal Clerk

Dated this _____ day of _____, _____


PLAN SECTION PAGE PA / 02
18.0 m
109.0 m
98.0 m
28.0 m
92.6 m
1 in = 150 ft
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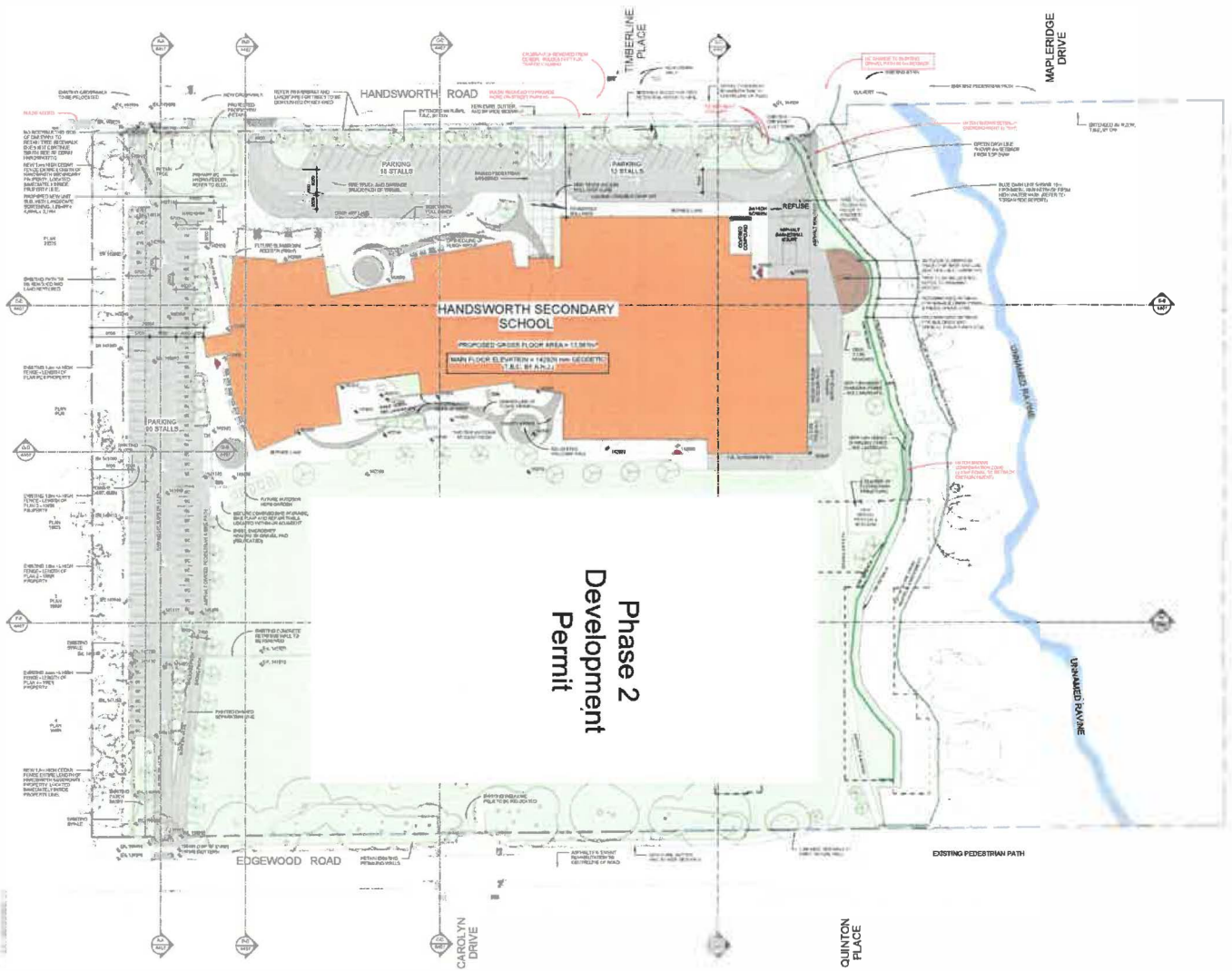
Published: March 28, 2019



CONTEXT SITE PLAN

Phase 2 Development Permit

ISSUED FOR BUILDING PERMIT

KMBR ARCHITECTS PLANNERS INC

No.	DATE	DESCRIPTION
1	2018-10-01	ISSUED FOR REZONING
2	2018-12-15	ISSUED FOR DP PRE-APPLICATION
3	2019-01-15	ISSUED FOR DP RESUBMISSION
4	2019-03-08	ISSUED FOR DP RESUBMISSION
5	2019-05-28	ISSUED FOR DEVELOPMENT PERMIT RE-APPLICATION
7		ISSUED FOR DP RESUBMISSION

GENERAL SITE NOTES

1. ARCHITECTURAL SITE PLAN IS TO BE READ IN CONJUNCTION WITH ALL LANDSCAPE, CIVIL, MECHANICAL AND ELECTRICAL DRAWINGS.
2. READ, CHECK AND COMPARE ALL DRAWINGS. NOTIFY ARCHITECT OF ANY/ALL DISCREPANCIES.
3. CHECK AND VERIFY EXISTING CONDITIONS AS SHOWN. NOTIFY ARCHITECT OF ANY/ALL DISCREPANCIES.
4. VERIFY ALL DIMENSIONS AND ELEVATIONS BEFORE FABRICATION / CONSTRUCTION OF ANY COMPONENT.
5. FOR SERVICING, GRADING, SITE DRAINAGE, ROADWORKS, RELATED TRAFFIC SIGNAGE AND BICYCLE RACKS REFER TO CIVIL DRAWINGS.
6. FOR CONTRACT SEQUENCING, SITE ACCESS, HOARDING AND SO ON REFER TO DRAWING [tbd]
7. FOR LANDSCAPING INCLUDING HARD AND SOFT SURFACES, SITE FURNISHINGS, FENCES AND GATES, AND TREE REMOVAL/RETENTION REFER TO LANDSCAPE DRAWINGS.
8. FOR RETAINING WALLS REFER TO LANDSCAPE AND CIVIL DRAWINGS.
9. ALL PLANES AND SWALES ARE TO BE SMOOTH AND TRUE PROVIDING POSITIVE DRAINAGE AND PREVENT PONDING OF WATER
10. REFER TO CIVIL AND LANDSCAPE DRAWINGS FOR ALL GRADING. HARD SURFACE GRADING ADJACENT TO BUILDING FACE TO BE 50mm BELOW FINISH FLOOR AND TO SLOPE AWAY TO DRAIN AT A MINIMUM SLOPE OF 2%. GRADING FOR SOFT SURFACES ADJACENT TO BUILDING FACE TO BE 150mm BELOW FINISH FLOOR IF CLADDING IS CONCRETE OR MASONRY.
11. SCRAPE AND REMOVE ALL EXISTING MATERIALS AND DEBRIS DUMPED ON SITE.

LEGEND

- PROPERTY LINE
- TREE PROTECTION DURING CONSTRUCTION - REFER TO ARBORIST REPORT
- FINISH GRADE AT BUILDING FACE
- EXISTING GRADE ELEVATION
- BUILDING MASSING
- ENTRY/EXIT ENTRANCE DOOR
- PAINTED DIRECTIONAL ARROW
- EXISTING TREE TO BE RETAINED - SEE LANDSCAPE DWGS.
- EXISTING TREES TO BE REMOVED - SEE LANDSCAPE DWGS.
- NEW TREES - SEE LANDSCAPE DWGS.
- SEWER CONNECTION
- NEW FIRE HYDRANT

North Vancouver School District

PROJECT TITLE
HANDSWORTH SECONDARY SCHOOL REPLACEMENT PROJECT

CLIENT
SCHOOL DISTRICT #44 NORTH VANCOUVER

SITE PLAN

JOB NO. 18322

DRAWN BY — SCALE As Indicated

DATE 2019-05-28

DRAWING NUMBER A100

DP 79.18 - 2

MAIN ENTRANCE

APPROACH FROM HANDSWORTH ROAD

VIEW OF CLASSROOMS FROM SOUTH-WEST CORNER

VIEW OF STUDENT PATIO FROM FIELD

ISSUED FOR DP
RE-APPLICATION

North Vancouver
School District

HANDSWORTH
SECONDARY
SCHOOL
REPLACEMENT
PROJECT

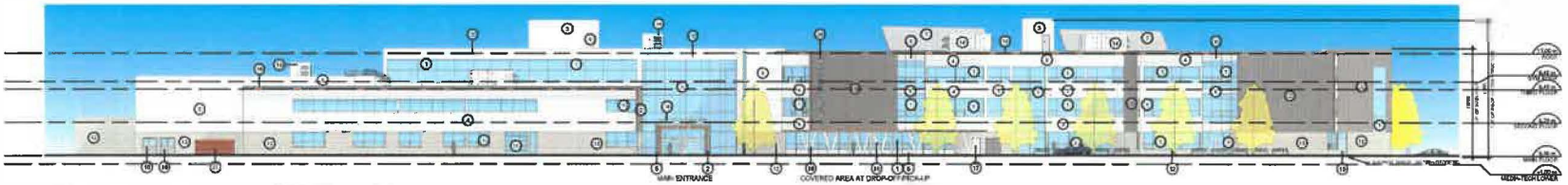
SCHOOL DISTRICT
#44 NORTH
VANCOUVER

3D RENDERINGS

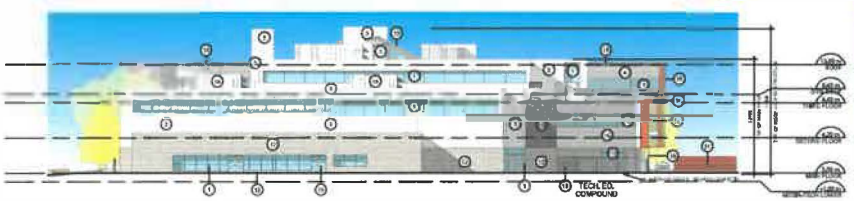
18322

A500

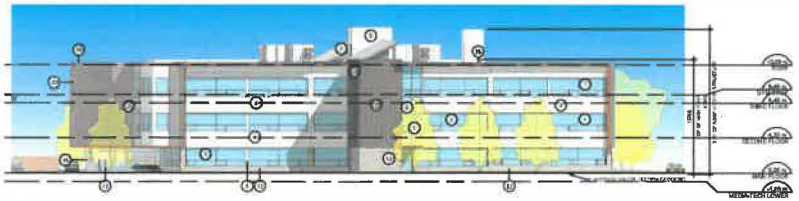
DP 79.18.3



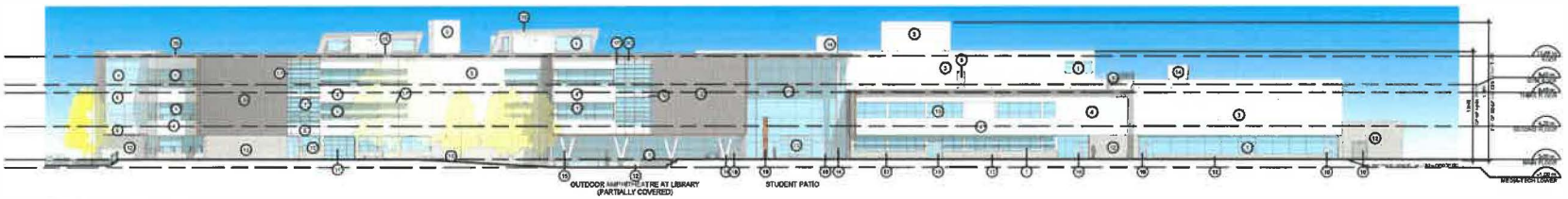
1 NORTH ELEVATION



2 EAST ELEVATION



3 WEST ELEVATION



4 SOUTH ELEVATION

MATERIAL LEGEND	
1	SEALED SOLINE GLAZING IN THERMALLY BROKEN CURTAIN WALL
2	PREFINISHED STANDING SEAM METAL CLADDING
3	HIGH-DENSITY GLASS FIBRE-REINFORCED CONCRETE PANELS
4	PREFINISHED HORIZONTAL METAL CLADDING
5	OPAQUE CURTAIN WALL SPANDREL PANEL
7	SBS MEMBRANE ROOF SYSTEM
8	WINDOW/VENT
9	DOOR AS SCHEDULE
10	PAIR DOOR AS SCHEDULE
11	PREFINISHED THERMALLY BROKEN OVERHEAD DOOR
12	CONCRETE MASONRY VENEER c/w ANTI-GRAFFITI COATING
13	EXISTING RELOCATED WELCOME POLE
14	MECHANICAL ROOF TOP UNIT
15	PREFINISHED METAL FASCIA
16	PAINTED STEEL COLUMN
17	SUN SHADES
18	ENTRANCE CANOPY (TBD)
19	CHAIN-LINK FENCE
20	SCHOOL SIGNAGE
21	REFUSE SCREENING
22	WOOD LOOK METAL SOFFIT

2 PRE-FINISHED STANDING SEAM METAL CLADDING

3 HIGH-DENSITY GLASS FIBRE-REINFORCED CONCRETE PANEL

4 PREFINISHED HORIZONTAL METAL CLADDING

5 OPAQUE GLASS SPANDREL PANELS

12 MASONRY VENEER

18 GLASS CANOPY AND PAINTED STEEL STRUCTURE

22 WOOD-LOOK METAL SOFFIT

KMBR

No.	DATE	DESCRIPTION
1	2018-12-21	ISSUED FOR DP RE-APPLICATION
2	2019-01-15	ISSUED FOR DP RE-APPLICATION
3	2019-02-07	ISSUED FOR DP RE-APPLICATION

ISSUED FOR DP RE-APPLICATION

North Vancouver School District

HANDSWORTH SECONDARY SCHOOL REPLACEMENT PROJECT

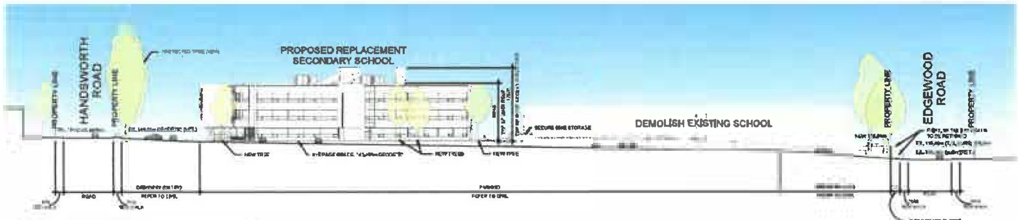
SCHOOL DISTRICT 44 NORTH VANCOUVER

COMPOSITE EXTERIOR ELEVATIONS

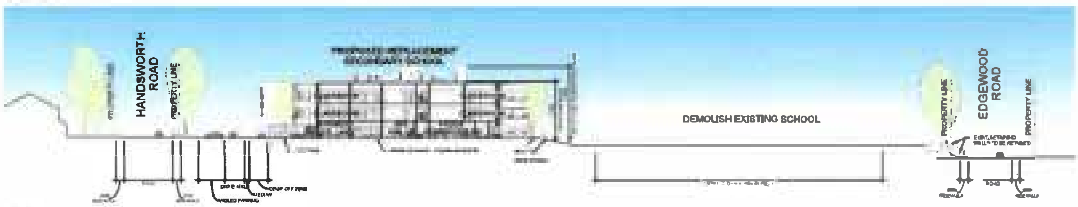
10322

A400

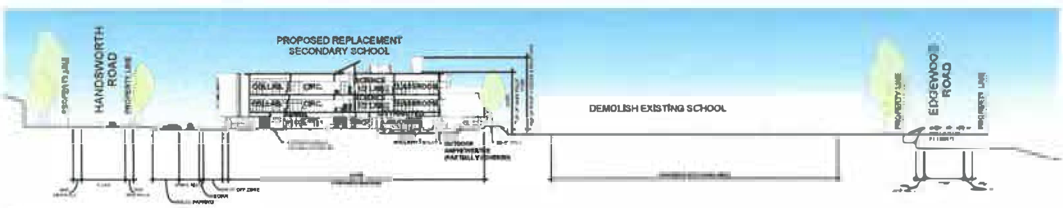
DP 79184



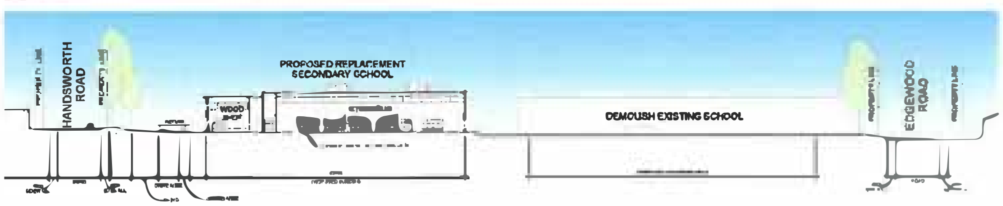
A-A SITE SECTION A-A - NORTH-SOUTH



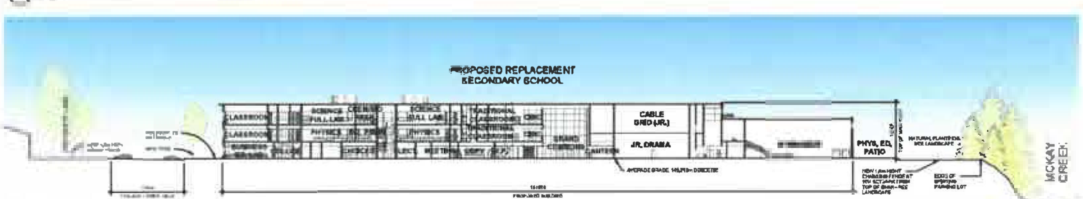
B-B SITE SECTION B-B - NORTH-SOUTH



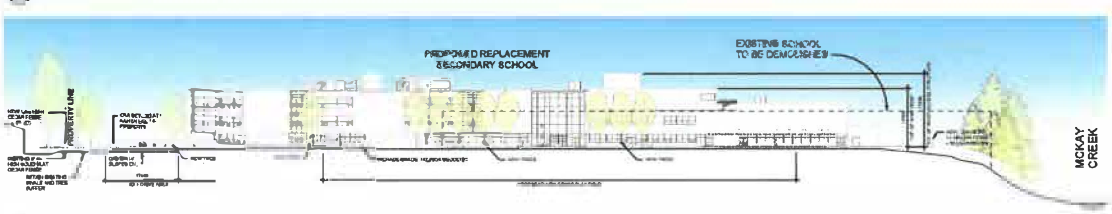
C-C SITE SECTION C-C - NORTH-SOUTH



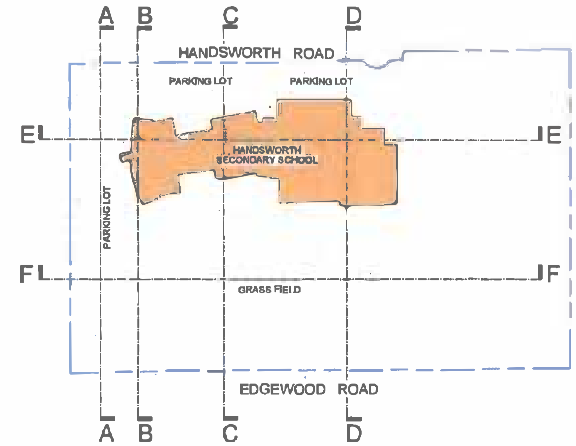
D-D SITE SECTION D-D - NORTH-SOUTH



E-E SITE SECTION E-E - EAST-WEST



F-F SITE SECTION F-F- EAST-WEST



SITE SECTION KEY PLAN

KMBR

ISSUED FOR DP RE-APPLICATION

North Vancouver School District

HANDSWORTH SECONDARY SCHOOL REPLACEMENT PROJECT

SCHOOL DISTRICT #44 NORTH VANCOUVER

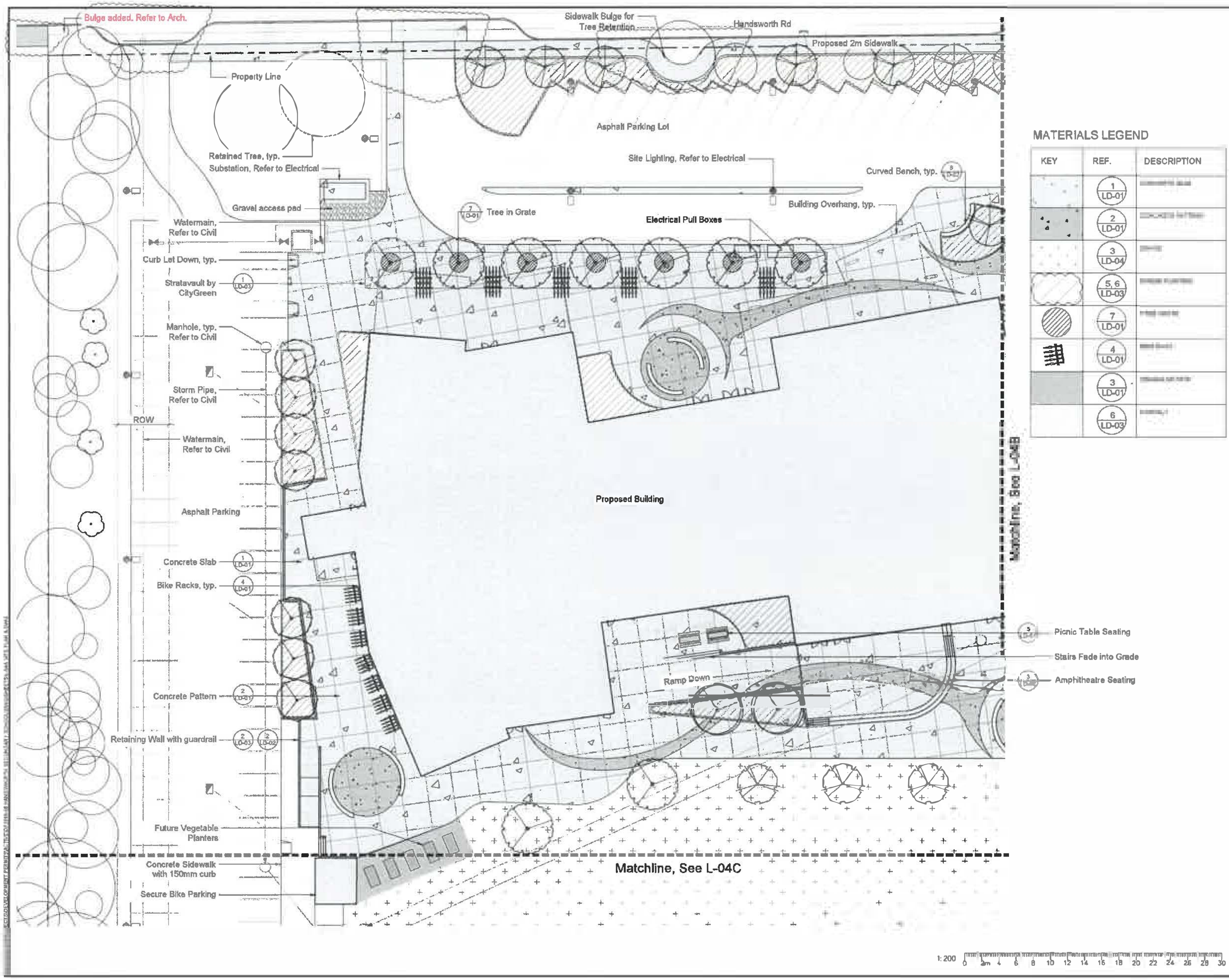
SITE SECTIONS

18322

A407

DP 79.18 - 5

VDZ+A
OVERALL SITE PLAN
DP2018-58
L-03
Drawing Title:
VDZ Project #:
Drawing #:
REVISIONS TABLE FOR DRAWINGS
REVISIONS TABLE FOR SHEET
Project:
Handsworth Secondary School
Location:
1044 Edgewood Rd
North Vancouver, BC
Drawn:
Checked:
DJ
Approved:
DJ
Original Sheet Size:
24" x 36"
Stamp:
1:500
Property Line
Top of Slope, as per Geotechnical Report
10m Setback from Top of Slope
McKay Creek
Handsworth Road
Interior Pattern, refer to Arch.
Site Plan B
See L-04B
Relocated Welcome Pole
Phase 2
Development
Permit
Proposed School
Site Plan A
See L-04A
Edgewood Road
Pacific Yew
Heritage Tree to Retain



MATERIALS LEGEND

KEY	REF.	DESCRIPTION
	1 LD-01	
	2 LD-01	
	3 LD-04	
	5, 6 LD-03	
	7 LD-01	
	4 LD-01	
	3 LD-01	
	6 LD-03	

VDZ+A

PORT LANGLEY STUDIO | MOUNT PLEASANT STUDIO

Key Map (NTS)

A B C D

No.	By:	Description	Date
			May 14, 2019
	HP	Re-issued for Costing	
4	HP	100% DD	Jan 4, 2019
3	HP	Issued for Review	Dec 20, 2018
2	HP	Issued for Development Permit	Nov 15, 2018
1	HP	Issued for Review	

REVISIONS TABLE FOR DRAWINGS

No.	By:	Description	Date

REVISIONS TABLE FOR SHEET

Project:
Handsworth Secondary School

Location:
1044 Edgewood Rd
North Vancouver, BC

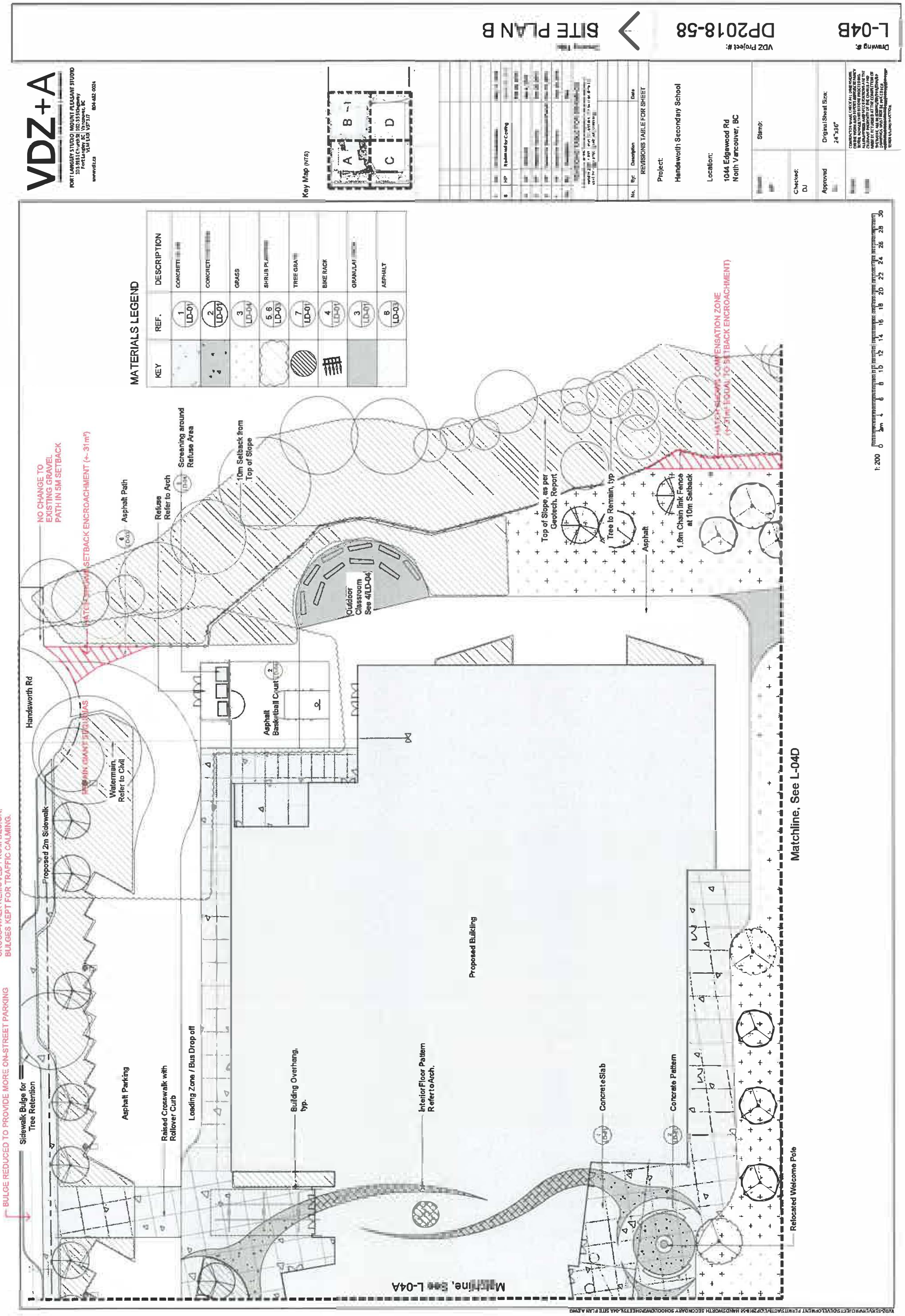
Drawn: HP
Stamp:
Checked: DJ
Approved: DJ
Original Sheet Size: 24"x36"

SITE PLAN A

VDZ Project #: DP2018-58

Drawing #: L-04A

DP 79.18 - 8


SITE PLAN B
Drawing Title:
DP2018-58
VDZ Project #:
L-04B
Drawing #:
VDZ+A
FORT LANGLEY STUDIO | MOUNT PLEASANT STUDIO
www.vdz.ca
Key Map (NTS)
A
B
C
D
No.
By:
Description
Date
REVISIONS TABLE FOR SHEET
Project:
Handsworth Secondary School
Location:
1044 Edgewood Rd
North Vancouver, BC
Stamp:
Checked:
DJ
Approved:
Original Sheet Size:
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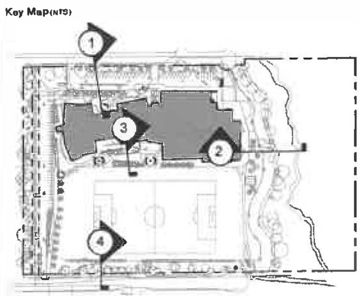
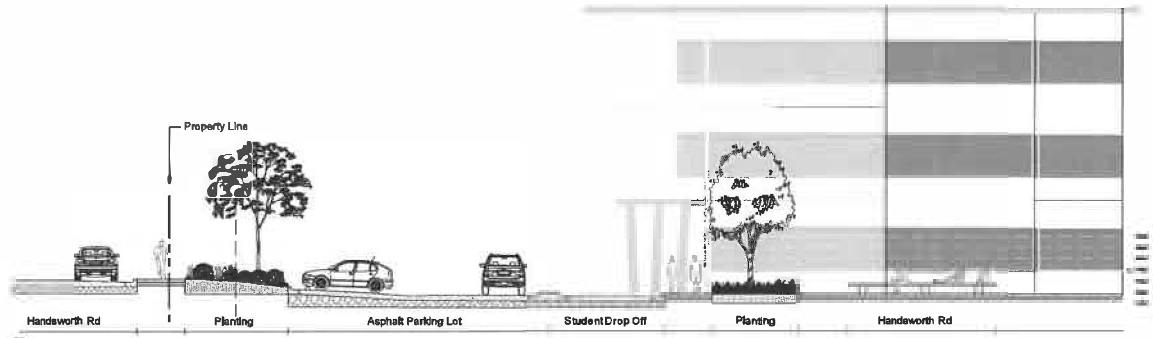
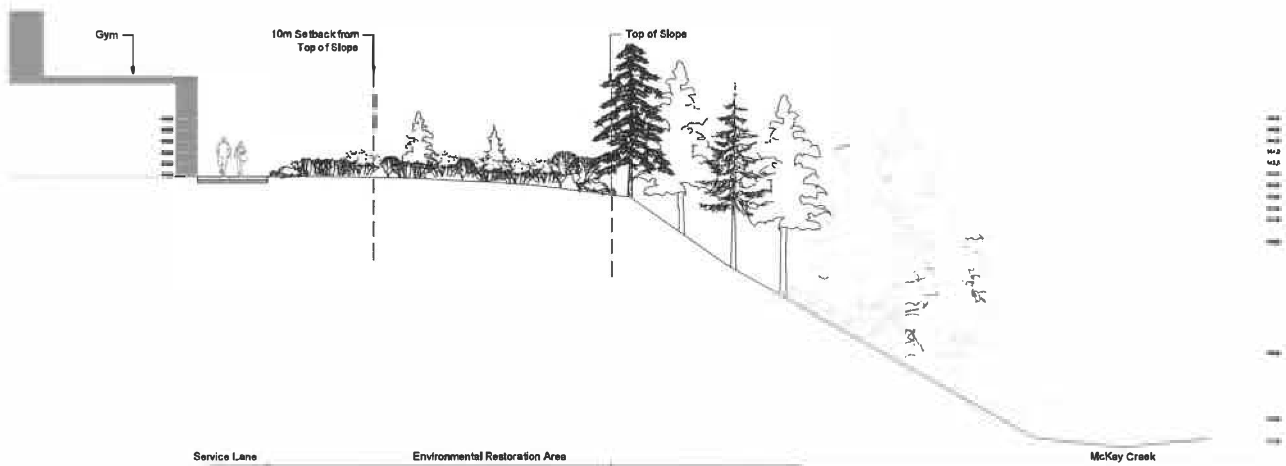
MATERIALS LEGEND
KEY
REF.
DESCRIPTION
CONCRETE
GRASS
SHRUB PLANTING
TREE GRATE
BIKE RACK
GRANULAR
ASPHALT
NO CHANGE TO EXISTING GRAVEL PATH IN 5M SETBACK
HATCH SHOWN SETBACK ENCROACHMENT (+- 31m²)
Asphalt Path
Refuse Refer to Arch
Screening around Refuse Area
10m Setback from Top of Slope
Outdoor Classroom See 4/LD-04
Top of Slope, as per Geotech. Report
Tree to Remain, typ
Asphalt
1.8m Chain link Fence at 10m Setback
HATCH SHOWS COMPENSATION ZONE (+-31m² EQUAL TO SETBACK ENCROACHMENT)
1:200
Handsworth Rd
Asphalt Basketball Court
Watermain, Refer to Civil
RETAIN GIANT SEQUOIAS
Proposed 2m Sidewalk
CROSS-WALK REMOVED FROM DESIGN, BULGES KEPT FOR TRAFFIC CALMING.
BULGE REDUCED TO PROVIDE MORE ON-STREET PARKING
Sidewalk Bulge for Tree Retention
Asphalt Parking
Raised Crosswalk with Rollover Curb
Loading Zone / Bus Drop off
Building Overhang, typ.
Interior Floor Pattern Refer to Arch.
Proposed Building
Concrete Slab
Concrete Pattern
Relocated Welcome Pole
Matchline, See L-04D
Matchline, See L-04A

VDZ+A
Drawing #: L-04C
VDZ Project #: DP2018-58
Drawing Title: SITE PLAN C
Location: 1044 Edgewood Rd North Vancouver, BC
Drawn: HP
Checked: DJ
Approved: DJ
Original Sheet Size: 24" x 36"
MATERIALS LEGEND
KEY
REF.
DESCRIPTION
CONCRETE SLAB
CONCRETE PATTERN
GRASS
SHRUB PLANTING
TREE GRATE
BIKE RACK
GRANULAR PATH
Matchline, See L-04D
Matchline, See L-04A
Cultec Recharger Stormwater System - Refer to Civil
Existing Walls and Stairs to Remain
Municipal Sidewalk
Edgewood Rd
Existing Trees to Remain
Existing Power Pole, typ.
Property Line
Secure Bicycle Storage
Asphalt Parking
ROW
Concrete Sidewalk with 150mm curb
Tree to Remain, typ.
Storm Line, Refer to Civil
Watermain, Refer to Civil
Site Lighting, Refer to Electrical
1:200

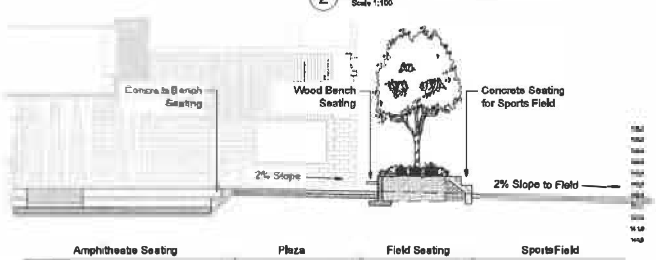




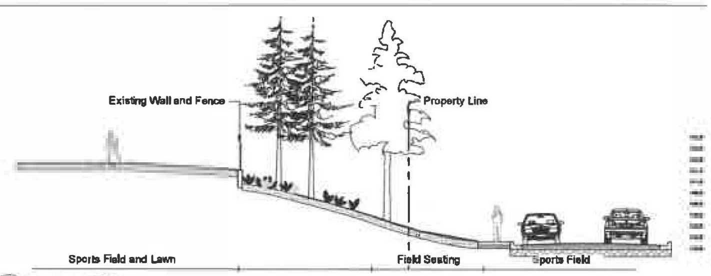
1 North Entrance
Scale 1:100



2 East Slope to the Creek
Scale 1:100



3 Library Plaza
Scale 1:100



4 South Property Line
Scale 1:100

1:100 0 1m 2 3 4 5 6 7 8 9 10 11 12 13 14 15

VDZ+A

FORT LANGLEY STUDIO | MOUNT PLEASANT STUDIO

REVISIONS TABLE FOR DRAWINGS

REVISIONS TABLE FOR SHEET

Project: Handsworth Secondary School

Location: 1044 Edgewood Rd North Vancouver, BC

Checked: DJ

Approved: DJ

Original Sheet Size: 24"x36"

Scale:

Drawing Title: SECTIONS

VDZ Project #: DP2018-58

Drawing #: LS-01

DP 79.18 - 10

AGENDA INFORMATION

☑ Regular Meeting Date: April 15, 2019
☐ Other: Date:

Dept. Manager | GM/ Director | CAO

The District of North Vancouver

REPORT TO COUNCIL

April 3, 2019
File: 08.3060.20/079.18

AUTHOR: Robyn Hay, Development Planner

SUBJECT: **DEVELOPMENT PERMIT 79.18 - 1044 Edgewood Road (Handsworth Secondary School)**

RECOMMENDATION:

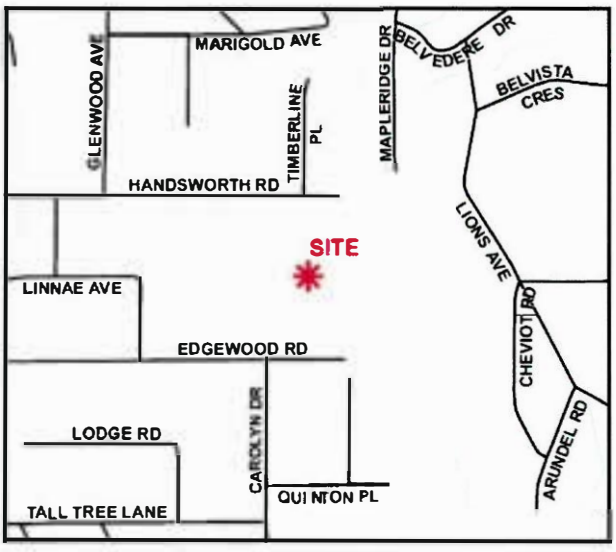
THAT Development Permit 79.18 (Attachment A) for the construction of a new Handsworth Secondary School be issued.

REASON FOR REPORT:

The proposed construction of a new Handsworth Secondary School triggers an environmental and hazard development permit (DP) with variances that requires Council's consideration.

SUMMARY:

The site is in DP areas for Protection of the Natural Environment, Streamside Protection, Protection from Natural Hazards (Wildfire and Slope) and Energy and Water Conservation and Green House Gas Emission Reduction. The proposal requires a variance to the Zoning Bylaw to amend the siting area map of the existing Handsworth School and to vary the parking requirements for the project.



