

STAGE 1 AND LIMITED STAGE 2 PRELIMINARY SITE INVESTIGATIONS: PEACE VALLEY LOOKOUT

Project number 20003 and 20003.001 | Reference number 030300386P



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EXECUTIVE SUMMARY

Focus Corporation (FOCUS), was retained by the Peace River Regional District (PRRD) to conduct a Stage 1 and Limited Stage 2 Preliminary Site Investigation (PSI) of a site legally described as the Northwest corner of N ½ of SW ¼, Section 19, Township 83, Route 18, W6M. The site is referred to as the Peace Valley Lookout and is located at the south end of 100th Street in Fort St. John, BC (the “Property”). The Property is currently unoccupied and used as a parking lot and lookout over the Peace River valley.

Based on the findings of the Stage 1 PSI, FOCUS identified one on-site Area of Potential Environmental Concern (APEC) that presents moderate potential to cause environmental impairment to the Property.

A Limited Stage 2 PSI was subsequently carried out to confirm the presence/absence of contamination in the subsurface soil at the Property in the vicinity of the identified APEC.

Based on the results of the Limited Stage 2 PSI findings, it is FOCUS’s opinion that further work is not required at this time.

This Executive Summary is provided solely as a brief summary of the key findings of the assessment and is not a complete summary of the conclusions. Please refer to the full contents of the report for all the findings FOCUS made during this Stage 1 and Limited Stage 2 PSI.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	I
1.0 INTRODUCTION	1
1.1 GENERAL	1
1.2 SCOPE OF WORK	1
2.0 SITE DESCRIPTION	3
2.1 LOCATION AND SITE DESCRIPTION	3
2.2 GEOLOGICAL AND HYDROGEOLOGICAL INFORMATION.....	4
2.3 CLIMATIC CONDITIONS	4
2.4 FLOOD POTENTIAL.....	4
2.5 HISTORICAL REVIEW.....	4
2.6 PREVIOUS REPORTS	5
2.6.1 <i>Peace Valley Lookout, Planning Feasibility Study, Focus Corporation, April 2010.....</i>	<i>5</i>
2.7 INTERVIEWS	5
2.8 LAND TITLE RECORDS	5
2.9 HISTORICAL LAND USE	5
2.10 PEACE RIVER REGIONAL DISTRICT (PRRD) RECORDS	7
2.11 PACIFIC NORTHERN GAS (PNG)	7
2.12 OIL AND GAS DEVELOPMENT.....	7
2.13 GROUNDWATER SEARCH RESULTS	7
2.14 BC ONLINE SITE REGISTRY	8
2.15 FEDERAL CONTAMINATED SITES INVENTORY	8
3.0 SITE VISIT	9
3.1 GENERAL	9
3.2 SITE STRUCTURES	9
3.3 SURROUNDING LAND USES	9
3.3.1 <i>North.....</i>	<i>10</i>
3.3.2 <i>West.....</i>	<i>10</i>
3.3.3 <i>East</i>	<i>10</i>
3.3.4 <i>South.....</i>	<i>10</i>
3.4 ABOVEGROUND STORAGE TANKS (ASTS) AND UNDERGROUND STORAGE TANKS (USTS)	10
3.5 FILL	10
3.6 HAZARDOUS MATERIALS, WASTES AND WASTE DISPOSAL	11
3.7 HAZARDOUS BUILDING MATERIALS.....	11
3.7.1 <i>Asbestos-Containing Materials (ACM).....</i>	<i>11</i>
3.7.2 <i>Polychlorinated Biphenyls (PCBs).....</i>	<i>11</i>
3.7.3 <i>Lead-Based Paint</i>	<i>12</i>
3.7.4 <i>Spill and Stain Areas</i>	<i>12</i>
3.8 WATER SUPPLY	12
3.9 SEWER SYSTEMS	12
3.10 SUMPS AND DRAINS	12
3.11 SUMMARY OF STAGE 1 PSI FINDINGS	13

TABLE OF CONTENTS (CONT)

4.0	FIELD INVESTIGATION.....	14
4.1	BOREHOLE DRILLING AND COLLECTION OF SOIL SAMPLES	14
4.2	SAMPLE SUBMISSION FOR ANALYTICAL TESTING	15
5.0	RESULTS OF LIMITED STAGE 2 PRELIMINARY SITE INVESTIGATION ..	15
5.1	SOIL CONDITIONS	15
5.2	ASSESSMENT STANDARDS	15
6.0	ANALYTICAL RESULTS.....	18
6.1	SOIL ANALYTICAL RESULTS	18
6.2	QUALITY ASSURANCE/QUALITY CONTROL – RESULTS	18
6.2.1	<i>Laboratory QA/QC</i>	<i>18</i>
6.2.2	<i>Field QA/QC</i>	<i>18</i>
6.2.3	<i>QA/QC Conclusion.....</i>	<i>19</i>
7.0	DISCUSSION.....	19
8.0	CONCLUSIONS	20
9.0	CLOSURE	21
	REFERENCES	22

Imbedded Tables

Table A – Summary of Property Description

Table B – Historical Land Use – The Property

Table C – Historical Land Use – Adjacent Sites

Table D – Groundwater Well Search

Table E – Surrounding Land Use – Adjacent Sites

Table F – APECs and PCOCs

Table G – Boreholes Locations and Purpose

Figures

Figure 1 – Site Location

Figure 2 – Site Plan and Surrounding Areas

Figure 3 – Borehole Locations

Figure 4 – Detailed Soil Analytical Results

Tables

Table 1 – Summary of Soil Analytical Results –Hydrocarbons

Table 2 – Summary of Soil Analytical Results – PAH's

Table 3 – Summary of Soil Analytical Results – VOCs

Table 4 – Summary of Soil Analytical Results – Metals

TABLE OF CONTENTS (CONT)

Appendices

Appendix A – Photographs

Appendix B – Aerial Photographs

Appendix C – Regional District Records

Appendix D – Oil and Gas Search Results

Appendix E – Groundwater Well Search

Appendix F – BC Online Search

Appendix G – Borehole Logs

Appendix H – Analytical Results

Appendix I – Environmental Report General Conditions

1.0 INTRODUCTION

1.1 GENERAL

Focus Corporation (FOCUS), was retained by the Peace River Regional District (PRRD) to conduct a Stage 1 and Limited Stage 2 Preliminary Site Investigation (PSI) for a site legally described as the Northwest corner of N ½ of SW ¼, Section 19, Township 83, Route 18, W6M. The site is referred to as the Peace Valley Lookout and is located at the south end of 100th Street in Fort St. John, BC (the “Property”). The Property is currently unoccupied and used as a parking lot and lookout over the Peace River valley.

The primary objective of the Stage 1 PSI is to assess the potential presence of contaminants, hazardous materials or waste materials of a deleterious nature that may affect subsequent use of the Property. Present and historical use of the Property and the surrounding area was reviewed to establish the potential for adverse impacts to the environmental condition of the Property. The primary objective of the Limited Stage 2 PSI portion was to assess the presence/absence of contamination in the subsurface soil at the Property in the vicinity of Areas of Potential Environmental Concern (APEC’s) identified in the Stage 1 PSI portion, compared with current applicable standards of BC Contaminated Sites Regulation¹ (CSR). It is the understanding of FOCUS that this Stage 1 and Limited Stage 2 PSI report is being completed for due diligence purposes prior to the redevelopment of the Property.

Authorization to proceed with the Stage 1 and Limited Stage 2 PSI was provided by Mr. Fred Banham, Chief Administrative Officer (CAO) of the PRRD, on March 1, 2011.

1.2 SCOPE OF WORK

The scope of work for this Stage 1 and Limited Stage 2 PSI included the following:

1. Conducting a visual observation of the Property and the surrounding areas to identify evidence and sources of possible contamination or environmental impairment, and to determine the presence and specific location of any critical environmental features;
2. Reviewing historical records such as aerial photographs and land titles to determine previous site occupancy and activities;
3. Investigating and collecting relevant information pertaining to environmental concerns on the Property and neighbouring site from such agencies as the City of Dawson Creek, the BC Ministry of Environment (MoE), Federal Contaminated Site Inventory (FCSI), West Coast Title Search, and Pacific Northern Gas (PNG);

¹ *Environmental Management Act* Contaminated Sites Regulation (“CSR”), B.C. Reg. 375/96, deposited 1996/12/16, O.C. 1480/96, effective 1997/04/01 [including amendments up to B.C. Reg. 286/2010, effective October 4, 2010].

