

FRASER VALLEY REGIONAL DISTRICT COMMERCIAL GRAVEL OPERATION PERMIT

Permit No.:	2017-02	Folio:	734-01206.300
Permit Holder:	Laurmel Holdings LTD (Inc. No. 73083)		
Address:	Unit #10 – 18663 52 nd Street, Surrey, BC V2S 8E5		
Agent:	Ms. Dani Miller, Mainland Sand & Gravel		
Permit Area:	6850 Cox Road, Area G (lands within FVRD Electoral Area "G	i" only)	

The lands affected by this permit are shown on Schedule A – Permit Area, attached hereto and which forms an integral part of this permit. The lands are legally described as:

Block A, Section 6 & 21, Township 20 and District Lot 944, Group 2, New Westminster District PID: 024-939-901

LIST OF ATTACHMENTS

The following schedules are attached hereto and form part of this permit:

Schedule "A"	Permit Area
Schedule "B"	Current and Future Mine Plan
Schedule "C"	Noise & Dust Control Plans

AUTHORITY TO ISSUE

This Commercial Gravel Operation Permit is issued under *FVRD Electoral Area Commercial Gravel Operations Bylaw No. 1181, 2014* ("Bylaw 1181") which was approved by the Minister of Energy & Mines on September 16, 2016 and adopted the FVRD Board on September 21, 2016.

TERMS & CONDITIONS

- 1. No person shall cause or permit the removal or processing of aggregate except in accordance with this permit and with *FVRD Commercial Gravel Operations Bylaw No. 1181, 201 (Bylaw 1181)*. Nothing in this permit allows or approves the processing of aggregates where aggregate processing is not a permitted use of the land under a valid and applicable zoning bylaw.
- 2. All gravel removal or processing activities shall be in accordance with the descriptions, plans, reports and specifications submitted by the applicant in support of the permit application.

- 3. The permit holder must comply with *FVRD Commercial Gravel Operations Bylaw No. 1181* and all other bylaws of the Regional District, the <u>Local Government Act</u>, and the <u>Community Charter</u> related to aggregate removal and processing.
- 4. The permit holder must obtain and keep in force all other permits, approvals, consents and permissions required under any statute, regulation, order, enactment or contract related to the aggregate removal or processing.
- 5. Aggregate operations should generally follow the best practices outlined in the *Environmental* Objectives and Best Management Practices for Aggregate Extraction and Aggregate Operators Best Management Practices Handbook for British Columbia (or as updated).

Term of Permit

6. The term of this permit will be five (5) years from the date of issuance by the FVRD Board. This permit will expire at 24:00 hours on February 27, 2023.

<u>Noise</u>

- 7. Between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday, no person shall cause or permit noise related to aggregate removal or processing to exceed sixty (60) dBA Leq (1 hour) exclusive of ambient sound when measured at any point along the property line of a receiving parcel or at any point within a receiving parcel.
- 8. Between the hours of 7:00 p.m. and 7:00 a.m. Monday through Saturday, and on Sundays and statutory holidays, no person shall cause or permit noise related to aggregate removal or processing to exceed fifty (50) dBA Leq (1 hour) exclusive of ambient sound when measured at any point along the property line of a receiving parcel or at any point within a receiving parcel.
- 9. The noise limitations set out in Terms & Conditions 7 and 8 do not apply to the noise that may be generated by the movement of trucks entering or exiting a parcel in the approved area of access to and egress from the permit area.
- 10. Aggregate removal or processing activities shall be undertaken in accordance with the Noise Control Plan included and forming an integral part of this permit as Schedule "C".

Dust

- 11. No person may cause or permit dust associated with aggregate removal or processing to escape from the permit area so as to constitute a nuisance on any other lands.
- 12. No person may cause or permit dust associated with aggregate removal or processing to result in:
 - (a) Dustfall over an average period of two (2) weeks in excess of 1.7 mg/(dm²-d), or
 - (b) Total Suspended Particulate Matter over an average period of twenty four (24) hours in excess of 120 $\mu g/m^3$,

on any other lands.

13. Aggregate removal or processing activities shall be undertaken in accordance with the Dust Control Plan included and forming an integral part of this permit as Schedule "C".

