
Phase 3: Groundwater Protection Study District of Highlands

District of Highlands
Victoria, BC



Submitted to:

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Executive Summary

This report presents the results of the third phase (Phase 3) of a three-phase Groundwater Protection Study conducted by Golder Associates Ltd. (Golder) on behalf of the District of Highlands.

BACKGROUND

The District of Highlands (Highlands) is one of 13 member municipalities in the Capital Regional District (CRD) on southern Vancouver Island. As a rural community that obtains potable water from private, individual water wells, the Highlands recognizes the importance of protecting all water resources, including groundwater. The Highlands Official Community Plan (OCP) identifies groundwater availability as one of the major factors that will determine future land use development in the Highlands.

In 2007, the District of Highlands Local Government (the District) initiated a three-Phase Groundwater Protection Study (the Study) to assess groundwater conditions across the Highlands, to guide future land-use decisions and to develop groundwater protection measures to support stewardship and water conservation.

The scope of work for Phase 1 consisted of a compilation and detailed review of available information, including water well records, geological mapping, climate and precipitation data to develop a conceptual model of groundwater flow in the Highlands. Golder also conducted a stream flow monitoring program at key locations in the Highlands to assess baseflow at the end of the dry season to supplement the available background information. Golder assigned representative Hydrogeologic parameters to the bedrock units and developed and calibrated a District-wide numerical hydrogeological model (the model) to steady-state (i.e., average annual) conditions. The model was then used to conduct water balance analyses to assess the sustainability of current and future groundwater withdrawals, together with the potential impacts of climate change. At the time of model development, seasonal data were not available to calibrate the model to assess transient (i.e., seasonal) conditions. It was recommended that the model be considered as a “working tool” that would be refined to simulate transient conditions following the collection of seasonal water-level data. With consideration of the results from the water balance analyses, monitoring wells were established at strategic locations of the Highlands and a preliminary groundwater quality and water-level monitoring program was implemented to collect the data needed to assess baseline conditions and seasonal patterns.

Under Phase 2 of the Study, Golder compiled a regional contaminant inventory to identify potential sources of contamination in the Highlands. For the purposes of the contaminant inventory, the Highlands was categorized into three types of land use activities: Park and Rural Residential (P/RR); Commercial/Industrial (C/I); and Comprehensive Development (CD). For each land use category, existing and potential hazards to groundwater quality were identified and relative rankings were assigned to the identified hazards to provide the District with guidance on prioritizing groundwater protection efforts. Based on the results of the contaminant inventory, preliminary groundwater protection measures were developed to establish the framework for the groundwater protection measures that were developed during Phase 3 of the Study. During Phase 2 of the Study, the Highlands groundwater quality and water-level monitoring program was expanded based on the results of both the contaminant inventory and the water balance analyses (Phase 1).



PHASE 3 OF GROUNDWATER PROTECTION STUDY

This report presents the results from Phase 3 of the Groundwater Protection Study. During Phase 3, the results from monitoring programs were used to calibrate the numerical model that was developed during Phase 1 of the Study to assess seasonal variability. The refined model was then used to refine the predicted groundwater water balance for the Highlands and the potential impacts associated with future development and climate change. The results from the numerical model formed the basis for the development of groundwater protection measures that support groundwater conservation and protection in the Highlands.

Monitoring Programs

Golder conducted stream flow monitoring during the wet season of 2010 to supplement the dry season data that were collected during Phase 1 of the Study. Golder also compiled and reviewed the results from the Highlands monitoring program and monitoring programs conducted by external stakeholders including the Bear Mountain Golf Course and operators of the Hanington Creek Estates Water System. Groundwater levels in the monitored wells were generally consistent with seasonal precipitation patterns.

Water-levels were generally stable during the wet season between November and April, declined during relatively drier months from May to September and increased between September and November in response to the onset of the wet season. The results from groundwater quality monitoring were generally consistent with mineralised and relatively hard groundwater that is typical in crystalline bedrock aquifers. Detectable concentrations of coliform bacteria reported for samples from most of the wells in the Highlands demonstrate the importance of regular water quality sampling for private well owners to confirm the potability of the water and to identify changes to water quality that may require further investigation.

In 2006, operators Bear Mountain Golf Course installed pressure transducers in observation wells 413 and 414 to collect continuous water-level data. During the summer of 2011, flow meters were installed to measure flow rates and volumes pumped from production wells 407 and 411. Pressure transducers were also installed in the production wells. Golder reviewed the flow meter and water-level data to assess groundwater use and the responses of the water-levels. Golder also received production data for the Hanington Creek Estates Water System (Hanington System) for 2011. The flow meter data were used to estimate average residential groundwater use in the Highlands during the summer and the winter seasons.

Numerical Model

Using data from the monitoring programs, Golder refined the numerical model that was developed during Phase 1 of the Study to simulate the seasonal variability observed in groundwater levels across the Highlands. The refined model was used to assess the sustainability of groundwater withdrawals under current and future conditions that included future development and the potential impacts of climate change. For the purpose of the numerical modelling, future development scenarios were developed based on future build-out estimates provided by the District. Although there is relatively high uncertainty regarding the potential impacts of climate change, longer summer drought conditions are generally anticipated for southern Vancouver Island, resulting in a decrease in groundwater recharge through less precipitation and increased evapotranspiration.



Transient model simulations were conducted to determine the water balance under current conditions and for four future build-out scenarios: full-build out with 20% secondary suites; full-build out with 50% secondary suites; full-build out with 20% secondary suites and impacts of climate change; and full-build out with 50% secondary suites and impacts of climate change. Predicted groundwater elevations at the end of the wet and dry seasons for the future scenarios were compared to the predicted water levels for the current conditions.

The results of the water balance analyses suggested that the simulated growth (full build-out) will not have a significant influence on the groundwater elevations in the Highlands, with little to no widespread differences to groundwater elevations were observed under Scenarios 1 and 2. At the end of the dry season, the decline to groundwater levels in the recharge areas at higher elevations of the western portion of the Highlands was predicted to be approximately 1 to 2 m compared to current conditions (the Base Case), with localized (i.e., small area) changes observed in the southwestern portion of the Highlands in the vicinity of the major groundwater users. The model simulations for future conditions suggested that the potential impacts of climate change could have a significant impact on average groundwater conditions within the Highlands. In Scenarios 3 and 4, the effects of climate change resulted in a general decrease in groundwater levels in the Highlands, particularly during the dry season. Groundwater levels at higher elevations were predicted to decrease 1 to 3 m by the end of the wet season when compared to the Base Case. At the end of the dry season, groundwater elevations were predicted to decrease on the order of 5 to 10 m at higher elevations, with localized decreases of up to 20 m, along the western and central portions of the Highlands when compared to current conditions. Less influence to water levels was observed in groundwater discharge areas at lower elevations.