4. Reviewing available published geological and hydrogeological information for the general area of the Property;
5. Interviewing individuals who were and are familiar with the Property and adjacent sites to obtain background information on past and present operating practices;
6. Determining the location of on-site underground utilities with agencies such as Pacific Northern Gas, the City of Fort St. John, Telus and BC Hydro using the BC-One-Call service and conducting a private utility locate by Underworld Line Locating Ltd. of Fort St. John, BC;
7. Drilling a total of seven boreholes on the Property to a maximum depth of 3.05 m. The boreholes were advanced for the purpose of assessing the presence or absence of hydrocarbon and/or metals contamination in the soil in the vicinity of the illegal dumping areas on the Property;
8. Logging the soil stratigraphy, soil characteristics, and collecting representative soil samples from each borehole;
9. Submitting select soil samples collected from the boreholes for laboratory analyses of benzene, toluene, ethylbenzene, xylenes and styrene (BTEXS), volatile petroleum hydrocarbons (VPH), volatile organic compounds (VOC), extractable petroleum hydrocarbons (EPHs), light/heavy extractable petroleum hydrocarbons (LEPH/HEPH), polycyclic aromatic hydrocarbons (PAHs) and/or metals concentrations;
10. Preparing this Stage 1 and Limited Stage 2 PSI report that summarises the entire investigation and compares the laboratory data obtained on samples to applicable standards from the BC CSR.

The scope of work for the Stage 1 and Limited Stage 2 PSI generally meets the requirements described in the CSR; however, all report components (i.e., additional figures, legal survey) required for submission to the MoE have not been included. If this report is to be submitted to the MoE for review, FOCUS should be contacted to provide the additional documentation.

The protocol followed to complete this Stage 1 and Limited Stage 2 PSI also generally conforms to Canadian Standards Association (CSA) standard CAN/CSA Z-768-01 (R2006) and Z-769-00 (R2008) for completing Phase I and Phase II Environmental Site Assessments.

2.0 SITE DESCRIPTION

2.1 LOCATION AND SITE DESCRIPTION

A Location Map has been attached as Figure 1. Current details of the Property and the surrounding land uses are shown in Figure 2, attached. Selected photographs taken during the site visit are provided in Appendix A. A summary of the Property information is provided in Table A.

Table A: Summary of Property Description

Current Owner	Crown
Legal Description	Northwest corner of N ½ of SW ¼, Section 19, Township 83, Range 18, W6M
PID	N/A
Municipal Address	South end of 100 th Street, outside of Fort St. John city limits, British Columbia
Latitude and Longitude	56° 12' 34.49" North 120° 50' 48.76" West
Zoning	A-2 – Large Agricultural Holdings Zone as shown on the Official Zoning Map – Schedule A, Zoning Bylaw No. 1343, 2001, Map # 13, Peace River Regional District
Property Area	The Property is comprised of one irregular shaped lot, approximately 0.7 ha in area.
Building %	0 %
Landscape %	25% grass and shrub forest, 75% gravel cover
Property bounded by	The property is bounded by one residence to the west, shrub forest to the north, steep sloping grass and shrub forest to the east and south. The Old Fort Road and the Peace River are to the further south.
Slope	The ground surface slopes gently south on the gravel surface (approximately 1-2 %). The east edge of the property has a slope of approximately 60 % towards the east. The south edge of the property has a slope of approximately 60 % towards the south and the Peace River.
Other Information	The property is currently unoccupied and used as a parking lot and lookout over the Peace River Valley. The Property appears to be used for illegal dumping of items such as household appliances and old vehicles. The Property is not located within the Agriculture Land Reserve as outlined by the Agricultural Land Commission.

2.2 GEOLOGICAL AND HYDROGEOLOGICAL INFORMATION

The Agriculture Canada Report No. 42 “Soils of the Fort St. John-Dawson Creek Area, British Columbia” indicates that the surficial geology in the area of the Property consists of primarily till and Falher-Judah soils. Falher-Judah soils are usually developed from the transport of lacustrotill and glaciofluvial materials that were deposited in and around glacial lakes. The soils consist of a dark-grey colour with brown and are generally silty to clayey. They are moderately calcareous and weakly saline. The soils occur on strongly rolling, rigid and hummocky terrain and are found at elevations mainly less than 700-750 m above sea level. Falher-Judah soils are well-drained to moderately well and slowly to moderately pervious.

The Aggregate Potential Map (2007) indicates the bedrock in the area of the Property consists of Fine Grained (Glacio) Lacustrine sediments.

For the purpose of this Stage 1 and Limited Stage 2 PSI, the regional groundwater flow is assumed to follow the topography, and as such, is inferred to flow south towards the Peace River, located approximately 1.3 km south of the Property.

2.3 CLIMATIC CONDITIONS

Fort St. John, British Columbia, is subject to regional climatic conditions. Environment Canada maintains a database of Canadian Climate Normals or Averages that tracks climatic data for locations throughout Canada. Based on available information, Fort St. John has an average annual precipitation of 465 mm. Approximately 67% of the precipitation falls in the form of rain from May to September.

Fort St. John experiences an annual average temperature of 2.0 °C. Approximately 185 days have a maximum temperature less than or equal to 0 °C and the remaining 180 days have a temperature greater than 0 °C.

2.4 FLOOD POTENTIAL

The Property is located 1.3 km north of the Peace River. FOCUS reviewed the Designated Floodplain Map for Peace Region and the Property is not located in the designated floodplain area. Significant flooding of the Property is not likely to occur as the Property is approximately 160 m higher in elevation than the nearest water course, the Peace River.

2.5 HISTORICAL REVIEW

FOCUS conducted a historical review of the Property based on available aerial photographs, personnel interviews, and information available from both regional and provincial regulatory agencies. This section documents the findings of the review and provides a summary of historical areas of potential environmental concern, if any, for both the Property and the surrounding areas.

2.6 PREVIOUS REPORTS

2.6.1 Peace Valley Lookout, Planning Feasibility Study, Focus Corporation, April 2010

Focus completed a Planning Feasibility Study in April 2010. The study referred to the Property as being used for public recreation and the historical use may have included an unlicensed landfill and a dumping ground for United States Army jeeps.

2.7 INTERVIEWS

Mr. Erik Lachmuth, Ministry of Transportation, Fort St. John, BC.

Mr. Lachmuth was interviewed by a representative of FOCUS via telephone on March 3, 2011. He indicated that Ministry of Transportation (MoT) maintains the road (100th Street) up to the northern Property boundary. No information regarding the historical and present land uses of the Property is available from MoT.

Ms. Tammy McRae, Adjacent Resident & McRae Metallizing Services Ltd.

Ms. McRae was interviewed through telephone on March 15, 2011. She indicated that she has lived at the adjacent residence to the west of the Property for 15 years. She stated that the Property has been used for recreational activities and illegal dumping, such as, but not limited to, unknown liquids, garbage, appliances, furniture and vehicles. Ms. McRae indicated that this has occurred for at least the last 15 years. To the best of her knowledge, the Property has never been developed and there were/are no aboveground or underground storage tanks (ASTs/USTs) present on the Property. She also indicated that the Property might have been historically used as a landfill or dump.

Her residential property, located immediately west of the Property, is serviced with a lagoon. There is a one-bay shop on her property for a home-based metalizing business.

2.8 LAND TITLE RECORDS

A land title search conducted by West Coast Title Search indicated that the Property has always been owned by the Crown, therefore there are no land title records for the Property.

2.9 HISTORICAL LAND USE

The sequence of development of the Property and adjacent sites was summarized based on historical information, such as aerial photographs (dated 1950, 1967, 1976, 1979, 1981, 1986, 1996 and 2009), municipal records, land title search and interviews. Selected aerial photographs are provided in Appendix B.