Development Permit 79.18 facilitates the complete replacement of Handsworth Secondary School for grades 8 to 12. The new school will be seismically sound under current standards and will accommodate general instruction classrooms, various other learning spaces for students with

special needs, business education, information technology, art, library, administration offices, multi-purpose rooms, lunch servery, tech ed shops, black box theatre, music, and three connected gyms which change rooms and storage rooms.

The proposal addresses environmental and hazard DP requirements, is targeting a LEED® Gold equivalency, addresses project constraints such as the creek, slope, trees, and the need to keep the existing school open during construction of the new school. The proposal will provide an improved parking layout and onsite pick-up and drop-off area. The parking variance is supported by a traffic study prepared by Binnie & Associates Ltd. which has been reviewed by staff.

SUBJECT PROPERTY:

The site is bounded by Handsworth Road to the north, Edgewood Road to the south and MacKay Creek (ravine) and forested area runs through the east side of the site. The property is bordered by residential land directly to the west and to the north and south on the opposite side of the respective streets.

The site is currently occupied by the existing Handsworth Secondary, a three storey school built in 1961. The existing school is 14,230 m^2 (153,170 sq ft) in size and occupies the south half of the site with field and running track on the north. The main pedestrian entrance of the existing school is on Edgewood Road with two parking areas (with a total of 119 formal parking spaces), one accessed from Edgewood Road and the other from Handsworth Road. The site is approximately 56,000 m^2 (13.8 acres).

Subject Site (1044 Edgewood Road)

EXISTING POLICY:

Zoning

The subject property is split zoned Public Assembly Zone 2 (PA2) and Natural Park Land (NPL). The NPL zoned area is associated with the MacKay Creek ravine towards the east side of the site. No development is proposed within the NPL zoned portion of the site. The proposed building is located on the PA2 zoned portion of the site which allows for the use and the density proposed.

The Zoning Bylaw includes siting (setback) maps for many public assembly buildings and the PA/02 map applicable to this site reflects the current school location. It must be varied to allow construction of the school in the proposed location which facilitates keeping the existing school open during construction of the new school.

Development Permit Areas

The property is within the following Development Permit Areas:

- Energy and Water Conservation and Green House Gas Emission Reduction;
- Protection of the Natural Environment;
- Streamside Protection; and
- Protection from Natural Hazards (Wildfire and Slope).

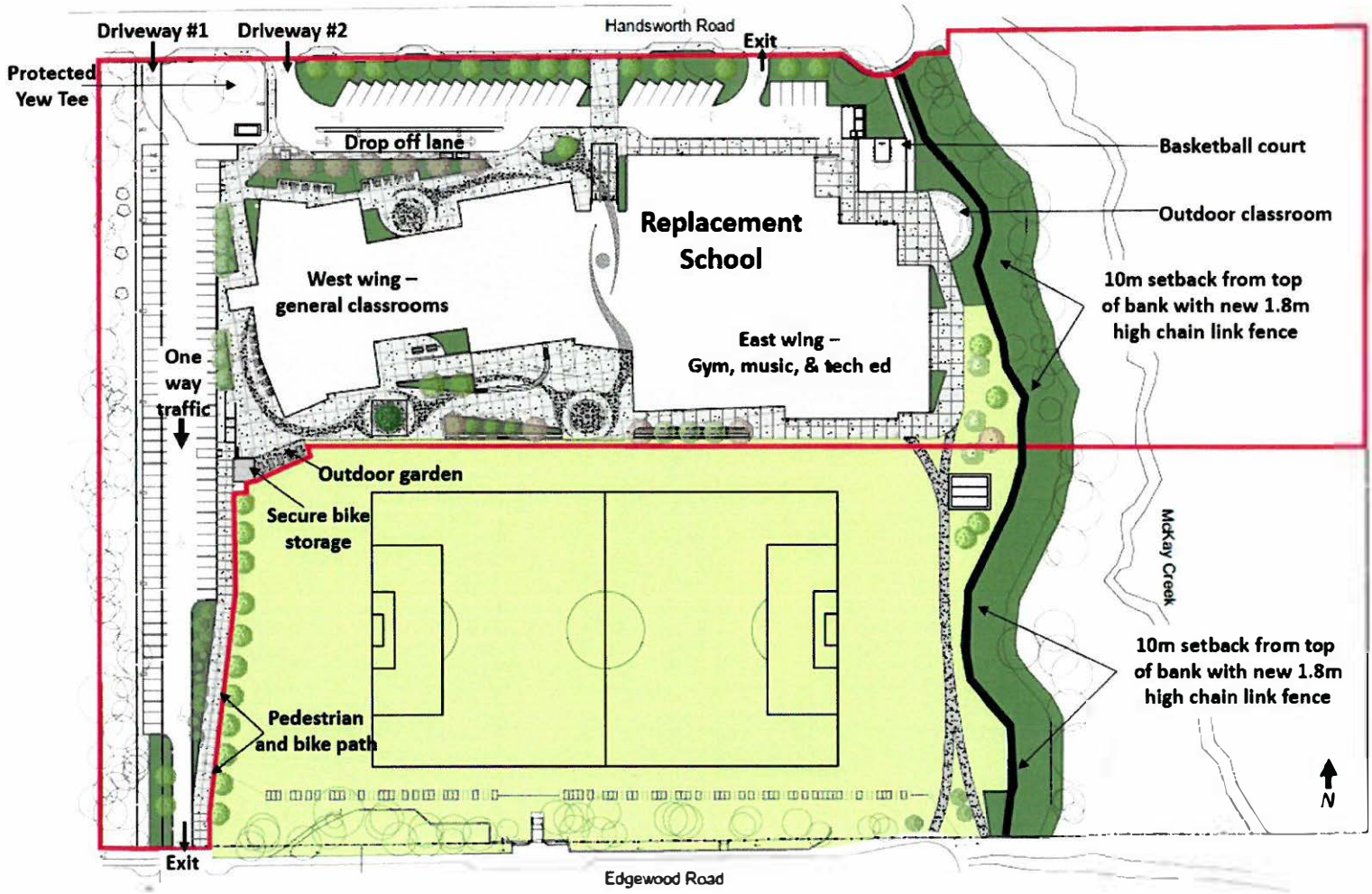
The development proposal has been reviewed against Schedule B of the OCP and is consistent with the applicable development permit guidelines. As an institutional use, the project is exempt from Form and Character Development Permit requirements, but has voluntarily undergone a design review by staff and Advisory Design Panel.

THE PROPOSAL:

The North Vancouver School District 44 (NVSD44) received funding from the Provincial Government to proceed with a full replacement of Handsworth Secondary School. The school will be developed in two phases to prevent interruptions to programing. The new building will be constructed in the northern portion of the site (on the existing field) as phase one. Once the building is complete and occupied the old school will be demolished and the construction of a new field in the south portion of the site can commence. There is the potential for an international tournament size sports field (65m x 100m) and a 6 lane running track. DP 79.18 applies only to the area outlined in red (phase one) on the map on the following page. This area includes the building and all parking, circulation and points of access. The south portion of the property, containing the proposed sports field will be subject of a separate development permit at a later date.

The proposed building is three-storeys with a height of 13.8m (45.3ft) and has a gross floor area of approximately 13,000 m^2 (139,930 sq. ft) which results in a floor space ratio of 0.23. The new building will be located on the north side of the property with main building entrance located centrally along the Handsworth Road frontage. The interior has been designed with maximum flexibility to support a variety of teaching and learning styles. The general instruction classrooms are located in the west wing of the building and the noisier uses (tech ed shop, music, gym etc.) are generally located in the east wing of the building, away from immediate neighbours.

Vehicle ingress to the site is proposed from Handsworth Road via two driveways. The entrance to the west will provide for one way traffic that flows through the site southbound to an exit on Edgewood Road. The second entrance from Handsworth provides for a one-way (west to east) drop-off and pick-up area near the building's main entrance. A total of 120 parking spaces are proposed on site in addition to 98 bike stalls and end of trip facilities.



Building Design

The expansive glass walls at the 'heart' of the building and main entrance creates a welcoming sense of arrival from Handsworth Road. The façade is broken down and well-articulated to provide visual interest. Ample glazing will be provided to maximise daylight and take advantage of the mountain views from within the building.

North (front) elevation – main entrance

South (rear) elevation

Large overhangs provide shelter at the main entrance and at the student patio and library amphitheatre at the rear. The external materials incorporates a mix of horizontal and vertical cladding textures. The colour scheme is neutral with wood emphasized at soffits. Overall, the building exhibits a quality design by virtue of its building material and finishes and articulation in the façade.

Sports Field and Potential Track

The Provincial Government has provided funding for a new tournament size (65m x 100m) grass field. Funding options will be explored, including with community groups, to upgrade the field to artificial turf with a running track around the perimeter. Given that the field will be constructed in phase two of the project, time is available to resolve the construction approach should funding for artificial turf and/or a running track be secured. The field and potential track will be subject to a separate DP at a later date.

Variances

The proposed footprint is located on a different part of the property than the existing school. There is siting area map (Plan Section Page PA/02) in the Zoning Bylaw which establishes setbacks for Handsworth Secondary School based on the location of the original building. DP 79.18 varies that Siting Map to reflect the new location and setbacks associated with the new Handsworth Secondary School. The new building is proposed to be located in a different location than the existing building in order to allow the existing building to remain in use while the new building is under construction and also to account for a variety of environmental constraints.

The current school has 119 parking stalls and 120 are proposed with improved circulation and onsite pick-up and drop-off. The Zoning Bylaw requires 3 stalls per classroom. The applicant's traffic consultant assumptions indicate that there are 58 classrooms proposed however, in accordance with the Zoning Bylaw there are only 54 classrooms (including 31 traditional classrooms and 23 additional learning spaces) which results in a requirement for 162 vehicle stalls. Therefore a variance of 42 spaces is proposed.

The floor area of the proposed building is approximately 1,230 m^2 (13,239 sq. ft) less than the existing school and the number of staff and students are expected to remain the same. The number of trips generated and parking demand generated from the proposed school will be the same or similar to the existing conditions. The applicant has provided a parking and traffic study which supports the proposed 120 stalls to meet the needs of the school.

The traffic demand management strategies outlined in the traffic study include supporting alternative transportation choices such as walking, cycling, taking public transit and carpooling. Encouraging these modes of travel is expected to decrease the overall site-generated parking demand. The site is serviced by public transit with route numbers 232, 236 and 247 operating along Capilano Road and route number 247 operating along Highland Boulevard. The respective transit stops are within walking distance to the site. Although not required, the design includes four electric vehicle charging stalls and two green vehicle stalls which will be used for a variety of sustainable initiatives/options such as hybrid vehicles, car-pool vehicles, and car-share. The site is located on a bike route in accordance with DNV's Bicycle Master Plan and the design includes an additional 14 secure bike parking stalls, end of trip shower facilities for staff and

bike repair and maintenance equipment, in addition to the 84 non secure bike parking stalls required by the Zoning Bylaw.

District staff supports the conclusions of the study as it relates to parking. DP 79.18 including the required parking variance, in accordance with the anticipated peak demand.

Zoning Regulation	Requirement	Proposed	Variance
Parking	162	120	42

Traffic and Circulation

The enrolment capacity of the new school will be 1,400 students which is generally consistent with the existing enrolment. No significant increase in traffic is anticipated. An onsite pick-up/drop-off loop is proposed near to main building entrance with access from Handsworth Road.

North elevation – drop off / pick up area

A new 2 metre wide sidewalk is proposed on the south side of Handsworth Road. This new sidewalk will require a statutory right of way which will be registered on title prior to the issuance of the building permit. A new raised crosswalk is proposed at the Handsworth Road and Timberline Place intersection and the existing crosswalk on Handsworth Road (near the west side of the frontage) will be relocated further to the east to better separate vehicle and pedestrian movements. The design includes narrowing of Handsworth Road with bulges at the crosswalks and other key locations to allow for the protection of existing trees, traffic calming, and improved pedestrian safety. The road bulges will result in the removal of approximately 11-13 street parking spaces however, is supported by Transportation Engineering as it improves pedestrian safety. An improved sidewalk is also proposed along the north side of Edgewood Road.

Bicycle Parking

The site is on a bike route and a separated onsite bike path from Handsworth Road to the new building is included in the off site design. The proposal includes 98 bicycle stalls which exceeds the Zoning Bylaw requirement of 84 stalls. Fourteen of these stalls are intended for long-term parking in enclosed secure areas. A bike repair area and end of trip facilities are also proposed.

Accessibility

The building has been designed to accommodate persons with disabilities and includes such features as centrally-located elevators, universally accessible bathrooms as well as wide hallways. A handydart parking space is provided near the west entrance and wheelchair accessible parking spaces are located adjacent to both the main and west entrances.

Crime Prevention Through Environmental Design (CPTED) and Lighting

External lighting is provided around the perimeter of the building including under the covered outdoor space. The lighting will be dimmed after hours to provide safe but unobtrusive lighting. The west parking is to be lit with lights facing toward the school mitigating light spillage onto neighbouring properties. The parking lot lighting will be programed to shut off at 11pm. All light fixtures will be "full-cut-off" design in accordance with the LEED requirements for light pollution reduction.

Staff met with Sgt Kevin Bracewell, advisor to Advisory Design Panel (ADP) to review the proposal and overall, it was considered that the proposal generally complies with the CPTED principles.

CONCURRENCE

Energy and Water Conservation and Greenhouse Gas Emission Reduction

In accordance with the Energy and Water Conservation and Greenhouse Gas Emission Reduction Development Permit Area Guidelines, a sustainability report prepared by Recollective Consulting Inc. was provided. The project is designed to reduce energy consumption and incorporate building performance measures that will result in reduced operation and maintenance costs for the NVSD44. The applicant is utilizing LEED® and is proposing to incorporate a range of features to meet a target equivalent to the Gold standard.

Notable highlights from the proposal include the installation of low flow and water efficient fixtures, LED lighting (interior and exterior), energy recovery ventilators, and a high performance building envelope which includes triple pane windows, continuous air barriers and exterior wall assembly with continuous outboard insulation. A light coloured roofing material has been used to reduce the heat island effect and outdoor water conservation strategies

include water-conscious landscaping incorporating drought-tolerant and native species. The design includes four electric vehicle charging stalls and two green vehicle stalls which will be used for a variety of sustainable initiatives/options such as hybrid vehicles, car-pool vehicles, and car-share. Additional measure to promote resource and greenhouse gas emission reduction include diverting at least 75% of construction materials the landfill and direct to reuse and recycling.

Given the institutional nature of the project the BC Energy Step Code is not applicable. The sustainability measure proposed satisfies the Energy and Water Conservation and Greenhouse Gas Emission Reduction DP requirements.

Protection of the Natural Environment and Streamside Protection

There are four watercourses east of the proposed development including MacKay Creek, two stormwater outflow ditches that flow into MacKay Creek and an unnamed watercourse that runs along the bottom of the slope on the western ravine bank before flowing into MacKay Creek.

The Streamside DPA requires a minimum 10 metre setback from the top of bank for all watercourses where the watercourse is set in a ravine over 60 metres wide. The width of the ravine associated with this site varies, but is generally between 100 and 150 metres wide.

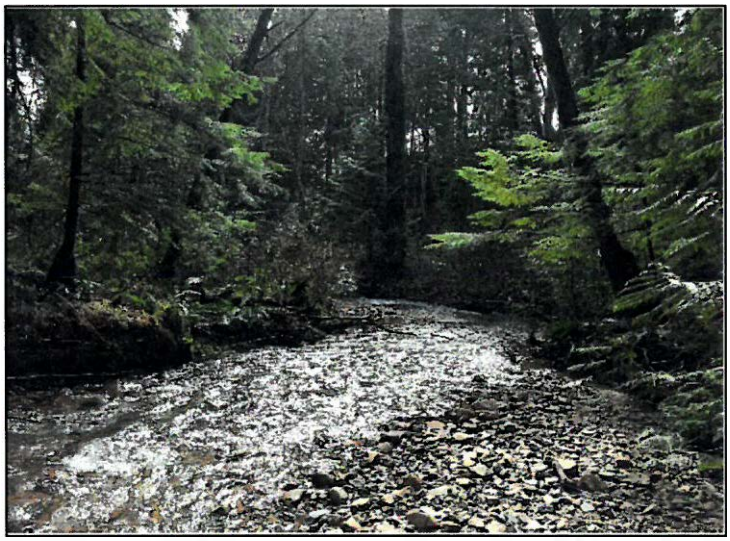


Photo of Mackay Creek from the center east edge of the property, facing south

The proposed building footprint has been carefully located to minimise impacts to natural areas. All development is outside the 10 metre setback from the Mackay Creek ravine in accordance with the Streamside DPA requirements and the Streamside Protection Environmental Report prepared by Diamond Head Consulting (Attachment C).

All trees along the ravine will be protected and measures taken to protect the slopes stability. Any existing impervious surfaces within the 10 metre setback will be removed and the area restored. Upon completion of the restoration works, a permanent 1.8 metre tall chain link fence will be installed along the 10 metre setback.

Invasive species are pervasive throughout the Mackay Creek ravine. The Protection of the Natural Environment DPA Report prepared by Diamond Head Consulting (Attachment D) recommends that once the invasive species are removed ecologically suitable native species

will be replanted in order to prevent these invasive species from re-establishing on the site. The report includes a restoration plan accordingly.

An arborist report has been prepared by BC Plant Health Care Inc. (Attachment E) and approximately 240 onsite and offsite trees have been assessed. While every effort is being made to minimize impacts to trees, there is tree removal required due to a combination of wildfire hazard, poor health, and siting conflicts associated with the new building, associated infrastructure and road upgrades. The arborist report indicates that 38 trees are slated for removal and 81 replacement trees are proposed. A final landscape plan will be required prior to the issuance of a building permit.

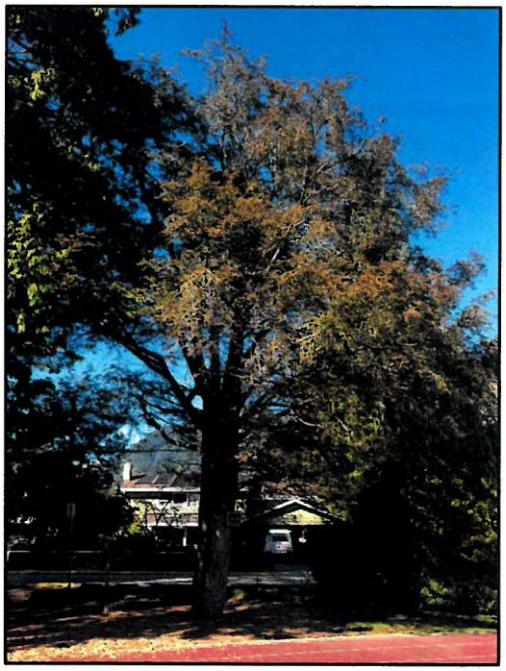


Photo of the Pacific Yew Tree

There is a Pacific Yew tree located to the north west corner of the site (photo on the following page). The tree is approximately 130 years old and this species of tree reaches maturity at 250-350 years of age. This tree has heritage value and the NVSD44 have agreed to formally protect it as a heritage tree, with a Section 219 Covenant.

Protection from Wildfire Hazard

A Wildfire Hazard Report prepared by Diamond Head Consulting (Attachment F) has been provided which outlines how the combination of the building materials and fire resistant replacement trees meets the Development Permit requirements for construction in a wildfire hazard area. A post construction sign off will be required as a condition of DP 79.18 to ensure the structure and landscaping meets the recommendations in the Wildfire Hazard Report.

Protection from Slope Hazard

A Slope Hazard Assessment Report prepared by EXP Services Inc. (Attachment G) has been provided which confirms that the site is safe for intended use as per Section 56 of the Community Charter. The proposed development complies with the District's current risk tolerance requirements as per the Official Community Plan (OCP). The proposal and associated Slope Hazard Assessment Report has been reviewed and accepted by the District's Environment Department.

DP 79.18 requires development in accordance with the above referenced environmental and hazard reports.

OFF-SITE IMPROVEMENTS

As part of this development, the NVSD44 will be responsible for off-site improvements to Handsworth Road and Edgewood Road including new sidewalks, crosswalks and new paving to the centre line of the respective streets.

CONCURRENCE

Staff

The project has been reviewed by staff from Permits, Parks, Development Engineering, Environment, Community Planning, Urban Design, and the Fire and Rescue Department.

Advisory Design Panel

As the form and character DP guidelines do not apply to institutional buildings, a review by the ADP is not required. Though not required to do so, the application was considered by the ADP on December 13, 2018 and the Panel recommended approval of the project subject to minor revisions to the satisfaction of staff.

The applicant has provided the following revisions in response to the ADP's comments:

- A horizontal pattern was added on the metal cladding to add visual interest.
- Sunshades have been added to the south and west side of the building to improve energy efficiency. Larger, deeper sunshades are used on the classrooms and shorter more narrowly spaced pattern sunshades are used on the collaboration spaces to provide variation.
- Additional windows have been added on the south elevation (east wing of the building).
- Landscaping details have been further developed.
- South plaza has been refined, with the outdoor basketball half-court moved to the north-east side of the site closer to the gym, and the grading from the parking lot to the plaza level has been resolved.

The above list of issues have been satisfied with design revisions.

Public Input

The applicant held a facilitated Public Information Meeting on January 24, 2019. Notices were distributed to 186 addresses within approximately a 100 metre radius of the site and via email to all the student parents, and two websites (DNV and NVSD44) have been established for this application. Two signs were placed on the property, and advertisements were placed in the North Shore News on December 28th and January 4th. The meeting was attended by approximately 100 people. 44 comments sheets were received at the meeting and an additional 210 were received following the meeting.

The NVSD44 also held user group input workshops, steering committee presentations open to the public, and distributed questionnaires to staff, students and parents.

The overall tone of the Public Information Meeting meeting was supportive of the replacement school and the proposed design. Comments included:

- Environment concerns relating impacts to the riparian area
    - The applicant has provide reports from qualified professionals addressing the Streamside Protection and Protection of the Natural Environment Development Permit Area Guidelines which have been reviewed and accepted by the District's Environment Department. The riparian area will be restored and protected as part of this project. Development Permit 79.18 requires construction in accordance with the recommendations of the professional reports.
- Traffic and parking impacts
    - Traffic and parking impacts have been carefully considered. The traffic demand management strategies outlined in the traffic study include supporting alternative transportation choices such as walking, cycling, taking public transit and carpooling. The design includes improved onsite pedestrian and cycling connections.
- Interest in having an artificial turf field and running track
    - The field and potential track will be subject to a separate DP at a later date, as mentioned previously.
- A number of operational concerns and question including the design and number of washroom and change room facilities and specific concerns from individual users with regards to individual programs
    - The NVSD44 had considered the issues raised and had very specific reasons for the design choices being presented, which largely reflect the Ministry of Education

South west (rear) elevation - south plaza

requirements and the desire to build a facility that is welcoming to as many users as possible.

- Relationship to the single family lots to the west

    - The school has been strategically place as far away from the neighbours as possible with the parking lot in between and maintained the tree buffer at the property line. Additionally, noisier programs such as tech ed and the gym (which gets heavier after hours use) are in the east wing of the school to mitigate impacts.

Also, in response to neighbour input the applicant has agreed to construct a new 1.8 metre high cedar fence along approximately half of the west property boundary, remove the exiting path along the sites west boarder and restore the land.

The facilitator report is attached as Attachment B.

CONSTRUCTION MANAGEMENT

In order to address the goal to reduce development impacts on pedestrian and vehicular movements, the applicant will be required to provide a final construction traffic management plan as a condition of Development Permit 79.18. The Construction Management plan must minimize construction impacts on pedestrian movement and vehicular traffic. The plan is required to be approved by the District prior to issuance of a building permit.
In particular, the construction traffic management plan must address:

1. Construction schedule
2. Coordination with other projects in the area or those affecting the transportation network
3. Construction site access and egress
4. Estimated traffic generated by the site during construction
5. Proposed truck routing and staging plan
6. Proposed crane assembly and/or concrete pouring sites
7. How traffic of all types (vehicle, transit, cyclists, pedestrians) will be managed around the site
8. A plan for monitoring and minimizing impacts to the community
9. Location of parking worker/trades vehicles
10. A plan for communicating with neighbours and other stakeholders

There are currently no other development applications in the immediate area and the District in not expecting any new major civil infrastructure work in the area during the construction of this project.

Conclusion

The project meets the applicable Development Permit Area Guidelines and the variances for building siting and parking are supported by staff. The new school is respectful of the natural environment and will create a quality learning environment for the students.

Development Permit 79.18 is now ready for Council's consideration.

Options

1. Issue Development Permit 79.18 (Attachment A) to allow for the proposed construction (staff recommendation); or

2. Provide direction to staff with respect to Development Permit 79.18.

Respectfully submitted,

Robyn Hay
Development Planner

Attachments:

A. DP 79.18 with attached drawings
B. Facilitator Report
C. Streamside Protection DPA report prepared by Diamond Head Consulting dated April 24, 2018 (updated February 12, 2019)
D. Protection of the Natural Environment DPA Report prepared by Diamond Head Consulting dated April 25, 2018 (updated January 24, 2019)
E. Wildfire Hazard DPA Report with appendix removed prepared by Diamond Head Consulting dated May 5, 2018 (updated January 22, 2019)
F. Slope Hazard Assessment Report with appendix removed prepared by EXP Services Inc. dated November 27, 2018
G. Arborist Report excerpt prepared by BC Plant Health Care Inc. dated October 25, 2018 (updated November 19, 2018 & February 21, 2019)

REVIEWED WITH:

❑ Sustainable Community Dev.	____	❑ Clerk's Office	____	External Agencies:	
❑ Development Services	____	❑ Communications	____	❑ Library Board	____
❑ Utilities	____	❑ Finance	____	❑ NS Health	____
❑ Engineering Operations	____	❑ Fire Services	____	❑ RCMP	____
❑ Parks	____	❑ ITS	____	❑ NVRC	____
❑ Environment	____	❑ Solicitor	____	❑ Museum & Arch.	____
❑ Facilities	____	❑ GIS	____	❑ Other:	____
❑ Human Resources	____	❑ Real Estate	____		

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ATTACHMENT A

DISTRICT OF
NORTH
VANCOUVER

355 West Queens Road
North Vancouver BC V7N 4N5
www.dnv.org
(604) 990-2311

THE CORPORATION OF THE DISTRICT OF NORTH VANCOUVER

DEVELOPMENT PERMIT 79.18

This Development Permit 79.18 is hereby issued by The Corporation of the District of North Vancouver to the registered owner(s) for the construction of a replacement school on the property located at 1044 Edgewood Road, legally described as Lot A Blocks 8 To 10 District Lot 596 Plan 15603, (PID: 007-645-961) subject to the following terms and conditions:

A. The following Zoning Bylaw regulations are varied under Part 14, Division 7, Subsection 490 (1) (a) of the Local Government Act:

   1. The Plan Section Page PA/02 setbacks are varied to permit the building footprint as illustrated in the attached plan DP 79.18 – 1, and to permit the construction of the building as illustrated in the attached package (DP 79.18 – 1-10).

   2. The minimum number of on-site parking stalls is varied to 120 stalls.

B. The following requirement is imposed under Subsection 490 (1) (c) of the Local Government Act:

   1. Substantial construction as determined by the Manager of Permits and Licenses shall commence within two years of the date of this permit or the permit shall lapse.

   2. A Construction Management Plan is required prior to issuance of the Building Permit and Excavation Permit, and may require amendments during the course of construction to ensure that construction impacts are minimized.

   3. No work shall take place except to the limited extent shown on the attached plans (DP 79.18 – 1-10) and in accordance with the following specifications:

      i. Commitment to demolish existing school upon occupancy permit being granted for new school.

      ii. Confirmation of registration of a section 219 covenant for the protection of the Pacific Yew Tree located in the north west corner of the subject site.

      iii. Confirmation of registration of a statutory right of way (SROW) for:

a. A water service through the proposed parking lot along the west side of the property (from Handsworth Road to Edgewood Road).

b. A widened sidewalk along Handsworth Road.

4. Prior to the issuance of a Building Permit, the following shall be submitted to:

i. Parks Department:

a. Three copies of a final detailed landscape plan prepared by a Landscape Architect registered in British Columbia for the approval of the General Manager of Engineering or their designate.

b. A written landscape estimate in accordance with District format, submitted by the Landscape Architect for approval by the Parks and Engineering Services Department for the installation of all landscaping as shown on the final approved landscape plan.

c. A completed "Permission to Enter" agreement to provide evidence that a Landscape Architect has been retained to supervise the installation of the landscape works and the written authorization for the District or its agents to enter the premises and expend any or all of the deposit monies to complete the landscape works in accordance with the approved landscape plan.

ii. Engineering Department:

a. Finalized civil and electrical engineering plans designed by a Professional Engineer, for review and acceptance by the Engineering Department.

b. An executed Engineering Services Agreement between the property owner and the District related to the required upgrading of off-site facilities on Handsworth Road and Edgewood Road. Upgrades will include, but are not limited to: street lighting, sidewalk, curb gutter, and street improvements.

C. The following requirements are imposed under Subsection 491 (1) of the Local Government Act:

1. No work shall take place except to the limited extent shown on the attached plans (DP 79.18 – 1-10) and in accordance with the following specifications:

i. The site shall be developed in accordance with the recommendations of the Protection of the Natural Environment and Streamside Protection Reports

prepared by Diamond Head dated April 25, 2018 (updated January 24, 2019) and April 24, 2018 (updated February 12, 2019) respectively.

ii. This permit does not authorize any buildings, structures, paving or other impervious surfaces or alteration of land to be constructed within the Natural Environment or Streamside Protected Area (10m from top of ravine bank) as outlined on the attached plans, except in accordance with the attached site plan and/or as exempted in the Streamside or Natural Environment Protection Sections in Schedule B of the District of North Vancouver Official Community Plan.

iii. A qualified professional shall confirm that the Building Permit drawings meet the recommendations of the Protection of the Natural Environment and Streamside Protection Reports referenced above, or meets an equivalent or higher degree of protection.

iv. No trees or other vegetation shall be disturbed or removed from the Natural Environment or Streamside Protected Area, except as identified on the attached plans.

v. No material of any kind, including grass clippings, compost material or other yard waste shall be placed within the Natural Environment or Streamside Protected Area.

vi. A permanent 1.8 metre high chain link fence (in accordance with District bylaws) must be constructed along the edge of the Natural Environment or Streamside Protected Area.

vii. A detailed arborist report based on a topographical survey of the trees within and within influencing distance of the subject site is required at the demolition and Building Permit stage. The arborist report must schedule all bylaw trees to be removed or pruned and detail any protection requirements for those being retained.

viii. A post construction report by the Registered Qualified Professional(s), stating that the development has been carried out in accordance with all the above mentioned Reports, shall be submitted prior to finalization of the Building Permit and release of security deposit monies held by the District including, but not limited to:

a. Invasive species management has occurred as cited in the Protection of the Natural Environment Report for development within the protected area.

b. Re-planting is to be in accordance with the recommendations of the Protection of the Natural Environment Report.

c. New habitat construction and/or enhancement has been completed in accordance with the recommendations of the Registered Professionals.

d. Construction mitigation measures have been carried out in accordance with the recommendations of the Protection of the Natural Environment Report.

ix. Construction on the site must adhere to all requirements of the *Environmental Protection and Preservation Bylaw* (EPPB), including, but not limited to:

a. During the project extreme care must be taken to ensure that absolutely no cement wash or other substance deleterious to aquatic life enter the creek, creek bank, waterfront, or the storm water system.

b. Soil removal and excavation is permitted on the site for foundation or other approved purpose.

c. Excavated soil is to be removed from the District of North Vancouver or to a site pre-approved by the building inspector.

d. Sediment and erosion control for the site to be as per the standard plan and maintained in compliance with the EPPB at all times.

e. Imported soil and fill for the site must comply with the appropriate contaminant criteria as per the EPPB.

f. DNV equipment called in to clean sediment from the roads will be charged to the project.

g. A copy of the permit to be on site at all times.

D. The following requirements are imposed under Subsections 491 (2) of the Local Government Act:

1. No work shall take place except to the limited extent shown on the attached plans (DP 79.18 – 1-10) and in accordance with the following specifications:

i. The site shall be developed in accordance with the recommendations of the Slope Hazard Report prepared by EXP Services Inc dated November 27, 2018.

ii. A qualified professional engineer shall confirm that the Building Permit drawings meet the recommendations of the Slope Hazard Report referenced above, or meets and equivalent or higher degree of protection.

iii. The site shall be developed in accordance with the recommendations of the Wildfire Report prepared by Diamond Head dated May 5, 2018 (updated January 22, 2019).

iv. Ongoing building envelope and landscape maintenance shall occur in accordance with the requirements set out within the Wildfire Hazard Assessment Report.

v. A post construction report by the Registered Qualified Professional(s), stating that the development has been carried out in accordance with all the above mentioned Reports, shall be submitted prior to finalization of the Building Permit and release of security deposit monies held by the District including, but not limited to:

a. Slope hazard mitigation measures as outlined in the Registered Professional report have been constructed and inspected to the satisfaction of the Registered Professional.

b. Details on any monitoring of slope conditions, structures or devices associated with the development.

c. Slope and/or creek restoration including re-planting or enhancement has been completed in accordance with the recommendations of the Registered Professionals.

d. Building construction has occurred using the building materials as cited in the Wildfire Hazard Assessment Report or their fire resistant equivalents have been implemented to meet the requirements for development within the Wildfire Hazard Development Permit Area.

e. Landscaping is to be in accordance with the recommendations of the Wildfire Hazard Assessment Report.

f. Mitigation measures have been carried out in accordance with the recommendations of the Wildfire Hazard Assessment Report.

E. The following requirements are imposed under Subsections 491 (9) and (10) of the Local Government Act:

1. Prior to issuance of the Building Permit the following is required:

i. Confirmation of the green building features included in the project as per the Sustainability Report dated March 28, 2019 to fulfil the Energy and Water Conservation and Greenhouse Gas Emission Reduction Development Permit Area Guidelines.

F. The following requirements are imposed under Subsection 502 of the Local Government Act:

1. Prior to issuance of the Building Permit the following deposits are required:

i. A security deposit equal to the greater of 125% of the estimated cost of all on-site landscaping, in accordance with the approved cost estimate or $100,000. The deposit must be provided prior to issuance of a Building Permit for the development on the Land and will be held as security for landscaping and environmental works.

ii. Engineering security deposit(s), in an amount specified in the Engineering Services Agreement, to cover the construction and installation of all off-site engineering and landscaping requirements.

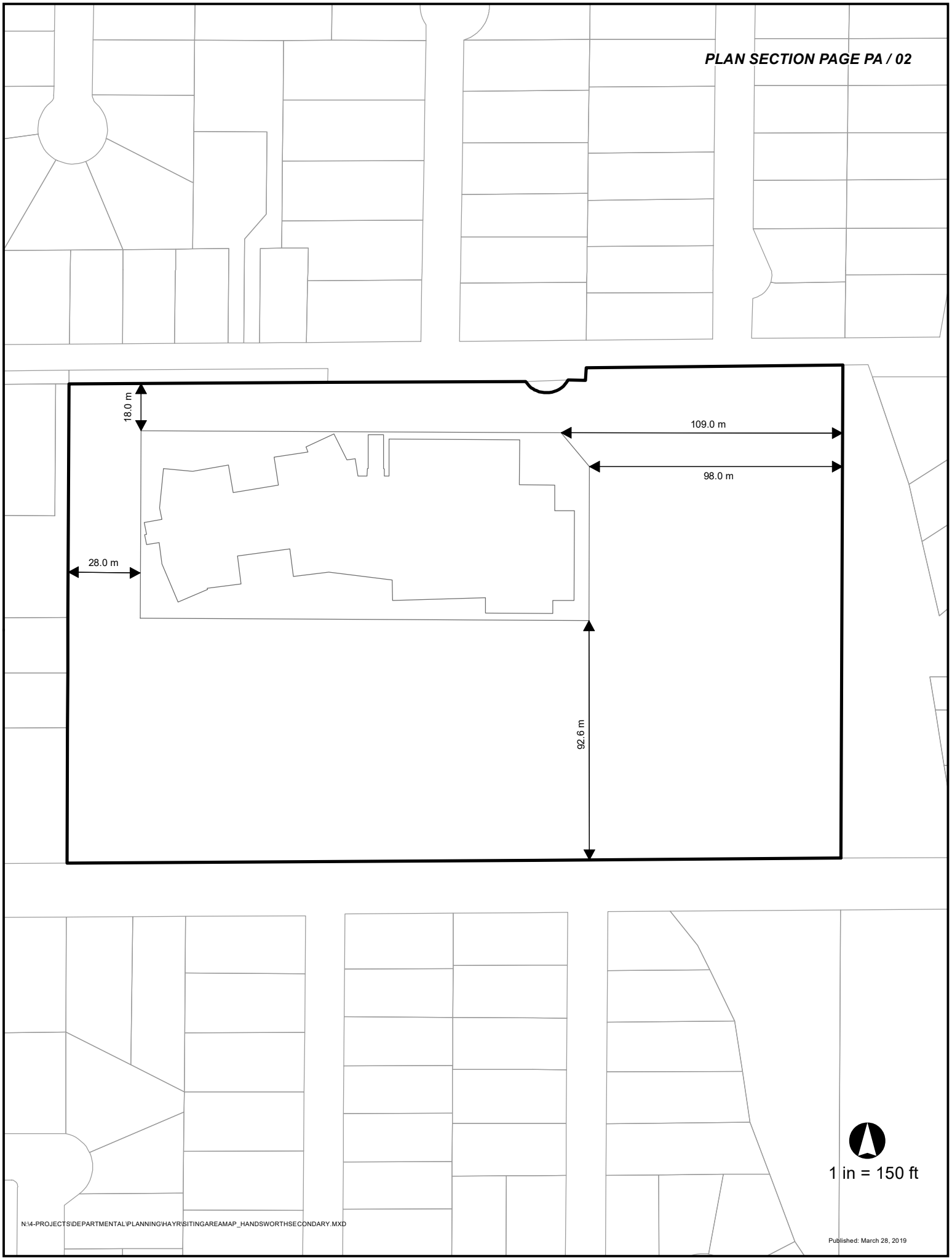
_____

Mayor

_____

Municipal Clerk

Dated this _____ day of _____, _____



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Published: March 28, 2019

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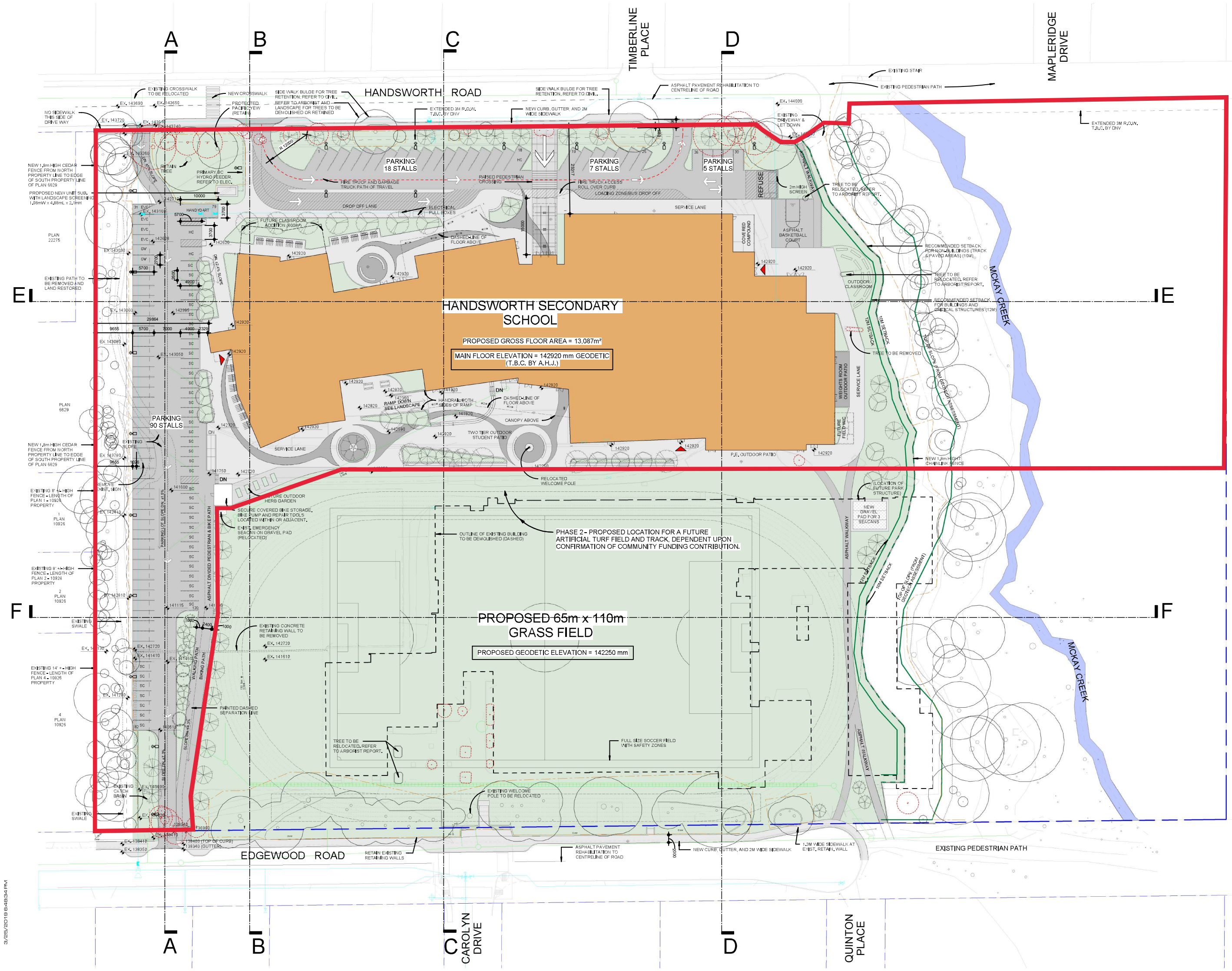

1 A201 CONTEXT SITE PLAN 1 : 400

SITE DESCRIPTION

LEGAL ADDRESS
LOT A, BLOCKS 8 TO 10, DISTRICT LOT 596, PLAN 15603

CIVIC ADDRESS
1044 EDGEWOOD ROAD, NORTH VANCOUVER, BC V7R 4G2

ZONING
PA2: PUBLIC ASSEMBLY ZONE 2, PA

SITE AREA
56,029.30m²

SITE ELEVATION
143.30m ABOVE SEA LEVEL

	REQUIRED	PROVIDED
FLOOR AREA RATIO	N/A	0.23
FLOOR AREAS FOR F.A.R.		
MAIN		6,899m²
SECOND		3,164m²
THIRD		3,108m²
TOTAL	N/A	13,171m²

	REQUIRED	PROVIDED
SITE COVERAGE		
BUILDING	N/A	0.14 (8,141 m²)
BUILDING AND PARKING	N/A	0.22 (12,425 m²)

	REQUIRED	PROVIDED
BUILDING HEIGHT	N/A	13.8m-17.4m

* BUILDING HEIGHT IS MEASURED TO THE AVERAGE OF THE LOWER OF THE NATURAL OR FINISHED GRADE ELEVATIONS.