Groundwater Protection Planning

Based on the results of the contaminant inventory that was compiled in Phase 2 and the refined numerical model, conservation and groundwater protection measures were developed to support stewardship and water conservation in the Highlands. With consideration of the legislative framework in BC and a water governance model that is most applicable to the Highlands, Golder identified a variety of regulatory and non-regulatory mechanisms and market approaches, that the District could implement. Complementary initiatives being implemented within the Highlands by the Highlands Sustainability Task Force (HSTF) and by other local governments were also considered to identify opportunities for collaboration. In particular, opportunities were identified to encourage collaboration and cooperation between stakeholders to implement tools that are available from other local governments and provincial agencies and applicable to the local context.

Conservation Planning

The goal of the groundwater conservation planning exercise was to develop the framework for a conservation strategy that the District could implement to encourage conservation and efficient groundwater use and also to enhance groundwater recharge to the bedrock aquifer in order to mitigate potential decreases in future groundwater supply.



Regulatory mechanisms that could support the Highlands OCP include revision of Zoning Bylaw No. 100 to rezone groundwater recharge areas with a land use designation that includes additional groundwater conservation measures. Recharge areas could also be addressed with Development Permit Areas (DPAs) that could require new developments to limit site disturbance and amount of impervious surfaces, preserve natural soils and vegetation, and require landscaping designs and alternative water sources such as rainwater. Supporting bylaws for water services, storm water management and roads could be refined and new bylaws developed to reinforce groundwater conservation.

Public education and outreach programs are required not only to educate well owners about the importance of groundwater conservation, but also to provide them with the tools to assess current water use, evaluate potential groundwater conservation opportunities and implement appropriate measures. The District could develop a suite of non-regulatory measures that include both initiatives that are developed for the Highlands and linkages to existing tools and sources of information that are available from other jurisdictions and organisations. Application of a combination of new and available tools will facilitate implementation of groundwater conservation measures that are relevant to the local context in a cost-effective manner. The District may consider developing a conservation strategy that develops and advocates a household audit program and landscape planning and irrigation initiatives to reduce groundwater demand and encourage the use of alternative water supplies for non-potable uses. The District could consider providing financial incentives such as rebates, subsidies, grants and/or funding to reward well owners who implement groundwater conservation measures and to encourage demonstration projects.

Groundwater Quality Protection Planning

The contaminant inventory that was compiled during Phase 2 of the Study identified and ranked potential sources of contamination in the Highlands. Groundwater quality protection measures were developed to prevent contamination of groundwater supplies from the identified hazards. In addition to collaborating with operators of Commercial/Industrial (C/I) properties in the southern portion of the Highlands, the District may wish to consider legislative tools that are available to support groundwater quality protection. These tools include amendments to Zoning Bylaw No. 100 to preclude home-based businesses (e.g., automotive repair, service and salvaging, excavation and/or construction, metal recycling, cabinetry and woodworking, etc.) that involve the use, storage and potentially disposal of chemicals and hazardous products, and recreational and agricultural operations that apply chemicals such as fertilisers, pesticides and/or herbicides. Alternatively, specific land uses, including home-based businesses, could be regulated through the use of DPAs to regulate land use activities to prevent contamination, mandate use of best management practices (BMPs) and environmental inspections and maintenance practices for fuel tanks and septic systems. Specific standards could be established in the form of bylaws for storm water management, roads, engineered filtration systems, well closure and fuel tank containment measures.

The public education programs that the District currently implements could be supplemented with non-regulatory measures that are designed to address the potential hazards identified in the contaminant inventory. The household audit program that is discussed in the preceding section could also include measures to assess potential sources of contamination and provide supporting information regarding groundwater protection measures. This would provide the District with the opportunity to reinforce public education programs and help well owners identify specific groundwater protection measures that could be implemented on their properties.



Supporting information could be delivered to well owners through technical assistance programs that are tailored for specific land uses. For example, the District could assess environmental practices currently used different properties in the Highlands (e.g., C/I properties, Bear Mountain Golf Course, home-based businesses, etc.) and, if required, identify best management plans (BMPs) and waste disposal programs that could be implemented to support groundwater protection. A hazardous waste collection program could also be developed to encourage property owners to regularly remove hazardous products from their property for appropriate disposal.

It is anticipated that market approaches may be required to encourage residents and business operators in the Highlands to adopt and implement the groundwater quality protection measures discussed above. The District may wish to consider financial incentives to encourage developers, C/I operators, the Bear Mountain Golf Course, home-based businesses and hobby farms to implement groundwater protection measures and BMPs, and to upgrade facilities to reduce the potential for groundwater contamination. It is recommended that the District collaborate with other local governments and agencies to assess sources of funding that may be available for initiatives and agencies, identify opportunities to collaborate and potentially share resources.

Preliminary Contingency Planning

The objective of contingency planning is to identify alternative water supplies that could be used if there were to be a decrease in the available groundwater supply or a decline in groundwater quality in the future due to potential impacts from climate change or a general deterioration of groundwater quality across large areas of the Highlands.

In the Highlands, each individual private well owners and commercial/communal well operators are responsible for their water supply. The role of the Highlands is to advocate groundwater conservation and protection and to provide information to well owners in the event that one or more alternative water supplies are required. Bulk water delivery may be a practical option to supplement the yield from an existing well during the dry, summer season. Bulk water can be scheduled as needed and can be delivered either as bottled water or with tanker trucks, if the water user has a tank with sufficient volume.

Although an existing well could potentially be drilled to a greater depth to encounter more fractures in the bedrock, this is expected to result in variable, and potentially marginal, improvements to the well yield. Alternatively, a new well could potentially be drilled on a property to supplement or replace an existing well that has a relatively low yield; however, in the Highlands, well yields are variable. As such there is uncertainty in locating and drilling a new well that has a higher yield.