TABLE B: Historical Land Use – the Property

Date	Land Use/Occupant	Information Sources
1950 - 2009	<p>In the aerial photos dated from 1950 to 2009, the Property appears to be cleared but undeveloped. A road is visible to the north of the Property.</p> <p>According to West Coast Title Search, the Property has always been owned by the Crown.</p> <p>According to Ms. McRae, the Property has been undeveloped for at least the last 15 years. However, illegal dumping of domestic waste occurred on the Property and the Property might have historically been used as a landfill.</p>	Aerial Photographs, Land Title Search, and interview

The review of historical land use suggests that the Property has been undeveloped since the 1950s. However, illegal dumping of domestic waste occurred on the Property and the Property might have historically been used as a landfill. As such, FOCUS considers historical use of the Property as an illegal dumping site have a moderate potential to cause environmental impairment to the Property.

TABLE C: Historical Land Use – Adjacent Sites

Direction from Property	Land Use/Occupants	Information Sources
North	<p>In aerial photograph dated 1950, the site to the north appears to be undeveloped. Further northeast of the Property there appears to be a cleared section of land.</p> <p>In aerial photographs dated from 1967 through 2005, the sites to the north appears to be undeveloped and agricultural land.</p>	Aerial Photographs
South	In aerial photographs dated 1950 through 2009, the area to the south appears to be undeveloped.	Aerial Photographs
East	In aerial photographs dated from 1950 to 1996, the site to the east appears to be undeveloped land.	Aerial Photographs

Direction from Property	Land Use/Occupants	Information Sources
West	<p>In aerial photograph dated 1950, the site to the west appears to be undeveloped.</p> <p>In aerial photographs dated from 1967 through 1976, the sites to the east appears to be undeveloped and agricultural land.</p> <p>In aerial photographs dated from 1979 through 2009, there appears to be a residential building east of the Property. An inferred lagoon is visible approximately 200 m west of the Property.</p>	Aerial Photographs

FOCUS considers the historical use of the sites to the north, east, south and west to present a low potential for environmental impairment to the Property.

2.10 PEACE RIVER REGIONAL DISTRICT (PRRD) RECORDS

Information received from the Peace River Regional District (PRRD) indicated that the Property is zoned as A-2 Large Agricultural Holdings Zone according to the Peace River Regional District Zoning By-Lay No. 1343, 2001. The Property is not connected to sanitary or storm sewers, and is not serviced with municipal water. There are no records of any environmental concerns or fire department records on file. The Property has no permits or plans on file. There are no records of any fill, illegal dumping, or miscellaneous use of the Property on file. A copy of the search results supplied by the PRRD is included in Appendix C.

2.11 PACIFIC NORTHERN GAS (PNG)

According to the information provided by PNG, the Property has never been serviced with natural gas. The residence to the west of the property is serviced with natural gas.

2.12 OIL AND GAS DEVELOPMENT

FOCUS conducted a search of the Integrated Land Resource Registry for oil and gas facilities located within a 1 km radius of the Property. There are no pipeline right-of-ways or well sites within 1 km radius of the Property. A copy of the oil and gas facility search results has been included in Appendix D.

2.13 GROUNDWATER SEARCH RESULTS

The BC MoE Groundwater Section database contains records of seven groundwater wells located within a 1.5 km radius of the Property. Information of the groundwater wells identified in the search is summarized in Table D below. A copy of the groundwater well search result has been included in Appendix E.

Table D: Groundwater Well Search

Well Tag Number	Location	Distance from Property (m)	Well Use	Well Depths (m)	Within the Municipal Water Distribution Limits	Likelihood of being Affected by Contaminants Originated from the Property (if any)
80284	North	1,018	Private Domestic	92.4	No	Low
80278	North	1,198	Private Domestic	98.5	No	Low
46593	North	612	Private Domestic	137.2	No	Low
39966	Southeast	1,192	Unknown	36.6	No	Low
102681	Southeast	1,245	Private Domestic	12.2	No	Low
59676	Southeast	1,278	Private Domestic	29.9	No	Low
46054	Southeast	1,139	Unknown	33.5	No	Low

Based on the distance between the wells and the Property, the anticipated flow direction of groundwater, the soils typical of this region (i.e. silt and clay) and the low permeability of these types of soils, it is FOCUS's opinion that the groundwater wells are not likely to be affected by contaminants originating from the Property, if any.

2.14 BC ONLINE SITE REGISTRY

The BC MoE maintains a database called the Site Registry that contains environmental information pertaining to contaminated or potentially contaminated sites. The database can be searched based on geographic location for records such as previous environmental investigations, waste management permits and pollution abatement orders. A search conducted within a 0.5 km radius area surrounding the Property indicated that there are no sites listed on the registry. A copy of the Site Registry search result has been included in Appendix F.

2.15 FEDERAL CONTAMINATED SITES INVENTORY

The Federal Contaminated Site and Solid Waste Landfills Inventory Policy (2000) require custodian departments and agencies to establish and maintain a database of contaminated site for which they are responsible. This information is submitted at least once a year to the Federal Contaminated Site Inventory (FCSI). The Inventory has been available to the public since July 2002 and is maintained by Treasury Board Secretariat, Assets and Acquired Services Directorate. The database can be searched based on different criteria or map navigator. A search conducted for the Fort St. John area, indicated that there are no federal contaminated sites within 1km radius of the Property.

3.0 SITE VISIT

3.1 GENERAL

FOCUS completed a site visit on March 2, 2011. The site visit included a cursory review of the Property and inspection of surrounding sites. Photographs taken during the site visit have been included in Appendix A. The site details and surrounding land use are shown in Figure 2.

The Property is comprised of one abnormally shaped lot situated at the south end of 100th Street, outside of the Fort St. John city limits. The ground surface of the Property is gravelled and slopes very gently to the south. There is a steep embankment along the south and east property boundaries. Currently, the Property is unoccupied and mainly used as a parking lot for the lookout over the Peace River Valley.

3.2 SITE STRUCTURES

There are currently no structures located on the Property.

3.3 SURROUNDING LAND USES

Visible portions of adjacent sites surrounding the Property were also viewed by FOCUS during the site visit to identify land use and any activities that may have the potential to adversely affect the Property. Surrounding site observations are listed in Table E below:

TABLE E: Surrounding Land Use – Adjacent Sites

Direction from Property	Land Use/Occupants
North	100 th Street and an undeveloped shrub forest area.
Northeast	Mainly shrub forest with a ravine.
East	Mainly grassy shrub land, undeveloped, used for trash/vehicle dumping into the ravine.
Southeast	Mainly grassy shrub land, undeveloped, used for trash/vehicle dumping into the ravine.
South	Slope has been used for trash/vehicle dumping. Old Fort Road runs along the base of the bluff.
Southwest	Grassy shrub land and undeveloped. Slope has been used for trash/vehicle dumping.
West	Residential with a home-based business, McRae Metalizing.
Northwest	Agricultural field.

3.3.1 North

100th Street extends from the Property to the north towards Fort St. John. This road is maintained by the BC MoT. The area adjacent to the road is agricultural on the west side and shrub forest on the east side.

3.3.2 West

There is a residential property to the west of the Property with home-based business “McRae’s Metallizing Services Ltd.”. A single family dwelling and two other structures were visible. The structure that houses a vehicle bay/shop with some vehicles/trailers storage is approximately 180 meters from the Property. There is a transformer located on the power pole beside the house. There is a lagoon located on this site, located approximately 200 m west of the Property

3.3.3 East

There is a ravine located east of the Property. Numerous vehicles and household appliances have been abandoned on the slope of the ravine. No other structures were noted to the further east of the Property.

3.3.4 South

There have been numerous vehicles and household appliances dumped over the side of the embankment and down the slope. The Old Fort Road is located to the further south of the Property at the base of the embankment.

3.4 ABOVEGROUND STORAGE TANKS (ASTS) AND UNDERGROUND STORAGE TANKS (USTS)

Storage tanks can present an environmental concern if there is leakage into the surrounding soil or groundwater because of the condition of the tanks and associated piping, or if there is spillage during refilling. The age, condition, contents and relative location of tanks are factors used to assess the environmental risk presented by ASTs or USTs.

There was no evidence of USTs or ASTs present on the Property.

3.5 FILL

Fill from an unknown source has the potential to impact a site, if the soil originates from a property with a known CSR Schedule 2 industrial activity. Typically, fill originating from local commercial gravel pits presents a low potential for environmental impairment.

