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RECEIVED

102985  
OCT 15 2012

Application is for:  Sand and Gravel Mine  Rock Quarry  
This application is for (check one):  
 Development  Amendment to existing permit Permit # \_\_\_\_\_

Ministry Of Forests, Lands and Natural Resource Operations  
FrontCounter BC  
Log No. 36050 NRS

Application is being made by:  
 Owner (Private property)  
 Operator/Agent (Person or company making application on Crown land or on private property not owned by applicant)  
Name NORM TAPP E-mail Address: nidev@shaw.ca  
Company (if applicable) WELCH AVENUE QUARRY COMPANY LTD  
Address 25469 - 84th AVENUE  
City LANGLEY Bus. Phone (604) 882-3774  
Province BC Postal Code V1M 3N2 Fax ( ) \_\_\_\_\_

LOCATION INFORMATION - Maps are mandatory under Schedule A

Name of Mine (What will the operation be called when in production?): WELCH AVENUE QUARRY  
Legal Description of Property: L.S. 13, Sec. 9, Twp 18, New Westminster District

Street Address of Property, if applicable: 32900 WELCH AVENUE,  
MISSION BC.

Access route from nearest town to property: DEWONEY TRUNK ROAD TO WELCH AVE.

B.C. Geographic System Map Sheet Number(s) [i.e. TRIM 093L.006] 0929019  
Northing: 5450350 Easting: 550050 UTM Zone: 10  
or NTS Map Sheet Number(s) [i.e. NTS 093L/14E]: \_\_\_\_\_  
Latitude: \_\_\_\_\_ °/ \_\_\_\_\_ ' 49.20389 Longitude: \_\_\_\_\_ °/ \_\_\_\_\_ ' -122.31278

OWNERSHIP (Complete a, b or c if the land is not privately held by applicant)

a) Proposed mine is on private land:

Name of property owner WELCH AVENUE QUARRY COMPANY LTD  
Address 25469 84th AVENUE  
City LANGLEY Bus. Phone (604) 882-3774  
Province BC Postal Code V1M 3N2 Fax ( ) \_\_\_\_\_

Signature of owner agreeing to the mining operation proposed in this application (or attach letter of authorization signed by owner):

Name: \_\_\_\_\_ Date: \_\_\_\_\_

b) Proposed mine is on Crown land:

Assets and Lands Corporation (BCAL) file reference number: N/A  
License of Occupation/Lease number: \_\_\_\_\_ Expiry date of Licence/Lease (y/m/d): \_\_\_\_\_

c) Proposed mine is a mineral quarry (as defined under the Mineral Tenure Act):

What mineral is proposed to be mined? \_\_\_\_\_  
Mineral Claim/Lease Tenure Number(s): N/A

MANAGEMENT

Correspondence regarding this application should be sent to:  Owner or  Operator/Agent

The mine manager (Mines Act Sections 21 and 22) responsible for management and operation of the mine will be:

Name: NORM TAPP Bus. Phone: (604) 882-3774

**LAND USE**

1) **Cultural Heritage Resources** (A cultural heritage resource is defined as "an object, a site or the location of a traditional societal practice that is of historical, cultural or archaeological significance to British Columbia, a community or an aboriginal people". B.C. law requires the conservation of these resources. It is the responsibility of the applicant to identify these resources.

Are you aware of any cultural heritage resources present on the property?

- Yes - please attach a plan for the conservation of cultural heritage resources on the property  
 No - if cultural heritage resources are discovered while mining, you are required to report them to the Mining Division.

**2) Soil Conservation**

Average depth of overburden (material, including topsoil, overlying sand, gravel and/or rock): \_\_\_\_\_ cm, or 2.0 m

Average depth of topsoil (Surface to maximum rooting depth of plants, plus 15 cm.): \_\_\_\_\_ cm, or 0.5 m

Measures to stabilize soil/overburden stockpiles and control noxious weeds: SOIL & OVERBURDEN

WILL BE EXCAVATED AND PLACED IN STOCKPILES AND SEEDED TO GRASS FOR REPLACEMENT RECLAMATION OF SITE. SPRAY FOR

NOXIOUS WEEDS.  
Topsoil must be conserved for reclamation of the mine site.  
Removal of topsoil from the site requires written approval of the Inspector

**3) End Land Use**

Is the site within the Agricultural Land Reserve?

- No  Yes - authorization for soil removal from the Land Reserve Commission and Regional District must be obtained. Provide permit application number if available: \_\_\_\_\_

Is the site within the Forest Land Reserve?

- No  Yes - authorization from the Land Reserve Commission must be obtained

Is the site within a Tree Farm Licence?

- No  Yes - state the TFL number: \_\_\_\_\_

Name of TFL holder: \_\_\_\_\_

Does the local government have a Soil Removal Bylaw?

- No  Yes - please be aware that a Soil Removal Permit may be required by the local government

Official Community Plan designation for the site is: I

Current land use zoning for the site is: RR

Proposed end land use is: INDUSTRIAL

**4) Reclamation of Site** (If space provided below is insufficient, please attach separate sheet describing proposed reclamation)

Reclamation measures and schedule proposed to achieve end land use objectives as per part 10.7.4 and 10.7.5 of the Health Safety and Reclamation Code for Mines in British Columbia (hereafter referred to as the Code): \_\_\_\_\_

FINAL LAND USE IS INDUSTRIAL ZONING.  
SITE WILL BE LEFT IN A STABLE AND GRADED  
CONDITION WITH A WATER MANAGEMENT SYSTEM  
IN PLACE. SEED TO GRASS. ANY BUFFERS OR  
DISTURBED AREAS AS THEY BECOME AVAILABLE.

If backfilling of pits or pit slopes is proposed in the final configuration for reclamation, provide details of materials to be used and placement procedure: \_\_\_\_\_

BACKFILLING AND GRADING OF GRAVEL EXCAVATION  
AREA AFTER MINING WITH TILL/OVERBURDEN  
AND SOIL COVER FROM STOCKPILED MATERIAL.

**MINE DEVELOPMENT PLAN (Maps are mandatory - please refer to Schedule A)**

Unless otherwise required by the Inspector, complete the following mine development plan and prepare development maps and cross sections based on a period of 5 years or less. Mines operating for longer than 5 years, may be required to file updated Notices of Work every 5 years over the life of the mine at the discretion of the District Inspector.

Proposed start date (y/m/d): 2012/10/01 Proposed finish date (y/m/d): 2034/12/31  
 The mining operation will generally be (check one)  Continuous (operates throughout the year)  
 Seasonal, usually operates from \_\_\_\_\_ to \_\_\_\_\_  
 Intermittent (occasionally operates with extended periods of inactivity)

Estimate total mineable reserves over the life of the mine: 5,600,000 tonnes, or 2,239,000 m<sup>3</sup>  
 Estimated annual extraction from site: 240,000 tonnes/yr, or 96,000 m<sup>3</sup>/yr

Application must be made to the Environmental Assessment Office if estimated extraction for sand/gravel production is 500,000 tonnes/yr. or 1,000,000 tonnes over 4 years; or if estimated extraction is 250,000 tonnes/yr. for quarried product.  
 Mineral quarries producing more than 1000 tonnes per year per claim require a mining lease.

**Description of Work (Check appropriate boxes):**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Excavation of Pit Run | <input type="checkbox"/> Washing - please complete Schedule B                                     |
| <input checked="" type="checkbox"/> Crushing              | <input checked="" type="checkbox"/> Blasting - please complete Schedule C                         |
| <input checked="" type="checkbox"/> Mechanical Screening  | <input type="checkbox"/> Timber Clearing * - estimate volume of timber: <u>NIL</u> m <sup>3</sup> |

\* Timber Clearing on Crown Land requires a Free Use Permit or License to Cut from the Ministry of Forests

Provide a brief description of operation, including proposed work schedule (i.e. hours, days of usual operation): \_\_\_\_\_

OPERATION INCLUDES GRAVEL REMOVAL (300,000 cu.m) AND EXCAVATION OF ROCK BY BLASTING. MATERIAL WILL BE SCREENED AND CRUSHED TO PROVIDE A VARIETY OF AGGREGATE PRODUCTS. NORMAL OPERATING HOURS 7.00 am To 6.00 pm 5 days/week

**Equipment List: (Please attach separate list if space provided below is insufficient)**

Type of Machine	Make/Model	Size/Capacity	# on Site
TRACKED DOZER	CAT/SIMILAR	D8/9 SIZE	1
EXCAVATOR	"	2 cu. m.	1
FRONT END LOADER	"	1.75 cu. m.	1
HAUL TRUCKS	"	30 Tonne	1
SCREENING/CRUSHING EQUIPMENT			1

**Surface Disturbance - Information provided must be documented in development maps submitted under Schedule A**

(Note that 10,000 m<sup>2</sup> = 1 hectare)

Existing Disturbance (Work areas, unreclaimed areas, access roads, etc.) \_\_\_\_\_ m<sup>2</sup>, or 1.0 hectares

Proposed Mining Disturbance (New work areas, settling ponds, access roads, buildings, etc. to be developed within the time frame of this Notice of Work) \_\_\_\_\_ m<sup>2</sup>, or 15.0 hectares

Total Disturbed Area (Existing + Proposed Disturbance) \_\_\_\_\_ m<sup>2</sup>, or 16.0 hectares

Will any portion of this disturbance be reclaimed within the time frame of this Notice of Work?

- No  Yes - state size of area to be reclaimed: \_\_\_\_\_ m<sup>2</sup>, or \_\_\_\_\_ hectares

Estimated Cost of Reclamation: Applicant \$ 10,000.00  
 Mining Division \$ \_\_\_\_\_

Are settling ponds or other structures proposed to control sedimentation in surface run off?

No  Yes - please complete Schedule B

What is the average depth to the high groundwater table at the proposed excavation? 730 m

Elevation of the groundwater table was determined from (check applicable boxes):

Existing area wells  Test wells drilled for this purpose  
 Test pits  Other (describe) \_\_\_\_\_

Describe measures proposed to protect groundwater quantity and quality from potential impacts of the proposed mining activity (i.e. fuel management program, buffer above water table, etc.): FUEL MANAGEMENT & CONTAINMENT PROVISIONS WILL BE ENFORCED WITH SPILL PROTECTION MEASURES.

*Note that excavations below the groundwater table may require special approval from the Inspector*

Will fuel/lubricants be stored on site?  No  Yes

If yes, handling, transportation and storage must adhere to B.C. Environment standards as detailed in "Summary of Environmental Standards and Guidelines for Fuel Handling, Transportation and Storage, 2<sup>nd</sup> edition"

Shortest distance between proposed excavation to nearest residence: 1000 m, or \_\_\_\_\_ km

Shortest distance between proposed excavation to nearest residential water source: 1000 m, or \_\_\_\_\_ km

Describe measures proposed to prevent inadvertent access of unauthorized persons on the mine site (i.e. fencing, vegetative barriers, berms, etc.): THE EXISTING ACCESS ROAD WILL BE GATED AND LOCKED WITH WARNING SIGNS TO PREVENT INADVERTENT ACCESS TO THE SITE.

Are measures proposed to minimize noise impacts of the operation? (i.e. equipment selection, restrictions on hours of operation, noise barriers, etc.)  No  Yes - Please describe: \_\_\_\_\_

RESTRICTION OF UNNECESSARY WORKING HOURS.  
TREE BUFFERS AROUND PROPERTY ON ADJACENT LANDS.

Are measures proposed to minimize dust impacts of the proposed operation? (i.e. apply dust suppressants, water sprays, wind breaks, vegetation, etc.)  No  Yes - Please describe: \_\_\_\_\_

WATER SPRAY TO HAUL ROAD WITH DUST SUPPRESSANT.  
WATER SPRAYS AT CRUSHING OPERATION AS REQUIRED.

Are measures proposed to minimize visual impacts of the proposed operation? (i.e. vegetative barriers, berms, green belts, etc.)

No  Yes - Please describe: EXISTING VEGETATIVE BARRIERS

AT PROPERTY AND ADJACENT BOUNDARIES.  
THE SITE IS SET BACK 350M FROM DEWDNEY TRUNK ROAD.

#### OCCUPATIONAL FIRST AID

First Aid Supplies and communication at the mine site are required as per Parts 3.6.1 to 3.6.3 of the Code.

Describe the means of communication from the mine site: VHF RADIO AND CELL PHONES.

Location of nearest hospital: MISSION MEMORIAL HOSPITAL

Travel time to hospital: 15 minutes Estimated number of employees on site (includes contractors): 4-8

Describe First Aid Level and supplies A Level 1 First Aid Attendant on site with Level 2 First Aid Kit Stretcher in office First Aid room.

I, NORM TAPP, hereby make application to undertake the mining activities described in this Notice, and in accordance with the *Mines Act* and the Health, Safety and Reclamation Code for Mines in British Columbia.

Applicant Signature \_\_\_\_\_

Date Oct 13/12

Mark the location(s) of all proposed settling ponds and/or sediment control structures on the appropriate map(s) under Schedule A.

Describe the source of water supply: WELL OR NATURAL RUN-OFF

Estimate volume of water to be used: \_\_\_\_\_ (cu. ft./sec), or \_\_\_\_\_ (liters/sec)

Complete the following table for existing and proposed settling ponds:

Pond #	Water Source (i.e. surface run off, wash plant, etc.)	Width (m)	Length (m)	Depth (m)	Construction Method (excavated, dyked, etc.)
1	EXISTING WELL	20	80	4	EXCAVATED NEW POND & WATER MANAGEMENT SYSTEM BY LETTS ENVIRONMENTAL.

Water from ponds will (check one):  be recycled  exfiltrate to ground  discharge to environment

If discharged to the environment, a *Waste Management Act* permit is required. Existing system in place.

Where there is a discharge to the environment:


- provide a cross section illustrating the sediment control structure(s), decant structure(s), and point of discharge to environment
- describe the type of sediment control structure(s): See Attached Letts Environmental Ltd. Report and Drawings
- describe the type and construction of the decant structure: " "
- describe area into which water is discharged: Existing outfall to drainage.

For all settling ponds describe:

- Spillway design: Rock spillway
- Clean out method: Excavator with reach into centre of Pond
- Disposal of fines from clean out (i.e. use as a subsoil material): Save/mix with soil for future Reclamation of the site

Describe proposed reclamation activities and timing of reclamation work: \_\_\_\_\_

POND SYSTEM AND WATER MANAGEMENT SYSTEM WILL BE INSTALLED AT START OF OPERATION

Applicant Signature: 

Date: Oct 13/12

Mark the location of all proposed blast sites on the appropriate map(s) under Schedule A. If any structure, water well(s), or roadways are located within 300 m of proposed blast sites, these items must be located on the map(s).

Shortest distance between blasting operations to nearest ~~residence~~/structure 200 m, or \_\_\_\_\_ km

Shortest distance between blasting operations to nearest water well 280 m, or \_\_\_\_\_ km

Are any public use areas (i.e. picnic/camping areas, hiking trails etc.) located within 1 km of the blasting area?

No  Yes - distance from recreation area to blasting operations is: \_\_\_\_\_ m

Will blasting be contracted out?  No  Yes

Name of Blaster/Company: TO BE APPOINTED - CONTRACT BLASTER

Blaster's Certificate # \_\_\_\_\_

Blaster must hold a valid BC Blasting Certificate as per Part 8.2.1 of the Code

Will explosives be stored on site?  No  Yes

If yes, has a B.C. Explosives Storage and Use Permit for Mining Purpose been issued?

No - Complete a permit application from the Mining Operations Regional Office and attach it to this schedule.

Yes - Provide current permit # \_\_\_\_\_ Date of expiry (y/m/d): \_\_\_\_\_

Provide details of (attach separate page(s) if space is insufficient):

• size and type of explosive(s) to be used: \_\_\_\_\_

BY BLASTER

• detonation method: \_\_\_\_\_

• type of explosives magazine: \_\_\_\_\_

• blasting procedure (public notification, on-site safeguards, timing, etc.): \_\_\_\_\_

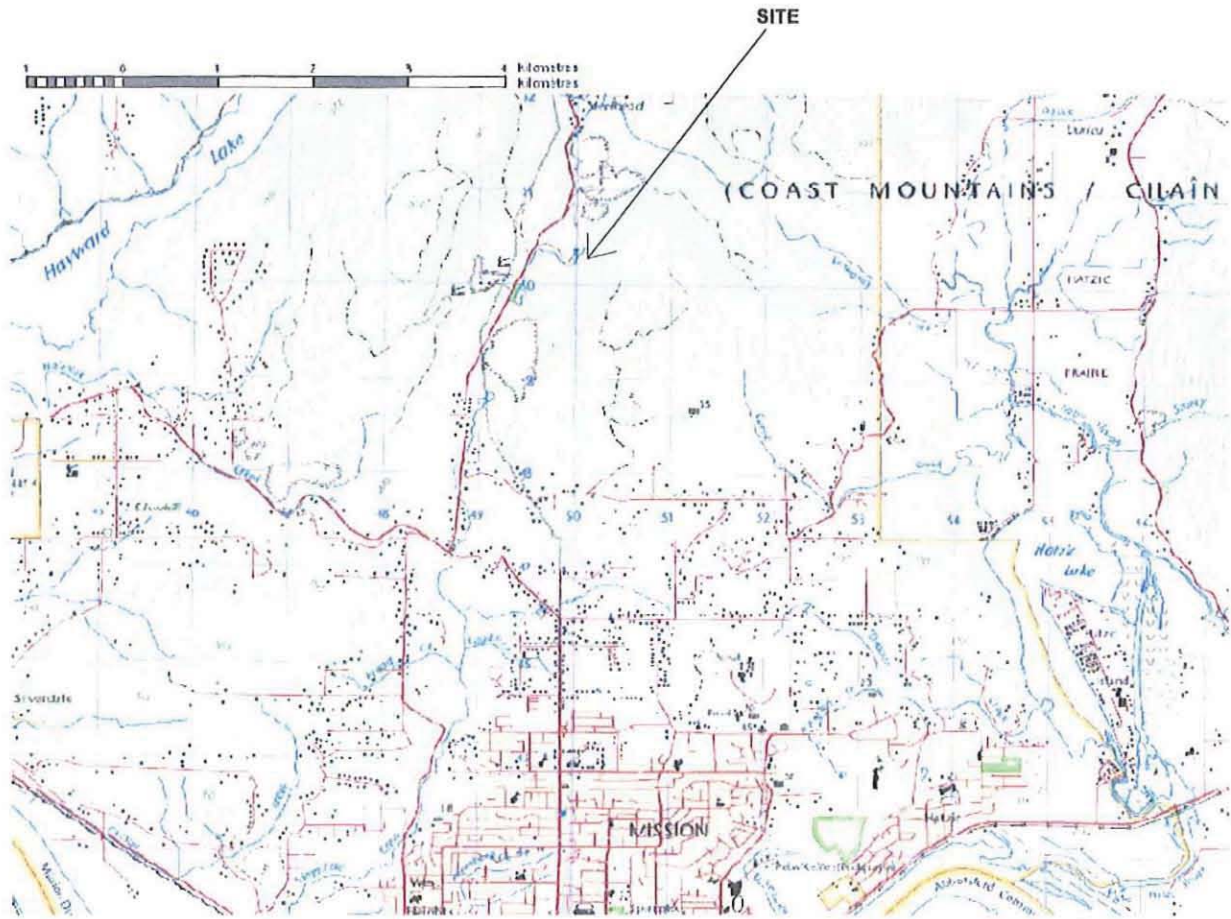
Blasting practices to conform to the  
BC Health Safety and Reclamation Code.

If blasting is proposed within 1 km of any residence, structure, well or public use area, the Inspector may request further information regarding fly rock control and/or seismic impacts.

The Inspector may request that a Workers' Compensation Board Blaster's Log be kept

[Signature]  
Applicant Signature:

OCT 12/13  
Date

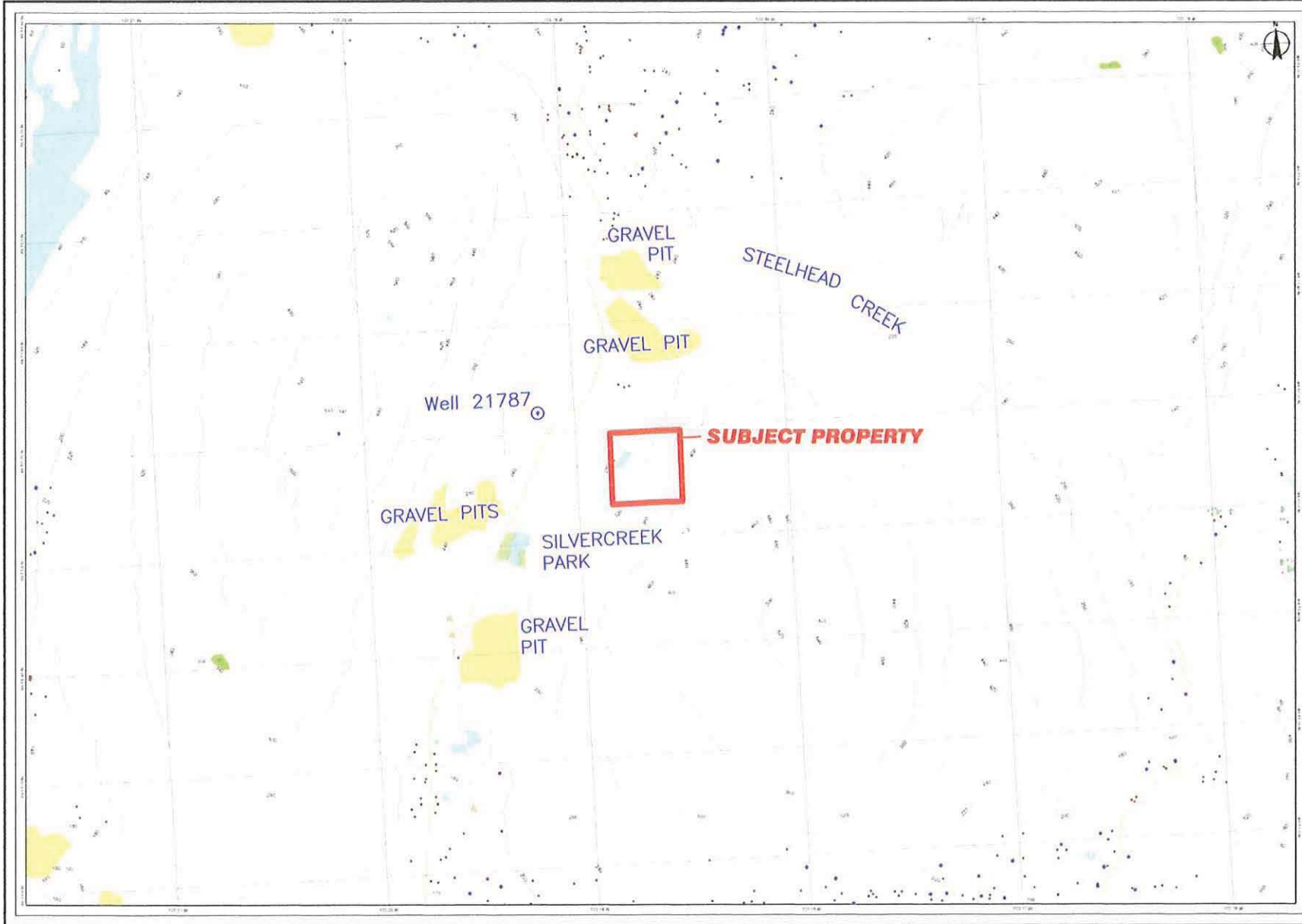


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ENGINEERING LTD**

*Foundation & Soil Consultants*

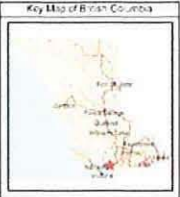
#1-82278 860 Collier Road Tel: (604) 853-2300 Cell: (604) 853-5300  
Abbotsford, BC Fax: (604) 854-6143  
V2Y 7W8 Email: info@geomediaeng.ca

NO	REVISION	DATE	BY	DESIGN	CLIENT	PROJECT NO.
				DRAWN SD	N & J DEVELOPMENTS LTD.	G1843
				CHECKED DG	WELCH AVENUE QUARRY MISSION	G1843-1
				DATE SEPTEMBER 2010	TITLE LOCATION MAP	ISSUE/REVISION
				SCALE 1:50000		

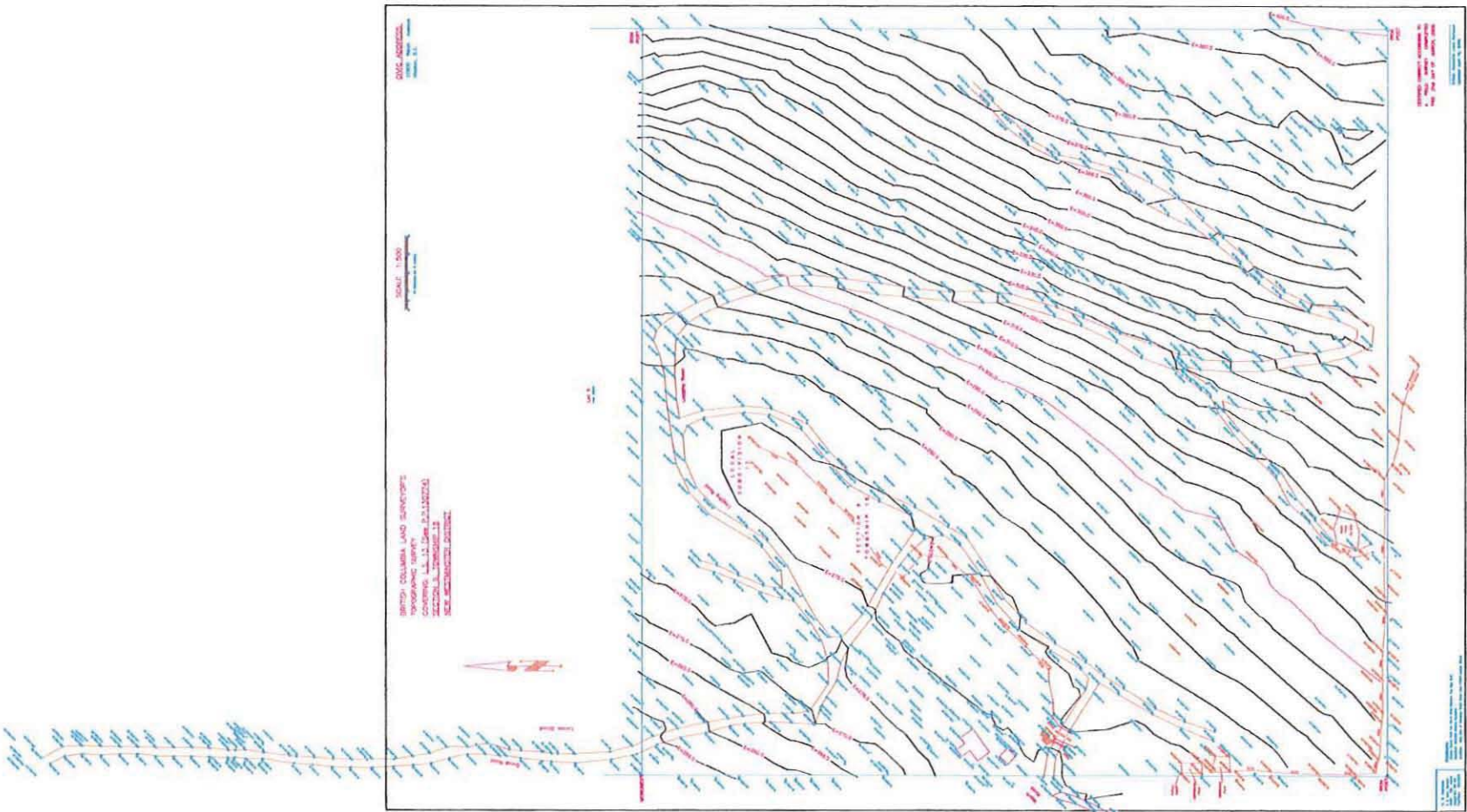


- WRBC map**  
Legend
- Abandoned Well Use
  - Commercial and Industrial Well Use
  - Unknown Well Use
  - Test Well Use
  - Other Well Use
  - Construction Well Use
  - Irrigation Well Use
  - Domestic Well Use
  - Water River, Canal, etc. - Colour Themed (1:20,000)
- Cover
  - River, River, Delta
  - Water, River, Canal, etc. - Outlined (1:20,000)
- Cover
  - River, River, Delta
  - Water, Lake, Reservoir, etc. - Colour Themed (1:20,000)
- Well Taking Point
  - Lake, Delta
  - Reservoir, Delta
  - Water, Lake, Reservoir, etc. - Outlined (1:20,000)
- Well Taking Point
  - Lake, Delta
  - Reservoir, Delta
  - Wetlands - Colour Themed (1:20,000)
- Flooded Land - Outlined
  - Marsh
  - Swamp
  - Wetlands - Outlined (1:20,000)
- Flooded Land - Outlined
  - Marsh
  - Swamp
  - Water, Ocean - Colour Themed (1:20,000)
  - Water, Ocean - Outlined (1:20,000)
- Landmark - Tower, Well, etc. - Colour Themed (1:20,000)
- Fireweed Tower
  - Tower
  - Windmill Tower
  - Transmission Tower
  - Chimney
  - Clock (Monument)
  - Gas Well
- Scale: 1:10,000

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NO	REVISION	DATE	BY	DESIGN	DG	CLIENT	N & J DEVELOPMENTS LTD.	PROJECT NO	G1843
				DRAWN	DG	PROJECT	WELCH AVENUE QUARRY MISSION	DWG. NO.	G1843-3
				CHECKED	DG	TITLE	LOCAL FEATURES MAP	ISSUE/REVISION	
				DATE	SEPTEMBER 2010				
				SCALE	NTS				


**GEO MEDIA ENGINEERING LTD**  
 Foundation & Soil Consultants  
 #10-2279 St. Colum Road Tel: (504) 888-8300 Cal: (504) 888-8309  
 Portsmouth, BC Fax: (504) 888-8188  
 V2S 7W8 Email: info@geomediaeng.ca



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118-3275 McArthur Road  
Edmonton, AB  
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NO	REVISION	DATE	BY

DESIGN
DRAWN SD
CHECKED DG
DATE SEPTEMBER 2010
SCALE NTS

CLIENT	N & J DEVELOPMENTS LTD.	PROJECT NO.	G1843
PROJECT	WELCH AVENUE QUARRY MISSION	DWG. NO.	G1843-4
TITLE	LAND TITLE PLAN	ISSUE/REVISION	

**POSTING PLAN OF L.S. 13  
OF SEC. 9, TP. 18, N.W.D.**

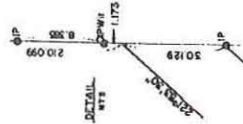
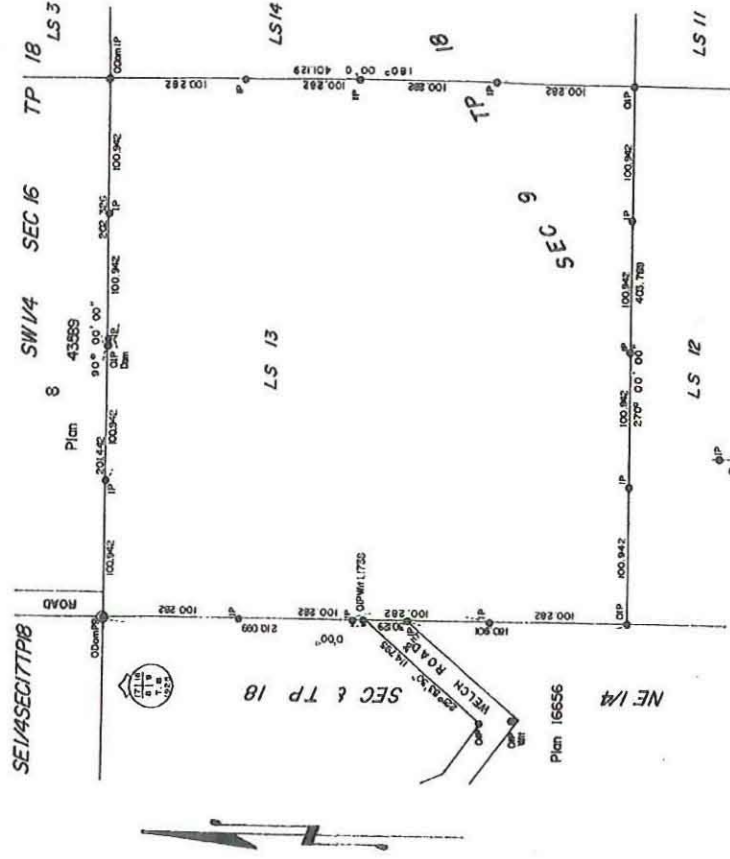
SCALE: 1:2500

All distances are in metres except where otherwise indicated.

N 130114

Deposited in the Land Registry Office at New Westminster, B.C., this \_\_\_\_\_ day of \_\_\_\_\_ 1977.

Registrar



**LEGEND**  
 ⊙ OPP Dom - Old dominion pipe post found  
 ● OIP Dom - Old dominion iron post found  
 ○ OIP - Old iron post found  
 ● IP - Iron post set  
 Wit - Witnessing as indicated  
 Bearings are astronomic and are derived from Plan 16656.

J.M.C. Woods and Associates  
B.C. Land Surveyors  
Mission and Maple Ridge

Certified correct this 7<sup>th</sup> day of July 1977.  
  
 J.M.C. Woods, B.C.L.S.



O:\Keweenaw\Drafting\1320\1320\1338\FIGS\_FIGS\_FIGS\_FIGS\_FIGS [Figure 1] October 14, 2010 - 4:54pm Image1.ch

**NOTE:**  
Base image from Google Earth Pro



CLIENT  
Welch Avenue Quarry Company Ltd.

WELCH AVENUE GRAVEL PIT  
WELCH AVENUE, MISSION, BRITISH COLUMBIA

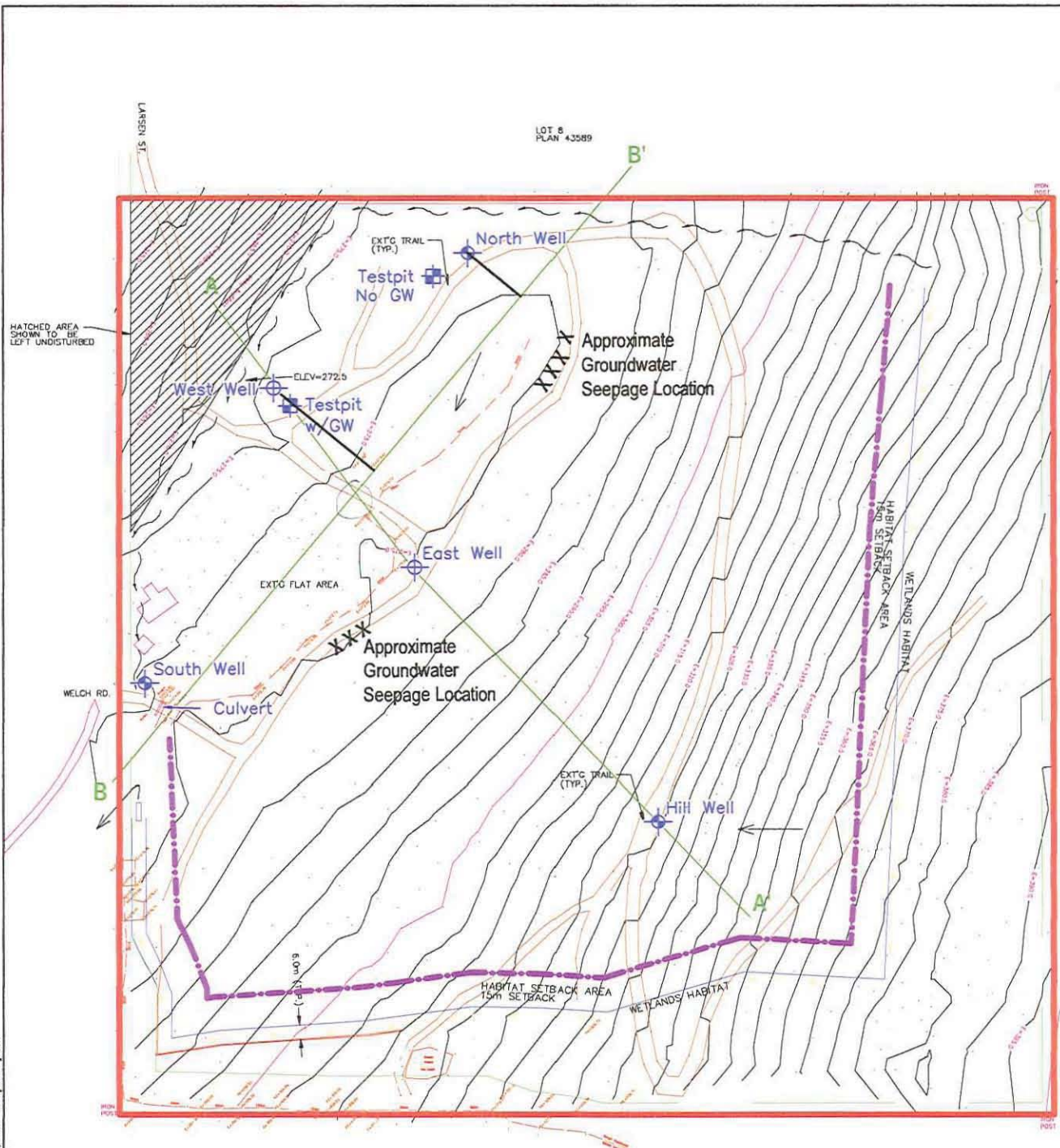
**WELCH GRAVEL PIT  
SITE LOCATION MAP**

**EBA Engineering  
Consultants Ltd.**



PROJECT NO. V13201338	DWN LM	CKD DW	REV 0
OFFICE EBA-KELOWNA	DATE October 4, 2010		

Figure 1








**NOTE:**

Source drawing from TGK Development Engineering Ltd.

SCALE 1:2500



**LEGEND**

-  Well Location, Groundwater Encountered
-  Well Location, Groundwater Not Encountered
-  Testpit Location with or without GW
-  Approximate Mining Area Boundary
-  Groundwater (GW) Seepage Area

CLIENT

Welch Avenue Quarry Company Ltd.

WELCH AVENUE GRAVEL PIT  
WELCH AVENUE, MISSION, BRITISH COLUMBIA

**WELCH GRAVEL PIT APPROXIMATE  
MINE AREA, WELL LOCATIONS and  
GEOLOGIC CROSS-SECTION LOCATIONS**

**EBA Engineering  
Consultants Ltd.**



PROJECT NO.  
V13201338

DWN  
LM

CKD  
DW

REV  
0

OFFICE  
EBA-KELOWNA

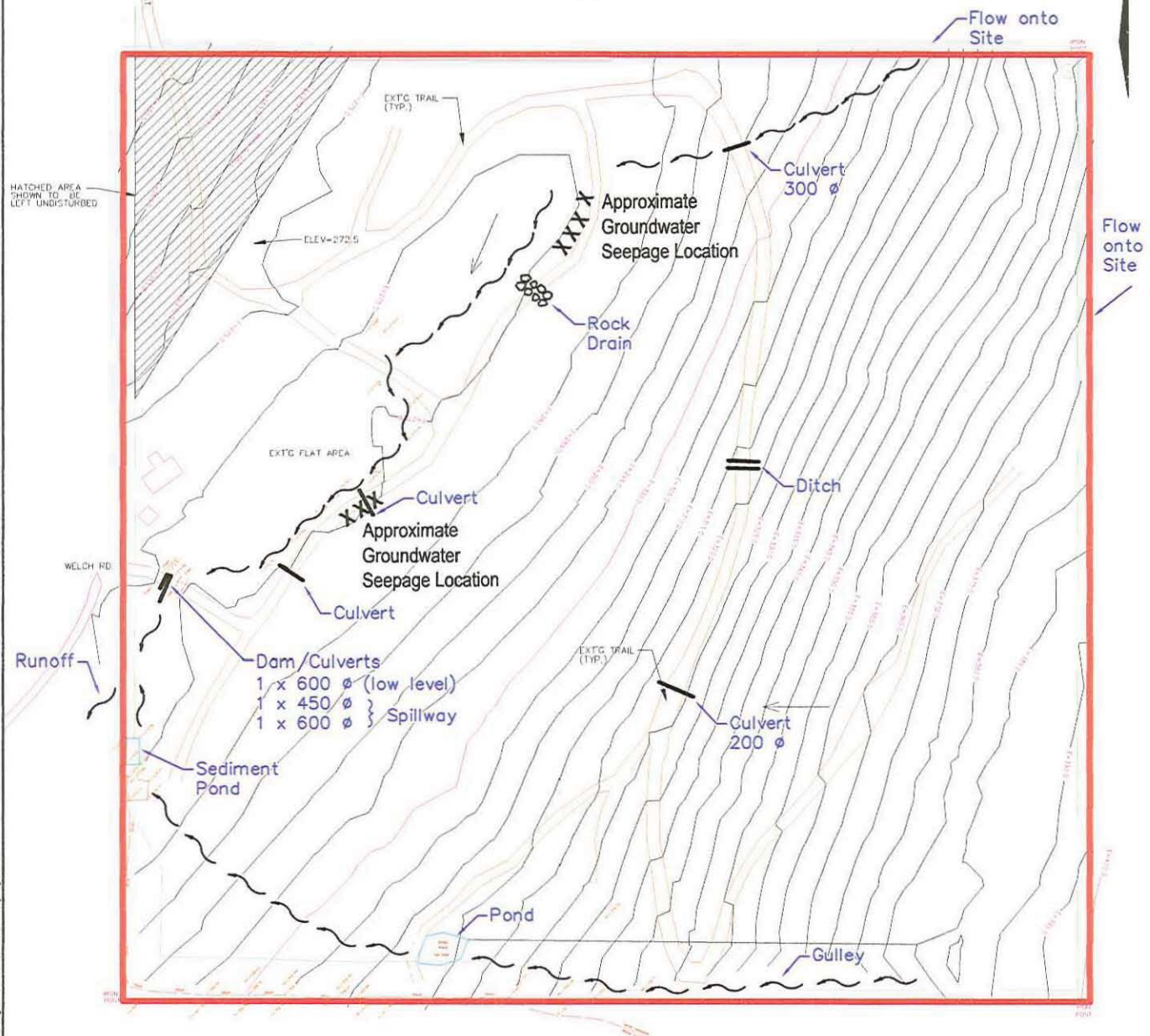
DATE  
October 4, 2010

Figure 2

Q:\kelowna\Drafting\13201338\13201338\_FIGS\_F01.dwg [Figure 2] October 14, 2010 - 4:54pm IvanJelich



LOT 8  
PLAN 43589



HATCHED AREA SHOWN TO BE LEFT UNDISTURBED

ELEV-272.5

Runoff

NOTE:

Source drawing from TGK Development Engineering Ltd.

SCALE 1:2500



**LEGEND**

- XXX** Groundwater (GW) Seepage Area
- Existing Watercourse

CLIENT

Welch Ave. Quarry Company Ltd.