Hazards

- 14. No person shall cause or permit aggregate removal activities to create a danger to the land or other lands from flooding, mud flow, debris flow, debris torrent, erosion, land slip, rock falls, subsidence or avalanche.
- 15. No person shall cause or permit aggregate removal activities to:
 - (a) lower the ground elevation below the 1:200 year flood elevation (plus 0.6 m freeboard) of the Fraser River, or
 - (b) occur within 30 metres of the natural boundary of any stream or wetland.

Monitoring and Reporting

- 16. The permit holder shall, on or before February 28 of each calendar year, provide a report or reports to the Chief Administrative Officer in the form prescribed in Schedule B-3 of *Bylaw 1181* (as applicable) and signed and sealed by the coordinating professional or, as applicable, the registered professional:
 - (a) confirming that the aggregate removal and processing is in substantial compliance with the descriptions, plans, and specifications submitted by the permit holder in support of the permit application, all permit conditions and the requirements of *Bylaw 1181*, or identifying and describing any areas of non-compliance with recommendations to bring operations into compliance; and
 - (b) including a report summarizing the methods and results of noise and dust emissions monitoring conducted not less than annually in accordance with a plan prepared by a qualified registered professional.
- 17. The permit holder shall submit to the Chief Administrative Officer, on the prescribed form, an aggregate removal volume report annually for the period January 1 to December 31 by February 28 of the following calendar year. The permit holder must ensure that that the volume report accurately states the volume of aggregate removed from the permit area in cubic metres and must be certified as correct by the coordinating professional to the best of his or her knowledge.

Fees

18. At the time of the filing of annual aggregate removal volume report, the permit holder shall pay to the Regional District fees for each cubic metre of aggregate removed from the permit area in the amount of \$0.20 per cubic meter of aggregate removed.

PERMIT ISSUANCE

AUTHORIZING RESOLUTION PASSED BY THE FRASER VALLEY REGIONAL DISTRICT BOARD ON THE XXth DAY OF February, 2018.

PERMIT 2017-02 IS DEEMED TO BE ISSUED ON THE XXTH DAY OF February, 2018.

PERMIT 2017-02 EXPIRES ON THE XXth DAY OF February, 2023.

Chief Administrative Officer/ Deputy Secretary



COMMERCIAL GRAVEL OPERATION PERMIT 2017-02 SCHEDULE "A" - Permit Area

COMMERCIAL GRAVEL OPERATION PERMIT 2017-02 SCHEDULE "B" – Current & Future Mine Plans

Current site survey, including property lines and new plant footprint (yellow oval)



Proposed site layout of new plant - note jurisdiction markers (blue)



COMMERCIAL GRAVEL OPERATION PERMIT 2017-02 SCHEDULE "C" - Noise & Dust Control Plans

Supplementary application information in support of a Commercial Gravel Operations Permit

For:

Cox Station Quarry, 6850 Cox Rd. Abbotsford

INDEX:

Page

Dust Mitigation Plan	2
Noise Control	7
Neighbourhood Communications	8
Buffers and Screening	9
Reclamation overview	11
Overlay Map of proposed new plant including:	12
New equipment locations	
New stockpile locations	
Property lines	
Orthophoto (exposed and buffer lands to remain)	
Survey of the Lands	Appendix A
Mine Plan	Appendix B
AMEC Fugitive Dust Study	Appendix C
Wakefield Noise Survey	Appendix D
Mines Permit Q-7-68	Appendix E
Bylaw 1181 Completed Permit Application	Appendix F
Bylaw 1181, 2014 Completed Schedule B-1	Appendix G

Submitted in accordance with: Fraser Valley Regional District Bylaw 1181, 2014.

By: Dani Miller, AScT, CPESC

September 5, 2017

Dust Mitigation Plan

Executive Summary:

Fugitive dust is generated at Mainland's Cox quarry, due to crushing, screening and transporting rock and soil. To protect worker health, equipment longevity and to prevent neighbourhood conflict, dust is largely controlled and worker exposures are monitored regularly.