The Property has been covered with gravel. The origin of this gravel is unknown.

3.6 HAZARDOUS MATERIALS, WASTES AND WASTE DISPOSAL

Illegal dumping of domestic wastes and abandoned vehicles has occurred on or near the Property (on the steep slope to the east and south).

3.7 HAZARDOUS BUILDING MATERIALS

3.7.1 Asbestos-Containing Materials (ACM)

The BC Occupational Health and Safety Regulation defines an asbestos contain material (ACM) as a product containing one percent of asbestos or greater by weight. The presence of non-friable ACMs (bound fibres), such as floor and ceiling tiles, are still in production, though their use in Canada has sharply declined since the mid 1970's. Most friable (easily pulverized) products were also withdrawn from the Canadian market in the mid 1970's and were generally commercially unavailable by 1982. However, some products remained on the shelf and were used in the construction of buildings and homes for several years thereafter. It was not until 1985 that the Hazardous Products Act restricted the use of ACMs.

ACM may become a health concern if the materials deteriorate or are disturbed and the asbestos fibres become airborne and are subsequently inhaled. If suspect ACM are disturbed during any renovation or demolition work at the Property, a complete asbestos survey (which would include sampling of any suspect ACM) should be conducted prior to the disturbance of these materials in order to prepare and plan for any required ACM removal, as per Worker's Compensation Board (WCB) regulations. Additionally, ACMs that are deteriorated or damaged need to be managed according to WCB regulations.

There have never been any buildings constructed on the Property. Therefore, FOCUS considers the potential for ACMs, as part of a structure or building, being present on the Property to be low. EWD notes that assessment of the potential for ACMs in municipal waste falls outside of the scope of work for this Phase 1 ESA.

3.7.2 Polychlorinated Biphenyls (PCBs)

The past use of PCBs in electrical equipment such as transformers, fluorescent lamp ballasts, and capacitors was common. The federal Environmental Contaminants Act, 1976, prohibited the use of PCBs in heat transfer and electrical equipment installed after September 1, 1977, and in transformers and capacitors installed after July 1, 1980. However, a widely used alternative to PCBs is naphenic mineral oil. Mineral oil transformers were sometimes contaminated with PCBs during manufacturing or maintenance activities. Electrical equipment taken out of service should be checked prior to disposal and any found or suspected to contain PCBs should be handled and stored as required by the Hazardous Waste Regulation².

² Environmental Management Act, Hazardous Waste Regulation (HWR), BC Reg. 63/88, deposited 1988/02/18, O.C. 268/88, effective 1988/04/01, (includes all amendments up to BC Reg. 63/2009, effective 2009/04/01).

There are no transformers present on or near the Property. FOCUS considers the potential for PCBs being present on the Property to be low.

3.7.3 Lead-Based Paint

In 1976, the Hazardous Products Act restricted the content of lead in exterior paints to 0.5% by weight. However, some products remained on the shelf and were used in the construction of buildings and homes for several years thereafter. This level was later amended in April of 2005 to contain 0.06% by weight of lead in paint. Most interior and exterior paints produced prior to the late 1960s contain significant amounts of lead which, if disturbed, may pose a health risk to the public, especially young children and pregnant women. Generally, lead based paints manufactured after 1980 did not contain significant amounts of lead. However, exterior paints produced before 1992 still have the potential to contain significant amounts of lead. Exterior paints produced after 1992 were virtually lead-free.

Lead paint may become a health concern if the materials deteriorate or they are disturbed during any renovation or demolition work. Potential lead based paints that are deteriorated or will be disturbed through demolition or renovations should be identified and managed in accordance with WCB regulations.

There have never been any buildings constructed on the Property. Therefore, FOCUS considers the potential for lead based paint, as part of a structure or building, being present on the Property to be low. EWD notes that assessment of the potential for lead based paints in municipal waste falls outside of the scope of work for this Phase 1 ESA.

3.7.4 Spill and Stain Areas

The ground surface on the Property was snow covered at the time of the site visit; therefore, a visual inspection of the ground surface was not possible at the time of the site visit.

3.8 WATER SUPPLY

The Property is not serviced with municipal water system.

3.9 SEWER SYSTEMS

The Property is not serviced with sewer systems.

3.10 SUMPS AND DRAINS

Separators and floor drains can present a potential environmental concern if there are cracks or breaks in the separator or piping. Cracks and breaks can be caused by shifting of the building due to expansive clays or inadequate packing of fill material during construction. Floor drains and separators can act as a direct conduit to the subsurface for chemicals (i.e., spills). Additionally, separators can leak separated waste oil and grease into the subsurface.

EWD did not find evidence of buildings constructed on the Property. Therefore, the potential for sumps or drains to have been historically present at the Property is low.

3.11 SUMMARY OF STAGE 1 PSI FINDINGS

Based on the assessment of information compiled during the investigation, FOCUS has identified the following Areas of Potential Environmental Concern (APECs) and associated Potential Contaminants of Concern as listed in Table F and outlined in Figure 2.

Table F: APECs and PCOCs

APEC ID	APEC	Contaminant Type	PCOCs in Soil	PCOCs in Water	Potential Concern
A (On-Site)	Illegal dumping of municipal wastes (garbage, appliances, furniture, and etc.) and abandoned vehicles for numerous years	Gasoline, Diesel, metals, coolant, municipal waste	BTEXS, VPH, LEPH/HEPH, PAHs, metals, VOCs and glycol	BTEXS, VPHw, VHW ₆₋₁₀ , EPHW ₁₀₋₁₉ , LEPHw, PAHs, Dissolved Metals, VOCs and glycol	Moderate
B (Off-Site)	Home-based metallizing business and lagoon	Gasoline and Diesel, coolant, sand-blasting waste and grey water	BTEXS, VPH, LEPH/HEPH, PAHs, VOCs and metals	BTEXS, VPHw, VHW ₆₋₁₀ , EPHW ₁₀₋₁₉ , LEPHw, PAHs, nitrites, nitrates and Dissolved Metals	Low

Notes:

BTEXS: benzene, toluene, ethylbenzene, xylenes and styrene.

VPH: volatile petroleum hydrocarbons with the exception of benzene, toluene, ethylbenzene and xylenes.

LEPH/HEPH: light extractable petroleum hydrocarbons and heavy extractable petroleum hydrocarbons, respectively.

PAHs: polycyclic aromatic hydrocarbons.

VPHw: volatile petroleum hydrocarbons in water with the exception of benzene, toluene, ethylbenzene and xylenes.

VHW₆₋₁₀: volatile petroleum hydrocarbons.

EPHW₁₀₋₁₉: light extractable petroleum hydrocarbons in water.

LEPHw: light extractable petroleum hydrocarbons in water, corrected for PAHs.

VOCs: volatile Organic Compounds.

1. APEC A is the dumping of municipal waste and vehicles at the Property. Municipal wastes (garbage, appliances, furniture and etc.) and abandoned vehicles have been illegally dumped on or near the Property. There is also a potential for the site to have been used as an unlicensed dump in the past. FOCUS considers the potential for environmental impairment to the Property from APEC A to be moderate.
2. APEC B is a home-based business McRae Metallizing Services Ltd and the associated lagoon. This business involves coating, sandblasting, painting and other oilfield services. Due to the small nature of this business and the distance of approximately

180 meters from the Property, FOCUS considers the potential for environmental impairment to the Property from APEC B to be low.

Based on the historical use of the Property it is EWDs opinion that an intrusive investigation should be conducted to determine if significant quantities of municipal waste or other types of waste is present in the fill at the Property. Soil samples should be submitted for analytical testing based on observations of fill type and field screening conducted as part of that investigation.

4.0 FIELD INVESTIGATION

FOCUS supervised the field investigation program which included locating underground utilities, supervision of drilling subcontractors, characterizing and logging soils encountered, collection of subsurface soil samples, and submission of soil samples for analytical testing.

4.1 BOREHOLE DRILLING AND COLLECTION OF SOIL SAMPLES

On March 04, 2011, seven boreholes (BH11-1 through BH11-7) were drilled on the Property using a truck mounted solid stem auger drill rig supplied and operated by Peace Drilling & Research of Fort St. John, BC. The boreholes were drilled to a maximum depth of 3.05 m below surface grade (bsg). The borehole locations are shown on the attached Figure 3 and the borehole logs are included in Appendix G.