WELCH AVENUE GRAVEL PIT  
WELCH AVENUE, MISSION, BRITISH COLUMBIA

**WELCH GRAVEL PIT APPROXIMATE MINE AREA  
EXISTING SURFACE WATER CONDITIONS**

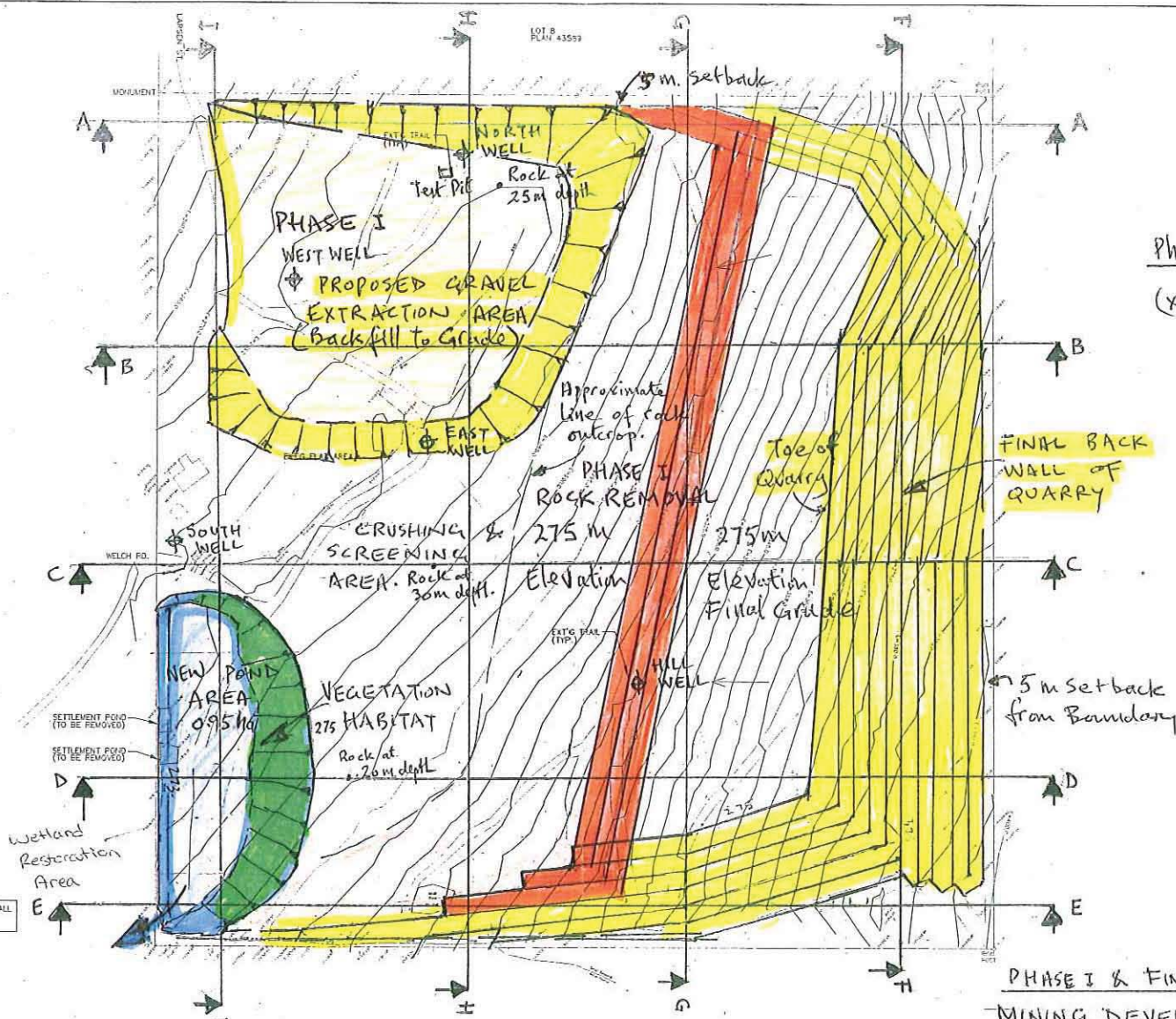
**EBA Engineering  
Consultants Ltd.**



PROJECT NO. V13201338	DWN LM/JAB	CKD ML	REV 1
OFFICE EBA-KELOWNA	DATE October 14, 2010		

**Figure 6**

Q:\Vancouver\Drawing\Engineering\13201338\13201338\_V13201338\_R1.dwg [Figure 6] October 14, 2010 - 5:33pm jpkdc



THESE PLANS ARE THE PROPERTY OF  
TGC DEVELOPMENT ENGINEERING LTD.  
ANY USE MUST BE AUTHORIZED.

GEOTECHNICAL CONSULTANT TO CONFIRM THAT ALL  
GEOTECHNICAL ASPECTS OF THE GRADING ARE  
SATISFACTORY.

Phase I - Rock  
230,000 cu.m  
(x2.5) 575,000 tonnes  
Gravel  
651,000 tonnes  
300,000 cu.m.  
TOTAL ROCK EXC. (Incl.)  
2,284,000 cu.m (Phase I)  
5,710,000 tonnes  
Total Tilt - Phase I  
Gravel and Rock  
Areas = 218,000 cu.m.

PHASE I & FINAL BACK WALL  
MINING DEVELOPMENT PLAN

LEGAL DESCRIPTION: L.S. 13, SECTION 9, TOWNSHIP 18  
P.P.130774, NEW WESTMINSTER DISTRICT

BENCHMARKS: MISSION BENCH MARK NO. E5-2 (TIRE HYDRANT TOP OFP NUT)  
ELEV = 222.255m GEODETIC, LOCATED AT WEST SIDE OF  
DEWANEY TRUNK ROAD NEAR 11354 LASSEN STREET

 TGC DEVELOPMENT ENGINEERING LTD.  
201-2776 BOURQUIN CRESCENT W., ABBOTSFORD BC V2S 6A4  
TEL 853-2333 FAX 853-7002

CLIENT/DEVELOPER: N & J DEVELOPMENTS LTD.  
25460 - 14TH AVENUE, FOOT LAMBEY BC V1L 2W5

*David Berghel P. Eng*  
January 17, 2011

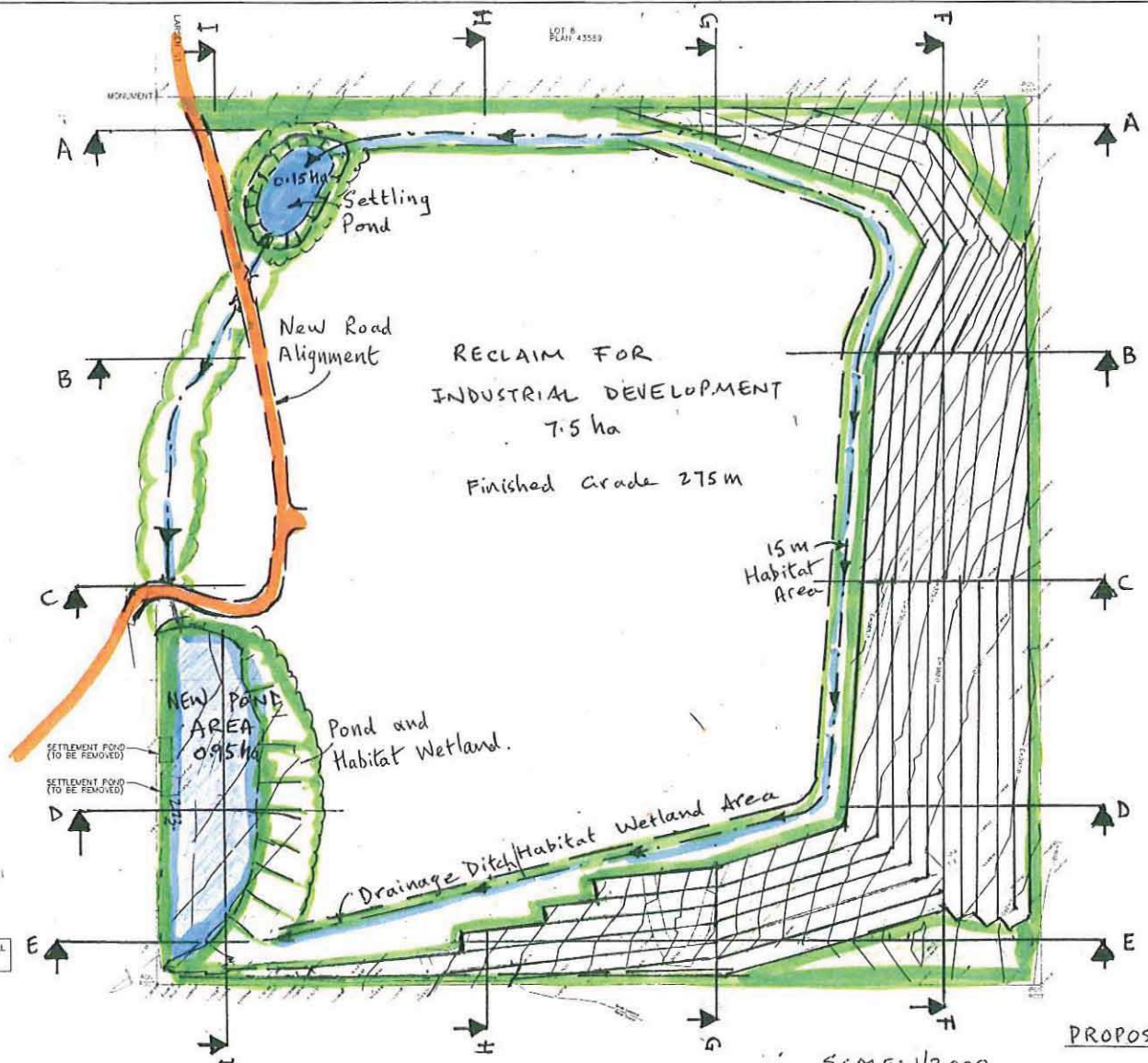
DESIGN: TKC  
DRAWN: JB  
CHECKED: TKC

DISTRICT OF MISSION

WELCH QUARRY

32000 WELCH AVENUE

SCALE: 1:2000  
DATE: JULY 2009  
DRAWING No: A-1505



THESE PLANS ARE THE PROPERTY OF  
TGC DEVELOPMENT ENGINEERING LTD.  
ANY USE MUST BE AUTHORIZED.

GEOTECHNICAL CONSULTANT TO CONFIRM THAT ALL  
PROTECTORIAL ASPECTS OF THE GRADINGS ARE  
SATISFACTORY.

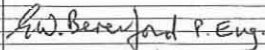
PROPOSED FINAL RECLAMATION  
PLAN

SCALE: 1/2,000

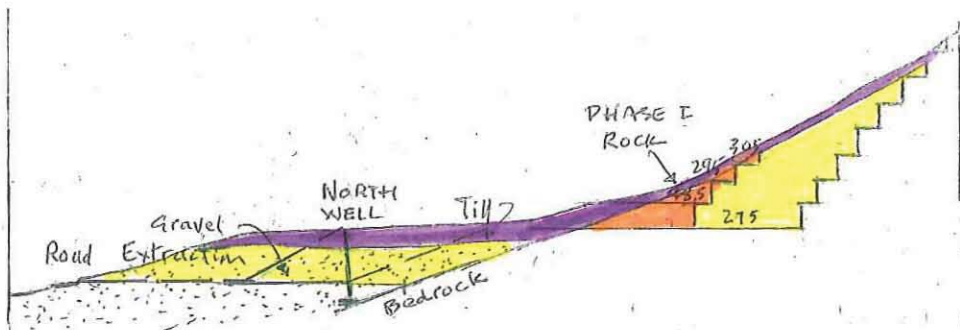
Page 15  
EGM-2013-00253

LEGAL DESCRIPTION:	L.S. 13, SECTION 9, TOWNSHIP 18 P.P.130774, NEW WESTMINSTER DISTRICT
BENCHMARKS:	MISSION BENCH MARK NO. ES-2 (FIRE HYDRANT TOP OFF 10/2) ELEV = 222.255m GEODETIC, LOCATED AT WEST SIDE OF DENEHY TRUNK ROAD NEAR 11364 LARSEN STREET

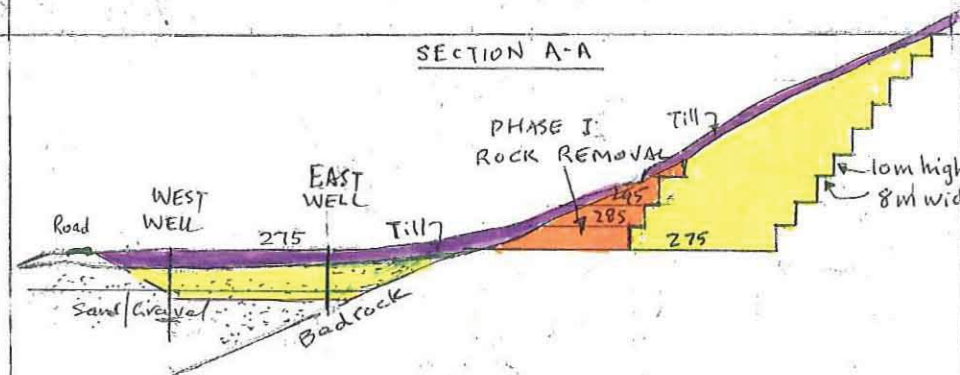
 <b>TGC DEVELOPMENT ENGINEERING LTD.</b> 201-2776 BOURQUIN CRESCENT W., ABBOTSFORD BC V2S 6A4 TEL 853-2333 FAX 853-7002	CLIENT/DEVELOPER:	<b>N &amp; J DEVELOPMENTS LTD.</b> 25459 - 84TH AVENUE, FORT LANGLEY BC VIM 3W2 TEL FOL-862-1774 FAX FOL-862-1776
---	-------------------	---

DESIGN:	TDK	 January 17/2011
DR/TP:	RB	
CHECKED:	TDK	

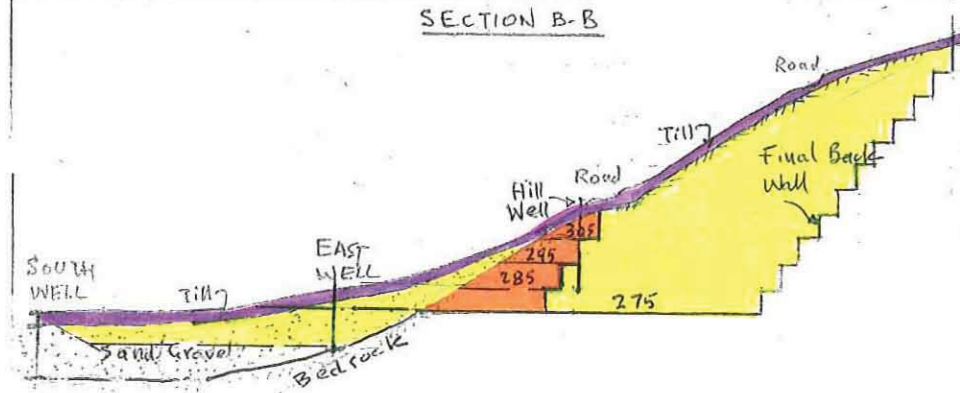
DISTRICT OF MISSION		SCALE: 1/2000
WELCH QUARRY		DATE: JULY 2009
FINAL RECLAMATION		DRAWING NO: A-1505
32900 WELCH AVENUE		SHEET NO.



200m Datum ↓



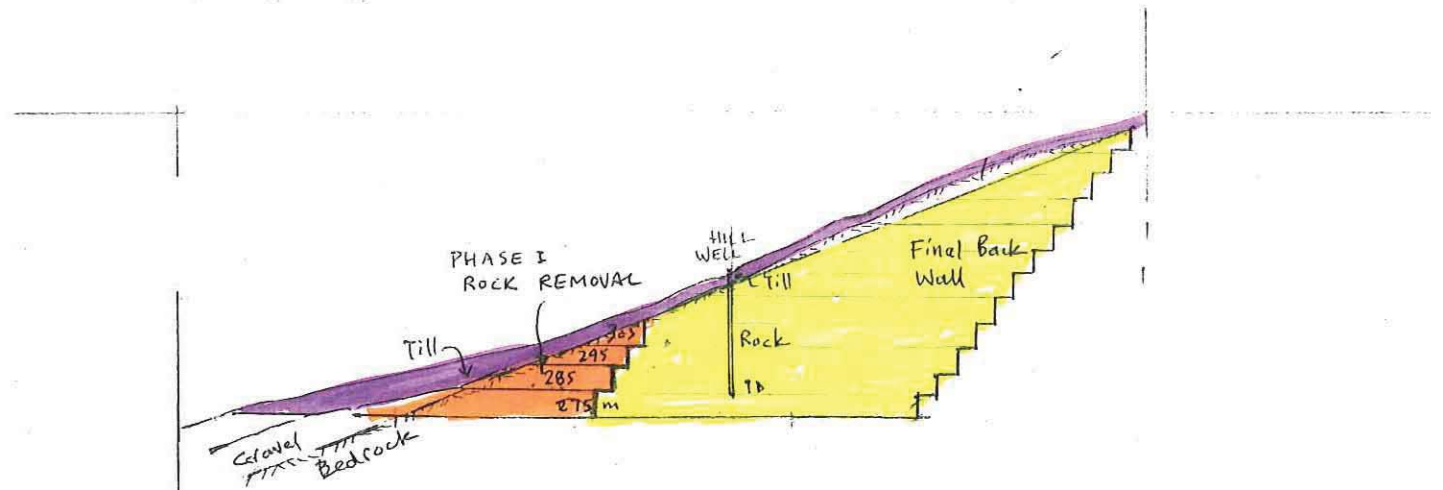
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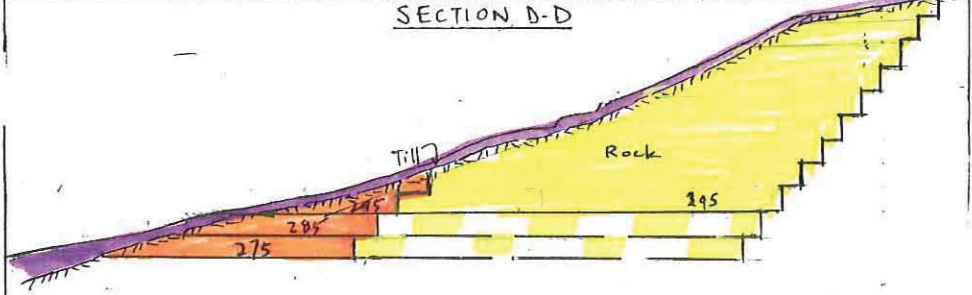
WELCH QUARRY  
MINING DEVELOPMENT  
SECTIONS

NATURAL SCALE: 1/2,000 Horiz & Vert.





SECTION D-D 200m Datum



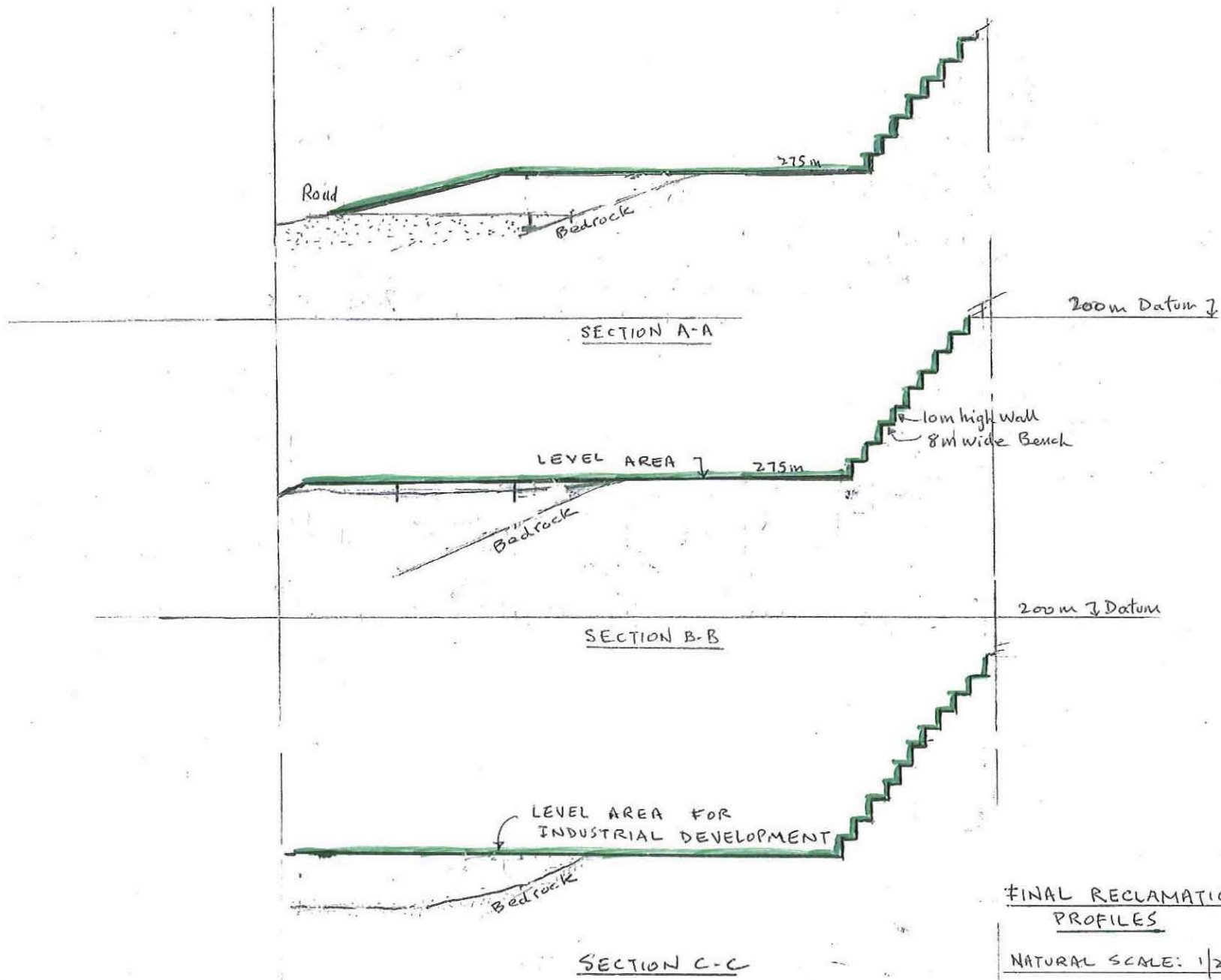
SECTION E-E 200m Datum



WELCH QUARRY  
MINING DEVELOPMENT  
SECTIONS

NATURAL SCALE: 1/2,000 Horiz & Vert.

January 17/2011 E.W. Bueford P. Eng



FINAL RECLAMATION  
PROFILES

NATURAL SCALE: 1/2,000 Horiz &  
Vertical

WELCH QUARRY



**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Monday, September 24, 2012 11:05 AM  
**To:** 'Norm Tapp'  
**Cc:** Malt, Joshua FLNR:EX; Davies, James W FLNR:EX; 'Sciankowy, Craig'; 'Mike Younie'; Jacobi, Steven ENV:EX; 'gary letts'; Olsen, Michael MEM:EX  
**Subject:** RE: Section 88 Order for restoration of pond and Cram Creek on 32900 Welch Avenue, Mission, BC - Norm Tapp (Water files: 0364261 and 0222423)  
**Attachments:** Sec 88 Order Norm Tapp ltr for list of owners.pdf

Hi Norm,

Please find attached a letter clarifying that the Order sent out on Friday applies to all registered owners of the property in which the unauthorized works occurred.

Thanks.

Thanks Mike for the update. s.22 Can you please attach this to the Order sent out on Friday for Jen Meier.

Sandra Jensen  
 Water Stewardship Officer, Water Authorization  
 Ministry of Forests, Lands and Natural Resource Operations  
 South Coast Region  
 3rd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
 Ph: 604-586-5627  Fax: 604-586-4444   
 Website: <http://www.env.gov.bc.ca/wsd/>  
 Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

---

**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Friday, September 21, 2012 4:19 PM  
**To:** 'Norm Tapp'  
**Cc:** Malt, Joshua FLNR:EX; Davies, James W FLNR:EX; 'Sciankowy, Craig'; 'Mike Younie'; Jacobi, Steven ENV:EX; 'gary letts'; Olsen, Michael MEM:EX  
**Subject:** Section 88 Order for restoration of pond and Cram Creek on 32900 Welch Avenue, Mission, BC - Norm Tapp (Water files: 0364261 and 0222423)

Hi Norm,



Please find attached the Section 88 Order for the restoration of Investment Pond as Pond A, Cram Creek and the removal of the culvert. There will be no requirement for a notification or approval upon the issuance of this Order for your instream works and removal of the culvert. Please read all conditions of the cover letter and Order carefully as you are required to obtain any other necessary permits that may be required from any other agencies and submit a post-construction report to me within 60 days of the completion of the works.

Your Order has been copied to Craig Sciankowy of DFO for his review; along with Mike Younie from the District of Mission; our Conservation Officer, Steven Jacobi who attended your site; Michael Olsen from the Ministry of Energy and Mines who attended your site; and Joshua Malt, Ecosystems who also attended your site with myself and provided comments for the review of your Order.

Please submit your drawing as requested for the amendment of your water licence F040222 for Investment Pond.



If you have any questions, do not hesitate to contact me.

Good luck.

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
3rd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5627  Fax: 604-586-4444   
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

# FW: 32900 Welch Ave Finals 1 & 2

Friday, December 13, 2013  
8:21 AM

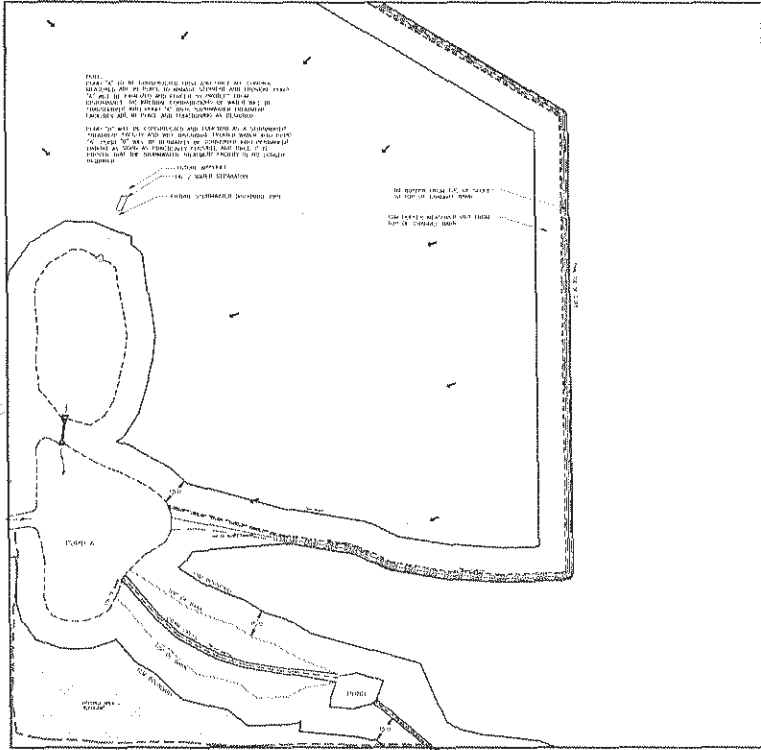
Subject	<b>FW: 32900 Welch Ave Finals 1 &amp; 2</b>
From	Jensen, Sandra L.S. FLNR:EX
To	Olsen, Michael MEM:EX
Sent	Tuesday, February 12, 2013 6:52 PM
Attachments	 1 OF 6  2 OF 6

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
2nd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5628 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

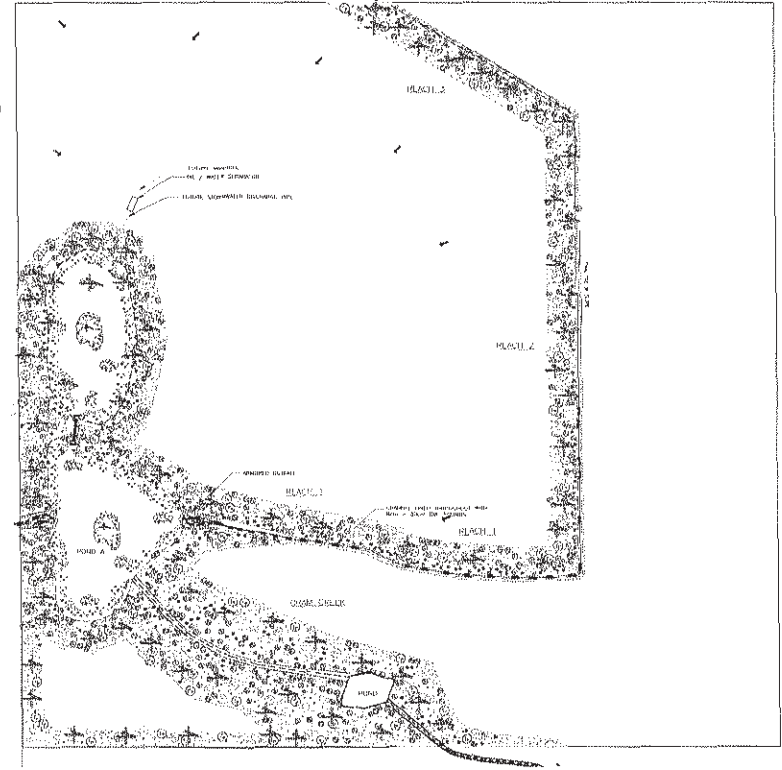
**From:** Aaron Fedora [<mailto:aaron.fedora@gmail.com>]  
**Sent:** Thursday, August 30, 2012 8:40 AM  
**To:** Jensen, Sandra L.S. FLNR:EX  
**Cc:** Norm Tapp  
**Subject:** 32900 Welch Ave Finals 1 & 2

Plans 1 & 2 of 6

SCALE 1:1200



SCALE 1:1200



Page 22  
EGM-2013-00253

CLIENT: N & J Developments Ltd  
 PROJECT: 32900 Welch Avenue, Mission, BC  
 TITLE: L.S. 11 (Case #12-18074) SECTION 2, Township 16 N.W. 40 SIMONSBURGH DISTRICT

**LETT'S ENVIRONMENTAL**  
 environmental consultants

10014 Woodhouseville Ln. Suite 200  
 White Ridge, B.C. V2A 5P2  
 Office: 604-428-8172  
 Cell: 604-220-2973  
 Fax: 604-402-2872  
 letters@letsenv.com

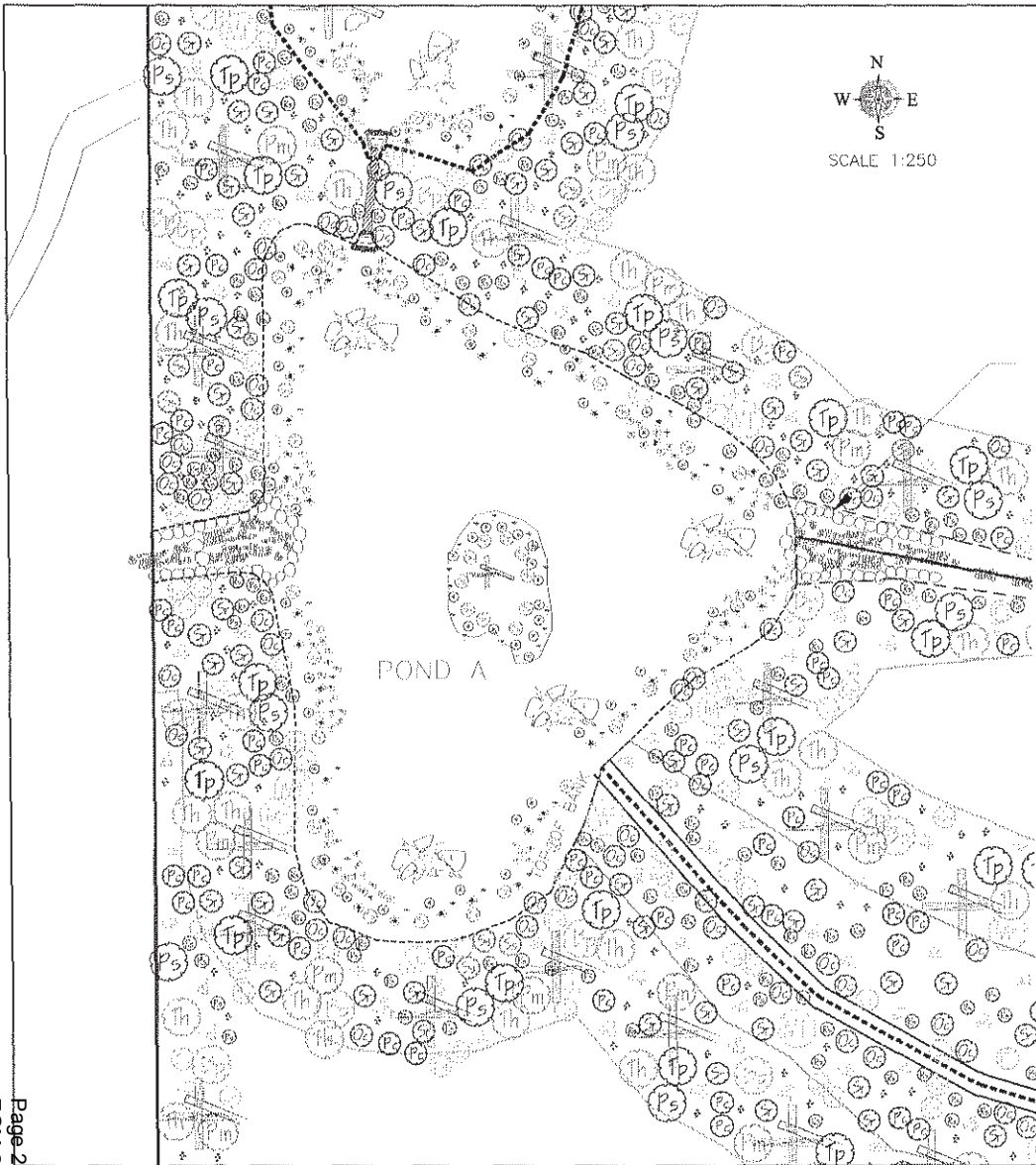
DRAWN BY:	EC
CHECKED BY:	EL
DESIGNED BY:	EL
APPROVED BY:	EL
SCALE:	

SEA:

CORPORATION OF THE DISTRICT OF MISSION  
 (FRODO LUNDI DEPARTMENT)

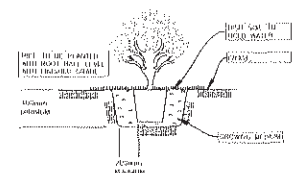
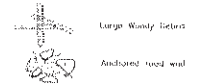
FINAL HABITAT REHABILITATION  
 PLAN  
 WELCH QUARRY

DATE:	APR 2012
SHEET:	3 OF 5
DWG NO.:	100-004-12

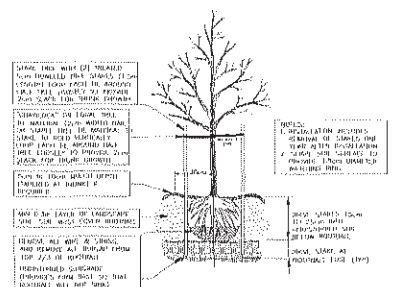


PLANT SCHEDULE				
SYMBOL	COMMON NAME	Latin NAME	QTY	PLANTED SIZE / DIMENSIONS
Ⓟ	WESTERN SLD CEDAR	THUSA PERCATA	50	MIN 5 GALLON POT
Ⓛ	WESTERN HEMLOCK	TSUGA HIEROGYPHILA	81	MIN 5 GALLON POT
Ⓟ	SEKA SPRUCE	PICEA SICHENSIS	29	MIN 5 GALLON POT
Ⓛ	PAPER BIRCH	BETULA PAPPYRIFERA	49	MIX 5 GALLON POT
Ⓜ	DOUGLAS FIR	PSEUDOTSUGA MENZIESII	48	MIN 5 GALLON POT
Ⓟ	PACIFIC CRABAPPLE	MALUS FUSCA	39	MIN 5 GALLON POT
Ⓟ	WESTERN MOUNTAIN ASH	SORBUS SCOPULINA	38	MIN 5 GALLON POT
Ⓟ	INDIAN PLUM	OSMORHIZA CLERAPHYLLIS	51	MIN 2 GALLON POT
Ⓟ	PACIFIC HINDBARK	PHYSCOCARPUS CAPITATUS	149	MIN 2 GALLON POT
Ⓟ	GLAUCOUS WLD ROSE	ROSA PSIGOCARPA	160	MIN 2 GALLON POT
Ⓟ	RED-OSIER DOGWOOD	CORNUS STOLONIFERA	151	MIN 2 GALLON POT
Ⓟ	RED ELDERBERRY	SAMBUCUS RACEMOSA	174	MIN 2 GALLON POT
Ⓟ	SALMONBERRY	RUBUS SPECIABILIS	359	MIN 1 GALLON POT
Ⓟ	SCULLER'S WILLOW	SALIX SCULLERIANA	100	MIN 1M LONG CUTTING
Ⓟ	SWORD FERN	POLYSTICHUM MUNIFORMIS	605	MIN 1 GALLON POT
Ⓟ	SALAL	GALPHENIA STRALOW	1924	MIN 1 GALLON POT
Ⓟ	BROAD LEAF CATTAIL	CYPHA LATIFOLIA	178	MIN 1 GALLON POT
Ⓟ	BEARDED SEDGE	CAREX ROSTRATA	291	PLUG
Ⓟ	WATER SEDGE	CAREX ROSTRATA	291	PLUG
Ⓟ	RUSHES	JURCUS SPP.	234	PLUG
TOTAL			6959	

RECOMMENDED SOIL MIX  
 75% Forest Humus/25% 10% Perennial Ryegrass  
 20% Topsoil / 80% White Clover  
 10% Turf / 90% Ryegrass  
 10% Onychopogon / 4% Red Top



TYPICAL CONTAINER SHRUB AND No. 1 & 2 POT TREE PLANTING DETAIL N.T.S.



TYPICAL 5&B TREE PLANTING DETAIL WITHIN LANDSCAPE SOILS MEDIUM N.T.S.

Page 28  
 EGM-2013-00253

NO.	DATE	DESCRIPTION	BY

CLIENT:  
 N & J Developments Ltd.  
 3740 West Avenue, Ste 101, BC  
 URSITY LOCATION:  
 SECTION 9, TOWNSHIP 18  
 NEW WESTMINSTER DISTRICT

**LETTS ENVIRONMENTAL**  
 environmental consultants  
 1088 Esplanade West, Vancouver, BC V6C 1P4  
 TEL: 604-275-2544  
 FAX: 604-275-1522  
 WWW: www.lettsenv.com

OWNER:	GN
DESIGNED BY:	GN
DRAWN BY:	GN
APPROVED BY:	GN
SCALE:	



CORPORATION OF THE DISTRICT OF MISSION  
 ENGINEERING DEPARTMENT

DATE:	AUG 2012
PROJECT:	2 OF 6
DRAWING NO.:	080405-12

POND "A" PLANTING PLAN

## Metcalfe, Megan MEM:EX

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**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Tuesday, February 12, 2013 6:52 PM  
**To:** Olsen, Michael MEM:EX  
**Subject:** FW: 32900 Welch Ave Finals 3 & 4  
**Attachments:** 3 OF 6.pdf; 4 OF 6.pdf

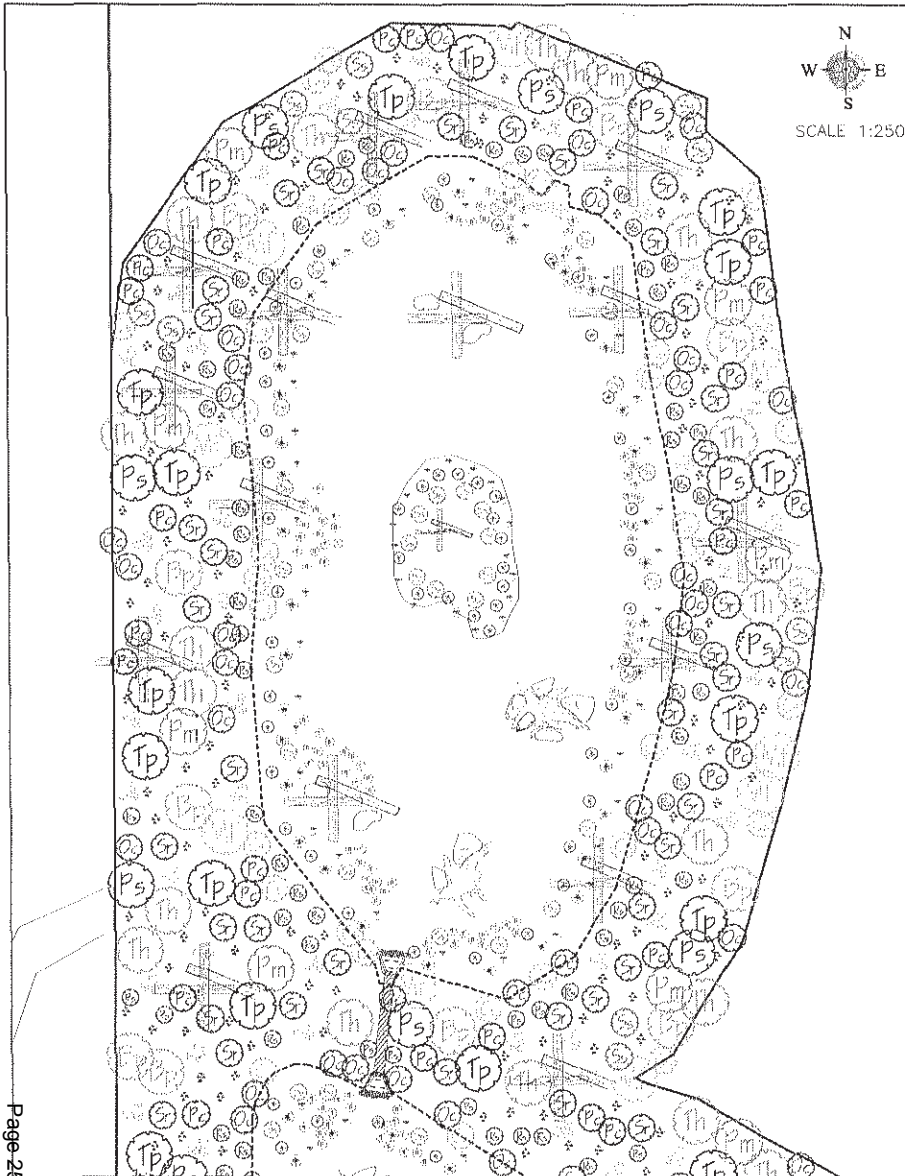
Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
2nd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5628 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

---

**From:** Aaron Fedora [<mailto:aaron.fedora@gmail.com>]  
**Sent:** Thursday, August 30, 2012 8:41 AM  
**To:** Jensen, Sandra L.S. FLNR:EX  
**Cc:** Norm Tapp  
**Subject:** 32900 Welch Ave Finals 3 & 4

3 & 4 of 6





N  
W — E  
S

SCALE 1:250

**GENERAL CONSTRUCTION SPECIFICATIONS**

1. Retain walls will be graded according to specifications in wetland reclamation plan prepared by Letts Environmental.
2. Retain walls shall be faced with 18" (450mm) of clay covered stone units. Top must be placed at same level as pond deck.
3. Pond dimensions shall be as depicted within plan drawings.
4. Retain walls shall be finished on the inside with 2:1.
5. No less than 0.5M (150mm) of tightly compacted sandstone gravel shall be placed on pond banks and substrate inside and then placed. No topsoil to be placed on banks until reclamation of wetland is complete.
6. Road shoulder of Water Ave crossing between the two ponds must be graded using area that contains no topsoil.
7. Planting of shrubs, trees, and semi-deciduous vegetation will be conducted on specified within plan drawings and General Planting Specifications below.
8. Prior to seeding of plants with seeds, interior of ponds must be compacted using tandem rollers, topsoil, and quantities of large woody debris that are indicated in plan drawings.
9. Outline of the center point between the two ponds must be determined using corner 300mm I.P.A. up.

**GENERAL CONSTRUCTION SPECIFICATIONS**

1. Pre-construction meeting.
2. Issue Construction log and unapproved all project related documents and drawings.
3. Issue copies of all project related documents and drawings on-site. This includes all / any Agreements, permits / plans and specifications / to remain on-site during all works.
4. Submit an incident control booklet as required and / or as directed by Environmental Monitor.
5. Model chemical treatment facility (MCTF) in the dry and not connected to any conveyance systems (MCTF must be thoroughly stable before introducing live water).
6. Damaged temporary channel to transfer existing flows from the site, ground work done to the advantage of the southern corner of the site. Suitable plan to reestablish existing flows into the temporary channel.
7. Identify (stake and) on the ground the parameters for the permanent post layout at the southeast corner of the site. Commence establishing the permanent post layout through to completion (staking & fencing).
8. Remove all debris from property.
9. Before plants are on-site and planting works commence, if planting works are completed during dry spells (weather) then watering may be required and determined by the environmental monitor. All native plant seedlings must be used, just the initial maximum volume of native dry seedlings within the 1000mm x 1000mm x 100mm pots. Native seedlings must be inspected, tagged, and recorded.
10. Subsoil areas will be graded down to 2% towards pond top of stone and no less surface runoff down and pond to pond.
11. Support items shall meet the strict BS 1 landscape standards. Contractor to provide environmental monitor with each item analysis results for review prior to placement of items.
12. 2" thick layers of top of bank and each corner boundary will remain in place for the duration of construction works. All works performed that all made areas that all forces are used to be removed or reduced.
13. Each piece of machinery will carry one (1) operator at all times. The lead contractor will be responsible to ensure that all persons carrying out works (including observers) will be made aware of the on-site and control plan and requirements should a spill of a dangerous or hazardous substance occur.
14. Any spill that occurs, regardless of the size and / or type must be immediately reported to the appropriate agencies and environmental monitor. In addition, the contractor must provide a report to be aware of and provide specific containment clean-up instructions.
15. No trees or herbaceous are to be placed or stored within the setback area. No refueling of machinery or equipment is to take place on the property.

**GENERAL CONSTRUCTION SPECIFICATIONS (Type of Stone to be used)**

1. Retain walls will be graded according to specifications in wetland reclamation plan prepared by Letts Environmental.
2. Retain walls shall be faced with 18" (450mm) of clay covered stone units. Top must be placed at same level as pond deck.
3. Pond dimensions shall be as depicted within plan drawings.
4. Retain walls shall be finished on the inside with 2:1.
5. No less than 0.5M (150mm) of tightly compacted sandstone gravel shall be placed on pond banks and substrate inside and then placed. No topsoil to be placed on banks until reclamation of wetland is complete.