	REQUIRED	PROVIDED
CAR PARKING**		
REGULAR STALLS	172	68
SMALL CAR STALLS	-	42
H/C STALLS	2	3
HANDI DART	-	1
GREEN VEHICLE STALLS	-	6 (4 EVC STALLS STUB OUTS FOR FUTURE EVC INSTALLATION)
LOADING STALLS	-	LOADING AISLE PROVIDED
TOTAL	174	120 REFER TO VARIANCE

** PARKING REQUIREMENTS BASED ON 3 STALLS PER CLASSROOM (58 CLASSROOMS) 3x58=174
PARKING STANDARDS:
- 2.7m X 5.7m REGULAR STALLS
- 2.6m X 4.9m SMALL CAR STALLS (UP TO 35%)
- 3.7m X 5.7m ACCESS STALLS @ 1 PER 100 REGULAR STALLS OR PART THEREOF
- 7.0m DRIVE AISLES (TWO WAY TRAFFIC WITH PARKING)
- 6.0m DRIVE AISLES (TWO WAY TRAFFIC)

	REQUIRED	PROVIDED
BICYCLE PARKING		
CLASS 1 (SECURED)***	N/A	14
CLASS 2 (NON-SECURED)****	84	84
TOTAL	84	98

*** CLASS 1 SECURE BIKE PARKING STALLS NOT REQUIRED. 14 PROVIDED (1/1000 STUDENTS/STAFF).
**** MIN. 0.6 BICYCLE SPACES FOR EVERY 10 STUDENTS ON A MAX. ATTENDANCE PERIOD

GENERAL SITE NOTES

1. ARCHITECTURAL SITE PLAN IS TO BE READ IN CONJUNCTION WITH ALL LANDSCAPE, CIVIL, MECHANICAL AND ELECTRICAL DRAWINGS.
2. READ, CHECK AND COMPARE ALL DRAWINGS, NOTIFY ARCHITECT OF ANY/ALL DISCREPANCIES.
3. CHECK AND VERIFY EXISTING CONDITIONS AS SHOWN. NOTIFY ARCHITECT OF ANY/ALL DISCREPANCIES.
4. VERIFY ALL DIMENSIONS AND ELEVATIONS BEFORE FABRICATION / CONSTRUCTION OF ANY COMPONENT.
5. FOR SERVICING, GRADING, SITE DRAINAGE, ROADWORKS, RELATED TRAFFIC SIGNAGE AND SIDEWALKS REFER TO CIVIL DRAWINGS.
6. FOR CONTRACT SEQUENCING, SITE ACCESS, HOARDING AND SO ON REFER TO DRAWING ###
7. FOR LANDSCAPING INCLUDING HARD AND SOFT SURFACES, SITE FURNISHINGS, FENCES AND GATES, AND TREE REMOVAL/RETENTION REFER TO LANDSCAPE DRAWINGS.
8. FOR RETAINING WALLS REFER TO LANDSCAPE AND CIVIL DRAWINGS.
9. ALL PLANES AND SWALES ARE TO BE SMOOTH AND TRUE PROVIDING POSITIVE DRAINAGE AND PREVENT PONDING OF WATER
10. REFER TO CIVIL AND LANDSCAPE DRAWINGS FOR ALL GRADING. HARD SURFACE GRADING ADJACENT TO BUILDING FACE TO BE 50mm BELOW FINISH FLOOR AND TO SLOPE AWAY FROM BUILDING AT A MINIMUM SLOPE OF 2%. GRADING FOR SOFT SURFACES ADJACENT TO BUILDING FACE TO BE 150mm BELOW FINISH FLOOR IF CLADDING IS CONCRETE OR MASONRY.
11. SCRAPE AND REMOVE ALL EXISTING MATERIALS AND DEBRIS DUMPED ON SITE.

LEGEND

- PROPERTY LINE
- TREE PROTECTION DURING CONSTRUCTION - REFER TO ARBORIST REPORT
- 2.945m — FINISH GRADE AT BUILDING FACE
- EX 2.945m — EXISTING GRADE ELEVATION
- BUILDING OUTLINE
- EXTERIOR ENTRANCE DOOR
- PAINTED DIRECTIONAL ARROW
- EXISTING TREE TO BE RETAINED - SEE LANDSCAPE DWGS.
- EXISTING TREES TO BE REMOVED - SEE LANDSCAPE DWGS.
- NEW TREES - SEE LANDSCAPE DWGS.
- SIAMESE CONNECTION
- FH NEW FIRE HYDRANT

REVISION - RECORD

No.	DATE	DESCRIPTION
1	2018-10-01	ISSUED FOR SD COSTING
2	2018-10-15	ISSUED FOR DP PRE-APPLICATION
3	2018-11-15	ISSUED FOR DEVELOPMENT PERMIT
4	2019-01-07	ISSUED FOR DD COSTING
5	2019-02-26	ISSUED FOR DEVELOPMENT PERMIT RE-APPLICATION

ISSUED FOR DP RE-APPLICATION

North Vancouver School District
the natural place to learn®

PROJECT TITLE:
HANDSWORTH SECONDARY SCHOOL REPLACEMENT PROJECT

CLIENT:
SCHOOL DISTRICT #44 NORTH VANCOUVER

DRAWING TITLE:
SITE PLAN

PROJECT NUMBER: **18322**

DRAWN: GF SCALE: As indicated
DATE: 2019-02-26

DRAWING NUMBER: **A100**

KMBR ARCHITECTS PLANNERS INC
1788 WEST 8th AVENUE, VANCOUVER, B.C. V6J 1V6
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MAIN ENTRANCE

APPROACH FROM HANDSWORTH ROAD

VIEW OF CLASSROOMS FROM SOUTH-WEST CORNER

VIEW OF STUDENT PATIO FROM FIELD

REVISION - RECORD

No.	DATE	DESCRIPTION
3	2018-11-15	ISSUED FOR DEVELOPMENT PERMIT
5	2019-02-26	ISSUED FOR DEVELOPMENT PERMIT RE-APPLICATION

ISSUED FOR DP RE-APPLICATION

North Vancouver School District
the natural place to learn®

PROJECT TITLE:
HANDSWORTH SECONDARY SCHOOL REPLACEMENT PROJECT

CLIENT:
SCHOOL DISTRICT #44 NORTH VANCOUVER

DRAWING TITLE:
3D RENDERINGS

PROJECT NUMBER: **18322**

DRAWN: GF SCALE:

DATE: 2019-02-26

DRAWING NUMBER: **A500**

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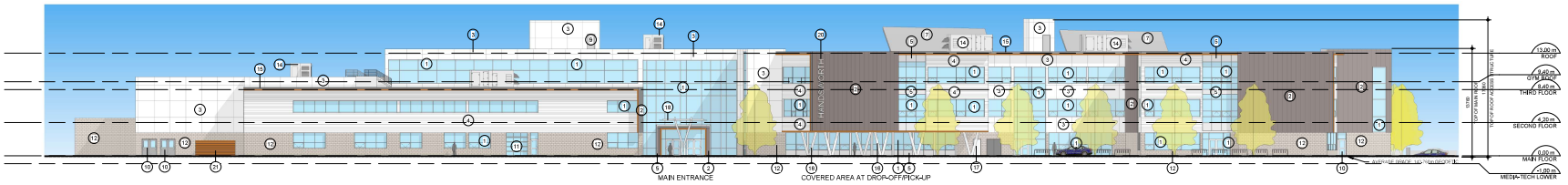
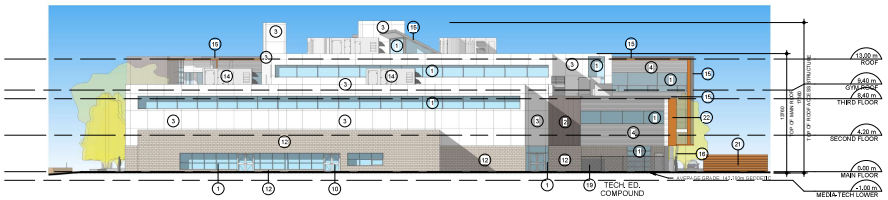
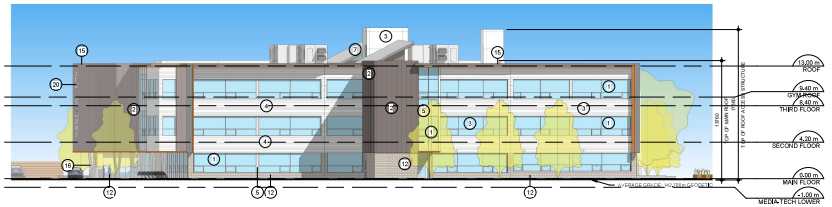


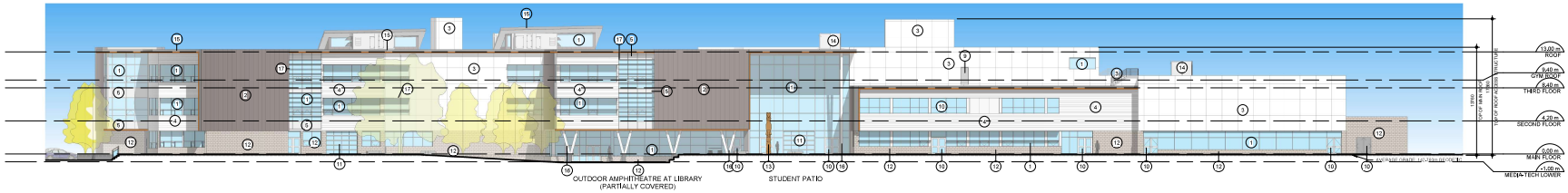
1 A202 NORTH ELEVATION 1 : 200



2 A203 EAST ELEVATION 1 : 200



3 A202 WEST ELEVATION 1 : 200



4 A202 SOUTH ELEVATION 1 : 200

MATERIAL LEGEND	
1	SEALED DOUBLE GLAZING IN THERMALLY BROKEN CURTAIN WALL
2	PEFINISHED STANDING SEAM METAL CLADDING
3	HIGH-DENSITY GLASS FIBRE-REINFORCED CONCRETE PANELS
4	PEFINISHED HORIZONTAL METAL CLADDING
5	OPAQUE CURTAIN WALL SPANDREL PANEL
7	SBS MEMBRANE ROOF SYSTEM
8	WINDOW VENT
9	DOOR AS SCHEDULE
10	PAIR DOOR AS SCHEDULE
11	PREFINISHED THERMALLY BROKEN OVERHEAD DOOR
12	CONCRETE MASONRY VENEER c/w ANTI-GRAFFITI COATING
13	EXISTING RELOCATED WELCOME POLE
14	MECHANICAL ROOF TOP UNIT
15	PREFINISHED METAL FASCIA
16	PAINTED STEEL COLUMN
17	SUN SHADES
18	ENTRANCE CANOPY (TBD)
19	CHAIN-LINK FENCE
20	SCHOOL SIGNAGE
21	REFUSE SCREENING
22	WOOD LOOK METAL SOFFIT


(2) PRE-FINISHED STANDING SEAM METAL CLADDING

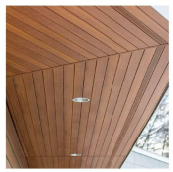

(3) HIGH-DENSITY GLASS FIBRE-REINFORCED CONCRETE PANEL


(4) PREFINISHED HORIZONTAL METAL CLADDING


(5) OPAQUE GLASS SPANDREL PANELS


(12) MASONRY VENEER


(18) GLASS CANOPY AND PAINTED STEEL STRUCTURE


(22) WOOD-LOOK METAL SOFFIT

REVISION + RECORD		
No.	DATE	DESCRIPTION
1	2018-10-05	ISSUED FOR SD COSTING
2	2018-11-15	ISSUED FOR DEVELOPMENT PERMIT
4	2019-02-07	ISSUED FOR SD COSTING
5	2019-02-26	ISSUED FOR DEVELOPMENT PERMIT RE-APPLICATION

ISSUED FOR DP RE-APPLICATION

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PROJECT TITLE
HANDSWORTH SECONDARY SCHOOL REPLACEMENT PROJECT

CLIENT
SCHOOL DISTRICT #44 NORTH VANCOUVER

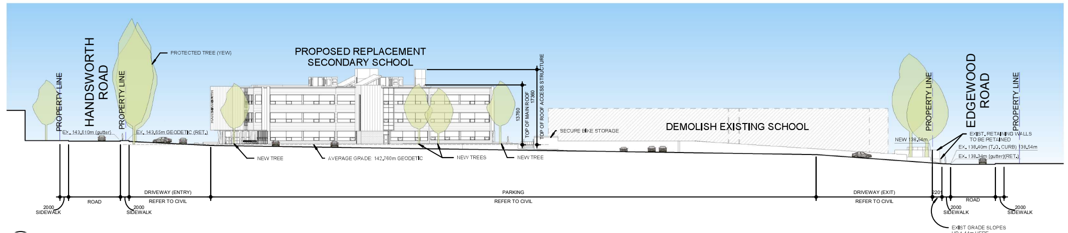
DRAWING TITLE
COMPOSITE EXTERIOR ELEVATIONS

PROJECT NUMBER
18322

DRAWN GF SCALE 1 : 200

DATE 03/12/19

DRAWING NUMBER
A400



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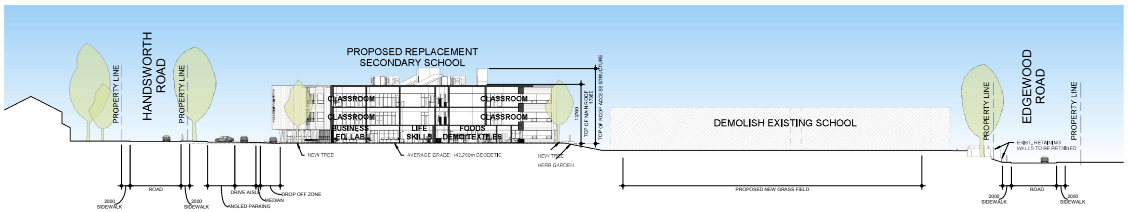

B-B A100 SITE SECTION B-B - NORTH-SOUTH
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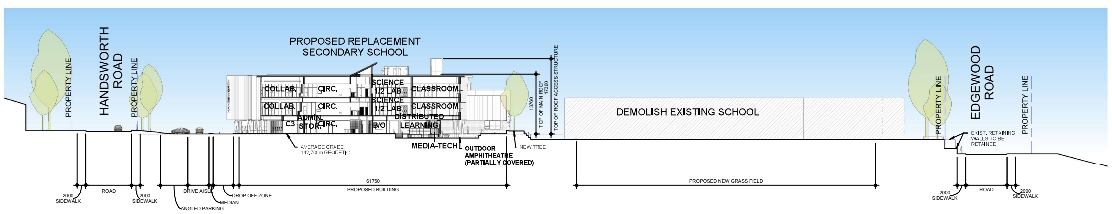

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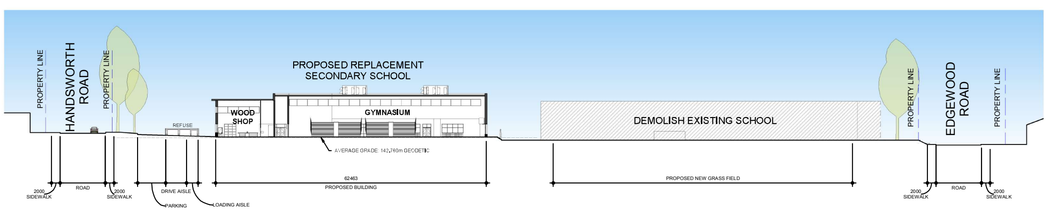

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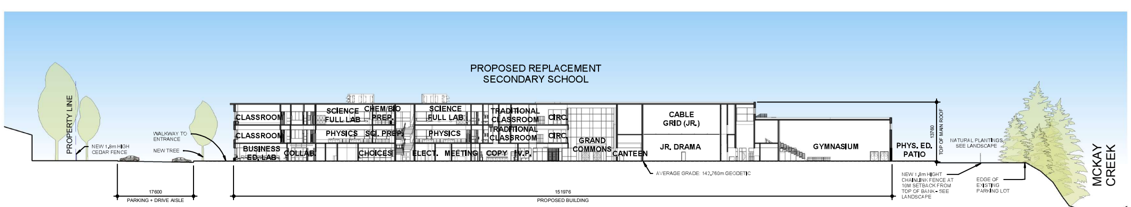

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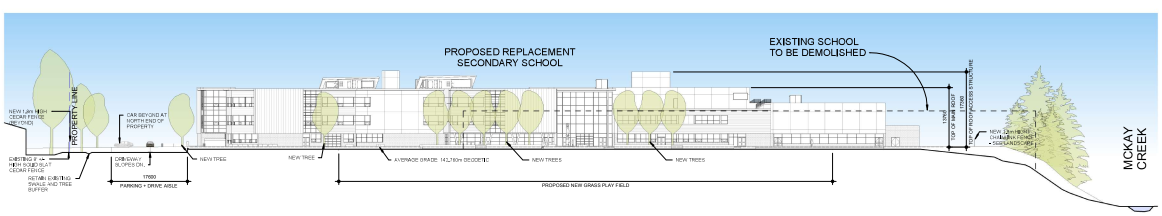

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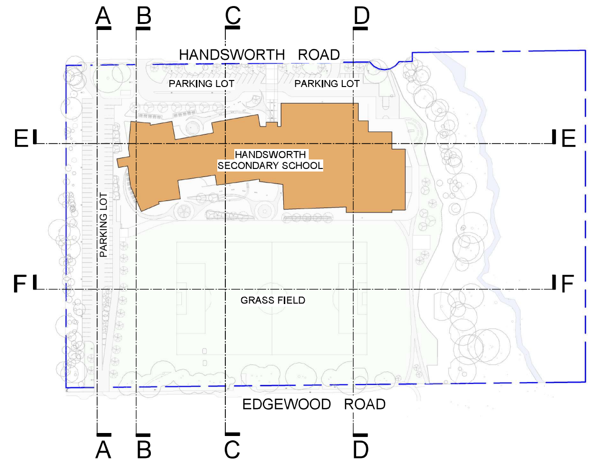

SITE SECTION KEY PLAN
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KMBR ARCHITECTS PLANNERS INC

No.	DATE	DESCRIPTION
2	2018-10-15	ISSUED FOR DP PRE-APPLICATION
3	2018-11-15	ISSUED FOR DEVELOPMENT PERMIT
4	2019-01-07	ISSUED FOR DE COSTING
5	2019-02-26	ISSUED FOR DEVELOPMENT PERMIT RE-APPLICATION

ISSUED FOR DP RE-APPLICATION

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PROJECT TITLE
HANDSWORTH SECONDARY SCHOOL REPLACEMENT PROJECT

CLIENT
SCHOOL DISTRICT #44 NORTH VANCOUVER

DRAWING TITLE
SITE SECTIONS

PROJECT NUMBER
18322

DRAWN GF SCALE As indicated

DATE 03/14/19

DRAWING NUMBER
A407

1:500 0 5m 10 15 20 25 30 35 40 45 50 55 60 65 70 75

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No.	By:	Description	Date
5	HP	Re-issued for DP	Feb 26, 2019
4	HP	100% DD	Jan 4, 2019
3	HP	Issued for Review	Dec 20, 2018
2	HP	Issued for Development Permit	Nov 15, 2018
1	HP	Issued for Review	Sept 28, 2018

REVISIONS TABLE FOR DRAWINGS

No.	By:	Description	Date

REVISIONS TABLE FOR SHEET

Project:
Handsworth Secondary School

Location:
1044 Edgewood Rd
North Vancouver, BC

Drawn:	Stamp:
HP	
Checked: DJ	
Approved: DJ	Original Sheet Size: 24"x36"
Scale: 1:960	

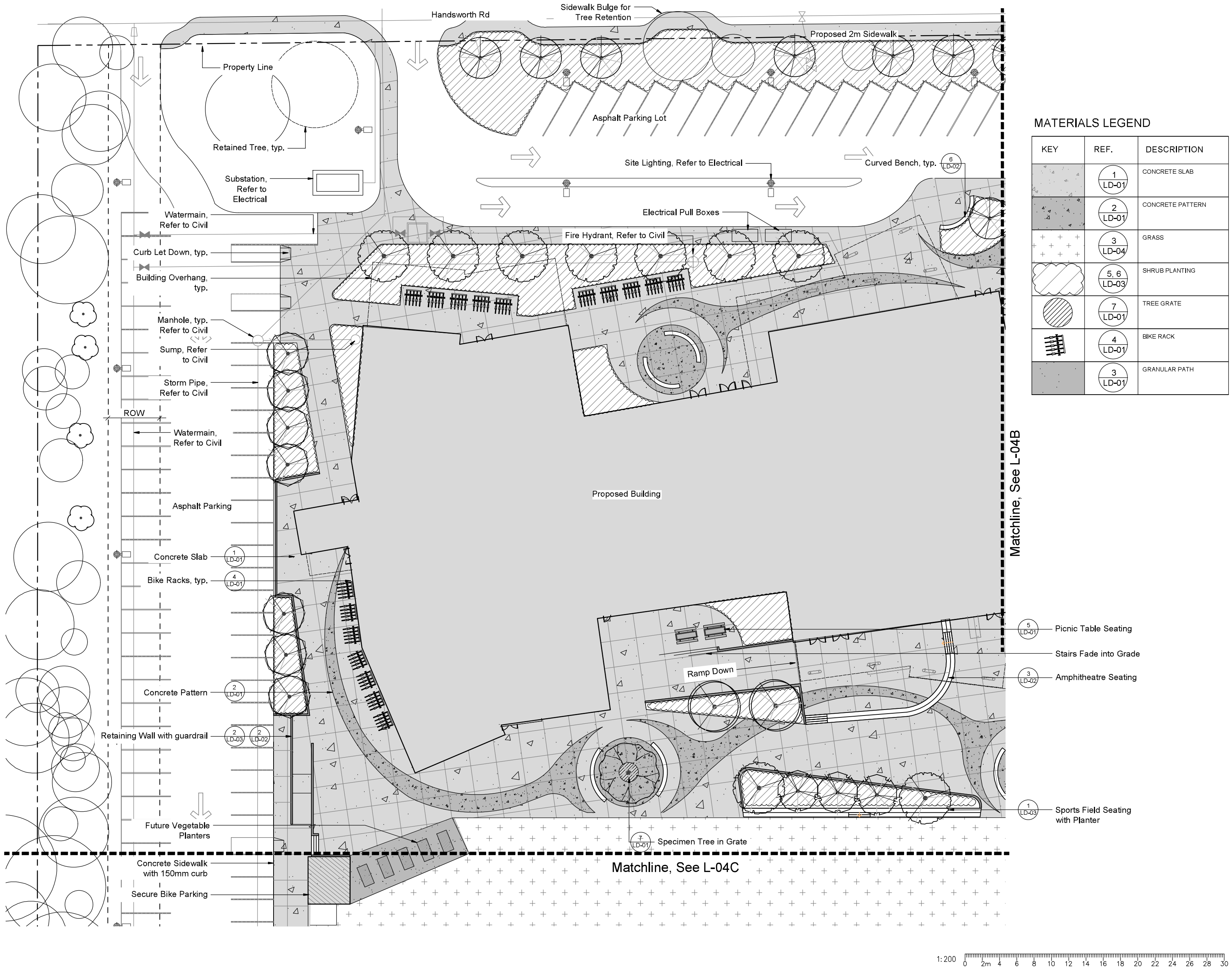
CONTRACTOR SHALL CHECK ALL DIMENSIONS ON THE WORK AND REPORT ANY DISCREPANCY TO THE CONSULTANT BEFORE PROCEEDING. ALL DRAWINGS AND SPECIFICATIONS ARE THE EXCLUSIVE PROPERTY OF THE OWNER AND MUST BE RETURNED AT THE COMPLETION OF THE WORK. ALL REZONING/DP/PPA/TPA/BP DRAWINGS MUST NOT BE PRICED FOR CONSTRUCTION UNLESS LABELED ISSUED FOR TENDER/CONSTRUCTION.

Drawing Title: OVERALL SITE PLAN

NORTH

VDZ Project #: DP2018-58

Drawing #: L-03



MATERIALS LEGEND

KEY	REF.	DESCRIPTION
	1 LD-01	CONCRETE SLAB
	2 LD-01	CONCRETE PATTERN
	3 LD-04	GRASS
	5, 6 LD-03	SHRUB PLANTING
	7 LD-01	TREE GRATE
	4 LD-01	BIKE RACK
	3 LD-01	GRANULAR PATH

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LANDSCAPE ARCHITECTURE | CIVIL ENGINEERING | URBAN FORESTRY

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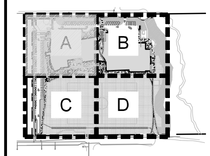
604-882-0024

Key Map (NTS)



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Handsworth Secondary School

Location:

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North Vancouver, BC

Drawn: HP

Checked: DJ

Approved: DJ

Stamp:

Original Sheet Size: 24"x36"

Scale: 1:200

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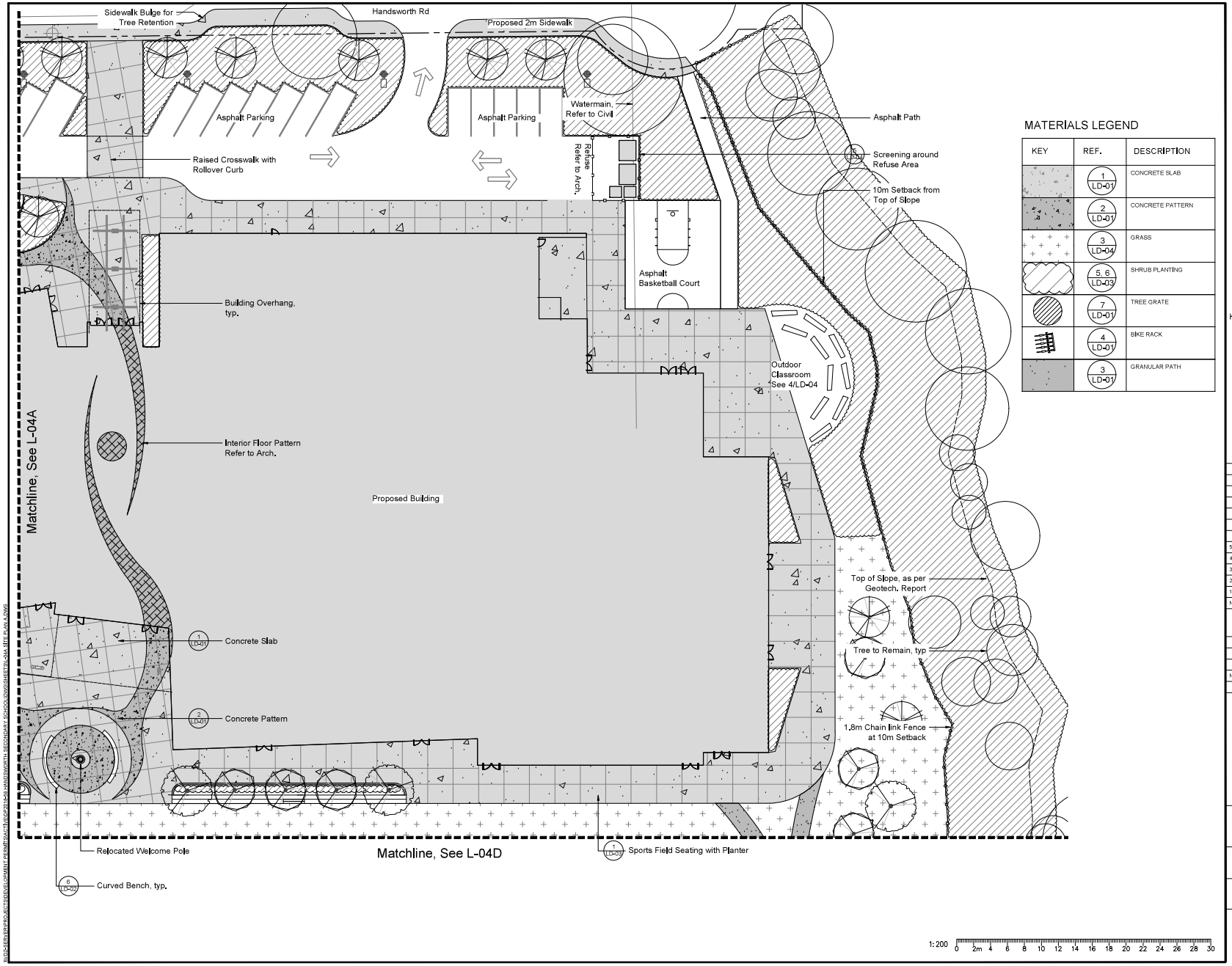
Drawing Title: SITE PLAN A

VDZ Project #: DP2018-58

Drawing #: L-04A



MATERIALS LEGEND

KEY	REF.	DESCRIPTION
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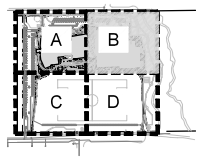
	2 LD-01	CONCRETE PATTERN
	3 LD-04	GRASS
	5, 6 LD-03	SHRUB PLANTING
	7 LD-01	TREE GRATE
	4 LD-01	BIKE RACK
	3 LD-01	GRANULAR PATH

Key Map (NTS)



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Location:
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North Vancouver, BC

Drawn: HP	Stamp:
Checked: DJ	
Approved: DJ	Original Sheet Size: 24"x36"
Scale: 1:200	

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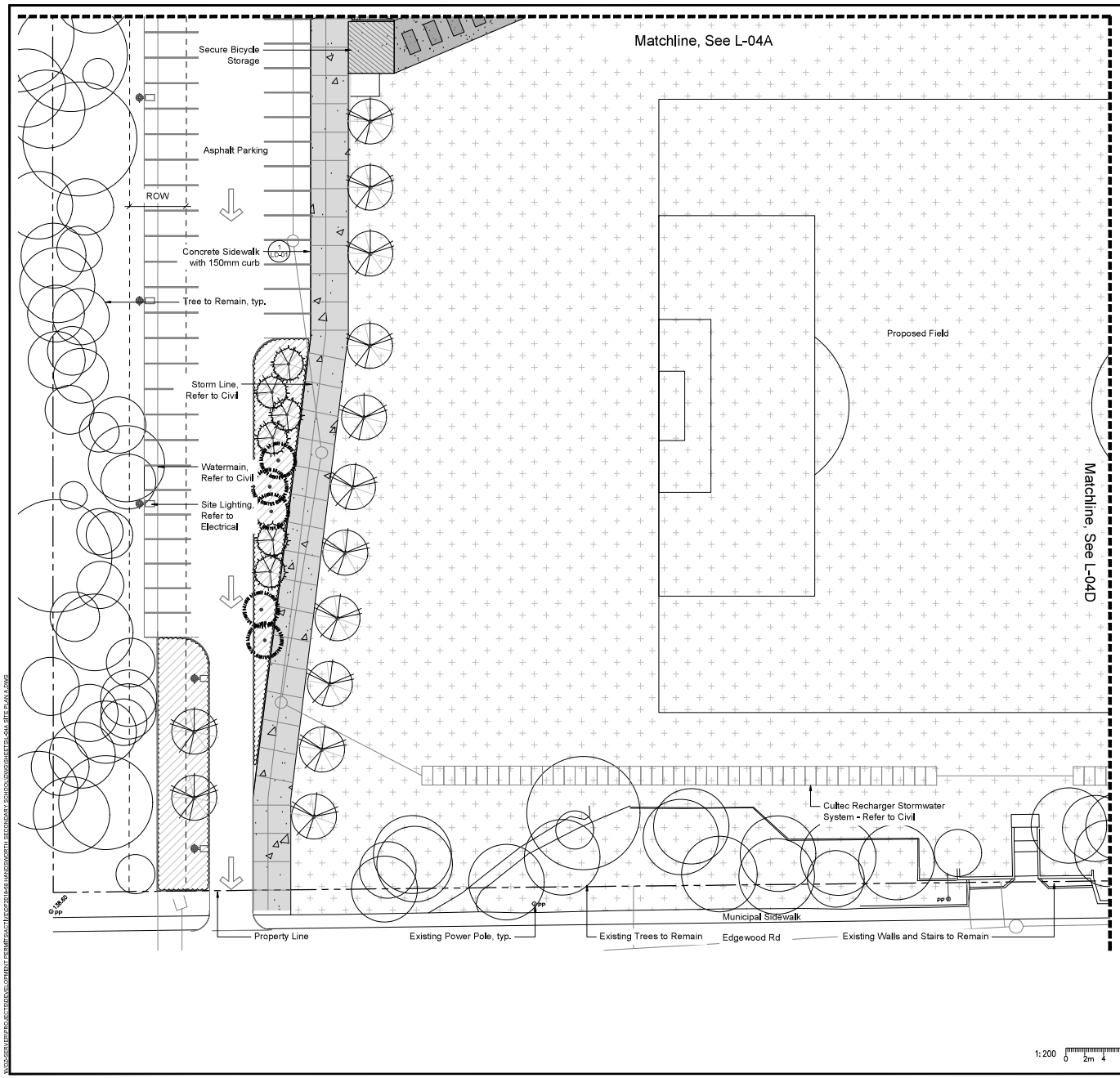
VDZ Project #: DP2018-58
Drawing #: L-04B



MATERIALS LEGEND

KEY	REF.	DESCRIPTION
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	2 LD-01	CONCRETE PATTERN
	3 LD-04	GRASS
	5, 6 LD-03	SHRUB PLANTING
	7 LD-01	TREE GRATE
	4 LD-01	BIKE RACK
	3 LD-01	GRANULAR PATH

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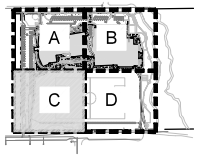
Key Map (NTS)



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1044 Edgewood Rd
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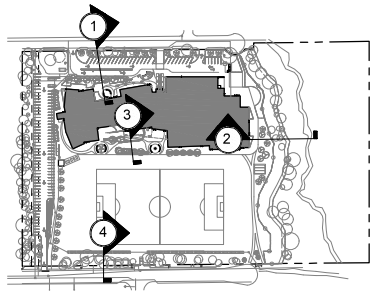
Checked:	
DJ	
Approved:	Original Sheet Size:
DJ	24"x36"
Scale:	
1:200	

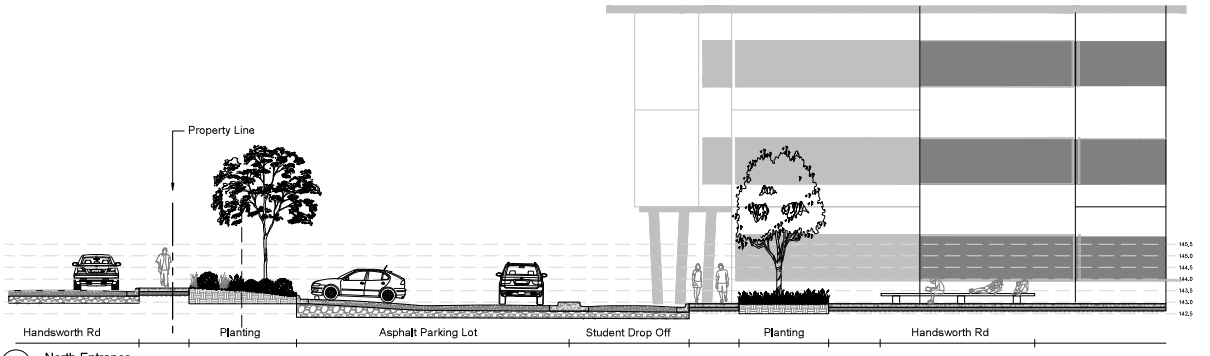
Drawing Title: SITE PLAN C

VDZ Project #: DP2018-58

Drawing #: L-04C

Key Map (NTS)





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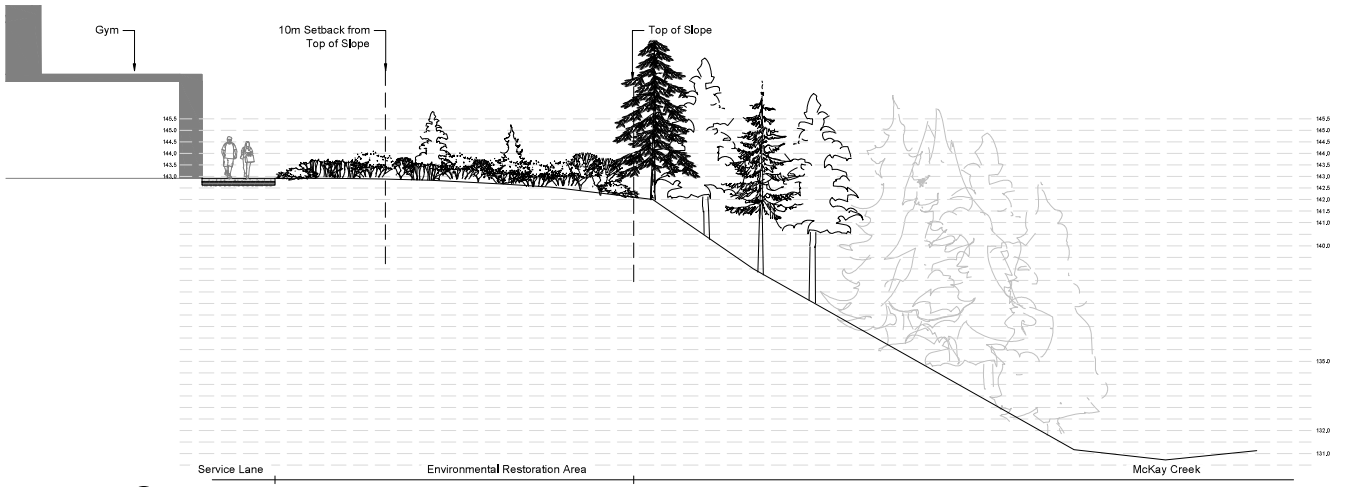

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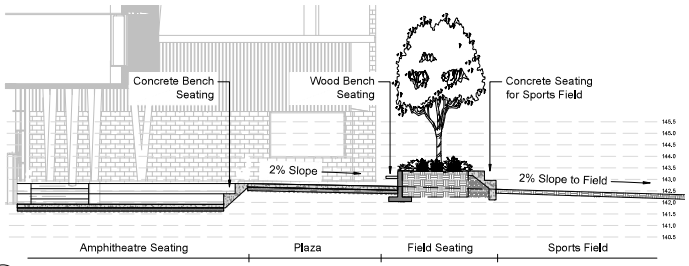

3 Library Plaza
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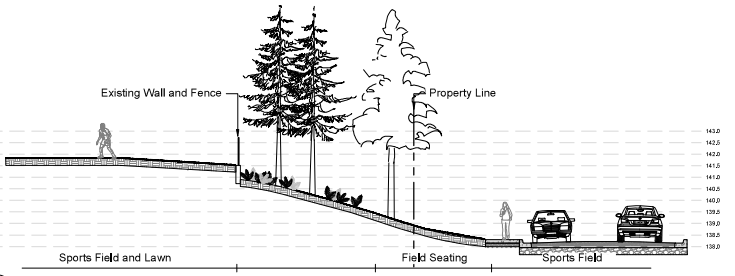

4 South Property Line
Scale 1:100

1:100 0 1m 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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Checked:	
DJ	
Approved:	Original Sheet Size:
DJ	24"x36"
Scale:	
1:100	

Drawing Title: SECTIONS

NORTH

VDZ Project #: DP2018-58

Drawing #: LS-01

ATTACHMENT B

ROCKANDEL&ASSOCIATES
Building Success Through Process Facilitation
Organizational & Community Engagement

PUBLIC INFORMATION MEETING REPORT

To: Robyn Hay, Development Planner, District of North Vancouver. E: hayr@dnv.org
Mark Thomson, North Vancouver School District. E: mthomson@sd44.ca

From: Catherine Rockandel, IAF Certified Professional Facilitator
Rockandel & Associates E: cat@growpartnerships.com

Re: PIM Summary for Handsworth Secondary School Replacement Project

Date: January 24, 2019

Event Date:	Wednesday, January 8, 2018
Time:	6:30 PM – 9:00 PM
Location:	1044 Edgewood Road, Handsworth School Gym, North Vancouver
Attendees:	One hundred and seven (107) people signed in to the meeting
Comment Forms:	Forty-four (44) comment forms were received at the meeting. A summary of comments is included in the Appendix. In addition, the School District received 254 email comments which were provided to the DNV planner.