Table G below summarizes the location of the boreholes and provides rational for their placement.

Table G: Borehole Locations and Purpose

Borehole / Monitoring Well ID	Location	APEC	Purpose
BH11-1 to BH11-6	Along the edge of the embankment at the south and west portions of the Property	A	Verify if municipal waste fill is present and to assess potential soil contamination associated with potential historical dumping.
BH11-7	Near the center of the site	A	Verify if municipal waste fill is present and to assess potential soil contamination associated with potential historical dumping.

During the drilling program, the 150 mm solid stem augers were advanced and then removed in 1.5 m lengths for soil sampling and logging. Soil samples were collected directly from the auger at approximately 0.75 m intervals or where the stratigraphy changed. Duplicate soil samples were obtained for field measurement of hydrocarbon vapour emissions (HVE) using a RKI Instruments Eagle Series portable multi-gas detector, calibrated to a hexane standard and

operated in the methane elimination mode. HVE concentrations from each sample are indicated on the borehole logs (see Appendix G). Selected soil samples were placed in laboratory supplied jars and stored on ice in coolers during transport under chain-of-custody to Maxxam Analytics Inc. (Maxxam) in Burnaby, BC, for analytical testing.

A total of 40 soil samples, including five blind duplicate soil samples for quality assurance and quality control (QA/QC) requirements, were collected. To minimize the potential for cross contamination, fresh nitrile sampling gloves were worn by FOCUS's field representative and soil collection tools were cleaned with distilled water for each new soil sample collected.

4.2 SAMPLE SUBMISSION FOR ANALYTICAL TESTING

All soil samples were submitted along with a Chain-of-Custody sheet to the Fort St. John depot of Maxxam on March 7, 2011 for testing at their CALA (Canadian Association for Laboratory Accreditation, former CAEAL, Canadian Association for Environmental Analytical Laboratories)-accredited laboratory in Burnaby, BC. Maxxam completed all laboratory analyses following methods approved by BC MoE. Two QA/QC duplicate soil samples were submitted for chemical analysis. The soil samples were tested for BTEXS, VPH, VOC, MTBE, EPHs, LEPH/HEPH, PAHs and/or metals concentrations.

Copies of the laboratory analytical reports are included in Appendix H and results have been tabulated in Table 1 through Table 4. Detailed analytical results are shown on Figure 4, attached.

5.0 RESULTS OF LIMITED STAGE 2 PRELIMINARY SITE INVESTIGATION

5.1 SOIL CONDITIONS

The general soil stratigraphy encountered at the Property consisted of a surficial layer of fill (i.e. sand and gravel) with a thickness ranging from 0.05 m to 0.17 m overlying the native soils. The native soils mostly consisted of silty clay or clay to the maximum of drilling depth of 3.05 m. Detailed description of the soil stratigraphy encountered at each borehole location is presented on the borehole logs attached in Appendix G.

5.2 ASSESSMENT STANDARDS

The analytical test results for all of the soil samples tested have been compared to standards contained in the following documents:

- *Environmental Management Act (EMA)*, Contaminated Sites Regulation (CSR), B.C. Reg. 375/96, deposited 1996/12/16, O.C. 1480/96, effective 1997/04/01 [including amendments up to B.C. Reg. 286/2010, effective 2010/10/04].

The following MoE guidance documents were also used:

- Technical Guidance Document 1 (TGD1) – Site Characterization and Confirmation Testing, BC Ministry of Environment (MoE), last updated January 2009;
- Technical Guidance Document 3 (TGD3) – Environmental Quality Standards, BC Ministry of Environment, last updated February 2009; and
- Technical Guidance Document 6 (TGD6) – Water Use Determination, BC Ministry of Environment, July 2010 (effective February 1, 2011)

Current soil quality assessment standards are described in the CSR of the BC *EMA*. Schedules 4 and 5 of the CSR provide generic and matrix numerical standards, respectively, for the assessment and remediation of soils. Generic standards depend solely on land use and matrix standards are risk-based standards that depend on land use and a number of site-specific factors, for example, the use, if any, of groundwater at the site. In addition, Schedule 10 of the CSR contains generic numerical criteria that can be used to determine when a site has been remediated to meet government requirements. Schedule 10 standards are only used to provide remedial targets in relation to human health risks. In addition, effective January 1, 2009, Schedule 11 provides numerical standards for vapour which are specific to human health only. When applying Schedule 10 or 11 standards, further consideration must be given the ecological receptors by the responsible persons.

EPH₁₀₋₁₉ and EPH₁₉₋₃₂ (EPHs) are not regulated substances under the CSR, with the exception of non-aqueous phase liquid (NAPL) standards. Under the CSR, LEPH and HEPH are regulated. LEPH and HEPH are corrected values of EPHs that exclude PAHs. Being such, EPH concentrations are a more conservative value and will be reported equal to or greater than LEPH and HEPH results. EPHs are commonly analysed when PAHs are not identified as a PCOC due to the increase in cost of a LEPH and HEPH analysis. In recognition of the common industry practice to compare EPHs to LEPH and HEPH standards, the MoE has approved, on an interim basis, the equivalency of EPH, and LEPH and HEPH methods indefinitely. For the purpose of this assessment, FOCUS has used this equivalency.

The CSR Agricultural Land use (AL) soil standards, based on present zoning, are considered by FOCUS applicable to the Property. In addition, the Property is likely to be re-developed into a park area in the near future; therefore, the CSR Urban Park Land use (PL) soil standards are applied to the analytical data.

On February 1, 2011 the BC MoE approved TGD6 – Water Use Determination replaced the former TGD6 – Applying Water Quality Standards to Groundwater and Surface Water, last revised in October 2005. Under the new TGD 6, current and future water uses are evaluated separately to determine if drinking water use is applicable. The groundwater at the Property is not currently used for drinking. A search of the BC MoE Groundwater Section database indicates that there are no water wells located within a 0.5 km radius of the Property (please refer to Section 2.12 for more details). The closest water well, #46593, is located approximately 610 m north of the Property in an assumed upgradient direction. According to the lithology information obtained from the well report, well #46593 is overlain by clay soil

with a thickness of 12 m. Based on the range of published hydraulic conductivity values (Freeze and Cherry, 1979), a clay type soil typically has a saturated hydraulic conductivity in the range of 10^{-6} to 10^{-12} m/s, and is considered to have insufficient permeability to supply drinking water. The clay soil is also considered to be a confining geological unit (greater than the 5 m minimum thickness) to protect the deep aquifer typical of the region. As such, it is not likely any contamination identified in shallow soil would migrate vertically through the low permeability clay soils and impact the drinking water aquifer in the area. Therefore, for the purpose of this investigation the BC CSR Drinking Water (DW) standards are considered not to apply to the Property. However, if a legal instrument such as a Determination is required, the presence of clay with a thickness greater than 5 m would need to be verified.

Under the new TGD 6, if a site is located within a radial distance of 500 m from the ecologically active zone of a surface water body containing aquatic life, or there is the potential for contaminated groundwater to flow through preferential corridors that discharge directly to a surface water body containing aquatic life, aquatic life standards would apply. The nearest aquatic receptor is the Peace River located approximately 1.3 km south of the Property. However, a seasonal water course, the ravine, is located immediately east of the Property and connects directly with the Peace River. Therefore, for the purpose of this preliminary investigation, the CSR standards for the protection of freshwater aquatic life (AW) have been applied to the analytical data.

The Property is currently zoned as agricultural. As such, the BC CSR standards for Livestock Water (LW) and Irrigation Water (IW) do apply to the Property.

Therefore, based on this analysis, the applicable standards under CSR are summarized below.

Soils

The CSR Agricultural Land (AL) and Urban Park Land (PL) soil standards apply to the Property. Three site-specific factors of the matrix soil standards apply to the site. These are:

Human Health Protection

- Intake of contaminated soil (applies regardless of site use). Environmental Protection.
- Toxicity to soil invertebrates and plants (applies regardless of site use).
- Groundwater flow to surface water used by freshwater aquatic life.