**GENERAL CONSTRUCTION SPECIFICATIONS**

1. All works shall be conducted in accordance with the wetland control provisions of the "Land Development Guidelines for the Protection of Aquatic Habitat" jointly prepared by the provincial Ministry of Environment and the Federal Department of Fisheries & Oceans.
2. All methods, plans and plant materials shall be consistent in accordance with the BS standards standards jointly prepared by the BC Society of Landscape Architects and the BC Nursery Trade Association.
3. All work methods to be inspected and approved by Letts Environmental prior to installation. Letts and Environment will ensure the setback areas prior to site works and to identify trees and shrub planting locations (if required).
4. All planting works to be carried out during the Spring or Fall season following planting(s) being granted.
5. All debris and / or excess materials from landscape operations shall be collected and disposed of in accordance with all regulatory requirements.
6. If native trees are found to be unsuitable for planting within the landscape impact will be required. Impacted herbaceous plants to be used as part of the interim revegetation shall comply with the latest BC Landscape Standards. Support of topsoil to be replaced by Letts prior to being delivered to the site. All native plants MUST be of good quality and be inspected by Letts prior to planting. Plants determined to be unsuitable will be removed with quality plant and that meets the design. All plants must meet the design plan.
7. The quantity of all plants will be placed on stockpile and presented on all sites and include (where shown) with landscaping layout. The form of plant planting will be applied to each area and time. Trees may require staking. Staking of trees will be determined by the environmental monitor at the time of plant arrival in compliance following tree planting. Tree staking will remain until 1 or if required, 2 above tree level.
8. Prior to plants being planted, water table within setback areas shall be studied in a manner where water will not pool or cause or effect plants, debris or other structures.
9. At least 100 plants of high maintenance is recommended. Plant maintenance to include watering and chemical of various species of plants. As necessary chemical/pesticides will be recommended to remove from the site and / or as required to remove any plants that are not suitable for use. 100% for trees and no less than 100% for shrubs for no less than one (1) year from planting. Replacement of dead stock will be required to follow job specifications.

PLANTING SPECIFICATIONS				
SYMBOL	COMMON NAME	SCIENTIFIC NAME	QTY	PLANT SIZE
Tp	WESTERN RED CEDAR	THUJA PLICATA	95	MIN 5 GALLON POT
Tp	WESTERN HEMLOCK	TSUGA HETEROPHYLLA	51	MIN 5 GALLON POT
Ps	SILVA SPRUCE	PICEA SICHENSIS	29	MIN 5 GALLON POT
Pm	IMPERIAL FIR	ABIES DOMESTICA	49	MIN 5 GALLON POT
Pm	BRUSLAW FIR	ABIES MILLENNIUM	48	MIN 5 GALLON POT
Sr	PACIFIC CRABAPPLE	MALUS FUSCA	35	MIN 5 GALLON POT
Z	WESTERN MOUNTAIN ASH	SORBUS SORBIFERA	38	MIN 5 GALLON POT
Z	RED MAPLE	ACER RUBRUM	51	MIN 2 GALLON POT
Z	PACIFIC HIBERNIAN	FRAXINUS CANADENSIS	149	MIN 2 GALLON POT
Z	DOUGLASS WILD RICE	ORYZA PERGRANATA	180	MIN 2 GALLON POT
Sr	RED-START HEDGEROW	CORNUS STOLONIFERA	191	MIN 2 GALLON POT
Sr	RED HEDGEROW	SAMBUCUS RACEMOSA	174	MIN 2 GALLON POT
Sr	SALMONBERRY	RUBUS SPECIOSUS	339	MIN 1 GALLON POT
Sr	SCOTLAND'S WILLOW	SALIX SCOTLANDICA	100	MIN 10 LUNG CUTTING
Sr	SWORD FERN	POLYSTICHUM MUNITZUM	685	MIN 1 GALLON POT
Sr	SALAL	GARLHEDIA THALICTRI	1924	MIN 1 GALLON POT
Sr	BROAD LEAF CATTAIL	TYPHA LATIFOLIA	170	MIN 1 GALLON POT
Sr	BLAKED SEDGE	CAREX ROSTRATA	251	PLUG
Sr	WATER SEDGE	CAREX ROSTRATA	251	PLUG
Sr	BUSHES	JONICUS SP.	234	PLUG
TOTAL			1450	

Page 25  
EGM-2013-00253

NO.	DATE	BY

CLIENT: N & J Development Ltd.  
PROPERTY LOCATION: 32500 Main Street, Mission BC  
L.S. 13 (See P.P. 130774)  
SECTION 8, TOWNSHIP 18, NEW WESTMINSTER DISTRICT

**LETT'S ENVIRONMENTAL environmental consultants**

Letts Environmental Ltd.  
P.O. Box 35808  
Mission BC V2X 4L2  
Tel: 604 402-8172  
Fax: 604 329-2872  
Email: info@lettsenv.com

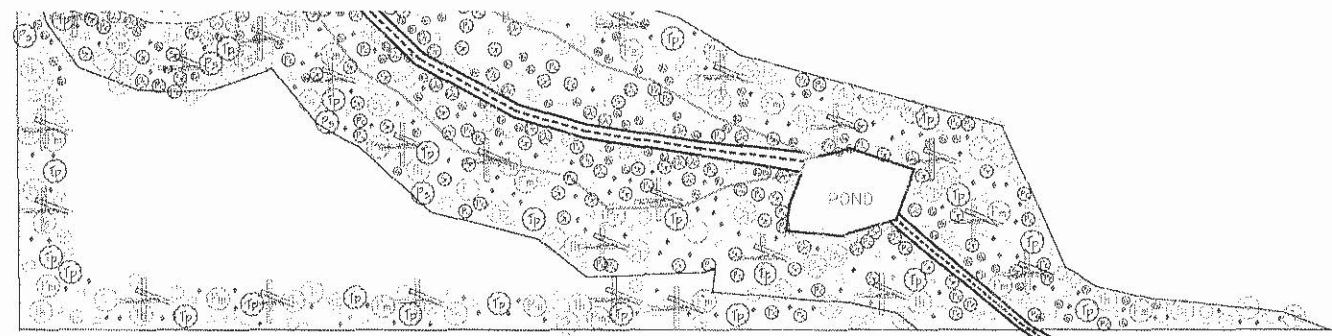
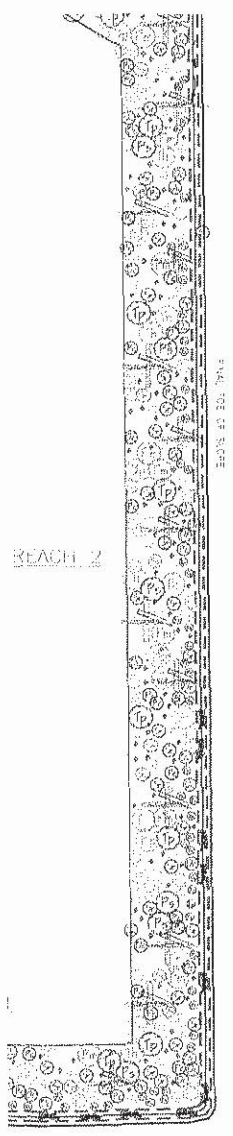
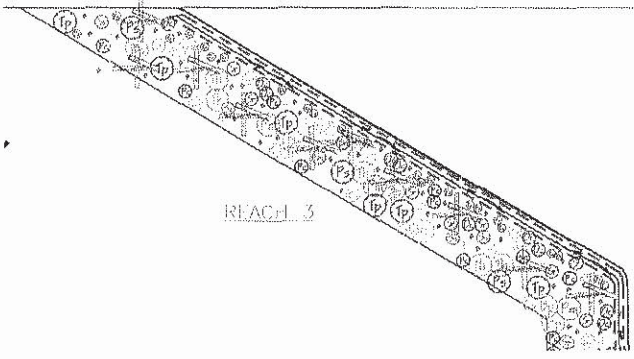
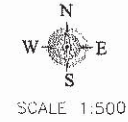
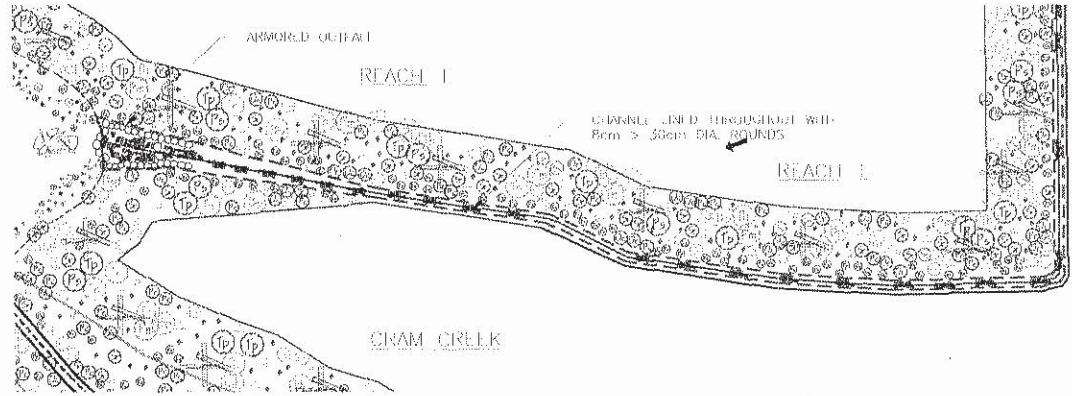
DESIGN BY:	GH
PREPARED BY:	GH
APPROVED BY:	GH
SCALE:	



**CORPORATION OF THE DISTRICT OF MISSION**  
EXECUTIVE DEPARTMENT

DATE:	AUG 2012
SCALE:	1:100
PROJECT NO.:	100406-12

**POND "B" PLANTING PLAN**



Page 26  
EGM-2013-00253

NO.	DATE	REVISION	BY

CLIENT:  
N & J Developments Ltd.  
32900 Wake Avenue, Mission, BC

PROPERTY LOCATION:  
L.S. 12 (See P.P. 130774)  
SECTION 9, TOWNSHIP 18  
NEW WESTMINSTER DISTRICT

**LETTS ENVIRONMENTAL**  
environmental consultants

Letts Environmental Consultants Ltd.  
2100 West 10th Street  
Vancouver, B.C.  
V6L 2K2

Phone: 604.681.2172  
Fax: 604.271.2822  
Email: info@lettsenv.com

DRAWN BY:	ESL
CHECKED BY:	ESL
DESIGNED BY:	ESL
APPROVED BY:	CSL
TITLE:	



CORPORATION OF THE DISTRICT OF MISSION  
(ENGINEERING DEPARTMENT)

TOE OF SLOPE PLANING PLAN

DATE:	Aug 2012
NO.:	4 OF 6
NO. 1001:	180417-12

## Metcalfe, Megan MEM:EX

---

**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Thursday, February 14, 2013 10:39 AM  
**To:** Olsen, Michael MEM:EX  
**Subject:** FW: 32900 Welch Ave Finals 5 & 6  
**Attachments:** 5 OF 6.pdf; 6 OF 6.pdf

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
2nd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5628 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

---

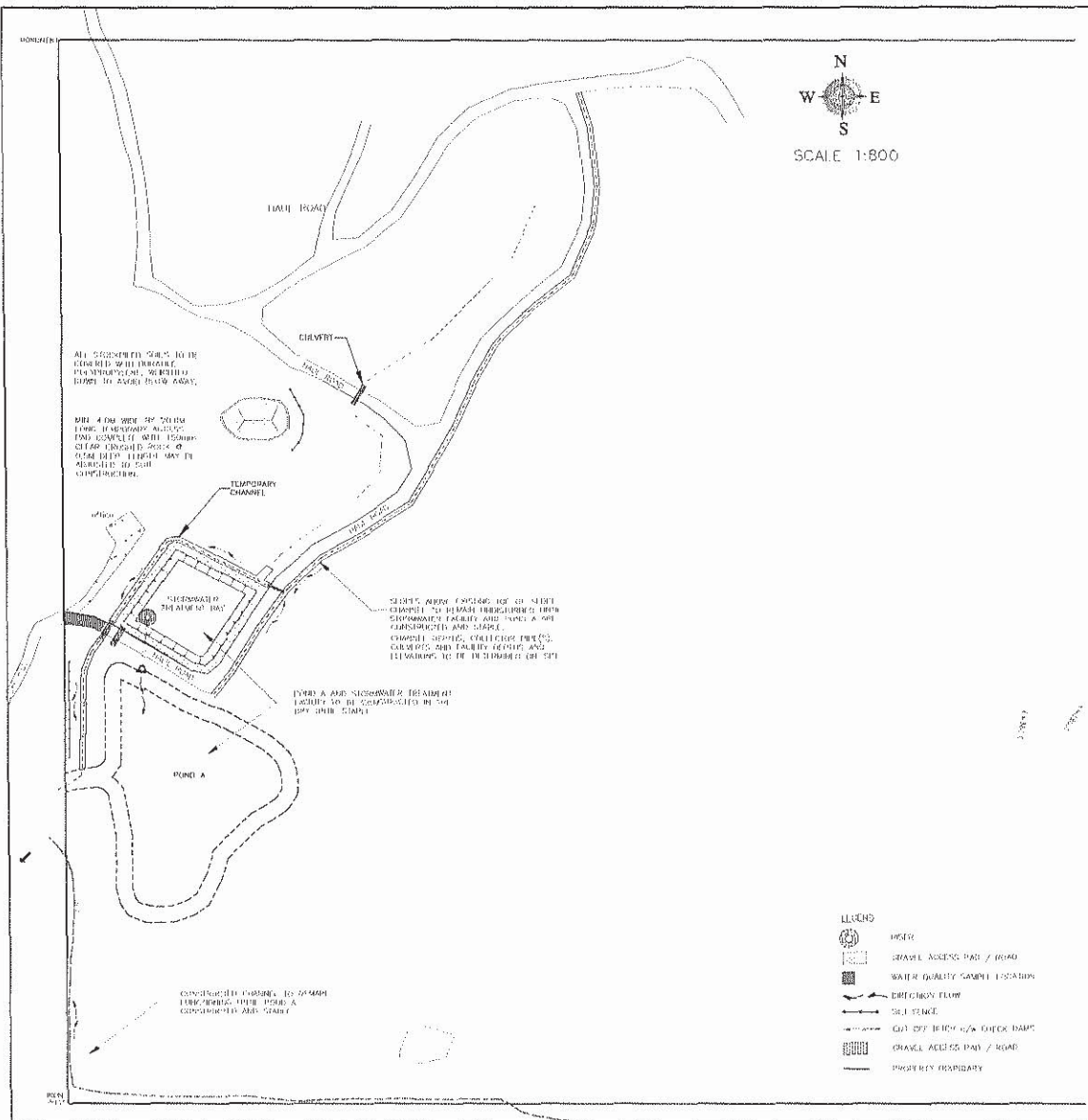
**From:** Aaron Fedora [<mailto:aaron.fedora@gmail.com>]  
**Sent:** Thursday, August 30, 2012 8:42 AM  
**To:** Jensen, Sandra L.S. FLNR:EX  
**Cc:** Norm Tapp  
**Subject:** 32900 Welch Ave Finals 5 & 6

5 & 6 of 6 plans.

Final email.

Thanks,

Aaron



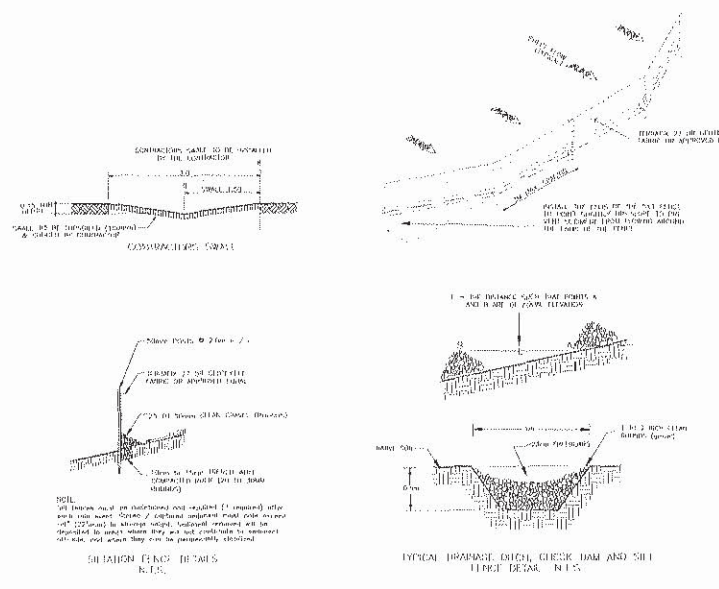
**PHASE I EROSION CONTROL**

1. TEMPORARY CHANNELS MUST BE INSTALLED FIRST TO DRAIN ANY INTERIM WATERS ARISING FROM WORK ZONES (STORMWATER FACILITY) AND POND A AND OFF THE PROPERTY AT THE RESIDENTIAL FRONT. THE CHANNELS MUST BE CONSTRUCTED IN THE DAY AND NIGHT PERIOD TO CONFORM WITH THE SOUTH COAST DRAINAGE BOARD'S REQUIREMENTS AND BE MAINTAINED AND REPAIRED ONCE THE STORMWATER FACILITY AND POND A ARE CONSTRUCTED AND STABLE.
2. THE STORMWATER FACILITY SHOULD BE CONSTRUCTED FIRST BEFORE COMMENCED ALL THE WORKING ONCE CONSTRUCTION HAS STARTED FROM A CHANNEL BE CONSTRUCTED. BOTH CHANNELS TO BE CONSTRUCTED IN THE DAY PERIODS AND REQUIRED TO BE KEPT ON-SITE TO DRAIN ANY WATER INTERIM TO THE WORK ZONES DURING CONSTRUCTION.
3. ONCE POND A HAS BEEN CONSTRUCTED AND DRAINED CLEAR BY THE ENVIRONMENTAL MONITOR, FLOODS MAY BE WITHHELD FROM INTERIM AREAS BY EITHER THE STORMWATER FACILITY (CONFORMANCE WITH CODE) OR POND A (CLEAR WATERS).

**NOISE ABATEMENT CONTROL**

- IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL STORMWATER FACILITIES IS INSTALLED TO PREVENT STORMWATER AND SEDIMENT CONTROL FACILITIES. SILT CONTROL AND CUT-OFF CHANNELS / TRENCHES SHALL REMAIN IN PLACE UNTIL ADDITIONAL FACILITIES ARE REQUIRED OR, WHEN PHASE 1 WORKS ARE COMPLETED, PHASE 1 CONSISTS OF THE INSTALLATION OF TEMPORARY CHANNEL(S), STORMWATER FACILITY, AND POND A.
- SILENT BARRIERS FOR CONSTRUCTION OF SILT FENCE TO BE INSTALLED "BEHIND" PLUS OR EQUIVALENT.
- ROAD MAINTENANCE - CONTRACTOR MUST MAKE EVERY PERSONNEL EFFORT TO MINIMIZE THE AMOUNT OF SOIL TRANSPORTED FROM THE SITE THE ROAD THE ROADWAY. THIS IS PARTICULARLY IMPORTANT WHEN TRUCKS ARE ACCESSING THE SITE, THE ROAD ROAD SURFACE MUST BE REGULARLY CLEANED OF ACCUMULATIONS OF SOIL ON THE SURFACE. THE SOIL SHALL BE CLEANED WITH A WELL SERVICED COMPACT TRUCK BE EQUIPPED WITH FIELD. OUTSIDE OF THE PROPERTY PERIMETERS, ACCUMULATIONS ON THE ROAD SURFACE, NO MATTER OF ANY TYPE IS TO BE REMOVED IN SUCH A WAY THAT IT INTERFERES WITH THE FLOW OF WATER ALONG THE ROAD CORNER OR CATCH BASINS, ROADSIDE DITCHES, OR INTERNAL STORMWATER CONDUIT(S) FACILITIES.
- DRIVEWAY ACCESS PAD - VERGEWAY AND DRIVEWAY ACCESS TO THE PROPERTY MUST BE MADE VIA A GRAVEL PAVING PAD. THIS GRAVEL PAVING PAD SHOULD BE CONSTRUCTED BY DEMOLISHING ALL MATERS OF TYPICAL AND REPLACING IT WITH 150MM DIA. STONE. ROCK (150) SHALL BE LAYED IN BEDDING OF 150MM DIA. STONE. ROADWAY SHOULD BE MAINTAINED SO THAT ALL SEDIMENT IS TRANSPORTED FROM THE SITE ON TO THE ROADWAY.
- SOIL TRAPS AROUND CATCH BASINS OR OVERFLOWS SHALL BE CLEANED AS REFERRED TO EIGHT MONTHS FREQUENCY. SOIL TRAPS SHALL BE CLEANED AT LEAST ONCE A YEAR. FREQUENCY OF CLEANING IN ADDITION, CONTRACTOR TO FOLLOW PROCEDURES FOR SEDIMENT CONTROL OUTLINED WITHIN THE SITE'S ENVIRONMENTAL MANAGEMENT PLAN AND THE ENVIRONMENTAL MONITOR.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE EFFECTIVE AND DETAILED MAINTENANCE OF THE COMPLETE SYSTEMS.
- THE ENVIRONMENTAL MONITOR SHALL SAMPLE AND ANALYZE INTERIM WATERS AND THE WATER BEING DISCHARGED FROM THE SITE TO ENSURE THAT THE TOTAL SOLIDIFIED SUSPENDED MATERIALS NOT EXCEED 250MG/L DURING THE WET SEASON AND 250MG/L DURING THE DRY SEASON OF MAY TO OCT 14.
- THERE IS TO BE AN INSPECTION OF THE SYSTEM EVERY WEEK AND SAMPLES IS TO BE CONDUCTED AT THE END OF EACH WEEK DURING THE SITE. IN ADDITION, DURING THE WETTER PERIODS, THE INSPECTION LEAVING THE SITE SHALL BE SAMPLED DURING OR AFTER RAIN AND AFTER STORM EVENT WHICH EXCEEDS AN ACCUMULATED DEPTH OF 10MM OR 15MM.
- WHEN THERE IS AN EXCEEDANCE OF THE ALLOWABLE LIMITS IMMEDIATE CORRECTIVE MEASURES ARE TO BE IMPLEMENTED.

PLEASE REFER TO THE ENVIRONMENTAL PLAN WHICH DESCRIBES IN DETAIL HOW IDENTIFIED RISKS SHALL BE MITIGATED THROUGH BEST MANAGEMENT PRACTICES (BMP) AND EMPLOY BEST MANAGEMENT PRACTICES, OR IN THE EVENT OF AN ACCIDENT, PROCEDURES THAT WILL CONTROL AND RESTORE THE IMPACTS TO THE ENVIRONMENT.



NO.	DATE	DESCRIPTION	BY

**CLIENT:**  
N & J Developments Ltd.  
37000 West Avenue, Mission, BC  
V2Y 1A1

**PROPERTY LOCATION:**  
L.S. 13 (S64 P.P.130774)  
SECTION 5, TOWNSHIP 18  
NEW WESTMINSTER DISTRICT  
V2Y 1A1

**LETTS ENVIRONMENTAL environmental consultants**

14141 Louisa Avenue, Unit 100, Mission, BC V2Y 1A1  
Tel: 604.877.8822 Fax: 604.877.8822  
www.lettsenv.com

DESIGNED BY: LJS  
DRAWN BY: LJS  
CHECKED BY: CJS  
APPROVED BY: LJS  
DATE: 2012

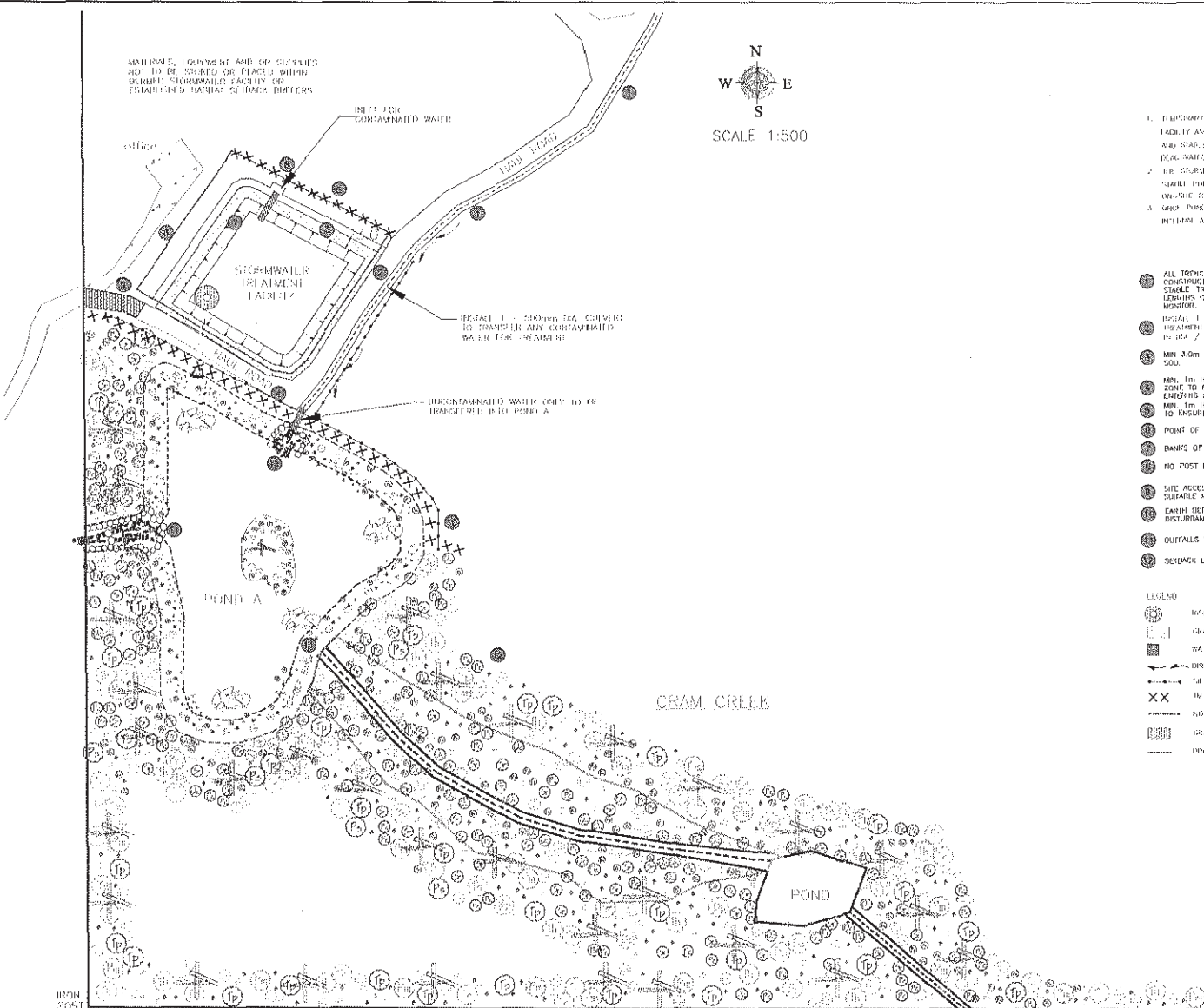
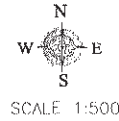
DATE: AUG 2012  
SCALE: A3 - E  
DWG NO.: 160408-12

CORPORATION OF THE DISTRICT OF MISSION  
ENGINEERING DEPARTMENT

PHASE I EROSION CONTROL PLAN

DATE: AUG 2012  
SCALE: A3 - E  
DWG NO.: 160408-12

MATERIAL, EQUIPMENT AND/OR SUPPLIES NOT TO BE STORED OR PLACED WITHIN DESIGNATED STORMWATER FACILITY OR ESTABLISHED NATURAL SETBACK BUFFERS



1. TEMPORARY CHANNEL(S) SHALL BE INSTALLED FIRST TO DRAIN ANY INTERNAL WATER AWAY FROM WORK ZONES. STORMWATER FACILITY AND POND A AND THE PROPERTY AT THE NEIGHBOURING CORNER THE CHANNEL(S) MUST BE CONSTRUCTED IN THE DAY AND STABLE PRIOR TO DEMONSTRATING FLOWS. THE STORMWATER CHANNELS SHALL BE INSTALLED WITH ALONG THE NORTH PROPERTY AND IS TO BE DEGRADED AND DEMONSTRATED ONCE THE STORMWATER FACILITY AND POND A ARE ESTABLISHED AND STABLE.
2. THE STORMWATER FACILITY (SHEETS IN CONSTRUCTION) (SHEETS) SHALL BE CONSTRUCTED ONCE ESTABLISHED AND STABLE POND A SHALL BE CONSTRUCTED. POND A FACILITY IS TO BE CONSTRUCTED IN THE DAY. POND A ARE REQUIRED TO BE KEPT OPEN TO DRAIN ANY WATER EXISTING ON WORK ZONES BEHIND CONSTRUCTION.
3. ONCE POND A HAS BEEN ESTABLISHED AND BEFORE START BY THE SUPERVISOR. FLOODS MAY BE OCCURRING THESE WITHIN AREAS TO THE STORMWATER FACILITY (EXHIBITED MAPS) OF POND A (STAY WITHIN)

1. ALL EROSION CAPTURES AND TRANSFERRING CLEAN UPSLOPE OR RUN ON WATERS TO BE CONSTRUCTED FIRST AND DISCHARGE INTO POND A ONCE POND A IS CONSTRUCTED AND STABLE. CHANNELS TO BE OTHER LINED WITH CLEAN COBBLES AND STONES THROUGHOUT LENGTHS OR CONTAIN TYPICAL STONE CHECK DAMS AT INTERVALS DETERMINED BY THE MONITOR.
2. FIGURE 1 - 500mm DIA. CURB TO INTERCEPT ANY CONTAMINATED WATER FLOW. FLOWING INTO TREATMENT FACILITY FURLED TO POND A. CURB / DITCH WITH MIN 100mm / REQUIRED CURB TO BE ARMORED WITH 500mm DIA STONE.
3. MIN 3.0m WIDE SHOULDER COVERED WITH 8.0cm LAYER SUITABLE SOIL, AND COVERED WITH 200.
4. MIN. 1m HIGH BY 1.5m WIDE GRADED BERM TO BE INSTALLED ALONG POND A SETBACK. STONE TO PREVENT NO TRAVEL INTO SETBACK ZONE AND KEEP ROAD RUNOFF FROM ENTERING INTO POND A.
5. MIN. 1m HIGH BY 1.5m WIDE BERM TO BE INSTALLED NORTH SIDE OF TREATMENT FACILITY TO ENSURE NO TRAVEL AND NO POST BARRIERS PLACED ALONG TOP OF BERM.
6. POINT OF COLLECTION FOR INTERNAL SURFACE RUNOFF TO TREATMENT FACILITY.
7. BANKS OF TREATMENT FACILITY GRADED AT 2:1 AND SEEDED.
8. NO POST BARRIERS INSTALLED TO ENSURE NO TRAVEL INTO TREATMENT FACILITY.
9. SITE ACCESS TO BE STABILIZED WITH 150mm SIEVE ROCK, CRUSHED ROCK OR OTHER SUITABLE MATERIAL TO PREVENT TRACKING SEDIMENT ONTO NEIGH AVY.
10. DRAIN BERM TO BE INSTALLED ALONG POND / CRAM CREEK SETBACK LINE TO ENSURE NO DISTURBANCE.
11. OUTFALLS TO BE ARMORED WITH CLEAN 150mm x 300mm DIA RIPRAP.
12. SETBACK LIMITS TO BE DELINEATED ALONG ENTIRE LENGTH.

- LEGEND
- ROOF
  - GRASS / MESH ZONE
  - WATER QUALITY SAMPLING LOCATION
  - DIRECTION FLOW
  - 100mm DIA
  - 150mm DIA
  - XX NO POST BARRIERS
  - ▨ GRAVEL AGGREG. PAD / ROWS
  - PROPERTY BOUNDARY

NO.	DATE	BY	DESCRIPTION

CLIENT:  
N A J Developments Ltd.

PROPERTY LOCATION:  
32900 Water Avenue, Mission, BC

L.S. 13 (See P.P. 130774)  
SECTION 9, TOWNSHIP 18  
NEW WESTMINSTER DISTRICT

**LETTS ENVIRONMENTAL**  
environmental consultants

1045 Britannia Road West, Suite 100  
P.O. Box 9100  
Mission, BC, V2Y 6C2

Phone: 604-857-8379  
Fax: 604-857-8375  
Tel: 604-857-8375  
letts@letts.ca

DESIGNED BY	GS
CHECKED BY	GS
APPROVED BY	GS
DATE	



CORPORATION OF THE DISTRICT OF MISSION  
ENGINEERING DEPARTMENT

PHASE 1 EROSION CONTROL PLAN

DATE: MAR 2012  
SCALE: 1:500  
PROJECT: 110-100-12

## Metcalfe, Megan MEM:EX

---

**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Tuesday, February 12, 2013 6:54 PM  
**To:** Olsen, Michael MEM:EX  
**Subject:** FW: 32900 Welch Ave Mission, BC (MoE File: 76800-20/LMR51-02-Pitt Lake)  
**Attachments:** Bennett-2009-07-31 Letter Norm Tapp.pdf; 2\_Mission Gravel Pit EIA FINAL Nov 9, 2011.pdf; 3\_2011-11-24 Restoration Plan Review Letter.pdf

You might find the EIA interesting if you didn't receive it.

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
2nd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5628 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: sandra.jensen@gov.bc.ca

---

**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Wednesday, March 14, 2012 3:57 PM  
**To:** 'myounie@mission.ca'  
**Subject:** FW: 32900 Welch Ave Mission, BC (MoE File: 76800-20/LMR51-02-Pitt Lake)

Here you go, I'll send another email or so with more info.... there is a trail of emails and reports on it. Do you think DFO should be involved? Looks like they said it wasn't their jurisdiction at the onset?

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
2nd Floor, 10470 152nd Street, Surrey, BC V3R 0Y3  
Ph: 604-930-7107 Fax: 604-930-7119  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: sandra.jensen@gov.bc.ca

*Our Vision: Economic prosperity and environmental sustainability*

---

**From:** Malt, Joshua FLNR:EX  
**Sent:** Monday, January 16, 2012 3:44 PM  
**To:** Jensen, Sandra L.S. FLNR:EX  
**Subject:** FW: 32900 Welch Ave Mission, BC (MoE File: 76800-20/LMR51-02-Pitt Lake)

Hi Sandra,

Believe it or not, I have one for you to discuss at our meeting.

This is the one I briefly mentioned before. They illegally drained a wetland, and I've been going back and forth with them to develop a suitable restoration plan as compensation. We're almost at a place where I'm willing to accept the plan (I just sent them the e-mail attached below). The question I have is how to proceed from here? I'm thinking they will need an official release letter from the Water Manager saying that they can proceed, as long as they follow a list of commitments. (not sure if there is a formal Order / document to do this?) Do you think they will also need a section 9 permit to construct the wetlands? If so, most of the work has already been done, because I have already reviewed the plans extensively. I've attached Tim Bennett's original letter requesting the compensation, as well as their latest two plans for your information.

Thanks,

Josh

---

Josh Malt, M.Sc., R.P.Bio.  
Ecosystem Biologist  
Forests, Lands, and Natural Resource Operations  
10470-152 Street, Surrey, BC, V3R OY3  
Tel: (604) 582-5282  
Cell: (604) 992-7164  
Fax: (604) 930-7119

---

**From:** Malt, Joshua FLNR:EX  
**Sent:** Monday, January 16, 2012 3:30 PM  
**To:** 'aaron.fedora@gmail.com'  
**Cc:** 'Norm Tapp'; 'Gary Letts'  
**Subject:** RE: 32900 Welch Ave Mission, BC (MoE File: 76800-20/LMR51-02-Pitt Lake) Response Letter

Hi folks,

We're getting very close. A couple of questions/comments:

- I'm concerned regarding the potential negative effects of draining water from the stormwater detention pond (Pond B), into Pond A, which is intended to function as suitable wetland habitat after it is constructed. Please provide a detailed description of how introduction of sediment, hydrocarbons, and other pollutants into pond A will be avoided. Also, drainage into pond A could cause an unnatural hydroperiod, and interfere with amphibian breeding and other natural processes.
- Please confirm the commitment to install an oil/water separator at the north end of pond B (currently worded as "WAQC is prepared to..."). This is an essential requirement to maintain water quality and habitat value within the ponds.
- Regarding the habitat balance, I confirm that the proposed restoration areas are sufficient in size to compensate for the impacted areas. The positive balance (more restoration than impacts) is justified given the long delay before Pond B will be converted to functional wetland habitat, and the lower habitat quality of the toe of slope channel.

Once you have addressed these, we can discuss next steps as far as formal commitments and authorizations.

Cheers,

Josh

---

Josh Malt, M.Sc., R.P.Bio.  
Ecosystem Biologist  
Forests, Lands, and Natural Resource Operations  
10470-152 Street, Surrey, BC, V3R OY3

Tel: (604) 582-5282  
Cell: (604) 992-7164  
Fax: (604) 930-7119

---

**From:** Aaron Fedora [mailto:aaron.fedora@gmail.com]  
**Sent:** Wednesday, January 4, 2012 1:10 PM  
**To:** Malt, Joshua FLNR:EX  
**Cc:** Norm Tapp; Gary Letts  
**Subject:** 32900 Welch Ave Mission, BC (MoE File: 76800-20/LMR51-02-Pitt Lake) Response Letter

Josh,

Please find attached the letter from Letts' Environmental Consultants Ltd. addressing the issues raised in your review.

Cheers,

Aaron

On Thu, Nov 24, 2011 at 1:55 PM, Malt, Joshua FLNR:EX <[Joshua.Malt@gov.bc.ca](mailto:Joshua.Malt@gov.bc.ca)> wrote:

Hi Aaron,

Please find my review of the impact assessment and wetland restoration plan attached.

Sincerely,

Josh Malt

---

Josh Malt, M.Sc., R.P.Bio.  
Ecosystem Biologist  
Forests, Lands, and Natural Resource Operations  
10470-152 Street, Surrey, BC, V3R OY3

Tel: (604) 582-5282  
Cell: (604) 992-7164  
Fax: (604) 930-7119



---

**From:** Aaron Fedora [mailto:[aaron.fedora@gmail.com](mailto:aaron.fedora@gmail.com)]  
**Sent:** Monday, November 14, 2011 12:03 PM  
**To:** Malt, Joshua FLNR:EX  
**Subject:** 32900 Welch Ave Mission, BC (MoE File: 76800-20/LMR51-02-Pitt Lake)

Josh,

Please find attached our EIA and plans. I believe this meets the requirements of Tim Bennet's letter of July 2009.

Cheers,

Aaron

July 31, 2009

File: 76800-20/LMR51-02-Pitt Lake

**REGISTERED MAIL**

Norm Tapp  
25469 84<sup>th</sup> Avenue,  
Langley, BC  
V1M 3N2

Dear Mr. Tapp:

**Re: Unauthorized Changes In or About A Stream at 32900 Welch Ave, Maple Ridge, BC**

I am writing to request that you undertake remedial actions to rectify unauthorized changes in and about a stream at 32900 Welch Avenue, Maple Ridge, BC.

Staff from the Ministry of Environment inspected your site on May 4th, 2009, in response to allegations of unauthorized changes in and about a wetland and stream. During that visit, staff noted the following: excavation within the stream resulting in the draining of the wetland, diversion of flows into a small excavated channel and the clearing and grubbing of soil within and directly adjacent to the subject wetland. It has been estimated that this has resulted in the elimination of approximately 9000 square metres of wetland habitat and the formation of a larger area of exposed erodible soil.

Under Section 93 of the *Water Act*, it is a general offence to make a change in and about a stream without lawful authority, or divert and use water without proper authority. Under Section 9 of that Act, changes in and about a stream may only be made in accordance with the Water Regulation, or an Approval, license or Order.

Consequently, you are required to undertake the following actions:

1. Immediately develop and implement a plan for the site to prevent the potential for further release of silt, sediment or sediment-laden water, or any other deleterious substances into any ditch, watercourse, ravine or storm sewer system. This plan is to be developed by and implemented under the supervision of a qualified professional(s) experienced with sediment and erosion control for sites of this type.
2. Provide a copy of the plan, and confirmation that it has been implemented, to the undersigned and copied to Scott Barrett, Sr. Ecosystems Biologist, by August 14<sup>th</sup>, 2009.

---

Ministry of  
Environment

Water Stewardship Division  
Lower Mainland Region

Mailing Address/Location  
#200 10470 – 152<sup>nd</sup> Street  
Surrey BC V3R 0Y3

Telephone: 604-582-5200  
Facsimile: 604 930-7119  
Website: [www.gov.bc.ca/env](http://www.gov.bc.ca/env)

3. Retain the services of a qualified environmental professional, experienced with wetland habitat assessment and wetland habitat restoration to develop a brief report and habitat restoration plan for the subject site. This report and plan must be submitted to the undersigned and copied to Scott Barrett, Sr. Ecosystems Biologist, for review and approval by August 31<sup>st</sup>, 2009. It is our intent that habitat restoration works can be designed, submitted, reviewed, approved and commenced during this year's instream work window. This report is to include:
  - i. A qualitative and quantitative assessment of wetland form and function (physical and ecological), including the associated riparian values, that existed at the site prior to the unauthorized works commencing; this may include (but not limited to):
    - a review of historic air photography to determine precise size, location and nature of the wetlands,
    - an assessment of known, remnant or anticipated land-form and hydrological characteristics (topography, soils, drainage basin etc.) of the wetland,
    - an assessment of known, remnant or anticipated biological communities that persisted within the wetland and riparian habitats, and
    - interviews with individuals (current and previous owners, machine operators, other contractors etc.) familiar with the wetland prior to unauthorized works proceeding.
  - ii. A review of potential habitat restoration options to restore the wetland features and functions on the site; including recommendations, and
  - iii. A habitat restoration plan that will describe the restoration of hydrological and ecological function of a wetland and it's associated riparian areas of equal or greater value to those of the habitats eliminated.

If you have any questions in this regard, please do not hesitate to contact the undersigned.

Regards,

*Original signed by*

Tim Bennett, P.Eng.  
Assistant Regional Water Manager

TB

pc: Scott Barrett, Environmental Stewardship Division (Surrey)  
Steve Jacobi, Conservation Officer Service (Chilliwack)  
Craig Sciankowy, Fisheries and Oceans Canada (Mission)  
Scott Lavery, Fisheries and Oceans Canada (Mission)  
Mike Younie, District of Mission

Environmental Impact Assessment Report  
for Proposed Gravel Pit located at  
32900 Welch Avenue, Mission, BC  
Legal Subdivision 13 SEC 9 TWP 18 NWD

**Prepared For:**

N & J Developments Ltd.  
25469 84<sup>th</sup> Avenue  
Langley, BC, V1M 3N2

**Prepared By:**



**LETTS**  
ENVIRONMENTAL  
CONSULTANTS  
LTD

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Figure 3: Map of species at risk. Source: BC Species and Ecosystems Explorer, Conservation Data Centre, BC..... 16

## EXECUTIVE SUMMARY

N & J Developments Ltd. (hereafter, “the client”) are seeking to develop a gravel pit to provide a supply of sand, gravel and rock within the local area. The client retained Letts Environmental Consultants Limited (LECL) to prepare an Environmental Impact Assessment (EIA) of the proposed gravel pit located at 32900 Welch Avenue, Mission. The specific objectives of this study were to: identify impacts to the environment which may occur as a result of developing the proposed gravel mining operation, evaluate the significance of those impacts, determine mitigating measures, and to recommend further monitoring efforts.

The proposed project is for extraction of approximately 240,000 tonnes of total material (sand, gravel and rock) per year. The amount of material extracted will not exceed 1,000,000 tonnes over the first 4 years of the mine. Access into the mine area will be from Dewdney Trunk Road entering onto Creston Avenue and Larsen Street with exiting out Welch Avenue.

This EIA provides details in four areas, which may be impacted as a result of mining the existing site. These include Aquatic/Hydrological Resources (Water Quality), Habitat Alteration (Vegetation & Wildlife), Pollution (Dust, Noise, On-site Facilities), and Cultural Features (Aesthetics & Public Safety).

The results contained within this report reveal that there are aquatic resources in the form of a watercourse, previous pond complex area as well as riparian and terrestrial habitats on and or affecting the subject property. This pond complex along the western edge of the property was the subject of works that resulted in the draining of this area. This initiated an investigation by the Ministry of Environment (MOE), resulting in the request that the client provide a description of the original form and function of this area as well as a habitat restoration plan to recreate the impacted system. Pre-disturbance habitat occupied an area of approximately 9000m<sup>2</sup>, composed of 2 open water ponds connected by a narrow channel. The pond complex functioned to provide habitat to a range of vegetation, aquatic, and terrestrial life. LECL will create a Pond Complex Ecosystem Restoration plan, with the scope of restoring the hydrological and ecological function of the pond complex and its associated riparian areas to equal those of the habitats eliminated. One pond will be constructed in its permanent configuration immediately and will operate as a pond ecosystem throughout the life of the mine. A second pond will be constructed to operate as an interim stormwater treatment facility during the life of the mine, and will be converted into a permanent pond complex following completion of mining activities.

Mining this site will alter surface and sub-surface flow patterns, which may result in changes in water quality. Development will remove surface soils and remaining vegetation, displace wildlife, and increase noise and air pollution. Development will permanently change the topography, alter soils and aesthetic values, and could increase the hazard risk to public safety if the foregoing mitigative measures are not implemented. This report concludes that it is possible to mitigate the impacts of extraction, preserve water quality, and control erosion during development.

The proposed mining operation must incorporate water controls to minimize disruption to aquatic resources and water quality. Key mitigative measures to minimize disruption to aquatic



resources include managing surface runoff, maintaining riparian areas, and implementing pollution reduction strategies and measures to ensure visual aesthetics and safety. Appropriate sequencing of activities will also be critical in reducing the negative impacts of the proposed development. Implementing sediment and erosion control methods is essential to treating runoff from roads and mined areas over the various stages of site development. Construction of sediment and erosion control facilities and ditches will take place prior to any mining activities. All sediment control measures incorporated will prevent the loss of sediment off-site and should follow the current standards set out in the BC Ministry of Environment's "*Land Development Guidelines for the Protection of Aquatic Habitat*." No work or disturbance should take place within any proposed setbacks.

