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Quarry Operation Notice of Work and Reclamation Program

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**BAMBERTON QUARRY**  
1451 Trowsse Road, Bamberton, B.C. V0R 2P4

***AMENDMENT TO EXISTING BC MINES ACT  
PERMIT Q-8-24***

for

*MINE NUMBER 0800407*

*LEGAL DESCRIPTION: DL 118, DL 73, DL 135, DL 183, DL 95, DL 127  
Malahat District*

April 2019

**Prepared for:**

BC Ministry of Energy and Mines  
Mining and Minerals Division  
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COAST MOUNTAIN RESOURCES  
BAMBERTON AGGREGATE QUARRY  
Operating Since 2014



**Entrance to Bamberton Quarry**

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## 1.0 INTRODUCTION

This Notice of Work and Reclamation Program document outlines amendments to an existing rock quarry *permit Q-8-45* that was issued for the Bamberton Quarry located 10 kilometres south of Mill Bay (Figure 1 – Property Location Map). The original work plan and reclamation program for the Bamberton Quarry was approved by the Ministry of Energy, Mines and Petroleum Resources in March 2011. This approval and permit was amended in March and July 2016.

The current permit amendment application proposes modifications to the existing mine plan that will expand the mine permitted area by approximately 48%. Associated maps and resource calculations will utilize new LIDAR elevation information which will significantly upgrade the overall accuracy of the application. Primarily, modifications to the existing mine plan bench configurations and water courses were necessary since the use of higher resolution elevation information acquired from a LIDAR data set is more accurate than the elevation data used in the 2016 application.

The expanded mine plan will incorporate the current phased development scheme and will include strategic expansion into Malahat Nation owned adjacent areas. The work will be based on an improved understanding of the natural elevation features of the property. Expansion plans will provide access to new rock resources as well as provide improved bench and slope configurations related to the permitted quarry final walls.

The proposed permit amendments are limited in scope and do not significantly alter the current mining processes or environmental and community impacts. Provisions are made to eventually increase the annual extraction rate to 479,000 tonnes. The quarry access and operating conditions will not change from the current plan. Malahat Nation is involved in the development of this application. The application is not subject to review under the BCEAA.

Based on current economic conditions and available reserves, the mine operators plan is to continue the quarry and processing operation over a 15 to 30 year period. They plan to continue meeting the existing conditions of their mining permit. They have a stringent environmental management plan in place as well as a progressive restoration strategy that will prepare the property for future Comprehensive Development Zone land use.

## 2.0 SITE CONDITIONS

### 2.1 Land Use and Site Features

The Bamberton properties consist of 525 hectares which are situated within the Cowichan Valley Regional District on lands that were part of a cement plant that operated from 1912 to 1980. Recently the properties were acquired by the Malahat Nation except for one southern lot, (DL 183), which was acquired by the Province of BC in the same transaction. The Trans-Canada Highway is located to the west and the Saanich Inlet to the east. Crown land and private land holdings can be found adjacent to the property boundary to the north, west and south.

The current zoning on the Bamberton Properties is Rural Resource 1 (RUR-1), Rural Resource 2 (RUR-2), Bamberton Light Industry (I-1A) and Heavy Industry (I-2) and the 2011 South Cowichan OCP lists zoning as Rural Resource (RUR) and Industrial (I) (Figure 2 – Land Status Map). The end land use will be mixed residential, business, light industry and heavy industry.

The existing mine permit area covers 39.3 hectares of which 11 hectares are disturbed from past quarry activities. An additional 1.6 hectares within the quarry footprint contain a reclaimed soil storage facility (SSF). The quarry exposure is positioned above the 6 metre contour line and extends to the 220 metre contour line on the east facing side of Mount Jeffrey which is characterized by steep slopes (See Figure 3 – Existing Surface Map). Areas immediately bordering the quarry are covered by exposed rock, forest, and ocean frontage.