Environmental Protection

- Toxicity to soil invertebrates and plants (applies regardless of site use).
- Livestock ingesting soil and fodder.
- Major microbial functional impairment.

- Groundwater flow to surface water used by freshwater aquatic life.
- Groundwater used for livestock watering.
- Groundwater used for irrigation.

The most stringent of the site specific factors was chosen to assess the analytical results.

6.0 ANALYTICAL RESULTS

6.1 SOIL ANALYTICAL RESULTS

A synopsis of the soil analytical results is as follows:

- All select soil samples analyzed for hydrocarbon concentrations are below the applicable CSR AL and PL standards.
- All select soil samples analyzed for metals contained metals concentrations below the applicable CSR AL and PL standards.

6.2 QUALITY ASSURANCE/QUALITY CONTROL – RESULTS

6.2.1 Laboratory QA/QC

FOCUS has reviewed the QA/QC reports generated by Maxxam. One soil Method Blank contained detectable arsenic concentrations. Two soil Spiked Blanks contained the recovery of cis-1-3 1,3-dichloropropene and trans-1,3-dichloropropene concentrations outside of the control limits of 60% – 140%. Maxxam stated that the overall quality control for the analysis met acceptable criteria. The remaining 138 QA/QC analytes did not exceed the set laboratory target range for the laboratory duplicate, spike tests or method blank. As such, there is approximately a 0.02% failure rate in Maxxam's QA/QC measurements. Based on this information, EWD considers the analytical results to be reliable.

6.2.2 Field QA/QC

RPD values between the samples and their blind duplicates were calculated as follows:

$RPD (\%) = 200 \times ABS (X - Y) / (X + Y)$ where

X = the concentration of the original sample

Y = the concentration of the blind field duplicate sample

Because analytical error increases near the RDL, an RPD calculation should only be applied where the concentrations of both samples are greater than 5 times the RDL; this is known as the Practical Quantification Limit (PQL).

Soil

The RPD's targets of the blind duplicate soil samples are 35% for inorganic constituents such as metals and salts and 50% for organic constituents such as BTEXS, VPH, EPH, LEPH/HEPH and PAHs. The RPD's targets are set by the lab variability target zones.

Two blind duplicate soil samples were submitted for analysis of BTEXS, VPH and MTBE. All calculated RPD's for blind duplicate samples submitted were below the PQL.

FOCUS considers the analytical results for hydrocarbons in soil to be reliable.

6.2.3 QA/QC Conclusion

Based on the results of the QA/QC program, FOCUS provides the following conclusions:

- The Maxxam laboratory quality assurance program has met FOCUS's quality control expectations; and
- The field QA/QC program has also met FOCUS's quality control objectives.

7.0 DISCUSSION

During the investigation boreholes were drilled along the south and east property boundaries where a steep embankment begins. The concern is that significant municipal waste or other type of waste were dumped at the edge of the embankment and later covered with clay or gravel fill, either through improvements to the lookout or grading that occurred over the years. During the drilling investigation a surficial layer of gravel fill was present on top of native soil. Significant waste fill was not encountered.

Soil sample BH11-2-1 contained a concentration of toluene and xylene equal to the detection limit. Laboratory blanks often have detectable concentrations due to improper cleaning of equipment or when a highly contaminated sample is analysed first. It is EWDs opinion that this result is well within the potential for laboratory error and is not significant.

Groundwater was not investigated in the limited Stage 2 PSI portion of this investigation. As soil contamination and significant municipal waste or other types of fill, other than a surficial layer of gravel, were not encountered; soil analytical data was below or at detection limits, all soil analytical data was below the CSR PL and AL use standards and clay soils were encountered; it is EWDs opinion that the potential for groundwater contamination to be present in a perched water table, if any, is low. Further, there is likely a significant vertical layer of clay present that would be protective of any deeper aquifer.

If there is a requirement to obtain a legal instrument in the future, such as a determination, EWD notes that soil vapour and groundwater may need to be assessed.

8.o CONCLUSIONS

FOCUS completed a Stage 1 and Limited Stage 2 PSI at the Property that included a review of the current and historical conditions for potential environmental concerns both on the Property and adjacent sites. A total of seven boreholes were drilled to a maximum depth of 3.05 m below surface grade to assess the subsurface soil quality in the close vicinity of the potential dumping areas on the Property. The following conclusions were made based on the findings of this investigation.

- The Property has been used for dumping of municipal wastes (garbage, appliances, furniture and etc.) and abandoned vehicles for a number of years. FOCUS considers the potential for environmental impairment to the Property from APEC A – illegal dumping to be moderate;
- One off-site APEC was identified from historical and current activities on the surrounding sites (McRae Metallizing Services). FOCUS considers the potential for environmental impairment to the Property from this APEC, to be low;
- Based upon the existing and future land use, FOCUS considers the CSR AL and PL soil standards are applicable to the Property; and
- Twelve soil samples, including two blind duplicate, were submitted to the laboratory for analysis of BTEXS, VPH, VOCs, EPHs, PAHs, LEPH and HEPH and/or metals concentrations. All concentrations were found to be below the applicable CSR AL and PL standards.

Based on the findings of this Stage 1 and Limited Stage 2 PSI, it is FOCUS's opinion that further work is not required at this time.

9.0 CLOSURE

Conclusions and recommendations presented herein are based on a visual site inspection and historical information that was reviewed at the time of this investigation. This report has been prepared for the use of Peace River Regional District and includes distribution as required for the purposes for which this assessment was commissioned.

The assessment has been carried out in accordance with generally accepted engineering practice. No other warranty is made, either expressed or implied. Engineering judgement has been applied in developing the recommendations in this report. Personnel with professional experience in investigations of this nature and who specifically conducted the investigations at this Property prepared this report. This report was completed by EWD Consulting Corp., a subsidiary of FOCUS, and reference should be made to the Environmental Report – General Conditions' attached in Appendix I that forms a part of this report.

This report was not prepared for submission for a legal instrument as defined under the British Columbia Contaminated Sites Regulation, and as such, soil vapour assessments were not included within the scope of work.

FOCUS trusts that this report satisfies your present requirements. Should you have any questions or comments, please contact our Fort St. John office at (250) 785-0660.