Notification:

Flyer Notification

Approximately 186 flyers were distributed to all addresses within 100m of the school. The flyer was also distributed by email to all Handsworth students/parents, and posted on the School District website. See Appendix

Social Media Notification

- Included: Facebook, Twitter and Instagram. See Appendix

Email Notification

- Dec 11: to parents
- Dec 14: to parents and email to staff
- Jan 7: to parents
- Jan 7: to parents and staff (a different email than the one above for the same date)

Website Notification

- Front page banner of SD44 website
- Capital Project Updates, presentation materials, and comments sheets located at: https://www.sd44.ca/Board/CapitalPlanProjects/CapitalProjectsUpdates/Handsworth/Pages/default.aspx

Site Signs

Two signs were erected on Handsworth Road and on Edgewood two weeks before meeting.

Newspaper Advertisement

Two versions of the notification ad ran in the North Shore news on December 28th and January 4, 2019. See Appendix

PIM Summary for Handsworth Secondary School Replacement Project
January 24, 2019

The following North Vancouver School District staff, Project Team, District of North Vancouver staff and Mayor were in attendance.

District of North Vancouver
Robyn Hay, Development Planner, District of North Vancouver
Mike Little, Mayor, District of North Vancouver

North Vancouver School District
Mark Pearmain, Superintendent of Schools
Georgia Allison, Secretary Treasurer
Chris Atkinson, Assistant Superintendent
Jim McKenzie, Director Facilities
Mark Thomson, Capital Projects Manager
Deneka Michaud, Communications Manager
Rupi Samra-Gynane, Principal, Handworth Secondary
Mark Barrett, Vice Principal, Handsworth Secondary
Justin Wong, Vice Principal, Handsworth Secondary

Project Consultants
Architecture: KMBR, Witmar Abele, Kate Lemon and Georgia Fisher
Transportation: Binnie Civil Engineering Consultants, Amy Cho
Landscape Architecture: van der Zalm & Associates, Heather Pelz

Facilitator
Catherine Rockandel, Rockandel & Associates

PRESENTATION SUMMARY

The North Vancouver School District presented a proposal to replace the existing Handsworth Secondary School, located at 1044 Edgewood Road. The new school is being designed to accommodate 1400 students. It will be designed with a focus on creating collaborative workspaces for students and staff with flexible and adaptable spaces for teaching and learning. The new Handsworth Secondary will be constructed on the existing grass play field at the north side of the property. Following completion of construction of the new school, the existing Handsworth school will be demolished, and a new grass sports field will be constructed in its place. Parking will line the west side of the property and will be on either side of a driving aisle that will provide one way traffic from Handsworth Road to Edgewood Road. Some additional parking will be provided near the new building entrance and associated drop-off and pick-up area within the site boundaries along the Handsworth Road frontage. A total of 120 parking spaces and 98 bike stalls are proposed to be provided on site. Various alternate site configuration options, which could accommodate the potential for future installation of an artificial turf field and a track, were presented for comment.

FACILITATED PUBLIC COMMENT: Q & A (Index: Q: Questions C: Comment A: Answers)

Q1 I am a North Shore Streamkeeper, I am wondering in your design have you consider management of storm water for the site and how it will embrace the creek from the use

of swales and soften the impact of the building? Does the design embrace the impact on this land?

A1 We have an environmental consultant who has been engaging on this project. They are looking at impacts on the creek. In terms of embracing the creek we have to do the opposite. There is a requirement to stay 10 metres back from the top of the bank associated with the creek. We have to install a fence along the creek set back 10 metres. There will be storm drains installed on the site to manage water. In terms of habitat encroachment, the plantings around the site will be native species. We are also being asked to look at where the invasive species are and in the slope area replace them with native species.

Q2 I am neighbor for about twenty years. I want to address the issue of parking. There is a bylaw in place that says is adequate. The school will see in the future the same amount of traffic. There are events at the schools that bring in traffic and buses to the neighbourhood. I can't see why we would want to see anything other than the bylaw requirement being met for parking. The school should meet the parking requirement. When you say that you are making an application for a bylaw variance, what form will that variance take, and how political will that be, and do the neighbours have much meaningful influence.

A2 We are contemplating reducing the parking requirement because what is in the budget is a grass field. A second option is a turf field but if a track is contemplated it needs the space that would be acquired from a reduction in parking.

(Robyn Hay) Tonight is part of the District's political process. If you have concerns please write them down on the comment forms. The next opportunity for you to voice your concerns will be at a Council meeting. We are hoping for that to be in the early spring. You can also talk to Councillors prior to that time.

Q3 I live in the area and my children will be coming to Handsworth. Is there an option to move the bike parking to a covered option? I would support that. Is there going to be any electric plug in parking area? Will there be gender neutral bathrooms?

A3 Bikes Parking: Half the bike parking is planned to be under cover --the secured bike parking is under cover and about half the unsecured is under cover. We could look at moving more of the unsecured bike parking to the covered area. This would be near the main entrance, just outside Admin.

Electric Vehicle Charging (EV): We are having a conversation about EV currently. 2-3 stalls are designated for future EV charging as part of design. We will allow for the electrical connection and the district is reviewing options for providing metered charging stations in future.

Gender Neutral Washrooms: In general, the design provides at least one universal washroom at each cluster of gendered washrooms and changerooms. The universal washrooms is a single occupant, wheel chair accessible, washroom, available to all genders. There are currently 5 universal washrooms distributed throughout the school -

-there is one near the gym change room, drama, and dance; There is one at the washrooms north of the theatre near the Grand Commons, LAC, and tech ed; and there is one at the centre of each classroom wing (one on each of the 3 floors). There is also a gender neutral, single occupant washrooms associated with Life Skills on level 1 and one in the admin and counselling area. In summary, there is one centrally located in each wing associated with each of the gendered washrooms blocks, and 2 additional universal single occupant GN washrooms not associated with the larger gendered washrooms blocks for a total of 7 altogether.

Q4 I am a parent and neighbor that is affected by traffic. I would like to have a track and would like to understand the rationale of why it is not in the initial plan? What analysis has occurred to involve the Ministry of Health. We currently have a situation of obesity, without a track an entire population of North Shore residents is going to be driving longer contributing to traffic issues all over the north shore. You have a dance studio and other amenities. There are numerous studies that support running as a base sport for other things. The loss of track is a huge loss for the whole community for the future of the community.

A4 The Government, Ministry of Education as funders only fund certain things and tracks are not one of them. We have an excellent relationship with the District and we are looking at working with them to find external funding for the track.

C5 Some positive feedback, I like the cool design, collaboration emphasis. I can see how you have integrated the feedback you received from parent surveys in terms of the drama, robotics, and the emphasis on active transportation. I do want to pick up on theme, your parking proposal is an improvement on the current situation. We must support the application that allows for maximum design flexibility for future. It is a win-win situation for the existing neighbourhood. It improves traffic flows, more space for the existing school, and it allows for track. We encourage design team to look at where you are going to get the cash. We as a community need your help to get organized to enable to the ask for the funding for the track to be made clearly and compellingly to other potential funders. It is not good enough to say we don't have the money. We need you to allow us to help you to get the money.

Q6 I wanted to emphasize my support for the track and field. I attended Handsworth many years ago. How much funding is required for the track and field? And what needs to happen to get that funding?

A6 We are not in the track and field business, but best guess is magnitude three to four million. This is outside of bake sale capacity fundraising. There are lots of different ways to approach this funding. The District is a big player in possibly funding this. There are a lot of different conversations required.

Q7 I am concerned about the geology. My house is adjacent to this site and it is creeping more than you think. I like the previous design where the fields were along the ravine this one is too modern. I would like to know why you diverged from that design. Other issues I am concerned about are that there are a lot of kids loitering after hours; along

Handsworth there is a lot of speeding; there are kids up on the roof of the school; I like the idea of robotics but we also need computers; LEED Gold are you doing that?

A7 In terms of the siting of the building, I don't recall a concept where the fields were along the ravine. This is not possible because the existing school has to be in operation while the new school is being built. A phased approach costs a lot more. The school is being designed to LEED Gold. We are looking at cross walks on Handsworth in particular raised cross walks and narrowing the road at the crossing with bulges.

The School District has the same concerns lighting, loitering, hiding at every school site. This is an opportunity to use design to address these issues. In terms of equipment, there will be all new computers, one of the design principles is about building community inside the building so Wi-Fi, video conferencing, and the space will be designed to support connectivity with gathering spaces.

Q8 I see the traffic design but I am a bit confused about traffic going north south exiting through Edgewood. Someone mentioned there is going to be a bike route. I have a hard time envisioning that people already travelling through Sunset will re-route and go on Capilano and then up and turn on Handsworth. It seems confusing to me as a biker. It seems strange to me that the parking is a far away from the theatre and the gymnasium where a lot of extra traffic will be coming. It seems awkward to have to walk across the school yard to get there. I would like to encourage the track for our children. There is a lot of space right now with the gravel field, the track and tennis courts and with the new building there will be less outdoor space. What is the square footage of the new school?

A8 The current school is 14,230 and the new school is 13,500 square metres. The decrease is in the design areas not in programming space.

Q9 I am curious about the mix of bathrooms, will they be taking into account female cultural backgrounds that have a need for female only spaces?

A9 There will be a mix of gender specific single sex and gender-neutral bathrooms.

Q10 I am concerned about the structural safety of the building in case of an earthquake. Are you taking that into account? Would students go out on the field?

A10 It is good to see students here asking questions. The new school is being built to a level that everyone inside the building can get out safely, that is the purpose of a seismic upgrade project. It is going to be safer to go outside than stay in the building. Now we practice what to do in event of an earthquake and we would also do that in the new school. The field will be a safe place because there is no overhead wires, glass from windows, etc.

Q11 Where is the post disaster building in the community if it is not the school?

A11 (Mayor Little) We are working on a project to put sensors on buildings in the event of an earthquake the District will be able to tell if there has been enough shaking on that building to make it unsafe. We would provide notification if the building is safe. The District of North Vancouver does not have a lot of post disaster buildings, I believe the new community centre building on Queens Road was built to a post disaster standard.

We are also trying to identify other spaces that can be completed to a post disaster standard, the next one is the Edgemont Library which is up for a capital upgrade.

Q12 When will the presentation materials be online for people that cannot attend this meeting but would like to comment in the two-week comment period?

A12 These presentation boards, comment sheets and materials were posted today online

Q13 I didn't see a cafeteria in the new plans or places to sit and eat. Is there one? The location of the front door with pick up and drop off right in front seems like a recipe for disaster. I would like to hear your thinking on this.

A13 Multi use is an important design principle for the new school. There is not a dedicated cafeteria, but there is a huge central commons area, that is a place to sit, connect with community. There are also decentralized hubs around the school that will be places where people can connect, eat lunch, etc. It is a big school but the way to make it feel like a small school is to create hubs where cohorts can gather.

Yes, we are looking at how to separate vehicle traffic from pedestrians, we are talking about the best way to do that.

Q14 Is there only one washroom per floor? I don't think this is enough as vaping is big and they do it the washrooms. As a student, I currently avoid going into washrooms where vaping occurs. In terms of traffic flow and the approximately 90 spots with the traffic flowing one way people are driving in they can't find a parking spot then they have to go out and drive around the block is that not going to make traffic worse with backups. I am also curious how you are going to stop the erosion from the creek? I am also concerned that with more students being enrolled each year you are making the new school smaller than before.

A14 There is one set of washrooms for male and one set of washrooms for female per classroom floor. This is a good comment about vaping, it is a challenge in all our schools. Patrolling washrooms and keeping them safe is one issue. The number of washrooms is another.

In terms of traffic flow, we are looking at that. In terms of creek erosion that is a good question but outside the focus of this meeting. In terms of space, all the programming space is built on current program requirements. This is built for maximum flexibility. You have a whole performing arts area, drama, there is lots of space to move things around.

C15 I am Janet Carswell and I am the Handsworth PAC Chair. There will be a cafeteria and kitchen. We are fundraising for equipment in the school and for the track. The main concern in the broader and school community is the track. There is a lot of support for this. It will be the only big track on the north shore if you build it. We have committee to raise funds and we are always open to more people joining that committee. We also need a lot of help from the District and the School to raise these funds. The contact information is on website

C16 I am a neighbor and in the 90s I was the PAC Chair, I wanted to comment that when the original track was built School District 44 contributed the most to building the existing

track. The municipality also contributed and we as parents raised money. It is not impossible. I do not want to lose the track in this area of the District that we worked so hard for.

Another point, there is a Yew tree in the northwest corner that is very important that I hope you are aware of?

A16 Yes, we are aware of the Yew tree. It will be protected as per draft plans. In terms of the track we are not saying it is impossible, it needs collaborative effort to make it happen.

C17 I am Brian and this is my tech crew. Handsworth has two student tech programs for drama, school plays and for big events such as Remembrance Day assembly and events like this. Our concern when we look at the drawings we don't see a tech booth like we have here in the gym. We are worried about moving into the mechanical room on the second floor. It has some pros such as sound proof but the cons are about microphones and the sound quality will not be as good as before. Currently our stuff is spread all over the school. We would like to see a tech room in the new gym that is a bit bigger if possible.

A17 Everything is possible, it really is dependent on space as to how we can implement improvements. In the drama space, it is much improved with a grid floor over top so safe walking and hanging lights. But not all of it has to be permanent. I can't guarantee that. The key is multi-use and flexible.

C18 It is going to be a really big pain for us to not have a tech booth in the gym and will affect the quality of the assemblies and other meetings. I have been involved in the tech program for four years and this is like a second family to me. Having that space where we can work together, collaborate and work on important tech stuff in private non-judgmental space I thoroughly enjoy. I think you should have a dedicated tech booth.

Q19 My kids are coming to the school. I appreciated the student's presentation on the rationale for the tech program needs. I am thinking outside the box, is there any chance that the track could be located off Nancy Green Way off Cleveland Park where there is more space for the track and parking area. There are a couple of schools up there, people drive up there and have track for more than running incorporating all the other field athletics. Is that possible? My second question, is I am biologist and on the north-east corner I don't see the trees, but perhaps they are not in good condition, can you provide an update on that?

A19 The sequoias in the north east corner showed signs of decay. These would have to be removed to widen the sidewalk. They would be replaced with native plantings.

In terms of alternate locations for track this may be something for District to look at.

Q20 I live on Edgewood Place, my property line is adjacent to the tree buffer for the parking lot, is that area protected or is it possible to landscape the area and clean out the brush as that area is being used as a smoking zone. All kinds of things get thrown into my yard including lit cigarette butts which is quite dangerous particularly in the summer when it

is dry. Also, is there an opportunity to include newer building methods into what you are doing such as recycling water, etc.

A20 We are doing some clean up in that area, so, yes, we could make it a higher visibility zone. The building is being designed to LEED Gold standards so that includes a number of measures such as water and energy conversation, materials selection that results in about 64 credit measures.

C21 I am a neighbor to the immediate west. The set back in the parking area could be adequate as shown of 30 feet or so but needs further attention in terms of the lighting for parking area. The current lights are on 30 foot standards and this adjacent to my property will not be acceptable. They do not have to be 30 feet high and I trust that they will have shields etc. Secondly, since you are proposing a three storey building with windows on that west side, I would suggest that the landscape buffering needs to be full mature trees at 20-30 feet to replace what you are taking out. This will create a buffer from school activities. It is important to me that you put in proper fencing and mature landscaping. In terms of the discussion about the field. I am in favor of a grass field without lighting and with a track. This is what we have now and that is what should be replaced. It has minimal impact but if you put in artificial turf and lighting that will bring in a lot more traffic and use. The loss of basketball hoops and tennis courts is something to recognize as Handsworth has a great athletic tradition and there are none of these elsewhere in the neighbourhood. I am not sure what the answer is but even in the winter there are kids playing hoops at the school. I am curious about security and how the school will address concerns raised by others.

Q22 First wanted to say that I love the beautiful design and am excited for my daughter to come next year for grade 8. I am in favor of track. There is a problem with obesity and a focus on fitness, it is right way to go to encourage students. I heard you say Province does not fund tracks. What if we can come up with a million or two dollars out of changes to the building design and go back to Province and say we can save this money can we use it for a track. Do we really need the most-fancy expensive building there is – LEED Gold is?

A22 The building will be durable but not fancy. There won't be any extra funds we can extract from the design. The LEED Gold design is not going to be certified, we are focusing on longevity and energy saving design. There is not being going to money left over.

Q23 I am hoping this project goes through and we get a track but who get to vote on it the school council? Is this District wide or just in the neighbourhood? If the bylaw does get amended what kind of engineering will happen on that field?

I have heard people here say that they would like a track and a grass field so that all activities such as rugby, football, javelin that happen on grass can occur. If the funding is not in place for the track what will happen. For example: If there is just a grass field is it going to be flat or with a slope. If there is no track does the School District have a plan for where the track and grass field related activities will happen?

A23 The decision makers on the School District application for the project and variance is the District of North Vancouver Mayor and Council.

(Robyn Hay) This application will be going to Mayor and Council for consideration in the spring.

The key to what type of engineering would occur on the field is timing. If the funding is not in place, then no track would be built but the space would be there for the future. Currently the plan is to have a slightly sloping grass field with no track until the track funding is in place. Once the funding is in place then a track would be built. Whomever takes on track building would be responsible for engineering and lighting. The School District does not have a plan yet for where the activities that occur on the track and grass field would occur if the track is not built right away. We will have one but not yet.

Q24 Where is everyone going to park while construction is underway?

A24 There is not a parking plan yet. We are working on it. It will be offsite.

C25 In West Vancouver they have been fundraising for a new track for 5 years. They may well have some tricks and tips. I think their track budget is 5 million. Not sure what bells and whistles it has. It is a big project

C26 We have lived in area for a long time and our kids are all finished school. I would support less parking. I think it is important to encourage people that driving to work, to school and driving your kids to drop them off is not the number one option. Lets have a field and track and less parking

A26 We encourage our staff to ride their bikes and also students. We have facilities to encourage people to do that.

Q27 I have lived in the neighbourhood for 20 years and my kids have graduated. I am wondering if you can shift the proposed parking lot from the west side to the east side. My concern is safety, on Edgewood there is a three way stop but cars turning have limited sight. Also on Handsworth people speed.

A27 Potentially it could be shifted. We looked at some options to do that. One of the concerns we had was that positioning the new school against neighbours would create a three storey on look. We don't have a lot of instructions from District in terms of height and setbacks but they do specifically say in bylaw that we should be thinking of our neighbours and massing adjacent. We also looked at whether we flipped the design and put the gymnasium and the theatre against the neighbours this also would creating massing and afterhours noise and activities. The decision was made to keep the massing and overlook away from neighbours as much as possible.

In terms of transportation we have conducted a number of site visits to the school. After school, before and after bell, afternoons, evenings, mornings, weekend events to understand traffic patterns. The proposed drop off on Handsworth includes opportunities to calm down Handsworth with traffic calming measures. We expect there would be less traffic coming out on Edgewood. We are also looking to separate vehicle and pedestrian traffic. The only overlap is in the drop off area.

Q28 I grew up in the neighbourhood and understand traffic patterns. Why is there a new pedestrian cross walk at the new entrance to the new school? For the residents of Timberline coming out of their street turning right onto Handsworth they will be right into a cross walk. In terms of the running track I went to Handsworth and did not enjoy running in circles. I think you should encourage trail running. They are beautiful and there are lots of great places to get exercise without track.

C29 The west parking lot, would it be more efficient if the parking was on an angle? It takes longer to park particularly for new drivers backing out. I think you should look at that.

A29 Angle parking requires more space than 90-degree parking. With angle parking, fewer parking stalls would be provided within the same overall parking lot space

APPENDIX: SUMMARY OF KEY ISSUES PROVIDED ON COMMENT SHEETS AT THE PIM

- Consideration should be given to traffic calming measures (i.e. speed bumps and/or raised crosswalk)
- The building has not been design to meet post-disaster standards
- Building too contemporary, industrial looking, very grey, incorporate more wood
- Parking should comply with the bylaw
- Concerns with congestion around the drop off and pick up area
- Concerns with increase of traffic
- Suggestion to move the parking to the east side of the site
- Consider resident only parking permitted areas for the local streets
- Concerns with the one-way traffic flow from Handsworth Road to Edgewood Road as people may not find a space and have to loop back through the neighbourhood to get a space or park on Edgewood
- Lighting of the parking lot and potential ATF field needs to be considered carefully
- Prefer grass field over artificial turf and vice versa
- Desire for a running track
- Consider a tennis court and more space for basketball
- Consider more washrooms facilities in the school as well as some external to be accessible by the community for events
- Consider gender natural washrooms and change rooms
- Clear the bush on western side of the site to improve visibility and prevent loitering
- Desire to have more covered bike parking and promote cycling to school
- Parking during construction / concern for construction safety
- Electric plugs for vehicles and bikes should be considered

APPENDIX: NEWSPAPER AD – VERSION ONE

Notice of Public Information Meeting

Handsworth Secondary School Replacement Project

The North Vancouver School District is hosting a public information meeting to present the development proposal to replace the current Handsworth Secondary School with a brand new school located on the same parcel of land (1044 Edgewood Road, North Vancouver)

North Vancouver School District proposes to replace the existing Handsworth Secondary School, located at 1044 Edgewood Road. The new school is being designed to accommodate 1400 students. It will be designed with a focus on creating collaborative workspaces for students and staff with flexible and adaptable spaces for teaching and learning. Spaces will be inclusive for all abilities and will incorporate First Peoples Principles of Learning. The new Handsworth will also be designed to meet the expectations from our community that we connect the building with our natural surroundings, be sustainable in operation and maximize community use opportunities in areas such as gymnasiums, arts spaces, multi-purpose spaces, and outdoor recreation. We look forward to this opportunity to create a prized community asset for the Handsworth community and the larger North Vancouver community.

The new Handsworth Secondary School will be constructed on the existing grass play field at the north side of the property. Following completion of construction of the new school, the existing Handsworth school will be demolished, and a new grass sports field will be constructed in its place.

Parking will line the west side of the property and will be on either side of a driving aisle that will provide one way traffic from Handsworth Road to Edgewood Road. Some additional parking will be provided near the new building entrance and associated drop-off and pick-up area within the site boundaries along the Handsworth Road frontage. A total of 120 parking spaces and 98 bike stalls will be provided on site.

Construction is anticipated to commence in Summer 2019, with target occupancy of the new school in September 2021.

Meeting Time and Location:
Wednesday, January 9, 2019 • 6:30 p.m. – 8:30 p.m.
Handsworth Secondary School small gymnasium, 1044 Edgewood Road, North Vancouver

This information notice is being distributed to residents within 100 meters of the site as per DNV requirements and sent home to students' parents. Community feedback is being sought on several community-related aspects of the project. For further information, please contact: Deneka Michaud, Communications Manager, North Vancouver School District, 604-903-1254, dmichaud@sd44.ca and Robyn Hay, Community Planner, District of North Vancouver, 604-990-2369, hayr@dnv.org

North Vancouver
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APPENDIX: NEWSPAPER AD – VERSION TWO

PUBLIC INFORMATION MEETING

The North Vancouver School District is hosting a public information meeting to present the development proposal to replace the current Handsworth Secondary School with a new school located on the same parcel of land at 1044 Edgewood Road, North Vancouver. You are invited to the meeting to discuss the project.

Date: Wednesday, January 9, 2019
Time: 6:30 p.m. – 8:30 p.m.
Location of Meeting: Handsworth Secondary School small gymnasium,
1044 Edgewood Road, North Vancouver

The school will be developed in two stages to prevent interruptions to programming. The new building will be constructed in the northern portion of the site (on the existing field) as part of stage one. Once the building is complete and occupied the old school will be demolished and the construction of a new field in the south portion of the site can commence. The proposed building is three-storeys with a height of 13.8m (45.3ft) and has a gross floor area of approximately 13,000 m2 (139,930 sq. ft). A total of 120 parking spaces are proposed on site in addition to 98 bike stalls and end-of-trip facilities. Construction is anticipated to commence in summer 2019, with target occupancy of the new school in September 2021.

Information packages are being distributed to residents within a 100 meter radius of the site. If you would like to receive a copy or if you would like more information, contact Deneka Michaud at dmichaud@sd44.ca or Robyn Hay of the Development Planning Department at 604-990-2369 or hayr@dnv.org, or bring your questions and comments to the meeting.

***This is not a Public Hearing. District of North Vancouver Council will receive a report from staff on issues raised at the meeting and will formally consider the proposal at a later date.**

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APPENDIX: PUBLIC INFORMATION FLYER P.1

Meeting Agenda

6:30 p.m. – Doors Open

6:30 – 7:00 p.m. – Open House

7:00 p.m. – Presentation

7:15 - 8:30 p.m. – Facilitated Q & A

Community feedback is being sought on several community-related aspects of the project

For further information, please contact:

- Deneka Michaud, Communications Manager, North Vancouver School District, 604-903-1254, dmichaud@sd44.ca
- Robyn Hay, Development Planner, District of North Vancouver, 604-990-2369, hayr@dnv.org

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Handsworth Secondary School small gymnasium
1044 Edgewood Road, North Vancouver

North Vancouver School District
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APPENDIX: PUBLIC INFORMATION FLYER P.2

The Proposal

North Vancouver School District proposes to replace the existing Handsworth Secondary School, located at 1044 Edgewood Road. The new school is being designed to accommodate 1400 students. It will be designed with a focus on creating collaborative workspaces for students and staff with flexible and adaptable spaces for teaching and learning. Spaces will be inclusive for all abilities and will incorporate First Peoples Principles of Learning. The new Handsworth will also be designed to meet the expectations from our community that we connect the building with our natural surroundings, be sustainable in operation and maximize community use opportunities in areas such as gymnasiums, arts spaces, multi-purpose spaces, and outdoor recreation. We look forward to this opportunity to create a prized community asset for the Handsworth community and the larger North Vancouver community.

The new Handsworth Secondary will be constructed on the existing grass playfield at the north side of the property. Following completion of construction of the new school, the existing Handsworth school will be demolished, and a new grass sports field will be constructed in its place. Parking will line the west side of the property and will be on either side of a driving aisle that will provide one way traffic from Handsworth Road to Edgewood Road. Some additional parking will be provided near the new building entrance and associated drop-off and pick-up area within the site boundaries along the Handsworth Road frontage. A total of 120 parking spaces and 98 bike stalls will be provided on site.

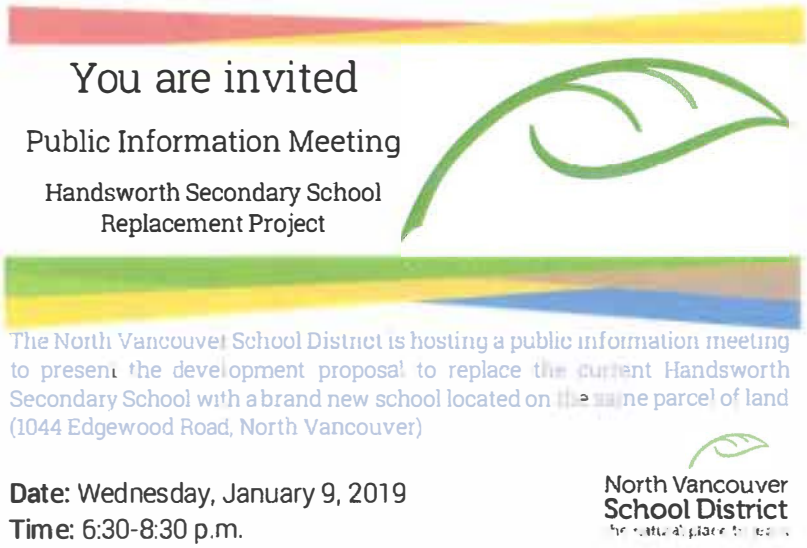
Construction is anticipated to commence in Summer 2019, with target occupancy of the new school in September 2021.

Proposed site plan

Conceptual representation of front entrance

APPENDIX: SITE SIGN

APPENDIX: SOCIAL MEDIA ADVERTISEMENT



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ATTACHMENT C

Diamond Head Consulting Ltd. Streamside Protection DPA Assessment

For:

Handsworth Secondary School
District of North Vancouver, BC

April 24th, 2018
Updated February 12th, 2019

Submitted to:

Mark Thomson
North Vancouver School District #44
2121 Lonsdale Avenue
North Vancouver, BC, V7M 2K6

DIAMOND HEAD
3551 Commercial Street
Vancouver BC 604 733 4886

SAFE CERTIFIED

The following Diamond Head Consulting staff performed the site visit and prepared the report. All general and professional liability insurance and individual accreditations have been provided below for reference.

Mike Coulthard, R.P.Bio., R.P.F.
Senior Forester, Biologist
Certified Tree Risk Assessor (46)

Cassandra Cummings, R.P.Bio
Biologist, Planner
MSc. Biology, MSc. Planning

If there are any questions or concerns as to the contents of this report, please contact us at any time.

Contact Information

Phone:	604-733-4886
Fax:	604-733-4879
Email:	cassandra@diamondheadconsulting.com, mike@diamondheadconsulting.com
Website:	www.diamondheadconsulting.com

Insurance Information

WCB:	# 657906 AQ (003)
General Liability:	Northbridge General Insurance Corporation - Policy #CBC1935506, $5,000,000
Errors & Omissions:	Lloyds Underwriters – Policy #1010615D, $1,000,000

Table of Contents

1 Introduction

Handsworth Secondary School is in need of seismic upgrades. Funding for a full replacement has been approved by the Ministry of Education, with a new school proposed to replace the existing school building on this lot. The new school building is planned to be built on the existing fields, so that the existing building can remain operational during construction. The property falls within the District of North Vancouver's Streamside Protection Development Permit Area , which is applicable to all residential, industrial and commercial uses. Diamond Head Consulting Ltd. (DHC) was retained to prepare a Streamside Setback Assessment for this site.

Civic address:	1044 Edgewood Rd, District of North Vancouver, BC, V7R 4G2
Legal description:	LOT A Blocks 8 to 10, District Lot 596 Plan 15603; PID 007-645-961
Client name:	Mark Thomson, North Vancouver School District #44
Date of site visit:	March 28th, 2018, April 12th, 2018

2 Legal Requirements

Regulatory requirements exist for works in and about streams and the ocean. These are contained within municipal bylaws and the Development Permit Area (DPA) process, the Riparian Areas Protection Act, Water Sustainability Act and Riparian Areas Regulation and the federal Fisheries Act.

2.1 District of North Vancouver (DNV)

The property falls within the District of North Vancouver Streamside Protection DPA. The DPA stipulates that all developments should be located outside of the minimum streamside protection area set by the DNV of 15.0 m from the top of bank or 10.0 m from the top of ravine bank. All properties within these areas are included in the Streamside Protection DPA, and may require an assessment from a qualified environmental professional (QEP) to determine the setback distances.

2.2 Ministry of Environment (MOE)

The primary provincial statutes regulating water resources is the *Water Sustainability Act*, the *Riparian Areas Protection Act* and associated *Riparian Areas Regulation (RAR)*. Any work proposed that may affect the integrity of a watercourse channel requires that a notification or approval application be submitted. No requirements for this project are expected under this legislation. The RAR identifies minimum riparian setback distances from the highwater mark that must be met by municipal policy.

2.3 Fisheries and Oceans Canada (DFO)

Section 35 of the federal *Fisheries Act* protects fish habitat. Fisheries and Oceans Canada (DFO) is responsible for regulatory enforcement of works in and around streams and the ocean. Subsection 35(2) of the *Fisheries Act* contains provisions for the DFO to authorize works where the harmful alteration, disruption or destruction (HADD) of fish habitat is expected. Proposed works that would result in a HADD require an authorization under Subsection 35(2) of the *Fisheries Act*. No requirements for this project are expected under this legislation.

3 Project Description

3.1 Project location

This site is located on Edgewood Road, east of Capilano Road and north of Highway 1 in North Vancouver, BC (Figure 1). There are 4 watercourses east of the proposed development site: Mackay Creek, two stormwater outflow ditches that flows into Mackay Creek, and an unnamed watercourse that runs along the toe of slope of the western ravine bank before flowing into Mackay Creek. This site is zoned for Public Assembly Zone 2, and Natural Parkland Zone. The area surrounding the site consists primarily of single family residences and corresponding amenities, with Capilano River to the west and mountainous natural areas to the north.

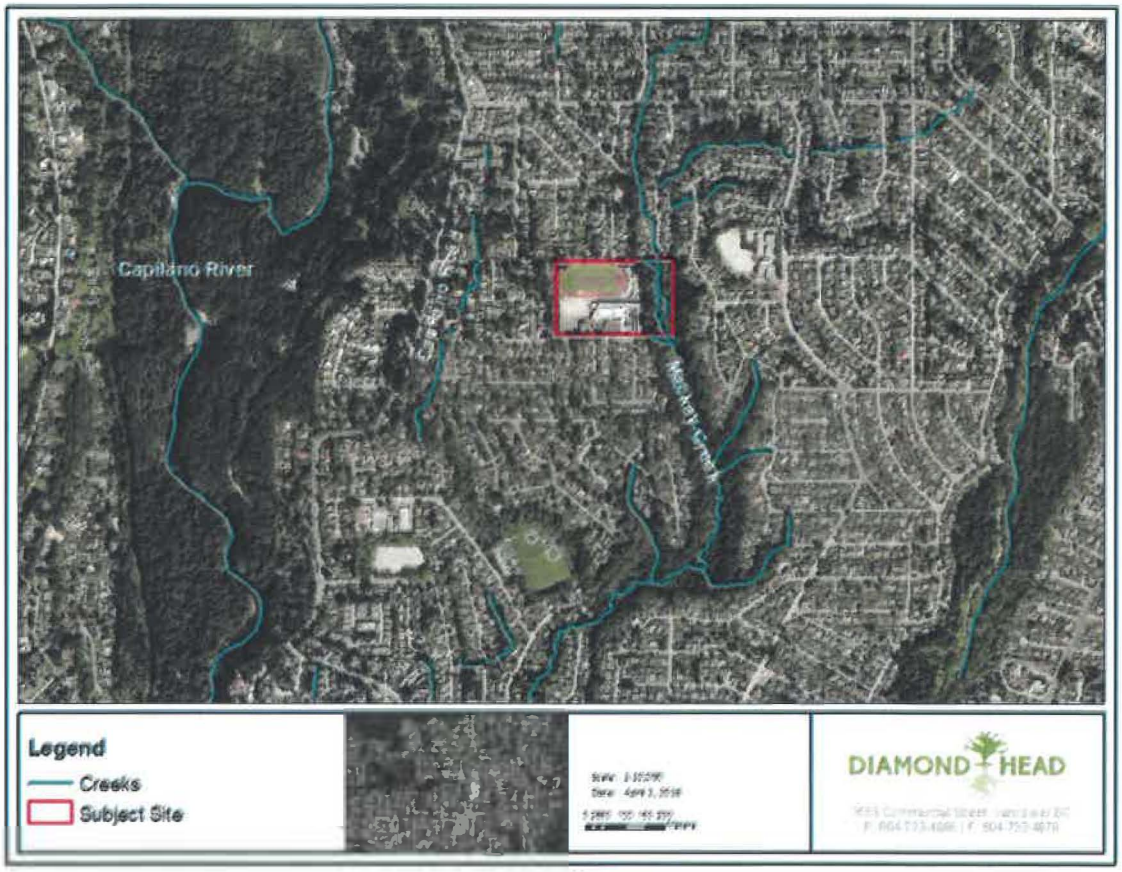


Figure 1. Project location – 1044 Edgewood Road, District of North Vancouver, BC. The subject site is west of Mackay Creek.