### 2.2 Aggregate Resource Expansion

The proposed expansion area to the north, west and east of the current permitted area will add 18.3 hectares to the mining area which will now total 57.7 hectares, (See Figure 4 and Table). This will expand the mine permit area by 47%. The expanded extraction plan (See Figure 5) will increase the total mineable reserves to approximately 19.5 million tonnes. The thickness of the target resource ranges from 10 to 60 metres. Table 1 summarizes the expected reserve total by individual phases.

Table 1: Estimated Total Bamberton Quarry Reserves.

PHASE	AREA (ha)	VOLUME (m <sup>3</sup> )	RESERVES (tonnes)
1	7.0	210,000	506,000
2A	11.2	1,900,000	4,579,000
2B	2.7	200,000	482,000
2C	2.6	55,000	132,500
2D	3.4	250,000	602,500
2E	2.5	140,000	337,500
3A	10.0	1,800,000	4,338,000
3B	7.2	600,000	1,446,000
4	4.2	800,000	1,928,000
5	7.0	2,100,000	5,061,000
<b>TOTAL</b>	<b>57.7</b>	<b>8,055,000</b>	<b>19,412,500</b>

### 3.0 QUARRY OPERATIONS

#### 3.1 Setbacks, Extraction Areas and Processing Site

In areas where the quarry operations encroach upon neighbouring properties outside the mine permit boundary, a minimum 5 metre excavation setback along the mine permit boundary will be maintained and is shown on the enclosed cross sections (Figures 8 to 14). Vegetation will be stripped to the mine permit boundary and any loose surface material will be removed to 3 metres from the crest of the excavation.

The proposed quarry expansion will extend into areas immediately adjacent to the current permitted boundary. The expansion areas will primarily take place around the existing Phase 1, 2, and 3 mining areas. No expansion will take place in the southern portion of the mine permitted area. The locations of existing Phases 1, 2, 3, 4 and 5 will not be altered. To accommodate proposed expansion, Phases 2 and 3 will be renamed to Phase 2A and 3A respectively. Labels for Phases 1, 4 and 5 remain unchanged as no expansion is planned for these three phases. The proposed expansion areas around Phase 2A will be identified as Phase 2B, 2C, 2D and 2E; the proposed expansion area around Phase 3A will be identified as Phase 3B. The phase outlines, labels, and increase in extraction areas is shown clearly between Figures 4 and 5. The quarry will continue to be developed from the top down in 10 to 11 metre bench heights for operational purposes. Final overall bench heights may be up to 20 metre and the planned overall slope angle will be 45 degrees.

**Five Year Mine Plan:** As part of identifying areas for near term (0 to 5 years) extraction, included in this application is a proposed 5 Year Mine Plan (Fig 6 – Proposed 5 Year Mine Plan). Detailed setbacks, planned areas of disturbance, bench configurations, surface water management, and planned reclamation areas are included in this plan. Much of the 0 to 5 year mine extraction area is within the current mine permitted area except for some new areas in Phases 2B and 2C. Table 2 summarizes the disturbance area, extraction quantity and reclamation area for the next 5 years.

Table 2: Five year mine plan estimated disturbance area, extraction, and reclamation.

PHASE	DISTURBANCE AREA (ha)	EXTRACTION (tonnes)	RECLAMATION (ha)
1	0.2	400,000	0
2A	2.6	400,000	0
2B	1.2	400,000	1.2
2C	0.5	130,000	0.5
4	4.0	800,000	0
TOTAL	8.5	2,130,000	1.7

Hydraulic excavators will be used for clearing, top soil salvaging and overburden removal. Front end loaders and haulage trucks will be used for handling blasted and processed rock products. Drilling and blasting will be contracted out to a mine certified blaster and will follow best management practices including the use of monitoring stations as well as suitable noise, dust and vibration controls. Blasting will take place on average 2 to 3 times per month. Explosives are not planned to be stored on site and pneumatic/hydraulic rock breaking will not be utilized for

primary excavation purposes. A copy of the blasting program/procedures will be posted on site. All blasting logs will be stored and available for review on site.