Respectfully submitted,

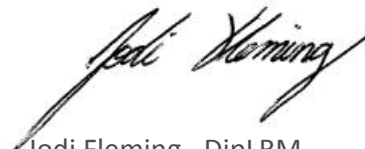
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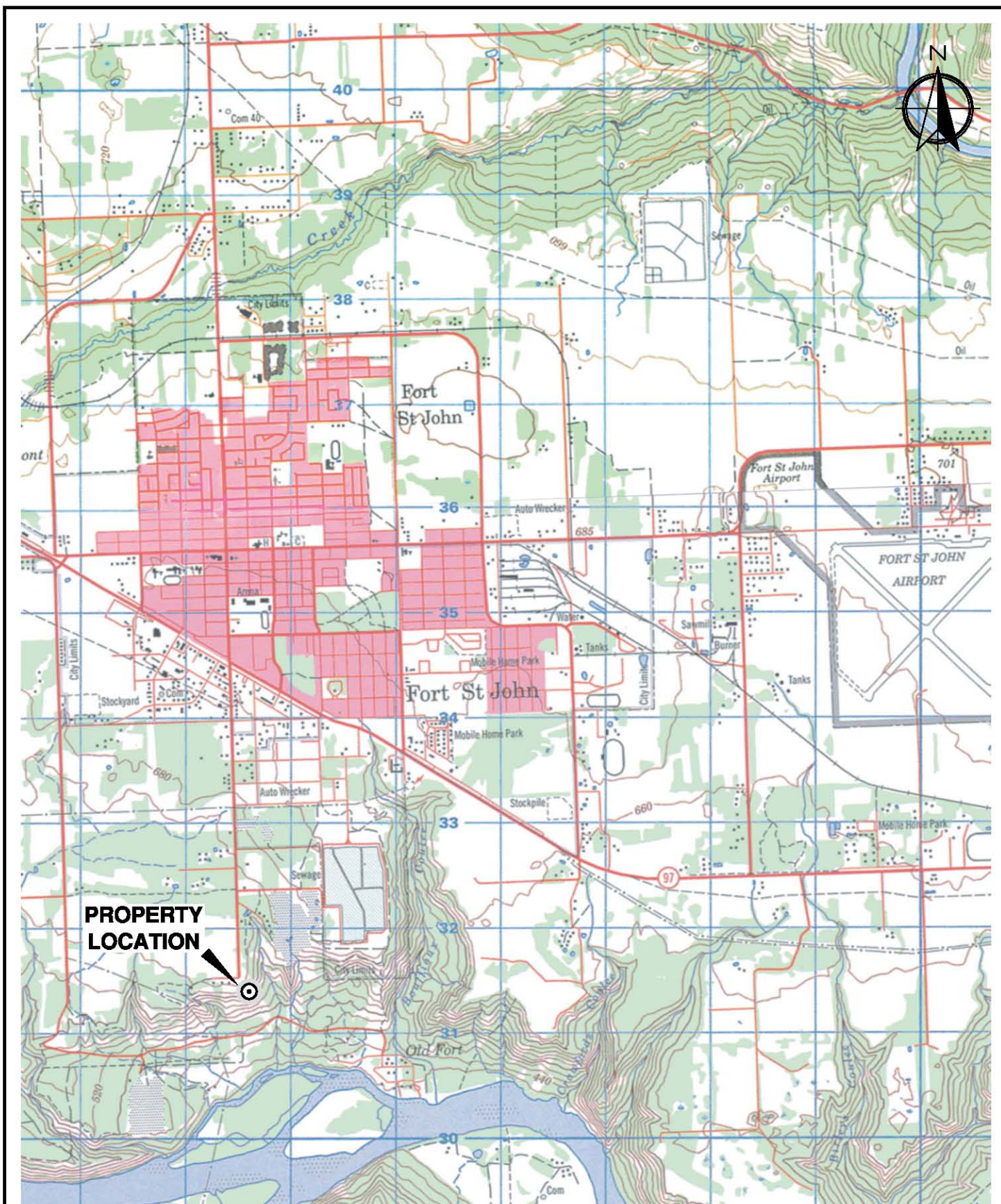
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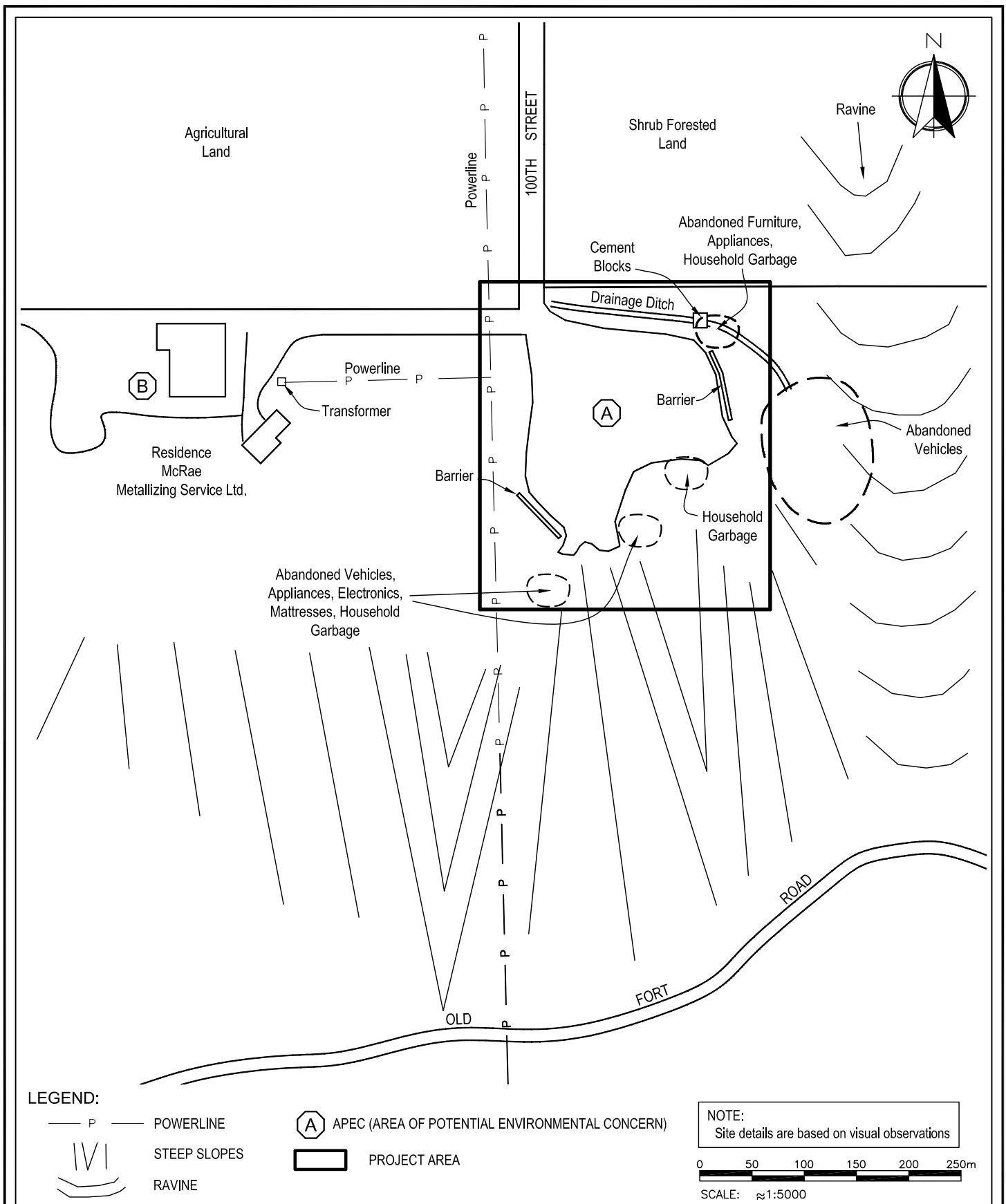
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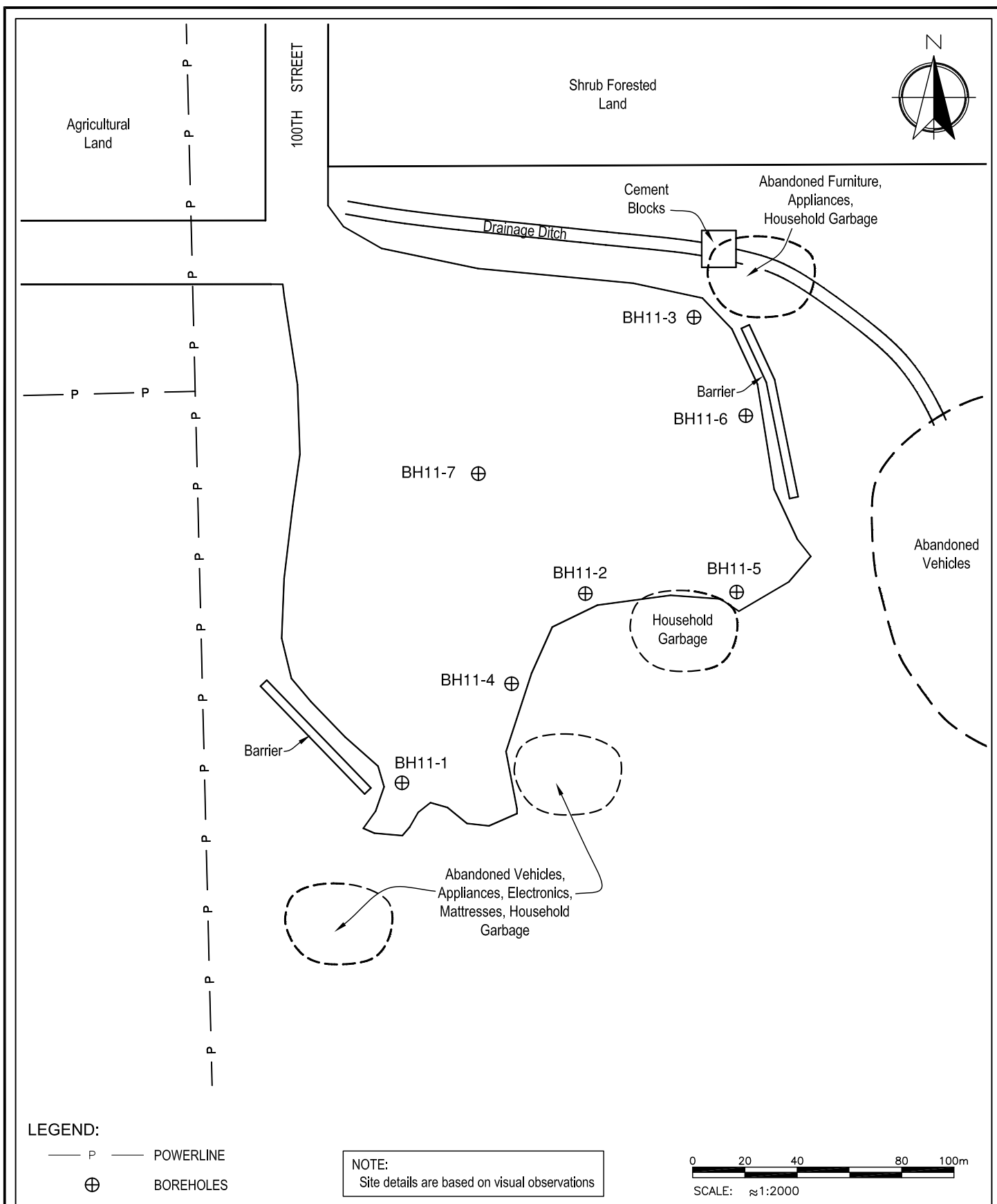
Figures