Surface water could potentially be used to as an alternative water supply source. Based on a search of the BC Ministry of Environment Water Resources Atlas database, it is anticipated that only a limited number of additional surface water licenses would be available within the Highlands. If additional water licenses were to be available, surface water would represent a viable option for properties that are adjacent to, or have access to (e.g., via a right-of-way), a surface water body. Treatment requirements would also have to be considered, as surface water generally requires more treatment than groundwater.



If configured appropriately, a rainwater harvesting system (RWH system) could be used to reduce demand for groundwater. RWH systems should comply with the BC Building Code and consideration should also be given to water treatment requirements and monitoring programs to assess the quality of the water from the RWH system. Precipitation is significantly lower during the summer months when water demand is greatest. Therefore, predicted precipitation patterns and other site-specific factors should be considered when sizing the volume of the storage reservoir for a RWH system.

The intent of the Highlands is for water supply to continue to be sourced primarily from privately owned individual wells in the majority of the Highlands. If required, the Greater Victoria Drinking Water System may represent an alternative water supply source for the Highlands; however, the capital costs required to extend the system in the majority of the Highlands would be relatively high on a per capita basis.

Emergency Response Planning

The District of Highlands Emergency Program (Emergency Program) outlines the District's responsibility during emergencies and the communications procedures to be followed. Although the District does not have jurisdiction over individual private water supplies in the event of an emergency, the District's role is to provide well owners with information, advocate preparedness and, in the event of an emergency, support first response activities, issue public warnings and provide information to residents.

A framework was developed to refine the Emergency Program to support timely and coordinated responses to emergency events that could contaminate groundwater supplies in the Highlands. It is recommended that a Hazard-Specific Plan be prepared to specifically address groundwater contamination. Measures should be developed to support both first response activities that consider the nature of the hazardous materials and immediate impacts to nearby wells, and follow-up phases of work that are required to identify receptors (including drinking water wells), assess potential flow paths from the area of the spill and the time before contaminants are expected to arrive at the receptors. Investigation of a spill and its effect on adjacent drinking water wells should be conducted in consultation with a contaminant hydrogeologist.

The District could consider developing a communications protocol specifically to address events that result in groundwater contamination. This protocol would identify lines of communication with the appropriate internal and external stakeholders such as MoE and the Vancouver Island Health Authority (VIHA), and companies that can provide specialised technical services such as remediation contractors and contaminant hydrogeologists.

Recommendations

The following recommendations are provided for the District to implement the groundwater protection measures presented above and to support long-term management of groundwater resources in the Highlands.



Public Education and Communications Strategy

Public education and involvement is required to raise awareness and provide information and tools that are necessary to educate well owners and residents about the importance of groundwater conservation and protection, and to provide information and tools that encourage changes in behaviour. Technical information from programs such as the current Study and the Highlands Integrated Community Sustainability Plan (ICSP) represent a clear and factual basis for a public education strategy that uses existing tools both internal and external to the Highlands and includes provisions to develop specific tools, as required, to customize the information for the local context. A variety of educational methods and tools could be implemented including:

- fact sheets and technical resources available from external resources;
- the Highlands newsletter and brochures;
- the “Highlands Sustainability” page on the District’s website with information on local initiatives and links to a variety of on-line tools that are available from external stakeholders;
- publically available reports and studies to share technical information with residents;
- public presentations, seminars and workshops to encourage collaboration between local governments and organizations and to provide residents with opportunities to learn about groundwater protection topics such as pesticide-free gardening practices, rainwater harvesting and grey water use, well and septic system maintenance, irrigation practices, etc.; and
- educational materials such as the Highlands Community Green Map could be displayed at local events such as the Highlands Farmer’s Market and the annual Highlands Fling.

The District should consider the merits, costs and challenges associated with the various options discussed in the preceding section to develop an education strategy that includes the right combination of methods and tools.

Groundwater Monitoring

Golder recommends that the District continue to monitor groundwater conditions in the Highlands using a coordinated approach that includes ongoing collection of continuous water-level data from Highlands monitoring wells and continued collaboration with stakeholders to obtain flow meter, water-level and precipitation data from the respective monitoring programs. The District should also obtain water quality data from select land owners to monitor potential changes to water quality in the southern portion of the Highlands. Data from the Highlands and stakeholder monitoring programs should be compiled and reviewed on an annual basis to assess long-term trends. If trends are observed, the results would provide the basis to guide implementation of management strategies including the conservation and groundwater protection measures.



Contaminant Inventory Review

It is recommended that the District work with property owners to implement the use of BMPs for the land uses at their respective properties. Based on the results of these activities, and in conjunction with the monitoring activities described above, the District should refine and review the results of the contaminant inventory on an annual basis to revise groundwater protection efforts such as implementation of technical assistance programs and the communications strategy.

Database System

The District may wish to consider building upon the Highlands database and establish a centralised database system to store and manage data from the monitoring programs and supporting information including land use practices and the results from the contaminant inventory, results from conservation and groundwater protection measures, records regarding spills and/or emergency response programs.

Legislative Review

It is recommended that, in support of the review process that is currently underway to integrate the ICSP into the OCP, the District consider regulatory measures that would support aquifer-scale planning and implementation of the groundwater conservation and protection measures described above.

Emergency Response Planning

Golder recommends that the Highlands review and revise the Emergency Response Program where necessary to address events that could potentially result in a loss of water supply or contamination of groundwater resources. The roles and responsibilities associated with groundwater related activities should be reflected in the Highlands Emergency Plan, including the Response Guidelines. The existing Hazard-Specific Plans for Dangerous Goods Release, Flood, and Transportation Accident – Road should be revised to reflect first response measures that consider groundwater contamination. It is also recommended that the District prepare a Hazard-Specific Plan for groundwater contamination to outline the first response and follow-up activities that are required to prevent groundwater contamination. The database system discussed above should provide a list of specialists, suppliers and contractors that provide spill response, remediation and water treatment services.