The processing of all materials will be maintained at the Bamberton quarry utilizing a 200-tonne/hour crushing/screening/washing plant. This application proposes increasing the annual production from 240,000 tonnes of material processed per year to eventually 479,000 tonnes of material processed per year.

### **3.2 Access**

Access to the Bamberton Quarry will continue to use highway and marine access. In bound and out bound truck traffic will continue to use the routes from the Trans-Canada Highway at Mill Bay Road Interchange and access the property via Trowsse Road. This application will not significantly increase truck traffic as much of the increase in quarry output will be shipped off-site through increased barging activity. Appropriate safety signage for traffic flow will be maintained.

### **3.3 Extraction Schedule and Hours of Operation**

The Bamberton Quarry conducts mining activities as a year round operation. Mining activities will take place approximately 300 days per year. Crushing, screening and pneumatic/hydraulic rock work, product sales and shipping will be conducted 7 days per week

The primary hours of work will be 7:00 am to 7:00 pm with 24 hour operation used when required.

## **4.0 ENVIRONMENTAL MANAGEMENT**

During the operation of the quarry all reasonable efforts are used to minimize the impact of the operation on the local community and natural environment. Environmental management and remediation strategies used are outlined as follows. These measures will be monitored on an ongoing basis and mediation actions will be immediately taken to correct/improve any identified concerns.

### **4.1 Water Management**

The management of drainage courses and storm flows in and around the extraction site is required to minimize the deposit of sediment and other possible contaminants into the local aquatic drainages and adjacent marine shoreline. The existing and proposed extraction work will be undertaken and completed in a manner as to prevent the direct or indirect discharge of soils, sediment and/or sediment-laden water or any other deleterious substances into any watercourse. Surface water flows containing suspended sediments are controlled using surface contouring, strategically located water containment berms, and control traps and settlement ponds. Water flows are contained within the extraction areas by maintaining grade elevations that are strategically sloped, maintaining undisturbed buffer strips and installing ditches/berms along the perimeter of the extraction sites. Water is confined and allowed to naturally evaporate and/or percolate into the porous adjoining subsurface limiting the escape of surface

water. Captured surface water within the quarry is also recycled as part of the dust control program and material washing. Figure 3 – Existing Surface Map outlines the current drainage courses in and around the extraction site. Water and sediment is collected in suitably designed settling ponds. Contained solids in the pond overflow is targeted not exceed 25 ppm.

During the full life cycle of the quarry operation, water management planning will be continually updated for each new phase of the mining sequence. New in-pit settlement ponds and water courses will be constructed as required for each phase of mining. The planned final surface water flows and controls are shown in Figure 7 – Final Surface Water Management Plan. This plan strives to keep pre-existing water courses to their original location and condition wherever possible.

## **4.2 Material Management**

The average depth of topsoil is 20 cm and overlies a thin veneer (0.2 to 2 metres) of overburden. This material is being conserved for reclamation of the mine site. Temporary topsoil and overburden stockpiles will be stabilized on level ground contoured and seeded with appropriate grass and will be routinely monitored for erosion and the appearance of noxious weeds. All excavated surface materials will be stored in suitable locations and protected from erosion.

## **4.3 Operational Management (Noise and Dust Mitigation)**

To minimize noise and dust pollution concerns, all heavy equipment and plant machinery will be maintained in good operating condition. All appropriate noise and dust suppression equipment will be available and in good working order.

Noise issues are commonly associated with blasting, and the operation of equipment and machinery during working activities. Noise mitigation measures for use in the operation include the following:

- ✓ Operating within defined work times.
- ✓ Maintaining berms and/or placement of gravel stockpiles in strategic locations to provide a barrier effect to the receiver locations.
- ✓ Orientation of the equipment to direct noise away from the receptor location.
- ✓ Locating noise sources at lower depths (bottom of excavation).
- ✓ Keeping equipment maintained for peak efficiency and overall reduction of noise.
- ✓ Operator awareness when operating equipment.
- ✓ Night time substitution of back-up alarms with strobe warning lights.