Pollution mitigation measures will incorporate a dust control program for road surfaces which are effective control measures successfully used in BC. This will include installation of dust control systems on all transfer systems (trucks), and surface amendments such as inundation or sprays to control areas, which are dust sources. Noise will be buffered with vegetation and additional measures outlined below.

Cultural features should be addressed by fencing (as per the Mines Act) erected around the perimeter of this site. Appropriate signage should also be attached to this fencing warning of the hazards associated with the site. Fencing should also be erected, and should surround all high bank cut-slopes along all forest edges and be clearly visible along at all site entrance points. Signs should outline current regulations, and hazards associated with entry onto the site.

The recommendations contained within this EIA should be followed closely to avoid impacts, work stoppages, disruptions, or violations. Sediment and erosion control plans are particularly important components and should be implemented prior to commencement of works.

In addition to the measures and recommendations contained within this report, a site specific, comprehensive Environmental Management Plan (EMP) will be prepared. This EMP will identify any components of the project that could present a hazard to the environment. This plan will describe how identified risks will be mitigated through best management practices and proper work procedures and, in the event of an accident, procedures that would contain and limit the impacts to the environment.

## 1.0 INTRODUCTION

The primary objective of this EIA was to identify impacts to the environment that could result from development of a mine on this site (Figure 1). This includes assessment of the construction, operation, dismantling and abandonment phases of the projects. Impacts include changes to Aquatic / Hydrological Resources (Water Quality), Habitat Alteration (Terrestrial vegetation, wildlife and wildlife habitat), Pollution (Dust, Noise and on-site Facilities) and Cultural Features (Visual Aesthetics and Public Safety).

In addition, this EIA presents specific measures to achieve environmental compliance objectives by:

1. minimizing all forms of pollution and contamination;
2. preventing the fouling of all bodies of water (watercourses),
3. minimizing soil erosion and preserving ground stability, and
4. developing a plan to address concerns raised by the MOE regarding the pond complex.

This EIA is also intended to facilitate environmental compliance during all aspects of the proposed construction works.

This report does not include any water quality measurements or specific habitat surveys.

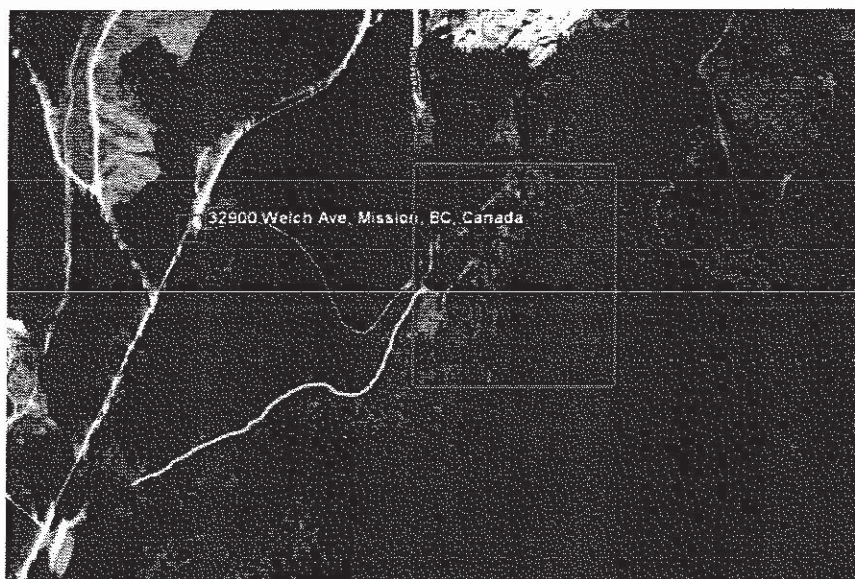
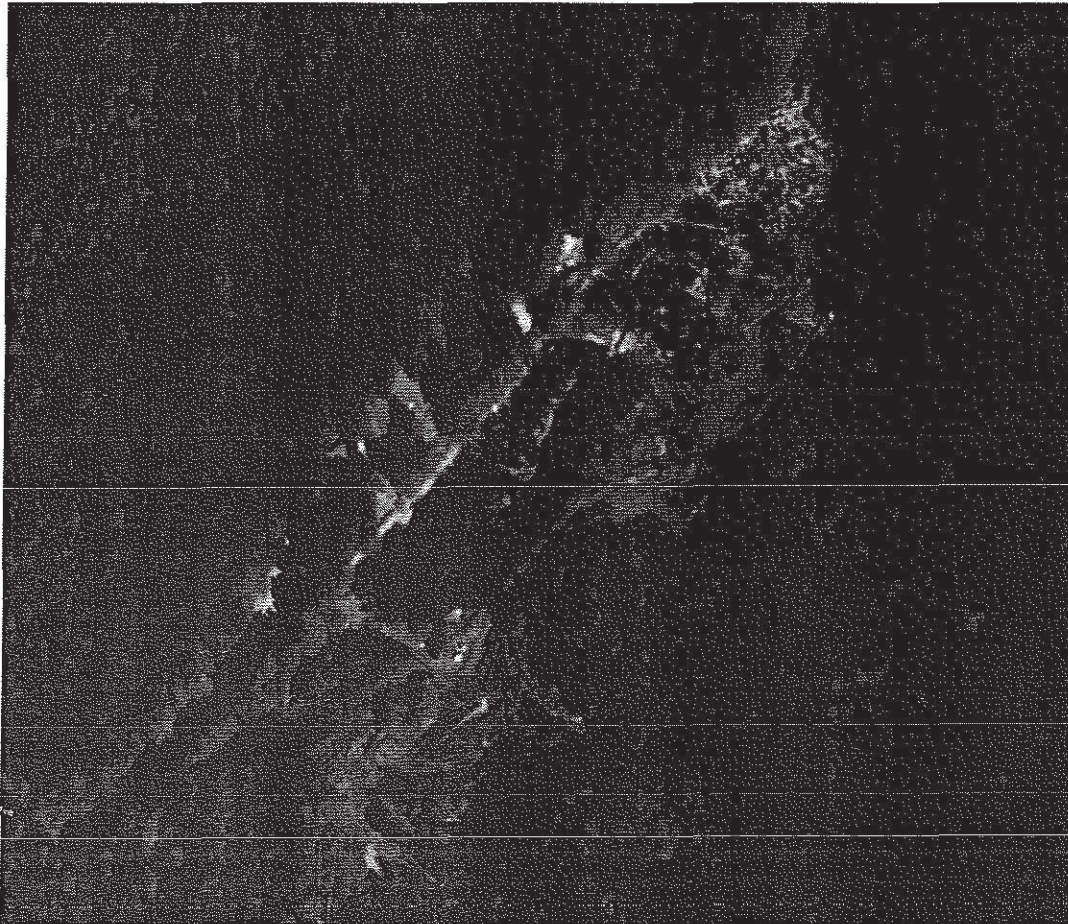


Figure 1: Aerial photo of general area near subject property (source: Google Earth 2009).

## 2.0 PROJECT DESCRIPTION

The subject property is located at 32900 Welch Avenue, Mission, BC. The legal designation for this property is Subdivision 13 SEC 9 TWP 18 NWD and is zoned Industrial according to the District of Mission's (DoM) Official Community Plan (OCP). The property is located in close proximity (0.5-1.0km) to two other known gravel pits. The property is bounded by forest on all sides, with the exception of the area to the north (which is also zoned Industrial).

The proposed gravel and bedrock mining activity will provide a supply of sand, gravel and rock for the local community and surrounding area. The amount of material to be processed equates to approximately 240,000 tonnes per year (pers comm. A. Fedora). Haul routes to and from the site would be along Dewdney Trunk Road, entering on Creston Avenue to Larsen Street from the northwest and exiting via Welch Avenue to the west.



**Figure 2:** Aerial photo of general area near subject property (source: Google Earth 2009) prior to clearing activities.

Logging and some land management activities have already been completed on the site. In addition, previous activities have resulted in the draining and infilling of a pond complex.

Mining activities will commence once approvals from the regulatory agencies have been received. The proposed mining operations will include<sup>1</sup>: grading the surficial impermeable sediments to create a flat work area, draining existing perched groundwater and routing ongoing groundwater seepage and surface water to south side of property, and commencement of mining eastward into the hill (bedrock mining - not extending below 275m elevation).

<sup>1</sup> Summarized from EBA Engineering Consultants, October 2010, Surface Hydrology and Hydrogeologic Assessment of Proposed Gravel Pit and Rock Quarry.

Once mining activities are complete, reclamation should commence. Reclamation is the process of returning the land disturbed by mining to an acceptable alternate use. Due to the nature of the final terraced form of the subject property, reclamation will be completed once all extraction and mining is complete.

Reclamation include activities such as removing any buildings and equipment, decommissioning of sediment and erosion control and stormwater management measures and creation of a final second pond complex. All exposed ground should be shaped and graded to provide stable long-term slopes and suitable surface runoff patterns meeting requirements contained within the Mines Act of BC. The *Mines Act* requires that a mine be reclaimed to a level of productivity equal to or exceeding prior use (Houlihan and Titerle, 2001).

## 2.1 Justification

The purpose of this project is the extraction of sand, gravel and rock resources. Reliable supplies of aggregate are an essential component of local, provincial and federal government infrastructure development and maintenance. Aggregate is needed as the raw material for building and maintaining a community's infrastructure and buildings, and is least expensive when extracted, processed and distributed locally<sup>2</sup>.

## 2.2 Regulatory Guidance / Protocols

This EIA contains relevant source material including key information from applicable legislation, regulations, standards, guidelines, and codes of practice. Under Section 1.4 Stewardship of Gravel Resources, the District of Mission's OCP states that development and use of aggregate must be carefully planned and include reclamation and end use of the gravel pits. In addition, the following Table 1 outlines, at minimum, the various acts, regulations and guidelines that apply to the project.

Agencies and tenure holders with a potential interest in aggregate pits and quarries may include the following:

- Department of Fisheries and Oceans Canada
- B.C. Ministry of Agriculture
- B.C. Ministry of Environment
- B.C. Ministry of Transportation and Infrastructure
- B.C. Ministry of Forests, Lands and Natural Resource Operations
- B.C. Environmental Assessment Office
- District of Mission
- Environment Canada
- First Nations

As part of the application review process, Ministry of Energy and Mines sends referrals to agencies and tenure holders with a potential interest in the proposed project. A period of 30 days is provided for review.

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<sup>2</sup> Aggregate Operators Best Management Practices Handbook for British Columbia, Volume 1

First Nations Engagement

Aggregate pit and quarry applications are referred to First Nations for input<sup>3</sup>,

**Table 1.** Standards, Guidelines and Best Management Practices (BMPs).

<b>Federal and Provincial Legislation, Regulations and Best management Practices</b>	
BC Environmental Management Act (2004)	BC Approved Water Quality Guidelines (Ministry of Environment [MoE], 2001)
BC Wildlife Act (1996)	Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2003a)
Canadian Environmental Quality Guidelines (CCME, 2003b)	Fisheries and Oceans Canada, Pacific Region Fisheries Act (1985)
District of Mission's Official Community Plan	2006 Design Build Standard Specifications for Highway Construction (Ministry of Transportation and Infrastructure)
A Users Guide to Working in and around Water – Regulation under B.C.'s Water Act (Land & Water B.C. 2001)	The BC Conservation Data Center Web Site <a href="http://www.env.gov.bc.ca">http://www.env.gov.bc.ca</a>
BC Mines Act (Ministry of Energy and Mines )	BC Ministry of Environment. Fish Protection Act. 1997.
Standards and Best Practices for Instream Works (MoE 2004)	Aggregate Operators Best Management Practices Handbook for BC (Volumes I and 2)
Environmental Best Management Practices for Urban and Rural Land Development in BC (MoE 2004)	BC Species and Ecosystems Explorer (Ministry of Environment)

According to the Mine Proponent's Guide (BC Environmental Assessment Office) for new sand and gravel pits, the project is reviewable under the Reviewable Project Regulation if the production capacity for excavated sand, gravel or both combined will equal or exceed at least one of the following:

1. Either at least 500 000 tonnes per year during at least one year of its operation, or
2. Over a period of not more than 4 years of operation, at least 1 000 000 tonnes in total.

This project does not meet either criteria and therefore is not required to be reviewed under the Reviewable Projects Regulation.

The following information regarding the regulation of sand and gravel operations was taken from the Ministry of Energy, Mines and Petroleum Resources (MoEMPR)<sup>4</sup>:

“Sand and gravel pits and quarries are regulated as mines under the Mines Act. Permits are required for these operations and the permitting process includes referrals to other government agencies, such as the Ministry of Environment, Lands and Parks, and allows for public input.”

<sup>3</sup> Guide to Preparing Mine Permit Applications for Aggregate Pits and Quarries in BC, Mining and Minerals Division, MEMPR

<sup>4</sup> MoEMPR: Information Regarding the Completion of the Notice of Work and Reclamation Program for a Sand & Gravel/Quarry Operation. Sand and Gravel/Quarry Operation Notice of Work and Reclamation Program.

According to Section 10(1) of the Provincial *Mines Act*:

“Before starting any work in, on or about a mine, the owner, agent, manager or any other person must hold a permit issued by the chief inspector [the minister must designate in writing a person appointed under the *Public Service Act*, as the Chief Inspector of Mines] and, as part of the application for the permit, there must be filed with an inspector a plan outlining the details of the proposed work and a program for the conservation of cultural heritage resources and for the protection and reclamation of the land, watercourses and cultural heritage resources affected by the mine, including the information, particulars and maps established by the regulations or the code.”

The local government is the District of Mission (DoM). Under the DoM’s Official Community Plan, they provide direction in terms of managing gravel operations within the DoM with a view to minimizing short and long term impacts. Section 1.4 of the OCP: Stewardship of Gravel Resources provides information regarding the operation of gravel pits. The objective is to manage gravel operations to minimize their impacts. Policies outlined include:

New or Expanded Gravel Pits

Policy 1.4.2 Evaluate applications for new or expanded gravel pits based on potential operating impacts upon adjacent residential neighbourhoods and other land uses, noise levels and traffic impacts on municipal roads.

Continuous Rehabilitation of Gravel Sites

Policy 1.4.3 Support the continuous rehabilitation of gravel extraction sites to reduce the visual impact of the operations on the community.

Reclamation of Gravel Sites

Policy 1.4.4 Support a variety of options for the reclamation of gravel sites, including conversion to residential, institutional, parkland and/or rural area industrial/business use.

### **3.0 STUDY METHODOLOGY**

This inventory of environmental features is based on field reconnaissance, and interpretation of aerial photographs, maps, reports and other information provided by the client. The field component of this study was conducted on March 24, 2009 and again on March 28, 2011. Transects were completed along all property lines, in addition to review of riparian areas.

Review of existing documents include, but is not limited to:

- Ecological Assessment of Previous Wetland at 32900 Welch Avenue. Letts Environmental Consultants Limited. November 2009.
- Legal Survey prepared by D.S.Martens. BC Land Surveyor. March 2009.
- Assessment of Rock Samples For Acid Rock Drainage (Generation Potential). Valley Testing Services Limited. January 2011.
- Surface Hydrology and Hydrogeologic Assessment for Proposed Gravel Pit and Rock Quarry. EBA Engineering Consultants Limited. October 2010.
- Preliminary Quality Testing of Rock and Gravel Materials, Proposed Quarry/Pit. Valley Testing Services Limited. September 2010.

Addition information regarding the reconstruction of ponds and wetland was also reviewed by LECL to assist in the development of the following restoration plan.

#### **4.0 EXISTING SITE CONDITIONS**

The subject property lies in the northeastern sector of Mission. In general, the property is void of vegetation and comprised of a steep, western facing slope and a flat depressional area near the west property line.

Most of the previously forested portion of the 39 acre property has been recently logged. The 2 acres of previous wetland habitat has been drained and altered significantly by logging activity and land clearing, grubbing and excavation.

A large culvert has been installed near the base of the main earthen dam which is still in place and top-dressed with gravel. The culvert drains a recently excavated drainage channel which curves northeast through the previous bottom of the pond intersecting with what appears to be the smaller of the 2 earthen dams which was previously covered by pond water and recently top-dressed with gravel. The constructed channel measuring approximately 2 metres in width and 1 metre in height has steep side slopes and transfers flows from north to south.

Almost the entire previous pond bottom has been either covered with gravel and piles of logging debris or altered through major land/soil clearing and grubbing. A few small areas of standing shallow water appear as possible remnant portions of the original bottom of the pond.

One existing home sits mid-point near the west property line along with several old storage areas where garbage and debris have been piled up. Further detail regarding the site specifics are provided in the sections below.

#### **5.0 SITE DESCRIPTION**

##### **5.1 General**

The subject property is 15.8ha (39 acre) in size and is located in the northeast portion of the District of Mission at 32900 Welch Avenue. The legal description of this property is Legal Subdivision 13 SEC 9 TWP 18 NWD. The surrounding areas directly adjacent to the study area are primarily forested. The study area occupies the north central portion of the Fraser Lowland physiographic region (Holland, 1976).

This property is within the Coastal Western Hemlock Biogeoclimatic Zone (CWH). This zone is typically the wettest ecosystem in British Columbia, with relatively cool summers and mild winters (Meidinger & Pojar, 1991), and is classified as cool mesothermal.

The topography of the study area comprises primarily of a steep slope (25-40%) to the northwest and a large flat depressional area near the west property line. Elevations range from approximately 255m at the bottom northwest corner up to 400m at the top of the slope (southeast corner).

## 5.2 Aquatic/Hydrologic Resources

### 5.2.1 Surface Water/Watercourses

In general, the property drains to the west southwest via numerous small roadside ditches adjacent to haul roads found throughout the eastern sloped portion. These slope ditches convey flows down the slope to the flat depressional area at its the northern end. Flows are then transferred southwest through the former ponded area via a manmade channel. The channel extends through most of the former ponded area.

The flat depressional area (former 2 acre (0.81ha) ponded area) had previously been the site of a large rectangular-shaped pond. The earliest air photos and local topography indicate that this was a natural collection area on a gently sloping bench where up-slope runoff water pooled and served as the headwaters of a main tributary flowing into Silverdale Creek.

A number of small ponds are also present on the property. One mid-slope along the south property line and two at the southwest corner of the property. No outflow for this small pond could be located in the field. Ponded water was also noted within the depressional area (formerly the pond area, Figure 2) near the center of the west property line.

Further south, roadside ditches convey surface water to the south property line. A watercourse is present along the south property line that conveys flows west down the slope. The watercourse currently flowing along the south property line turns sharply and flows north at the properties southwest corner. Flows then discharge into two connected constructed ponds (approximately 80m<sup>2</sup> and 63m<sup>2</sup> in size). Water conveys out of these ponds and off the property to a small stream with an average wetted width of 2.0m with wider sections of 5.0m across, a soil and organic substrate with shallow banks. These flows contribute to a tributary of Silverdale Creek. Silverdale Creek flows into Mill Pond (located approximately 1.7km downstream).

As noted in previous sections of this report, near the middle of the west property line is a large, depressional receiving area (formally the pond area). Land management activities in this area have channelized the flow of water from this area. Currently, a water channel flows adjacent to the access road and south under the access road via a 0.6m corrugated plastic culvert. A total of 16m of sheet piling has been used on the upstream side of the road crossing. There are a number of old culverts within the road that are no longer functioning as they are now above and to the west of the surface of the water. This indicates that the flows have scoured the base of the channel. The channel has a wetted width of 1.0m and confluences with the tributary to Silverdale Creek at the southwest corner of the property.

### 5.2.2 Groundwater

Recharge of groundwater in the proposed mine area "...likely occurs by direct infiltration of precipitation and snowmelt." (EBA Engineering<sup>5</sup>). EBA Engineering also noted shallow groundwater within and perched above the upper silt, clay and till layer in the central bench area and minor groundwater seepage and greater seepage at the base of the hill. Some deeper

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<sup>5</sup> Surface Hydrology and Hydrogeologic Assessment. EBA Engineering Consultants Limited. October 2010.



groundwater was encountered as well. In addition, they note “ongoing groundwater seepage at the base of the hill suggests that this area is a groundwater discharge zone, with lateral flows from shallow sediments and/or bedrock within the hill towards the ground surface”.

The area is not underlain by any known aquifer (MOE, 2010).

### 5.3 Vegetation Ecosystems

The property has been cleared of vegetation. Surrounding the site is a mature second growth western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) forest with components of Douglas fir (*Pseudotsuga menziesii*) and other deciduous species such as big leaf maple (*Acer macrophyllum*), vine maple (*Acer circinatum*) and red alder (*Alnus rubra*). Intact vegetation along the small stream that conveys off the property at the southwest corner includes blueberry (*Vaccinium* sp.), sword fern (*Polystichum munitum*) and salmonberry (*Rubus spectabilis*).

It is noted that along the west property line, the depression area was a pond complex prior to land management activities (details of this area are provided in Section 5.4).

### 5.4 Pond Complex Ecosystem

In July 2009, The Ministry of Environment (MOE) identified that a pond complex along the western edge of the property was the subject of works that resulted in the draining of this area. The drainage of this pond complex took place in the spring of 2008 and the ponds were drained completely and filled with gravel. This initiated an investigation by the MOE into the works (Ministry of Environment<sup>6</sup> letter), upon which the MOE requested that the client provide a description of the original form and function of this area as well as a habitat restoration plan to recreate the impacted system.

#### 5.4.1 Previous Conditions

LECL conducted an Ecological Assessment (EA) Report<sup>7</sup> that described the pre-disturbance state of the area. This report provided a qualitative and quantitative assessment of the known, remnant and anticipated land forms and biological communities contained within and adjacent to the subject property as required in the MOE letter (2009). Findings in the EA report noted the previous pond complex occupied a rectangular area of approximately 9000m<sup>2</sup> in recent years.

Local site topography, aerial photo interpretation and the depth of the outflow value previously located in the main dam suggest a pond depth of approximately 2 to 3 metres. In general, the area was composed of 2 distinct open water ponds connected by a narrow channel.

The pond complex functioned to provide habitat to a range of vegetation, aquatic, and terrestrial life. Included in the functions and habitat values provided by this pond complex were water filtration, flood abatement, enhancement of biodiversity in the area, a clean water and

<sup>6</sup> Unauthorized Changes In or About A Stream at 32900 Welch Ave, Maple Ridge, BC. Ministry of Environment. July 2009.

<sup>7</sup> Ecological Assessment of Previous Wetland at 32900 Welch Ave. Letts Environmental Consultants Limited, November 10, 2009.

nutrient source for fish located downstream of the property in Silverdale Creek and Mill Pond, as well as potential habitat for several species at risk.

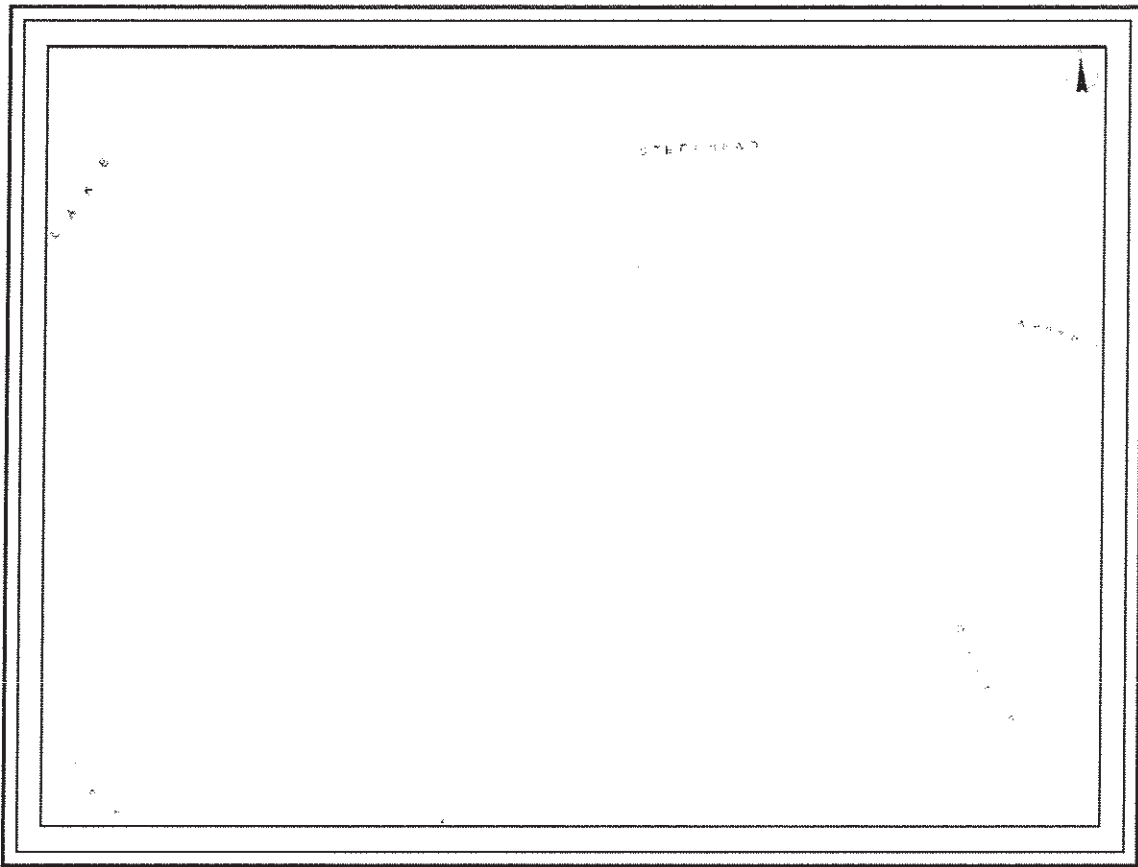
#### **5.4.2 Current Conditions**

Portions of the pond complex were partially infilled with gravel and/or cleared through land clearing activities. A number of small pools of shallow water are present in the original pond bottom, and vegetation is limited to small areas of low groundcover.

A Pond Complex Ecosystem Restoration Plan will be developed by LECL and is summarized in the forthcoming sections of this document. The goal of this plan is to restore the hydrological and ecological function of the pond complex and its associated riparian areas to equal those of the habitats eliminated.

### **5.5 Wildlife and Wildlife Habitat**

Much of the previously forested area of the property has been logged and most of the logs have been removed. A significant amount of logging debris/slash remains on the ground. Thus, opportunities for wildlife within this cleared area are very limited. The adjacent forested areas and the area near the watercourse on the southwest corner may offer marginal habitat for a number of vertebrate wildlife species. Information from the federal and provincial databases were utilized to generate a list of Species at Risk that may inhabit the proposed site or surrounding areas (Section 5.5.5). No known mapped occurrences of species at risk were noted within the general area of the proposed development.



**Figure 3:** Map of species at risk. Source: BC Species and Ecosystems Explorer, Conservation Data Centre, BC.

A comprehensive list of potentially occurring species within previous wetland area was provided in LECL Wetland Assessment Report. The information below is a general summary of species that may be present.

### 5.5.1 Mammals

Small mammals (mice, voles, shrews, etc.) may occupy the cleared area. It is likely that area surrounding the watercourse and forested areas adjacent to the site offer good wildlife habitat as these areas provide forage and cover opportunities and there is a more diverse vegetation structure. During site visits LECL personnel observed signs of black-tailed Deer (*Odocoileus hemionus*) and it is likely that species such as black bear (*Ursus americanus*), Douglas's squirrel (*Tamiasciurus douglasii*), coyote (*Canis latrans*), cougar (*Puma concolor*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*) and cottontail (*Sylvilagus* sp.) utilize the general area.

### 5.5.2 Birds

Bird use of the logged area is expected to be minimal. Birds were seen and heard during our field investigations and are likely utilizing the adjacent forested areas for nesting and cover.

A visual survey for raptor nests was completed along all forested edges. No raptor nests were observed. There are not significant numbers of large dead or dying trees along the edge of the forests where raptors are likely to select for roosting or nesting.

### **5.5.3 Amphibians and Reptiles**

The subject property likely does not offer habitat opportunities for amphibians and reptiles.

### **5.5.4 Fish**

Fish presence on the subject property is unknown. No fish inventories were completed during this assessment. No records of fish distribution are available for on the provincial FISS database or from the District of Mission overview map of fish presence locations. At minimum, the tributary to Silverdale Creek contributes cool nutrient-laden water to downstream fish resources in Mill Pond.

### **5.5.5 Species at Risk**

As of June 1, 2004, it is a federal offence to kill, harm, harass, capture or take an individual of a listed endangered or threatened species. These offences can also apply to prohibitions against the destruction of critical habitat.

Although no species at risk were identified during field studies by LECL, a search of the BC Species and Ecosystems Explorer for species listed under Schedule 1 of the Species at Risk Act was completed to identify potential species that may inhabit the site or areas immediately adjacent to the subject property. No mapped known occurrences were located in the general area of the subject property. A summary of these potential species, including federal and provincial designation and general habitat preferences is included below (Table 2) (Source: BC Species and Ecosystem Explorer).

**Table 2:** Summary of Potential Listed Species at Risk within the study area.

Scientific Name	Common Name	COSEWIC* listing	BC Status**	General Habitat
<b>Mammals</b>				
<i>Sorex bendirii</i>	Pacific Water Shrew	Endangered	Red-listed	Riparian marshy habitat, forages in streams, habitat comprised of more coniferous than deciduous trees
<b>Birds</b>				
<i>Megascops kennicottii</i>	Western Screech Owl	Special Concern	Blue-listed	Lower elevation forested areas, typically close to water
<b>Amphibians</b>				
<i>Ascaphus truei</i>	Coastal Tailed Frog	Special Concern	Blue-listed	Wet, coniferous forests, cold, clear mountain streams/creeks with forested borders
<i>Rana aurora</i>	Red-legged Frog	Special Concern	Blue-listed	Moist forests, ponds and stream
<i>Rana pretiosa</i>	Oregon Spotted Frog	Endangered	Red-listed	Marshes, sometimes within forested areas
<b>Fish</b>				
<i>Catostomus</i> sp.	Salish Sucker	Endangered	Red-listed	Coastal streams, small rivers with gravel bottoms, fairly slow currents
<b>Molluscs</b>				
<i>Allogona townsendiana</i>	Oregon Forestsnail	Endangered	Red-listed	Older, mixed wood deciduous lowland forests with woody debris and leaf litter
<b>Plants</b>				
<i>Cephalanthera austinae</i>	Phantom orchid	Threatened	Red-listed	Coniferous forests with little or sparse ground cover
<i>Lupinus rivularis</i>	Streambank lupine	Endangered	Red-listed	Riverbanks in sites with little ground cover

\*Committee On the Status of Wildlife In Canada

\*\*BC Status – Red-listed (Endangered), Blue listed (Threatened)

## 5.6 Soils/Geology

According to EBA Engineering (October 2010), the subsurface stratigraphy in the proposed mine area "...consists of silt, clay and cobbly glacial till..." (p.6). The bedrock consisted of "...generally massive biotite granite or diorite" (p.6). Geology consists of "...glacially-derived silt, clay, sand and gravel deposited in terraces along the valley sides" (p.2).

At the east foot of the bedrock are Pleistocene lodgement and flow tills." (Valley Testing Services Ltd<sup>8</sup>).

<sup>8</sup> Valley Testing Services Ltd. Preliminary Quality Testing of Rock and Gravel Materials. September 2010.

## **5.7 Visual Quality / Aesthetics**

The west side of the proposed extraction site is visible from Welch Avenue. However, there are no homes in the immediate area surrounding this property. The property is in close proximity to two other gravel pits located to the north.

## **6.0 PROJECT DEVELOPMENT PROCEDURES**

### **6.1 Mining Sequence and Development Plan**

Installation of sediment and stormwater management facilities will be required prior to the commencement of mining activities. Quarry mining operations are proposed to be initiated at the upper east side (Phase 1 Bench Area) and move down the slope (westward). This will involve drilling and blasting the bedrock which then can be transferred to the lower area where it will be processed. The final slope will be terraced.

Gravel extraction is proposed for the northwest corner (651,000 tonnes). Sediment and Erosion Control should be sequenced to match current operations. The stormwater treatment facility will incorporate one of the two proposed constructed ponds, which should be installed as a stormwater treatment area. Once mining is complete, this pond should be converted to function as a permanent pond ecosystem.

The southwest portion of the west property line will be the location of the permanent wetland that will be constructed prior to mining operations. A 15m riparian setback for the channel along the south property line should also be maintained.

### **6.2 Site Preparations and Equipment**

Blasting will be required on the sloped portion of the site. Processing of blasted rock will take place in the lower northwest corner of the site. Bulldozers, front-end loaders and excavators will be used to remove topsoils for road construction and / or stockpiling.

Track excavators and front-end loaders likely will be used for gravel extraction. All topsoils / material should be removed in accordance with the District of Mission Soil Removal Bylaw (3088-1997) and any additional conditions set out therein. Overburden of unwanted material such as glacial sands, clays and peat should also be stockpiled and preserved for future restoration / reclamation work.

Access into the mine area will be from along Dewdney Trunk Road, with entrance along Larsen Street and exiting out Welch Avenue. Gravel trucks will also be used to haul the final product to the surrounding local community.

Clearing (removal of trees and vegetation) has already taken place. Grubbing (removal of any stumps and root systems) will likely take place in areas that will be actively used for extraction and stockpiling in the near future.

### **6.3 Utility Service Requirements**

It is not known what facilities will be proposed on-site.

### **6.4 Fuel Storage and Supply**

Petroleum products such as diesel and gasoline will likely be used as fuel and for the maintenance of mobile equipment. Other chemicals such as lubricants required for routine equipment repair may also be used.

### **6.5 Heat**

Heat for any proposed facility and scale shack is expected to be electrical but is not known at this time.

### **6.6 Toxic / Hazardous Materials**

Petroleum (diesel / gasoline) products and lubricants will likely be used for fuelling and servicing mobile equipment, and for maintenance of mobile equipment.

## **7.0 ENVIRONMENTAL IMPACTS**

There are numerous Environmental Concerns regarding mining operations. The main environmental impacts associated with the proposed mining operation include the following:

- Aquatic / Hydrological Resources – *Water Quality*
- Habitat Alteration – *Vegetation, Wildlife*
- Pollution – *Dust, Noise, On-site Facilities*
- Cultural Features – *Aesthetics & Public Safety*.

Mining this site will alter surface and sub-surface flow patterns, which may result in changes in water quality. Blasting bedrock and gravel extraction will permanently change the topography, alter soils and aesthetic values, and increase the hazard risk to public safety.

The large amount of exposed soils can increase erosion and sedimentation. In addition, extraction and blasting will result in a progressive disruption of wildlife movement throughout the site. As the site is developed and other associated activities take place, wildlife trails / corridors and habitat will be eliminated.

### **7.1 Aquatic/Hydrologic Resources**

#### **7.1.1 Surface water/watercourses**

Maintaining water quality is a primary environmental concern at a mining site. This includes stormwater management, groundwater and surface water protection, and discharge options for stormwater and process water. Protecting water quality means ensuring that any water discharged from the operation will meet provincial and federal standards. Prevention of negative impacts on water quality is always preferable to treatment.

Specifically, increased runoff and off-site sedimentation may result. As extraction proceeds, the surface and subsurface hydraulic regimes and the flow patterns and delivery rhythms will be altered. These may increase both the peak flow as well as the volume of surface runoff. Unmitigated, this can result in increased erosion and degradation of water quality as well as damage to terrestrial and aquatic environments. Stormwater drainage and excess sedimentation can greatly alter plant and animal communities, and can adversely affect streams by causing changes in water chemistry, turbidity, temperature, and streambed morphology. Such changes will affect aquatic organisms and habitats.

The processes of clearing, excavating, blasting, processing and stock piling of materials on the subject property will produce fine sands and silts. General activities such as traffic (haul trucks) will further breakdown and compact fine sands and will increase compaction and accelerate surface runoff. Compaction may result in excess water ponding on the soil surface, leading to soil saturation and reduced infiltration capacity. Ponding may also increase the risk of fines being translocated off-site by haul trucks. The location and quantity of stockpiles will also affect levels of sediment load to drainage ditches and retention facilities.

### **7.1.2 Groundwater**

The hydrological and hydrogeological conditions and potential impacts related to the proposed development were evaluated and summarized by EBA Engineering (Oct 2010). It is important to ensure that the long-term quality and quantity of groundwater is not affected or disrupted. Mining can alter subsurface flow patterns and negatively impact groundwater flow downgradient of the site.

Findings from EBA Engineering's report are summarized in Section 8.2.2.

## **7.2 Habitat Alteration**

### **7.2.1 Vegetation**

Most of the vegetation with the exception of a narrow strip near the small stream in the southwest corner has been removed. Operators should retain any existing vegetation (shrubs, root wads) on areas of high erosion potential such as erodible soils and steep slopes. If it becomes necessary to remove vegetation from these areas, revegetation should be done as quickly as possible thereafter. Interim measures should include covering the site with tarps, geotextiles, or straw.

### **7.2.2 Wildlife and Wildlife Habitat**

Development has historically degraded or completely eliminated wildlife habitat associated with the land-base within which it occurs. The development of this site will eventually result in the elimination of habitat with the exception of the riparian area along the south watercourse and the pond area on the west property line. The pond complex will be constructed prior to the commencement of any mining activities. One of the two ponds within the pond complex ecosystem will serve as permanent pond habitat, while the other will be installed as stormwater management facility and will be converted to permanent pond ecosystem following completion of mining activities.



Species such as blacktail deer and black bear will be displaced and may be replaced with species more tolerant of human activities such as raccoons (*Procyon lotor*), and coyotes. Other species that may have utilized the site prior to disturbance likely will not return until the habitat around the pond/channel area is restored. Mining activities (blasting, noise, etc.) likely will disturb wildlife in adjacent areas as well.

## 7.3 POLLUTION

### 7.3.1 Dust

Dust is any particle up to 75 microns ( $\mu\text{m}$ ) in size and has a wide variety of man-made and natural origins. The most difficult type of dust to control is "fugitive" dust, which is generated by unstable, non-point sources (like movement of equipment). Dust is a common cause of complaints at mining operations. Exposed soils are hotter and drier, and will result in more air-borne pollution (dust).

Potential sources of dust include, but are not limited to:

- vegetation clearing and hauling,
- stripping soils / overburden (depending on soil moisture content),
- road construction,
- loader and haul truck movement (on and off-site),
- personnel, supervisory, and service vehicles,
- loading material and blasting
- stockpiling materials, and
- offsite traffic – personal, trucks, deliveries, visitors.

During mining dust will be generated by:

- construction of water management structures,
- road construction,
- material excavation and blasting
- processing (crushing and screening),
- haul truck and loader movement (on and off-site),
- personnel, supervisory, and service vehicles (on and off-site),
- stockpiling materials, and
- loading.

The levels of dust will be determined by soil moisture content, traffic speed, and dry weather. Dust levels will most likely be highest during the drier summer months. Visible coarse dust and emissions from mobile equipment will travel beyond property boundaries during heavy winds in dry weather.

Dust settling in the riparian setback areas around the watercourses and the permanent wetland may affect the biotic integrity of these areas. Incorporating an effective dust management plan will dramatically reduce the levels of dust infiltrating these buffer strips. Reducing the potential for dust creation and dust control should be part of ongoing operations.

### **7.3.2 Noise**

An increase in ambient noise levels will result from the proposed mine. Noise is associated with a great number of common activities at mining operations, including blasting, loading, crushing, screening, washing and hauling. Noise is one of the most commonly cited community concerns regarding operations.

Noise may be generated by blasting, rock impacting metal, equipment noise (crushers), loaders, and load out facilities and trucks. Intermittent noise from trucks will result from three sources: engine noise, transmission brake noise, and backup horns. Noise from the excavator will occur infrequently throughout the day (principally from the backup horn). Noise generated from the loader will be more frequent as it will back up more frequently in truck loading, hauling and processing operations.

### **7.3.3 On-Site Facilities**

Petroleum products such as diesel and gasoline likely will be used as fuel and for the maintenance of mobile equipment. Fuel storage facilities located in unsuitable locations, or not protected, may cause accidental impacts. Any petroleum products spilled or burned may result in contamination to the local environment, groundwater, and aquatic life.

## **7.4 Cultural Features**

### **7.4.1 Aesthetic Values/Visual**

The extraction operation will significantly affect the visual quality of the area. Managing the appearance of the operation is important. Visual landscape planning balances the aesthetic concerns of the community with the operations of the mine. Processing facilities may be less attractive than overall surroundings and considerations to visual impacts during mine layout planning should be completed.

Visual evidence of the site and ongoing alterations will be visible from Welch Avenue to the west.

### **7.4.2 Public Safety**

High-bank cut slopes and unauthorized entry into the site during hours of operation will pose the most significant risks to human health and safety. Unskilled or unauthorized individuals moving on top of or below high cut slopes are at risk of falling off or, having loose debris falling on them. Unauthorized people entering or moving around the site and / or machinery during operations would be at risk to serious personal injury or death. The proposed pond complex should be fenced to prevent unauthorized entry.

### **7.4.3 Traffic**

An increase in heavy truck traffic along the access routes along Dewdney Trunk Road, Creston Avenue, Larsen Street and Welch Avenue is anticipated.

### 7.4.3 First Nations

No archaeological assessment or consultation with First Nations has been completed to date. It is not known what, if any, impacts to potentially occurring archaeological resources would result from the proposed mining operation. According to the Guide to Preparing Mine Permit Applications for Aggregate Pits and Quarries in BC, Mining and Minerals Division, MEMPR, aggregate pit and quarry applications are referred to First Nations for input.

## 8.0 MITIGATING MEASURES

Environmental concerns with aggregate mining can be mitigated through proper mine planning, diligent procedures, use of Best Management Practices and by integrating aggregate operations with local community planning. Undisturbed, sand, gravel and quarry rock are environmentally benign materials. Concerns arise when these resources are removed which causes environmental disturbance. The effects on the environment (i.e. plants, animals, soil, water and air) need to be considering during plan formation and operations.

The environmental impacts resulting from the mining operation range from those that can be minimized to those that are unavoidable (Table 3). Impacts termed unavoidable are those for which no practical mitigation measures exist. For the impacts that can be reduced, mitigating measures are outlined in the sections below.

**Table 3: Impacts from the Proposed Mining Operation**

Unavoidable Impacts	Impacts that can be Minimized
<ul style="list-style-type: none"> <li>• Noise</li> <li>• Vegetation removal</li> <li>• Aesthetics</li> <li>• Traffic increase</li> </ul>	<ul style="list-style-type: none"> <li>• Sediment loading</li> <li>• Pollution</li> <li>• Public safety</li> </ul>

The main concern with this site is the treatment of surface runoff. The impacts that may result from draining the site, such as increased sediment loading and discharge, can be reduced. To manage surface runoff from this site will require a series of ditches, check dams and stormwater treatment facility to treat runoff from roads and mined areas from the different pit areas over the various stages of site development. The construction of retention facilities and ditches should take place first. Additional land clearing and extraction and blasting should only begin after erosion and sediment control measures are in place.

All sediment control measures incorporated should prevent the loss of sediment off-site and should follow the current standards set out in the BC Ministry of Environment's "*Land Development Guidelines for the Protection of Aquatic Habitat*".

Best Management Practices incorporated into the mining operation may;

- Provide effective, economical and safe stormwater management, discharge and erosion and sediment control
- Reduce siltation
- Control dust
- Control noise emissions,

- Discourage garbage dumping
- Provide pollution control

## 8.1 Pond Complex Ecosystem Restoration Plan

This section is a summary of the Pond Complex Ecosystem Restoration Plan that has been developed to date to address the concerns raised by the Ministry of Environment in the July 31, 2009 memo as result of the prior habitat disturbance. Prior to the commencement of any mining activities on the property, a comprehensive Pond Complex Ecosystem Restoration Plan for the construction, phasing and maintenance of the pond complex will be prepared and implemented. The plan will describe the goals, procedures, and outcomes of the habitat restoration to be undertaken to restore impacted habitat. Below is a general summary of the procedures that will be followed in constructing the wetland habitat.

The form and features of the restored wetland habitat will replicate the original wetland habitat as closely as possible. However, it is noted that original habitat can only be inferred from available assessments and information. The original habitat evaluation included open areas of permanent water with lightly vegetated banks. Although the banks of the ponds were generally graded between 1:1 and 1.5:1 prior to disturbance, the banks of the ponds below the top of banks should be graded no greater than 2:1 to provide stable, non-eroding banks.

The goal of the habitat restoration plan is to establish a functioning long-term permanent pond complex that contains the biophysical characteristics of a naturally occurring pond / wetland. This includes habitat for wildlife such as birds, amphibians and reptiles, and a variety of wetland and aquatic plants. It is understood that the pond complex will be constructed first at the southwest corner of the property. This facility will encompass a wetted area of 4,555.3m<sup>2</sup> and will be complexed with native plant species that were likely found in the original pond complex, as well as abiotic habitat features such as large woody debris and boulder clusters.