Glossary of Acronyms

AO	Aesthetic Objective
BMP	Best Management Plan
CAVI	Convening Action on Vancouver Island
C/I	Commercial/Industrial
COA	Certificate of Analysis
CRD	Capital Regional District
CVRD	Cowichan Valley Regional District
DF	Difference Factor
DOH	District of Highlands
DPA	Development Permit Area
EOC	Emergency Operations Centre
Fm	Fractured Media
GCDWQ	Guidelines for Canadian Drinking Water Quality
GCM	Global Climate Model
GWPR	Ground Water Protection Regulation
HSF	Highlands Stewardship Foundation
HSTF	Highlands Sustainability Task Force
ICSP	Integrated Community Sustainability Plan
IPM	Integrated Pest Management
MAC	Maximum Allowable Concentration



PHASE 3: GROUNDWATER PROTECTION STUDY, DISTRICT OF HIGHLANDS

MoA	Ministry of Agriculture
MoE	Ministry of Environment
MoH	Ministry of Health
NRC	Natural Resources Canada
NTU	Nephelometric Turbidity Unit
OBWB	Okanagan Basin Water Board
OCP	Official Community Plan
OG	Operational Guideline
RCMP	Royal Canadian Mounted Police
RDN	Regional District of Nanaimo
RPD	Relative Percent Difference
RRU	Royal Roads University
RWH	Rainwater Harvesting
TDS	Total Dissolved Solids
UBCM	Union of BC Municipalities
UVic	University of Victoria
VIHA	Vancouver Island Health Authority
VIU	Vancouver Island University
WRA	Water Resources Atlas



Table of Contents

EXECUTIVE SUMMARY	i
1.0 INTRODUCTION.....	1
1.1 Background and Objectives	1
1.2 Scope of Work	2
PART I: DATA COLLECTION AND MONITORING PROGRAMS	4
2.0 STREAM FLOW MONITORING	5
3.0 MONITORING WELL UPGRADES AND PRESSURE TRANSDUCER INSTALLATION	6
4.0 HIGHLANDS GROUNDWATER MONITORING PROGRAM	7
4.1 Groundwater Monitoring Program.....	7
4.1.1 Methods	7
4.1.2 Results and Discussion.....	9
4.1.2.1 Groundwater Levels.....	9
4.1.2.2 Groundwater Quality.....	10
5.0 STAKEHOLDER MONITORING PROGRAMS.....	13
5.1 Precipitation Monitoring Programs.....	13
5.2 BC Ministry of Environment Observation Well Network.....	13
5.3 Bear Mountain Monitoring Program	14
5.4 Hanington Creek Estates Water System	14
6.0 HIGHLANDS WELL DATABASE.....	15
PART II: NUMERICAL MODELING.....	16
7.0 REFINEMENT OF NUMERICAL MODEL.....	17
7.1 Groundwater Consumption.....	17
7.2 Land Use	17
7.3 Model Development.....	18
7.3.1 Model Code.....	18
7.3.2 Finite Element Mesh	18
7.3.3 Boundary Conditions.....	19
7.3.4 Discrete Feature Elements.....	20