3.2 Construction Work Plan

Currently, the existing school building is set on the southern half of the property, with a football field on the northern half. A new school building is being proposed on the existing field, with plans to tear down the existing school and replace with a field after construction on the new building is completed. Diamond Head Consulting was retained to determine the riparian setbacks for the 3 watercourses to the east, to ensure that the new building plans are outside of the Streamside Protection Enhancement Area (SPEA) for the two waterbodies.

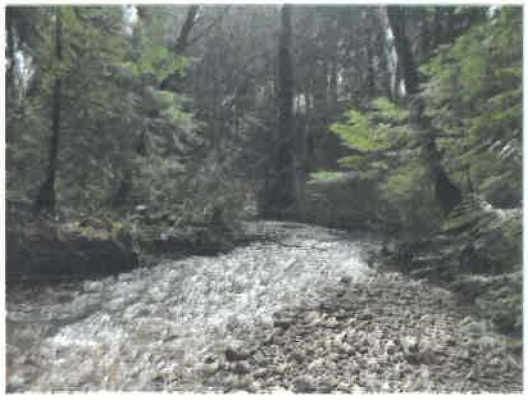
4 Site Description

4.1 Mackay Creek

Mackay Creek flows south along the eastern edge of the property, before draining into Burrard Inlet. Mackay Creek is a fish-bearing watercourse, with several fish species recorded over the last 20 years including Chum Salmon, Coastal Cutthroat Trout, Coastrange Sculpin, Coho Salmon, Lamprey, Prickly Sculpin, Rainbow Trout, Signal Crayfish, Slimy Sculpin, Starry Flounder, Steelhead, and Threespine Stickleback[1].

The reach of Mackay Creek that is adjacent to the school is moderately wide, averaging 7.0 m wide at the highwater mark. Water depth averages 50 cm. The banks are moderately tall and steep, averaging 0.9 m metres on the right bank and 1.0 m on the left bank. Slopes were variable, averaging 70% on the left bank and 75% on the right. The average slope of this reach is 2.5%. Moderate amounts of large woody debris (LWD) is found in the creek. The streambed was on average roughly composed of 15% rocks and boulders, 50% cobble, 25% gravel, and 10% sand and silt.

View of Mackay Creek from the southern edge of the property, facing north.



View of Mackay Creek from the center east edge of the property, facing south.

View of Mackay Creek from the northern edge of the property, facing south. Note the large amounts of LWD.

View of Mackay Creek from the southern edge of the property, facing south. The pedestrian crossing is visible in the background.

[1] Habitat Wizard. 2017. *Retrieved* Oct. 11th, 2017 *from* http://maps.gov.bc.ca/ess/sv/habwiz/

4.2 Unnamed Watercourse 1 – Along West Ravine Bank

There is an unnamed watercourse that begins at a stormwater outfall at the northeastern end of the property, runs south along the base of the ravine and flows into Mackay Creek near the southern end of the property. It is considered a fish bearing watercourse due to its connection to Mackay Creek. The watercourse averages 2.0 m wide at the highwater mark and 30 cm deep. The top of bank of the right bank is often the same as the top of the ravine bank. When the top of bank is distinct from the ravine, they average about 0.7m. The banks are generally steep, averaging 75% and ranging from 15-100%. The average slope of the watercourse is ~2%. Some large woody debris (LWD) was found in the ditch. The streambed is composed of 5% rocks and boulders, 15% cobble, 40% gravel, and 40% sand, silt and organic materials. A mixed age second growth stand exists in the riparian habitat around the watercourse.

View of the stormwater outfall at the northern end of the property.

Riparian areas around the creek are often flooded.

View of the main side channel on the northern end of the site, facing north.

High concentrations of English Ivy in some parts of the riparian area.

4.3 Unnamed Watercourse 2 – Side Channel

There is a second stormwater outfall which flows from under the school into Mackay Creek, starting roughly one third up the property. It is considered a fish bearing watercourse when there is sufficient water flow due to its connection to Mackay Creek. A detailed assessment of this ditch was attempted but not completed, due to its short length. It has a highwater mark width of 0.55 m, and an average depth of 5 cm. The banks are short and steep, with the left bank averaging .25 m and 100%. The right bank averages 0.2 m and 90%. The average creek slope is ~5%. The streambed was composed mainly of sands and organic materials, with up to 10% gravel and 10% cobble.

Example photos of the side channel.

Stormwater outfall under the school

4.4 Unnamed Watercourse 3 – Along Pedestrian Path

There is a culvert that releases stormwater from the surrounding area into a small side channel of Mackay Creek, roughly halfway up the site. This side channel then flows alongside the pathway from Edgewood Road into Mackay Creek. The lower portion of this is considered a fish bearing watercourse due to its connection to Mackay Creek. A detailed assessment of this ditch was attempted but not completed, due to its short length of 30m from the culvert to the creek. It averages 1.8m wide at the highwater mark, and <10cm deep. Banks are short and gentle, with the left bank averaging 20 cm and <15% slope. The right bank was highly variable because of the path to the top of the ravine, ranging from 0.3 m to over 3 m tall and from 35% to 70% steep. The slope of the watercourse is ~3%, with no large woody debris (LWD). The streambed was on average composed of 60% sand, silt and organics, 35% gravel, and 5% rocks and cobble.

A stormwater outfall releases into a naturalized side channel of Mackay Creek.

View of the watercourse from the nearby pathway.

4.5 Terrestrial Environment

The eastern edge of the property consists of Mackay Creek and surrounding forest. Most of the property west of the top of slope is highly modified, consisting of a school with a large football field and parking lot. Most of the developed area is impervious, except for the turf grass. There is a row of Western Red Cedars along the edge of the school and Edgewood Road, and a few scattered deciduous and coniferous trees throughout the developed part of the property.

View of the coniferous trees lining Edgewood Road.

Scattered deciduous and coniferous trees on the school site.

View of the field and parking lot

View of the side of the school.

Mackay Creek is located in a ravine east of the school. The ravine ranges from 110 to 140 m wide, and supports a second growth forest. The right ravine bank adjacent to the school faces east, and ranges from 40% to 80% slope. The understory is partially disturbed, with both formal and informal walking paths along the creek and the introduction of invasive species. There is a bridge that crosses the creek and formal walking path at the southern edge of the school property that runs south along Mackay Creek, and east across the creek. This formal walking path has high volumes of foot traffic from local residents and students. There are multiple informal walking paths in the area that lead down to the water.

This site is situated within the Coastal Western Hemlock Dry Maritime (CWHdm) subzone of the Biogeoclimatic Ecosystem Classification (BEC) System of BC. This subzone occurs at low elevations on the mainland, between sea level to approximately 650 m. It is associated with warm, relatively dry summers and moist, mild winters with little snowfall.

The soils in the natural areas below the top bank of the ravine originated from morainal deposits and are generally sandy loams, with ~35% coarse fragments. Humus types are mostly moders ranging from 2-10cm deep. The ravine slope has a moderate moisture regime and is classified as site series 05. At the base of the slope and on the flat slopes below the site series is a complex of 12 and 07.

4.5.1 Ravine slope

The forest stand on the ravine banks is a moderately dense second growth stand. There are numerous heritage stumps remaining. The dominant layer consists of Douglas-firs (*Pseudotsuga menziesii*). The co-dominant layer of the canopy consists of Western red cedar (*Thuja plicata*), Red alder (*Alnus rubra*), Western hemlock (*Tsuga heterophylla*), Douglas-fir, and Black cottonwood (*Populus trichocarpa*). Intermediate, suppressed and regenerating layers consist of Western hemlock and Western red cedar.

STAND CHARACTERISTICS					
Canopy Layer	Dominant Trees	Co-Dominant Trees	Intermediate Trees	Suppressed Trees	Regeneration
Species[1] (% by volume; + denotes <10%)	Fd	$Hw_4Cw_3Fd_2Dr_1Act_+$	Hw_7Cw_3	Hw_6Cw_4	Hw_4Cw_6
Density (stems/ha)	10	150	200	100	50
Tree diameter at breast height (cm)	110	50	25	10	
Tree height (m)	45	32	20	8	
Live crown ratio	70	60	70	80	
Crown closure (%)	55				

[1] Species codes: Fd (Douglas-fir), Hw (western hemlock), Cw (western redcedar), Act (black cottonwood), Mb (bigleaf maple), Dr (red alder), Pr (bitter cherry), Ep – (Paper birch), W (willow)

Representative photo of the trees on the right ravine bank behind the school.

Representative photo of the trees on the right ravine bank behind the football field.

Understory vegetation is variable, averaging ~75% site coverage. However, invasive species makes up more than half of the understory vegetation on the ravine banks. Native understory vegetation on the ravine banks includes: 10% Vine Maple (*Acer circinatum)*, 5% Sword fern (*Polystichum munitum*), 2% Red huckleberry (*Vaccinium parvifolium*), 2% Deer fern (*Blechnum spicant*), 2% dull Oregon grape (*Mahonia nervosa*), 1% Spiny wood fern (*Dryopteris expansa*), with Hazelnut (*Corylus cornuta*) and False azalia (*Menziesia ferruginea*) present.

4.5.2 Floodplain/Valley bottom

The flat area below the ravine bank and adjacent to Mackay creek is a moderately dense second growth stand. The dominant layer consists of Black cottonwoods. The co-dominant and intermediate layers consist of Western redcedar, Red alder, and Western Hemlock, with scattered Black cottonwoods; the intermediate layer contains a presence of Paper birch (*Betula papyrifera*). The suppressed and regenerating layers consist of Western redcedars and Western hemlock.

STAND CHARACTERISTICS					
Canopy Layer	Dominant Trees	Co-Dominant Trees	Intermediate Trees	Suppressed Trees	Regeneration
Species[1] (% by volume; + denotes <10%)	Act	$Hw_2Cw_2Dr_6Act_+$	$Dr_6Hw_3Cw_1Ep_+$	Hw_7Cw_3	Hw_7Cw_3
Density (stems/ha)	25	300	150	100	
Tree diameter at breast height (cm)	75	35	25	10	
Tree height (m)	40	28	20	7	
Live crown ratio	70	60	60	80	
Crown closure (%)	50				

[1] Species codes: Fd (Douglas-fir), Hw (western hemlock), Cw (western redcedar), Act (black cottonwood), Mb (bigleaf maple), Dr (red alder), Pr (bitter cherry), Ep – (Paper birch), W (willow)

Representative photo of the forest canopy found at the valley floor.

View of the formal path adjacent to Mackay Creek, leading south away from the school.

Understory vegetation is discontinuous on the valley floor, with breaks where informal walking paths exist. Vegetation covers ~60-70% of the ground. Invasive species are also present here in large quantities, but overall it contains a lower quantity of invasive species than the ravine banks. Native understory vegetation in the valley includes: 15% Salmonberry (*Rubus spectabilis*), 7% vine maple, 5% Skunk Cabbage (*Symplocarpus foetidus*), 3-4% False lily-of-the-valley (*Maianthemum dilatatum*), 2% Sword fern, 2% deer fern, 2% lady fern (*Athyrium filix-femina*), 2% Red huckleberry (*Vaccinium parvifolium*), 2% Devil's club (*Oplopanax horridus*) 2% Pacific bleeding heart (*Dicentra formosa*), 1% black gooseberry (*Ribes lacustre*), 1% Indian plum (*Oemleria cerasiformis*), with a presence of: Red elderberry (*Sambucus racemosa*), salal (*Gaultheria shallon*), Sweet coltsfoot (*Petasites frigidus var. nivalis*), sitka mountain ash (*Sorbus sitchnesis*), goatsbeard (*Aruncus dioicus*), three-leaved floamflower (*Tiarella trifoliata var trifoliata*) and Oval-leaved blueberry (*Vaccinium ovalfolium*).

Photos of the trees (left) along the northern bank of Hastings Creek.

Understorey vegetation on the right ravine bank below the school.

4.5.3 Invasive Species

The natural area below the top of bank is highly infested (20-50% cover) with invasive plant species. There are large areas covered with English ivy (*Hedera helix). Other species are scattered throughout the forests. There are high concentrations* near the pedestrian paths and creek crossing. In addition to ivy there is Cherry laurel (*Prunus laurocerasus*), Common periwinkle (*Vinca minor*), English holly (*Ilex aquifolium)*, Himalayan blackberry (*Rubus armeniacus*), yellow archangel/lamium (*Lamiastrum galeobdolon*), policeman's helmet (*Impatiens glandulifera*), Spurge laurel (*Daphne laureola*), Goutweed (*Aegopodium podagraria*), Japanese knotweed (*Fallopia japonica*), and bamboo (*Bambusoideae*). Non-native plants not currently considered invasive include Herb Roberts (*Geranium robertianum*).

Spurge laurel

English ivy climbing trees

English Holly is starting to establish on site

Common Periwinkle.

English Ivy (left) and Cherry laurel (right)

5 Riparian Protection

5.1 Provincial Riparian Areas Regulation

The minimum setback required following the provincial Riparian Areas Regulation was calculated using the detailed assessment method. This resulted in a minimum Streamside Protection and Enhancement Area (SPEA) setback for Mackay Creek of 21.1m, measured back from the highwater mark (HWM) (Figure 2). All 3 unnamed watercourses found in the natural area east of Handsworth secondary school require RAR setbacks of 10m measured back from the HWM (Figure 2).

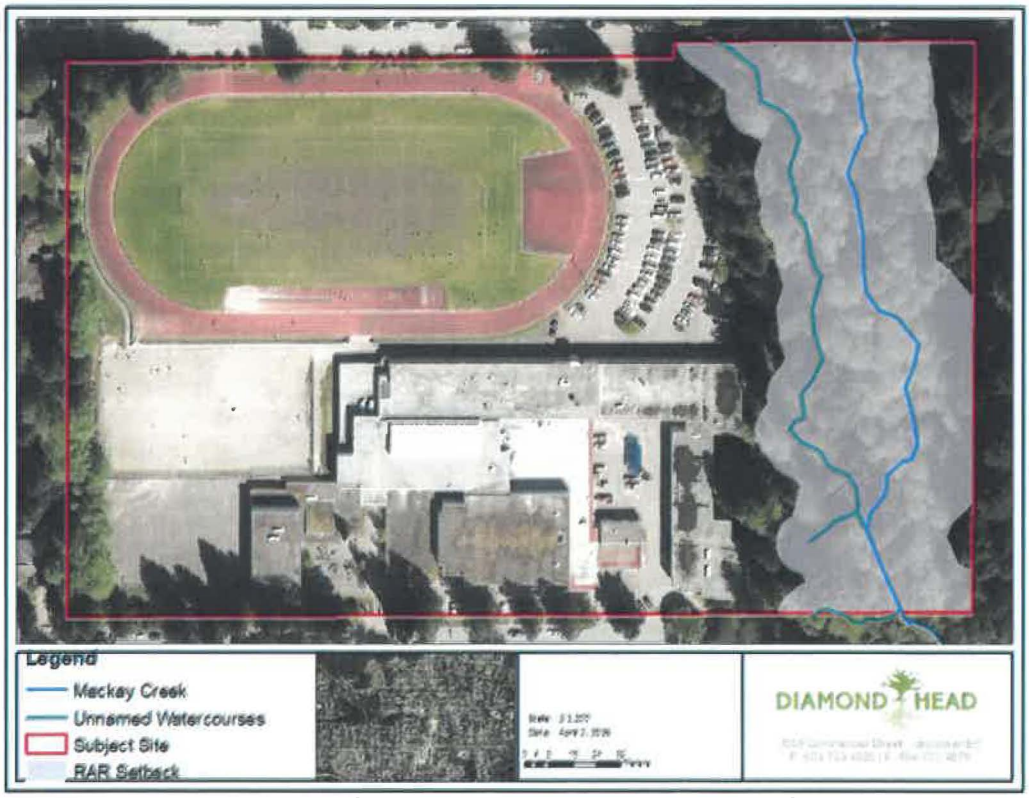


Figure 2. Approximate location of the Riparian Areas Regulation setbacks from the 4 on-site watercourses.

The Provincial RAR also required that measures to be identified that will protect and maintain the SPEA. These include ensuring that the slope remain stable and the trees remain windfirm. In this case the measures would require that the existing stand of trees remain protected at the top of slope and that a suitable geotechnical setback be established.

5.2 District of North Vancouver Streamside Protection DPA

This property is within the Streamside Protection DPA in the District of North Vancouver. This DP requires a minimum of a 15 m setback from the top of bank (TOB) of all watercourses. Where the watercourse is set in a ravine over 60 m wide, the District of North Vancouver Streamside DPA requires a setback of 10m from the top of ravine bank. The width of the ravine associated with this site varies, but is generally between 100 and 150 m wide near the school, thereby requiring a setback of 10 m from the top of ravine bank (Figure 3, 4).

All trees along this edge will have to be protected and measures taken to protect the slopes stability. Any impervious surfaces within the 10 m setback will need to be removed, and the area restored. Upon completion of works, a permanent 1.8 m tall chain link fence will need to be installed along the 10m setback.

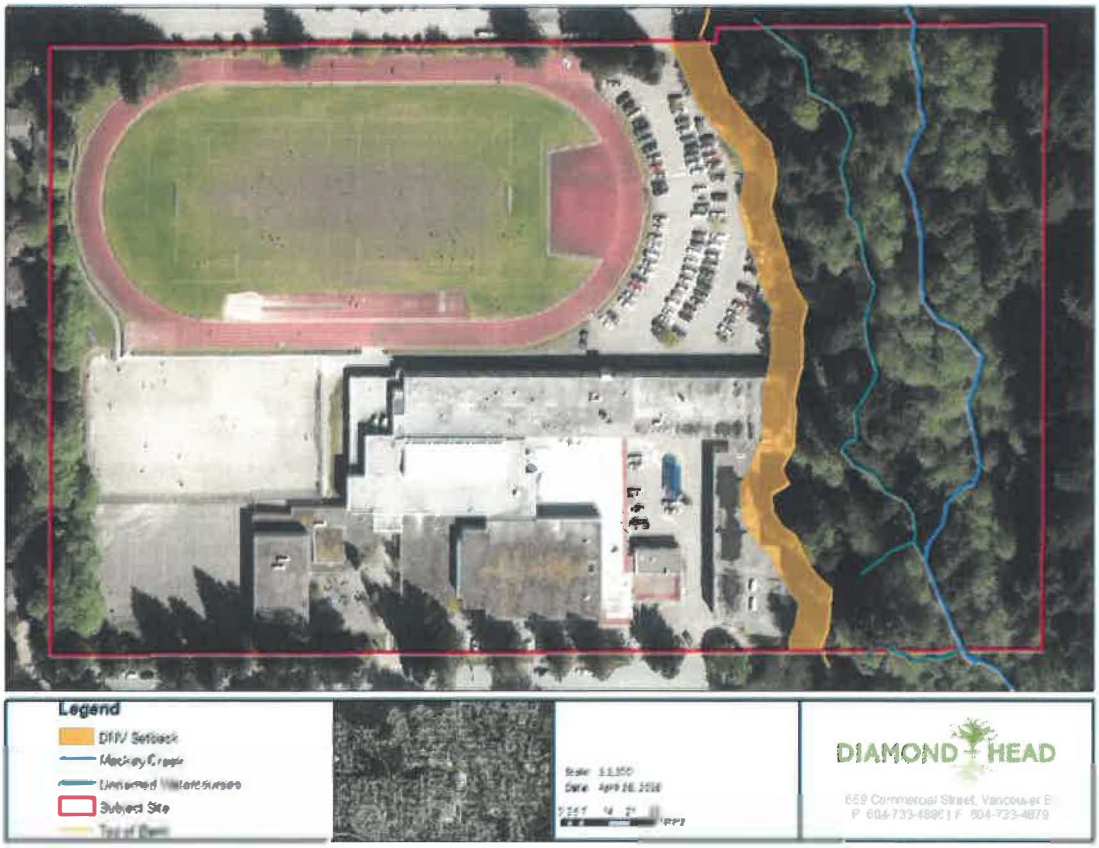


Figure 3. Approximate location of the District of North Vancouver Riparian Protection DPA 10m setback from the top of ravine bank.

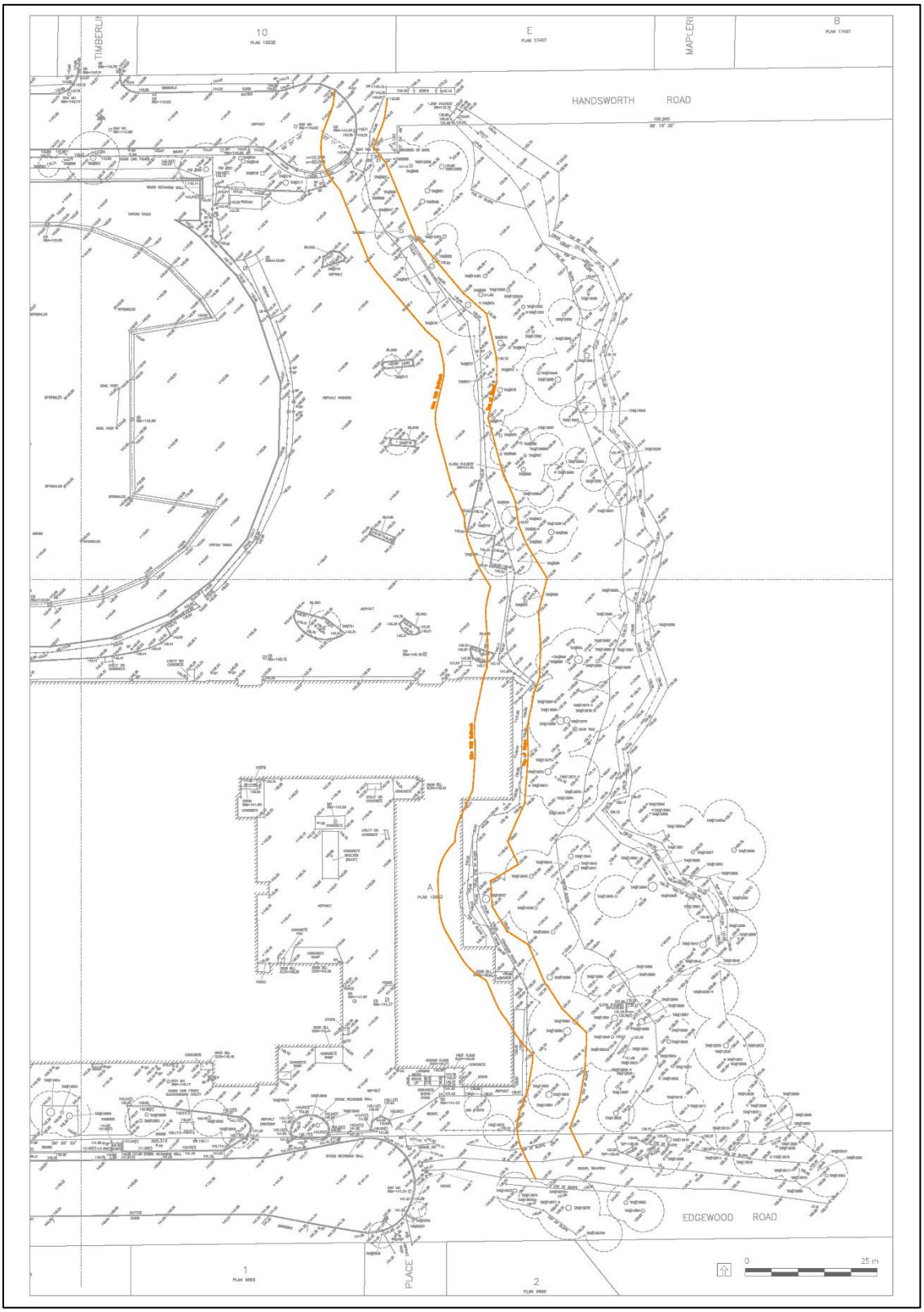


Figure 4: Location of the District of North Vancouver Riparian Protection DPA 10m setback from the ravine, using the site survey.

6 Opportunities for Enhancement

Invasive species are pervasive throughout the Mackay Creek ravine. There are opportunities in this natural area east of the site to manually remove these invasive species. Since invasives are so pervasive and in some areas dominate the ground cover, ecologically suitable native species will need to be replanted in order to prevent these invasive species from re-establishing on the site. Recommended tree and plant species communities are provided in Tables 1 and 2.

Table 1: Recommended plants for replanting below the toe of slope. Soil moisture is very wet and nutrients are rich.

Tree Layer	
Alnus rubra	Red Alder
Populus trichocarpa	Back Cottonwood
Rhamnus purshiana	Cascara
Picea sitchensis	Sitka Spruce
Thuja plicata	Western Red Cedar
Shrub Layer	
Lonicera involucrata	Black Twinberry
Rubus spectabilis	Salmonberry
Crataegus douglasii	Black hawthorn
Ribes bracteosum	Stink currant
Cornus stolonifera	Red-osier Dogwood
Oplopanax horridus	Devil's club
Oemleria cerasiformis	Indian Plum
Sambucus racemosa	Red elderberry
Salix Sp	Willow (Pacific, Scouler, Sitka)
Spiraea douglasii	Hardhack
Physocarpus capitatus	Pacific Ninebark

Table 2: Recommended plants for the ravine banks. Soil moisture is fresh to moist, nutrients are rich.

Tree Layer	
Pseudotsuga menziesii	Douglas-Fir
Acer macrophyllum	Broadleaf Maple
Rhamnus purshiana	Cascara
Thuja plicata	Western Red Cedar
Shrub Layer	
Acer circinatum	Vine Maple
Symphocarpos albus	Snowberry
Corylus cornuta	Beaked Hazelnut
Gaultheria shallon	Salal
Ribes sanguineum	Red Flowering Currant
Polystichum munitum	Sword Fern
Oemleria cerasiformis	Indian Plum
Amelanchier alnifolia	Saskatoon
Mahonia nervosa	dull Oregon-grape
Rosa gymnocarpa	Baldhip Rose

When development begins, the streamside setback should be protected. All edge trees should be protected with fencing constructed at distances specified in the project arborist report. This includes the development of an erosion and sediment control and stormwater management plan. Hardscape features should be avoided in the SPEAs.

The District of North Vancouver requires restoration of the 10m setback from top of bank for Handsworth secondary school. Species selected for this restoration work and their required are provided in Table 3. The cost of the enhancement works has been estimated, assuming that all work within the setback has been completed, after the current school has been demolished and the asphalt has been removed (Table 4).

Table 3: Plant species and quantity for restoration of the 10m setback from top of bank.

		Area (m2) 1400				
RIPARIAN		**PLANT LIST**	**Percent Cover**	**Size**	**Spacing**	**Space/plant**
Soil Moisture: Moderately Dry - **Soil Nutrients:** Medium			%		m	m2
QTY	**Botanical Name**	**Common Name**				
Tree Layer			60			
13	*Prunus emarginata*	Bitter Cherry	20	1.2m ht	5.00	21.65
26	*Acer macrophyllum*	Broadleaf Maple	40	1.2m ht	5.00	21.65
26	*Rhamnus purshiana*	Cascara	40	1.2m ht	5.00	21.65
65						
		Area (m2) 2600				
RIPARIAN		**PLANT LIST**	**Percent Cover**	**Size**	**Spacing**	**Space/plant**
Soil Moisture: Moderately Dry - **Soil Nutrients:** Medium			%		m	m2
QTY	**Botanical Name**	**Common Name**				
Shrub Layer			100			
495	*Acer circinatum*	Vine Maple	20	#1 Pot	1.10	1.05
248	*Corylus cornuta*	Beaked Hazelnut	10	#1 Pot	1.10	1.05
495	*Oemleria cerasiformis*	Indian Plum	20	#1 Pot	1.10	1.05
495	*Polystichum munitum*	Sword Fern	20	#1 Pot	1.10	1.05
124	*Ribes sanguineum*	Red Flowering Curran	5	#1 Pot	1.10	1.05
248	*Rosa gymnocarpa*	Baldhip Rose	10	#1 Pot	1.10	1.05
124	*Sambucus racemosa*	Red elderberry	5	#1 Pot	1.10	1.05
248	*Symphocarpos albus*	Snowberry	10	#1 Pot	1.10	1.05
2477						

Table 4: Estimated cost of enhancement works.

	Cost
Removal and disposal of invasive species	$6,000
Purchase and delivery of plants and trees	$31,700
Planting of plants and trees	$15,000
Purchase and delivery of soil (30 cm) wood chip mulch (5cm)	$25,000
Purchase and placement of woody debris (20)	$4,000
Total Cost	**$81,700**

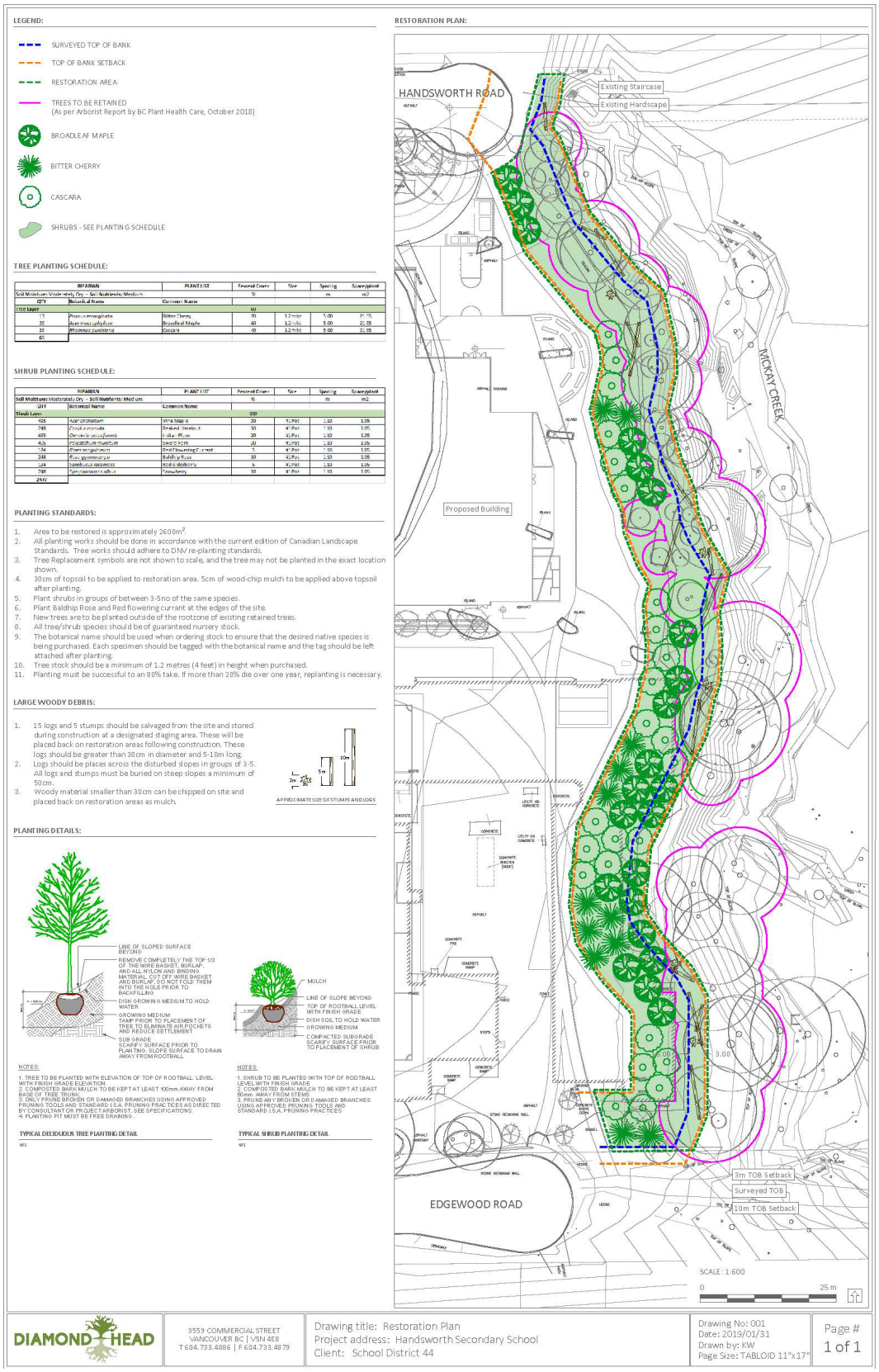


Figure 5: Restoration plan for the 10 m setback from top of bank for Handsworth Secondary School.

7 Erosion and Sediment Control Requirements

The riparian setback area for this creek must be protected at all stages of construction. The creek channel is located downslope and away from the construction area. It is recommended that a silt fence be installed above the existing top of bank. These fences must remain in place for the duration of the project. This fencing can be installed in the same location as the tree protection fencing.

The Contractor shall comply with all applicable laws governing sediment and erosion control. Care shall be exercised during all phases of the Work to control the release of sediments and other debris or deleterious substances into the watercourse. Specifically, the discharge of substances deleterious to fish or other aquatic life is prohibited.

Construction and excavation wastes, overburden, soil, or other substances deleterious to aquatic life must be disposed of or placed in such a manner by the Contractor to prevent their entry into any watercourse. All excavated material shall be stockpiled as far as possible away from the watercourses. Excavated soils should be covered and protected with polyethylene sheeting, and/or silt fencing installed and maintained along the toe of excavated slopes.

Sediment and erosion control measures (silt fence/hay bales) must be installed adjacent to work areas to control potential release of soils or sediment-laden water from entering the creek or the ocean.

The Contractor shall determine in consultation with the Owner's representative a monitoring program, with a schedule, test points and methodology to be used to measure the concentration of total suspended solids (TSS) in the runoff water discharged during the construction work. TSS concentrations shall be compared against criteria specified in the *Land Development Guidelines for the Protection of Aquatic Habitat* (DFO and MELP 1993) and the *B.C. Approved Water Quality Guidelines (Criteria) 1998 Edition*. Specifically, total suspended solids in runoff water shall not exceed 25 mg/litre above background suspended solid concentrations during normal dry weather operation, and shall not exceed 75 mg/litre of suspended solids above background levels during design storm events.

If sediment or other deleterious materials enter the creeks during any of the work activities, the Contractor shall immediately take remedial steps to control and contain the release. The Owner and its representatives shall have authority to immediately suspend without compensation to the Contractor, all activities which are resulting, or which could imminently result, in the release of sediment or other deleterious materials to any adjacent fish bearing water bodies.

8 General Environmental Construction Specifications

The Contractor shall conduct all operations in a manner which minimizes disturbances to environmental resources, and which complies with the requirements of all authorities having jurisdiction, including federal and provincial legislation, regulations, permits, approvals, authorizations, and guidelines applicable to the Project. In undertaking the Work, the Contractor shall be responsible for the actions of its agents, employees, subcontractors and everyone else engaged by or through the Contractor. Accordingly, the Contractor shall undertake all

reasonable actions to ensure that environmental protection measures are in place and working effectively throughout all areas affected by the Project.

In the event that an activity which contravenes these Environmental Construction Specifications occurs, the Owner may issue a Stop Work Order directing the immediate suspension of all or a portion of the activity(ies) causing the environmental impact and may order or at the Contractor's cost undertake remedial measures to be conducted as deemed necessary. The Contractor shall be solely responsible for all costs of all work stoppages and/or remedial works necessary, which result from the foregoing.

The Contractor shall notify the Owner in writing, immediately upon discovery, of the existence of any hazardous conditions, property, or equipment within or immediately adjacent to the Site. However, it shall be the Contractor's responsibility to take all necessary precautions against injury to the environment and to persons or damage to property from such hazards until corrected by the responsible party.

The Contractor shall comply with all applicable law, including all federal and provincial legislation. In the event of a discrepancy between any of the clauses of these Environmental Construction Specifications and the provisions of any applicable law, including any legislation, regulations, or municipal bylaws, the more stringent provisions resulting in the higher protection of the environment, the lower discharges of contaminants and the higher degree of environmental protection and safety shall prevail.

Impacts from construction activities to the existing riparian habitat will be minimized through the use of best management practices (BMP) and guidelines, including those found in the following documents:

- *"Users' Guide to working In and Around Water" 2005* - B.C. Ministry of Environment http://www.env.gov.bc.ca/wsd/water_rights/cabinet/working_around_water_v5_2013.pdf
- "*Standards and Best Practices for Instream Works*" 2004 - B.C. Ministry of Water, Land and Air Protection http://env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf
- "Land Development Guidelines for the Protection of Aquatic Habitat" 1993 - Department of Fisheries and Oceans, http://www.landfood.ubc.ca/sxd/9_resources/fed_files/fed_land_development guidelines.pdf - search=%2211.%09Land%20Development%20Gui

- Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia. 2014 - B.C. Ministry of Environment http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/

These BMP will be implemented to avoid, limit or mitigate impacts to water quality and quantity, aquatic and riparian habitats. The following is a summary of BMPs to be implemented that will ensure that practices comply with legislation. These are not comprehensive, however a qualified environmental monitor will use adaptive management to monitor construction activities and implemented additional measures where necessary.

Mitigation measures recommended for this project to ensure minimal or no impacts to aquatic resources and no net loss of habitat include but are not limited to the following:

- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- All construction materials must be clean, non-eroding and non-toxic to aquatic life. Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures.
- Any materials that inadvertently fall into the stream or the ocean must be removed immediately.
- Sediment control measures are to be put in place prior to any work activities and remain in place until work is complete and the site is stable.

8.1 Environmental Monitoring

It is recommended that a qualified Environmental Monitor inspect, oversee, and report on the project with respect to environmental legislation, regulatory approvals, and best management practices (BMPs). During Construction, the Environmental Monitor will have the primary responsibility to evaluate the effectiveness of the environmental mitigation measures to achieve compliance with the terms and conditions of all regulatory permits, approvals, and environmental legislation. Environmental monitoring reports will be completed to document construction activities, mitigation measures, problems encountered, if any, and how they were managed. Following construction, the Environmental Monitor will prepare and submit an environmental monitoring completion report.

The role of the Environmental Monitor will be to inspect, evaluate and report on the performance of the construction activities and effectiveness of environmental control methods and mitigation measures with respect to applicable legislation, permits and approvals, and BMPs.

The key responsibilities of the Environmental Monitor include:

- Liaison with regulatory agencies, and other key stakeholders;
- Holding a pre-construction meeting with the Contractor to review and discuss the project approvals and the required environmental BMPs;
- Providing technical assistance on environmental matters to construction personnel and regulatory agencies;
- Inspecting activities during construction to evaluate and report on compliance with terms and conditions of environmental approvals and permits;
- Providing recommendations for modifying and/or improving environmental mitigation measures, as necessary;
- Documenting construction activities by field notes and photographs;

- Suspending construction activities that are causing, or potentially causing, risk of environmental damage;
- Preparing factual environmental monitoring summary reports throughout the duration of construction, to summarize activities and actions taken to minimize potential effects during each of the construction activities;
- Monitoring levels of turbidity and/or total suspended solids (TSS) relative to criteria established in the *Land Development Guidelines for the Protection of Aquatic Habitat* (25 mg/L above background levels and 75 mg/L above background levels during storm events); and
- Monitoring levels of pH to relative to criteria established by the Canadian Council of Ministers of the Environment for the protection of aquatic habitat.

The Environmental Monitor will have the authority to suspend construction activities if, in their opinion, the Contractor's actions contravene, or potentially contravene, the recommended BMPs or applicable legislation, permits, and approvals.