The total offered restored habitat area (including aquatic and riparian habitats) will equate to approximately 20,753.48 m<sup>2</sup>. Plant selection and abiotic habitat features will be extrapolated from nearby Mill Pond, which presently offers a representation of habitat similar to the original habitat and species composition found on this property). LECL "Ecological Assessment of Previous Wetland at 32900 Welch Avenue" (2009) provides a comprehensive overview of nearby Mill Pond.

**Table 4: Estimated Areas of Impacted Habitat and Proposed Restoration Areas**

Pre-disturbance Conditions (Excluding Riparian Habitat)		
Approximately 9000 m <sup>2</sup>		
Proposed Pond Ecosystem Restoration		
Details	Aquatic Habitat	Riparian Habitat
Pond Complex	8,246.90 m <sup>2</sup>	7,393.24 m <sup>2</sup>
Toe of Slope Channel	1,144.39 m <sup>2</sup>	3,968.95 m <sup>2</sup>
<b>Total Proposed Restored Areas</b>	<b>9,391.29 m<sup>2</sup></b>	<b>11,362.19 m<sup>2</sup></b>
<b>Combined Total</b>	<b>20,753.48 m<sup>2</sup></b>	

### 8.1.1 Shape and Features

The proposed pond complex will consist of two separate 'pond' areas. Pond A, located in the extreme southwest corner of the property, will be constructed to its permanent configuration. Pond B, immediately north of Pond A, will function as a stormwater treatment facility throughout the life of the mine. Pond B will then be transformed to pond habitat following completion of mining activities. The banks of the ponds below the top of banks should be graded no greater than 2:1 to provide stable, non-eroding banks. Riparian areas out from the top of banks, specifically the north and east side of Pond B and east side of Pond A should be graded no greater than 3:1.

The pond complex should be diverse and contain elevated vegetated hummocks, clusters of large woody debris, root wads and boulder clusters. Each of these features serves a distinct purpose in pond habitat and contribute collectively to the ecological complexity inherent to wetlands. The perimeter of the pond system should consist of a 15m buffer of native vegetation from the top of bank. All native plants planted within setbacks areas buffering the ponds should be planted within a 0.3m deep layer of approved landscape topsoil. The topsoil should be lightly compacted and graded so as to not result in water pooling.

Diversity within a pond system provides a wide range of habitat for the various life stages of wildlife including amphibians, reptiles, invertebrates, small mammals and birds. Ponds and wetlands are used by amphibians, invertebrates and reptiles as areas to forage, breed, nest. For instance, clusters of large woody debris serve as concealing cover, flooded areas are used for breeding, and the buffer area surrounding the wetland ponds serves as refuge<sup>9</sup>. Ephemeral, or

<sup>9</sup> It is not possible to provide an accurate distinction between habitat areas of open water from areas of adjacent riparian habitat. Aerial photo interpretation since 1983 indicates that area of pond/wetland with open water surface varied from year to year.

<sup>9</sup> Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia, Ministry of Water, Land and Air Protection, November 2004; Wind, E. and B. Beese. 2008. Little known and little understood: Development of a small wetland assessment field card to identify potential breeding habitat for amphibians. *BC Journal of Ecosystems and Management* 9(1):47-49.

seasonal, pools that dry up during the summer months also serve as breeding habitat for species of amphibians that migrate between wetlands and forested areas<sup>10</sup>.

Aerial photo interpretation completed by LECL (Ecological Assessment 2009) noted that the area of open water surface varied from year to year but open water was present. The proposed pond/wetland aims to maintain water in the pond at all times of the year to mimic the likely pre-disturbance conditions. It should be noted that the final mine floor should be graded in a manner where all internal runoff is directed to the more northerly Pond B system. This approach will be required to maintain the ponds habitat during periods of drought and assist in meeting the long-term hydrological needs of the desired aquatic and terrestrial communities.

### 8.1.2 Equipment

Pre-construction works (including the initial site excavation and lining of the pond bottom) will require the use of machines. All machines employed in the excavation, construction and maintenance of the wetland should follow “Best Management Practices” outlined in a detailed Pond Complex Ecosystem Restoration Plan and Environmental Management Plan.

### 8.1.3 Soils

Following excavation, the pond bottom should be lined with no less than 0.3 metres of moist malleable clay up to the ponds top of banks. Clay is the preferred material in lining constructed wetlands and if applied properly will prevent water from draining from the ponds. There are no available groundwater sources of water to maintain a sufficient hydroperiod. A layer of landscape topsoil no less than 0.3m deep should be spread and lightly compacted on top of the clay liner along the vegetated banks and internal hummocks. This soil provides a growing medium for vegetation while organic litter from wetland plants develops during the initial years.

### 8.1.4 Plants and Planting Methods

A variety of emergent and submerged plants are recommended for planting in the pond system(s). Plants should be selected according to their function in the pond system, their rate of growth and colonization and their compatibility with the general climate, soil type, and other plants. These should include species native to the area such as rushes (*Juncus* spp.), sedges (*Carex* spp.), flowering shrubs (*Rubus* spp., *Cornus* spp., *Rosa* spp.), and a variety of trees such as Sitka spruce (*Picea sitchensis*) and black cottonwood (*Populus trichocarpa*). LECL (2009) “Ecological Assessment of Previous Wetland at 32900 Welch Avenue” lists plant species found at nearby Mill Pond, an ecosystem similar to that expected at Welch Ave. This information, in conjunction with literature referenced below and observation of site conditions, should be used to compile a comprehensive summary of the plant species and numbers to be planted as part of the pond restoration.

Plant stock should be acquired from a local nursery and delivered on site immediately before planting to prevent plant die-off prior to planting.

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<sup>10</sup> Habitat Management Guidelines for Amphibians and Reptiles of the Midwest, Partners in Amphibian and Reptile Conservation

Planting should be undertaken during the growing season to allow time for vegetation to establish before the next dormant period and should be conducted by hand. Plants should be protected from wildlife damage by placing a temporary mesh fence overtop of the planted areas. This would ensure that the sensitive roots of young plants will not be uprooted or eaten by wildlife.

### **8.1.5 Spillway and Water Control Design**

As part of the final pond complex (Pond B) that will be in place following the completion of mining activities, the following guidelines should be implemented. The final mine floor should be graded in a manner where internal surface runoff is directed to the north end of Pond B. Runoff should then be directed to one or more receiving manhole type structures such as a Vortech Unit or Stormceptor at a location back from the established riparian habitat limits and or as determined by a Professional Engineer. Oil/water separators may also be required and are suitable for removal of floatable petroleum-based contaminants from small areas such as parking lots via a coalescing plate oil/water separator. The inlet by which water is released into the forebay area of Pond B should consist of a culvert that directs flows into a distributor pipe buried in gravel that will disperse flows.

The outlet by which water evacuates from Pond B should consist of an adjustable-height weir or spillway (if the existing roadway is removed) or adjustable riser pipes (if the existing roadway remains in place) that will allow water levels to be adjusted and prevent system failure in the event of changes in the water level. Both Ponds must be designed in a manner that ensures they will not dewater and will provide a supply of clean water to off-site habitat systems.

### **8.1.6 Maintenance and Monitoring**

The objective of pond maintenance is to ensure continued system performance and wetland health in the initial stages of habitat development so that deficiencies and issues that may arise as the pond complex undergoes gradual natural changes can be addressed and rectified in a timely manner.

Vegetation should be inspected on a monthly basis following the final watering of the wetland (the final stage of planting) for a period of two years after which a yearly review should be conducted. Reviews of vegetation should include maintenance of existing vegetation, replacing unsuccessful plants, and removing invasive or weedy species. Maintenance should also include the removal of sediments and/or debris accumulated at the inflow and outflow points. The litter trap located at the outflow should be cleaned at minimum 4 times per year. Other routine maintenance tasks include ensuring that stagnant areas have not developed and that all areas of the pond are permanently watered. Water quality readings will not be carried out.

A comprehensive monitoring plan will be developed and included in the Pond Ecosystem Restoration Manual and will include the specific objectives, duration, frequency, tasks, and reporting/resource requirements of monitoring.

## 8.2 Aquatic/Hydrologic Resources

In addition to the Pond Complex Ecosystem Restoration Plan, a comprehensive Environmental Management Plan (EMP) for this site should be prepared. An EMP will identify any components of the project that could present a hazard to the environment, including water quality. This plan should describe how effects to water quality will be mitigated through best management practices, proper work and emergency response procedures.

### 8.2.1 Surface Water/Watercourse

As this area is developed, interceptor-conveyance ditches will need to be continually added and managed. The primary role of interceptor ditches is to convey flows received from higher developed areas and away from locations where operations are being carried out. Interceptor ditches should only be constructed or altered during favourable weather conditions, as sediment loading is greatest during ditch alteration or relocation. Fortunately, the pervious soil characteristics of non-compacted sand and gravel will result in most precipitation permeating at the point of impact.

The ultimate objective should be to convey flows to the towards treatment facilities. Specific details of runoff management should be provided in a detailed Environmental Management Plan (EMP) for this site. Specific design details with all storm water systems and retention ponds / facilities should be in accordance with the Ministry of Environments "*Land Development Guidelines for the Protection of Aquatic Habitats*", and local precipitation data. A certified engineer should design all storm water facilities.

Ditches should be constructed along the toe of all cut slopes. All ditches should ultimately convey flows into adequately sized retention facilities. A series of rock check dams should be incorporated in the entire length of all ditches. These will reduce flow velocity, retain flows for longer periods of time, and limit the transport of sediment off-site. Where possible the ditch shoulders and banks should be seeded immediately after installation. All horizontal surfaces should slope away from all cut slopes.

The location and quantity of soil stockpiles will also affect levels of sediment load to drainage ditches and retention facilities. Topsoils stockpiled for longer than 30 days should either be vegetated or covered. A silt fence should be installed around the perimeter of the each soil stockpile.

Considerations in the design criteria for ditches and sediment ponds include;

1. Storm event treatment period: for example, 6-month, 24-hour storm. Short-duration, high -intensity summer storms are of interest because of their ability to produce high runoff and pollutant loading / wash-off rates, particularly following long periods of dry weather.
2. For grass-lined ditches: these are appropriate providing conveyance design velocity does not exceed 6 ft/sec. Velocities in excess of 6 ft/sec. will require rip rap or paved channels. Establishment of dense, resistant vegetation is critical. The channel depth should be proportioned to meet the needs of drainage, soil conditions, erosion control needs, and site conditions such as design grades and natural



topography. Stone channel bottom lining may be needed where prolonged low flow is anticipated. Outlets should be sized for adequate carrying capacity based on design discharge volumes. Outlets need to be protected from erosion by limiting exit velocity with adequate energy dissipators.

Permanent grass channels need to be protected from excess sedimentation, especially during periods of heavy land disturbance. This can be accomplished by effective use of diversions, temporary sediment traps, check dams and vegetated filter strips along the channel.

We recommend that no works or gravel extraction should take place within the 15m setback adjacent to the small south-side watercourse or pond complex. The following steps are recommended to minimize impacts on water quality:

1. Construct retention facilities and ditches prior to extraction.
2. Construct all ditches large enough so as to incorporate step weirs, check dams or linear sediment ponds if required.
3. Control sediment release from areas disturbed during operations such that no off-site sedimentation occurs.
4. Minimize erosion of soils by diverting runoff away from disturbed areas or other sources of contamination to meet water quality objectives.
5. Treat any diverted waters as necessary to remove sediment such that site-specific water quality objectives are met.
6. Implement and improve sediment control measures prior to the start of operations.
7. Cease construction activities or other activities contributing to sediment release and improve sediment control measures whenever water quality objectives are exceeded.
8. Establish on and off-site water quality monitoring locations.
9. Recruit a qualified independent environmental monitor to oversee the construction and maintenance of all sediment control facilities, and inspect check dams and ditches for damage after each run-off event.
10. Cover and / or vegetate materials stockpiled longer than 30 days. If this is not feasible then install silt fences around their bases.

## 8.2.2 Groundwater

EBA Engineering Consultants Ltd. concluded that "...the proposed gravel and bedrock mining activity is not expected to impact groundwater quantity or quality in the vicinity of and downgradient from the site" (p.12)<sup>11</sup>.

## 8.3 Habitat Alteration

### 8.3.1 Vegetation

Numerous large trees are located immediately adjacent to the site. Where excavation is to take place within 4m of the drip line of a tree, a protection barrier at least 1.2m in height should be installed around the tree. The diameter of the barrier shall be no smaller than the drip line of the trees(s). The barrier should be constructed of snow fencing staked every 1m, plywood sheets

<sup>11</sup> Surface Hydrology and Hydrogeologic Assessment. EBA Engineering Consultants Limited. October 2010.

fastened to wooden stakes or another form approved by the environmental monitor. The barrier(s) should be constructed prior to any works and remain intact until all works are complete.

Vegetation plays a critical role in protecting the soil surface from raindrop impact, which is a major force in dislodging soil particles and moving them down slope. It also shields the soil surface from the scouring effect of overland flow and decreases the erosive capacity of the flowing water by reducing its velocity. Besides preventing erosion, healthy vegetated cover cuts down on heat reflectance and dust. It also provides the essential components for sustaining wildlife.

The removal of the site's remaining groundcover will leave the site vulnerable to accelerated erosion and will greatly increase off-site sedimentation. Preserving the natural vegetation on-site to the maximum extent practicable will minimize the impacts of gravel pit development on stormwater runoff. Appropriate sequencing of construction activities can be an effective way to reduce the negative impacts of the proposed development.

### **8.3.2 Wildlife and Wildlife Habitat**

A riparian buffer of 15m from the top of bank should be maintained on the south side watercourse to protect the integrity of the channel.

A Pond Complex Ecosystem Restoration Plan will be developed and implemented for the pond on the west property line. This will be protected with a 15m buffer that extends out from the top of the pond banks.

## **8.4 Pollution**

It is anticipated that there will be some limited impacts to ambient air quality in the immediate area due to equipment exhaust, movement, etc. The affected areas are localized around the immediate area, and the subject property is not within a populated area and should not affect local residents.

### **8.4.1 Dust**

Dust generation sources should be controlled to the greatest extent practical by watering. Mitigation could include inundation or surface sprays.

During dry weather, haul trucks should use canvas load covers or have trucks run underneath a sprinkler system.

The following measures should be incorporated to reduce dust generation:

1. Incorporate a dust control program for road surfaces to include effective control measures successfully used in BC.
2. Install dust control systems on all transfer systems (trucks), and surface amendments such as inundation or sprays to control areas, which are dust sources.
3. Schedule construction operations so that the least area is disturbed at one time.
4. Leave undisturbed buffer areas between graded areas wherever possible.

5. Vegetate or cover stockpiled soils with grasses with a mix of native seed prior to summers end.
6. Traffic speed should be kept below 30km / hour throughout this site.

#### 8.4.2 Noise

Adjacent forested areas will act as noise dissipitators. Audible alarms on mobile equipment are currently required by the Health, Safety and Reclamation Code for Mines in British Columbia and therefore cannot be altered. Haul trucks should refrain from using transmission brakes while traveling Dewdney Trunk Road.

Where safety is not an issue, large trees should be left along the west side to preserve visual quality and dissipate noise.

#### 8.4.3 On-Site Facilities

The following spill prevention measures should be implemented during operations

- Petrochemicals should be stored in approved, environmentally safe containers and locations.
- Mobile construction equipment should be fuelled, lubricated and serviced only at pre-approved locations.
- Except in emergencies, field servicing of equipment near the setback area(s) should not be permitted.
- Equipment and machinery should not be washed near any environmentally sensitive area (i.e. watercourse or pond area).

Petroleum products should be stored where they will be protected from accidental impact, and where fire suppression equipment and spill kits (for small spills incidental to filling and use of tanks) should be available. Spill kits should be made available for small spills. All tanks and fuelling stations should meet Provincial and *National Fire Code* standards. Waste oil from vehicle maintenance should be collected and stored in an approved waste oil storage tank. All waste oil should be recycled through a petroleum products supplier.

Petroleum products should be stored where they will be protected from accidental impact, and where fire suppression equipment and spill kits (for small spills incidental to filling and use of tanks) will be available. Spill kits should be made available for small spills. All tanks and fuelling stations should meet BC and *National Fire Code* standards.

Waste oil from vehicle maintenance should be collected and stored in an approved waste oil tank. All waste oil should be recycled through a petroleum products supplier.

### 8.5 Cultural Features

#### 8.5.1 Aesthetic Values

Where safety is not an issue, large trees should be left to block mine visibility where possible. All exposed surface soils, stockpiles, slopes, and ditches throughout the subject property should be seeded with a mix of native seed prior to summers end.

## 8.5.2 Public Safety

Sand and gravel pits and rock quarries commonly have activities and equipment that are potentially hazardous. Risks at aggregate operations may affect people (employees and the public), the environment or the operation.

Fencing (as per the Mines Act) should be erected along the west side of this site and encompass both pond facilities. Fences should be installed along established setback limits. Appropriate signage should also be attached to this fencing warning of the hazards associated with the site and or sensitivities (associated with the ponds).

Fencing should also be erected to surround all high bank cut-slopes along all forest edges. Several clearly visible signs should be erected at all site entrance points. Signs should outline current regulations, and hazards associated with entry onto construction sites. This would include, but not be limited to, general entry requirements (hard-hats etc), and specific site hazards.

## 8.6 Construction and Maintenance

### 8.6.1 Roads

Roads will compact, collect and convey runoff water along their surface. Rills, gullies and ponding areas will form unless the road is stable and surface flows managed. Specific recommendations regarding controlling surface flows and reduce surface flow rates along roads are provided below.

The industrial access roads should be constructed / built according to the BC *Mines Act* requirements and / or Provincial and local regulations. To control surface flows and reduce surface flow rates we recommend the following:

1. Ensure that the road follows the natural contours of the terrain if it is possible.
2. Ensure that grades do not exceed 8%.
3. Provide surface drainage, and divert runoff towards treatment facilities by using water bars or cobble filled ditches.
4. Armor all runoff outlets / areas.
5. Keep cuts and fills at 2:1 or flatter for safety and stability and if possible add ground cover.
6. Where seepage areas or seasonally wet areas must be crossed, install subsurface drains. All drain inlets and outlets should be armored.
7. Install ditches along the toe of roads with check dams and / or silt fences.
8. Vegetate all roadside ditches, cuts, fills and other disturbed areas or otherwise appropriately stabilize as soon as grading is complete.
9. Overburden of unwanted material such as glacial sands, clays and peat should also be stockpiled and preserved for future restoration / reclamation work.

Inspect construction roads and parking areas periodically for condition of surface. Top-dress with new gravel as needed. Check all ditches and other areas for erosion and sedimentation after runoff producing rains. Sediment producing areas should be treated immediately.

## 8.6.2 Construction Scheduling

Scheduling of activities can minimize the effects of the operations on the environment. Table 5 outlines the general sequencing of the operation.

**Table 5.** Considerations for construction scheduling for the proposed gravel pit.

<b>Construction Activity</b>	<b>SCHEDULING SEQUENCE</b>
<p><b>1. Construction access</b> Construction entrance, construction routes, equipment parking areas.</p>	Stabilize bare areas immediately with gravel and temporary vegetation as land disturbances take place.
<p><b>2. Pond A Creation</b></p>	Excavate and create permanent Pond A in southwest corner of property.
<p><b>3. Sediment traps and barriers</b> Basin traps, sediment fences, and outlet protection.</p>	Install principal basins after construction site is accessed. Install additional temporary traps as needed during grading.
<p><b>4. Runoff control</b> Diversions, water bars, outlet protection.</p>	Install key sedimentation control practices after principal sediment traps.
<p><b>5. Runoff conveyance</b> Stabilize channels, inlet and outlet protection.</p>	Install principal runoff conveyance system with runoff control measures.
<p><b>6. Mining Activities</b></p>	Begin excavation activities once principal sediment and runoff control measures are installed. Install additional temporary protection measures and maintain respect for riparian setback areas.
<p><b>7. Surface Stabilization, Pond B</b> Temporary and permanent seeding, mulching, sod.</p>	Apply temporary or permanent stabilization measures immediately on all disturbed areas when cutting / filling is delayed or completed.  Convert stormwater treatment facility to Pond B.
<p><b>8. Final stabilization</b> Topsoil, permanent seeding.</p>	Last construction phase. Stabilize all disturbed areas except for areas of active aggregate extraction. Remove and stabilize all temporary control measures.
<p><i>Maintenance: inspections should be performed weekly and after periods of rainfall. Repairs should be made immediately.</i></p>	

## 9.0 MONITORING

Monitoring by an appropriately qualified environmental monitor should be completed during all phases of the project; pre-excavation, start-up, operation, closure and post-completion.

Monitoring is critical to ensure compliance with legislation, regulations and guidelines, including all BMP's and other requirements. Monitoring frequency will be dependant upon the activities being conducted and current site conditions. Monitoring will likely be more frequent during and after heavy rainfall events and less frequent when conditions are stable. The standards and best practices for the excavation works and all appropriate plans, drawings, and documents will be provided to the contractor or crew supervisor, and this information will be readily available at the site while the work is proceeding. A pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site should be held to ensure a common understanding of the mitigative best practices for the project.

A comprehensive Environmental Monitoring Plan should be developed for this site.

## 10.0 CONCLUSIONS

Appropriate sequencing of construction activities can be an effective way to reduce the negative impacts of the proposed development. The conclusions of this Environmental Impact Assessment are that:

1. Surface and sub-surface flow patterns will change but no significant impacts to downgradient groundwater are anticipated.
2. A comprehensive plan to manage and treat stormwater and address sediment and erosion control should be implemented. This will reduce the negative impact of the development on water quality.
3. Pond complex creation in the southwest corner should be undertaken prior to mining activities.
4. Pollution mitigation measures outlined above will minimize the effects of gravel pit development and should be implemented during all stages of the mine.

Please do not hesitate to contact the undersigned with any questions or concerns.

Yours Truly,

and

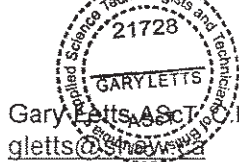


Toby Jones, RP Bio. For:  
Letts Environmental Consultants Ltd.

Diana Cobaschi, BSc. For:  
Letts Environmental Consultants Ltd.

Reviewed By:

**LETTS ENVIRONMENTAL CONSULTANTS LTD.**



Gary Letts, ASCT, E.T., Principal  
gletts@lettsenv.com

## 11.0 REFERENCES

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November 24, 2011

File No: 76800-20/LMR51-02-Pitt Lake

N & J Developments Ltd.  
25469 84<sup>th</sup> Ave.  
Langley, BC  
V1M 3N2

**Re: Review of “Environmental Impact Assessment for Proposed Gravel Pit located at 32900 Welch Ave, Mission, B.C.”**

This letter is a review of the impact assessment and wetland restoration plan for 32900 Welch Ave, Mission, B.C. On July 31, 2009, the Assistant Regional Water Manager sent a letter requesting that the proponent rectify unauthorized changes in and about a stream that were made on this property, which is a general offense Under Section 93 of the *Water Act*. This information was requested by August 31, 2009, but was not received until November 14, 2011. While the overall content of this document is consistent with what was requested, further information and associated actions are required before this compensation plan can be approved. Cooperation with these requests will help to ensure compliance under the Water Act, and help to avoid escalating administrative action by the Ministry.

Please provide the following information and/or modifications to the wetland restoration plan:

1. *Provide more precise estimates of aquatic and riparian habitat loss.*

The report estimates that approximately 9000 m<sup>2</sup> of aquatic habitat existed under pre-disturbance conditions, but does not provide an estimate of riparian habitat loss. Estimates of pre-disturbance aquatic habitat levels can be estimated with greater precision using aerial photos and GIS tools, and should be estimated at high water levels. Amounts of pre-disturbance riparian habitat should be assessed using similar methods.

2. *Provide design modifications to support the use of the “toe of slope channel” as habitat compensation.*

In order for restored habitat to adequately compensate for habitat impacts, it must provide similar functionality to that which was lost. However, under the current design, this channel is unlikely to provide functional aquatic habitat. Because the channel is extremely narrow, it is unlikely to provide a sufficient hydroperiod similar to pre-disturbance conditions. Similarly, the riparian buffer width is so narrow that it is unlikely to provide functional habitat. The riparian area will likely be colonized by invasive plant species, and is not large enough to maintain water quality within the channel. As such, either significant modifications need to be developed to improve the functionality of this habitat (i.e. a larger buffer width with significant riparian planting), or the compensation ponds need to be enlarged to provide sufficient aquatic compensation totals to offset impacts.

3. *Provide additional assessment of the hydroperiod of the impacted wetlands.*

The report states that because open water was continually observed in aerial photographs, the compensation ponds should therefore be constructed as permanent wetlands. However, further evidence is required to improve certainty regarding the hydroperiod of the impacted wetlands. Aerial photographs during late summer/early fall (when water levels are at their lowest) need to be compared over multiple years to assess if these wetlands were indeed permanent. This assessment is important, as maintaining permanent water levels may result in negative consequences, such as colonization by invasive bullfrogs, which are detrimental to native amphibian species.

4. *Provide detail on how water quality will be maintained and restored in the stormwater detention pond.*

- a. Describe how sediment levels and other harmful substances/pollutants will be controlled to limit introduction into the pond system. This should include a description of the sediment control practices that will be employed when interceptor ditches etc. are used to convey flows towards the ponds. If these details will be included in the *Environmental Management Plan*, this document may be required before the compensation plan can be approved.
- b. Provide a timeline of mining activities and associated wetland construction. Please include the length of time Pond B will act as a stormwater treatment facility, and at what point it will be transformed to provide suitable habitat conditions.
- c. Describe how Pond B will be remediated after mining operations are complete, such that water quality and other habitat conditions are restored to reflect pre-disturbance conditions.

5. *Modification of the pond design to decrease slopes associated with ponds and riparian areas.*

The proposed slopes of the ponds below the top of bank and adjacent riparian areas are likely too steep to provide natural wetland habitat conditions. The impacted wetlands likely were associated with less steep slopes, which can be assessed by reviewing historical topographical maps of the area. Gradual slopes at wetland margins help to maintain a broader ecotone which benefits a wide variety of wildlife species. Gradual slopes enable riparian areas to retain moisture for longer periods, which provides important terrestrial habitat for Red-legged Frogs, Western Toads, and other amphibians. More gradual slopes could be facilitated by creating wider riparian buffers surrounding the ponds. If this is not possible during mining operations, the creation of water buffers could be conducted retroactively after mining operations are completed.

6. *Provide a monitoring plan associated with implementation and effectiveness of restoration activities.*

The Ministry requires assurance that restoration commitments will be implemented successfully. As such, a monitoring plan needs to be completed before approval of this compensation plan. The monitoring plan should include a description of how implementation of restoration works will be reported to the Ministry (before and after mining operations), and how the effectiveness of this restoration will be monitored. Effectiveness monitoring should utilize wildlife surveys including amphibian egg mass surveys. The plan should also include commitments to rectify any deficiencies with additional works.

If you have any questions in this regard, please do not hesitate to contact me.

Regards,

*Original signed by*

Josh Malt, M.Sc., R.P.Bio.  
Ecosystem Biologist

## Metcalfe, Megan MEM:EX

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**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Tuesday, February 12, 2013 6:52 PM  
**To:** Olsen, Michael MEM:EX  
**Subject:** FW: Norm Tapp  
**Attachments:** 1(a) OF 6.pdf

Here is a drawing indicating the proposed restoration plan for the "Investment Pond" (as Pond A). It also shows the location of Pond B to be used for the mining operation. I'll submit all the drawings that I had so you can see what the plan is supposed to be. I will take a look at what they submitted again tomorrow and give you a call in the afternoon. I have a site visit first thing in the morning.

Cheers!

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
2nd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5628 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

---

**From:** gary letts [<mailto:gletts@shaw.ca>]  
**Sent:** Wednesday, September 12, 2012 3:23 PM  
**To:** Jensen, Sandra L.S. FLNR:EX  
**Cc:** Norm Tapp Tapp  
**Subject:** Re: Norm Tapp

Area calculations included within plan.

On 2012-07-10, at 9:02 AM, Jensen, Sandra L.S. FLNR:EX wrote:

Hi Gary,

If the restoration plan is only for reinstating Cram Creek to its original location, then this drawing titled "Approximate Cram Creek Habitat Areas", LECL0127-12 is fine. However, I do need you to clarify the total aquatic habitat area and total offered habitat area as they keep on changing and the shapes of the pond has changed on this drawing as well.

As mentioned in my May 2, 2012 email in 4(a):

- a. The Final Wetland Habitat Plan states that there is 7,890 m2 for aquatic habitat but the December 22, 2011 letter states a total of 8,246.90. Also, the total offered habitat is 19,583 m2 on this Plan, but the EIA states 20,753 m2 and then you state 16,862.13 total riparian habitat in the December 22, 2011. If the totals in your December 22, 2011 report are your final totals, the plans submitted do not accurately reflect this. Letts stated that he would have to look into this. Please confirm the final values and ensure

they are accurately reflected on the drawings and submitted to me in writing (email is fine) so that this forms part of the final review documents for the restoration plan.

Please confirm with me what the areas are for Both Pond A and B (separately in aquatic and riparian) along with the Creek with the surveyed measurements. Please provide this in a table format as well as labelled on the drawing.

I am still waiting for the copy of the sediment control plan that was a requirement for the advisory letter 1 as mentioned in my May 2, 2012 email.

Thanks.

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
3rd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5627 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

---

**From:** gary letts [<mailto:gletts@shaw.ca>]

**Sent:** Monday, July 9, 2012 4:16 PM

**To:** Jensen, Sandra L.S. FLNR:EX

**Subject:** Re: Norm Tapp

I believe the surveyors were on-site. We are waiting for that survey file. Once received will commence in preparing final plans. I assume then that you are fine with Cram Creek being reinstated as per the most recent plan drawing?

Yes will revise the Table within the Assessment Report to reflect the actuals once we have the legal to work from.

:)

On 2012-07-09, at 2:13 PM, Jensen, Sandra L.S. FLNR:EX wrote:

Also, could you please inform me if the surveyor went out to Norm's property? Can you provide updated information in the environmental assessment on the habitat and riparian loss then in that table, which was based on the estimates.

Thanks.

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
3rd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5627 Fax: 604-586-4444

Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

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**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Monday, July 9, 2012 2:10 PM  
**To:** 'gary letts'  
**Subject:** RE: Norm Tapp

Thanks Gary for bringing that to my attention. I had just quickly passed this note onto you without taking into consideration that we have a 15m buffer that we agreed upon for the stormwater management system under the ponds. So after talking to Josh, we are satisfied with keeping the 15m setback you have stated in the environmental assessment for Cram Creek. Also, please proceed with the restoration plan as requested in the Advisory Letter 2 for Cram Creek.

In terms of my questions on the Advisory Letter 1 and the May 2, 2012 email. I will take it then, upon completion of the restoration plan, that you will be submitting a new Wetland Habitat Plan for both the ponds and Creek with the appropriate habitat and riparian loss and the necessary updates as mentioned in the May 2, 2012 letter? If so, then yes, we can wait for this to be revised with the latest restoration plan. You are correct, that we only need to have you submit this to us once. But please remember that if you are proposing more than one option, that we receive a Habitat Compensation Plan for all proposals. If not, please provide the Wetland Habitat Plan with the applicable revisions as outlined in the May 2, 2012 email under 4(a). Will you also then have finalized design drawings for both the ponds and creek, which would resolve my request in 4(b) of the May 2, 2012 email?

Also, please provide a copy of the sediment control plan that was a requirement for the advisory letter 1 as mentioned in my May 2, 2012 email.

Thanks Gary.

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
3rd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5627 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

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**From:** gary letts [<mailto:gletts@shaw.ca>]  
**Sent:** Monday, July 9, 2012 8:31 AM  
**To:** Jensen, Sandra L.S. FLNR:EX  
**Subject:** Re: Norm Tapp

Well, and since RAR is now the approach in Mission, we could base the setbacks on RAR if you prefer. The resultant SPEA will likely be 10m out from high water mark.  
What would you prefer?

On 2012-07-09, at 8:21 AM, Jensen, Sandra L.S. FLNR:EX wrote:

Ok, only one question from Josh on the assessment: On what basis do they determine 15 m has the setback for calculating riparian impacts? This should be justified based on a RAR assessment, or on ecological grounds. Also, setbacks should be calculated from top of bank.

Thanks.

Also, did the survey get done?

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
3rd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5627 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

Gary Letts ASCT., C.E.T. Principal

**LETTS ENVIRONMENTAL CONSULTANTS**

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Gary Letts ASCT., C.E.T. Principal

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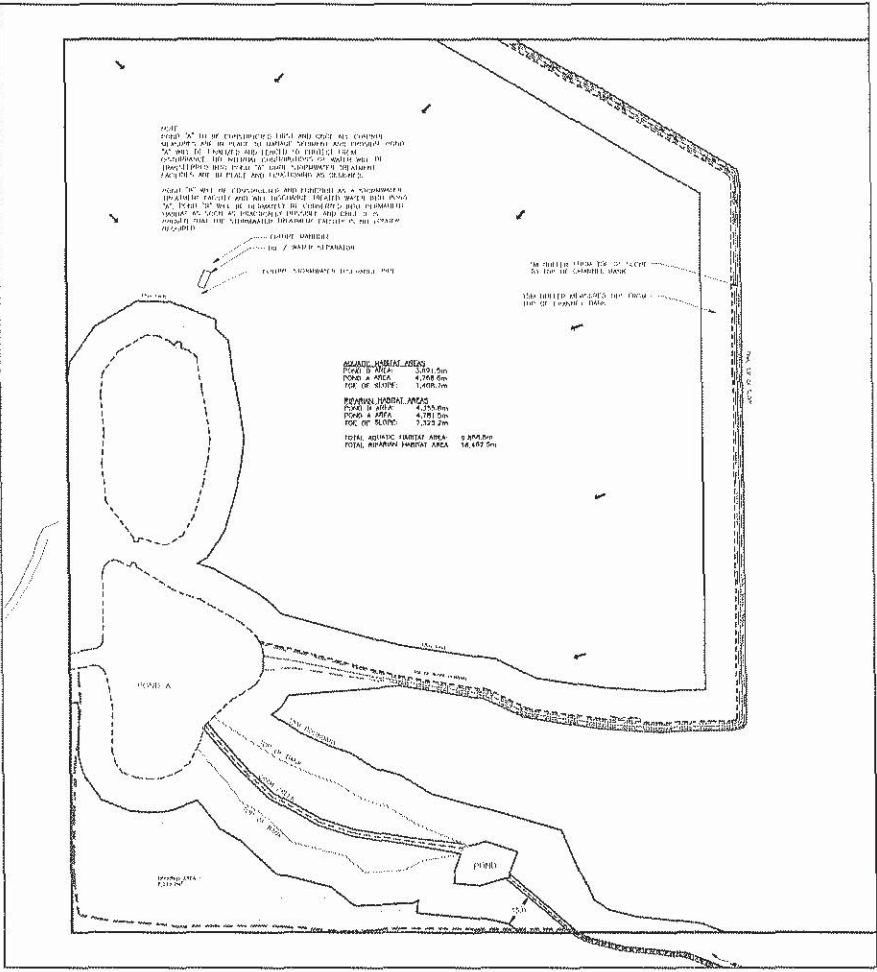
Gary Letts AScT., C.E.T. Principal

**LETTS ENVIRONMENTAL CONSULTANTS**

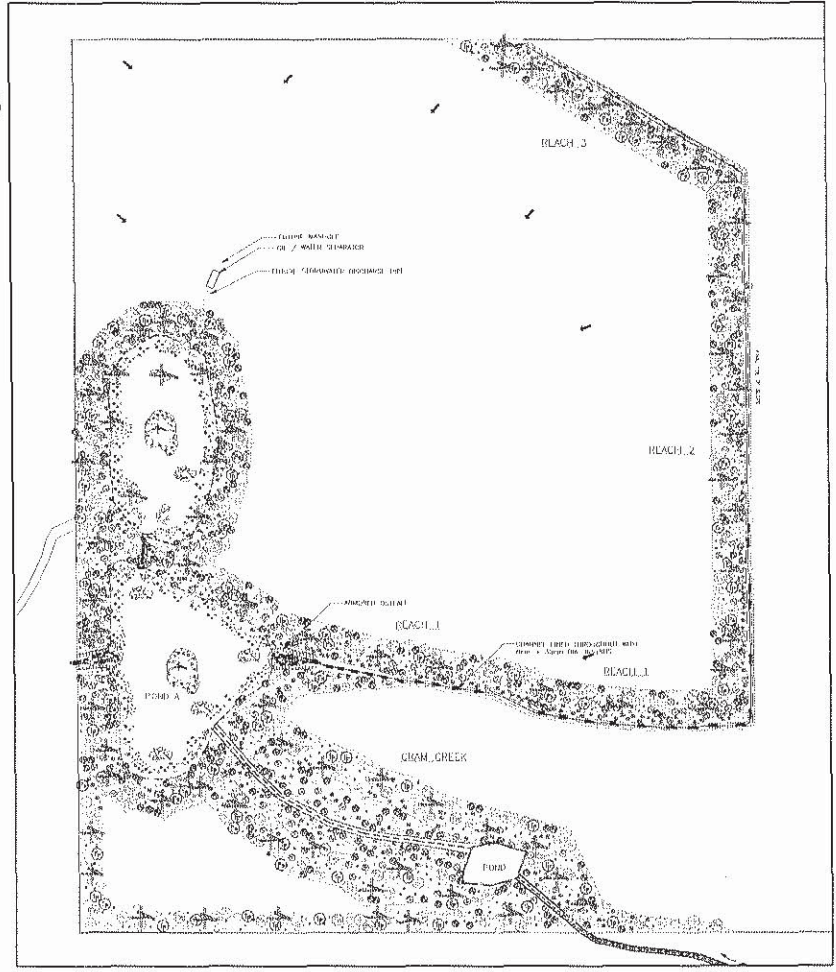
PO Box 29568 I Maple Ridge, BC I V2X 0V2  
O: 604.466.8172 I C: 604.329.2972 I F: 604.467.8972



SCALE: 1"=1000'



SCALE: 1"=1000'



NO.	DATE	REVISION	BY

CLIENT: H & J Development, LLC  
 PROJECT: 32500 Welch Avenue, Mission, TX  
 LEGAL: L2, 13 (Case # 01-158724) SECTION 9, TOWNSHIP 16 N, RANGE 42E, COUNTY OF BROWN, TEXAS

**LETTS ENVIRONMENTAL**  
 environmental consultants  
 2611 E. 29th Street, Suite 200  
 Dallas, Texas 75228  
 Phone: 972-446-2000  
 Fax: 972-446-2002  
 www.lettsenv.com

DESIGN BY:	EG	SEW
IN CHARGE BY:	EGP	
CHECKED BY:	EGP	
APPROVED BY:	EGP	
DATE:		

CORPORATION OF THE DISTRICT OF MISSION  
 ENGINEERING DEPARTMENT

**FINAL HABITAT REHABILITATION PLAN**  
 WILCH QUARRY

DATE: AUG 2012  
 SHEET: 1 OF 5  
 DRAWING NO: 1603404-12

## Metcalfe, Megan MEM:EX

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**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Friday, November 23, 2012 7:44 AM  
**To:** Olsen, Michael MEM:EX  
**Subject:** FW: Water Licence Amendments on Cram Creek in response to Compliance and Enforcement  
**Attachments:** 0364261 Licence.pdf; 0364261 Plat.pdf; 0323222 licence.pdf; 0323222 Plat.pdf

Hi Michael,

We finally finished all the C&E investigation and restoration requests for Investment Pond and Cram Creek for 32900 Welch Avenue, Mission, BC for Norm Tapp/N&J Developments. You have already received the Order authorizing the client for the restoration of Investment Pond as Pond "A" and Cram Creek to its original location. We have water licences on both of these sources. The water licence for Investment Pond is for land improvement purpose. We have stated in the licence, that this pond is not to be used for any of the mining operation, except for the fact that there will be 2 culverts connecting Pond "B" to Pond "A". Pond "B" is for the stormwater treatment facility, which you will authorize, that will convey clean and treated water from Pond "B" to Pond "A". The other water licence is for enterprise purpose for water from Cram Creek for their office.

File 0323222 Licence C129318 issued in substitution for C046020;

File 0364261 Licence C129319 issued in substitution for F052684.

If you have any questions, do not hesitate to contact me.

Cheers!

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
3rd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5627 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)



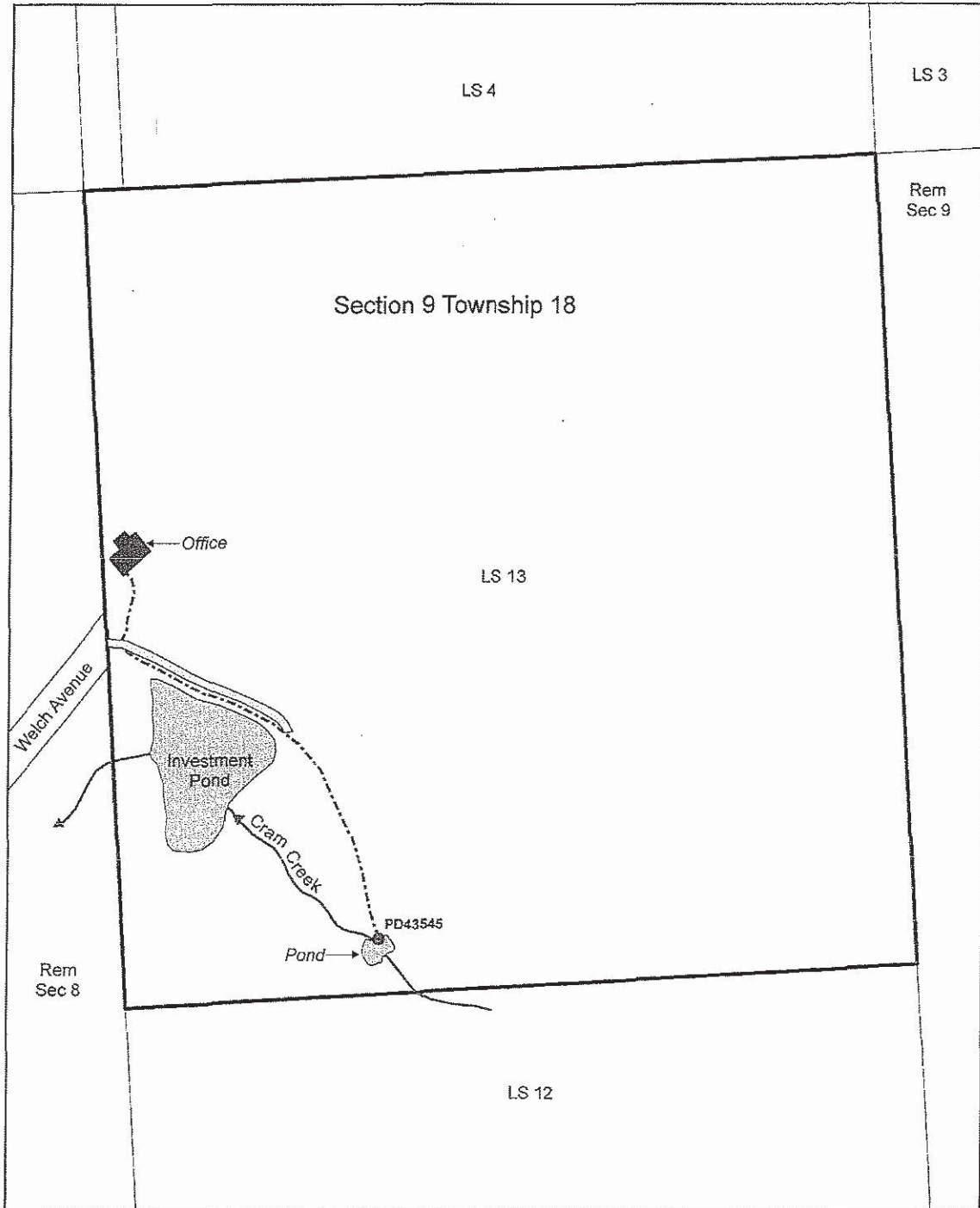
# Province of British Columbia *Water Act*

## CONDITIONAL WATER LICENCE

The owners of the land to which this licence is appurtenant are hereby authorized to divert and use water as follows:

- a) The stream on which the rights are granted is Cram Creek.
- b) The point of diversion is located as shown on the attached plan.
- c) The date from which this licence shall have precedence is June 14, 1978.
- d) The purpose for which this licence is issued is enterprise.
- e) The maximum quantity of water which may be diverted for enterprise purpose is 2.27305 cubic meters (500 gallons) a day.
- f) The period of the year during which the water may be used is the whole year.
- g) The land upon which the water is to be used and to which this licence is appurtenant is Legal Subdivision 13, Section 9, Township 18, New Westminster District.
- h) The authorized works are screened intake, pond, and pipe which shall be located approximately as shown on the attached plan.
- i) The construction of the said works shall be completed and the water shall be beneficially used prior to December 31, 2015. Thereafter, the licensee shall continue to make regular beneficial use of the water in the manner authorized herein.
- j) The diversion of water authorized under this licence may be restricted or prohibited at any time by an Order in writing of an Engineer under the Water Act, in order to maintain a minimum flow in the stream for the preservation of fish and other aquatic life.
- k) This licence authorizes the use of water for domestic purpose in one dwelling/building located approximately as shown on the attached plan.
- l) This Licence is issued in substitution of Final Water Licence F052684.