**PHASE 3: GROUNDWATER PROTECTION STUDY,
DISTRICT OF HIGHLANDS**

7.3.5 Model Calibration 21

8.0 WATER BALANCE ANALYSES 23

8.1 Factors Potentially Affecting Groundwater Conditions in the Future 23

8.1.1 Build-Out 23

8.1.2 Climate Change 23

8.2 Water Balance Scenarios 24

8.2.1 Current Conditions 24

8.2.2 Future Conditions 24

8.3 Water Balance Results 25

8.4 Overall Uncertainty Associated with Water Balance Predictions 26

8.5 Changes in Groundwater Levels Associated with Future Scenarios 27

8.6 Summary 28

PART III: GROUNDWATER PROTECTION PLANNING 29

9.0 LEGISLATIVE FRAMEWORK AND GOVERNANCE 30

9.1 Existing Legislative Framework 30

9.1.1 Federal Government 30

9.1.2 Provincial Government 30

9.1.3 Local Government 31

9.2 Proposed New Legislation 31

9.3 Groundwater Governance 32

10.0 GROUNDWATER CONSERVATION PLANNING 34

10.1 Regulatory Mechanisms 35

10.1.1 Official Community Plan (OCP) 36

10.1.2 Zoning and Land Use Designations 36

10.1.3 Development Permit Areas (DPAs) 36

10.1.4 Bylaws 37

10.2 Non-Regulatory Mechanisms 37

10.2.1 Household Audit Program – Water Use 38

10.2.2 Landscape and Irrigation Planning 39

10.2.3 Rainwater Harvesting 39



**PHASE 3: GROUNDWATER PROTECTION STUDY,
DISTRICT OF HIGHLANDS**

10.3 Market Approaches..... 40

11.0 GROUNDWATER QUALITY PROTECTION PLANNING 41

11.1 Regulatory Mechanisms 42

11.1.1 Official Community Plan (OCP)..... 42

11.1.2 Zoning and Land Use Designations 42

11.1.3 Development Permit Areas (DPAs)..... 42

11.1.4 Bylaws..... 43

11.2 Non-Regulatory Mechanisms 43

11.2.1 Household Audit Program – Groundwater Protection 43

11.2.2 Technical Assistance Programs 44

11.2.2.1 Commercial/Industrial Properties..... 44

11.2.2.2 Bear Mountain Comprehensive Development 44

11.2.2.3 Residential Properties..... 44

11.2.2.4 Home-based businesses 45

11.2.2.5 Hobby Farms 45

11.2.3 Household Hazardous Waste Collection..... 45

11.3 Market Approaches..... 46

12.0 PRELIMINARY CONTINGENCY PLANNING 47

12.1 Roles and Responsibilities..... 47

12.2 Alternative Water Supply Sources 47

12.2.1 Bulk Water Delivery..... 48

12.2.2 Groundwater 48

12.2.2.1 Modification to Existing Wells 48

12.2.2.2 Connection to an Alternate Well 48

12.2.2.3 Construction of a New Well 49

12.2.3 Surface Water 49

12.2.4 Rainwater..... 50

12.2.5 Capital Regional District Municipal Supply..... 50

13.0 EMERGENCY RESPONSE PLANNING..... 51

13.1 Existing Emergency Response Plan..... 52

13.2 Roles and Responsibilities..... 52



**PHASE 3: GROUNDWATER PROTECTION STUDY,
DISTRICT OF HIGHLANDS**

13.3 Emergency Response Framework..... 53

13.3.1 Preparation and Coordination 53

13.3.2 Measures to Mitigate Groundwater Contamination 53

13.3.2.1 First Response 53

13.3.2.1.1 Liquids 54

13.3.2.1.2 Solids or Sludges 54

13.3.2.2 Follow-up Phase 55

13.3.2.2.1 Ongoing Assessment 55

13.3.2.2.2 Contaminant Transport and Assessment of Time-To-Impact 55

13.3.2.2.3 Mitigation Measures 55

13.3.2.2.4 Spill Recording 56

13.3.3 Water Supply Loss Mitigation and Replacement Alternatives 56

13.3.3.1 Bulk Water Delivery 56

13.3.3.2 Alternate Groundwater Sources..... 56

13.3.3.3 Surface Water Sources..... 57

13.3.3.4 Capital Regional District Municipal Supply 57

13.3.3.5 Water Supply Treatment..... 57

13.3.4 Communication Protocols 58

13.3.5 Resources..... 58

**PART IV: FRAMEWORK FOR IMPLEMENTATION OF CONSERVATION AND GROUNDWATER
PROTECTION MEASURES 59**

14.0 RECOMMENDATIONS..... 60

14.1 Public Education and Communications Strategy 60

14.1.1 Effective Leadership and Committed Participants..... 60

14.1.2 Content and Messages 60

14.1.3 Methods and Tools 61

14.1.4 Implementation 63

14.2 Groundwater Monitoring 63

14.2.1 Water-Level Monitoring 63

14.2.2 Groundwater Quality Monitoring 64

14.2.3 Flow Monitoring..... 65



**PHASE 3: GROUNDWATER PROTECTION STUDY,
DISTRICT OF HIGHLANDS**

14.3 Contaminant Inventory Review 65

14.4 Database System 65

14.5 Legislative Review 66

14.6 Emergency Response Planning 66

15.0 LIMITATIONS AND USE OF THIS REPORT 67

16.0 CLOSURE..... 68

17.0 REFERENCES..... 69

TABLES

- Table 1: Results of Groundwater Quality Monitoring Program
- Table 2: Results of QA/QC Sample Analyses, Groundwater Quality Monitoring Program
- Table 3: Results of Equipment Blank Sample, Groundwater Quality Monitoring Program
- Table 4: Initial and Calibrated Values of Hydrogeological Parameters
- Table 5: Sensitivity Analysis Results for Predicted Water Balance
- Table 6: Measured Streamflow and Predicted Baseflow
- Table 7: Predicted Water Balance for Current and Future Conditions

FIGURES

- Figure 1: Key Plan
- Figure 2: Locations of Monitoring Stations
- Figure 3A: Depth to Groundwater in Monitoring Wells DOH-01 and DOH-03 and Precipitation in Southern Highlands
- Figure 3B: Depth to Groundwater in Monitoring Wells DOH-02A and DOH-04B and Precipitation in Western Highlands
- Figure 3C: Depth to Groundwater in Monitoring Well DOH-07B and Precipitation in Northern Highlands
- Figure 3D: Depth to Groundwater in Monitoring Well DOH-09A and Precipitation in Eastern Highlands
- Figure 4: Depth to Groundwater in MoE Observation Well No. 372 and Precipitation at Highland Weather Station
- Figure 5: Water Well Locations
- Figure 6: Conceptual Groundwater Model
- Figure 7: Groundwater Model Finite Element Mesh



- Figure 8: Groundwater Model Calibrated Hydraulic Conductivity and Effective Porosity
- Figure 9: Groundwater Model Boundary Conditions
- Figure 10: Results of Model Calibration Hydraulic Heads
- Figure 11: Results of Model Calibration Pumping Tests
- Figure 12A: Results of Model Calibration Change in Hydraulic Head, Wells DOH-01 and DOH-03
- Figure 12B: Results of Model Calibration Change in Hydraulic Head, Wells DOH-02A and DOH-04B
- Figure 12C: Results of Model Calibration Change in Hydraulic Head, Wells DOH-07B and DOH-09A
- Figure 12D: Results of Model Calibration Change in Hydraulic Head, Well No. 372
- Figure 12E: Results of Model Calibration Change in Hydraulic Head, Wells 407 and 411
- Figure 12F: Results of Model Calibration Change in Hydraulic Head, Wells 413 and 414
- Figure 13: Results of Model Sensitivity Analysis

APPENDICES

APPENDIX A

Summary of Results from Winter 2010 Stream Flow Monitoring Program

APPENDIX B

Photographs of Monitoring Well Upgrade

APPENDIX C

Laboratory Certificates of Analysis

APPENDIX D

Bear Mountain Monitoring Data

APPENDIX E

Groundwater Use Information

APPENDIX F

Summary of Water-Related Legislation in British Columbia

APPENDIX G

DRASTIC Vulnerability Map

APPENDIX H

Supplemental Information for Emergency Response Planning



Notice of Work

Millstream Road Quarry
Tracking Number: 100202890

Application Information

If approved, will the authorization be issued to an Individual or Company/Organization? Company/Organization
 What is your relationship to the company/organization? Agent

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit / Tenure / Licence will be issued, if approved.

Name: Barry Chalmers
Doing Business As: OK Industries Ltd
Phone: 250-652-9211
Fax: 250-652-9210
Email: bchalmers@islandpaving.com
BC Incorporation Number:
Extra Provincial Inc. No:
Society Number:
GST Registration Number:
Contact Name: Barry Chalmers
Mailing Address: 6792 Rajpur @ Keating X Road
 PO Box 1324
 Victoria BC V8W 2W3

AGENT INFORMATION

Please enter the contact information of the Individual/Organization who is acting on behalf of the applicant.

Name: TAJE, Edward
Doing Business As:
Phone: 250-743-2590
Fax: s.22
Email:
BC Incorporation Number:
Extra Provincial Inc. No:
Society Number:
GST Registration Number:
Contact Name: Ed Albert Taje
Mailing Address: 15-1751 Northgate Road Road
 Cobble Hill BC V0R 1L6
Letter(s) Attached: Yes (millstream agent letter.pdf)

CORRESPONDENCE E-MAIL ADDRESS

If you would like to receive correspondence at a different email address than shown above, please provide the correspondence email address here. If left blank, all correspondence will be sent to the above given email address.