Appendix A: Statement of Limitations

This document was prepared by Diamond Head Consulting Ltd. Should this report contain an error or omission then the liability, if any, of Diamond Head Consulting Ltd. should be limited to the fee received by Diamond Head Consulting Ltd. for the preparation of this document. Recommendations contained in this report reflect Diamond Head Consulting Ltd.'s judgment in light of information available at the time of study. The accuracy of information provided by Diamond Head Consulting Ltd. is not guaranteed. This report is valid for 6 months from the date of submission. Additional site visits and report revisions are required after this point to ensure accuracy of the report.

Neither all nor part of the contents of this report should be used by any party, other than the client, without the express written consent of Diamond Head Consulting Ltd. This report was prepared for the client for the client's own information and for presentation to the approving government agencies. The report may not be used or relied upon by any other person unless that person is specifically named by Diamond Head Consulting Ltd as a beneficiary of the report, in which case the report may be used by the additional beneficiary Diamond Head Consulting Ltd has named. If such consent is granted, a surcharge may be rendered. The client agrees to maintain the confidentiality of the report and reasonably protect the report from distribution to any other person. If the client directly or indirectly causes the report to be distributed to any other person, the client shall indemnify, defend and hold Diamond Head Consulting Ltd harmless if any third party brings a claim against Diamond Head Consulting Ltd relating to the report.

ATTACHMENT D

Diamond Head Consulting Ltd. Protection of the Natural Environment DPA Assessment

For:

Handsworth Secondary School
District of North Vancouver, BC

April 25th, 2018
Updated January 24th, 2019

Submitted to:

Mark Thomson
North Vancouver School District #44
2121 Lonsdale Avenue
North Vancouver, BC, V7M 2K6

DIAMOND HEAD

1559 Commercial Street
Vancouver, BC 604.733.4886

SAFE CERTIFIED

The following Diamond Head Consulting staff performed the site visit and prepared the report. All general and professional liability insurance and individual accreditations have been provided below for reference.

Mike Coulthard, R.P.Bio., R.P.F.
Senior Forester, Biologist
Certified Tree Risk Assessor (46)

Cassandra Cummings, R.P.Bio
Biologist, Planner
MSc. Biology, MSc. Planning

If there are any questions or concerns as to the contents of this report, please contact us at any time.

Contact Information

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Insurance Information

WCB:	# 657906 AQ (003)
General Liability:	Northbridge General Insurance Corporation - Policy #CBC1935506, $5,000,000
Errors & Omissions:	Lloyds Underwriters – Policy #1010615D, $1,000,000

Table of Contents

1 Introduction

Handsworth Secondary School is in need of seismic upgrades. Funding for a full replacement has been approved by the Ministry of Education, with a new school proposed to replace the existing school building on this lot. The new school building is planned to be built on the existing fields, so that the existing building can remain operational during construction. The property falls within the District of North Vancouver's Protection of the Natural Environment Development Permit Area (DPA), which is applicable to all residential, industrial and commercial uses. Diamond Head Consulting Ltd. (DHC) was retained to prepare a Natural Environment DPA Assessment for this site.

Civic address:	1044 Edgewood Rd, District of North Vancouver, BC, V7R 4G2
Legal description:	LOT A Blocks 8 to 10, District Lot 596 Plan 15603; PID 007-645-961
Client name:	Mark Thomson, North Vancouver School District #44
Date of site visit:	March 28th, 2018, April 12th, 2018

2 Natural Environment DP Requirements

This DP applies to properties that are adjacent to areas that are considered in a natural state. The objectives of this DP as stated in the Official Community Plan (OCP) include the following:

- Protect the District's natural setting, ecological systems and visual assets as a part of a rich natural heritage for the benefit of present and future generations;
- Protect wildlife corridors and the connectivity of ecosystems;
- Protect forested character and enhance the health of forests, trees and soils;
- Conserve environmentally sensitive areas in order to protect biodiversity;
- Protect forested areas inside watersheds in order to maintain or enhance hydrological functions.

Properties that must comply with this DP must attempt to protect existing natural features on and adjacent to the property. Key guidelines include:

- Efforts should be made to locate development away from:
    - habitat for species at risk
    - mature stands of trees
    - raptor nest sites
    - wetlands
    - wildlife corridors
- The proposed development should be located and designed so as to minimize any damage to natural environment protected areas and efforts should be made to protect and enhance natural tree cover and vegetation, drainage patterns and landforms.
- New structures should be located as far away from natural environmental protected areas as is feasible.
- Habitat compensation is required for the disturbance to natural environment protected areas.

Compliance with this DP requires that an assessment be completed to inventory all "natural" features on and adjacent to the property. Efforts must be shown through the design phase of the project to minimize any impacts to the features. If impacts are incurred, the District requires that some equivalent enhancement work be completed.

3 Project Description

3.1 Project location

This site is located on Edgewood Road, east of Capilano Road and north of Highway 1 in North Vancouver, BC (Figure 1). This site is zoned for Public Assembly Zone 2, and Natural Parkland Zone. The area surrounding the site consists primarily of single family residences and corresponding amenities, with Capilano River to the west and mountainous natural areas to the north.

Figure 1. Project location – 1044 Edgewood Road, District of North Vancouver, BC. The subject site is west of Mackay Creek.

3.2 Construction Work Plan

Currently, the existing school building is set on the southern half of the property, with a football field on the northern half. A new school building is being proposed on the existing field, with plans to tear down the existing school and replace with a field after construction on the new

building is completed. Diamond Head Consulting was retained to determine the riparian setbacks for watercourses to the east, to ensure that the new building plans are outside of them.

4 Site Description

The western end of the site contains an existing school and field, with a second growth forest at the eastern edge. This area contains 4 watercourses east of the site: Mackay Creek, 2 ditches that flows into Mackay Creek, and an unnamed watercourse that runs along the toe of slope of the western ravine bank before flowing into Mackay Creek. Numerous large old growth heritage stumps provide evidence of previous logging..

4.1 Topography

The western end of the site contains the existing school and football field and is fairly flat (Figure 2). The eastern end of the site contains a ravine in which Mackay Creek and its tributaries are found. This ravine banks are quite steep, often over 100% slope. The site ranges from 127 m at Mackay Creek up to 143 m above sea level on the western end of the property.

Figure 2: Topography of Handsworth Secondary School.

4.2 Climate and Soils

This site is situated within the Coastal Western Hemlock Dry Maritime (CWHdm) subzone of the Biogeoclimatic Ecosystem Classification (BEC) System of BC. This subzone occurs at low elevations on the mainland, between sea level to approximately 650 m. It is associated with warm, relatively dry summers and moist, mild winters with little snowfall.

The soils in the natural areas below the top bank of the ravine originated from morainal deposits and are generally sandy loams, with ~35% coarse fragments. Humus types are mostly moders ranging from 2-10cm deep. The ravine slope has a moderate moisture regime and is classified as site series 05. At the base of the slope and on the flat slopes below the site series is a complex of 12 and 07.

4.3 Plant Communities

Plant communities are defined as units of vegetation with a relatively uniform plant species composition and physical structure. Two distinct plant communities, based upon specific tree and vegetation characteristics, were identified within the study area. One includes the banks of the ravine from the top of bank to the toe of the slope. The second is below the toe of the slope on the flat floodplain areas adjacent to Mackay Creek.

4.3.1 Ravine slope

The forest stand on the ravine banks is a moderately dense second growth stand. There are numerous heritage stumps remaining. The dominant layer consists of Douglas-firs (*Pseudotsuga menziesii*). The co-dominant layer of the canopy consists of Western red cedar (*Thuja plicata*), Red alder (*Alnus rubra*), Western hemlock (*Tsuga heterophylla*), Douglas-fir, and Black cottonwood (*Populus trichocarpa*). Intermediate, suppressed and regenerating layers consist of Western hemlock and Western red cedar.

STAND CHARACTERISTICS					
Canopy Layer	Dominant Trees	Co-Dominant Trees	Intermediate Trees	Suppressed Trees	Regeneration
Species[1] (% by volume; + denotes <10%)	Fd	$Hw_4Cw_3Fd_2Dr_1Act_+$	Hw_7Cw_3	Hw_6Cw_4	Hw_4Cw_6
Density (stems/ha)	10	150	200	100	50
Tree diameter at breast height (cm)	110	50	25	10	
Tree height (m)	45	32	20	8	
Live crown ratio	70	60	70	80	
Crown closure (%)	55				

[1] Species codes: Fd (Douglas-fir), Hw (western hemlock), Cw (western redcedar), Act (black cottonwood), Mb (bigleaf maple), Dr (red alder), Pr (bitter cherry), Ep – (Paper birch), W (willow)

Representative photo of the trees on the right ravine bank behind the school.

Representative photo of the trees on the right ravine bank behind the football field.

Understory vegetation is variable, averaging ~75% site coverage. However, invasive species makes up more than half of the understory vegetation on the ravine banks. Native understory vegetation on the ravine banks includes: 10% Vine Maple (*Acer circinatum)*, 5% Sword fern (*Polystichum munitum*), 2% Red huckleberry (*Vaccinium parvifolium*), 2% Deer fern (*Blechnum spicant*), 2% dull Oregon grape (*Mahonia nervosa*), 1% Spiny wood fern (*Dryopteris expansa*), with Hazelnut (*Corylus cornuta*) and False azalia (*Menziesia ferruginea*) present.

4.3.2 Floodplain/Valley bottom

The flat area below the ravine bank and adjacent to Mackay creek is a moderately dense second growth stand. The dominant layer consists of Black cottonwoods. The co-dominant layer of the canopy consists of Western red cedar, Red alder, and Western Hemlock, with scattered Black cottonwoods. Intermediate trees consist of the same, with a presence of Paper birch (*Betula papyrifera*). The suppressed and regenerating layers are composed of Western red cedars and Western hemlock.

STAND CHARACTERISTICS					
Canopy Layer	Dominant Trees	Co-Dominant Trees	Intermediate Trees	Suppressed Trees	Regeneration
Species[1] (% by volume; + denotes <10%)	Act	$Hw_2Cw_2Dr_6Act_+$	$Dr_6Hw_3Cw_1Ep_+$	Hw_7Cw_3	Hw_7Cw_3
Density (stems/ha)	25	300	150	100	
Tree diameter at breast height (cm)	75	35	25	10	
Tree height (m)	40	28	20	7	
Live crown ratio	70	60	60	80	
Crown closure (%)	50				

[1] Species codes: Fd (Douglas-fir), Hw (western hemlock), Cw (western redcedar), Act (black cottonwood), Mb (bigleaf maple), Dr (red alder), Pr (bitter cherry), Ep – (Paper birch), W (willow)

Representative photo of the forest canopy found at the valley floor.

View of the formal path adjacent to Mackay Creek, leading south away from the school.

Understory vegetation is discontinuous on the valley floor, with breaks where informal walking paths exist. Vegetation covers ~60-70% of the ground. Invasive species are also present here in large quantities, but overall it contains a lower quantity of invasive species than the ravine banks. Native understory vegetation in the valley includes: 15% Salmonberry (*Rubus spectabilis*), 7% vine maple, 5% Skunk Cabbage (*Symplocarpus foetidus*), 3-4% False lily-of-the-valley (*Maianthemum dilatatum*), 2% Sword fern, 2% deer fern, 2% lady fern (*Athyrium filix-femina*), 2% Red huckleberry (*Vaccinium parvifolium*), 2% Devil's club (*Oplopanax horridus*) 2% Pacific bleeding heart (*Dicentra formosa*), 1% black gooseberry (*Ribes lacustre*), 1% Indian plum (*Oemleria cerasiformis*), with a presence of: Red elderberry (*Sambucus racemosa*), salal (*Gaultheria shallon*), Sweet coltsfoot (*Petasites frigidus var. nivalis*), sitka mountain ash (*Sorbus sitchnesis*), goatsbeard (*Aruncus dioicus*), three-leaved floamflower (*Tiarella trifoliata var trifoliata*) and Oval-leaved blueberry (*Vaccinium ovalfolium*).

Photos of the trees (left) and the informal path and understory vegetation (right) along the northern bank of Hastings Creek.

Understorey vegetation on the right bank below the school.

4.4 Aquatic Habitat

There are 4 watercourses found on site. Mackay Creek is the largest, and only named watercourse. Three unnamed watercourses begin at various stormwater outfalls, and flow into Mackay Creek.

4.4.1 Mackay Creek

Mackay Creek flows south along the eastern edge of the property, before draining into Burrard Inlet. Mackay Creek is a fish-bearing watercourse, with several fish species recorded over the last 20 years including Chum Salmon, Coastal Cutthroat Trout, Coastrange Sculpin, Coho Salmon, Lamprey, Prickly Sculpin, Rainbow Trout, Signal Crayfish, Slimy Sculpin, Starry Flounder, Steelhead, and Threespine Stickleback[1].

The reach of Mackay Creek that is adjacent to the school is moderately wide, averaging 7.0 m wide at the highwater mark. Water depth averages 50 cm. The banks are moderately tall and steep, averaging 0.9 m metres on the right bank and 1.0 m on the left bank. Slopes were variable, averaging 70% on the left bank and 75% on the right. The average slope of this reach is 2.5%. Moderate amounts of large woody debris (LWD) is found in the creek. The streambed was on average composed of 15% rocks and boulders, 50% cobble, 25% gravel, and 10% sand and silt.

View of Mackay Creek from the northern edge of the property, facing south. Note the large amounts of LWD.

View of Mackay Creek from the southern edge of the property, facing south. The pedestrian crossing is visible in the background.

4:4.2 Unnamed Watercourse 1 – Along west ravine bank

Unnamed watercourse 1 starts at the north end of the site, flowing south along the western ravine bank, before connecting to Mackay Creek at the south end of the site. This watercourse starts at the largest of the 3 stormwater outfalls, and is the largest of the 3 unnamed watercourses. It averages 2.0 m wide at the highwater mark and 30 cm deep. Where distinct from the ravine bank, banks are short and steep averaging 0.7 m and 75%. The streambed is composed of 5% rocks and boulders, 15% cobble, 40% gravel, and 40% sand, silt and organic materials

[1] Habitat Wizard. 2017. *Retrieved* Oct. 11th, 2017 *from* http://maps.gov.bc.ca/ess/sv/habwiz/

View of the stormwater outfall at the northern end of the property.

View of the main side channel on the northern end of the site, facing north.

4.4.3 Unnamed Watercourse 2 – Side channel

Unnamed watercourse 2 starts from a stormwater outfall found under the school, halfway up the property. It flows east before joining with unnamed watercourse 1 and Mackay Creek. It is considered a fish bearing watercourse when there is sufficient water flow due to its connection to Mackay Creek. It has a highwater mark width of 0.55 m, and an average depth of 5 cm. The banks are short and steep, with the left bank averaging .25 m and 100%. The right bank averages 0.2 m and 90%. The average creek slope is ~5%. The streambed was composed mainly of sands and organic materials, with up to 10% gravel and 10% cobble.

Example photos of the side channel.

Stormwater outfall under the school

4.4.4 Unnamed watercourse 3 – Along southern pedestrian path

There is a culvert that releases stormwater from the surrounding area into a small side channel of Mackay Creek, roughly halfway up the site. This side channel then flows alongside the pathway from Edgewood Road into Mackay Creek. The lower portion of this is considered a fish bearing watercourse due to its connection to Mackay Creek. A detailed assessment of this ditch

was attempted but not completed, due to its short length of 30m from the culvert to the creek. It averages 1.8m wide at the highwater mark, and <10cm deep. Banks are short and gentle, with the left bank averaging 20 cm and <15% slope. The right bank was highly variable because of the path to the top of the ravine, ranging from 0.3 m to over 3 m tall and from 35% to 70% steep. The slope of the watercourse is ~3%, with no large woody debris (LWD). The streambed was on average composed of 60% sand, silt and organics, 35% gravel, and 5% rocks and cobble.

A stormwater outfall releases into a naturalized side channel of Mackay Creek.

View of the watercourse from the nearby pathway.

4.5 Wildlife Habitat

The natural areas associated with Mackay creek are part of a linear greenway that extends to the North Shore mountains and down slope to the Burrard Inlet. This corridor varies in width and is fragmented in places by roads and infrastructure, and provides a travel corridor for wildlife. At this site the ravine is wide and provides a variety of high value habitat features that supports a large diversity of wildlife, including mammals, birds, fish and amphibians.

Disturbance caused by the presence of nearby residential development and well used trails reduces the wildlife habitat value of the site. The wildlife community that inhabits this area includes mostly birds and small to medium mammals that are more tolerant of urban disturbance. Larger mammals are likely to use this area as part of a more extensive home range.

4.5.1 *Bird Species*

Bird surveys were not completed during this study. However, the survey was completed early in the nesting season and numerous common resident song birds were heard. A bald eagle was also observed flying not far above the canopy. Two high value wildlife trees were found and 4 large size trees that provide potential nesting and roosting sites for raptors.

The site provides terrestrial and aquatic habitat for a variety of birds. A diversity of habitat features is present to support nesting, foraging, and roosting. Bird species groups likely present include swallows, hummingbirds, warblers, woodpeckers, flycatchers, jays, crows, chickadees, nuthatches, thrushes, sparrows, wrens, kinglets, and finches.

4.5.2 *Mammal Species*

Mammal surveys were not completed during this study. The forest and shrub communities provide habitat to support a diversity of small mammals including squirrels, voles, shrews, and mice. Medium and large sized mammals likely to inhabit this area (as part of a larger range) include raccoon (*Procyon lotor)*, skunk (*Mephitis mephitis)*, coyote (*Canis latrans)*, black-tailed deer (*Odocoileus hemionus)* and black bear (*Ursus americanus)*.

4.5.3 *Amphibian and Reptile Species*

The high water table within this site, as well as the proximity to Mackay creek and the associated tributary, likely provide sufficient moist habitat to support native herpetofauna. This includes terrestrial and aquatic salamanders and frogs.

4.5.4 *Fish Species*

A fish survey was not conducted for this assessment. Mackay Creek is a fish-bearing watercourse, with several fish species recorded over the last 20 years including Chum Salmon, Coastal Cutthroat Trout, Coastrange Sculpin, Coho Salmon, Lamprey, Prickly Sculpin, Rainbow Trout, Signal Crayfish, Slimy Sculpin, Starry Flounder, Steelhead, and Threespine Stickleback[3].

4.6 Ecological Features of Significance

No dens or raptors nests were noted during the site survey. One large stick nest was found in the crotch of a Hemlock tree where it was previously topped. This is likely used by racoon or squirrel. There are 4 trees of significance in terms of their size. These are all Douglas-fir tree that range in diameter from 125cm to 145cm diameter and are ~45m tall. These trees provide high value habitat and are potential nesting sites for raptors.

There are two dead standing wildlife trees that have numerous feeding and nesting cavities.

There are numerous heritage stumps throughout the site. Nine were identified as being of significance. These are large diameter stumps some of which have springboard notches. Many also are acting as nurse stumps and have mature hemlock trees growing out of them.

A summary of these significant features is provided in Table 1. Some features had survey tag numbers which are provided. Their locations are illustrated in Figure 3.

[3] Habitat Wizard. 2017. *Retrieved* Oct. 11th, 2017 *from* http://maps.gov.bc.ca/ess/sv/habwiz/

Table 1 – Features of significance.

Tag # or ID	Type	Species	DBH	Height	Comment
T 12898	Significant Tree	Douglas-fir	145	42	Mid slope. Tree of significant diameter and age. Top 5m of this tree is dead. This is a high value wildlife tree.
T 12891	Significant Tree	Douglas-fir	134	45	Mid slope. Tree of significant diameter and age. This is a high value wildlife tree.
S 12949	Heritage Stump				Heritage stump 170cm diameter. Hemlock growing on stump which is 50cm diameter and 40m tall. Stilt roots around stump. Stump has springboard notches.
S 1	Heritage Stump				Heritage stump 200cm diameter. Hemlock growing on stump which is 35cm diameter and 27m tall. Stilt roots around stump. Stump has springboard notches.
S 2	Heritage Stump				Heritage stump 140cm diameter. Hemlock growing on stump which is 20cm diameter and 16m tall. Stilt roots around stump. Stump has springboard notches.
S 3	Heritage Stump				Heritage stump 220cm diameter. Hemlock growing on stump which is 40cm diameter and 30m tall. Stilt roots around stump.
S 4	Heritage Stump				Heritage stump 140cm diameter. 2 Hemlocks growing on stump which are 25cm and 35cm diameter and 25m tall. Stilt roots around stump.
W 1	Wildlife Tree	Douglas-fir	60	11	High value wildlife tree. Tree is dead with numerous cavities.
W 2	Wildlife Tree	Western hemlock	70	11	High value wildlife tree. Tree is dead with two stems and numerous cavities.
T 12970	Significant Tree	Douglas-fir	125	45	Mid slope. Tree of significant diameter and age. This is a high value wildlife tree.
T 854	Significant Tree	Douglas-fir	140	45	Mid slope. Tree of significant diameter and age. This is a high value wildlife tree.
S 5	Heritage Stump				Heritage stump 250cm diameter. Hemlocks growing on stump which 20cm diameter and 14m tall.
S 6	Heritage Stump				Heritage stump 180cm diameter. Stump has springboard notches.
S 7	Heritage Stump				Heritage stump 300cm diameter. Hemlock growing on stump which is 55cm diameter and 30m tall. Middle of stump is burned out.
S 12962	Heritage Stump				Heritage stump 220cm diameter. 7m tall with middle burned out.
N 890	Nest				Possible nest in platform of where previously topped. Not expected to be a raptors nest. Likely used by racoon or squirrel.

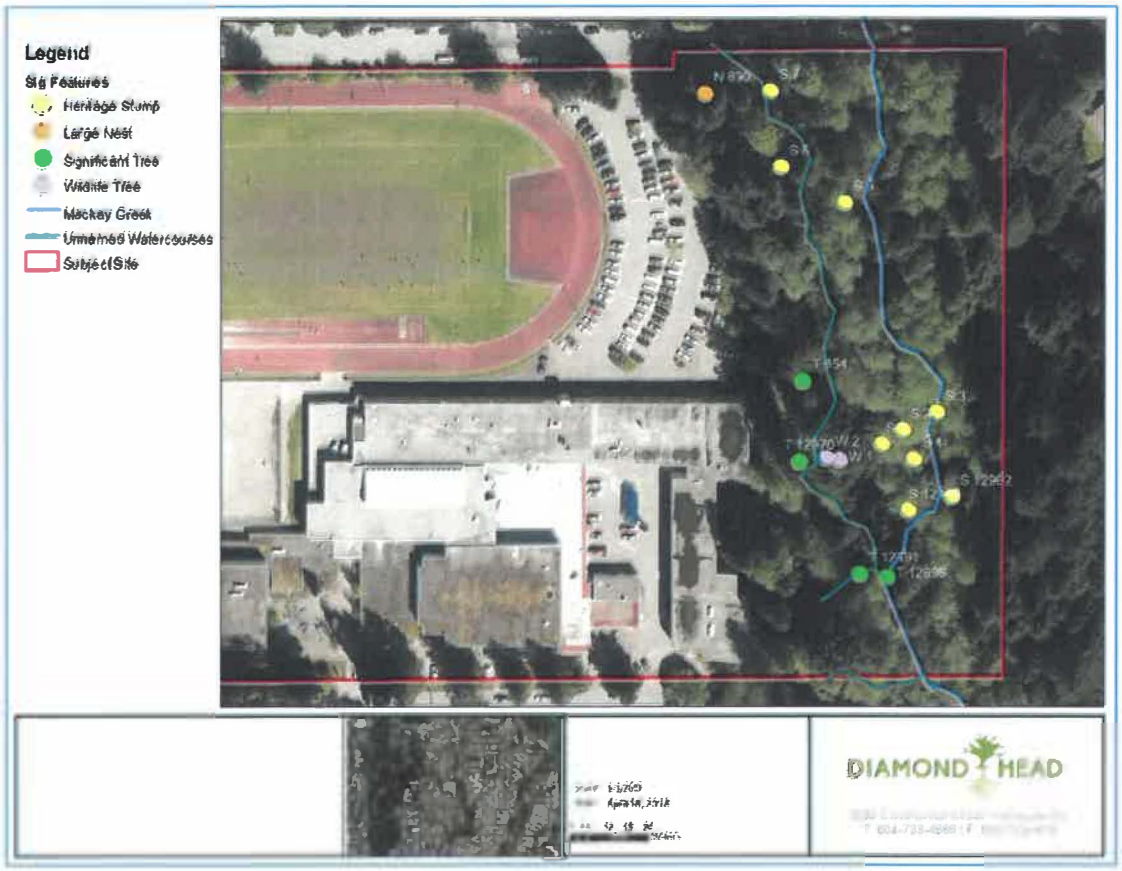

Figure 3: Location of features of significance.

Wildlife trees

Heritage/nurse stump

Heritage nurse stumps

Tree growing on top of a fallen tree

Significant size Douglas-fir

4.7 Species at Risk

The BC Conservation Data Centre (CDC) records BC's most vulnerable vertebrate animals and vascular plants, each of which is assigned to a provincial Red or Blue list according to their provincial conservation status rank. Species or populations at high risk of extinction or extirpation are placed on the Red list and are candidates for formal endangered species status. Blue-listed species are considered vulnerable to human activity and natural events.

No known species or habitats at risk were described in the CDC database for Handsworth Secondary school or the nearby areas.

Listed species identified by the CDC within a 5km radius are summarized in Table 2. One buffer for a sensitive masked occurrence exists 500m to the west and does not require further investigation.

Table 2 – Red and Blue-listed Species with recorded locations within five kilometres of project site.

Common Name	Scientific Name	Provincial Status
Pacific Water Shrew	*Sorex bendirii*	Red
Green Heron	Butorides virescens	Blue

The site is located within a natural area that provides potential habitat for a number of species at risk (Table 3). The most valuable habitat for species at risk consists of the areas that are within close proximity of the creeks on site.

Table 3 – Red and Blue-listed wildlife species that have the potential to inhabit the project site.

Common Name	Species Name	Provincial Status/ (SARA Schedule)	Habitat
Pacific Water Shrew	*Sorex bendirii*	Red	Terrestrial (mixed forest)
Keen's Myotis	*Myotis keenii*	Blue	Terrestrial; riparian; anthropogenic
Townsend's Big-eared Bat	*Plecotus townsendii*	Blue	Terrestrial; anthropogenic
Southern Red-backed Vole	*Myodes gapperi occidentalis*	Red	Terrestrial (forest); riparian
Red-legged Frog	*Rana aurora*	Blue	Aquatic; riparian, terrestrial;
Band-tailed Pigeon	*Columba fasciata*	Blue	Terrestrial (forest); riparian
Western Screech Owl	*Megascops kennicottii*	Blue	Terrestrial (forest)
Olive-sided Flycatcher	*Contopus cooperi*	Blue	Terrestrial (forest); riparian; lacustrine
Long-tailed weasel, altifrontalis subspecies	*Mustela frenata altifrontalis*	Red	Terrestrial (forest); riparian; wetland; grassland
Barn Swallow	*Hirundo rustica*	Blue	Anthropogenic; terrestrial (forest); lacustrine; wetland

Protection of habitat for these species will be achieved on site by protecting and enhancing the existing natural area associated with Mackay Creek.

4.8 Invasive Species

The natural area below the top of bank is highly infested (20-50% cover) with invasive plant species. There are large areas covered with English ivy (*Hedera helix).* Other species are scattered throughout the forests. There are high concentrations near the pedestrian paths and creek crossing. In addition to ivy there is Cherry laurel (*Prunus laurocerasus*), Common periwinkle (*Vinca minor*), English holly (*Ilex aquifolium)*, Himalayan blackberry (*Rubus armeniacus*), Yellow archangel/lamium (*Lamiastrum galeobdolon*), Policeman's helmet (*Impatiens glandulifera*), Spurge laurel (*Daphne laureola*), Goutweed (*Aegopodium podagraria*), Japanese knotweed (*Fallopia japonica*), and Bamboo (*Bambusoideae*). Non-native plants not currently considered invasive include Herb Roberts (*Geranium robertianum*).

Spurge laurel

English ivy climbing trees

English Holly is starting to establish on site

Common Periwinkle.

English Ivy (left) and Cherry laurel (right)

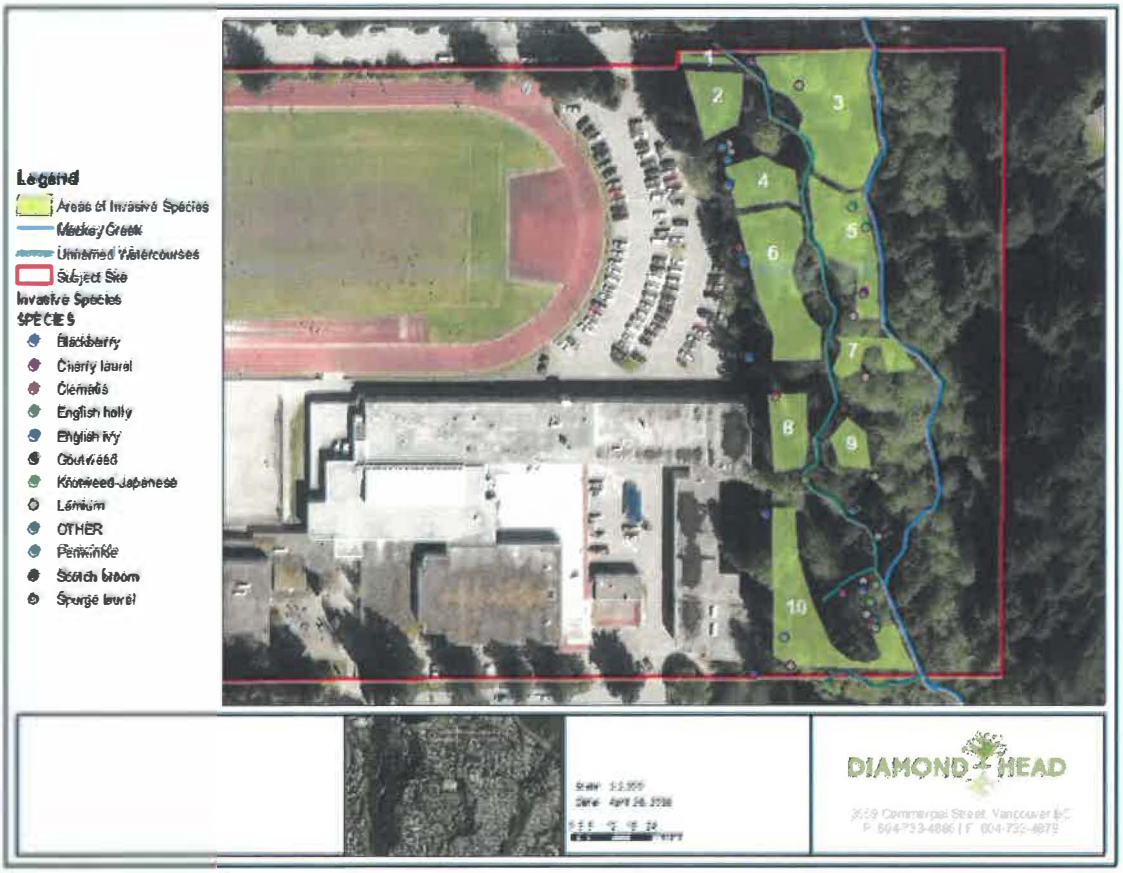

Figure 4: Invasive species located on site. Large areas with multiple species were grouped together in polygons, and are described in the following table.

Table 4 – Invasive species found on site, organized by location.

Polygon #	Species Present – % Site Coverage
1	Himalayan blackberry – 75-99%
2	Mostly Cherry laurel with some Spurge laurel, Common periwinkle, and Goutweed – 50-74%
3	Complex of Lamium, Goutweed, Common Periwinkle, English ivy, and scattered Cherry laurel – 75-99%
4	Cherry laurel – 35% English holly – 10% English ivy – 5%
5	Mostly English ivy with scattered Cherry laurel, English holly, and Goutweed – 50-74%
6	Mostly English ivy with Goutweed, English Holly, Cherry laurel – 25-49%
7	Mostly English ivy with some Goutweed – 50-74%
8	Mostly English ivy with scattered Cherry laurel, Himalayan Blackberry and one Spurge laurel – 75-99%
9	Japanese knotweed (12 m^2) – 50% cover
10	Mostly English ivy with scattered Cherry laurel and Common Periwinkle

5 Opportunities for Enhancement

The natural area at the east edge of the site and below the top of bank where the existing school facility is provides high value habitat for a diversity of species. The required setbacks for streamside protection requires that none of this natural area be disturbed. All development planning must ensure that the stability of slopes and trees are not compromised.

Streams and their riparian areas will be protected as per the District's DP requirements. No disturbance to trees is expected below the top of bank. There is a healthy diversity of important habitat features such as wildlife trees, woody debris, areas with dense shrub cover, water features and large diameter trees.

Invasive species are pervasive throughout the Mackay Creek ravine (Figure 4), including English Holly, cherry laurel, Himalayan blackberry, English Ivy, spurge laurel, common periwinkle, and goutweed. There are opportunities in this natural area on the east end of the site to manually remove these invasive species. Hardscape and invasive plant species in the 10m riparian setback area need to be removed in order to restore the function of this setback.

Mechanical removal is recommended for all seven species. Removal should also take place in a buffer zone of at least 3m below the top of bank to prevent re-colonization of any restored natural areas before native plant establishment can occur. Use of chemical treatment (herbicide) is not recommended for occurrences of these species due to the small scale and proximity to a watercourse.

The most common and cost-efficient method is manually removing the plants and the associated root structure. Above ground growth can be cut and root structures can be dug out using a shovel or other machinery. All removed plant materials should be properly disposed of in an appropriate green waste facility that accepts invasive vegetation. Care must be taken during transportation to ensure that no plant or root fragments are lost, as these can spread the plants to other areas. Follow up monitoring is strongly recommended for all removed species as regrowth can commonly occur if some plants or roots are missed in the initial treatment. Large plants such as mature cherry laurel or English holly may require additional effort to remove the root structure. If the root structure can not be completely removed, follow up monitoring and cutting will likely be required to control regrowth.

Since invasives are so pervasive, ecologically suitable native species will need to be replanted in order to prevent these invasive species from re-establishing on the site. Recommended tree and plant species communities that should be considered are provided in Tables 5-7.

Table 5 – Recommended plants for replanting below the toe of slope. Soil moisture is very wet and nutrients are rich.

Tree Layer	
Alnus rubra	Red Alder
Populus trichocarpa	Back Cottonwood
Rhamnus purshiana	Cascara
Picea sitchensis	Sitka Spruce
Thuja plicata	Western Red Cedar
Shrub Layer	
Lonicera involucrata	Black Twinberry
Rubus spectabilis	Salmonberry
Crataegus douglasii	Black hawthorn
Ribes bracteosum	Stink currant
Cornus stolonifera	Red-osier Dogwood
Oplopanax horridus	Devil's club
Oemleria cerasiformis	Indian Plum
Sambucus racemosa	Red elderberry
Salix Sp	Willow (Pacific, Scouler,Sitka)
Spiraea douglasii	Hardhack
Physocarpus capitatus	Pacific Ninebark

Table 6 – Recommended plants for replanting along the ravine banks. Soil moisture is fresh to moist and nutrients are rich.

Tree Layer	
Pseudotsuga menziesii	Douglas-Fir
Acer macrophyllum	Broadleaf Maple
Rhamnus purshiana	Cascara
Thuja plicata	Western Red Cedar
Shrub Layer	
Acer circinatum	Vine Maple
Symphocarpos albus	Snowberry
Corylus cornuta	Beaked Hazelnut
Gaultheria shallon	Salal
Ribes sanguineum	Red Flowering Currant
Polystichum munitum	Sword Fern
Oemleria cerasiformis	Indian Plum
Amelanchier alnifolia	Saskatoon
Mahonia nervosa	dull Oregon-grape
Rosa gymnocarpa	Baldhip Rose

Table 7 – Recommended plants for replanting above the ravine bank. Conifers are not recommended in order to comply with the wildfire report. Soil moisture is fresh to moist and nutrients are rich.

Tree Layer	
Prunus emarginata	Bitter Cherry
Acer macrophyllum	Broadleaf Maple
Rhamnus purshiana	Cascara
Shrub Layer	
Acer circinatum	Vine Maple
Symphocarpos albus	Snowberry
Corylus cornuta	Beaked Hazelnut
Sambucus racemosa	Red elderberry
Ribes sanguineum	Red Flowering Currant
Polystichum munitum	Sword Fern
Oemleria cerasiformis	Indian Plum
Rosa gymnocarpa	Baldhip Rose

When development begins, the streamside setback should be protected. All edge trees should be protected with fencing constructed at distances specified in the project arborist report. This includes the development of an erosion and sediment control and stormwater management plan. Hardscape features should be avoided in the SPEAs.

There are also numerous unauthorised trails that run through this area. A well used trail follows the right bank of Mackay creek. Efforts should be made to restore this trail and encourage users to follow existing authorised trails.

6 General Environmental Construction Specifications

The Contractor shall conduct all operations in a manner which minimizes disturbances to environmental resources, and which complies with the requirements of all authorities having jurisdiction, including federal and provincial legislation, regulations, permits, approvals, authorizations, and guidelines applicable to the Project. In undertaking the Work, the Contractor shall be responsible for the actions of its agents, employees, subcontractors and everyone else engaged by or through the Contractor. Accordingly, the Contractor shall undertake all reasonable actions to ensure that environmental protection measures are in place and working effectively throughout all areas affected by the Project.

In the event that an activity which contravenes these Environmental Construction Specifications occurs, the Owner may issue a Stop Work Order directing the immediate suspension of all or a portion of the activity(ies) causing the environmental impact and may order or at the Contractor's cost undertake remedial measures to be conducted as deemed necessary. The Contractor shall be solely responsible for all costs of all work stoppages and/or remedial works necessary, which result from the foregoing.
The Contractor shall notify the Owner in writing, immediately upon discovery, of the existence of any hazardous conditions, property, or equipment within or immediately adjacent to the Site. However, it shall be the Contractor's responsibility to take all necessary precautions against

injury to the environment and to persons or damage to property from such hazards until corrected by the responsible party.
The Contractor shall comply with all applicable law, including all federal and provincial legislation. In the event of a discrepancy between any of the clauses of these Environmental Construction Specifications and the provisions of any applicable law, including any legislation, regulations, or municipal bylaws, the more stringent provisions resulting in the higher protection of the environment, the lower discharges of contaminants and the higher degree of environmental protection and safety shall prevail.

Impacts from construction activities to the existing riparian habitat will be minimized through the use of best management practices (BMP) and guidelines, including those found in the following documents:

- *"Users' Guide to working In and Around Water" 2005* - B.C. Ministry of Environment http://www.env.gov.bc.ca/wsd/water_rights/cabinet/working_around_water_v5_2013.pdf
- "*Standards and Best Practices for Instream Works*" 2004 - B.C. Ministry of Water, Land and Air Protection http://env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf
- "Land Development Guidelines for the Protection of Aquatic Habitat" 1993 - Department of Fisheries and Oceans, http://www.landfood.ubc.ca/sxd/9_resources/fed_files/fed_land_development guidelines.pdf - search=%2211.%09Land%20Development%20Gui

- Developw ith Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia. 2014 - B.C. Ministry of Environment http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/

These BMP will be implemented to avoid, limit or mitigate impacts to water quality and quantity, aquatic and riparian habitats. The following is a summary of BMPs to be implemented that will ensure that practices comply with legislation. These are not comprehensive, however a qualified environmental monitor will use adaptive management to monitor construction activities and implemented additional measures where necessary.

Mitigation measures recommended for this project to ensure minimal or no impacts to aquatic resources and no net loss of habitat include but are not limited to the following:

- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- All construction materials must be clean, non-eroding and non-toxic to aquatic life. Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures.
- Any materials that inadvertently fall into the stream or the ocean must be removed immediately.