Remko Rosenboom, M.Sc., A.Ag.  
Assistant Regional Water Manager



Map Number: 92G.029  
Scale: 1:2,500



- Water District: New Westminster
- Precinct: 201 - Mission
- Point of Diversion: ●
- Structure/Dwelling: ■
- Works: - - - - -
- Works (polygon): ■

Signature: *[Handwritten Signature]*

Date: NOV 21, 2012

C129319 for F052684  
File: 0364261

The boundaries of the land to which this licence is appurtenant are shown thus: \_\_\_\_\_



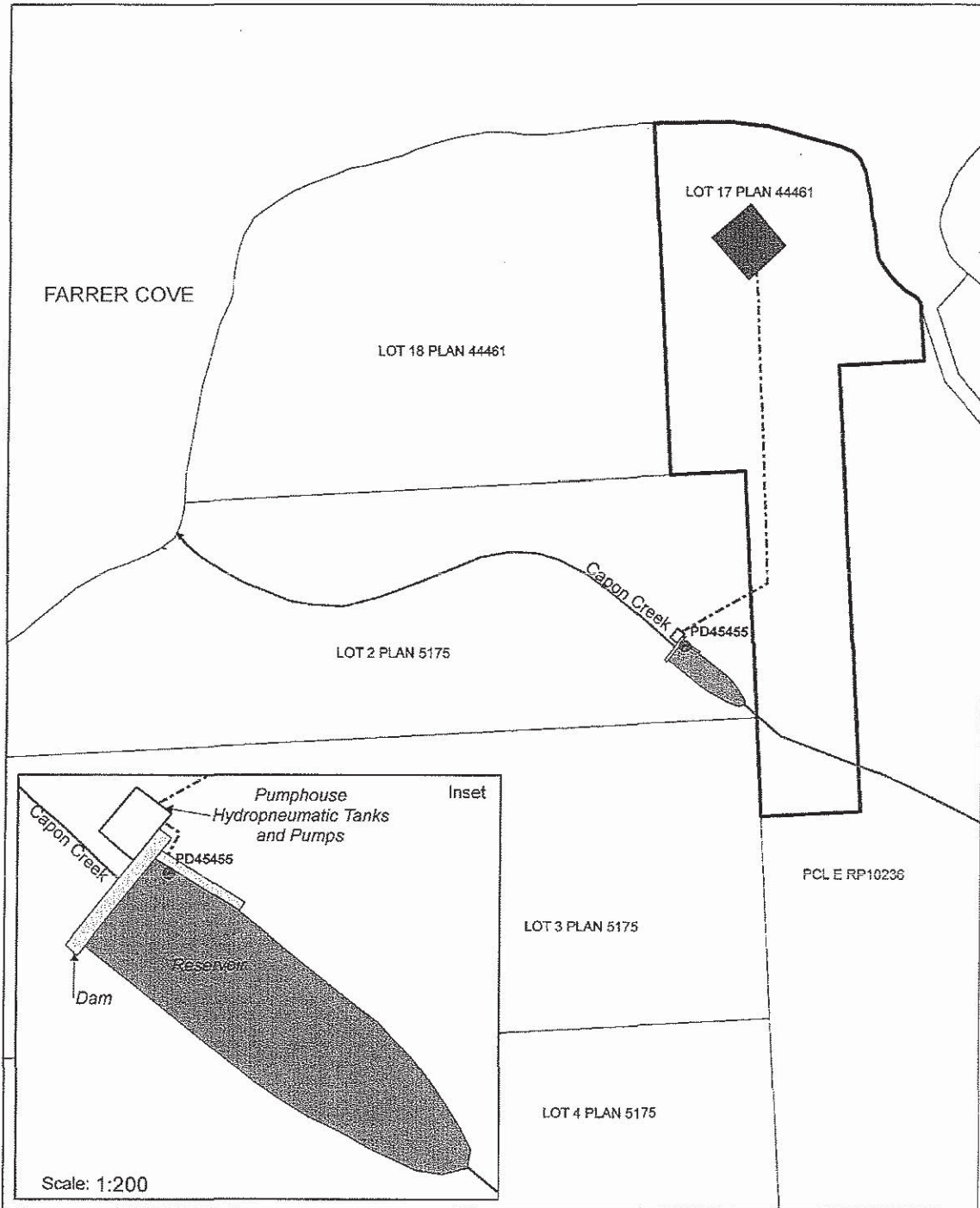
# Province of British Columbia *Water Act*

## CONDITIONAL WATER LICENCE

The owner of the land to which this licence is appurtenant is hereby authorized to divert and use water as follows:

- a) The stream on which the rights are granted is Capon Creek.
- b) The point of diversion is located as shown on the attached plan.
- c) The date from which this licence shall have precedence is June 11, 1974.
- d) The purpose for which this licence is issued is domestic.
- e) The maximum quantity of water which may be diverted for domestic purpose is 2.27305 cubic meters (500 gallons) a day.
- f) The period of the year during which the water may be used is the whole year.
- g) The land upon which the water is to be used and to which this licence is appurtenant is Lot 17, Section 30, Township 39 and of Section 25, Fractional Township West of Township 39, New Westminster District, Plan 44461.
- h) The authorized works are screened intake, reservoir, dam, hydropneumatic tanks, pumps, pumphouse, and pipe which shall be located approximately as shown on the attached plan.
- i) The construction of the said works has been completed and the water is being used. The licensee shall continue to make regular beneficial use of the water in a manner authorized herein.
- j) This licence authorizes the use of water for domestic purpose in one dwelling located approximately as shown on the attached plan.
- k) This Licence is issued in substitution of Conditional Water Licence C046020.


Remko Rosenboom, M.Sc., A.Ag.  
Assistant Regional Water Manager



Map Number: 8160B  
Scale: 1:1,000



- Water District: New Westminster
- Precinct: 20E - Coquitlam
- Point of Diversion: ●
- Structure/Dwelling: ■
- Works: - - - - -
- Works (pond): ▒
- Works (dam): □

Signature: 

Date: 7/10/21, 2012

C129318 for C046020  
File: 0323222

The boundaries of the land to which this licence is appurtenant are shown thus: \_\_\_\_\_

## Metcalfe, Megan MEM:EX

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**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Friday, September 21, 2012 4:19 PM  
**To:** 'Norm Tapp'  
**Cc:** Malt, Joshua FLNR:EX; Davies, James W FLNR:EX; 'Sciankowy, Craig'; 'Mike Younie'; Jacobi, Steven ENV:EX; 'gary letts'; Olsen, Michael MEM:EX  
**Subject:** Section 88 Order for restoration of pond and Cram Creek on 32900 Welch Avenue, Mission, BC - Norm Tapp (Water files: 0364261 and 0222423)  
**Attachments:** Order Norm Tapp.pdf

Hi Norm,

Please find attached the Section 88 Order for the restoration of Investment Pond as Pond A, Cram Creek and the removal of the culvert. There will be no requirement for a notification or approval upon the issuance of this Order for your instream works and removal of the culvert. Please read all conditions of the cover letter and Order carefully as you are required to obtain any other necessary permits that may be required from any other agencies and submit a post-construction report to me within 60 days of the completion of the works.

Your Order has been copied to Craig Sciankowy of DFO for his review; along with Mike Younie from the District of Mission; our Conservation Officer, Steven Jacobi who attended your site; Michael Olsen from the Ministry of Energy and Mines who attended your site; and Joshua Malt, Ecosystems who also attended your site with myself and provided comments for the review of your Order.

Please submit your drawing as requested for the amendment of your water licence F040222 for Investment Pond.

If you have any questions, do not hesitate to contact me.

Good luck.

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
3rd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5627 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)



September 21, 2012

Files: 0364261  
0222423

Norm Tapp  
25469 84<sup>th</sup> Avenue  
Langley, BC V1M 3N2

Dear Mr. Tapp:

**Re: Order for unauthorized changes in and about a stream on Investment Pond and Cram Creek held under Final Water Licences F052684 and F040222**

---

Attached is an Order issued pursuant to Section 88 of the *Water Act* authorizing the restoration of Cram Creek to its former stream channel location, the restoration of the adjacent riparian area of Cram Creek to its former state, the decommissioning of the unauthorized artificial channel, the removal of the culvert (as authorized under F052684) associated with the small pond that will be incorporated into Cram Creek, and the partial restoration of Investment Pond as Pond A with its associated riparian area.

Final Water Licence F040222 (Investment Pond) will be amended to reflect the change of works and Final Water Licence F052684 (Cram Creek) will be amended to reflect the change in works and change in purpose from domestic to enterprise.

Pond B, located north of Pond A and of the access road, will later be constructed for the proposed mining operation as a sediment control pond. Please contact the water allocation office to review the decommissioning of Pond B when the mining operation is completed.

This authorization is solely for the requirements the *Water Act* and does not remove the legal requirement of authorization/approval of any other organization.

A right of appeal to my Order lies to the Environmental Appeal Board. Notice of any appeal must (1) be in writing, (2) include grounds for the appeal, (3) be directed by registered mail or personally delivered to the Chair, Environmental Appeal Board, 4<sup>th</sup> Floor, 747 Fort Street, PO Box 9425 Stn Prov Govt, Victoria, BC V8V 9V1, (4) be delivered within 30 days of receiving this Order, and (5) be accompanied by a fee of \$25, payable to the Ministry of Finance and Corporate Relations.

You are also reminded that Section 92(9) of the *Water Act* states: "An appeal does not act as a stay or suspend the operation of the Order being appealed unless the appeal board orders otherwise."



Yours truly,

A handwritten signature in black ink that reads "James Davies". The signature is written in a cursive, slightly slanted style.

James Davies, P. Eng.  
Designated Engineer under the *Water Act*

cc Joshua Malt, MFLNRO  
Mike Younie, District of Mission  
Steven Jacobi, MFLNRO  
Gary Letts, Letts Environmental Consultants Ltd.  
Michael Olsen, Ministry of Energy and Mines  
Craig Sciankowy, DFO



Province of British Columbia  
*Water Act*

---

**ORDER**

**Section 88**

of the

***Water Act of British Columbia***

**IN THE MATTER** of unauthorized changes in and about a stream on Investment Pond held under Final Water Licence F040222 and on Cram Creek held under Final Water Licence F052684, both within the property boundary of Legal Subdivision 13, Section 9, Township 18, East of the Coast Meridian, New Westminster District; owned by Norm Tapp.

**WHEREAS** Norm Tapp made unauthorized changes in and about a stream on Investment Pond by excavating within the stream resulting in the draining of the wetland, diversion of flows into a small excavated channel and the clearing and grubbing of soil within and directly adjacent to the subject wetland.

**WHEREAS** Norm Tapp made unauthorized changes in and about a stream on Cram Creek by diverting the stream along the property boundaries which has impacted the riparian and sediment control of the stream.

**WHEREAS** Norm Tapp has been provided an advisory letter dated July 31, 2009 regarding the unauthorized changes on Investment Pond and an advisory letter on April 5, 2012 regarding the unauthorized changes on Cram Creek. The advisory letters required Norm Tapp to prepare a wetland habitat assessment and a wetland restoration plan on the ponds and stream channel, a sediment control plan for Investment Pond, and an Environmental Management Plan and Sediment Control Plan for the restoration work.

**WHEREAS** Norm Tapp has provided the following documentation in support of the advisory letters:

For the advisory letter dated July 31, 2009 for Investment Pond:

- Drawing Number 049-09, entitled "Temporary Sediment Control Plan", dated August 1, 2009, prepared by Letts Environmental Consultants Ltd.
- To form the Wetland Habitat Assessment for Investment Pond, the following documentation applies:
  - "Ecological Assessment of Previous Wetland at 32900 Welch Ave., Mission, BC, Legal Subdivision 13, Sec 9, TWP 18, NWD", prepared by Letts Environmental Consultants Ltd., dated November 10, 2009.

- To form the environmental impact assessment and restoration plan the following documents apply:
  - “Environmental Impact Assessment Report”, dated November 9, 2011, prepared by Letts Environmental Consultants Ltd.
  - Letter dated November 24, 2011 from Josh Malt to N&J Developments Ltd.
  - Letter dated December 22, 2011 from Letts Environmental Consultants Ltd. to Josh Malt in response to November 24, 2011 letter which includes “Environmental Monitoring Plan” in Appendix 2 and “Sediment & Erosion Control Plan” in Appendix 3.
  - Email dated January 16, 2012 from Josh Malt to N&J Developments Ltd. / Letts Environmental Consultants Ltd.
  - Memorandum dated January 19, 2011 from Letts Environmental Consultants Ltd. to N&J Developments Ltd. / Josh Malt.

For the advisory letter dated April 5, 2012 for Cram Creek:

- “Revised Environmental Assessment of Cram Creek and impacts of unauthorized works in or about a stream, 32900 Welch Ave., Mission, BC”, prepared by Letts Environmental Consultants Ltd., dated August 24, 2012.
- Drawing HR0404-12, Sheet 1 of 6, “Final Habitat Rehabilitation Plan”, dated August 2012, prepared by Letts Environmental Consultants Ltd., revised to indicate the aquatic habitat and riparian habitat areas.
- Drawing HR0405-12, Sheet 2 of 6, “Pond “A” Planting Plan”, dated August 2012, prepared by Letts Environmental Consultants Ltd.
- Drawing HR0406-12, Sheet 3 of 6, “Pond “B” Planting Plan”, dated August 2012, prepared by Letts Environmental Consultants Ltd.
- Drawing HR0407-12, Sheet 4 of 6, “Toe of Slope Planting Plan”, dated August 2012, prepared by Letts Environmental Consultants Ltd.
- Drawing HR0408-12, Sheet 5 of 6, “Phase I Erosion Control Plan”, dated August 2012, prepared by Letts Environmental Consultants Ltd.
- Drawing HR0409-12, Sheet 6 of 6, “Phase II Erosion Control Plan”, dated August 2012, prepared by Letts Environmental Consultants Ltd.

**WHEREAS** in accordance to the above submitted reports and plans, Norm Tapp will restore Cram Creek to its former stream channel location, restore the adjacent riparian area of Cram Creek to its former state, decommission the unauthorized artificial channel, remove the culvert (as authorized under F052684) associated with the small pond, incorporate the small pond back into Cram Creek, and partially restore Investment Pond as Pond A with the associated riparian area.

**WHEREAS** from these plans, water licence F040222 for land improvement (ornamental pond) on Investment Pond will require an amendment for a change of works and F052684 for domestic purpose on Cram Creek will require amendment for a change of purpose and for a change of works.

**WHEREAS** the Water Officer, Sandra Jensen, has reviewed and accepted the above plans and reports as being satisfactory.

**NOW THEREFORE**, I, James Davies, Designated Engineer under the *Water Act*, hereby order pursuant to Section 88 of the *Water Act* of British Columbia, that Norm Tapp proceed with the proposed restoration of Investment Pond as Pond A, the removal of a culvert on the small pond, the incorporation of the small pond back into Cram Creek, the restoration of Cram Creek and all associated riparian areas, as well as the decommissioning of the artificial channel, subject to the following conditions:

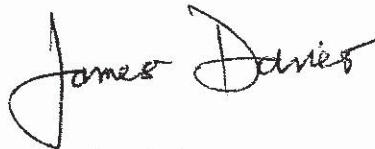
- a) This Order does not constitute authority of any other agency. The holder of this Order shall have the necessary permits from other agencies concerned prior to the commencement of the works authorized herein.
- b) Work in the stream channel shall occur only during the period of August 1 to October 31, so that the fisheries interests are protected.
- c) All works must be carried out during favourable weather and low flow.
- d) Upon commencement of the project, the work shall be pursued to completion as quickly as possible.
- e) All proposed work shall be completed in isolation of the stream flows.
- f) Care shall be exercised during all phases of the work to prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate or any deleterious substances.
- g) Equipment and machinery used in or near the stream channel must be in good operating condition and free of leaks, excess oil and grease.
- h) Site preparation and construction of the works is to be carried out from the banks of the stream, thus minimizing disturbance to the stream.
- i) All disturbed areas of the banks of the stream shall be restored to their original condition.
- j) Vegetation along the banks of the stream shall be disturbed as little as possible.
- k) Vegetation removed for the purposes of temporary access must be replanted using native species that are suitable for the site conditions.
- l) All excavated material and debris shall be removed from the site or placed in a stable area above the high water mark of the stream and mitigative measures to protect the excavated material and debris from erosion and reintroduction into the watercourse shall be used, such as, but not limited to, covering the material with erosion blankets or seeding and planting with native vegetation.
- m) Rock used as rip-rap shall be clean of any substances deleterious to aquatic life and shall be durable, angular in shape and suitably graded and sized to resist movement by stream flow.
- n) All works shall comply with the drawings and plans, prepared by Letts Environmental Consultants Ltd., as outlined above.
- o) A copy of this Order (and associated plans/drawings listed on this Order) must be available for inspection, upon request, at the location where the authorized changes in and about a stream are being undertaken.
- p) This Order authorizes the removal of the culvert associated with Final Water Licence F052684 as part of the restoration of the small pond into Cram Creek as outlined in the

“Revised Environmental Assessment of Cram Creek and impacts of unauthorized works in or about a stream, 32900 Welch Ave., Mission, BC”, prepared by Letts Environmental Consultants Ltd., dated August 24, 2012.

- q) The holder of this Order shall retain a qualified Environmental Monitor to supervise all in-stream works authorized under this Order. In the event of an environmental incident or non-compliance with any of the terms or conditions of this Order, the Environmental Monitor shall notify Sandra Jensen, Water Officer, at 604 586-5627, within 24 hours.
- r) The Environmental Monitor is hereby granted authority to stop the work authorized under this Order if deemed necessary by the Environmental Monitor to address risks to the environment.
- s) A brief post-construction report must be forwarded to Sandra Jensen, Water Officer, within 60 days of completion of the works.

That report shall include a signed statement from the Environmental Monitor summarizing: the in-stream works undertaken, the timing of those works, the total in-stream area directly affected, sediment and erosion control measures, the frequency of monitoring; whether or not they observed or were otherwise aware of any non-compliance with the terms and conditions of this Order; and a description of any environmental incidents, non-compliance or other difficulties, and how these were addressed and reported.

**DATED AT** Surrey, British Columbia, this 21<sup>st</sup> day of September, 2012.



James Davies, P.Eng.  
Designated Engineer under the *Water Act*

Welch Ave Quarry

# 1610586

November 9/11

FINAL

Environmental Impact Assessment Report  
for Proposed Gravel Pit located at  
32900 Welch Avenue, Mission, BC  
Legal Subdivision 13 SEC 9 TWP 18 NWD

Prepared For:

Prepared By:

N & J Developments Ltd.  
25469 84<sup>th</sup> Avenue  
Langley, BC, V1M 3N2



**LETTS**  
ENVIRONMENTAL  
CONSULTANTS  
LTD

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## EXECUTIVE SUMMARY

N & J Developments Ltd. (hereafter, “the client”) are seeking to develop a gravel pit to provide a supply of sand, gravel and rock within the local area. The client retained Letts Environmental Consultants Limited (LECL) to prepare an Environmental Impact Assessment (EIA) of the proposed gravel pit located at 32900 Welch Avenue, Mission. The specific objectives of this study were to: identify impacts to the environment which may occur as a result of developing the proposed gravel mining operation, evaluate the significance of those impacts, determine mitigating measures, and to recommend further monitoring efforts.

The proposed project is for extraction of approximately 240,000 tonnes of total material (sand, gravel and rock) per year. The amount of material extracted will not exceed 1,000,000 tonnes over the first 4 years of the mine. Access into the mine area will be from Dewdney Trunk Road entering onto Creston Avenue and Larsen Street with exiting out Welch Avenue.

This EIA provides details in four areas, which may be impacted as a result of mining the existing site. These include Aquatic/Hydrological Resources (Water Quality), Habitat Alteration (Vegetation & Wildlife), Pollution (Dust, Noise, On-site Facilities), and Cultural Features (Aesthetics & Public Safety).

The results contained within this report reveal that there are aquatic resources in the form of a watercourse, previous pond complex area as well as riparian and terrestrial habitats on and or affecting the subject property. This pond complex along the western edge of the property was the subject of works that resulted in the draining of this area. This initiated an investigation by the Ministry of Environment (MOE), resulting in the request that the client provide a description of the original form and function of this area as well as a habitat restoration plan to recreate the impacted system. Pre-disturbance habitat occupied an area of approximately 9000m<sup>2</sup>, composed of 2 open water ponds connected by a narrow channel. The pond complex functioned to provide habitat to a range of vegetation, aquatic, and terrestrial life. LECL will create a Pond Complex Ecosystem Restoration plan, with the scope of restoring the hydrological and ecological function of the pond complex and its associated riparian areas to equal those of the habitats eliminated. One pond will be constructed in its permanent configuration immediately and will operate as a pond ecosystem throughout the life of the mine. A second pond will be constructed to operate as an interim stormwater treatment facility during the life of the mine, and will be converted into a permanent pond complex following completion of mining activities.

Mining this site will alter surface and sub-surface flow patterns, which may result in changes in water quality. Development will remove surface soils and remaining vegetation, displace wildlife, and increase noise and air pollution. Development will permanently change the topography, alter soils and aesthetic values, and could increase the hazard risk to public safety if the foregoing mitigative measures are not implemented. This report concludes that it is possible to mitigate the impacts of extraction, preserve water quality, and control erosion during development.

The proposed mining operation must incorporate water controls to minimize disruption to aquatic resources and water quality. Key mitigative measures to minimize disruption to aquatic

resources include managing surface runoff, maintaining riparian areas, and implementing pollution reduction strategies and measures to ensure visual aesthetics and safety. Appropriate sequencing of activities will also be critical in reducing the negative impacts of the proposed development. Implementing sediment and erosion control methods is essential to treating runoff from roads and mined areas over the various stages of site development. Construction of sediment and erosion control facilities and ditches will take place prior to any mining activities. All sediment control measures incorporated will prevent the loss of sediment off-site and should follow the current standards set out in the BC Ministry of Environment's "*Land Development Guidelines for the Protection of Aquatic Habitat*." No work or disturbance should take place within any proposed setbacks.

Pollution mitigation measures will incorporate a dust control program for road surfaces which are effective control measures successfully used in BC. This will include installation of dust control systems on all transfer systems (trucks), and surface amendments such as inundation or sprays to control areas, which are dust sources. Noise will be buffered with vegetation and additional measures outlined below.

Cultural features should be addressed by fencing (as per the Mines Act) erected around the perimeter of this site. Appropriate signage should also be attached to this fencing warning of the hazards associated with the site. Fencing should also be erected, and should surround all high bank cut-slopes along all forest edges and be clearly visible along at all site entrance points. Signs should outline current regulations, and hazards associated with entry onto the site.

The recommendations contained within this EIA should be followed closely to avoid impacts, work stoppages, disruptions, or violations. Sediment and erosion control plans are particularly important components and should be implemented prior to commencement of works.

In addition to the measures and recommendations contained within this report, a site specific, comprehensive Environmental Management Plan (EMP) will be prepared. This EMP will identify any components of the project that could present a hazard to the environment. This plan will describe how identified risks will be mitigated through best management practices and proper work procedures and, in the event of an accident, procedures that would contain and limit the impacts to the environment.

## 1.0 INTRODUCTION

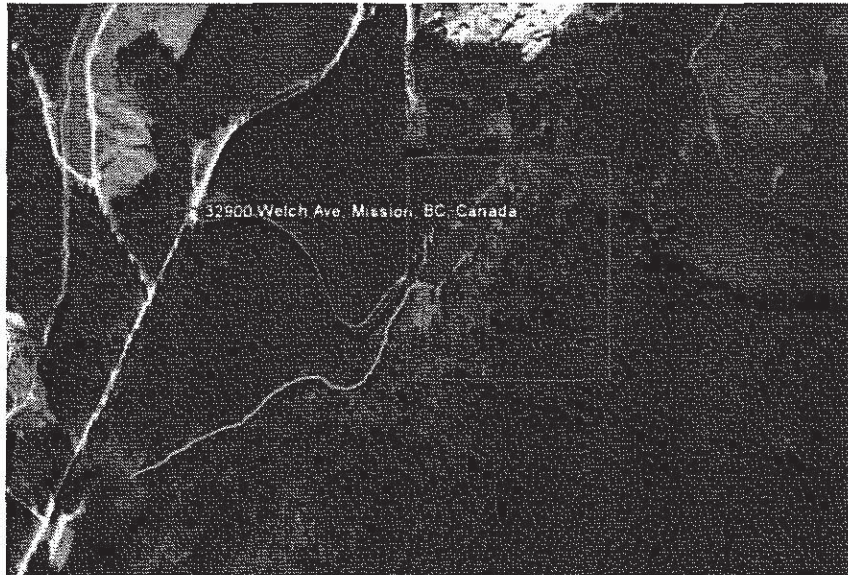
The primary objective of this EIA was to identify impacts to the environment that could result from development of a mine on this site (Figure 1). This includes assessment of the construction, operation, dismantling and abandonment phases of the projects. Impacts include changes to Aquatic / Hydrological Resources (Water Quality), Habitat Alteration (Terrestrial vegetation, wildlife and wildlife habitat), Pollution (Dust, Noise and on-site Facilities) and Cultural Features (Visual Aesthetics and Public Safety).

In addition, this EIA presents specific measures to achieve environmental compliance objectives by:

1. minimizing all forms of pollution and contamination;
2. preventing the fouling of all bodies of water (watercourses),
3. minimizing soil erosion and preserving ground stability, and
4. developing a plan to address concerns raised by the MOE regarding the pond complex.

This EIA is also intended to facilitate environmental compliance during all aspects of the proposed construction works.

This report does not include any water quality measurements or specific habitat surveys.

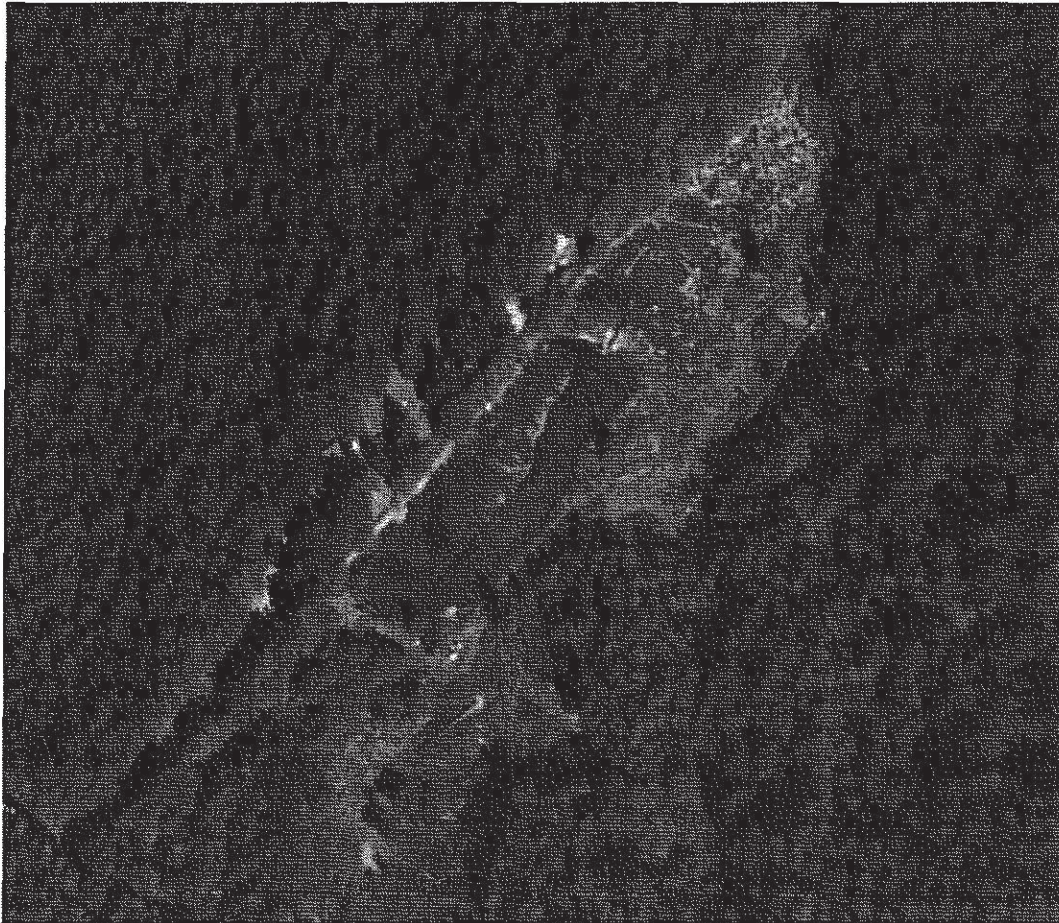


**Figure 1:** Aerial photo of general area near subject property (source: Google Earth 2009).

## 2.0 PROJECT DESCRIPTION

The subject property is located at 32900 Welch Avenue, Mission, BC. The legal designation for this property is Subdivision I3 SEC 9 TWP 18 NWD and is zoned Industrial according to the District of Mission's (DoM) Official Community Plan (OCP). The property is located in close proximity (0.5-1.0km) to two other known gravel pits. The property is bounded by forest on all sides, with the exception of the area to the north (which is also zoned Industrial).

The proposed gravel and bedrock mining activity will provide a supply of sand, gravel and rock for the local community and surrounding area. The amount of material to be processed equates to approximately 240,000 tonnes per year (pers comm. A. Fedora). Haul routes to and from the site would be along Dewdney Trunk Road, entering on Creston Avenue to Larsen Street from the northwest and exiting via Welch Avenue to the west.



**Figure 2:** Aerial photo of general area near subject property (source: Google Earth 2009) prior to clearing activities.

Logging and some land management activities have already been completed on the site. In addition, previous activities have resulted in the draining and infilling of a pond complex.

Mining activities will commence once approvals from the regulatory agencies have been received. The proposed mining operations will include<sup>1</sup>: grading the surficial impermeable sediments to create a flat work area, draining existing perched groundwater and routing ongoing groundwater seepage and surface water to south side of property, and commencement of mining eastward into the hill (bedrock mining - not extending below 275m elevation).

---

<sup>1</sup> Summarized from EBA Engineering Consultants, October 2010, Surface Hydrology and Hydrogeologic Assessment of Proposed Gravel Pit and Rock Quarry.

Once mining activities are complete, reclamation should commence. Reclamation is the process of returning the land disturbed by mining to an acceptable alternate use. Due to the nature of the final terraced form of the subject property, reclamation will be completed once all extraction and mining is complete.

Reclamation include activities such as removing any buildings and equipment, decommissioning of sediment and erosion control and stormwater management measures and creation of a final second pond complex. All exposed ground should be shaped and graded to provide stable long-term slopes and suitable surface runoff patterns meeting requirements contained within the Mines Act of BC. The *Mines Act* requires that a mine be reclaimed to a level of productivity equal to or exceeding prior use (Houlihan and Titerle, 2001).

## 2.1 Justification

The purpose of this project is the extraction of sand, gravel and rock resources. Reliable supplies of aggregate are an essential component of local, provincial and federal government infrastructure development and maintenance. Aggregate is needed as the raw material for building and maintaining a community's infrastructure and buildings, and is least expensive when extracted, processed and distributed locally<sup>2</sup>.

## 2.2 Regulatory Guidance / Protocols

This EIA contains relevant source material including key information from applicable legislation, regulations, standards, guidelines, and codes of practice. Under Section 1.4 Stewardship of Gravel Resources, the District of Mission's OCP states that development and use of aggregate must be carefully planned and include reclamation and end use of the gravel pits. In addition, the following Table 1 outlines, at minimum, the various acts, regulations and guidelines that apply to the project.

Agencies and tenure holders with a potential interest in aggregate pits and quarries may include the following:

- Department of Fisheries and Oceans Canada
- B.C. Ministry of Agriculture
- B.C. Ministry of Environment
- B.C. Ministry of Transportation and Infrastructure
- B.C. Ministry of Forests, Lands and Natural Resource Operations
- B.C. Environmental Assessment Office
- District of Mission
- Environment Canada
- First Nations

As part of the application review process, Ministry of Energy and Mines sends referrals to agencies and tenure holders with a potential interest in the proposed project. A period of 30 days is provided for review.

---

<sup>2</sup> Aggregate Operators Best Management Practices Handbook for British Columbia, Volume 1

First Nations Engagement

Aggregate pit and quarry applications are referred to First Nations for input<sup>3</sup>,

**Table 1.** Standards, Guidelines and Best Management Practices (BMPs).

<b>Federal and Provincial Legislation, Regulations and Best management Practices</b>	
BC Environmental Management Act (2004)	BC Approved Water Quality Guidelines (Ministry of Environment [MoE], 2001)
BC Wildlife Act (1996)	Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2003a)
Canadian Environmental Quality Guidelines (CCME, 2003b)	Fisheries and Oceans Canada, Pacific Region Fisheries Act (1985)
District of Mission's Official Community Plan	2006 Design Build Standard Specifications for Highway Construction (Ministry of Transportation and Infrastructure)
A Users Guide to Working in and around Water – Regulation under B.C.'s Water Act (Land & Water B.C. 2001)	The BC Conservation Data Center Web Site <a href="http://www.env.gov.bc.ca">http://www.env.gov.bc.ca</a>
BC Mines Act (Ministry of Energy and Mines )	BC Ministry of Environment. Fish Protection Act. 1997.
Standards and Best Practices for Instream Works (MoE 2004)	Aggregate Operators Best Management Practices Handbook for BC (Volumes 1 and 2)
Environmental Best Management Practices for Urban and Rural Land Development in BC (MoE 2004)	BC Species and Ecosystems Explorer (Ministry of Environment)

According to the Mine Proponent's Guide (BC Environmental Assessment Office) for new sand and gravel pits, the project is reviewable under the Reviewable Project Regulation if the production capacity for excavated sand, gravel or both combined will equal or exceed at least one of the following:

1. Either at least 500 000 tonnes per year during at least one year of its operation, or
2. Over a period of not more than 4 years of operation, at least 1 000 000 tonnes in total.

This project does not meet either criteria and therefore is not required to be reviewed under the Reviewable Projects Regulation.

The following information regarding the regulation of sand and gravel operations was taken from the Ministry of Energy, Mines and Petroleum Resources (MoEMPR)<sup>4</sup>:

“Sand and gravel pits and quarries are regulated as mines under the Mines Act. Permits are required for these operations and the permitting process includes referrals to other government agencies, such as the Ministry of Environment, Lands and Parks, and allows for public input.”

<sup>3</sup> Guide to Preparing Mine Permit Applications for Aggregate Pits and Quarries in BC, Mining and Minerals Division, MEMPR

<sup>4</sup> MoEMPR: Information Regarding the Completion of the Notice of Work and Reclamation Program for a Sand & Gravel/Quarry Operation. Sand and Gravel/Quarry Operation Notice of Work and Reclamation Program.

According to Section 10(1) of the Provincial *Mines Act*:

“Before starting any work in, on or about a mine, the owner, agent, manager or any other person must hold a permit issued by the chief inspector [the minister must designate in writing a person appointed under the *Public Service Act*, as the Chief Inspector of Mines] and, as part of the application for the permit, there must be filed with an inspector a plan outlining the details of the proposed work and a program for the conservation of cultural heritage resources and for the protection and reclamation of the land, watercourses and cultural heritage resources affected by the mine, including the information, particulars and maps established by the regulations or the code.”

The local government is the District of Mission (DoM). Under the DoM’s Official Community Plan, they provide direction in terms of managing gravel operations within the DoM with a view to minimizing short and long term impacts. Section 1.4 of the OCP: Stewardship of Gravel Resources provides information regarding the operation of gravel pits. The objective is to manage gravel operations to minimize their impacts. Policies outlined include:

New or Expanded Gravel Pits

Policy 1.4.2 Evaluate applications for new or expanded gravel pits based on potential operating impacts upon adjacent residential neighbourhoods and other land uses, noise levels and traffic impacts on municipal roads.

Continuous Rehabilitation of Gravel Sites

Policy 1.4.3 Support the continuous rehabilitation of gravel extraction sites to reduce the visual impact of the operations on the community.

Reclamation of Gravel Sites

Policy 1.4.4 Support a variety of options for the reclamation of gravel sites, including conversion to residential, institutional, parkland and/or rural area industrial/business use.

### **3.0 STUDY METHODOLOGY**

This inventory of environmental features is based on field reconnaissance, and interpretation of aerial photographs, maps, reports and other information provided by the client. The field component of this study was conducted on March 24, 2009 and again on March 28, 2011. Transects were completed along all property lines, in addition to review of riparian areas.

Review of existing documents include, but is not limited to:

- Ecological Assessment of Previous Wetland at 32900 Welch Avenue. Letts Environmental Consultants Limited. November 2009.
- Legal Survey prepared by D.S.Martens. BC Land Surveyor. March 2009.
- Assessment of Rock Samples For Acid Rock Drainage (Generation Potential). Valley Testing Services Limited. January 2011.
- Surface Hydrology and Hydrogeologic Assessment for Proposed Gravel Pit and Rock Quarry. EBA Engineering Consultants Limited. October 2010.
- Preliminary Quality Testing of Rock and Gravel Materials, Proposed Quarry/Pit. Valley Testing Services Limited. September 2010.



Addition information regarding the reconstruction of ponds and wetland was also reviewed by LECL to assist in the development of the following restoration plan.

#### **4.0 EXISTING SITE CONDITIONS**

The subject property lies in the northeastern sector of Mission. In general, the property is void of vegetation and comprised of a steep, western facing slope and a flat depressional area near the west property line.

Most of the previously forested portion of the 39 acre property has been recently logged. The 2 acres of previous wetland habitat has been drained and altered significantly by logging activity and land clearing, grubbing and excavation.

A large culvert has been installed near the base of the main earthen dam which is still in place and top-dressed with gravel. The culvert drains a recently excavated drainage channel which curves northeast through the previous bottom of the pond intersecting with what appears to be the smaller of the 2 earthen dams which was previously covered by pond water and recently top-dressed with gravel. The constructed channel measuring approximately 2 metres in width and 1 metre in height has steep side slopes and transfers flows from north to south.

Almost the entire previous pond bottom has been either covered with gravel and piles of logging debris or altered through major land/soil clearing and grubbing. A few small areas of standing shallow water appear as possible remnant portions of the original bottom of the pond.

One existing home sits mid-point near the west property line along with several old storage areas where garbage and debris have been piled up. Further detail regarding the site specifics are provided in the sections below.

#### **5.0 SITE DESCRIPTION**

##### **5.1 General**

The subject property is 15.8ha (39 acre) in size and is located in the northeast portion of the District of Mission at 32900 Welch Avenue. The legal description of this property is Legal Subdivision 13 SEC 9 TWP 18 NWD. The surrounding areas directly adjacent to the study area are primarily forested. The study area occupies the north central portion of the Fraser Lowland physiographic region (Holland, 1976).

This property is within the Coastal Western Hemlock Biogeoclimatic Zone (CWH). This zone is typically the wettest ecosystem in British Columbia, with relatively cool summers and mild winters (Meidinger & Pojar, 1991), and is classified as cool mesothermal.

The topography of the study area comprises primarily of a steep slope (25-40%) to the northwest and a large flat depressional area near the west property line. Elevations range from approximately 255m at the bottom northwest corner up to 400m at the top of the slope (southeast corner).

## 5.2 Aquatic/Hydrologic Resources

### 5.2.1 Surface Water/Watercourses

In general, the property drains to the west southwest via numerous small roadside ditches adjacent to haul roads found throughout the eastern sloped portion. These slope ditches convey flows down the slope to the flat depressional area at its the northern end. Flows are then transferred southwest through the former ponded area via a manmade channel. The channel extends through most of the former ponded area.

The flat depressional area (former 2 acre (0.81ha) ponded area) had previously been the site of a large rectangular-shaped pond. The earliest air photos and local typography indicate that this was a natural collection area on a gently sloping bench where up-slope runoff water pooled and served as the headwaters of a main tributary flowing into Silverdale Creek.

A number of small ponds are also present on the property. One mid-slope along the south property line and two at the southwest corner of the property. No outflow for this small pond could be located in the field. Ponded water was also noted within the depressional area (formerly the pond area, Figure 2) near the center of the west property line.

Further south, roadside ditches convey surface water to the south property line. A watercourse is present along the south property line that conveys flows west down the slope. The watercourse currently flowing along the south property line turns sharply and flows north at the properties southwest corner. Flows then discharge into two connected constructed ponds (approximately 80m<sup>2</sup> and 63m<sup>2</sup> in size). Water conveys out of these ponds and off the property to a small stream with an average wetted width of 2.0m with wider sections of 5.0m across, a soil and organic substrate with shallow banks. These flows contribute to a tributary of Silverdale Creek. Silverdale Creek flows into Mill Pond (located approximately 1.7km downstream).

As noted in previous sections of this report, near the middle of the west property line is a large, depressional receiving area (formally the pond area). Land management activities in this area have channelized the flow of water from this area. Currently, a water channel flows adjacent to the access road and south under the access road via a 0.6m corrugated plastic culvert. A total of 16m of sheet piling has been used on the upstream side of the road crossing. There are a number of old culverts within the road that are no longer functioning as they are now above and to the west of the surface of the water. This indicates that the flows have scoured the base of the channel. The channel has a wetted width of 1.0m and confluences with the tributary to Silverdale Creek at the southwest corner of the property.

### 5.2.2 Groundwater

Recharge of groundwater in the proposed mine area "...likely occurs by direct infiltration of precipitation and snowmelt." (EBA Engineering<sup>5</sup>). EBA Engineering also noted shallow groundwater within and perched above the upper silt, clay and till layer in the central bench area and minor groundwater seepage and greater seepage at the base of the hill. Some deeper

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<sup>5</sup> Surface Hydrology and Hydrogeologic Assessment. EBA Engineering Consultants Limited. October 2010.

groundwater was encountered as well. In addition, they note “ongoing groundwater seepage at the base of the hill suggests that this area is a groundwater discharge zone, with lateral flows from shallow sediments and/or bedrock within the hill towards the ground surface”.

The area is not underlain by any known aquifer (MOE, 2010).

### 5.3 Vegetation Ecosystems

The property has been cleared of vegetation. Surrounding the site is a mature second growth western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) forest with components of Douglas fir (*Pseudotsuga menziesii*) and other deciduous species such as big leaf maple (*Acer macrophyllum*), vine maple (*Acer circinatum*) and red alder (*Alnus rubra*). Intact vegetation along the small stream that conveys off the property at the southwest corner includes blueberry (*Vaccinium* sp.), sword fern (*Polystichum munitum*) and salmonberry (*Rubus spectabilis*).

It is noted that along the west property line, the depressional area was a pond complex prior to land management activities (details of this area are provided in Section 5.4).

### 5.4 Pond Complex Ecosystem

In July 2009, The Ministry of Environment (MOE) identified that a pond complex along the western edge of the property was the subject of works that resulted in the draining of this area. The drainage of this pond complex took place in the spring of 2008 and the ponds were drained completely and filled with gravel. This initiated an investigation by the MOE into the works (Ministry of Environment<sup>6</sup> letter), upon which the MOE requested that the client provide a description of the original form and function of this area as well as a habitat restoration plan to recreate the impacted system.

#### 5.4.1 Previous Conditions

LECL conducted an Ecological Assessment (EA) Report<sup>7</sup> that described the pre-disturbance state of the area. This report provided a qualitative and quantitative assessment of the known, remnant and anticipated land forms and biological communities contained within and adjacent to the subject property as required in the MOE letter (2009). Findings in the EA report noted the previous pond complex occupied a rectangular area of approximately 9000m<sup>2</sup> in recent years.

Local site topography, aerial photo interpretation and the depth of the outflow value previously located in the main dam suggest a pond depth of approximately 2 to 3 metres. In general, the area was composed of 2 distinct open water ponds connected by a narrow channel.

The pond complex functioned to provide habitat to a range of vegetation, aquatic, and terrestrial life. Included in the functions and habitat values provided by this pond complex were water filtration, flood abatement, enhancement of biodiversity in the area, a clean water and

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<sup>6</sup> Unauthorized Changes In or About A Stream at 32900 Welch Ave, Maple Ridge, BC. Ministry of Environment. July 2009.

<sup>7</sup> Ecological Assessment of Previous Wetland at 32900 Welch Ave. Letts Environmental Consultants Limited, November 10, 2009.

nutrient source for fish located downstream of the property in Silverdale Creek and Mill Pond, as well as potential habitat for several species at risk.