Email:
Contact Name: Ed Taje

TECHNICAL INFORMATION

APPLICATION INFORMATION

Type of Notice of Work: Quarry - Construction Aggregate
Is this a New Permit or an Amendment to an existing permit for this property? New Permit

MINE INFORMATION

Do you have an existing mine number? No
Name of the property: Millstream Road Quarry
Tenure Numbers: CA4187362
Crown Grant / District Lot Numbers: Lot 1 Section 5 Range 3 West Highlands District Plan VIP702242
Directions to site from nearest municipality: From Victoria, take Millstream exit and stay on Millstream road , the site is the property just south of The Tervita Landfill, and opposite Hannington Road. Private access not in place as of this time, The access to be constructed as easement is in place.
Geographic Coordinates of Mine: **Latitude:** 48.48010 **Longitude:** -123.50110
Maximum Annual Tonnage Extracted: 150000 tonnes

INFORMATION ABOUT PROPOSED ACTIVITIES

Activities to be undertaken: Blasting
 Sand & Gravel / Quarry Operations

FIRST AID

Proposed First Aid equipment on site: Level II First Aid Kit with stretcher. Direct communications to Provincial Ambulance, Medical services
Level of First Aid Certificate held by attendant: Occupational First Aid Level 1 with Transportation Endorsement

DESCRIPTION OF WORK PROGRAM

If you prefer to upload a document, please enter "see attached document" and attach the document in the "Document Upload" step later in the application under "Other".

Sufficient details of your work program to enable a good understanding of the types and scope of the activities that will be conducted:

The basic program consists of mining the property through a series of 5 phases. Overall the property has an estimated reserve of 3,000,000 tonnes. Initially an access road will be constructed to the site on an easement to the property line at Phase 1 (EV 6988). This will involve some blasting and removal of rock. Any rock excavated will be used for road construction, and will be sized to spec at the existing 2121 Millstream road owned and operated by the proponent. Following access to the Quarry site, Phase I will be mined to elevation 95M. This will be in a series of 10 M benches. On the "South excavation within this Phase there will be two benches of 10 M. The " East excavation" of this Phase will be one bench of 10M with minor variances due to topography. Variances are necessary to establish consistent face heights of 10M. Material from this phase will be trucked to the operator's site at 2121 Millstream Road for crushing screening washing until such time as room as been established to locate the necessary infrastructure on site. It is anticipated Phase one will provide sufficient material at the projected production rate for 6 years, at which time a new updated mine plan will be submitted as per the requirements of the Health Safety and Reclamation Code for Mines in British Columbia (HSRC). It must be noted that some encroachment into Phase II is expected to ensure continuity of benches in the next submitted plan. Water for Drilling and dust control will be hauled to the site. A second Access Road along the South boundary of the property will be constructed , and as this road is largely within the mine footprint will be constructed in accordance with the Requirements of the HSRC. This road will remain on conclusion of mining operations and is not factored into final reclamation costs. Roads and phases of mining are shown on attached maps. Note pit run as checked off on this form refers to shot rock prior to crushing or screening.

TIME OF PROPOSED ACTIVITIES

Original Start Date: Mar 22, 2017
Proposed start and end date: Mar 22, 2017 to Mar 22, 2042

Please remember that you need to give 10 days notice to the Inspector of Mines of your intention to start work, and 7 days notice of your intention to stop work.

ACCESS

Access presently gated: No

PRESENT STATE OF LAND

Please identify what the present state of the land is where you would like to undertake your activities. If some of the questions do not apply to you please enter n/a in the space provided.

Present condition of the land: Raw undeveloped land
Type of vegetation: Grasses, shrubs, limited timber
Physiography: varying elevations, (see topo Map), no known wet lands within proposed mining activities, no glaciers, elevations vary from Aprox 95 meters to 116 meters phase I with a low elevation of Aprox 70 meters NE corner of Phase III (see Aqua Tex report attached). Final proposed elevation for all phases on completion to be 95 meters.
Current means of access: Access to site will be private road off Millstream road. Constuction of road will be on approved easement see attached maps. In addition a second road through the mine site will be constructed off Millstream Road, through the mine footprint subject to local access approvals and in addition this road shown on the attached maps will comply with the requirements of the HSRC
Old equipment: None on site
Recreational trails / use: None within proposed mine footprint

ACCESS TO TENURE

Do you need to build a road, create stream crossings or other surface disturbance that will not be on your tenure? Yes
Required access authorizations in place: Yes
Type and authorization number: Easement District of Highlands EV6988. Principle access . Second Access within mine site, will require final authorization

LAND OWNERSHIP

Application area in a community watershed: No
Proposed activities on private land: Yes

Please note that under Section 19 of the Mineral Tenure Act and Section 2.1 of the Mineral Tenure Act Regulation you must not begin any mining activities until 8 days after giving notice to every owner of the surface area on which the recorded holder intends to carry out that activity.

Please attach a copy of the letter of authorization signed by the landowner The document can be uploaded at the "Document Upload" step later in the application process.

Legal description of land: Lot 1 Section 5 Range 3 West Highland District Plan VIP70242
Proposed activities on Crown land: No

Activities in a park: No

CULTURAL HERITAGE RESOURCES

Cultural Heritage applies to a large spectrum of heritage resources that 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."

The Archaeology Branch of the Ministry of Forests, Land and Natural Resource Operations is responsible for the administration of the Heritage Conservation Act as it applies to archaeological sites. The Archaeology Branch has developed guidelines for companies engaged in natural resource extraction to aid in planning for and avoiding or managing impacts to protected archaeological sites.

Are you aware of any protected archaeological sites that may be affected by the proposed project? No

FIRST NATIONS ENGAGEMENT

In making decisions on authorizations, the government will be fulfilling its responsibility to consult, and where appropriate, accommodate First Nations. The government takes this responsibility seriously and encourages the applicant to engage First Nations early and often as part of any planned development.

Establishing good relations with First Nations who might be affected by a proposed development is a key part of any successful mining operation. The Ministry of Energy and Mines encourages applicants to engage and information share with First Nations that might be affected by a proposed development prior to submitting an application. The earlier in the life of a proposed activity that the avenues of communication are established the greater the likelihood that the relationships formed will be constructive and beneficial to all parties. A lack of information sharing and engagement by the applicant may result in extended timeframes for decision.

Applicants should keep a detailed record of information sharing and engagement with First Nations on their project in the event the government needs to review it. Information on First Nations information sharing and engagement should include the following: a list of First Nations contacted, whether the activity was modified based on feedback from First Nations, and whether the applicant has entered into any informal or formal agreements with First Nations in connection with the project.

The Consultative Areas Database Public Map Service is an online, interactive mapping tool that allows you to identify First Nations who have treaty rights or asserted or proven rights or title on the land base. More information can be found at <http://maps.gov.bc.ca/ess/sv/cadb/>.