- Sediment control measures are to be put in place prior to any work activities and remain in place until work is complete and the site is stable.

6.1 Environmental Monitoring

It is recommended that a qualified Environmental Monitor inspect, oversee, and report on the project with respect to environmental legislation, regulatory approvals, and best management practices (BMPs). During Construction, the Environmental Monitor will have the primary responsibility to evaluate the effectiveness of the environmental mitigation measures to achieve compliance with the terms and conditions of all regulatory permits, approvals, and environmental legislation. Environmental monitoring reports will be completed to document construction activities, mitigation measures, problems encountered, if any, and how they were managed. Following construction, the Environmental Monitor will prepare and submit an environmental monitoring completion report.

The role of the Environmental Monitor will be to inspect, evaluate and report on the performance of the construction activities and effectiveness of environmental control methods and mitigation measures with respect to applicable legislation, permits and approvals, and BMPs.

The key responsibilities of the Environmental Monitor include:

- Liaison with regulatory agencies, and other key stakeholders;
- Holding a pre-construction meeting with the Contractor to review and discuss the project approvals and the required environmental BMPs;
- Providing technical assistance on environmental matters to construction personnel and regulatory agencies;
- Inspecting activities during construction to evaluate and report on compliance with terms and conditions of environmental approvals and permits;
- Providing recommendations for modifying and/or improving environmental mitigation measures, as necessary;
- Documenting construction activities by field notes and photographs;
- Suspending construction activities that are causing, or potentially causing, risk of environmental damage;
- Preparing factual environmental monitoring summary reports throughout the duration of construction, to summarize activities and actions taken to minimize potential effects during each of the construction activities;
- Monitoring levels of turbidity and/or total suspended solids (TSS) relative to criteria established in the *Land Development Guidelines for the Protection of Aquatic Habitat* (25 mg/L above background levels and 75 mg/L above background levels during storm events); and
- Monitoring levels of pH to relative to criteria established by the Canadian Council of Ministers of the Environment for the protection of aquatic habitat.

The Environmental Monitor will have the authority to suspend construction activities if, in their opinion, the Contractor's actions contravene, or potentially contravene, the recommended BMPs or applicable legislation, permits, and approvals.

Appendix A: Statement of Limitations

This document was prepared by Diamond Head Consulting Ltd. Should this report contain an error or omission then the liability, if any, of Diamond Head Consulting Ltd. should be limited to the fee received by Diamond Head Consulting Ltd. for the preparation of this document. Recommendations contained in this report reflect Diamond Head Consulting Ltd.'s judgment in light of information available at the time of study. The accuracy of information provided by Diamond Head Consulting Ltd. is not guaranteed. This report is valid for 6 months from the date of submission. Additional site visits and report revisions are required after this point to ensure accuracy of the report.

Neither all nor part of the contents of this report should be used by any party, other than the client, without the express written consent of Diamond Head Consulting Ltd. This report was prepared for the client for the client's own information and for presentation to the approving government agencies. The report may not be used or relied upon by any other person unless that person is specifically named by Diamond Head Consulting Ltd as a beneficiary of the report, in which case the report may be used by the additional beneficiary Diamond Head Consulting Ltd has named. If such consent is granted, a surcharge may be rendered. The client agrees to maintain the confidentiality of the report and reasonably protect the report from distribution to any other person. If the client directly or indirectly causes the report to be distributed to any other person, the client shall indemnify, defend and hold Diamond Head Consulting Ltd harmless if any third party brings a claim against Diamond Head Consulting Ltd relating to the report.

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ATTACHMENT E

BC PLANT HEALTH CARE INC.
ARBORIST REPORT

JOB NAME:	North Vancouver School District 44 – 20171208-1
RE:	Arborist Report for Development Purposes
SITE:	Handsworth Secondary School 1044 Edgewood Road, North Vancouver
PREPARED FOR:	North Vancouver School District 44 – Mark Thomson Mark Thomson 2121 Lonsdale Avenue North Vancouver, BC V7P 2K6 Phone: 778-772-0469 Email: mthomson@nvsd44.bc.ca
DATE:	October 25th, 2018; Revised November 19th, 2018, Revised February 21st, 2019
PROJECT ARBORIST:	Andrew C. MacLellan ISA Certified Arborist #ON-1978A ISA Tree Risk Assessment Qualification Forestry Technician FTDipl
REVIEWED BY:	Thomas Walz ISA Board Certified Master Arborist #PN-5960BT ISA Tree Risk Assessment Qualification WUAA/HEBC Falling & Bucking Endorsement #98 TCIA Certified Treecare Safety Professional #866 BC C of Q Arborist Technician #00017-TA-10 BC C of Q Climbing Arborist #00007-TB-13 ITA Registered Climbing Arborist Assessor Member – American Society of Consulting Arborists

1.0 Summary

This revision was initiated by Heather Pelz of *van der Zalm architects* on December 5th, 2018 requesting an updated tree preservation plan concerning a substation on the north west corner of the property. On December 14th, 2018, a document containing the *District of North Vancouver (DNV)* staff comments and public input regarding the detailed application to replace the existing school was received and distributed. An updated report responding to *DNV* staff comments and public input was requested by Georgia Fisher of *KMBR architects* on January 16th, 2019. A site meeting was conducted with Mark Thomson of *NVSD44*, Kate Lemon, Georgia Fisher, and Witmar Abele of *KMBR architects*, Heather Pelz of *van der Zalm architects*, and Bryson Caze of *Creus Engineering* on January 18th, 2019 to discuss the contents of the document. A series of action items was identified and presented to Robyn Hay, Development Planner with the *DNV*. Robin Hay's response concerning these items was received on January 24th, 2019. On February 19th, 2019, the design team and Mark Thomson opted to retain the 2 giant sequoias (#216 and #217) on the north east of the property and distributed drawings coo-ordinating the design team for their submission to the DNV. Items from these events that have been discussed in this report include:

- Retaining the trees associated with the removal of the retaining wall
- Referring to the arborist report detailing the heritage status to tree #837, Pacific Yew, and outlining a more robust preservation prescription
- Addressing new information regarding site grading
- The addition of the electrical substation
- The retention of trees #225 and #829
- Clarification of the health of the trees along the south, and additional information regarding drought related decline of *Thuja plicata*
- Discussion of observed conditions during the recent site visit
- Reference to the *I.S.A. TRAQ* assessment performed during the initial resource evaluation
- Clarification of the botanical name of 7 yellow cedar trees
- Clarification and discussion of the *I.S.A. BMP for Managing Tees During Construction*
- Detailed explanation of the difference between critical root zone (CRZ) calculations and CRZ diameter and their relationship to the *I.S.A. BMP for Managing Tees During Construction*, *ANSI A300 Part 5 – Management of Trees and Shrubs During Site Planning, Site Development, and Construction*, and the *BSI Standards Publication – Trees in relation to design, demolition and construction – Recommendations*
- Detailed prescriptions for tree protection during demolition
- Discussion of tree barriers
- Discussion of tree grates
- Discussions of tree soil volumes, silva cells, and similar
- Exploration of creative sidewalks retaining tree #845
- Exploration of a road bulge retaining tree #223
- Exploration of a narrow sidewalk retaining tree #123845
- Preservation of trees #216 and #217

[237] trees were inventoried, [13] of which were 'off-site': #2, #3, #4, #5, #6, #7, #8, #754, #791, #798, #799, #800, and #828. [38] trees are recommended for removal: #218, #219, #220, #221, #222, #224, #718, #721, #724, #725, #726, #727, #728, #729, #730, #731, #741, #742, #743, #744, #745, #746, #747, #748, #831, #832, #833, #834, #836, #840, #841, #842, #843, #844, #848, #850, #851, #853.

Based on varying site conditions, changes to the development plans, and changes to the health and condition of many trees now being preserved, pre-construction plant health care is recommended for [43] trees: #12845 - #12871, #223, #733 - #740, #824 - #830, #835, #837, #845 - #847. The prescription is as follows: deep root inject and aerate into the CRZs with slow release fertilizer, mycorise, moisture regulator and root conditioner to encourage plant health and pest resistance.

[16] trees conflict with the driveway. [7] are recommended for retention: #216, #217, #778, #825, #829, #830, #835. Arborist oversight will be required for activities near all of them. [3] trees will require robust root protection: #825, #829, #830. Geocell has been recommended to preserve CRZs. Canopy pruning may be required for tree #778 for the removal of the retaining wall and the installation of the water utility.

The new school will have 2m wide sidewalks installed on Handsworth and Edgewood Roads. This will impact [27] trees. [4] of these trees: #838, #839, #849, and #852 are recommended to be re-located. [17] are recommended for removal: #218, #219, #220, #221, #222, #742, #832, #833, #834, #836, #842, #843, #844, #848, #850, #851, and #853. Trees #223 and #845 will have significant CRZ conflicts. Geocell and pervious concrete have been recommended, as well as extended plant health care. The prescription is as follows: alleviate soil compaction through deep root injection with moisture regulator, slow release organic fertilizer with low nitrogen content, and microbial stimulant. Ensure solution and application rates are appropriate for soil type. Install 10cm composted bark mulch. Design options include road bulges and split sidewalks.

[8] trees are recommended for removal due to the proposed play field. #724 - #721. Most of these trees are containerized in planters and will not survive the removal of the planter nor suitable for re-location. [2] trees are recommended for re-location: #722 and #723.

Detailed demolition tree preservation prescriptions are included in this report. A 2 phase TPB has been recommended along with multiple construction related damage abatement opportunities. Please refer to section ***5.4 Demolition Prescriptions***.

Water and storm utilities will be run on the west side of the project on either edge of the parking lot. Drainage ties into Edgewood Road near the impact buffer of heritage tree #837. Due to the political nature and the intolerance of Pacific yew trees to root pruning, this impact buffer shall not be violated during excavation. If possible, the drainage should be re-aligned to ensure minimal impact to tree #837's impact buffer. Discussions with KMBR and Creus resulted in the re-location of the storm water chamber system south of the play field to a location that does not impact the CRZs of any retained trees. This plan has not yet been reviewed. Water utility will impact [4] trees (#752, #778, #825, #830), but not to the extent that they will be impacted by driveway installation. Tree #732 will be impacted by the water main installation alone. Each tree with impacts has a Phase 1 TPB protecting the CRZ until which time roots can be properly pruned and structural stability can be assessed in-situ by the project arborist. Once potential impacts have been negated the TPB can be adjusted to the Phase 2 location. Arborist oversight is required for all activities near retained trees.

Currently, as far as has been communicated, cuts to the berm adjacent to the swale along the west side of the property will be reduced to achieve a more appropriate slope. These cuts will not impact retained trees other than the removal of a retaining wall near trees #777 - #779. It is unlikely there will be root habitat where the loc-block retaining wall currently sits, however, arborist oversight during this operation is prudent. In some instances, canopy conflicts may occur with the excavators. Pruning recommendations should be withheld until a pre-construction meeting to determine the size of equipment, magnitude of cut, and extent of pruning required. At the time of pruning this section of the project, clearance pruning for sign removal on the west corner shall occur as well.

The substation has since been re-located to the southeast of the island containing heritage tree #837. This raises some concerns, mainly the excavations for the electrical utility conductors and the substation itself. Most of the substation will be located where the existing Tartan track is located, however the TPB for tree #837, and by extension tree #835, is intended on being as oversized as possible to allow for maximum rooting habitat. It is imperative that the CRZ impact buffer for both these trees remain undisturbed during trenching for the substation. Should the substation sit in this proposed location, it is recommended that the screening be of taller plants which will eventually provide shade from the south for the Pacific yew.

Tree #837 is a 'Protected' tree. This tree has immense cultural value to the community and should be preserved. It is also a candidate for heritage tree status, however at this time it is unknown if a covenant has been signed constituting a legal realization of this status. A ***Heritage Tree Arborist Report*** has been performed by Guy Exley, *DNV* Community Forester on August 30th, 2012. This tree appears to have maintained its health since that assessment and may survive retention during the development process. These trees also have a dense fibrous root architecture which is not tolerant to disturbance. The sensitivity of these trees to abrupt site changes increases with age. Recognizing that this tree is mature (250 – 300 years of age), there are several intricacies regarding the preservation of this tree:

- The retention of tree #835 – a 133cm western red cedar in fair condition. This tree provides the shade necessary for the health of tree #837. By virtue of this, it must be afforded the same protections awarded to #837.
- The CRZ of this tree will be defined as DBHx6 plus 1.5m (the CRZ Impact Buffer). This roughly amounts to a CRZ calculation of DBHx8.
- Trees #835 and #837 must be prepared for potential impacts through extended plant health care action prior to the commencement of the development. Please refer to the ***Detailed Spreadsheet*** for recommendations.
- An oversized TPB of construction fencing is recommended to reduce any canopy conflict or stockpiling of refuse typical of TPBs along roadways. This construction fencing is to display orange snow fencing typical of TPBs in the DNV. This tree protection barrier is to be offset 30cm from the proposed driveway and sidewalk. Refer to the ***Tree Preservation Plan*** for detailed location. A Phase 1 TPB has been recommended for the area between tree #837 and the existing sidewalk.
- Other than the disturbance from the removal of the existing sidewalk and the Tartan Track, there shall be no intrusion of the Impact Buffer. Arborist oversight is required during these activities. Trenching for storm pipes should remain outside the prescribed TPB.

- A 25cm layer of mulch is to be applied to the entirety of the area within the TPB as soon as hardscape is lifted to protect any roots, nourish the trees, and regulate soil moisture and temperature.
- These trees require watering during the growing season. Specifications to be discussed with the prime contractor, project manager, and DNV.

[8] trees: #716 - #723, #838, #839, #849, #852 are recommended for re-location. Optimal timing for re-location is during the dormant season, when trees are least susceptible to stress. Trees recommended to be re-located will require root pruning prior to excavation and relocation to allow a root ball diameter of 10cm per cm of caliper, as per the *I.S.A. Best Management Practices for Tree Planting.* These trees should be re-located prior to the demolition of the building.

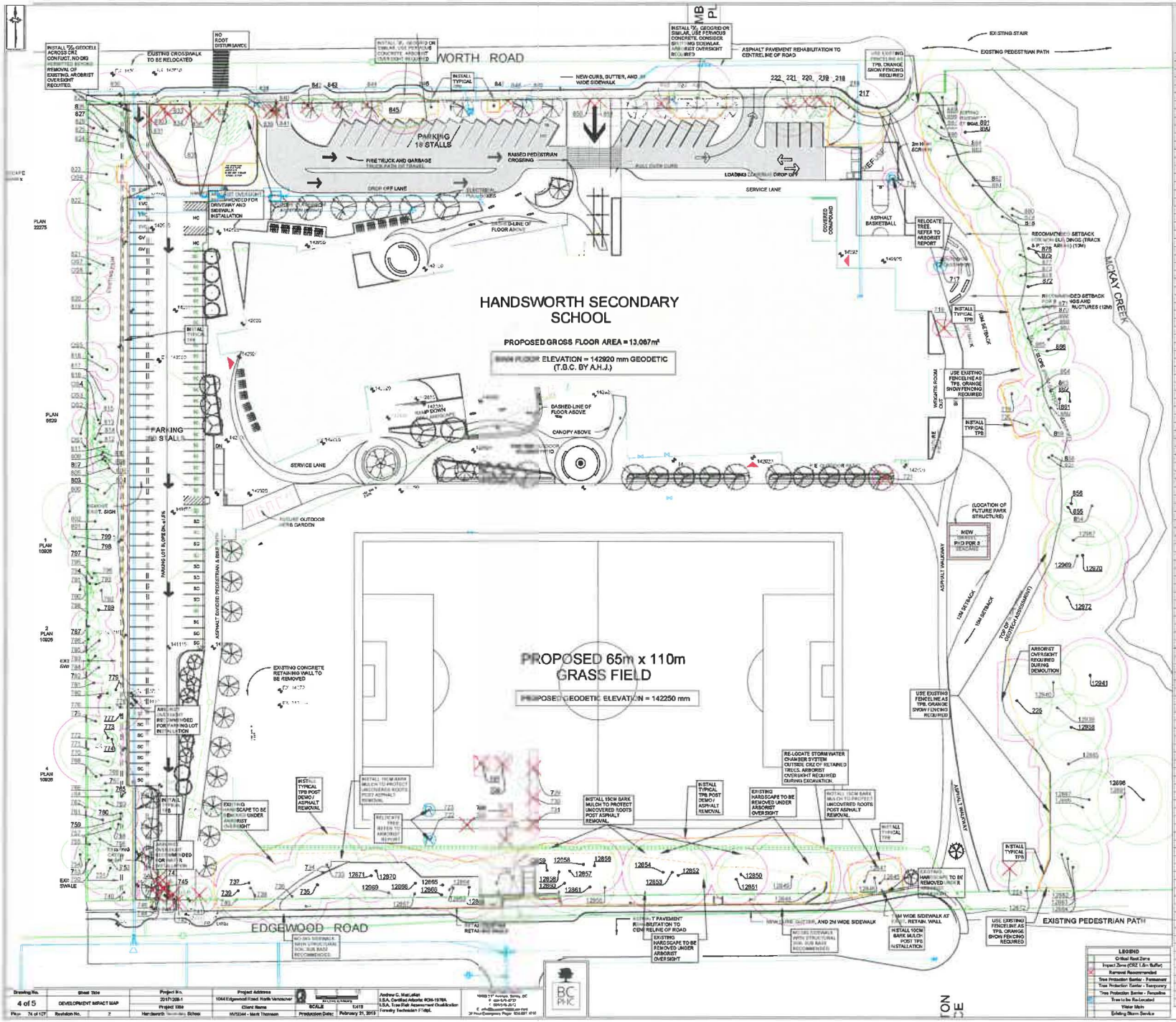
Since several of the trees are directly adjacent to the development area, the project arborist may determine that a tree may become de-stabilized or rapidly decline and die due to development impacts and recommend removal. Trees expected to require such assertations include but are not limited to: #778, #822, #825, #835, #837, #846, #12845, #12846, and #12847. Arborist oversight is recommended for development activities near these trees.

Applying an even layer of mulch over as much of the CRZ as practical for retained trees will conserve soil moisture, control weeds, buffer soil temperatures, fertilize and replenish organic matter. Mulch also helps prevent soil erosion and surface crusting. Composted cedar or fir bark mulch is recommended. Do not pile mulch against the trunk of the tree. Deep root fertilization with soil conditioner is intended to amend the soil and provide trees with the necessary nutrients for creating chemical and physical barriers against decay, as well as to create new wood fiber to replace or repair damaged or removed parts. Trees that are recommended to receive extended plant health care action include: #732, #835, #837, #846, #847, and #12863.

TPBs are to be constructed and maintained before construction commences as per *Bylaw 7671*. TPBs have a 2 phased approach in some instances to ensure protection of CRZs.

General Construction Guidelines are to be followed as outlined in this report.

Securities will be required at the discretion of the DNV.



Tree #	Common Name	DBH (cm)	CRZ Radius from Trunk (m)	Recommendation
2	W. Red Cedar	50	3	Retain
3	W. Red Cedar	30	1.8	Retain
4	W. Red Cedar	30	1.8	Retain
5	Red alder	30	1.8	Retain
6	W. Red Cedar	30	1.8	Retain
7	W. Red Cedar	30	1.8	Retain
8	W. Red Cedar	30	1.8	Retain
216	Giant sequoia	84	5.04	Retain
217	Giant sequoia	106	6.48	Retain
218	W. Red Cedar	69	4.14	Remove
219	W. Red Cedar	62	3.72	Remove
220	Western hemlock	55	3.84	Remove
221	W. Red Cedar	60	3.6	Remove
222	W. Red Cedar	86	5.16	Remove
223	W. Red Cedar	104	6.24	Remove
224	Laurel spp.	45	2.7	Remove
225	W. Red Cedar	116	7.56	Retain
735	Norway maple	12	0.72	Re-locate
737	Norway maple	14	0.84	Re-locate
738	Little leaf linden	22	1.32	Remove
739	Norway maple	28	1.68	Retain
720	Norway maple	26	1.56	Retain
721	Norway maple	25	1.35	Remove
722	Hazel spp.	11	0.66	Re-locate
723	Hazel spp.	10	0.6	Re-locate
724	elm spp.	20	1.2	Remove
725	Beech spp.	35	2.1	Remove
726	Beech spp.	20	1.2	Remove
727	Norway spruce	31	1.85	Remove
728	Norway maple	20	1.2	Remove
729	Beech spp.	29	1.74	Remove
730	Beech spp.	22	1.32	Remove
731	Beech spp.	18	1.08	Remove
732	Japanese maple	33	1.98	Retain
733	W. Red Cedar	113	6.78	Retain
734	W. Red Cedar	46	2.76	Retain
735	W. Red Cedar	69	2.84	Retain
736	W. Red Cedar	106	6.36	Retain
737	W. Red Cedar	81	4.86	Retain
738	W. Red Cedar	99	5.94	Retain
739	W. Red Cedar	39	2.34	Retain
740	W. Red Cedar	50	3	Retain
741	Western hemlock	64	2.64	Remove
742	W. Red Cedar	45	2.7	Remove
743	Western hemlock	41	2.46	Remove
744	W. Red Cedar	57	3.42	Remove
745	Red alder	18	1.08	Remove
746	Red alder	43	2.58	Remove
747	W. Red Cedar	48	2.88	Remove
748	Red alder	17	1.02	Remove
749	Red alder	26	1.56	Retain
750	W. Red Cedar	82	4.92	Retain
751	Red alder	12	0.72	Retain
752	W. Red Cedar	104	6.24	Retain
753	Red alder	15	0.9	Retain
754	W. Red Cedar	67	4.02	Retain
755	W. Red Cedar	39	2.34	Retain
756	Red alder	43	2.58	Retain
757	Red alder	47	2.82	Retain
758	W. Red Cedar	20	1.2	Retain
759	W. Red Cedar	40	2.4	Retain
760	W. Red Cedar	10	0.96	Retain
761	Red alder	40	2.4	Retain
762	W. Red Cedar	37	2.22	Retain
763	Red alder	28	1.68	Retain
764	Red alder	25	1.5	Retain
765	W. Red Cedar	40	2.4	Retain
766	W. Red Cedar	23	1.38	Retain
767	Red alder	82	4.92	Retain
768	W. Red Cedar	15	0.9	Retain
769	Red alder	40	2.4	Retain
770	W. Red Cedar	19	1.14	Retain
771	W. Red Cedar	101	6.06	Retain
772	W. Red Cedar	21	1.26	Retain
773	W. Red Cedar	20	1.2	Retain
774	W. Red Cedar	20	1.2	Retain
775	Red alder	18	1.08	Retain
776	W. Red Cedar	13	0.78	Retain
777	W. Red Cedar	31	1.86	Retain
778	W. Red Cedar	55	3.3	Retain
779	W. Red Cedar	28	1.68	Retain
780	W. Red Cedar	14	0.84	Retain
781	Western hemlock	32	1.92	Retain
782	Red alder	34	2.04	Retain
783	Red alder	36	2.16	Retain
784	Red alder	23	1.38	Retain
785	W. Red Cedar	34	2.04	Retain
786	Red alder	42	2.52	Retain
787	Red alder	40	2.4	Retain
788	Red alder	32	1.92	Retain
789	Red alder	24	1.44	Retain
790	Red alder	26	1.56	Retain
791	Red alder	40	2.4	Retain
792	Red alder	37	2.22	Retain
793	Red alder	29	1.74	Retain
794	Red alder	34	2.04	Retain
795	Red alder	21	1.26	Retain
796	Cherry spp.	10	0.6	Retain
797	W. Red Cedar	86	5.28	Retain
798	W. Red Cedar	55	3.3	Retain
799	W. Red Cedar	50	3	Retain
800	W. Red Cedar	100	6	Retain
801	Cherry spp.	20	1.2	Retain
802	W. Red Cedar	98	5.88	Retain
803	Red alder	45	2.7	Retain
804	W. Red Cedar	37	2.22	Retain
805	W. Red Cedar	32	1.92	Retain
806	W. Red Cedar	14	0.84	Retain
807	Red alder	27	1.62	Retain
808	Red alder	26	1.56	Retain
809	W. Red Cedar	21	1.26	Retain
810	Red alder	21	1.26	Retain
811	Red alder	26	1.56	Retain
812	Red alder	31	1.86	Retain
813	Red alder	17	1.02	Retain
814	Red alder	28	1.68	Retain
815	Red alder	24	1.44	Retain
816	W. Red Cedar	18	1.08	Retain
817	Red alder	10	0.6	Retain
818	Red alder	17	1.02	Retain
819	Red alder	20	1.2	Retain
820	Norway maple	11	0.66	Retain
821	Cherry spp.	16	0.96	Retain
822	W. Red Cedar	98	5.88	Retain
823	W. Red Cedar	34	2.04	Retain
824	W. Red Cedar	70	4.2	Retain
825	W. Red Cedar	73	4.38	Retain
826	W. Red Cedar	77	4.62	Retain
827	Douglas-fir	83	4.98	Retain
828	W. Red Cedar	52	3.12	Retain
829	W. Red Cedar	88	5.28	Retain
830	Douglas-fir	46	2.76	Retain
831	W. Red Cedar	94	5.64	Remove
832	Western hemlock	47	2.82	Remove
833	Western hemlock	33	1.98	Remove
834	Western hemlock	53	3.18	Remove
835	W. Red Cedar	133	7.98	Retain
836	Western hemlock	62	3.72	Remove
837	Pacific yew	84	5.04	Retain
838	Yellow cedar	25	1.5	Re-Locate
839	Yellow cedar	23	1.38	Re-Locate
840	Japanese maple	23	1.38	Remove
841	Holly spp.	15	0.9	Remove
842	Yellow cedar	35	2.1	Remove
843	Yellow cedar	44	2.64	Remove
844	Japanese maple	24	1.44	Remove
845	W. Red Cedar	93	5.46	Retain
846	Yellow cedar	78	1.56	Retain
847	Japanese maple	22	1.32	Retain
848	Holly spp.	15	0.9	Remove
849	Yellow cedar	36	1.8	Re-Locate
850	Norway maple	23	1.38	Remove
851	W. Red Cedar	25	1.5	Remove
852	Yellow cedar	27	1.62	Re-Locate
853	Japanese maple	15	0.9	Remove
854	Douglas-fir	141	8.46	Retain
855	Western hemlock	17	1.02	Retain
856	Douglas-fir	20	1.2	Retain
857	W. Red Cedar	54	3.24	Retain
858	Western hemlock	40	2.4	Retain
859	Western hemlock	25	1.5	Retain
860	Western hemlock	28	1.68	Retain
861	Western hemlock	27	1.62	Retain
862	W. Red Cedar	119	7.14	Retain
863	Western hemlock	20	1.2	Retain
864	Western hemlock	25	1.5	Retain
865	Western hemlock	38	2.28	Retain
866	Western hemlock	77	4.62	Retain
867	Western hemlock	57	3.42	Retain
868	Red alder	80	4.8	Retain
869	Western hemlock	32	1.92	Retain
870	Red alder	50	3	Retain
871	W. Red Cedar	41	2.46	Retain
872	Western hemlock	90	5.4	Retain
873	Western hemlock	28	1.68	Retain
874	Western hemlock	31	1.86	Retain
875	Western hemlock	50	3	Retain
876	W. Red Cedar	107	6.42	Retain
877	Western hemlock	37	2.22	Retain
878	Douglas-fir	92	5.52	Retain
879	Bigleaf maple	22	1.32	Retain
880	Western hemlock	78	4.68	Retain
881	Black cottonwood	86	5.16	Retain
882	W. Red Cedar	105	6.3	Retain
883	Western hemlock	64	3.84	Retain
884	Vine maple	24	1.44	Retain
885	Western hemlock	52	3.12	Retain
886	Laurel spp.	30	1.8	Retain
887	Laurel spp.	60	3.6	Retain
888	Laurel spp.	60	3.6	Retain
889	W. Red Cedar	52	3.12	Retain
890	Western hemlock	72	4.32	Retain
891	W. Red Cedar	73	4.38	Retain
1272	Black cottonwood	44	2.64	Retain
12840	W. Red Cedar	51	4.86	Retain
12846	W. Red Cedar	51	3.06	Retain
12847	W. Red Cedar	51	3.06	Retain
12848	W. Red Cedar	60	3.6	Retain
12849	W. Red Cedar	132	9.12	Retain
12850	W. Red Cedar	74	4.44	Retain
12851	W. Red Cedar	67	4.02	Retain
12852	W. Red Cedar	102	6.12	Retain
12853	W. Red Cedar	58	3.48	Retain
12854	W. Red Cedar	122	7.32	Retain
12855	W. Red Cedar	31	1.86	Retain
12856	W. Red Cedar	79	4.74	Retain
12857	Grand sequoia	77	4.62	Retain
12858	Giant sequoia	74	4.44	Retain
12859	Giant sequoia	100	6	Retain
12860	Giant sequoia	104	6.24	Retain
12861	W. Red Cedar	88	5.28	Retain
12862	W. Red Cedar	90	5.4	Retain
12863	W. Red Cedar	50	3	Retain
12864	W. Red Cedar	28	1.68	Retain
12865	W. Red Cedar	89	4.54	Retain
12866	W. Red Cedar	74	4.44	Retain
12867	W. Red Cedar	76	4.56	Retain
12868	W. Red Cedar	71	4.26	Retain
12869	W. Red Cedar	87	5.22	Retain
12870	W. Red Cedar	60	3.6	Retain
12871	W. Red Cedar	72	4.32	Retain
12882	Black cottonwood	17	1.02	Retain
12883	Black cottonwood	125	7.5	Retain
12884	Black cottonwood	21	1.26	Retain
12885	W. Red Cedar	119	7.14	Retain
12886	W. Red Cedar	133	7.98	Retain
12887	W. Red Cedar	110	6.6	Retain
12891	Douglas-fir	145	8.7	Retain
12898	Douglas-fir	162	9.72	Retain
12938	W. Red Cedar	121	7.26	Retain
12939	Red alder	68	4.08	Retain
12940	Western hemlock	80	4.8	Retain
12941	W. Red Cedar	111	6.66	Retain
12987	Western hemlock	53	3.12	Retain
12969	W. Red Cedar	119	7.14	Retain
12970	Douglas-fir	142	8.52	Retain
12972	Red alder	60	3.6	Retain

Drawing No.	Sheet Title	Project No.	Project Address			
4 of 5	DEVELOPMENT IMPACT MAP	2017128-1	1044 Edgewood Road, North Vancouver			
Page 74 of 127	Revision No. 2	Project Title: Handsworth Secondary School	Client Name: MVSS344 - Mark Thomson	SCALE: 1:419	Production Date: February 21, 2018	

Andrew C. MacLellan
I.S.A. Certified Arborist #PN-1978A
I.S.A. Tree Risk Assessment Qualification
Forestry Technician Finalist

ATTACHMENT F

Wildfire Hazard DP Area Assessment Report

Handsworth Secondary School
North Vancouver, BC

May 5, 2018
Updated January 22, 2019

Submitted to:

Mark Thomson
North Vancouver School District
mthomson@sd44.ca
604-903-3462

DIAMOND HEAD
3559 Commercial Street
Vancouver, BC 604.733.4886

SAFE CERTIFIED

Table of Contents

List of Figures

List of Tables

1.0 Introduction

Diamond Head Consulting Ltd. (DHC) was retained to prepare an assessment of wildfire interface risks and mitigation measures for the proposed redevelopment of Handsworth secondary school (Figure 1).

Civic address:	1044 EDGEWOOD RD, District of North Vancouver
Legal Address:	LOT A Blocks 8 to 10, District Lot 596 Plan 15603; PID 007-645-961
Client name:	North Vancouver School District
Date of site visit:	March 23, 2018

This project includes one lot located within the District of North (DNV) Vancouver Wildfire Hazard Development Permit Area. The overall objective of this report is to assess the potential wildfire threat and provide recommendations and tools to reduce this threat to the development site. This detailed assessment report is meant to be submitted as a part of the Wildfire Development Permit application. It must be prepared and signed by a qualified professional and recommend whether a more detailed assessment is required. Specific goals for this assessment are:

- To assess interface fuels, determine the extent, location and presence of wildfire hazard;
- To recommend site-specific fuel treatments for adjacent high fuel hazards that will reduce the risk to structures, human lives, and critical natural features;
- To make recommendations for improving suppression capabilities in and around the proposed development, and;
- To make recommendations for access, building and landscape materials that will minimize wildfire threat.

1.1 Site Planning Documents Reviewed

Diamond Head Consulting was provided with the following documentation from the client that provides the basis for all comments and recommendations:

1. Arborist Report – Handsworth Secondary School, 1044 Edgewood Road, North Vancouver BC – Andrew MacLellan, BC Plant Health Care
2. Topographic Survey – Handsworth Secondary School, 1044 Edgewood Road, North Vancouver BC – Underhill Geomatics Ltd.
3. Site Plan – Handsworth Secondary School, 1044 Edgewood Road, North Vancouver, BC – KMBR Architects Planners Inc.
4. Landscape Drawings – Handsworth Secondary School, 1044 Edgewood Road, North Vancouver, BC – VDZ + A

Any changes to this report or survey should be provided to Diamond Head Consulting so that this wildfire report can be updated accordingly.

1.2 Policy Considerations for Wildfire Threat Mitigation

The Districts Wildfire Hazard Report Master Requirement SPE 115 was developed based on the recommendations of the Community Wildfire Protection Plan. The guidelines were developed with the intent of using precautionary measures to protect property in areas that are at risk from potential wildfire. Standards to achieve these objectives are identified, and reference NFPA-1144 (Standard for Reducing Structure Ignition Hazards from Wildland Fire). In some cases, these standards can be difficult to achieve for developments, and can result in more stringent restrictions than intended.

This assessment report considers both NFPA standards and Canadian FireSmart standards to assess hazard and guide recommendations for the design and construction of buildings and structures located within the boundaries of the Wildfire Development Permit Area (Figure 2).

Figure 1. Location of the subject site - Handsworth Secondary School in the District of North Vancouver.

Figure 2. Development Permit Areas (Wildfire) as defined by the District of North Vancouver.

2.0 Methodology

This project falls within the DNV Wildfire Hazard Development Permit Wildfire Risk and Interface Areas. One nearby stand of trees to the east of the site was identified as a potential risk in the Community Wildfire Protection Plan (CWPP, 2007). This stand was classified into fuel types. There are no fuel classifications specific to the coastal region in the Canadian Fire Behaviour Prediction System; instead, the site has been classified as the fuel type that best represents the fire behavior potential of the forest types most accurately. Fuel type interpretations can be reviewed in Appendix 2. Figure 4 is an aerial image with the fuel types located in relation to the project site.

Detailed fuel hazard assessments were completed within 500m of the lot using the provincial assessment system, "Rating Interface Wildfire Threats in BC" (Morrow, Johnson, Davies, 2008). These plots are shown on Figure 8. Data collected at each fuel plot included:

- Soil and humus characteristics;
- Slope, aspect and terrain classification;
- Forest stand composition by layer (species, density, age, diameter, height, etc.);
- Vertical and horizontal stand structure;
- Quantity and distribution of ladder fuels;
- Composition and coverage of understory brush, herbs and grasses; and
- Quantity and distribution of ground fuels by size class.

A Wildfire Hazard Assessment has been completed using:

1. Current forest fuel threat in and adjacent to the proposed development using the 2016 Wildfire Threat Assessment Guide and Worksheets (MFLNRO, 2016); and,
2. Future structural hazard of the proposed development using the FireSmart Homeowners Manual (Partners in Protection and Province of BC, 2016).

3.0 Project Overview

This property (1044 Edgewood Road) is developed as a high school with a total area of approximately 5.6 hectares. The current high school occupies approximately 30% of the total lot area, with the remainder occupied by sports fields and parking lots. The vegetation on the site is comprised of manicured sports fields with short grass, and perimeter conifer trees along the south, west, and north property lines. The eastern portion of the subject site is occupied by greenspace that continues south and is connected with the Mackay Creek greenspace. This area is occupied by a mature native forest stand, which slopes steeply down to Mackay Creek itself.

A new high school will be built on site. It will be located in the north half of the property where the current sports field exists. The existing high school building will remain until the new building is completed. Figure 3 illustrates the new plans for the site as well as the outline of the existing school. A 12m setback will be remain undeveloped above the top of bank of the Mackay creek riparian area.

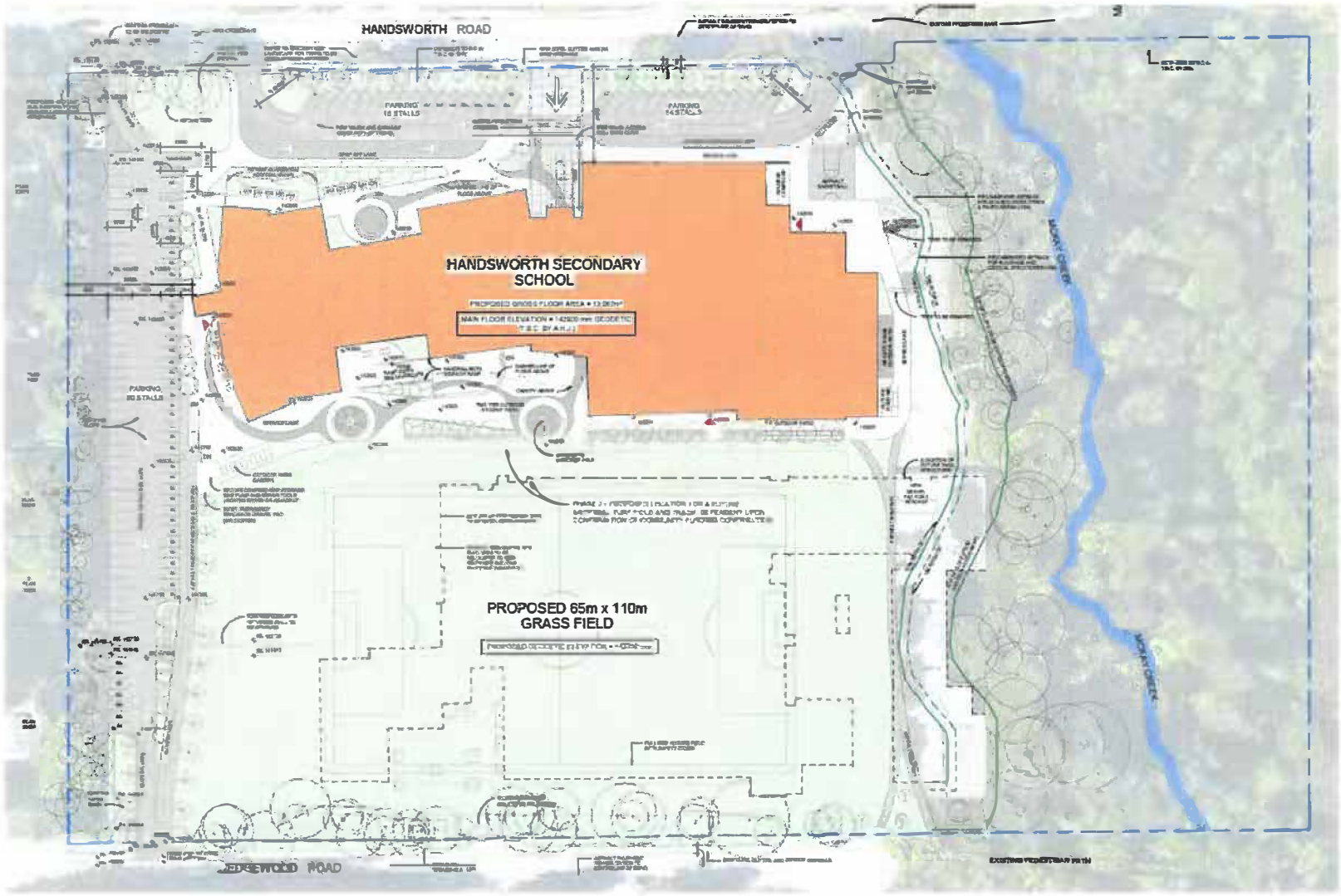


Figure 3. Site plan - by KMBR Architects Planners Inc.