As a part of obtaining a Mine's Permit from the Provincial Government, Mainland engaged AMEC earth and Environmental to conduct a detailed Fugitive Dust Study in 2003 (Appendix C). This study incorporated onsite downwind sample collection, analysis and modeling to predict the off-site impacts of fugitive dust. At 1000m (less than the distance to the nearest neighbour) the maximum potential concentration of total particulate under the least favourable meteorological conditions was 102 ug/m3 (Table 8, page 22), less than the maximum 24 hour average specified in Bylaw 1181.

Mainland's proposed new plant will further reduce the main source of emissions – truck traffic on unpaved roads, by nearly 90% due to shorter haulage distances. It will also move the crushing operation almost half a kilometer farther from the nearest neighbour. For the health and welfare of onsite workers, dust controls including road-wetting, material wetting, enclosure, and under extreme cold conditions shut-down will continue to be implemented and refined to the new plant configuration.

Based on the 2003 study, and the falling exposure levels noted in annual personnel exposure monitoring in subsequent years, it can be expected that fugitive dust emissions from the Cox Station Quarry will not have a negative impact on the surrounding neighbourhood or, on site workers. In fact, a significant reduction in emissions is anticipated.

National Pollutant Release Inventory (NPRI) Classification	Examples	Current NPRI annual PM discharge (tonnes)	Proposed NPRI annual PM discharge (tonnes)
Road Dust	Off road rock hauling trucks, service vehicles, pickups and highway trucks. Also includes road grading.	66.78	21.645* (likely less due to less grading, however not calculated here)
Stack or point releases	Drilling of blast holes, crushing and screening	6.7368	6.7368
Storage or handling releases	Stockpile discharges, stripping and material handling	2.5872	2.5872
Fugitive	Blasting	2.2132	2.2132
Total		78.3172	33.1822

The main existing and anticipated sources of dust at Mainland Sand and Gravel are:

Primary Dust Control Plan:

Dust generation and control at the Mainland facility falls into two broad categories.

- 1) Road dust the dust generated by site traffic and road maintenance, currently 85% of discharges.
- Transfer point dust the dust generated by crushing, screening and moving material 12% of discharge.

Fugitive emissions from blasting which are generally uncontrollable make up the remaining 3% and are not discussed.

The proposed changes to plant location will eliminate nearly 90% of road dust emissions, along with a corresponding amount of diesel exhaust. Existing road wetting techniques and equipment will be maintained ensuring the per-kilometer emission rate is kept low.

Mainland's plant upgrades will include transfer point dust control in keeping with current dust prevention (material wetting) techniques. Dust prevention has proven superior to traditional 'dust arresting' techniques such as hoods and misters based on the reduction in on-site exposures seen in annual employee exposure testing.

Overall, by relocating the plant, shortening haul distances and replicating existing, successful dust control systems Mainland will reduce their total dust output by almost 58%.

Truck Traffic Dust Control Specifications:

Mainland's proposed new plant will move crushing and screening 1KM closer to the mining face, and reduce the haul distance by almost 90%. This eliminates approximately 3.5 KM of round-trip travel for each load of gravel extracted.

Mainland owns and will continue to operate a 30,000 Liter water truck. The water truck is utilized to wet the roads on dry days, preventing dust creation. The truck provides effective coverage for the current configuration and will provide surplus water distribution capability for the proposed reduced haul track. The water truck is deployed to wet down road ways based on visual observation – any time suspended dust is visible, the truck is required to wet down the road. Typically this is most often between July and September however the truck is available for use year round.

Less than 2% of Mainland's product leaves the site by highway truck. While the driveway is gravel, so too are surrounding roads. Interior roads are kept wetted and surrounding municipal road ways are treated with dust suppressant as required by the City of Abbotsford.

Emission calculation assumptions and tables, and the corresponding current and future haul track are detailed below. This estimation is based on current federally reported emissions calculations *AP 42 Compilation of Air Pollutant Emission Factors* as accepted for annual, Federal National Pollutant Release Inventory reporting.