Have you shared information and engaged with First Nations in the area of the proposed activity? No

BLASTING

MAPS

Please mark the location(s) of the proposed magazine(s) on the map. Unless this is an area based application also mark the proposed locations of the blast site(s) on the map. The maps will be uploaded at the document upload step later in the application process.

ACTIVITIES WHERE BLASTING WILL TAKE PLACE

Please select the activities to which blasting is related: Sand & Gravel / Quarry Operations

ON SITE STORAGE OF EXPLOSIVES

Are you proposing to store explosives on site? No
Describe how you will get the explosives to the site: Explosives will be transported to site and unused explosives will be removed from site by Licensed blasting contractor.

ADDITIONAL INFORMATION

Only a person with a valid certificate granted under Section 8.2.1 of the Code is permitted to conduct a blasting operation.

SAND & GRAVEL / QUARRY OPERATIONS

MAPS

All plans and sections must indicate the scale and orientation of the drawing and must include:

1) Plan View of Proposed Development illustrating:

- Property boundaries and set back of excavation from property boundary
- Watercourses and drainage (wet, dry or intermittent) on the property and within 150 metres of its boundaries
- All previous surface workings, the final boundaries of proposed excavation, and boundaries of excavation at the end of development described in the Notice of Work
- Access roads, including development roads within the pit and access to the public roads
- All proposed and existing stockpiles (topsoil, overburden, product etc.)
- All settling ponds (for both surface run off and process water) and source of process water
- Buildings and other facilities (fuel/lubricant storage, sanitary facilities, weigh scale, etc.)
- Sediment control structures and the location of any point discharges from the property
- Fencing, berms and/or vegetative buffers.

2) Cross and longitudinal sections of Proposed Development illustrating:

- The original land surface and, if applicable, the groundwater table elevation
- Typical configuration during mining, indicating angle of slope and, where applicable, bench locations
- Proposed configuration on completion of reclamation

3) A copy of the land title/crown land tenure map must be provided.

SOIL CONSERVATION

Average depth of overburden:	0.50 m
Average depth of topsoil:	0.01 m
Measures to stabilize soil overburden stockpiles and control noxious weeds:	Limited overburden will be stripped stockpile and vegetated as may be required. If necessary covered to prevent spread or germination of Noxious weeds

LAND USE

Is the site within the Agricultural Land Reserve?	No
Does the local government have a Soil Removal Bylaw?	Yes
Official Community Plan for the site:	Commercial and Industrial
Current land use zoning for the site:	Greenbelt
Proposed end land use is:	Comercial/ Industrial Subdivisions
Estimate total minable reserves over the life of the mine:	3,000,000 tonnes
Estimate annual extraction from site:	150,000 tonnes/year

Application must be made to the Environmental Assessment Office if estimated extraction for sand/gravel production is 500,000 tonnes/year or 1,000,000 tonnes over 4 years; or if estimated extraction is 250,000 tonnes/year for quarried product.

ACTIVITIES

Click on the "Add Activity" button to add one or more activities. Select your activity out of the list and enter the tonnes, the total disturbed area and the total merchantable timber volume.

Please note that you must notify the Inspector at least two weeks before if you are planning to bring a crusher on site.

Activity	Total Disturbed Area (ha)	Merchantable timber volume (m³)
Crushing	0.30	0.00
Excavation of Pit Run	5.90	0.00
Mechanical Screening	0.30	0.00
Total:	6.50	0.00

Is the work year round or only seasonal?	Year round
Brief description of operation, including proposed work schedule:	Drilling and blasting in Benches of 10 meters as noted earlier. When area is mined and room is created infrastructure to accommodate crushing ,and screening , will be located on site, plans as may be required will be provided at that time. All equipment installed will meet requirements of HSRC.

RECLAMATION PROGRAM

Describe the proposed reclamation and timing for this specific activity:
If backfilling of pits or pit slopes is proposed in the final configuration for reclamation, details of materials to be used and placement procedures:

There is no proposed reclamation at this time as the area will be required for infrastructure during the period of this 6 year mining plan. no backfilling or slope stabilization required during this six year mining plan Reclamation cost estimate based on \$5000.00 Ha. When mining completed, and site prepared for commercial/ industrial reclamation costs will likely be lower, as it will generally consist of leveling and providing access to lots. Note: scaling of faces to be undertaken if required for safety considerations.

Estimated cost of reclamation activities described above: \$30,000.00

Will progressive reclamation be carried out? No

GROUNDWATER PROTECTION

Average depth to the high groundwater table at the proposed excavation: 25.0 m

Elevation of the groundwater table was determined from: Existing area wells
 Test pits
 Test wells drilled for this purpose
 Other: Inferred from ecological and SNC lavilin report to be verified

Measures proposed to protect groundwater from potential impacts of the proposed mining activity: Verify highground water table by drilling . Adjust final elevation if required to remain 1 meter above water table. No fuel initially stored on site, Should on site fuel become necessary storage will comply with HSRC , re: containments , spill kits, and training in use of spill kits. Nitrates from Blasting operation are covered in attached blasting plan.

IMPACT MINIMIZATION

Shortest distance between proposed excavation to nearest residence: 730 m

Shortest distance between proposed excavation to nearest residential water source: 730 m

Measures proposed to prevent inadvertent access of unauthorized persons to the mine site: Fencing, Vegetative barriers and berms as may be required. Gated access points; Also note distance to nearest residence and water source measured on google earth,

Measures proposed to minimize noise impacts of the operation: Vegetation buffers, lay out of working faces to keep work below high points in the topography as far as practical. hours of work 7am to 5 pm Monday to Friday, If required light Maintenance on Saturday

Measures proposed to minimize the dust impacts of the operation: Drills equipped with vacuum system or wet drilling , sprays on crushers , and screening plants, watering of roads as may be required.

Measures proposed to minimize visual impacts of the operation: Green strips laid out in the mine plan see attached maps.

TIMBER CUTTING

Total merchantable timber volume: 0.00 m3

No TimberYou have indicated that there is no merchantable timber that will be cut. Therefore a Free Use Permit or a Licence to Cut is not required. If this is not accurate, please correct your entries.

EQUIPMENT

Click on the "Add Equipment" button to add one type of equipment at a time. All equipment must comply with the requirements of the Health, Safety and Reclamation Code.