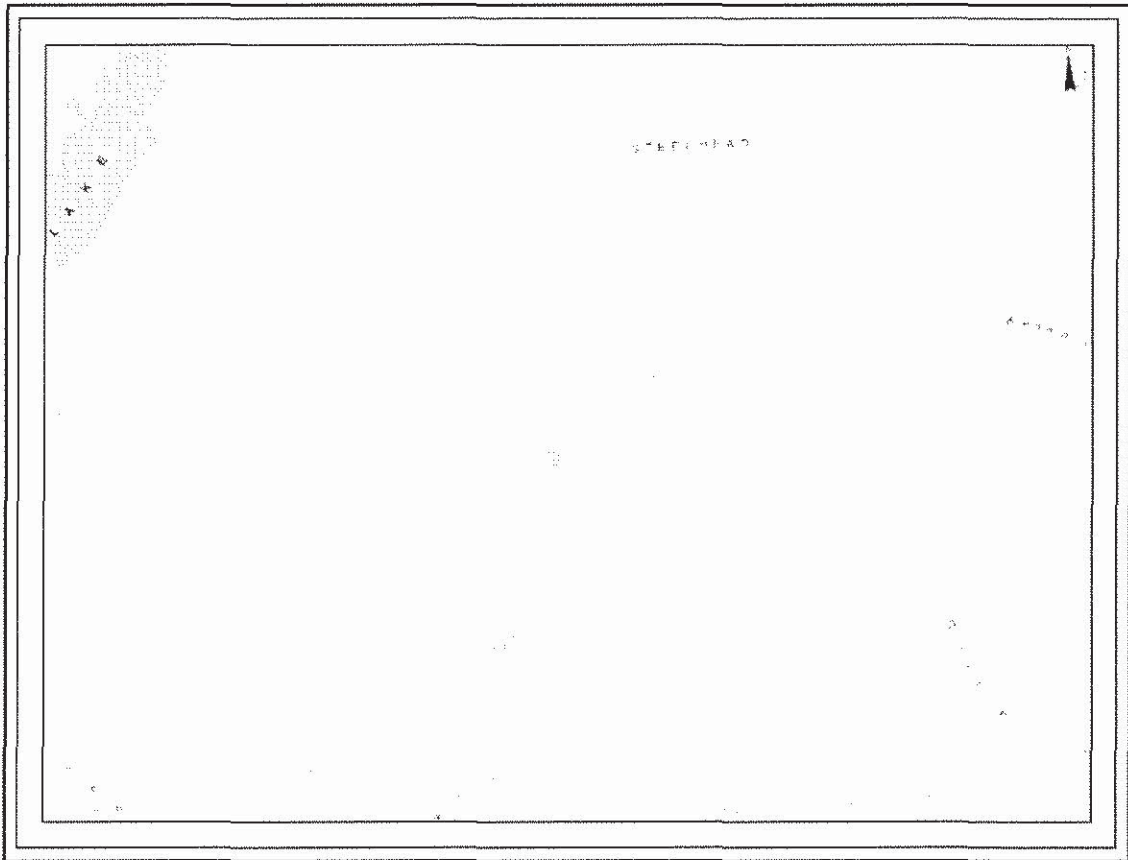
#### **5.4.2 Current Conditions**

Portions of the pond complex were partially infilled with gravel and/or cleared through land clearing activities. A number of small pools of shallow water are present in the original pond bottom, and vegetation is limited to small areas of low groundcover.

A Pond Complex Ecosystem Restoration Plan will be developed by LECL and is summarized in the forthcoming sections of this document. The goal of this plan is to restore the hydrological and ecological function of the pond complex and its associated riparian areas to equal those of the habitats eliminated.

### **5.5 Wildlife and Wildlife Habitat**

Much of the previously forested area of the property has been logged and most of the logs have been removed. A significant amount of logging debris/slash remains on the ground. Thus, opportunities for wildlife within this cleared area are very limited. The adjacent forested areas and the area near the watercourse on the southwest corner may offer marginal habitat for a number of vertebrate wildlife species. Information from the federal and provincial databases were utilized to generate a list of Species at Risk that may inhabit the proposed site or surrounding areas (Section 5.5.5). No known mapped occurrences of species at risk were noted within the general area of the proposed development.



**Figure 3:** Map of species at risk. Source: BC Species and Ecosystems Explorer, Conservation Data Centre, BC.

A comprehensive list of potentially occurring species within previous wetland area was provided in LECL Wetland Assessment Report. The information below is a general summary of species that may be present.

### 5.5.1 Mammals

Small mammals (mice, voles, shrews, etc.) may occupy the cleared area. It is likely that area surrounding the watercourse and forested areas adjacent to the site offer good wildlife habitat as these areas provide forage and cover opportunities and there is a more diverse vegetation structure. During site visits LECL personnel observed signs of black-tailed Deer (*Odocoileus hemionus*) and it is likely that species such as black bear (*Ursus americanus*), Douglas's squirrel (*Tamiasciurus douglasi*), coyote (*Canis latrans*), cougar (*Puma concolor*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*) and cottontail (*Sylvilagus* sp.) utilize the general area.

### 5.5.2 Birds

Bird use of the logged area is expected to be minimal. Birds were seen and heard during our field investigations and are likely utilizing the adjacent forested areas for nesting and cover.

A visual survey for raptor nests was completed along all forested edges. No raptor nests were observed. There are not significant numbers of large dead or dying trees along the edge of the forests where raptors are likely to select for roosting or nesting.

### **5.5.3 Amphibians and Reptiles**

The subject property likely does not offer habitat opportunities for amphibians and reptiles.

### **5.5.4 Fish**

Fish presence on the subject property is unknown. No fish inventories were completed during this assessment. No records of fish distribution are available for on the provincial FISS database or from the District of Mission overview map of fish presence locations. At minimum, the tributary to Silverdale Creek contributes cool nutrient-laden water to downstream fish resources in Mill Pond.

### **5.5.5 Species at Risk**

As of June 1, 2004, it is a federal offence to kill, harm, harass, capture or take an individual of a listed endangered or threatened species. These offences can also apply to prohibitions against the destruction of critical habitat.

Although no species at risk were identified during field studies by LECL, a search of the BC Species and Ecosystems Explorer for species listed under Schedule 1 of the Species at Risk Act was completed to identify potential species that may inhabit the site or areas immediately adjacent to the subject property. No mapped known occurrences were located in the general area of the subject property. A summary of these potential species, including federal and provincial designation and general habitat preferences is included below (Table 2) (Source: BC Species and Ecosystem Explorer).

**Table 2:** Summary of Potential Listed Species at Risk within the study area.

Scientific Name	Common Name	COSEWIC* listing	BC Status**	General Habitat
<b>Mammals</b>				
<i>Sorex bendirii</i>	Pacific Water Shrew	Endangered	Red-listed	Riparian marshy habitat, forages in streams, habitat comprised of more coniferous than deciduous trees
<b>Birds</b>				
<i>Megascops kennicottii kennicottii</i>	Western Screech Owl	Special Concern	Blue-listed	Lower elevation forested areas, typically close to water
<b>Amphibians</b>				
<i>Ascaphus truei</i>	Coastal Tailed Frog	Special Concern	Blue-listed	Wet, coniferous forests, cold, clear mountain streams/creeks with forested borders
<i>Rana aurora</i>	Red-legged Frog	Special Concern	Blue-listed	Moist forests, ponds and stream
<i>Rana pretiosa</i>	Oregon Spotted Frog	Endangered	Red-listed	Marshes, sometimes within forested areas
<b>Fish</b>				
<i>Catostomus</i> sp.	Salish Sucker	Endangered	Red-listed	Coastal streams, small rivers with gravel bottoms, fairly slow currents
<b>Molluscs</b>				
<i>Allogona townsendiana</i>	Oregon Forestsnail	Endangered	Red-listed	Older, mixed wood deciduous lowland forests with woody debris and leaf litter
<b>Plants</b>				
<i>Cephalanthera austiniiae</i>	Phantom orchid	Threatened	Red-listed	Coniferous forests with little or sparse ground cover
<i>Lupinus rivularis</i>	Streambank lupine	Endangered	Red-listed	Riverbanks in sites with little ground cover

\*Committee On the Status of Wildlife In Canada

\*\*BC Status – Red-listed (Endangered), Blue listed (Threatened)

## 5.6 Soils/Geology

According to EBA Engineering (October 2010), the subsurface stratigraphy in the proposed mine area “...consists of silt, clay and cobbly glacial till...” (p.6). The bedrock consisted of “...generally massive biotite granite or diorite” (p.6). Geology consists of “...glacially-derived silt, clay, sand and gravel deposited in terraces along the valley sides” (p.2).

At the east foot of the bedrock are Pleistocene lodgement and flow tills.” (Valley Testing Services Ltd<sup>8</sup>).

<sup>8</sup> Valley Testing Services Ltd. Preliminary Quality Testing of Rock and Gravel Materials. September 2010.

## **5.7 Visual Quality / Aesthetics**

The west side of the proposed extraction site is visible from Welch Avenue. However, there are no homes in the immediate area surrounding this property. The property is in close proximity to two other gravel pits located to the north.

## **6.0 PROJECT DEVELOPMENT PROCEDURES**

### **6.1 Mining Sequence and Development Plan**

Installation of sediment and stormwater management facilities will be required prior to the commencement of mining activities. Quarry mining operations are proposed to be initiated at the upper east side (Phase 1 Bench Area) and move down the slope (westward). This will involve drilling and blasting the bedrock which then can be transferred to the lower area where it will be processed. The final slope will be terraced.

Gravel extraction is proposed for the northwest corner (651,000 tonnes). Sediment and Erosion Control should be sequenced to match current operations. The stormwater treatment facility will incorporate one of the two proposed constructed ponds, which should be installed as a stormwater treatment area. Once mining is complete, this pond should be converted to function as a permanent pond ecosystem.

The southwest portion of the west property line will be the location of the permanent wetland that will be constructed prior to mining operations. A 15m riparian setback for the channel along the south property line should also be maintained.

### **6.2 Site Preparations and Equipment**

Blasting will be required on the sloped portion of the site. Processing of blasted rock will take place in the lower northwest corner of the site. Bulldozers, front-end loaders and excavators will be used to remove topsoils for road construction and / or stockpiling.

Track excavators and front-end loaders likely will be used for gravel extraction. All topsoils / material should be removed in accordance with the District of Mission Soil Removal Bylaw (3088-1997) and any additional conditions set out therein. Overburden of unwanted material such as glacial sands, clays and peat should also be stockpiled and preserved for future restoration / reclamation work.

Access into the mine area will be from along Dewdney Trunk Road, with entrance along Larsen Street and exiting out Welch Avenue. Gravel trucks will also be used to haul the final product to the surrounding local community.

Clearing (removal of trees and vegetation) has already taken place. Grubbing (removal of any stumps and root systems) will likely take place in areas that will be actively used for extraction and stockpiling in the near future.



### **6.3 Utility Service Requirements**

It is not known what facilities will be proposed on-site.

### **6.4 Fuel Storage and Supply**

Petroleum products such as diesel and gasoline will likely be used as fuel and for the maintenance of mobile equipment. Other chemicals such as lubricants required for routine equipment repair may also be used.

### **6.5 Heat**

Heat for any proposed facility and scale shack is expected to be electrical but is not known at this time.

### **6.6 Toxic / Hazardous Materials**

Petroleum (diesel / gasoline) products and lubricants will likely be used for fuelling and servicing mobile equipment, and for maintenance of mobile equipment.

## **7.0 ENVIRONMENTAL IMPACTS**

There are numerous Environmental Concerns regarding mining operations. The main environmental impacts associated with the proposed mining operation include the following:

- Aquatic / Hydrological Resources – *Water Quality*
- Habitat Alteration – *Vegetation, Wildlife*
- Pollution – *Dust, Noise, On-site Facilities*
- Cultural Features – *Aesthetics & Public Safety*.

Mining this site will alter surface and sub-surface flow patterns, which may result in changes in water quality. Blasting bedrock and gravel extraction will permanently change the topography, alter soils and aesthetic values, and increase the hazard risk to public safety.

The large amount of exposed soils can increase erosion and sedimentation. In addition, extraction and blasting will result in a progressive disruption of wildlife movement throughout the site. As the site is developed and other associated activities take place, wildlife trails / corridors and habitat will be eliminated.

## **7.1 Aquatic/Hydrologic Resources**

### **7.1.1 Surface water/watercourses**

Maintaining water quality is a primary environmental concern at a mining site. This includes stormwater management, groundwater and surface water protection, and discharge options for stormwater and process water. Protecting water quality means ensuring that any water discharged from the operation will meet provincial and federal standards. Prevention of negative impacts on water quality is always preferable to treatment.

Specifically, increased runoff and off-site sedimentation may result. As extraction proceeds, the surface and subsurface hydraulic regimes and the flow patterns and delivery rhythms will be altered. These may increase both the peak flow as well as the volume of surface runoff. Unmitigated, this can result in increased erosion and degradation of water quality as well as damage to terrestrial and aquatic environments. Stormwater drainage and excess sedimentation can greatly alter plant and animal communities, and can adversely affect streams by causing changes in water chemistry, turbidity, temperature, and streambed morphology. Such changes will affect aquatic organisms and habitats.

The processes of clearing, excavating, blasting, processing and stock piling of materials on the subject property will produce fine sands and silts. General activities such as traffic (haul trucks) will further breakdown and compact fine sands and will increase compaction and accelerate surface runoff. Compaction may result in excess water ponding on the soil surface, leading to soil saturation and reduced infiltration capacity. Ponding may also increase the risk of fines being translocated off-site by haul trucks. The location and quantity of stockpiles will also affect levels of sediment load to drainage ditches and retention facilities.

### **7.1.2 Groundwater**

The hydrological and hydrogeological conditions and potential impacts related to the proposed development were evaluated and summarized by EBA Engineering (Oct 2010). It is important to ensure that the long-term quality and quantity of groundwater is not affected or disrupted. Mining can alter subsurface flow patterns and negatively impact groundwater flow downgradient of the site.

Findings from EBA Engineering's report are summarized in Section 8.2.2.

## **7.2 Habitat Alteration**

### **7.2.1 Vegetation**

Most of the vegetation with the exception of a narrow strip near the small stream in the southwest corner has been removed. Operators should retain any existing vegetation (shrubs, root wads) on areas of high erosion potential such as erodible soils and steep slopes. If it becomes necessary to remove vegetation from these areas, revegetation should be done as quickly as possible thereafter. Interim measures should include covering the site with tarps, geotextiles, or straw.

### **7.2.2 Wildlife and Wildlife Habitat**

Development has historically degraded or completely eliminated wildlife habitat associated with the land-base within which it occurs. The development of this site will eventually result in the elimination of habitat with the exception of the riparian area along the south watercourse and the pond area on the west property line. The pond complex will be constructed prior to the commencement of any mining activities. One of the two ponds within the pond complex ecosystem will serve as permanent pond habitat, while the other will be installed as stormwater management facility and will be converted to permanent pond ecosystem following completion of mining activities.

Species such as blacktail deer and black bear will be displaced and may be replaced with species more tolerant of human activities such as raccoons (*Procyon lotor*), and coyotes. Other species that may have utilized the site prior to disturbance likely will not return until the habitat around the pond/channel area is restored. Mining activities (blasting, noise, etc.) likely will disturb wildlife in adjacent areas as well.

## 7.3 POLLUTION

### 7.3.1 Dust

Dust is any particle up to 75 microns ( $\mu\text{m}$ ) in size and has a wide variety of man-made and natural origins. The most difficult type of dust to control is "fugitive" dust, which is generated by unstable, non-point sources (like movement of equipment). Dust is a common cause of complaints at mining operations. Exposed soils are hotter and drier, and will result in more air-born pollution (dust).

Potential sources of dust include, but are not limited to:

- vegetation clearing and hauling,
- stripping soils / overburden (depending on soil moisture content),
- road construction,
- loader and haul truck movement (on and off-site),
- personnel, supervisory, and service vehicles,
- loading material and blasting
- stockpiling materials, and
- offsite traffic – personal, trucks, deliveries, visitors.

During mining dust will be generated by:

- construction of water management structures,
- road construction,
- material excavation and blasting
- processing (crushing and screening),
- haul truck and loader movement (on and off-site),
- personnel, supervisory, and service vehicles (on and off-site),
- stockpiling materials, and
- loading.

The levels of dust will be determined by soil moisture content, traffic speed, and dry weather. Dust levels will most likely be highest during the drier summer months. Visible coarse dust and emissions from mobile equipment will travel beyond property boundaries during heavy winds in dry weather.

Dust settling in the riparian setback areas around the watercourses and the permanent wetland may affect the biotic integrity of these areas. Incorporating an effective dust management plan will dramatically reduce the levels of dust infiltrating these buffer strips. Reducing the potential for dust creation and dust control should be part of ongoing operations.

### **7.3.2 Noise**

An increase in ambient noise levels will result from the proposed mine. Noise is associated with a great number of common activities at mining operations, including blasting, loading, crushing, screening, washing and hauling. Noise is one of the most commonly cited community concerns regarding operations.

Noise may be generated by blasting, rock impacting metal, equipment noise (crushers), loaders, and load out facilities and trucks. Intermittent noise from trucks will result from three sources: engine noise, transmission brake noise, and backup horns. Noise from the excavator will occur infrequently throughout the day (principally from the backup horn). Noise generated from the loader will be more frequent as it will back up more frequently in truck loading, hauling and processing operations.

### **7.3.3 On-Site Facilities**

Petroleum products such as diesel and gasoline likely will be used as fuel and for the maintenance of mobile equipment. Fuel storage facilities located in unsuitable locations, or not protected, may cause accidental impacts. Any petroleum products spilled or burned may result in contamination to the local environment, groundwater, and aquatic life.

## **7.4 Cultural Features**

### **7.4.1 Aesthetic Values/Visual**

The extraction operation will significantly affect the visual quality of the area. Managing the appearance of the operation is important. Visual landscape planning balances the aesthetic concerns of the community with the operations of the mine. Processing facilities may be less attractive than overall surroundings and considerations to visual impacts during mine layout planning should be completed.

Visual evidence of the site and ongoing alterations will be visible from Welch Avenue to the west.

### **7.4.2 Public Safety**

High-bank cut slopes and unauthorized entry into the site during hours of operation will pose the most significant risks to human health and safety. Unskilled or unauthorized individuals moving on top of or below high cut slopes are at risk of falling off or, having loose debris falling on them. Unauthorized people entering or moving around the site and / or machinery during operations would be at risk to serious personal injury or death. The proposed pond complex should be fenced to prevent unauthorized entry.

### **7.4.3 Traffic**

An increase in heavy truck traffic along the access routes along Dewdney Trunk Road, Creston Avenue, Larsen Street and Welch Avenue is anticipated.

### 7.4.3 First Nations

No archaeological assessment or consultation with First Nations has been completed to date. It is not known what, if any, impacts to potentially occurring archaeological resources would result from the proposed mining operation. According to the Guide to Preparing Mine Permit Applications for Aggregate Pits and Quarries in BC, Mining and Minerals Division, MEMPR, aggregate pit and quarry applications are referred to First Nations for input.

## 8.0 MITIGATING MEASURES

Environmental concerns with aggregate mining can be mitigated through proper mine planning, diligent procedures, use of Best Management Practices and by integrating aggregate operations with local community planning. Undisturbed, sand, gravel and quarry rock are environmentally benign materials. Concerns arise when these resources are removed which causes environmental disturbance. The effects on the environment (i.e. plants, animals, soil, water and air) need to be considering during plan formation and operations.

The environmental impacts resulting from the mining operation range from those that can be minimized to those that are unavoidable (Table 3). Impacts termed unavoidable are those for which no practical mitigation measures exist. For the impacts that can be reduced, mitigating measures are outlined in the sections below.

**Table 3:** Impacts from the Proposed Mining Operation

Unavoidable Impacts	Impacts that can be Minimized
<ul style="list-style-type: none"> <li>• Noise</li> <li>• Vegetation removal</li> <li>• Aesthetics</li> <li>• Traffic increase</li> </ul>	<ul style="list-style-type: none"> <li>• Sediment loading</li> <li>• Pollution</li> <li>• Public safety</li> </ul>

The main concern with this site is the treatment of surface runoff. The impacts that may result from draining the site, such as increased sediment loading and discharge, can be reduced. To manage surface runoff from this site will require a series of ditches, check dams and stormwater treatment facility to treat runoff from roads and mined areas from the different pit areas over the various stages of site development. The construction of retention facilities and ditches should take place first. Additional land clearing and extraction and blasting should only begin after erosion and sediment control measures are in place.

All sediment control measures incorporated should prevent the loss of sediment off-site and should follow the current standards set out in the BC Ministry of Environment's "*Land Development Guidelines for the Protection of Aquatic Habitat*".

Best Management Practices incorporated into the mining operation may;

- Provide effective, economical and safe stormwater management, discharge and erosion and sediment control
- Reduce siltation
- Control dust
- Control noise emissions,

- Discourage garbage dumping
- Provide pollution control

## **8.1 Pond Complex Ecosystem Restoration Plan**

This section is a summary of the Pond Complex Ecosystem Restoration Plan that has been developed to date to address the concerns raised by the Ministry of Environment in the July 31, 2009 memo as result of the prior habitat disturbance. Prior to the commencement of any mining activities on the property, a comprehensive Pond Complex Ecosystem Restoration Plan for the construction, phasing and maintenance of the pond complex will be prepared and implemented. The plan will describe the goals, procedures, and outcomes of the habitat restoration to be undertaken to restore impacted habitat. Below is a general summary of the procedures that will be followed in constructing the wetland habitat.

The form and features of the restored wetland habitat will replicate the original wetland habitat as closely as possible. However, it is noted that original habitat can only be inferred from available assessments and information. The original habitat evaluation included open areas of permanent water with lightly vegetated banks. Although the banks of the ponds were generally graded between 1:1 and 1.5:1 prior to disturbance, the banks of the ponds below the top of banks should be graded no greater than 2:1 to provide stable, non-eroding banks.

The goal of the habitat restoration plan is to establish a functioning long-term permanent pond complex that contains the biophysical characteristics of a naturally occurring pond / wetland. This includes habitat for wildlife such as birds, amphibians and reptiles, and a variety of wetland and aquatic plants. It is understood that the pond complex will be constructed first at the southwest corner of the property. This facility will encompass a wetted area of 4,555.3m<sup>2</sup> and will be complexed with native plant species that were likely found in the original pond complex, as well as abiotic habitat features such as large woody debris and boulder clusters.

The total offered restored habitat area (including aquatic and riparian habitats) will equate to approximately 20,753.48 m<sup>2</sup>. Plant selection and abiotic habitat features will be extrapolated from nearby Mill Pond, which presently offers a representation of habitat similar to the original habitat and species composition found on this property). LECL "Ecological Assessment of Previous Wetland at 32900 Welch Avenue" (2009) provides a comprehensive overview of nearby Mill Pond.

**Table 4: Estimated Areas of Impacted Habitat and Proposed Restoration Areas**

Pre-disturbance Conditions (Excluding Riparian Habitat)		
Approximately 9000 m <sup>2</sup>		
Proposed Pond Ecosystem Restoration		
Details	Aquatic Habitat	Riparian Habitat
Pond Complex	8,246.90 m <sup>2</sup>	7,393.24 m <sup>2</sup>
Toe of Slope Channel	1,144.39 m <sup>2</sup>	3,968.95 m <sup>2</sup>
<b>Total Proposed Restored Areas</b>	<b>9,391.29 m<sup>2</sup></b>	<b>11,362.19 m<sup>2</sup></b>
<b>Combined Total</b>	<b>20,753.48 m<sup>2</sup></b>	

### 8.1.1 Shape and Features

The proposed pond complex will consist of two separate ‘pond’ areas. Pond A, located in the extreme southwest corner of the property, will be constructed to its permanent configuration. Pond B, immediately north of Pond A, will function as a stormwater treatment facility throughout the life of the mine. Pond B will then be transformed to pond habitat following completion of mining activities. The banks of the ponds below the top of banks should be graded no greater than 2:1 to provide stable, non-eroding banks. Riparian areas out from the top of banks, specifically the north and east side of Pond B and east side of Pond A should be graded no greater than 3:1.

The pond complex should be diverse and contain elevated vegetated hummocks, clusters of large woody debris, root wads and boulder clusters. Each of these features serves a distinct purpose in pond habitat and contribute collectively to the ecological complexity inherent to wetlands. The perimeter of the pond system should consist of a 15m buffer of native vegetation from the top of bank. All native plants planted within setbacks areas buffering the ponds should be planted within a 0.3m deep layer of approved landscape topsoil. The topsoil should be lightly compacted and graded so as to not result in water pooling.

Diversity within a pond system provides a wide range of habitat for the various life stages of wildlife including amphibians, reptiles, invertebrates, small mammals and birds. Ponds and wetlands are used by amphibians, invertebrates and reptiles as areas to forage, breed, nest. For instance, clusters of large woody debris serve as concealing cover, flooded areas are used for breeding, and the buffer area surrounding the wetland ponds serves as refuge<sup>9</sup>. Ephemeral, or

<sup>9</sup> It is not possible to provide an accurate distinction between habitat areas of open water from areas of adjacent riparian habitat. Aerial photo interpretation since 1983 indicates that area of pond/wetland with open water surface varied from year to year.

<sup>9</sup> Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia, Ministry of Water, Land and Air Protection, November 2004; Wind, E. and B. Beese. 2008. Little known and little understood: Development of a small wetland assessment field card to identify potential breeding habitat for amphibians. *BC Journal of Ecosystems and Management* 9(1):47-49.

seasonal, pools that dry up during the summer months also serve as breeding habitat for species of amphibians that migrate between wetlands and forested areas<sup>10</sup>.

Aerial photo interpretation completed by LECL (Ecological Assessment 2009) noted that the area of open water surface varied from year to year but open water was present. The proposed pond/wetland aims to maintain water in the pond at all times of the year to mimic the likely pre-disturbance conditions. It should be noted that the final mine floor should be graded in a manner where all internal runoff is directed to the more northerly Pond B system. This approach will be required to maintain the ponds habitat during periods of drought and assist in meeting the long-term hydrological needs of the desired aquatic and terrestrial communities.

### **8.1.2 Equipment**

Pre-construction works (including the initial site excavation and lining of the pond bottom) will require the use of machines. All machines employed in the excavation, construction and maintenance of the wetland should follow “Best Management Practices” outlined in a detailed Pond Complex Ecosystem Restoration Plan and Environmental Management Plan.

### **8.1.3 Soils**

Following excavation, the pond bottom should be lined with no less than 0.3 metres of moist malleable clay up to the ponds top of banks. Clay is the preferred material in lining constructed wetlands and if applied properly will prevent water from draining from the ponds. There are no available groundwater sources of water to maintain a sufficient hydroperiod. A layer of landscape topsoil no less than 0.3m deep should be spread and lightly compacted on top of the clay liner along the vegetated banks and internal hummocks. This soil provides a growing medium for vegetation while organic litter from wetland plants develops during the initial years.

### **8.1.4 Plants and Planting Methods**

A variety of emergent and submerged plants are recommended for planting in the pond system(s). Plants should be selected according to their function in the pond system, their rate of growth and colonization and their compatibility with the general climate, soil type, and other plants. These should include species native to the area such as rushes (*Juncus* spp.), sedges (*Carex* spp.), flowering shrubs (*Rubus* spp., *Cornus* spp., *Rosa* spp.), and a variety of trees such as Sitka spruce (*Picea sitchensis*) and black cottonwood (*Populus trichocarpa*). LECL (2009) “Ecological Assessment of Previous Wetland at 32900 Welch Avenue” lists plant species found at nearby Mill Pond, an ecosystem similar to that expected at Welch Ave. This information, in conjunction with literature referenced below and observation of site conditions, should be used to compile a comprehensive summary of the plant species and numbers to be planted as part of the pond restoration.

Plant stock should be acquired from a local nursery and delivered on site immediately before planting to prevent plant die-off prior to planting.

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<sup>10</sup> Habitat Management Guidelines for Amphibians and Reptiles of the Midwest, Partners in Amphibian and Reptile Conservation



Planting should be undertaken during the growing season to allow time for vegetation to establish before the next dormant period and should be conducted by hand. Plants should be protected from wildlife damage by placing a temporary mesh fence overtop of the planted areas. This would ensure that the sensitive roots of young plants will not be uprooted or eaten by wildlife.

### **8.1.5 Spillway and Water Control Design**

As part of the final pond complex (Pond B) that will be in place following the completion of mining activities, the following guidelines should be implemented. The final mine floor should be graded in a manner where internal surface runoff is directed to the north end of Pond B. Runoff should then be directed to one or more receiving manhole type structures such as a Vortech Unit or Stormceptor at a location back from the established riparian habitat limits and or as determined by a Professional Engineer. Oil/water separators may also be required and are suitable for removal of floatable petroleum-based contaminants from small areas such as parking lots via a coalescing plate oil/water separator. The inlet by which water is released into the forebay area of Pond B should consist of a culvert that directs flows into a distributor pipe buried in gravel that will disperse flows.

The outlet by which water evacuates from Pond B should consist of an adjustable-height weir or spillway (if the existing roadway is removed) or adjustable riser pipes (if the existing roadway remains in place) that will allow water levels to be adjusted and prevent system failure in the event of changes in the water level. Both Ponds must be designed in a manner that ensures they will not dewater and will provide a supply of clean water to off-site habitat systems.

### **8.1.6 Maintenance and Monitoring**

The objective of pond maintenance is to ensure continued system performance and wetland health in the initial stages of habitat development so that deficiencies and issues that may arise as the pond complex undergoes gradual natural changes can be addressed and rectified in a timely manner.

Vegetation should be inspected on a monthly basis following the final watering of the wetland (the final stage of planting) for a period of two years after which a yearly review should be conducted. Reviews of vegetation should include maintenance of existing vegetation, replacing unsuccessful plants, and removing invasive or weedy species. Maintenance should also include the removal of sediments and/or debris accumulated at the inflow and outflow points. The litter trap located at the outflow should be cleaned at minimum 4 times per year. Other routine maintenance tasks include ensuring that stagnant areas have not developed and that all areas of the pond are permanently watered. Water quality readings will not be carried out.

A comprehensive monitoring plan will be developed and included in the Pond Ecosystem Restoration Manual and will include the specific objectives, duration, frequency, tasks, and reporting/resource requirements of monitoring.

## 8.2 Aquatic/Hydrologic Resources

In addition to the Pond Complex Ecosystem Restoration Plan, a comprehensive Environmental Management Plan (EMP) for this site should be prepared. An EMP will identify any components of the project that could present a hazard to the environment, including water quality. This plan should describe how effects to water quality will be mitigated through best management practices, proper work and emergency response procedures.

### 8.2.1 Surface Water/Watercourse

As this area is developed, interceptor-conveyance ditches will need to be continually added and managed. The primary role of interceptor ditches is to convey flows received from higher developed areas and away from locations where operations are being carried out. Interceptor ditches should only be constructed or altered during favourable weather conditions, as sediment loading is greatest during ditch alteration or relocation. Fortunately, the pervious soil characteristics of non-compacted sand and gravel will result in most precipitation permeating at the point of impact.

The ultimate objective should be to convey flows to the towards treatment facilities. Specific details of runoff management should be provided in a detailed Environmental Management Plan (EMP) for this site. Specific design details with all storm water systems and retention ponds / facilities should be in accordance with the Ministry of Environments "*Land Development Guidelines for the Protection of Aquatic Habitats*", and local precipitation data. A certified engineer should design all storm water facilities.

Ditches should be constructed along the toe of all cut slopes. All ditches should ultimately convey flows into adequately sized retention facilities. A series of rock check dams should be incorporated in the entire length of all ditches. These will reduce flow velocity, retain flows for longer periods of time, and limit the transport of sediment off-site. Where possible the ditch shoulders and banks should be seeded immediately after installation. All horizontal surfaces should slope away from all cut slopes.

The location and quantity of soil stockpiles will also affect levels of sediment load to drainage ditches and retention facilities. Topsoils stockpiled for longer than 30 days should either be vegetated or covered. A silt fence should be installed around the perimeter of the each soil stockpile.

Considerations in the design criteria for ditches and sediment ponds include;

1. Storm event treatment period: for example, 6-month, 24-hour storm. Short-duration, high -intensity summer storms are of interest because of their ability to produce high runoff and pollutant loading / wash-off rates, particularly following long periods of dry weather.
2. For grass-lined ditches: these are appropriate providing conveyance design velocity does not exceed 6 ft/sec. Velocities in excess of 6 ft/sec. will require rip rap or paved channels. Establishment of dense, resistant vegetation is critical. The channel depth should be proportioned to meet the needs of drainage, soil conditions, erosion control needs, and site conditions such as design grades and natural

topography. Stone channel bottom lining may be needed where prolonged low flow is anticipated. Outlets should be sized for adequate carrying capacity based on design discharge volumes. Outlets need to be protected from erosion by limiting exit velocity with adequate energy dissipators.

Permanent grass channels need to be protected from excess sedimentation, especially during periods of heavy land disturbance. This can be accomplished by effective use of diversions, temporary sediment traps, check dams and vegetated filter strips along the channel.

We recommend that no works or gravel extraction should take place within the 15m setback adjacent to the small south-side watercourse or pond complex. The following steps are recommended to minimize impacts on water quality:

1. Construct retention facilities and ditches prior to extraction.
2. Construct all ditches large enough so as to incorporate step weirs, check dams or linear sediment ponds if required.
3. Control sediment release from areas disturbed during operations such that no off-site sedimentation occurs.
4. Minimize erosion of soils by diverting runoff away from disturbed areas or other sources of contamination to meet water quality objectives.
5. Treat any diverted waters as necessary to remove sediment such that site-specific water quality objectives are met.
6. Implement and improve sediment control measures prior to the start of operations.
7. Cease construction activities or other activities contributing to sediment release and improve sediment control measures whenever water quality objectives are exceeded.
8. Establish on and off-site water quality monitoring locations.
9. Recruit a qualified independent environmental monitor to oversee the construction and maintenance of all sediment control facilities, and inspect check dams and ditches for damage after each run-off event.
10. Cover and / or vegetate materials stockpiled longer than 30 days. If this is not feasible then install silt fences around their bases.

## **8.2.2 Groundwater**

EBA Engineering Consultants Ltd. concluded that "...the proposed gravel and bedrock mining activity is not expected to impact groundwater quantity or quality in the vicinity of and downgradient from the site" (p.12)<sup>11</sup>.

## **8.3 Habitat Alteration**

### **8.3.1 Vegetation**

Numerous large trees are located immediately adjacent to the site. Where excavation is to take place within 4m of the drip line of a tree, a protection barrier at least 1.2m in height should be installed around the tree. The diameter of the barrier shall be no smaller than the drip line of the trees(s). The barrier should be constructed of snow fencing staked every 1m, plywood sheets

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<sup>11</sup> Surface Hydrology and Hydrogeologic Assessment. EBA Engineering Consultants Limited. October 2010.

fastened to wooden stakes or another form approved by the environmental monitor. The barrier(s) should be constructed prior to any works and remain intact until all works are complete.

Vegetation plays a critical role in protecting the soil surface from raindrop impact, which is a major force in dislodging soil particles and moving them down slope. It also shields the soil surface from the scouring effect of overland flow and decreases the erosive capacity of the flowing water by reducing its velocity. Besides preventing erosion, healthy vegetated cover cuts down on heat reflectance and dust. It also provides the essential components for sustaining wildlife.

The removal of the site's remaining groundcover will leave the site vulnerable to accelerated erosion and will greatly increase off-site sedimentation. Preserving the natural vegetation on-site to the maximum extent practicable will minimize the impacts of gravel pit development on stormwater runoff. Appropriate sequencing of construction activities can be an effective way to reduce the negative impacts of the proposed development.

### **8.3.2 Wildlife and Wildlife Habitat**

A riparian buffer of 15m from the top of bank should be maintained on the south side watercourse to protect the integrity of the channel.

A Pond Complex Ecosystem Restoration Plan will be developed and implemented for the pond on the west property line. This will be protected with a 15m buffer that extends out from the top of the pond banks.

## **8.4 Pollution**

It is anticipated that there will be some limited impacts to ambient air quality in the immediate area due to equipment exhaust, movement, etc. The affected areas are localized around the immediate area, and the subject property is not within a populated area and should not affect local residents.

### **8.4.1 Dust**

Dust generation sources should be controlled to the greatest extent practical by watering. Mitigation could include inundation or surface sprays.

During dry weather, haul trucks should use canvas load covers or have trucks run underneath a sprinkler system.

The following measures should be incorporated to reduce dust generation:

1. Incorporate a dust control program for road surfaces to include effective control measures successfully used in BC.
2. Install dust control systems on all transfer systems (trucks), and surface amendments such as inundation or sprays to control areas, which are dust sources.
3. Schedule construction operations so that the least area is disturbed at one time.
4. Leave undisturbed buffer areas between graded areas wherever possible.

5. Vegetate or cover stockpiled soils with grasses with a mix of native seed prior to summers end.
6. Traffic speed should be kept below 30km / hour throughout this site.

#### **8.4.2 Noise**

Adjacent forested areas will act as noise dissipitators. Audible alarms on mobile equipment are currently required by the Health, Safety and Reclamation Code for Mines in British Columbia and therefore cannot be altered. Haul trucks should refrain from using transmission brakes while traveling Dewdney Trunk Road.

Where safety is not an issue, large trees should be left along the west side to preserve visual quality and dissipate noise.

#### **8.4.3 On-Site Facilities**

The following spill prevention measures should be implemented during operations

- Petrochemicals should be stored in approved, environmentally safe containers and locations.
- Mobile construction equipment should be fuelled, lubricated and serviced only at pre-approved locations.
- Except in emergencies, field servicing of equipment near the setback area(s) should not be permitted.
- Equipment and machinery should not be washed near any environmentally sensitive area (i.e. watercourse or pond area).

Petroleum products should be stored where they will be protected from accidental impact, and where fire suppression equipment and spill kits (for small spills incidental to filling and use of tanks) should be available. Spill kits should be made available for small spills. All tanks and fuelling stations should meet Provincial and *National Fire Code* standards. Waste oil from vehicle maintenance should be collected and stored in an approved waste oil storage tank. All waste oil should be recycled through a petroleum products supplier.

Petroleum products should be stored where they will be protected from accidental impact, and where fire suppression equipment and spill kits (for small spills incidental to filling and use of tanks) will be available. Spill kits should be made available for small spills. All tanks and fuelling stations should meet BC and *National Fire Code* standards.

Waste oil from vehicle maintenance should be collected and stored in an approved waste oil tank. All waste oil should be recycled through a petroleum products supplier.

### **8.5 Cultural Features**

#### **8.5.1 Aesthetic Values**

Where safety is not an issue, large trees should be left to block mine visibility where possible. All exposed surface soils, stockpiles, slopes, and ditches throughout the subject property should be seeded with a mix of native seed prior to summers end.

## 8.5.2 Public Safety

Sand and gravel pits and rock quarries commonly have activities and equipment that are potentially hazardous. Risks at aggregate operations may affect people (employees and the public), the environment or the operation.

Fencing (as per the Mines Act) should be erected along the west side of this site and encompass both pond facilities. Fences should be installed along established setback limits. Appropriate signage should also be attached to this fencing warning of the hazards associated with the site and or sensitivities (associated with the ponds).

Fencing should also be erected to surround all high bank cut-slopes along all forest edges. Several clearly visible signs should be erected at all site entrance points. Signs should outline current regulations, and hazards associated with entry onto construction sites. This would include, but not be limited to, general entry requirements (hard-hats etc), and specific site hazards.

## 8.6 Construction and Maintenance

### 8.6.1 Roads

Roads will compact, collect and convey runoff water along their surface. Rills, gullies and ponding areas will form unless the road is stable and surface flows managed. Specific recommendations regarding controlling surface flows and reduce surface flow rates along roads are provided below.

The industrial access roads should be constructed / built according to the BC *Mines Act* requirements and / or Provincial and local regulations. To control surface flows and reduce surface flow rates we recommend the following:

1. Ensure that the road follows the natural contours of the terrain if it is possible.
2. Ensure that grades do not exceed 8%.
3. Provide surface drainage, and divert runoff towards treatment facilities by using water bars or cobble filled ditches.
4. Armor all runoff outlets / areas.
5. Keep cuts and fills at 2:1 or flatter for safety and stability and if possible add ground cover.
6. Where seepage areas or seasonally wet areas must be crossed, install subsurface drains. All drain inlets and outlets should be armored.
7. Install ditches along the toe of roads with check dams and / or silt fences.
8. Vegetate all roadside ditches, cuts, fills and other disturbed areas or otherwise appropriately stabilize as soon as grading is complete.
9. Overburden of unwanted material such as glacial sands, clays and peat should also be stockpiled and preserved for future restoration / reclamation work.

Inspect construction roads and parking areas periodically for condition of surface. Top-dress with new gravel as needed. Check all ditches and other areas for erosion and sedimentation after runoff producing rains. Sediment producing areas should be treated immediately.

## 8.6.2 Construction Scheduling

Scheduling of activities can minimize the effects of the operations on the environment. Table 5 outlines the general sequencing of the operation.

**Table 5.** Considerations for construction scheduling for the proposed gravel pit.

<b>Construction Activity</b>	<b>SCHEDULING SEQUENCE</b>
<b>1. Construction access</b> Construction entrance, construction routes, equipment parking areas.	Stabilize bare areas immediately with gravel and temporary vegetation as land disturbances take place.
<b>2. Pond A Creation</b>	Excavate and create permanent Pond A in southwest corner of property.
<b>3. Sediment traps and barriers</b> Basin traps, sediment fences, and outlet protection.	Install principal basins after construction site is accessed. Install additional temporary traps as needed during grading.
<b>4. Runoff control</b> Diversions, water bars, outlet protection.	Install key sedimentation control practices after principal sediment traps.
<b>5. Runoff conveyance</b> Stabilize channels, inlet and outlet protection.	Install principal runoff conveyance system with runoff control measures.
<b>6. Mining Activities</b>	Begin excavation activities once principal sediment and runoff control measures are installed. Install additional temporary protection measures and maintain respect for riparian setback areas.
<b>7. Surface Stabilization, Pond B</b> Temporary and permanent seeding, mulching, sod.	Apply temporary or permanent stabilization measures immediately on all disturbed areas when cutting / filling is delayed or completed.  Convert stormwater treatment facility to Pond B.
<b>8. Final stabilization</b> Topsoil, permanent seeding.	Last construction phase. Stabilize all disturbed areas except for areas of active aggregate extraction. Remove and stabilize all temporary control measures.
<i>Maintenance: inspections should be performed weekly and after periods of rainfall. Repairs should be made immediately.</i>	

## 9.0 MONITORING

Monitoring by an appropriately qualified environmental monitor should be completed during all phases of the project; pre-excavation, start-up, operation, closure and post-completion.

Monitoring is critical to ensure compliance with legislation, regulations and guidelines, including all BMP's and other requirements. Monitoring frequency will be dependant upon the activities being conducted and current site conditions. Monitoring will likely be more frequent during and after heavy rainfall events and less frequent when conditions are stable. The standards and best practices for the excavation works and all appropriate plans, drawings, and documents will be provided to the contractor or crew supervisor, and this information will be readily available at the site while the work is proceeding. A pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site should be held to ensure a common understanding of the mitigative best practices for the project.

A comprehensive Environmental Monitoring Plan should be developed for this site.

## 10.0 CONCLUSIONS

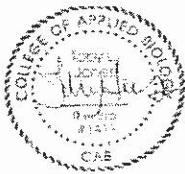
Appropriate sequencing of construction activities can be an effective way to reduce the negative impacts of the proposed development. The conclusions of this Environmental Impact Assessment are that:

1. Surface and sub-surface flow patterns will change but no significant impacts to downgradient groundwater are anticipated.
2. A comprehensive plan to manage and treat stormwater and address sediment and erosion control should be implemented. This will reduce the negative impact of the development on water quality.
3. Pond complex creation in the southwest corner should be undertaken prior to mining activities.
4. Pollution mitigation measures outlined above will minimize the effects of gravel pit development and should be implemented during all stages of the mine.

Please do not hesitate to contact the undersigned with any questions or concerns.

Yours Truly,

and



Toby Jones, RP Bio. For:  
**Letts Environmental Consultants Ltd.**

Diana Cobaschi, BSc. For:  
**Letts Environmental Consultants Ltd.**

Reviewed By:

**LETTS ENVIRONMENTAL CONSULTANTS LTD.**



Gary Letts, ASCT, C.E.T., Principal  
gletts@shaw.ca




## 11.0 REFERENCES

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# FW: 32900 Welch Ave. - Cram Creek Report

Friday, December 13, 2013  
8:20 AM

Subject	<b>FW: 32900 Welch Ave. - Cram Creek Report</b>
From	Jensen, Sandra L.S. FLNR:EX
To	Olsen, Michael MEM:EX
Sent	Tuesday, February 12, 2013 6:52 PM
Attachments	 Revised EA report of C...

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
2nd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5628 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

**From:** Aaron Fedora [<mailto:aaron.fedora@gmail.com>]  
**Sent:** Thursday, August 30, 2012 8:39 AM  
**To:** Jensen, Sandra L.S. FLNR:EX  
**Cc:** Norm Tapp  
**Subject:** 32900 Welch Ave. - Cram Creek Report

Good-morning, Sandra.

Please find attached to this email, the revised report on Cram Creek by Letts Environmental. The other plans will follow shortly.

Thank you very much.

Aaron

**Letts Environmental**

P.O Box 29568  
Maple Ridge, BC  
V2X 0V2

O: 604.466.8172 / 604.329.2972 F: 604.467.8972



Norm Tapp  
N & J Developments Limited  
25469 84<sup>th</sup> Avenue  
Langley, BC V1M 3N2

August 24, 2012

**Attn:** Norm Tapp  
**Re:** Revised Environmental Assessment of Cram Creek and impacts of unauthorized works in or about a stream, 32900 Welch Avenue, Mission, BC

**SUMMARY**

Letts Environmental Consultants Limited were retained in June 2012 to conduct a qualitative and quantitative assessment of a former stream (Cram Creek) channel and an existing unauthorized constructed channel on the above noted property. The terms of reference for that report were based on the requirements outlined by the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) in their letter dated April 5, 2012<sup>1</sup>. Our recommendation Item 2 in the original report stated: "A legal survey of the entire length of Cram Creek both on and off the subject property is strongly recommended. This is necessary to accurately determine the location of the undisturbed channel in the eastern portion and both the original and constructed channel on the western portion. A legal survey will ensure that setbacks are applied in the correct location". Cram Creek and its top of banks have since been surveyed within the limits of the property and this revised assessment and attached plan drawing are provided and addresses Items 1a, b and c as outlined in the above-noted MFLNRO letter.