4.0 Fuel Descriptions and Wildfire Threat Assessment

4.1 Summary of Fuel Types

Forested areas nearby the proposed development site were classified into the fuel types mapped in Figure 4. The fuels have been divided into classifications based on the sixteen national benchmark fuel types that are used by the Canadian Fire Behavior Prediction System (Appendix 3). Two fuel types were identified (C5 and M2). Detailed descriptions of these forest areas are provided in Appendix 2.

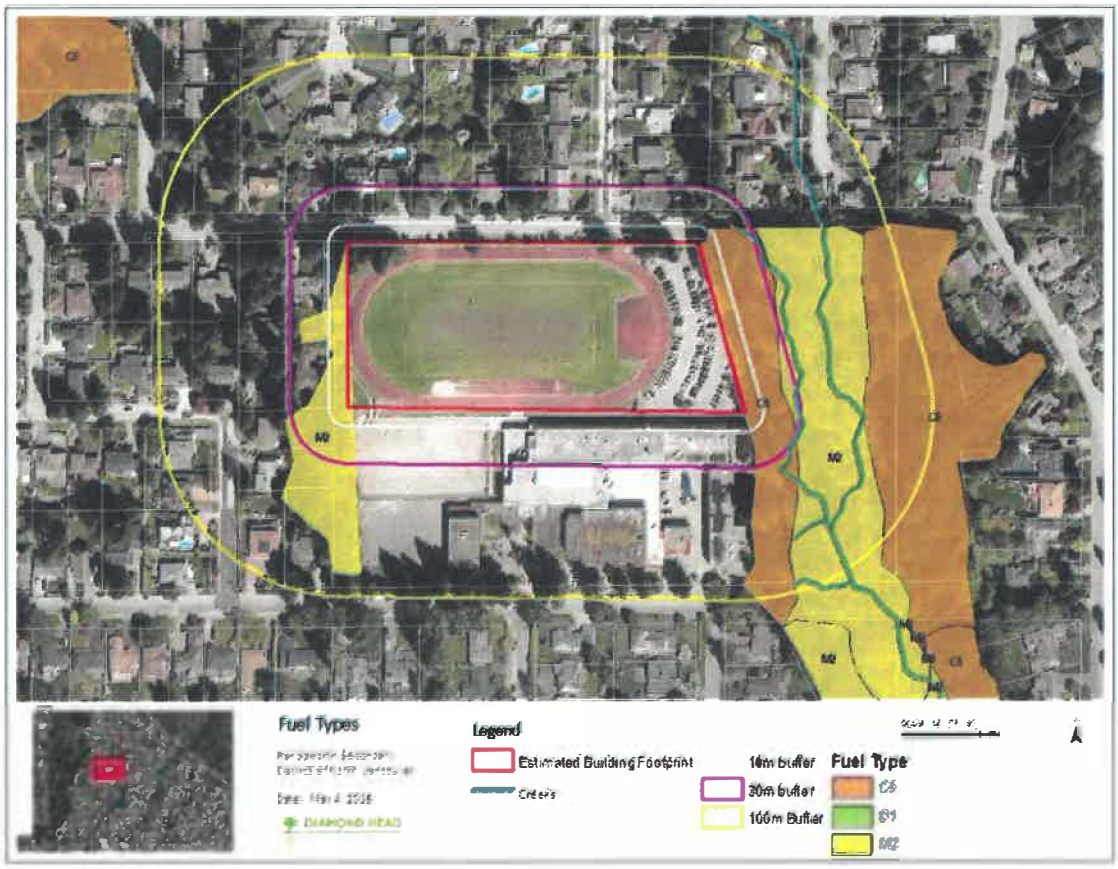


Figure 4. Location of the fuel types relative to project site. Buffers are set off of the north end of the property.

4.2 Summary of Wildfire Threat from surrounding forest

Each fuel type and distinct stand was assessed for wildfire threat using the Wildfire Urban Interface worksheet. Figure 5 outlines the wildfire threat and plot locations. The Wildfire Urban Interface (WUI) ratings and plot characteristics are summarized in Appendix 1. This assessment accounts for the fire behavior potential of these stands but does not consider plans for the future structure. The subject site in its current state has an overall moderate wildfire risk. This is largely driven by the adjacent forest in Upper Mackay Creek park, which has a conifer component directly adjacent to the site on a steep slope. This conifer forest transitions to a mixed deciduous and coniferous forest downslope and to the south.

The forest growing adjacent to the new building is on a steep slope and includes conifers with variable base crown heights, understory ladder fuels, and fine and large fuels on the ground. The proximity of these fuels to the school increases the vulnerability of this structure to wildfire. This vulnerability is also increased by the line of conifer trees along the north and south perimeter.

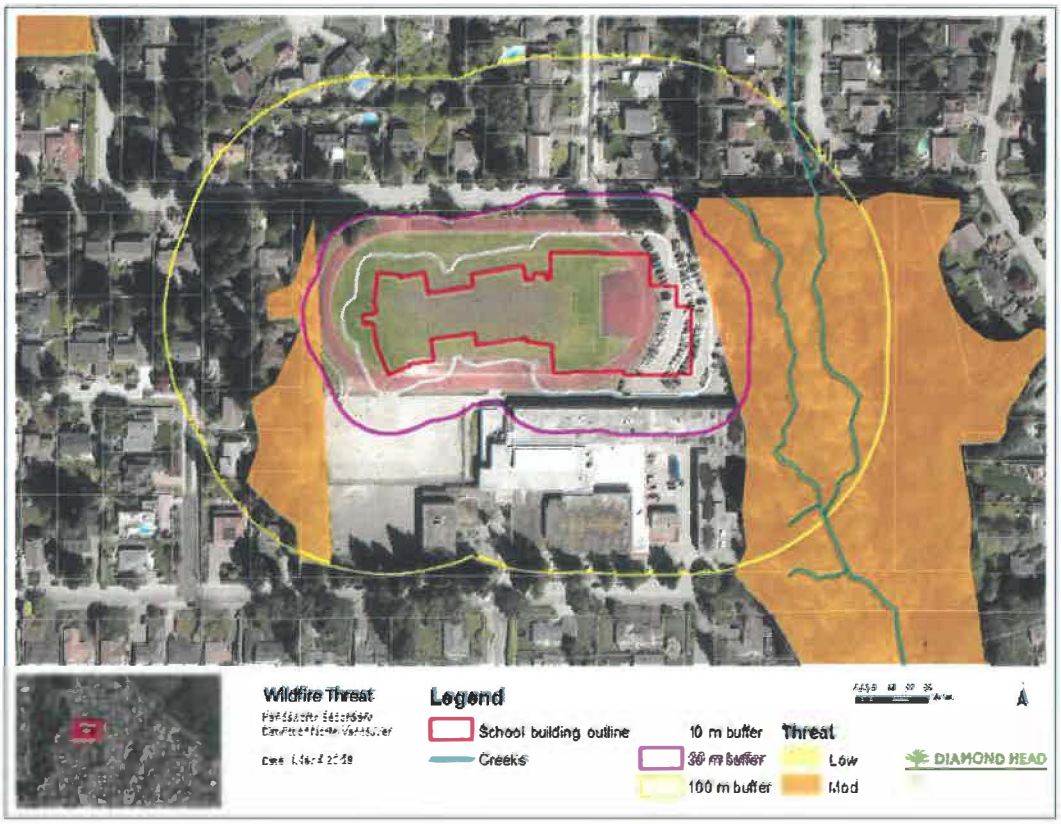


Figure 5. Wildfire threat mapping

Photo 1: View of existing school. Photo facing east at building. Adjacent fuels are visible behind.

Photo 2: There are currently numerous conifers within 10 meters of the existing structure.

Photo 3: The proposed new school will be located where this current sports field and track are. Photo from same vantage as Photo 1.

5.0 Wildfire Threat Mitigation Recommendations

The following are recommendations to mitigate risk to the development. Community and design recommendations focus on siting of structures, construction materials, access, water sources and utilities. These are factors that provide long term mitigation against a wildfire event. Vegetation fuels on and adjacent to the development will change over time and require maintenance. Recommendations are made for on-site landscaping as well as treatments and required maintenance for forest areas adjacent to the property.

At the time this assessment was completed, detailed architectural structural plans showing roofing and exterior siding were not available for review. It is the responsibility of the owner and their project team to understand the following restrictions and to comply with them.

5.1 Buildings setback from hazardous fuels

FireSmart recommends that a 10m fuel free zone be established and maintained between structures and hazardous fuels. The proposed location of the new school is located with a suitable fuel free buffer from the forested edge of the Mackay Creek riparian area. This setback includes a 12m setback for geotechnical considerations. There is also an additional 7-15 fuel free zone which includes a service lane, basketball court and landscapes area. This provides a suitable fuel free zone for wildfire mitigation.

5.2 Buildings and Construction

Generally, during a wildfire, homes are ignited as a result of embers landing and accumulating on vulnerable surfaces such as roofs, verandas, eaves and openings. Embers can also land on or in nearby flammable materials such as bushes, trees or woodpiles and, if the resulting fire is near the home, it could create enough radiant heat to ignite the walls of the home. Small fires in the yard can also spread towards the structures, beneath porches or under homes. Therefore, the building material and construction techniques are a paramount concern for homes in the interface.

Construction standards and requirements for roofs, chimneys, balconies, decks and porches apply to all new houses that are built within the wildfire DP area. These are outlined in Schedule B of the District of North Vancouver's Official Community Plan, which can be found at the District website (www.dnv.org/sites/default/files/edocs/wildfire-hazard-DPA-details-schedule-B-OCP.pdf). The DNV building standards along with additional recommendations are summarized in Table 1.

Table 1. Requirements for community design and construction

Feature	Requirements for building materials
Roofing	• Class A or B rated roofing material* should be used, and asphalt or metal roofing should be given preference. • Any spaces between roof decking and covering should be blocked. • Screen or enclose rain gutters to prevent accumulation of plant debris.
Siding	• Exterior vertical walls should be sheathed with non-combustible materials*. Preference should be given to stucco, metal, brick and concrete cladding. • Ensure that fire resistant materials extend from the foundation to the roof.
Vents, openings, eaves, attics, overhanging projections, soffits	• Vents should be screened using 3mm, non-combustible wire mesh, and vent assemblies should use fire shutters or baffles. • Eaves, soffits, attics, overhanging projections and underfloor openings should be protected with non-combustible covers.
Exterior windows and doors	• All windows should be multi-paned, or of glass block. Radiant faces exposed to the forest edge should be multi-paned with one pane glazed with annealed or tempered insulating glass. • Limit the size and number of windows that face large areas of vegetation. • Window screens should be non-combustible. • Exterior doors on radiant faces exposed to the forest edge should be of fire resistant materials.
Decks, porches, balconies	• Decks, porches and balconies should be sheathed with fire-resistant or non-combustible materials. • Slotted deck surface allows needle litter to accumulate beneath the deck. Provide access to this space to allow for removal of this debris. • Any covers should be built of the same ignition-resistant materials as a roof.
Exterior sprinklers	• While exterior wall or roof sprinklers were considered, they are not presently recommended because of the lack of accepted standards for design and installation, and the uncertainty regarding maintenance and triggering of sprinklers during a wildfire event when homes are evacuated. • Irrigation sprinklers should be installed on private property and in landscaped parks to keep plants healthy and fire-resistant. The switch for these should be made accessible to turn on in the case of a wildfire.
Fences	• Where fencing is within 10 m of the building or accessory buildings, use fire-resistant or non-combustible materials.

Feature	Recommendations during construction
Combustible materials	• During construction of houses, all waste construction materials including brush and land clearing debris; needs to be cleaned up on a regular basis, to minimize the potential risk. No combustible materials should be left at the completion of construction.
Hydrants	• Prior to construction of any wood frame buildings, there must be fire hydrants within operating range.
Fire Suppression	• The contractor should be familiar with the BC Wildfire Act and the current provincial standards for wildfire suppression and have the appropriate tools on-site for the duration of the project.

*** Non-combustible materials:** means that a material meets the acceptance criteria of CAN/ULC S114, (Standard Method of test for determination of non-combustibility in Building Materials)
Fire-resistant materials: means that a material meets the acceptance criteria of CAN/ULC-S101, (Fire Endurance Tests of Building Construction and Materials)
Rated roofing materials: Class A, B or C is a measure of the external spread of flame on a roof surface. Tests are conducted using CAN/ULC S107M methods of fire tests of roof coverings, or equivalent. The best rating achieved is Class A, which may be described as effective against severe fire exposure.

The following specification are very important to comply with. Roofing must be fire retardant. These have a Class A flame spread rating defined as "Class A roof coverings are not readily flammable, are effective against severe fire exposures, and do not carry or communicate (i.e., spread) fire". ANSI/UL 790, "Tests for Fire Re-sistance of Roof Covering Materials," and ASTM E 108, "Standard Test Methods for Fire Tests of Roof Coverings," are the fire-resistance capacity tests used to determine a product's or roof assembly's classification. Any products that are certificated as Class A with an "Assembly" requirement must have a project engineer or architect provide signed proof that the product has been installed as per the specifications of the manufacturer.

Exterior siding must be fire resistant. (Stucco, brick, fibre cement boards/panels and poured concrete). Untreated wood products do not meet this standard. Flame resistant coatings that require ongoing maintenance or reapplication are not acceptable. Exterior wall assemblies that have exterior wood that is untreated and rely on the interior wall for fire resistance are not acceptable. Wood products that have permanent treatments or are naturally fire resistant can be accepted as long as product specifications and certified testing is provided.

It is critical that the structure be designed and built to these standards. The District will require that the final structure be inspected to confirm it is compliant and in order to obtain permit for occupancy and bonding.

5.3 Firesmart Landscaping and Fuel Mitigation

Landscaping and maintenance for the site should follow FireSmart principals (Ministry of Forests Wildfire Management Branch, Firesmart Program. Planning and maintenance of this area should follow the requirements of priorty zone 1 (<10m from strucures) outlines in the Firesmart program. The goal in this zone is to remove hazardous fuels and convert vegetation to fire resistance species to produce an environment that does not support combustion. These recommendations include strategic selection of fire resistant replacement trees as well as landscaping and maintenance standards are summarised in Table 2.

Diamond Head Consulting is working with the School District to develop a restoration planting area that will be within 10m above the top of bank. No confier trees or species that are highly flamable will be planned in this area.

Table 2. Requirements for Landscaping

Feature	Recommendations
Planting	• Remove all highly flammable vegetation and other combustibles from around the building. This includes all conifer hedging. • No conifer trees species should be planted within 10m of any buildings. • Landscaping should incorporate species that are fire resistant. These types of plants tend to have moist, supple leaves with low amounts of sap or resin. They also have a tendency not to accumulate dead material. A list of fire resistant plants and trees can be found at the Firesmart Canada website[1]. A list of suitable species has also be provided in Appendix 6. • Ensure that vegetation will not grow to touch or overhang buildings. • Irrigation sprinklers should be installed in landscaping.
Maintenance	• Annual grasses within 10 meters of buildings should be kept mowed to 10 centimeters or less and watered regularly during the summer months; • Ground litter and downed trees should be removed regularly and prior to the fire season.

5.4 Recommendations for Onsite and Neighboring Trees

Trees within the Mackay creek riparian zone will be retained. There is a wide enough fuel free zone between these trees and the school that no further mitigation is required. There will also be rows of existing trees retained along the north and west sides of the school. These trees will be separated from the new building by a parking lot and require no further mitigation.

5.5 Ongoing Maintenance

To ensure that FireSmart standards are maintained on the property, periodic re-treatment or maintenance is recommended in Table 3.

Table 3. Requirements for ongoing maintenance

Owner	Recommendation
School's responsibility	• Regularly remove debris from roofs, gutters and beneath overhanging projections. • Grass and landscaping should be kept mowed to 10 cm or less and watered regularly during the summer months. • Landscape sprinkler systems should be installed and maintained by the homeowner. • Remove any local accumulations of woody or combustible material (e.g., no woodpile or yard waste accumulations). • Remove any over mature, dead or dying shrubs and trees. • Plant only fire resistant trees and shrubs. A list of fire resistant plants and trees can be found at the fire smart canada website (*https://www.firesmartcanada.ca/images/uploads/resources/FireSmart-Guide-to-Lanscaping.pdf*).

6.0 Future Condition FireSmart Structure and Hazard Assessment

The form below provides an assessment of the proposed development using the FireSmart Structure and Hazard Assessment form. Assessment ratings are made assuming that the recommendations outlined in this report are adhered to. This assumes all exterior walls and roofing are made of fire resistant materials and all landscaping within 10m of the building consists of fire resistant species. This form can be revised once detailed architectural plans are complete.

Table 4. FireSmart Structure and Hazard Assessment

ZONE 1			
HOME/10 m	Criteria	Rating Options	RATING
What type of roofing material do you have?	Metal, clay tile, asphalt shingle or ULC rated shakes (may be affected by the condition of your roof)	0	0
	Unrated Wood Shakes	30	
How clean is your roof?	No needles, leaves or other combustible materials	0	0
	A scattering of needles and leaves	2	
	Clogged gutters and extensive leaves	3	
What is the exterior of your home built of?	Non-combustible material, stucco, metal siding or brick	0	0
	Logs of heavy timbers	1	
	Wood, vinyl siding or wood shakes	6	
How fire-resistant are your windows and doors?	Tempered glass in all doors/windows	0	2
	Double-pane glass - small/medium (smaller than 1 metre x 1 metre)	1	
	Double-pane glass - large (greater than 1 metre x 1 metre)	2	
	Single-pane glass - small/medium (smaller than 1 metre x 1 metre)	2	
	Single-pane glass - large (greater than 1 metre x 1 metre)	4	
Are your eaves closed up and your vents screened?	Closed eaves, vents screened with 3-millimetre wire mesh	0	0
	Closed eaves, vents without mesh	1	
	Open eaves, vents not screened	6	
Have you sheathed-in the underside of your balcony, deck, porch or open foundation?	Sheathed with fire-resistant materials	0	0
	Sheathed with combustible materials	2	
	Not sheathed	6	
Is your home set back from the edge of a slope?	Building is located on the bottom or lower portion of a hill	0	6
	Building is located on the mid to upper portion of a hill or the crest of a hill	6	
ZONE 1 HOME SCORE			8

ZONE 1			
YARD/within 10 m	Criteria	Rating Options	RATING
Where are your outbuildings (or adjacent buildings) located	More than 10 metres from home	0	0
	Less than 10 metres from home	6	
Where is your woodpile located?	More than 10 metres from any building	0	0
	Less than 10 metres away from any building	6	
What type of forest* grows within 10 metres of your home?	Deciduous trees	0	0
	Mixed wood trees (deciduous and conifer)	30	
	Conifer trees	30	
What kind of surface vegetation and combustible materials are within 10 metres of your home and outbuildings?	Well-drained lawn or non-combustible landscaping material	0	0
	Uncut grass or shrubs	30	
	Twigs, branches and tree needles on the ground	30	
ZONE 1 YARD SCORE			0

*a forest is considered a continuous intact treed area

ZONE 2			
YARD/10 – 30 m	Criteria	Rating Options	RATING
What type of forest surrounds your home?	Deciduous trees	0	10
	Mixed wood trees (deciduous and conifer)	10	
	Conifer trees separated	10	
	Conifer trees continuous	30	
What kind of surface vegetation grows within 10-30 metres of your home and around your buildings?	Well-drained lawn or non-combustible landscaping material	0	0
	Uncut grass or shrubs	5	
	Scattered twigs, branches and tree needles on the ground	5	
	Abundant twigs, branches and tree needles on the ground	30	
Are there shrubs and low branches (within 2 metres of the ground) in the surrounding forest?	None within 10-30 metres	0	0
	Scattered within 10- 30 metres of buildings	5	
	Abundant within 10-30 metres of buildings	30	
ZONE 2 YARD SCORE			10

TOTAL SCORE		Rating
ZONE 1/ Home and Yard	Home	8
	10 metres from home	0
ZONE 2 / Yard	10 – 30 metres from home	10
	TOTAL	18

HAZARD SCORE: Low: <21 Moderate: 21-29 High: 30 – 35 Extreme: >35

Following the recommendations in this report will achieve a FireSmart hazard score of LOW

7.0 Final Remarks

The District of North Vancouver requires that the proposed development is consistent with the Wildfire Development Permit Guidelines. Planners, engineers, and landscape architects should refer to this report and the FireSmart manual during the design phase of this development. All construction operations should be conducted according to the Wildfire Act and the regulations. Following these regulations will help reduce liability and protect the development.

The District will require that an inspection be done following construction to ensure that the structure and landscaping meet these requirements.

If the recommendations made within this report and the requirements outlined by the District of North Vancouver are complied with, wildfire risk to life and property will be substantially mitigated and the development will meet FireSmart standards to a reasonable extent within the limitations of zoning and ownership.

If there are any questions or concerns as to the contents of this report, please contact us at any time.

Sincerely,

Supervisor:

Mike Coulthard, R.P.Bio., R.P.F.
Senior Forester, Biologist
Certified Tree Risk Assessor (46)

Project Staff:

Conor Corbett MSFM
ISA Certified Arborist (PN-8429A)
ISA Tree Risk Assessment Qualified (TRAQ)
Forester in Training

ATTACHMENT G

November 27, 2018 Reference: VAN-00241165-A1

School District No. 44 (North Vancouver)
2121 Lonsdale Avenue
North Vancouver, BC V7M 2K6 via email: mthomson@sd44.ca

Attention: Mark Thomson, Capital Project Manager

Re: Geotechnical Slope Hazard Assessment Report
Handsworth Secondary School Replacement Project
East-Facing Slope on 1044 Edgewood Road, North Vancouver, BC

Dear Mr. Thomson:

1.0 INTRODUCTION

As requested, EXP Services Inc. ("EXP") has carried out a detailed slope hazard assessment related to the above-referenced site. The objective of this assessment was to comment on the current condition of the existing slope located east of the school and recommend slope setbacks and development guidelines to minimize adverse impacts to the subject slope.

This letter report ("report") summarizes the site's subsurface conditions based on our in-house records, EXP's observations and assessment of the current slope's condition based on the site reconnaissance completed on October 22, 2018, and geotechnical recommendations for the above-noted project.

This detailed slope hazard assessment has been completed in accordance with widely-accepted standards and geotechnical engineering principles and practices for similar projects in this region. It should be noted that the assessment of environmental aspects of the site or chemical assessment of soil and groundwater are beyond the scope of this report.

Authorization to proceed with the work was provided by the School District No. 44 ("SD No. 44"). The scope of service rendered in the preparation of this report generally conforms to EXP's proposal dated October 9, 2018 (Ref. No. 999-00062224-PP).

Review and use of this report should be completed in accordance with the attached *"Interpretation & Use of Study and Report"* document. This document outlines the intended use and interpretation of this report. It is included as an integral part of this report and should be read in conjunction with all parts of this report.

2.0 SOURCE OF INFROMATION

The following sources of information were reviewed during the development of this report:

- Published Surficial Geology Maps of the area;
- Diamond Head Consulting Ltd. "*Streamside Protection DPA Assessment*" report dated April 24, 2018;

- EXP's geotechnical assessment report dated March 15, 2018 (File No. VAN-00241165-A0);
- Westrek Geotechnical Services Ltd.'s "*Mackay Creek Virginia Crescent & Sunnycrest Drive Landslide Assessment*" report dated February 8, 2018.
- KMBR Architect Planner Inc.'s "*Development Permit Pre-Application*" drawings of the proposed development dated October 4, 2018;
- EXP's site reconnaissance completed on October 22, 2018;
- Underhill Geomatics Ltd.'s topographic survey dated October 23, 2018;
- Contour data available from the district of North Vancouver's website; and,
- The District of North Vancouver ("DNV") Official Community Plan (Schedule B, part 4) dated July 23, 2018.

3.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The school is located at 1044 Edgewood Road, North Vancouver, BC. The site is bounded by Handsworth Road to the north, Mackay Creek to the east, Edgewood Road to the south, and 1- to 2-storey single-family homes to the west. The northern half of the site is currently occupied by a sports field, a running track and a paved parking lot. The southwest quadrant of the site is occupied by a playground and three tennis courts, while the southeast portion is occupied by the existing school building.

Based on a review of the available topographic data, a relatively seep slope is present at the east portion of the site with slope crest bordering the east edge of the existing school (see Figure 1). The height of this slope varied from approximately 10m to 12m with an average gradient ranging of about 1.6 to 1:8H:1V (Horizontal:Vertical) with localized steeper gradient of up to 1H:1V. Six profiles through this slope were prepared and are presented in the attached Figures 3 to 5. According to the District of North Vancouver ("DNV") GEOweb, this section of the slope is classified as *Slope Hazard Development Permit Area ("DPA").*

Based on the design drawings provided by KMBR Architects Planners Inc. dated October 4, 2018, it is understood that the proposed new school development will consist of a sports field, an auxiliary building and a school building with no underground level. The finished site grades will generally match the existing site grades. The proposed school building would be located at the existing sports field (i.e., north portion of the site) and could be divided into two sections: a classroom section and a gymnasium section. The classroom section (i.e., west section) of the proposed building is 3-storeys high and the gymnasium section of the proposed building is about 9.4m in height (1-storey high). The proposed sports field and running track area would be located south of the proposed building which is currently occupied by the existing school building. A site plan showing the proposed development is attached as Figure 2.

4.0 SITE RECONNAISSANCE

At the time of the site reconnaissance on October 28, 2018, the slope was generally vegetated with bushes, shrubs and second growth trees. The observed second growth trees generally consisted of Douglas-firs, western red cedar, red alder, western hemlock and black cottonwood. Fallen trees and "pistol butts" (tree-trunk bases that have thickened and curved to the shape of an old pistol) were also noticed along the subject slope indicative of shallow translational slope movements. Old growth stumps were mainly observed along the base of the subject slope indicating the unlikelihood of large deep-seated slope movements.

Five (5) possible head scarps were noticed along the subject slope. Three (3) of the suspected head scarps were mainly located around the crest of the slope. These scarps generally appeared to be wide and shallow supporting the indication of shallow translational slope movements. It is worth noting that the most significant potential head scarp was located east of the existing school building with a portion of which appeared to have been undermined due to previous slope movement, see Figure 1.

During the site reconnaissance, seepage zones were also encountered. These zones were observed to extend mainly to about 1m to 3m above the toe of the slope. Vegetation indicating continuous wet area were also noticed at the base of the slope portion located adjacent to the existing school.

Outfall structures and a metal pipe were also noticed; however, no waterflow was observed at the time of our review. Approximate locations and extent of observed features are shown in Figure 1 and select photos of these features are included in Appendix A.

5.0 GROUND SUBSURFACE CONDITIONS

Interpretation of the subsurface soil and groundwater conditions around the subject slope is based on available published surficial geology maps, EXP's relevant and nearby experience, and select soils logs obtained from EXP's geotechnical assessment report dated March 15, 2018 (File No. VAN-00241165-A0). A copy of these soil logs (AH17-01, -06, AH18-07 to -09, and AH18-16) are included in Appendix B and the approximate locations of these test holes are shown in Figure 1.

A review of the published Geological Survey of Canada Surficial Geology Map (Map 1486A) indicates the subject property is underlain with Capilano Sediments consisting of raised deltaic and channel fill medium sand to cobble gravel up to 15m thick underlain by silty to silty clay loam.

Based on our review of the available subsurface information, a generalized stratigraphy around the slope area can be described as shown in Table 1 below.

Table 1: Summary of Soil Stratigraphy

Soil Unit	Thickness	Depth to Top of Unit	Description
A	0.5m to 1.5m	Surface	VARIABLE FILL This unit is variable in nature and generally ranged from: - loose to dense SAND, with some silt to silty, and some gravel to - firm/loose SILT and SAND, some gravel and wood fragments to - SANDY SILT with some gravel.
B	1.5m to >5.3m	0.5m to 1.5m	SILTY SAND / SAND / GRAVELLY SAND This unit generally ranged from: - dense SILTY SAND with trace to some gravel to - dense SAND with trace to some silt and trace to some gravel to - dense GRAVELLY SAND with trace to some silt, and, frequent/occasional cobbles. At some locations, the top of this unit ranged from loose to compact.
C	To the bottom of exploration depth	3.0m to 5.3m	SANDY SILT / SILT This unit generally ranged from: - stiff to hard SILT, with trace to some sand and trace clay to - stiff to very stiff SANDY SILT. In AH18-09, this unit was underlain by dense to very SILTY SAND

Groundwater was encountered in all testholes except at AH18-08 and AH18-16. Depth to groundwater ranged from about 1.8m to 3.7m below ground surface. The variability in groundwater elevations may indicate perched water tables on less permeable layers. It should be noted that groundwater level would fluctuate seasonally, with precipitation and with adjacent land use.

It should be noted that geological conditions are innately variable and the above-inferred subsurface stratigraphy should be considered as a generalized profile, as information obtained from the test holes represents discrete subsurface conditions at the test hole locations only. The subsurface conditions may vary between and beyond the test hole locations, and below the depths explored.

6.0 DEBRIS FLOW AND DEBRIS FLOOD HAZARD

According to DNV's GEOweb, the areas associated with debris flow and debris flood hazards are mainly located along the fan at the base of Grouse Mountain which is about 1km to 2km away from the subject slope. It is possible that the flow could "back up" toward Mackey Creek; however, the Mackay ravine/channel would confine debris and associated "flood water" to the bottom of the gully. As a result, the existing school as well as the proposed new school development is not expected to be directly affected by potential debris flood hazard.

7.0 EXISTING SLOPE CONDITION

As mentioned previously, signs of possible previous slope movements were observed. These signs included historic head scarps, tilling/leaning trees and pistol butts. Although the existing slope condition was found to be marginally stable, the observed signs generally indicate shallow movements that are limited to the upper 3m to 4m rather than deep seated failure modes. Causes of the failure may be attributed to the following factors:

1. Significant fill has been added to the crest of the slope, particularly at the south portion;
2. Possible increase of groundwater flow to the slope. Sources of the groundwater could include leaky perimeter drains, stormwater system leakage and/or natural flows;
3. Introduction of stormwater discharge to the slopes as observed by existing outfall structures and pipes daylighting near the crest of the slope;
4. Possible slope toe erosion due to increased flow in the creeks located near the toe; and,
5. The steep nature of the existing slope.

8.0 DISTRICT OF NORTH VANCOUVER SLOPE HAZARD GUIDELINES

Risk tolerance criteria have been utilized by DNV, on an interim basis, to manage landslide risk since early 2005. In February 2007, the DNV Council held a workshop to review the natural hazards management program and approved a plan which included, "establish a process to adopt risk tolerance criteria". The Natural Hazards Task Force was assembled in October 2007 "to provide a forum to gather input from an informed, broad-based community perspective regarding quantitative tolerable risk or risk acceptance criteria for landslides and other natural hazards". The task force presented their recommendations and policy guidelines for natural hazards risk tolerance for building permit and development applications were adopted by the Council in December 2009 (see DNV Official Community Plan, Schedule B, part 4, dated July 23, 2018).

Applicants for subdivisions, development approvals and building permits may be required to meet the

following conditions:

1. Demonstrate that natural hazards risks are reduced to As Low as Reasonably Practicable (ALARP); and,
2. In addition to ALARP, that:
   a. The following risk tolerance criteria are satisfied (if a quantitative risk methodology is used):
      i. Maximum 1:10,000 risk of fatality per year for re-developments involving an increase to gross floor area on the property of less than or equal to 25%;
      ii. Maximum 1:100,000 risk of fatality per year for new developments and for re-developments involving an increase to gross floor area on the property of greater than 25%.

   or,

   b. The following Factor-of-Safety (FOS) criteria are satisfied (if factor-of-safety and/or slope displacement methodology is used):
      i. For re-developments involving an increase to gross floor area on the property of less than or equal to 25%:
         1. Under static conditions the slope stability FOS must be greater than 1.3; and,
         2. Under non-static conditions (e.g., for earthquake ground motions) the slope stability FOS must be greater than 1.0 or predicted ground displacement must be less than 0.15m with a 1:475 annual chance of exceedance;
      ii. For new developments and for re-developments involving an increase to gross floor area on the property of greater than 25%:
         1. Under static conditions the slope stability FOS must be greater than 1.5; and,
         2. Under non-static conditions (e.g., for earthquake ground motions) the slope stability FOS must be greater than 1.0 or predicted ground displacement must be less than 0.15 m with a 1:2475 annual chance of exceedance.

The assessment methodology is to be determined by a Qualified Professional in accordance with the Guidelines for Legislated Landslide Assessment for Proposed Residential Developments in BC published by the Association of Professional Engineers and Geoscientists of BC dated March 2006 (current version, revised May 2010.

Generally, the DNV's Natural Hazards Risk Tolerance Criteria can be summarized as follows:

Table 2: Summary of DNV Slope Hazard Requirements

	Type of Application / Development	Risk of Fatality per Year	Minimum Factor of Safety (FOS) under Static Conditions	Maximum Ground Displacement - Seismic Conditions
A	Building permit (<25% increase to gross floor area)	1:10,000 + ALARP	1.3	15cm (with a 1:475 annual chance of exceedance)
B	Building permit (>25% increase to gross floor area and/or retaining wall >1.2m)	1:100,000	1.5	15cm (with a 1:2,475 annual chance of exceedance)
C	Rezoning			
D	Subdivision			
E	New development			

Item B of Table 2 above is deemed to be applicable for the subject slope.

9.0 SLOPE STABILITY ANALYSIS AND METHODOLOGY

Slope stability analysis was completed using the Morgenstern and Price limit equilibrium method that is available in the commercially software, SLOPE/W, Version 9.0.2 developed by GeoStudio. The soil parameters used in the analysis are presented in the table below. It should be noted that these soil parameters are based on EXP's local experience, available test hole logs, observations made during the site reconnaissance, and back analysis of a critical profile cross-section. This profile cross-section was based on the topographic survey completed by Underhill and October 23, 2018. Typical slope cross-sections are shown in Figures 3 through 6 and the locations of the profiles lines are shown in Figure 2.

Table 3: Summary of Soil Parameters Used in the Analysis

Soil Name	Unit Weight (kN/m^3)	Effective Stress Analysis		Total Stress Analysis
		Friction Angle, Φ (degree)	Cohesion (kPa)	Undrained Shear Strength, s_u, (kPa)
Existing Sand Fill	18	33	-	-
In-situ Dense Sand	18	40	-	-
Stiff to Very Stiff SILT	17	28	15	100
Surficial Slope Soil	17	33	7	-

As described in Section 5.0, the thickness of the in-situ Sand ranged from about 1.5m to more than 5.3m. To account for the variability in soil conditions, the most critical soil profiles was selected for the analysis. The results outputs of the slope stability analysis are included in Appendix C.

To evaluate seismic performance, Site Class "C" in accordance with 2015 National Building Code of Canada was selected (EXP report dated March 15, 2018). For the design earthquake motion with a 2% probability of exceedance in 50 years, or a 1:2475-year return period, a Peak Ground Acceleration (PGA) value of 0.341 was selected for the analysis.

As discussed in Section 8.0 above, the required Factor of Safety ("FOS") of at least 1.5 under static conditions and a maximum ground displacement of about 15cm under earthquake with a 1:2475 annual chance of exceedance would apply to this development. It is EXP's understanding that the slope improvement techniques such as permanent shoring or armoring are not considered due to environmental and economical constrains. Therefore, the proposed school development should be setback sufficiently from the slope crest to achieve the required DNV's requirements as detailed in the section below.

10.0 DISCUSSION AND RECOMMENDATIONS

10.1 Summary

Based on EXP's site reconnaissance, site observations and results of the stability assessment, it is EXP's professional opinion that the subject slope is marginally stable; hence, appropriate setbacks for significant structures such as the new school building should be established as detailed in the following subsections.

10.2 Recommended Slope Setbacks

To achieve the minimum Factor of Safety required by the DNV (i.e., FOS ≥1.5), it is recommended that the proposed new school building and other buildings that are classified as "buildings" under the current building code, be setback at least 12m from the crest of the slope. A 10m setback (i.e., FOS=1.4) is considered sufficient for the proposed sports field and running track area due to its nature and low importance. Recommended setback lines for the proposed development are presented in the attached Figure 2. It should be noted that the geotechnical recommended setbacks are based on EXP's understanding that the proposed development with be constructed with nominal site grade increase.

For a design earthquake motion with a 1:2475-year return period and a PGA value of 0.341, it is estimated that the horizontal displacement of the subject slope at 12m setbacks would be in the order of 9cm. Similarly, it is estimated that the horizontal displacement at 10m setbacks would be in the order of 13cm. It is also worth mentioning that based on the provided architectural drawings, the proposed new school building is setback at least 16.5m from the crest of the slope and it is estimated that the horizontal displacement under the design earthquake event would be minimal.

As shown in Figure 2, the proposed sports field and running track area does not meet the geotechnical setbacks stated above. It is recommended that the proposed sports field and running track area be shifted to the west to meet the geotechnical setbacks. Alternatively, ground improvement techniques such as geogrid reinforcement or soil geocells may be considered. It should be noted that ground improvement considerations are beyond the scope of this report.

10.3 Development Considerations

As mentioned previously, the stability of the subject slope is significantly influenced by the groundwater conditions, toe erosion, and surface erosion. To minimize adverse impacts to the slope, and, hence, neighbouring developments, the following items should be taken into considerations.

Stormwater Management:

- Stormwater collected in catch basins should be directed to the district storm sewers, or to appropriate outfall at the toe of slope that is designed against erosion;
- Surface flow should be directed away from this slope;
- Use of infiltration methods for stormwater management should be minimized as that could increase groundwater flow towards the slope; and,
- Existing outfall(s) and/or outlets located at the crest or mid-slope should be decommissioned.

Extreme Events:

As noted previously, no significant signs of active toe erosion were noted during the site reconnaissance. The toe erosion rate is dependent on the flow rate in the creeks along the slope toe. If an extreme event (i.e., 1:200-year rainfall) were to happen or signs of significant slope movement are noted, it is suggested that a Qualified Engineer be retained to review the condition of the slope.

10.4 Impact of Proposed Development

As the proposed school development will not have active construction on or near the crest of the slope, impact of the proposed school re-construction is not expected to have adverse impacts to the existing slope or neighboring properties.

11.0 CLOSURE

It should be understood that this report was prepared based on the information provided by the Client and EXP's understanding of project as described in Section 3 above. Also note that this report was prepared for the exclusive use of our client, School District No. 44 (North Vancouver), and their designated agents, and may not be used by any other parties without the written consent of EXP. The District of North Vancouver may use this report for the purpose of the development permitting process.

EXP Services Inc. should be given the opportunity to review final construction plans and make any needed modifications to our geotechnical report to reflect changes in the original design assumptions. If the construction plans change, or if during construction, the subsurface conditions are noted to differ from those described in this report, EXP should be notified immediately, and the recommendations provided regarding the geotechnical aspects of the development should be reviewed and, if deemed necessary, modified.

We trust this report meets your present requirements. Please contact the undersigned if you have any questions or require further assistance.

Sincerely,

EXP Services Inc.

Muhammed Al-Kustaban, E.I.T.
Geotechnical Engineer

Kai-Sing Hui, P.Eng.
Manager, Geotechnical Discipline, Western Canada

Enclosures: Interpretation & Use of Study and Report
Figures 1 to 5
Appendix A – Select Site Photos (No.1 to 8)
Appendix B – Select Soil Logs (AH17-01, -06; AH18-07 to -09, AH18-16)
Appendix C – Slope Stability Analysis Output