Quantity	Type	Size / Capacity
1	Crusher	Cedar Rapids
1	Drill	Ranger Hydraulic
3	Excavator	Cat 336 E 35 ton unit
2	Loader	Cat 980 M 7Yd

SUMMARY OF RECLAMATION

Based on the information you have provided on the previous screens the Summary of Reclamation is:

Activity	Total Affected area (ha)	Estimated cost of reclamation (\$)
Sand & Gravel / Quarry	6.50	30,000.00
Subtotal:	6.50	30,000.00
Unreclaimed disturbance from previous year:	0.00	
Disturbance planned for reclamation this year:	0.00	
Total:	6.50	30,000.00

OTHER CONTACTS

Please enter the contacts that are applicable to your application.

Contact Info	Type of Contact
Name: Barry Chalmers Phone: 250-887-2296 Daytime Phone: 259-652-9211 Fax: 250-652-9210 Email: bchalmers@islandpaving.com Mailing Address: 6702 Rajpur@Keating X Road PO Box 1324 Victoria BC V8W 2W3	Tenure Holder

Name: Barry Chalmers Phone: 250-897-2296 Daytime Phone: 259-652-9211 Fax: 250-652-9210 Email: bchalmers@islandpaving.com Mailing Address: 6702 Rajpur@Keating X Road PO Box 1324 Victoria BC V8W 2W3	Site operator
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Name: Barry Chalmers Phone: 250-897-9210 Daytime Phone: 250-652-9211 Fax: 250-652-9210 Email: bchalmers@islandpaving.com Mailing Address: 6702 Rajpur @Keating Road PO Box 1324 Victoria BC V8W 2W3	Permittee
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Name: Barry Chalmers
Phone: 250-897-2296
Daytime Phone: 259-652-9211
Fax: 250-652-9210
Email: bchalmers@islandpaving.com
Mailing Address: 6702 Rajpur@Keating X Road
 PO Box 1324
 Victoria BC V8W 2W3

Mine manager

LOCATION INFORMATION

All applications must include the appropriate maps and applications received without maps will be returned. All maps must be in colour, computer generated, with a scale, north arrow and a detailed legend.

For Mineral, Coal and Placer applications you must provide a minimum of 3 maps:

- A Location Map which must show the location of the property in relation to the nearest community with the access route from the community to the work site clearly marked;
- A Tenure Map which must show the boundaries of the tenure(s) and tenure numbers, at a scale of 1:20,000 or less;
- A Map of Proposed Work which must show topography, water courses, existing access, existing disturbance, contour lines, known cultural heritage resources and/or protected heritage property, at a scale of 1:10,000 or 1:5,000. For site specific applications the location of all proposed exploration activities must be shown; for area-based applications the work area must be shown as a polygon, with the location of all proposed exploration activities for year 1 shown, and shape files provided of the area.

For Sand & Gravel/Quarry applications you must provide a Plan View, Cross and Longitudinal Sections and a Land Title/Crown Land Tenure Map. Details of these requirements are listed in the Sand & Gravel/Quarry Operations Activity sheet.

I have one or more files (PDF, JPG, PNG etc.) with my maps

MAP FILES

Do you have a PDF or image file of a drawn map? You can upload it here.

Description	Filename
Cross Section	2845_Industrial Park_CROSS ...
Location plan	2845_Industrial Park_LOCATI...
Topo	2845_Industrial Park_TOPOGR...
Topo 2	2845_Industrial Park_TOPOGR...
Work Plan	2845_Industrial Park_PROPOS...
X section 2	2845_Industrial Park_CROSS ...

ATTACHED DOCUMENTS

Document Type	Description	Filename
Blasting Procedure	Blasting plan including protection for adjacent landfill	OK Industries LTD Blast Pla...
Other	Ecological report	ecological SKMBT_C203170228...
Other	environmental compliance report	SNC Lavalin Millstream Repo...

PRIVACY DECLARATION**PRIVACY NOTE FOR THE COLLECTION, USE AND DISCLOSURE OF PERSONAL INFORMATION**

Personal information is collected by FrontCounter BC under the legal authority of section 26 (c) and 27 (1) of the Freedom of Information and Protection of Privacy Act (the Act).

The collection, use, and disclosure of personal information is subject to the provisions of the Act. The personal information collected by FrontCounter BC will be used to process your inquiry or application(s). It may also be shared when strictly necessary with partner agencies that are also subject to the provisions of the Act. The personal information supplied in the application package may be used for referrals or notifications as required. Personal information may be used by FrontCounter BC for survey purposes. For more information regarding the collection, use, and/or disclosure of your personal information by FrontCounter BC, please contact FrontCounter BC at 1-877-855-3222 or at:

FrontCounter BC Program Director
 FrontCounter BC, Provincial Operation
 441 Columbia Street
 Kamloops, BC V2C 2T3

Check here to indicate that you have read and agree to the privacy declaration stated above.

REFERRAL INFORMATION

Some applications may also be passed on to other agencies, ministries or other affected parties for referral or consultation purposes. A referral or notification is necessary when the approval of your application might affect someone else's rights or resources or those of the citizens of BC. An example of someone who could receive your application for referral purposes is a habitat officer who looks after the fish and wildlife in the area of your application. This does not apply to all applications and is done only when required.

Please enter contact information below for the person who would best answer questions about your application that may arise from anyone who received a referral or notification.

Company / Organization: OK Industries Ltd
Contact Name: Barry Chalmers
Contact Address: 6792 Rajpur @ Keating X Road
 PO Box 1324
 Victoria BC V8W 2W3
Contact Phone: 250-652-9211
Contact Email: bchalmers@islandpaving.com

I hereby consent to the disclosure of the information contained in this application to other agencies, government ministries or other affected parties for referral or First Nation consultation purposes.

IMPORTANT NOTICES

- Once you click 'Next' the application will be locked down and you will NOT be able to edit it any more.

DECLARATION

By submitting this application form, I, declare that the information contained on this form is complete and accurate.

APPLICATION AND ASSOCIATED FEES

Item	Amount	Taxes	Total	Outstanding Balance
Mines Notice of Work Application Fee	\$16,000.00		\$16,000.00	\$0.00

OFFICE

Office to submit application to: Nanaimo

PROJECT INFORMATION

Is this application for an activity or project which requires more than one natural resource authorization from the Province of BC? No

APPLICANT SIGNATURE

Applicant Signature	Date
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OFFICE USE ONLY		
Office Nanaimo	File Number	Project Number
	Disposition ID	Client Number