Diversion of the lower, western portion of Cram Creek from the point where the channel enters onto the subject property has occurred. The upslope, eastern portion of the creek (upslope of the small pond) has not been relocated.

Pre-disturbance, Cram Creek was a naturally functioning watercourse that conveyed flows down the steep slope of the property. The channel's form and function would have maintained water quality to downstream receiving environments and reduced water velocity. Post-disturbance, the value of aquatic and riparian habitats associated with Cram Creek have been significantly reduced. Aquatic habitat has been adversely impacted as well as removal of established adjacent forested riparian habitat.

**BACKGROUND**

A number of other plans and reports have been prepared for this property. Unauthorized changes in or about a stream for the pond/wetland complex along the western property line where previously noted by the Ministry of Environment<sup>2</sup>. For the subject property, LECL has completed:

<sup>1</sup> James Davies, Assistant Regional Water Manager, Ministry of Forests, Lands and Natural Resource Operations. Unauthorized Diversion of a Stream (Cram Creek) at 32900 Welch Avenue, Maple Ridge, BC. April 5, 2012.

<sup>2</sup> Tim Bennett, Ministry of Forests, Lands and Natural Resource Operations. Unauthorized Changes In or About a Stream at 32900 Welch Avenue, Maple Ridge, BC. July 2009.

Assessment of:  
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- An Ecological Assessment of the Previous Wetland
- An Environmental Impact Assessment Report for the Proposed Gravel Pit
- A comprehensive Pond Complex Ecosystem Restoration Plan.

The Pond Complex Ecosystem Restoration Plan has been reviewed and generally endorsed by the Ministry of Forests, Lands and Natural Resource Operations. However, those plans have been revised to reflect and incorporate the findings of this report.

During a subsequent inspection of the property, the MFLNRO noted additional unauthorized changes in or about a stream (Cram Creek). The MFLNRO has requested that assessment of the diverted portion of Cram Creek be completed along with the subsequent development of a restoration plan that restores the stream and decommissions the existing artificially created stream (diverted portion).

This assessment report and attached drawing addresses Items 1a, b and c as outlined in the MFLNRO letter to describe the amount, form and function of Cram Creek and its associated riparian areas pre and post-disturbance.

### EXISTING CONDITIONS

In general, the property slopes steeply to the west, northwest. Cram Creek originates on the adjacent south side property beyond the southeast corner of the subject lot. Cram Creek enters onto the subject property approximately 420m west of the properties southeast corner. From the point it enters the subject property the channel currently conveys west along the south property line within an excavated channel to the properties southwest corner. From there flows turn north and run along the west property line before discharging into two small settling ponds located approximately 120m north of the properties southwest corner. Cram Creek originally bisected the south south western portion of the property and was in the past moved south an average of 40m from its original alignment.

LECL notes the upslope (eastern off-lot reaches) channel portion of Cram Creek has not been altered. The portion from the point where this watercourse enters onto the property has been relocated to run parallel with the south and west property lines. Some riparian vegetation may have been removed from the north side of Cram Creek and involving the upper off-lot portion.

Cram Creek originally entered the subject property and conveyed flows directly west down a steep slope (40%) within a small ravine. The original channel is comprised of a cobble/boulder (average 0.3m diameter) substrate with some fine gravels/sands (Photos 1 and 2). The wetted width ranges from 1.0-1.5m. Channelized runoff down the north side ravine bank was observed in several locations. This runoff originates from the roadside ditches along the access road to the north. Within the upper portion of Cram Creek the aquatic habitat has been retained (no realignment has occurred) but the riparian vegetation adjacent to the channel has been removed. A general survey for stream macroinvertebrates was completed and numerous insects and various larval stages were noted within the substrate of the original channel.

A small man-made pond is present near the center of the south property line (Photo 3). A man-made berm has been constructed on the downslope side (evidence of non-native fill was observed along the downslope, western side of the small pond). This small pond is likely within or adjacent to the original channel location (pond is not a result of recent channel diversion). No visible channelized inflow or outflow for this pond was noted in the field. This pond was likely historically created to act as a source of water (water license F052684).

Assessment of:  
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Relocation of Cram Creek has occurred just southeast of this small pond (Photo 4) (LECL Drawing No. LECL 0126-12). Cram Creek was relocated to flow directly west down the slope at the south property line. At the southwest corner (Photo 5), the channel has been constructed to bend 90° and continue north along the west property line (Photo 6) where it discharges off the

property. The constructed channel has a wetted width of 1.0-2.0m and a top of bank width of ranging from 3-5m. The substrate of the channel is comprised of boulders and hardpan. Some bank erosion and undercutting was noted within the lower reaches of the constructed channel. A number of larger diameter tree trunks have been placed across the channel. There was no evidence of bank overtopping, including the area immediately downslope of the 90° bend in the man-made channel.

Vegetation on the property side of this new channel currently consists of predominately early colonizing species such as fireweed (*Epilobium angustifolium*), red alder (*Alnus rubra*) seedlings, ferns, salmonberry (*Rubus spectabilis*), Himalayan blackberry (*Rubus discolor*), some Devil's club (*Oplopanax horridus*) and non-native weeds. The area surrounding this newly created channel off the subject property to the south and west is mature second growth forest.

LECL personnel field verified the location of the original channel west of the small pond. A small draw/gully was noticeable in the field (Photo 7). Within this small gully, the original channel was noted. There were very low flows within the channel at the time of assessment. The channel has a wetted width of approximately 1.0-2.0m (Photo 8) although this was difficult to determine in the field due to the presence of a significant amount of slash (logging debris) within the channel and channel banks (Photo 9). Vegetation has started to regenerate and a number of young big leaf maple (*Acer macrophyllum*) trees were noted at the approximate top of banks of the channel (Photo 7). Other vegetation is similar to species noted above.

**Table 1:** Quantitative assessment of aquatic and riparian habitat for Cram Creek\*

Cram Creek	Total Disturbed Aquatic Habitat Area For Cram Creek (western portion only) (m <sup>2</sup> )	Total Amount of aquatic habitat of small pond (m <sup>2</sup> )	Total Riparian Area extended to 15m around entire length of original channel and small pond (m <sup>2</sup> ) (not incl. pond or aquatic habitat area)
Pre-disturbance (eastern portion has riparian disturbance only, western portion has aquatic and riparian disturbance)	2,949.9m	404.1	5,407.0m

\*NOTES: All reported numbers of aquatic and riparian habitat for the original location of Cram Creek are based field observation and the most recent legal survey.

#### HABITAT VALUE (QUALITY)

##### Vegetation

The pre-disturbance riparian area for Cram Creek was likely a mature second growth forest with some components of mature deciduous trees. This riparian area would have provided opportunities for forage and cover for a wide variety of wildlife species as well as a movement corridor connecting the downslope wetland area to upland terrestrial forest. Linkages (vegetated riparian travel corridors) between a variety of habitat types provide crucial habitat for many species during different seasons and life cycle stages.

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Vegetation also plays a key role in maintaining bank stability, providing overhead cover and regulating water temperature. The mature forest that existed prior to disturbance would have, at minimum, stabilized channel banks, provided a source of leaf litter and insect drop to aquatic habitat, and provide shade for water temperature regulation.

Removal of the vegetation adjacent to the creek decreases channel bank stability, eliminate cover and temperature regulation functions.

### **Terrestrial Wildlife**

A comprehensive listing of species that may have utilized the subject property prior to disturbance is listed in LECL Wetland Assessment Report<sup>3</sup>. The riparian area of Cram Creek was likely utilized by a variety of species, including but not limited to: black bear (*Ursus americanus*), black-tailed Deer (*Odocoileus hemionus*), Douglas's squirrel (*Tamiasciurus douglasii*), and coyote (*Canis latrans*). Other species that may have inhabited the area include cougar (*Puma concolor*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), cottontail (*Sylvilagus* sp.) and various species of small mammals including bats, mice, voles, moles, shrews, etc.

Areas adjacent to Cram Creek may have been preferred habitat for the endangered Pacific Water Shrew (PWS) (*Sorex bendirii*). This species prefers forestland along streams and wetlands and dense, wet forests of western red cedar. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Report (2006) noted that "the most serious threat to the species [PWS] is loss of habitat from urban development on private lands". Recommendations include a 30-50m buffer zone around known habitat.

Cram Creek and its associated forested riparian area also would have be utilized by amphibians and some reptiles. The geomorphic form and biophysical characteristics found within the intact portion of Cram Creek indicate high ecological value for many species of mammals, birds, amphibians, and fish. It is expected that species of amphibians and reptiles may have been found utilizing Cram Creek and adjacent area, including salamanders and frogs. The upland forested areas may have provided habitat for a number of reptiles including skinks and snakes.

It is not possible to determine which portions of Cram Creek and its associated riparian area provided the most important wildlife habitat for wildlife. It is likely that areas that previously surrounded Cram Creek offered good wildlife habitat, as a variable second growth forest with components of mature deciduous vegetation provide forage and cover due to the more diverse vegetation structure.

Currently, the value of the habitat remaining within and adjacent to the original channel and adjacent to the created channel is limited to early colonizing species. Some species may utilize this clearcut area for forage but cover and movement habitat is very restricted.

### **Aquatic Habitat**

The existing natural portion of Cram Creek on the subject property has good overhead cover in the form of an established tree and shrub layer which would provide a source of leaf litter and insect drop, as well as regulation of water temperature and maintenance of bank stability.

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<sup>3</sup> Letts Environmental Consultants Limited, November 10, 2009. Ecological Assessment of Previous Wetland at 32900 Welch Avenue, Mission, BC.

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Although no fish inventories of Cram Creek were completed during this assessment, fish presence within Cram Creek on the subject property is unlikely. The average channel slope up from the western property line is 30-40% making Cram Creek unsuitable as fish habitat. The channel gradient would act as a barrier to fish access.

No records of fish distribution are available for Cram Creek on the provincial FISS database. At minimum, Cram Creek would have provided a source of food as well as cool, nutrient loaded waters to downstream fish habitats.

The current value of aquatic habitat within the created channel on the subject property is poor. No overhead cover exists as a source of nutrients, insects or to provide shade. In addition, some portions of the channel are void of substrate (only hardpan) and lacks step-pool morphology which would have been utilized by invertebrates and other animal species.

### **Water quality and quantity**

Prior to disturbance, Cram Creek would have functioned to transfer upslope runoff from upper portions of the watershed to lower areas and off the subject property at the west property line. The natural form of the channel would have functioned to reduce water velocity through pooling down the slope and would have maintained water quality.

The constructed portions of Cram Creek have resulted in increased erosion of channel banks which has in turn caused sedimentation to downslope areas. There is also evidence of greatly increased water velocities (no channel substrate) and bank undercutting.

### **CONCLUSIONS**

The purpose of this and the initial report and attached drawing was to address Items 1a, b and c as outlined in the letter from the Ministry of Forests, Lands and Natural Resource Operations (April 5, 2012)<sup>4</sup>. The results of this assessment have found that Cram Creek was a naturally functioning watercourse that conveyed flows down the steep slope of the property. The channel's form and function would have maintained water quality to downstream receiving environments and reduced water velocity.

The undisturbed aquatic and riparian areas of Cram Creek likely provide habitat for a variety of species, including potentially occurring Species at Risk.

Post-disturbance, the value of aquatic and riparian habitats associated with Cram Creek have been significantly reduced. Aquatic habitat has been adversely impacted as well as removal of established adjacent forested riparian habitat.

### **RECOMMENDATIONS**

LECL recommends that this revised assessment and attached drawing be provided to Sandra Jensen, Water Stewardship Officer and Joshua Malt, Ecosystems Biologist, for their review. If they are satisfied with the contents of this assessment and attached drawing, we recommend that restoration of Cram Creek as depicted commence.

<sup>4</sup> James Davies, Assistant Regional Water Manager. Ministry of Forests, Lands and Natural Resource Operations. Unauthorized Diversion of a Stream (Cram Creek) at 32900 Welch Avenue, Maple Ridge, BC. April 5, 2012.



Assessment of:  
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The included plan has been prepared to provide the same hydrological and ecological function to support the same diversity and abundance of species that would have been present in Cram Creeks former state and:

- Restores the stream to its former stream channel location,
- Restores the adjacent riparian area to its former state,
- Decommissions the unauthorized artificially created stream.

It is noted that two options for restoration can be proposed (S. Jensen, email May 2/12)<sup>5</sup> that "...must provide the same hydrological and ecological function and support the same diversity and abundance of species that would have been [present]...". The Restoration Plan however, must contain the option of restoring Cram Creek in its original location.

LECL offer the following recommendations for subsequent works within and adjacent to Cram Creek:

1. Within the Restoration plan developed, the small pond will be incorporated into Cram Creek. Prior to actual connection being made, the existing pond will need to be drained somewhat to a level where existing culverts can be removed. Once the culverts have been removed, the lower Pond A constructed and stable to receive Cram Creek flows and any other works the Environmental Monitor feels are necessary, then Cram Creek flows can be diverted at it's upstream end immediately above the pond.
2. Restoration of the original Cram Creek channel would need to include removal of all logging debris and slash from within the aquatic and riparian area. This debris should be hauled offsite and disposed of at an appropriate facility.
3. All restoration works should be completed under the direction of a Qualified Environmental Professional.
4. Sediment and Erosion Control measures should be in place during all construction and rehabilitation works to ensure that no sediment laden water is permitted to exit the site.
5. Disturbance to areas that are naturally revegetating should be kept to a minimum. This includes avoidance of machinery and equipment movement over large vegetated areas adjacent to the channel. Machinery movement should be minimized as much as possible.
6. Machinery should not be permitted to move within the wetted width of any channel.
7. All works in and adjacent to Cram Creek, require, at minimum, Notification to the provincial Ministry of Environment.

Please feel free to contact the undersigned if you have any questions or concerns.

Yours Truly,

**LETTS ENVIRONMENTAL CONSULTANTS LTD.**

  
Gary Letts, ASCT, C.E.T., Principal  
[gletts@shelburne.com](mailto:gletts@shelburne.com)

<sup>5</sup> Email to Norm Tapp regarding 32900 Welch Avenue, May 2, 2012.

**PHOTOGRAPHS**



**Photo 1:** Unaltered, natural channel condition of Cram Creek, upslope of diversion.

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**Photo 2:** Unaltered, natural channel of Cram Creek near center of south property line, (pond area visible in back of photo).



**Photo 3:** Pond area (approximately 15m north of south property line), viewing west.



**Photo 4:** Upslope start point for relocated channel (just southeast of small pond), viewing upstream.



**Photo 5:** Relocated channel at southwest corner, viewing upstream.



**Photo 6:** Relocated channel along west property line, viewing south.



**Photo 7:** Original channel location for Cram Creek, viewing west (young big leaf maples growing at the approximate top of bank).



**Photo 8:** Original channel.



**Photo 8:** Slash and logging debris within original channel.

## Metcalfe, Megan MEM:EX

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**From:** Jensen, Sandra L.S. FLNR:EX  
**Sent:** Thursday, February 14, 2013 10:39 AM  
**To:** Olsen, Michael MEM:EX  
**Subject:** FW: Stormwater Treatment Facility

Sandra Jensen  
Water Stewardship Officer, Water Authorization  
Ministry of Forests, Lands and Natural Resource Operations  
South Coast Region  
2nd Floor, 10428 153rd Street, Surrey, BC V3R 1E1  
Ph: 604-586-5628 Fax: 604-586-4444  
Website: <http://www.env.gov.bc.ca/wsd/>  
Email: [sandra.jensen@gov.bc.ca](mailto:sandra.jensen@gov.bc.ca)

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**From:** gary letts [<mailto:gletts@shaw.ca>]  
**Sent:** Wednesday, February 13, 2013 3:30 PM  
**To:** Norm Tapp  
**Cc:** Jensen, Sandra L.S. FLNR:EX  
**Subject:** Stormwater Treatment Facility

All internal runoff will be directed into the designed Stormwater Treatment Facility 'prior' to entering into the constructed Pond A Facility.

The short ditch currently depicted on the east side of the Stormwater Treatment Facility will not be connected to Pond A.

### **Operation and Maintenance of Stormwater facility will include:**

1. Settled sediment will be removed after each storm event or when the sediment capacity has exceeded 33% of design sediment storage volume.
2. Periodic inspections and removal of accumulated sediments and the required inspections and maintenance interval will be weekly and conducted by an independent Qualified Environmental Professional.
3. Accumulated sediment removed during facility maintenance must be disposed of in a manner which will prevent its re-entry into the site drainage system, or into any watercourse.
4. The tops of slopes or berms around the facility (and Pond) should be wide enough to provide a safe and stable work area where required for the operation of maintenance equipment and personnel and should be covered with crushed stone and/or turf stone to prevent damage to the structure, and loosening of soil which could wash into the facility.
5. Filter cloth covering the riser system will be maintained (replaced) as required and under the direction of the Environmental Monitor.



Gary Letts AScT., C.E.T. Principal

**LETTS ENVIRONMENTAL CONSULTANTS**

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PROVINCE OF BRITISH COLUMBIA  
MINISTRY OF ENERGY, MINES AND NATURAL GAS

**QUARRY PERMIT**  
**APPROVING WORK SYSTEM AND RECLAMATION PROGRAM**  
(Issued pursuant to Section 10 of the *Mines Act* R.S.B.C. 1996, C.293)

Permit: **Q-7-090**

Mine No.: **1610586**

Issued to: **Welch Avenue Quarry Company Ltd**  
**25469 84th Avenue**  
**Langley BC V1M 3N2**

for work located at the following property:

**Welch Avenue Quarry**

This approval and permit is subject to the appended conditions.

Issued this 2nd day of May in the year 2013.

  
\_\_\_\_\_  
**Ed Taje**  
**Senior Inspector of Mines**

## PREAMBLE

Notice of intention to commence work on a quarry, including a plan of the proposed work system and a program for the protection and reclamation of the surface of the land and watercourses affected by the work dated Monday, October 15, 2012 was filed with the Inspector of Mines on Monday, October 15, 2012. Notice of such filing was published in the Mission Record on January 24, 2013 and in the Gazette on January 24, 2013.

This permit contains the requirements of the Ministry of Energy and Mines for reclamation. It is also compatible, to the extent possible, with the requirements of other provincial ministries for reclamation issues. The amount of security required by this permit, and the manner in which this security may be applied, will also reflect the requirements of those ministries. Nothing in this permit, however, limits the authority of other provincial ministries to set other conditions, or to act independently, under their respective permits and legislation.

Decisions made by staff of the Ministry of Energy and Mines will be made in consultation with other ministries.

## CONDITIONS

The Chief Inspector of Mines (Chief Inspector) hereby approves the work plan and the program for protection and reclamation of the land surface and watercourses subject to compliance with the following conditions:

### 1. Reclamation Security

- (a) The owner, agent or manager (herein called the Permittee) shall maintain with the Minister of Finance securities in the amount of dollars (\$0). The security will be held by the Minister of Finance for the proper performance of the approved program and all the conditions of this permit in a manner satisfactory to the Chief Inspector.
- (b) The Permittee shall conform to all forest tenure requirements of the Ministry of Forests and Range. Should the Permittee not conform to these requirements then all or part of the security may be used to cover the costs of these requirements.
- (c) The Permittee shall conform to all Ministry of the Environment approval, license and permit conditions, as well as requirements under the **Wildlife**

**Act.** Should the Permittee not conform to these conditions, then all or part of the security may be used to fulfill these requirements.

2. Land Use

The surface of the land and watercourses shall be reclaimed to the following land use: **Industrial**.

3. Productivity

The level of land productivity to be achieved on reclaimed areas shall not be less than existed prior to mining on an average property basis unless the Permittee can provide evidence which demonstrates, to the satisfaction of the Chief Inspector, the impracticality of doing so.

4. Revegetation

Land shall be re-vegetated to a self-sustaining state using appropriate plant species.

5. Use of Suitable Growth Medium

(a) On all lands to be revegetated, the growth medium shall satisfy land use, productivity, and water quality objectives. Topsoil and overburden (to rooting depth) shall be removed from operational areas prior to any disturbance of the land and stockpiled separately on the property for use in reclamation programs, unless the Permittee can provide evidence which demonstrates, to the satisfaction of the Chief Inspector, that reclamation objectives can otherwise be achieved.

(b) No topsoil shall be removed from the property without the specific written permission of the Inspector of Mines.

6. Buffer Zones and Berms

Buffer zones and/or berms shall be established between the mine and the property boundary unless exempted in writing by the Inspector of Mines.

7. Treatment of Structures and Equipment

Prior to abandonment, and unless the Chief Inspector has made a ruling otherwise, such as heritage project consideration or industrial use,

- (a) all machinery, equipment and building superstructures shall be removed,
- (b) concrete foundations shall be covered and revegetated unless, because of demonstrated impracticality, they have been exempted by the Inspector, and
- (c) all scrap material shall be disposed of in a manner acceptable to the Inspector.

8. Watercourses

- (a) Watercourses shall be reclaimed to a condition that ensures
  - (1) long-term water quality is maintained to a standard acceptable to the Chief Inspector,
  - (2) drainage is restored either to original watercourses or to new watercourses which will sustain themselves without maintenance, and
  - (3) use and productivity objectives are achieved and the level of productivity shall not be less than existed prior to mining unless the Permittee can provide evidence which demonstrates, to the satisfaction of the Chief Inspector, the impracticality of doing so.
- (b) Water which flows from disturbed areas shall be collected and diverted into settling ponds.

9. Roads

- (a) All roads shall be reclaimed in accordance with land use objectives unless permanent access is required to be maintained.

- (b) Individual roads will be exempted from the requirement for total reclamation under condition 9(a) if either:
- (1) the Permittee can demonstrate that an agency of the Crown has explicitly accepted responsibility for the operation, maintenance and ultimate deactivation and abandonment of the road, or
  - (2) the Permittee can demonstrate that another private party has explicitly agreed to accept responsibility for the operation, maintenance and ultimate deactivation and abandonment of the road and has, in this regard, agreed to comply with all the terms and conditions, including bonding provisions, of this reclamation permit, and to comply with all other relevant provincial government (and federal government) regulatory requirements.

10. Disposal of Fuels and Toxic Chemicals

Fuels, chemicals or reagents which cannot be returned to the manufacturer/supplier are to be disposed of as directed by the Chief Inspector in compliance with municipal, regional, provincial and federal statutes.

11. Fuels and Lubricants

Fuels and Lubricants, if stored on the mine site, shall conform to the requirements of the Ministry of Environment **Field Guide to Fuel Handling, Transportation, and Storage**.

The Permittee shall develop and implement a hydrocarbon management plan that deals with fueling, operational servicing, spill prevention and clean-up for fuels and lubricants stored on the mine site. The plan shall account for the following:

- a) Fuel and lubricants shall be delivered to site as needed to re-supply fuel and oil tanks on mobile and fixed equipment.
- b) Impermeable, oil absorbent matting shall be used when refueling and servicing equipment.
- c) While refueling the operator shall be in control of the refueling nozzle at all times.
- d) If any Petroleum, hydrocarbon or other product (no matter how small) is spilled the contaminated soil/gravels shall be forthwith collected and removed for appropriate disposal.

- e) Fuel or oil leaks on equipment shall be effectively repaired as soon as they are discovered or the equipment shall be removed from the site and not operated until repairs have been made.
- f) An emergency spill containment and clean up kit shall be maintained at the site while it is in operation. The kit shall have the capacity to contain and clean up 100% of a spill from a failure of the largest volume of a fuel or lubricant tank or system plus 10%.

12. Archaeological Find

An Archaeological Chance Find Procedure (ACFP) for this site shall be developed within 3 months of the date of this permit:

- a. A copy of the procedure shall be posted at the Mine Site, and all workmen shall be trained in the implementation of this procedure.
- b. A copy of this procedure shall be filed with the Inspector.

In the event that an archaeological site is encountered during the course of the approved mining activities, the program shall be suspended or modified in such a manner so as to ensure that the site is not damaged, desecrated or otherwise altered and the occurrence shall be reported immediately to the Archaeological Branch of the Ministry Forests, Lands & Natural Resource Operations and, the Ministry of Energy & Mines (Inspector of Mines). Work shall not be resumed until authorized by the joint Ministries.

13. Site Access

The Mine Manager, or in their absence a Designate, shall allow Employees of other Provincial Ministries holding authorizations related to Compliance and Enforcement duties onto the mine site subject to the following conditions:

- (a) the Provincial Employee must present the appropriate Ministry identification; and
- (b) must clearly state that they are acting on behalf of an Inspector of Mines;
- (c) they must be given a site orientation as required by the Health & Safety, and Reclamation Code;
- (d) they must sign-in and sign-out as acknowledgement of being on site;
- (e) they must be accompanied at all times by the Mine Manager, or qualified person appointed by the Manager, and shall take all necessary measures to ensure the safety and well being of the individual(s); and this condition is not applicable to other Provincial Legislation.

14. Site Stability

- b) The inspector shall be advised in writing at the earliest opportunity of any unforeseen conditions that could adversely affect the extraction of materials, site stability, erosion control or the reclamation of the site.
- c) The stability of the slopes shall be maintained at all times and erosion shall be controlled at all times.
- d) The discovery of any significant subsurface flows of water, seeps, substantial amounts of fine textured, soils, silts and clays, as well as significant adverse geological conditions shall be reported to the inspector as soon as possible and work shall cease until the inspector advises otherwise.

15. Site Security

All site access shall be secured with locking gates and signage provided indicating the mine name, operator's name and emergency contact number as well as all necessary safety advisories. Gates shall be locked when the quarry is not in operation.

16. Temporary Shutdown

If this quarry ceases operation for a period longer than one year the Permittee shall either continue to carry out the conditions of the permit or apply for an amendment setting out a revised program for approval by the Chief Inspector.

17. Safety Provisions

All safety and other provisions of the **Mines Act** shall be complied with to the satisfaction of the Chief Inspector.

18. Monitoring

The Permittee shall undertake monitoring programs, as required by the Inspector of Mines, to demonstrate that reclamation objectives are being achieved.



19. Alterations to the Program

Substantial changes to the program must be submitted to the Inspector of Mines for approval.

20. Notice of Closure

Pursuant to Part 10.6.1 of the Health, Safety and Reclamation Code for Mines in British Columbia, a Notice of Completion of Work shall be filed with the Inspector of Mines not less than seven days prior to cessation of work.

21. Annual Report

Annual reports shall be submitted in a form and containing the information as and if required by the Inspector of Mines.

The Manager shall forward to the Inspector each year a copy of the submitted Health and Safety Assessment form.

**SITE SPECIFIC CONDITIONS:**

- 1) Annual Quarry Production shall not exceed 240,000 tonnes.
- 2) This permit authorizes the excavation of Pit Run, Mechanical Screening, Blasting and Crushing . Washing of materials is not authorized.
- 3) Operating hours shall be from 7:00 AM to 5:00 PM Monday to Friday and there shall be no work on Weekends or Statutory Holidays, except Saturdays, as noted in (a)
  - a. Light maintenance is permitted on Saturdays between 9am and 4 pm. *Light Maintenance* is defined as: work requiring the use of hand tools only. It does not include air impact tools, air arcing, or any heavy equipment to perform the task.

- 4) Notwithstanding the hours of work provisions of Permit Q-7-090, the permittee is authorized to conduct work outside of this provision should:
  - a) An agency having jurisdiction declare an emergency and the product from this site is required to mitigate an emergency.
  - b) A safety concern on site is such that a failure to complete necessary work can result in harm or risk to workers or members of the public.
  - c) If an environmental incident on site has occurred and a failure to address or mitigate the incident can result in harm to the receiving environment.
- 5) Prior to starting operations, the Manager shall notify the Inspector of their anticipated start date.
- 6) The operator shall ensure that the proposed exploration activities do not affect nesting birds, especially under Section 34 of the *Wildlife Act*. Typical species of interest would be Heron, Eagle, Peregrine Falcon, Spotted Owl and primary cavity nesters.
- 7) All work shall be suspended during any forest closures relating to extreme fire hazard conditions as determined by the Ministry of Forest, Land and Natural Resources Operations. Firefighting equipment shall be maintained on the site in accordance with the Forest Fire Prevention and Suppression Regulation.
- 8) Topsoil and overburden shall be stockpiled, protected from erosion and used to rehabilitate the site upon completion of mining. The area shall be replaced with native species ecologically suited for the site.
- 9) Property boundaries, right of ways, limits of pit development, environmental setbacks, etc. shall be marked prior to commencing operations. Such markings shall be maintained over the course of mine operations and all persons working on the site are instructed as to the meaning of the markings.

- 10) The site shall not be used for any other purpose than that described in the Notice of Work. Disused or damaged equipment shall not be stored on site and the site shall not be used for the disposal of items including but not restricted to; garbage, wood waste, toxic materials, petroleum waste and soils defined under the Ministry of Environment Contaminated Soils Regulation.
- 11) Appropriate measures shall be taken to protect against inadvertent access to the settling pond(s), wells, trenches etc.
- 12) This permit does not authorize the importation of any fill material.
- 13) The Permittee shall undertake monitoring programs, as directed by an Inspector of Mines, to demonstrate and ensure all environmental and reclamation objectives are achieved.
- 14) All trees, vegetation and topsoil shall be removed within 2 metres of the rim of a working face. Timber debris shall not be buried or placed as pit backfill but shall be disposed of in an appropriate manner and at the earliest possible opportunity.
- 15) No excavation shall take place within 5 metres of any property boundary, nor below a plane dipping into the pit from the property boundary setback within a final wall angle of 50 degrees.
- 16) On the common property boundaries shared with the District of Mission's Tree Farm License (TFL 26) a minimum of 20 meter set back shall be established and visually marked to mitigate impacts to the recreational values of this area. This shall be maintained throughout the life of the mine.
- 17) Sediment laden water resulting from mining activities, including surface drainage, shall not be allowed free access to creeks or water courses but shall be suitably contained and /or treated to produce **final effluent not exceeding 25 mg/l total suspended solids** at the discharge point of pond "B".

- 18) Implement a suitable water management program developed by a registered professional in the appropriate discipline.
- 19) The site water management system shall be constructed and completed prior to site development of the main quarry. This system shall include but not be limited to, monitoring stations for high flows and sediment concentration. Pond "B" shall provide final catchment for all site flows.
- 20) Machinery shall not be operated in a water course or riparian area.
- 21) Suitable methods of dust control, including water sprays, shall be utilized to mitigate dust created from mining/processing operations including haulage on and from site. In addition, a log book shall be kept to record the date, time and person whom applies the dust control. If multiple methods and/or applications are required, each instance shall be logged.
- 22) The Permittee shall ensure that a buffer is maintained between any watercourse or riparian area and the area of excavation. (Refer to the Health, Safety and Reclamation Code for Mines in British Columbia, Part 9, Table 9.1, Riparian Setback Distances.)
- 23) Refueling operations shall not be carried out within any of the established environmental buffers or within 30 metres of any water management facility.
- 24) Machinery operating near a watercourse and/or settling pond shall be in good repair and free of oil leaks and free of surface oil and grease.
- 25) Stationary engines and related drive mechanisms shall be provided with drip pans that shall be cleaned on a regular basis.
- 26) The Permittee shall prepare and maintain a refueling procedure prior to the start of site development and operations, and include it as part of the Fuel Management and Spill Contingency Plan. The procedure shall be available to all supervisors and workers and personnel directly involved with refueling shall be properly instructed.

- 27) An area for the bulk storage of fuel and refueling of equipment shall be designed which consists of an impermeable layer or barrier to mitigate the introduction deleterious substances into the surrounding environment.
- 28) Emergency spill containment kits shall be maintained on site whenever the quarry is in operation and the areas of the quarry where work is being conducted.
- 29) The Permittee shall immediately contain and implement remedial measures for any spill of hydrocarbon or other deleterious substance at the mine site. Any such occurrence shall be reported to the District Inspector, and to the Provincial Emergency Program in accordance with the Spill Reporting Regulation of the Environmental Management Act. Contaminated materials shall be disposed of in a manner acceptable to the Regional Waste Manager. Any spill of hydrocarbons requiring reporting under the Transportation of Dangerous Goods regulations shall be considered a Dangerous Occurrence.
- 30) The manager shall ensure that a drill log is developed and implemented. A copy of the drill logs shall accompany the blast logs, (copy attached), and the blast monitoring data. This documentation shall be available onsite for review by inspector on demand.
- 31) The manager shall ensure that a Drill log is developed and maintained for each drill pattern and shall include;
  - a. Location of hole
  - b. Depth of hole
  - c. Characteristics of strata, particularly;
    - i. Hardness,
    - ii. Structure encountered
    - iii. Voids or significant fracturing.
- 32) The Manager shall ensure that blasts are designed and conducted to meet the following limitations.
  - a. A blast monitor device shall be located approx. 100m east of Dewdney Trunk Rd. along site access road or at property boundary

- of nearest residence if that boundary falls within 500 metres from the mine center.
- b. Peak Particle Velocity (PPV) shall not exceed 50mm/sec or 2 inches/sec.
  - c. Air Blast (overpressure) shall not exceed 120 Db on the "L" scale.
- 33) The Manager shall ensure that all blasts are electronically monitored and all records are maintained onsite for review by an inspector upon request.
- 34) The manager shall report, without delay, any blast which exceeds the limits as stated above.
- 35) Loading of blast holes when using ANFO shall be controlled to prevent spillage, and any spillage shall be cleared and not allowed to accumulate on the pit floor.
- 36) Blasts shall be conducted in such a manner that the blast "Danger Zone" remains within the quarry boundaries.
- 37) All blasts shall be scheduled and designed to minimize effects on nearby residences.
- 38) Where there is potential for fly rock beyond the property boundary the manager shall ensure that blast mats or other suitable means of prevention.
- 39) The Permittee shall develop and implement a written safe work procedure for the guarding of Dewdney Trunk Rd. Road, prior to any blast.
- 40) In advance of any blast the manager shall;
- a. Provide 24 hr. notice to all residence within 1 Km of the blast site.
  - b. Post a sign at the mine access road indicating that a blast is scheduled, the date and time of the blast and contact information
  - c. Blasts shall be conducted within a 90 minute window as posted on the blasting notification sign.



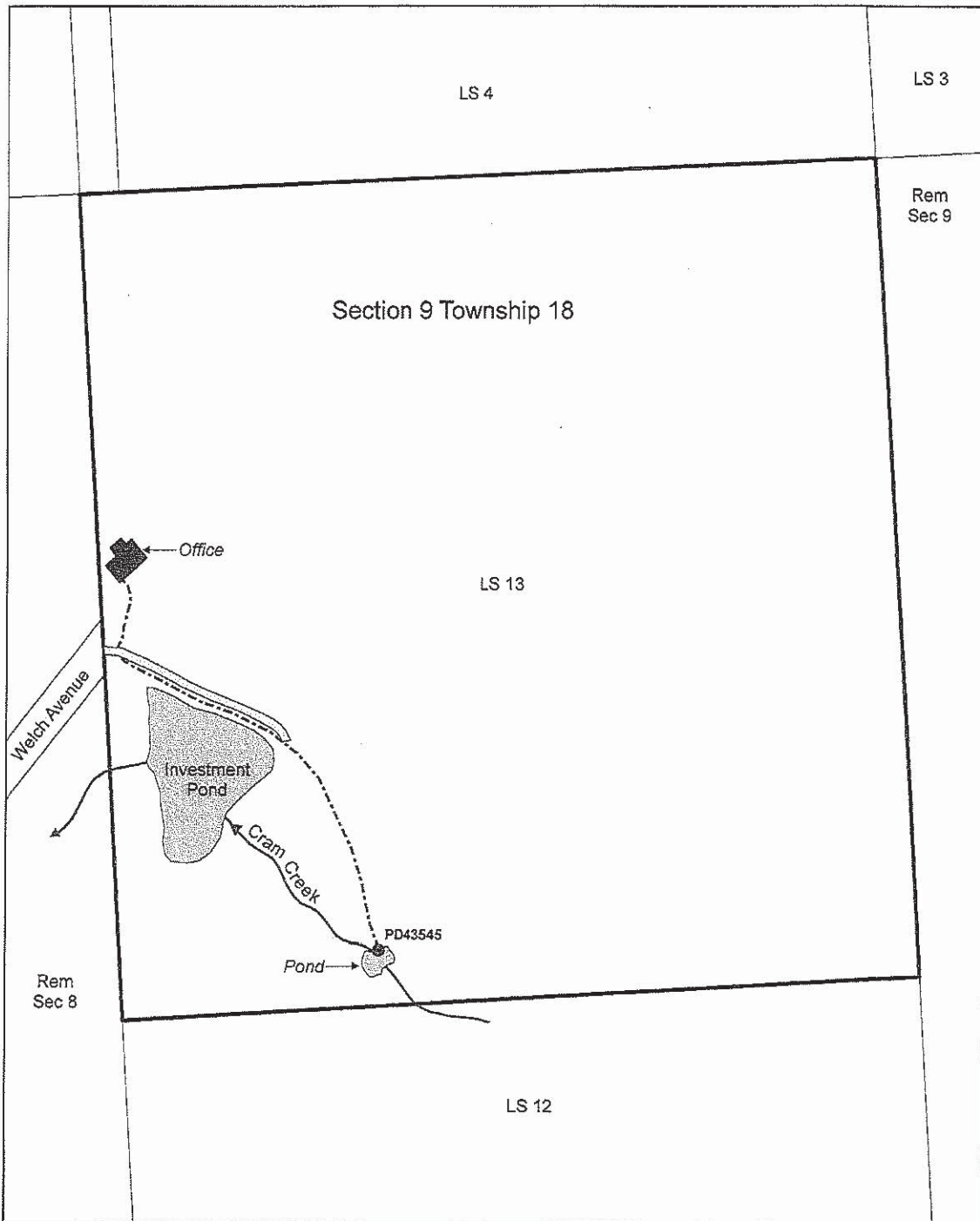
# Province of British Columbia *Water Act*

## CONDITIONAL WATER LICENCE

The owners of the land to which this licence is appurtenant are hereby authorized to divert and use water as follows:

- a) The stream on which the rights are granted is Cram Creek.
- b) The point of diversion is located as shown on the attached plan.
- c) The date from which this licence shall have precedence is June 14, 1978.
- d) The purpose for which this licence is issued is enterprise.
- e) The maximum quantity of water which may be diverted for enterprise purpose is 2.27305 cubic meters (500 gallons) a day.
- f) The period of the year during which the water may be used is the whole year.
- g) The land upon which the water is to be used and to which this licence is appurtenant is Legal Subdivision 13, Section 9, Township 18, New Westminster District.
- h) The authorized works are screened intake, pond, and pipe which shall be located approximately as shown on the attached plan.
- i) The construction of the said works shall be completed and the water shall be beneficially used prior to December 31, 2015. Thereafter, the licensee shall continue to make regular beneficial use of the water in the manner authorized herein.
- j) The diversion of water authorized under this licence may be restricted or prohibited at any time by an Order in writing of an Engineer under the Water Act, in order to maintain a minimum flow in the stream for the preservation of fish and other aquatic life.
- k) This licence authorizes the use of water for domestic purpose in one dwelling/building located approximately as shown on the attached plan.
- l) This Licence is issued in substitution of Final Water Licence F052684.

Remko Rosenboom, M.Sc., A.Ag.  
Assistant Regional Water Manager



0 20 40 80 120 160 200 Meters

Map Number: 92G.029  
Scale: 1:2,500



Water District: New Westminster  
Precinct: 201 - Mission  
Point of Diversion: ●  
Structure/Dwelling: ■  
Works: - - - - -  
Works (polygon): ■

Signature: 

Date: NOV 21, 2012

C129319 for F052684  
File: 0364261

The boundaries of the land to which this licence is appurtenant are shown thus: \_\_\_\_\_





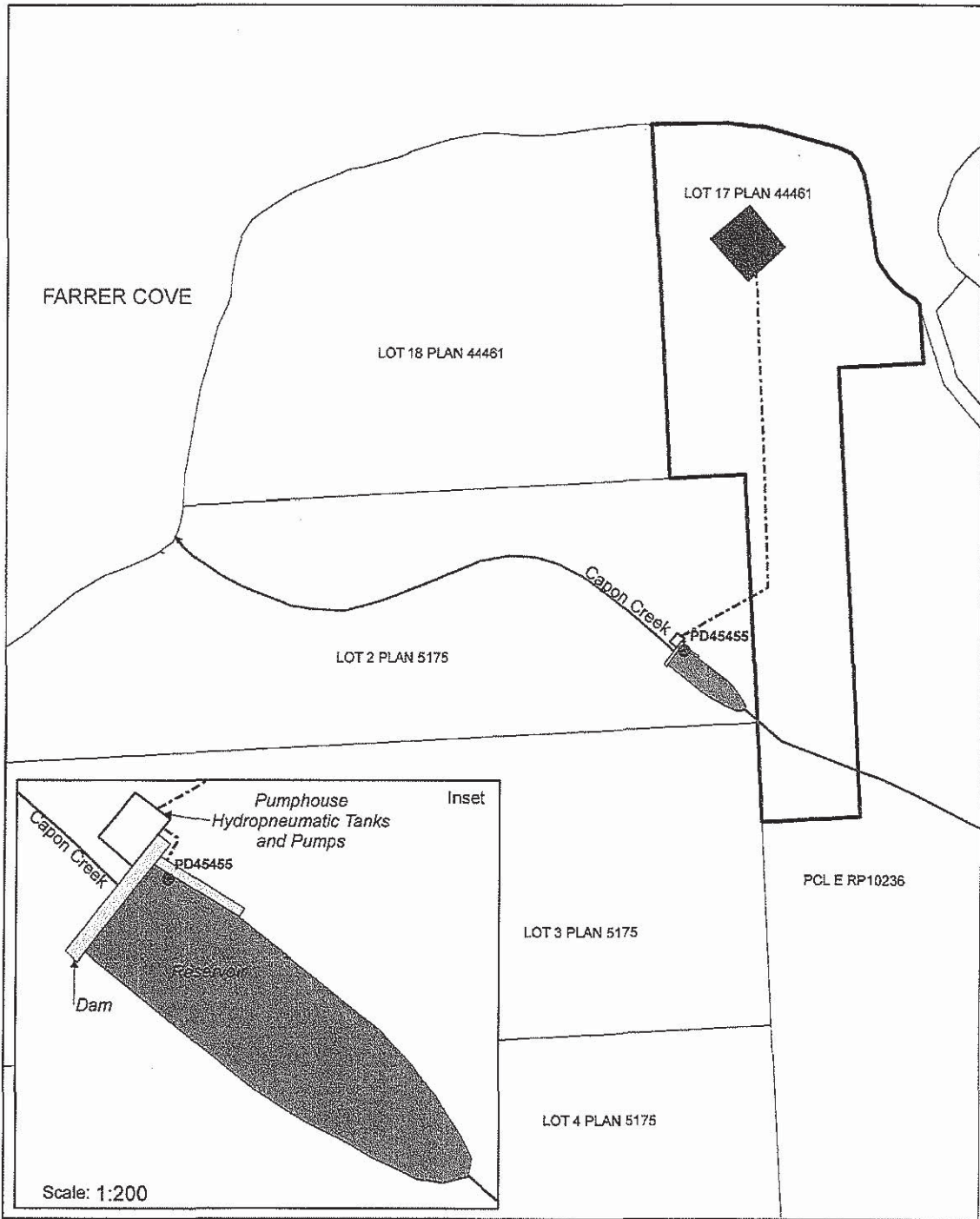
# Province of British Columbia *Water Act*

## CONDITIONAL WATER LICENCE

The owner of the land to which this licence is appurtenant is hereby authorized to divert and use water as follows:

- a) The stream on which the rights are granted is Capon Creek.
- b) The point of diversion is located as shown on the attached plan.
- c) The date from which this licence shall have precedence is June 11, 1974.
- d) The purpose for which this licence is issued is domestic.
- e) The maximum quantity of water which may be diverted for domestic purpose is 2.27305 cubic meters (500 gallons) a day.
- f) The period of the year during which the water may be used is the whole year.
- g) The land upon which the water is to be used and to which this licence is appurtenant is Lot 17, Section 30, Township 39 and of Section 25, Fractional Township West of Township 39, New Westminster District, Plan 44461.
- h) The authorized works are screened intake, reservoir, dam, hydropneumatic tanks, pumps, pumphouse, and pipe which shall be located approximately as shown on the attached plan.
- i) The construction of the said works has been completed and the water is being used. The licensee shall continue to make regular beneficial use of the water in a manner authorized herein.
- j) This licence authorizes the use of water for domestic purpose in one dwelling located approximately as shown on the attached plan.
- k) This Licence is issued in substitution of Conditional Water Licence C046020.

Remko Rosenboom, M.Sc., A.Ag.  
Assistant Regional Water Manager



Map Number: 8160B  
Scale: 1:1,000

Water District: New Westminster  
Precinct: 20E - Coquitlam  
Point of Diversion: ●  
Structure/Dwelling: ■  
Works: - - - - -  
Works (pond): ■  
Works (dam): ■

Signature: 

Date: NOV 21, 2012

C129318 for C046020  
File: 0323222