Current Annual Road Dust Discharge Calculation (2016 reporting year)



1	of	1	\mathbf{r}
4	U	1	2

Unpaved Segment Road Length	4	Km
Number of operating days per year	260	Days/Year
Silt Content	8.3	%
Estimated working days when roads were frozen or snow covered and wet for Winter + Estimated working days with precipitation exceeding 0.2 mm	198	Days (*)

Emissions		Annual uncontrolled emissions (tonnes)	Adjustment factor ADJ for natural mitigations	Annual adjusted emissions for natural mitigation (tonnes)	Dust control methods adjustement	Total Release (*)	Units
Total Particulate Matter	TPM	717.357	24%	171.062	30%	51.319	tonnes
Particulate matter less than 10 µm	PM ₁₀	203.991	24%	48.644	30%	14.593	tonnes
Particulate Matter less than 2.5 µm	PM _{2.5}	20.399	24%	4.864	30%	1.459	tonnes

Proposed Plant Annual Road Dust Discharge Calculation

Unpaved Segment Road Length	0.482	Km	
Number of operating days per year	260	Days/Year	
Silt Content	8.3	%	
Estimated working days when roads were frozen or snow covered and wet for Winter + Estimated working days with precipitation exceeding 0.2 mm	198	Days (*)	



Emissions		Annual uncontrolled emissions (tonnes)	Adjustment factor ADJ for natural mitigations	Annual adjusted emissions for natural mitigation (tonnes)	Dust control methods adjustement	Total Release (*)	Units
Total Particulate Matter	TPM	86.442	24%	20.613	30%	6.184	tonnes
Particulate matter less than 10 µm	PM ₁₀	24.581	24%	5.862	30%	1.758	tonnes
Particulate Matter less than 2.5 µm	PM _{2.5}	2.458	24%	0.586	30%	0.176	tonnes

Transfer Point Dust Control Specifications (addressing stacks, point, storage and handling releases)

Control of dust at transfer points can be achieved in two ways.

- 1) Arrest generated dust.
- 2) Prevent dust generation.

Traditional dust controls have focused on arresting dust after it has been generated as typically, dry material is easier on crushing and handling equipment than wet, and oftentimes a reliable source of water is difficult to find within a gravel operation's footprint. Dust is arrested by enclosure of each individual transfer point and high pressure, low volume water atomizing nozzles which increase the weight of the dust particles and pull them together and out of suspension. As the small volume of water used can be quickly evaporated, this process is repeated at each individual transfer point. The mechanical infrastructure for this system is complicated and prone to leakage and breakdown. Changes in wind can expose the 'un-sealable' areas around moving parts like conveyors and make complete control difficult. It also does not typically address dust generated loading or dumping trucks.

With a large and consistent supply of water, Mainland has been able to convert to a dust-prevention program. All material is wetted prior to being loaded, dumped or put through crushers or screen decks. This prevents the generation of dust as the fine particles stick to the rock and are not released to the atmosphere. After each size reduction where rock is broken and fresh 'dry' rock and dust are exposed, more water is added until the material bed is wetted through. Due to the large droplet size used, dust prevention is not affected by wind. By wetting freshly blasted 'muck' (rock) with the water cannon on the water truck, mainland is also able to address truck loading and dumping. While this process increases the wear on equipment, the impact on repair and maintenance is less than that of a more complicated but dryer dust arresting system and the resulting air quality is better for workers, and neigbours.

Mainland's transfer point dust prevention program includes:

- Pre-watering of 'muck' (fresh blasted material) prior to loading in haul trucks.
- Addition of water via large-droplet spray 'fans' at the primary dump hopper.
- Re-wetting after each crusher and along long conveyor runs where drying may occur.

This program has been in use since 2013 on the existing crushing plant at Cox station and, based on the results of annual personal exposure monitoring it has reduced dust exposure by a factor of 2-3x from that which was traditionally achieved using dust arresting technology.

Traditional dust arresting hood failure



Mainland Dust prevention (note wetted material)



Contingency dust control plan:

Under periods of prolonged dry sub zero weather (rare but possible during 'arctic high' conditions in December / January) dust control using water becomes impossible due to freezing lines, and the hazards associated with icy surfaces. Even in the absence of icy roads, failure to supress dust very quickly results in on-site visibility concerns that are considered to be a serious safety hazard, even when employees can be confined to the cabs of trucks, crushers or other spaces with filtered air.