The most significant source of dust to be controlled is from trucks traveling within the pit as well as dust from stockpiles and crushers. The dust control program for the site will include the following:

- ✓ Regular application of dust suppressants (e.g. water sprinkling).
- ✓ Drilling machinery will be equipped with dust collectors.
- ✓ Use of vegetative coverings on overburden stockpiles and filled reclamation slopes.
- ✓ Watering and sweeping of access routes.



#### **4.4 Hydrocarbon Management**

To minimize potential hydrocarbon pollution concerns, all equipment and machinery will be maintained in good operating condition. It will be free of leaks or excess oil and grease. No refueling or servicing will be undertaken within 30-metres of any watercourse or surface water drainage. Spill kits will be readily accessible on site.

A Hydrocarbon Management Plan has been developed to guide the storage, fueling, operational servicing, spill prevention, disposal and clean-up for fuels and lubricants stored on the mine site. The plan conforms to the requirements of the Ministry of Environments Field Guide to Fuel Handling, Transportation and Storage. A copy of the plan is posted at the mine site and all workers have been instructed on the use of the plan.

#### **4.5 Archaeological Chance Find Procedure**

An archaeological chance find procedure (ACFP) has been implemented for the Bamberton Quarry. The ACFP outlines action to be taken in the event of a chance find. A copy of the procedure is posted at the mine site and all workers have been trained in its implementation.

#### **4.6 Site Security and Safety**

Access routes into the excavation areas will be gated or use other forms of barricades. Appropriate barriers will be used to control access into any danger areas and warning signs will be posted in unguarded areas. For incidents which may happen on-site, a site specific emergency response plan has been developed.

### **5.0 RECLAMATION PLAN**

The end land use for the properties has been identified as mixed residential, commercial, light industry and heavy industry. Extraction and reclamation plans are being designed with the intent of accommodating and facilitating these types of future development.

Currently, mining at the Bamberton Quarry has directly disturbed a total of 11.0 hectares of the property. Extending the existing quarry in the five year plan would add 8.5 hectares of disturbed ground (Table 2). The combined mine disturbance area after this proposed work has been completed would be approximately 19.5 hectares. Progressive restoration activities will be incorporated in the overall mine plan that includes preparation of areas for future use, and the maintenance and monitoring of environmental management plans.

#### **5.1 Land Surface**

In order to accommodate reclamation requirements, the mined areas will be re-contoured to appropriate elevations and grades that are suitable for the final designated zoning and use.

Residual high-walls will be properly scaled and have appropriate catch benches installed and maintained. The final high-wall reclamation will include the planting of fir trees along the inner edge of the catch benches where appropriate. Any smaller back slopes will be re-sloped to a

minimum 1.5:1 grade and re-vegetated to a self-sustaining state using appropriate plant species. Previously stockpiled overburden and approved imported fill materials will be used as part of the reclamation program. Stockpiled topsoil will be spread to cap the fill materials and enhance the re-vegetation.

Final ground level elevations will be graded towards (1 to 3% grade) catchment ponds located at the edge of the final quarry floor.

## **5.2 Watercourses**

The final phase of the quarry's water management plan will be developed to assist in transition to the drainage scheme for the site after final reclamation is completed. This includes constructing water courses and catchment/retention ponds in appropriate areas of the quarry for final use. Water courses and structures will be developed to be compatible with future land uses. The plan will be for long-term water quality to be maintained to an acceptable standard and contained solids in final pond overflows to not exceed 25 ppm.

Where possible, drainages will be restored to their original condition. If not, drainages will be diverted into new watercourses which will sustain themselves without maintenance. The level of productivity of these watercourses will not be less than conditions that existed prior to mining.

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**MAPS, PLANS, and CROSS-SECTIONS**

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