Cox station has traditionally shut down under these conditions and will continue to do so with the new plant.

Reporting:

Cox Station is federally required to report annually to the NPRI or, the National Pollutant Release Inventory – for total particulate discharges as well as other air contaminates. The total annual discharges are calculated based on actual production rates and Environment Canada climate data using industry standard *AP 42 Compilation of Air Pollutant Emission Factors*. This information provides a reliable, vetted indication of performance and is a publicly accessible, searchable report.

Cox Station is also provincially required to monitor employees for dust exposure, typically annually. Testing is usually conducted during hot, dry conditions to increase the factor of safety built into the results. These samples, though collected for a different reason, are analyzed for total dust. The total mass of particulate is expressed in both cases as grams per cubic meter of air.

Table 8, page 22 of the 2003 AMEC report provides modeling results based on various maximum on site concentrations of dust. Should there be a concern about off site dust, this table can be used in conjunction with annual employee monitoring as a screening level check to determine the likelihood of an offsite exceedance. If substituting on-site exposures into the noted table suggests there is a potential offsite exceedance, dust fall equipment can be sourced and deployed at the receptor site of concern. In case of a public complaint, Mainland is also equipped to collect samples and will have them analyzed at an independent laboratory.



Executive Summary - Noise:

In 2000, Wakefield Acoustics, Consulting Acoustical Engineers conducted a noise survey at Cox Station. Calibrated sound level meters were deployed obtaining, continuous measurements over several hours of normal operation. Three onsite and three 'fence-line' monitoring sites were also studied.

While on site measurements were (as expected) louder than the bylaw receiving-site limit of 60 dBA L_{eq} , all three fence-line monitoring sites were under the 60dBA Leq. It should be noted the sample period and calculated L_{eq} was for 2.5 hours, not the one-hour sample indicated in the Bylaw. Further the quarry 'fence-line' is bordered by crown land to the east, the river to the north and all properties directly adjacent to the south and west are owned by the quarry's landlord – Laurmel Holdings Ltd.

The current crushing operations, which are relatively unchanged from the study in 2000 are approximately 680m from the closest fence-line sampling location, but over one kilometer away from the nearest resident. The proposed new plant will be approximately 1.6 KM from any neighbour and, will move farther "behind the mountain" blocking more of the southerly sound transmission.

Based on the 2000 Study, the (low) number of complaints to date, and moving the plant a further half kilometer from the next nearest resident, negative noise impacts are not anticipated.

Noise Controls:

While Cox does not exceed noise limits, noise controls are still employed for both the comfort of neighbours and the health and safety of workers.

Blasting is the most common cause of noise complaints. Cox Station blasts 2-3 times a week and has only received a handful of blasting related complaints over the last several years. This is due in part to our distance from neighbours but also to the experience of our blaster, the attention paid to charge –per – delay and timing. Energy can be transmitted as movement or noise, but what is transmitted as noise, is taken away from the energy that fractures the rock. The most efficient blasts are also the quietest and we have refined our techniques over the years.

Back up beepers are a common cause of industry vs neighbourhood complaints. While they do not cause Cox Station to have sound level exceedances they can 'stand out' from the ambient noise and transmit long distances. Mainland now installs 'white noise' backup alarms. These alarms produce a 'quacking' or 'swishing' sound that is only audible in the travel path of the vehicle. These alarms also improve on-site safety as you only hear them if you are in danger, reducing the likelihood of an employee 'tuning out' competing alarms in a busy traffic area.

Crushing, screening and material transfer are the predominant sources of constant on site noise, however as the Wakefield study proves, even at the fence line, this noise is already below the Bylaw daytime levels. Noise reducing technology for crushing equipment is poor at best and most site must rely upon a combination of physical screening and distance. The sound blocking geography at Cox good at present and is expected to improve as the operation moves east. The noise due to screening activities at Mainland is anticipated to be reduced with the commissioning of the new plant as most of the screen decks will be fitted with polyurethane instead of wire mesh. Although we cannot predict the magnitude of noise reduction, we can say with certainty that rock hitting plastic is significantly less noisy than rock hitting metal.

An added noise advantage at Cox Station is the availability of BC Hydro line power. Many gravel operations are forced to utilize large diesel generators – which produce sound levels well in excess of crushing and material handling. The new Cox Station plant will continue to be powered by BC Hydro.

Neighbourhood Participation and Communications:

Cox Station has a decades-long open-door relationship with their neighbours. While there will always be people who are opposed to mining in general, or in particular to mines near their home, Cox has been demonstrably accepted by the community. By invite, several Mainland managers are members of the local Straiton Hall Community Club. They meet formally and informally with the neighbours at town hall meetings, BBQ's and dances, ensuring open lines of honest communication. Cox shares their unique, onsite safety capabilities such as rough-terrain fire response, water rescue, and heavy equipment (snow clearing, off road recovery) with local first responders. The neighbours typically know, mine teams may be the first-on-scene to help in case of an emergency, and if you dial 911, the fire department may dispatch the mine's water truck, depending on the nature and location of the fire. Over the years Cox Station has assisted in medical distress, vehicle accidents and police incidents on the mountain.

For the wider community, Cox hosts over several hundred children annually to learn about mining, the environment, jobs and safety. This is part of their larger efforts to educate the public about how applying a "buy local" philosophy to aggregates reduces their impact on the environment, road safety municipal taxes and personal expenses.

New Permit Enhancement:

With the issuance of a City Of Abbotsford Permit, the Mine will become party to the Blasting Schedule website <u>www.blastingschedule.com</u> which provides unique direct-line accountability to neighbours. Typically in quarrying, blasting is the source of most complaints. The root of the complaints is most often being startled by the sound of an unexpected explosion, not any actual damage or harm. Mainland (and many others) have regularly confirmed this through the ongoing use of Seismographs when blasting. Abbotsford has taken the wise step of setting up a website to ensure concerned residents have a simple way to know when to expect the sound of a blast, and who to call if they have any questions or concerns. The City of Abbotsford Permits also require the deployment of Seismographs for every blast.

Routine and emergency contact information is also posted at the mine gates.

Screening and Buffers:

Cox Station Quarry is buffered by a river to the north, forested mountainous crown land to the east, and purpose-bought forested 'buffer lands' to the south and west. The landowner Larumel Holdings Ltd. has long worked to reduce the potential of neighbourhood conflict by purchasing the neighbouring properties as they have come for sale, over the last 30 years. The current distance to the nearest neighbour's home is 1.1Km and that will increase to 1.6Km with the construction of a new plant, farther east.

Due to the relatively steep terrain and the forested areas south, west and east, cox is only clearly visible to neighbours across the river in Mission, Dewdney and Deroche. Aside from 100m of working foreshore at the barge loadout facility, the riverfront is predominantly treed meaning, the closer you approach the quarry from the north, the less of it you can see due to the shrinking viewing angle over the trees.

This said, Cox rises from an elevation of 10M to over 200M and, the site encompasses several hundred acres. It is a distinct landmark, visible from the Mission Bridge and even, commercial flights. Complete screening of such a large site is not possible but the landowner, and miners have taken care to ensure the impact is minimized.



Cox Station as seen from Dewdney, after light snowfall (highest contrast scenario)

Buffer lands, purchased & crown land





Mine closure, post mining use and access

The permitted reserves at Cox Station Quarry are more than 30 years from exhaustion. Further mineral claims extend over nearly 1000 acres of adjacent crown land, creating the possibility of continuous aggregate production for the next several generations.

If or when Cox Station ceases to be a mine, the proposed reclamation will be to the best-and-highest land use available at the time. Currently, it is envisioned that this land could become the farthest in-land marine / rail port, facilitating the non-road transmission of goods to Abbotsford and beyond.

The Ministry of Mines retains a reclamation bond, to ensure in the unlikely scenario of abandonment, the mine can be safely decommissioned. The miners also follow an engineered mine plan (Appendix B) which will ensure safe, stable 'final walls' that are not subject to landslides or other geological failures.



Current site survey, including property lines and new plant footprint (yellow oval)

Proposed site layout of new plant – note jurisdiction markers (blue)