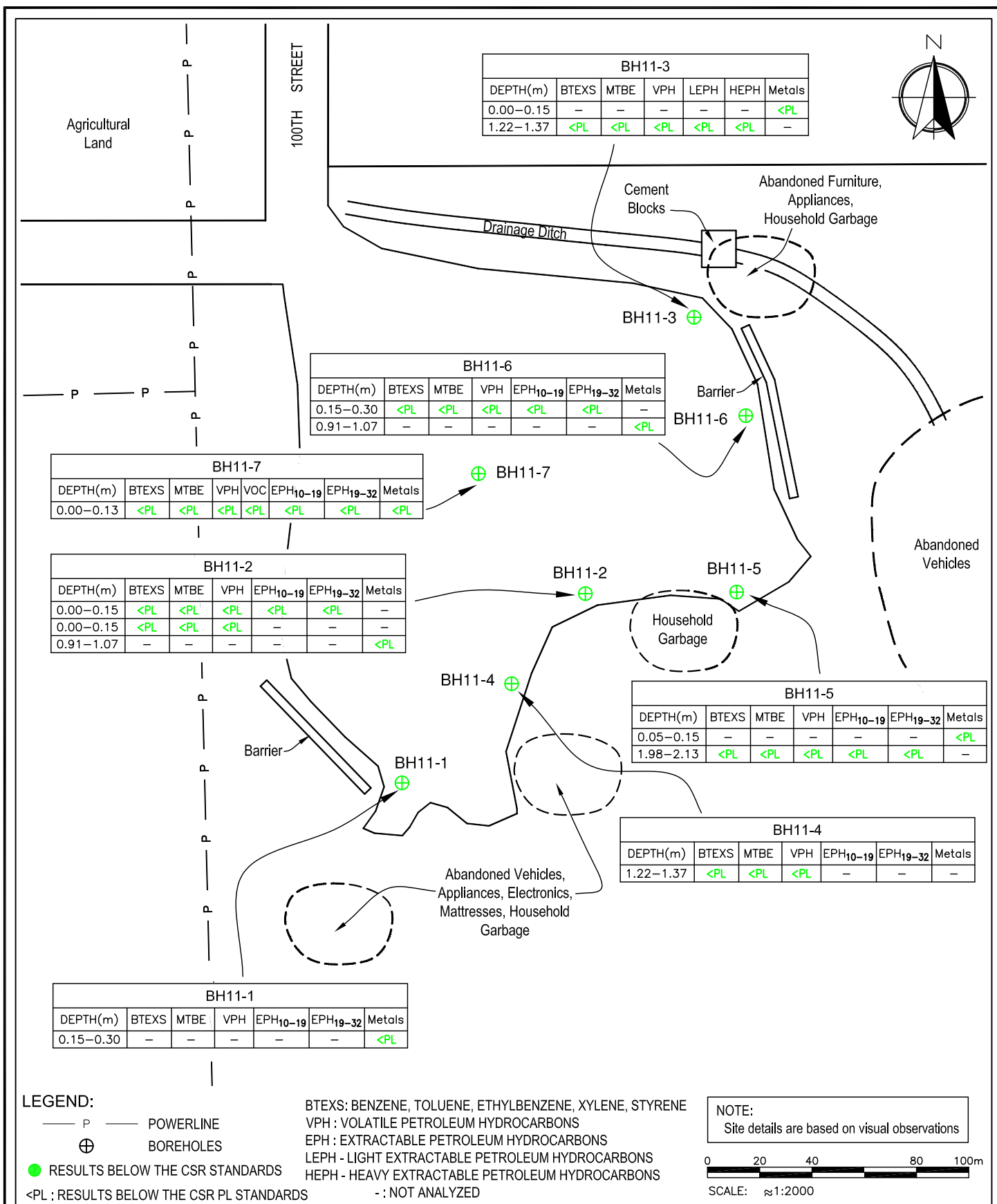
CLIENT: PEACE RIVER REGIONAL DISTRICT	FOCUS Kamloops #420-301 Victoria St. BC, V2C 2A3 Focus Surveys Ph. (250)374-5252 Engineering - Geomatics - Planning Fax (250)372-8336 www.focus.ca		
PROJECT: Stage 1 and Limited Stage 2 Preliminary Site Investigation Peace Valley Lookout	DATE: March 29, 2011	DRAWN BY: TP	CHECKED BY: TB
TITLE: PROPERTY LOCATION MAP	SCALE: 1 : 50,000	PROJECT NO.: 20003.001	CAD FILE NO.: 20003.001_Flg1 DRAWING NO.: FIGURE 1



CLIENT: PEACE RIVER REGIONAL DISTRICT	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> FOCUS Focus Surveys <small>Engineering • Geomatics • Planning</small> </div> <div> Kamloops <small>#420-301 Victoria St. BC, V2C 2A3 Ph. (250)374-5252 Fax (250)372-8336 www.focus.ca</small> </div> </div>			
PROJECT: Stage 1 and Limited Stage 2 Preliminary Site Investigation Peace Valley Lookout	DATE: March 29, 2011	DRAWN BY: TP	CHECKED BY: TB	DRAWING NO.: FIGURE 2
TITLE: SITE PLAN	SCALE: ≈ 1:5000	PROJECT NO.: 20003.001	CAD FILE NO.: 20003.001_Fig2	



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PROJECT: Stage 1 and Limited Stage 2 Preliminary Site Investigation Peace Valley Lookout				
TITLE: BOREHOLE LOCATIONS	DATE: March 29, 2011	DRAWN BY: TP	CHECKED BY: TB	DRAWING NO.: FIGURE 3
	SCALE: ≈1:2000	PROJECT NO.: 20003.001	CAD FILE NO.: 20003.001_Fig3	



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Tables

Table 1: Summary of Soil Analytical Results - Hydrocarbons
Peace River Regional District
Peace Valley Look Out

Sample Location	BH11-2			BH11-3	BH11-4	CSR Standards ¹	
Sample ID	BH11-2-1	BH11-2-1 DUP	% RPD ²	BH11-3-3	BH11-4-3		
Depth (m)	0.0 - 0.15	0.0 - 0.15		1.22 - 1.37	1.22 - 1.37	AL	PL
Date Sampled	04-Mar-11	04-Mar-11		04-Mar-11	04-Mar-11		
Non-Halogenated Volatiles (mg/kg)							
Benzene	<0.005	<0.005	-	<0.005	<0.005	10	10
Toluene	0.02	<0.02	-	<0.02	<0.02	1.5	1.5
Ethylbenzene	<0.01	<0.01	-	<0.01	<0.01	1	1
Total Xylenes	0.04	<0.04	-	<0.04	<0.04	0.1	5
Styrene	<0.03	<0.03	-	<0.03	<0.03	0.1	5
Methyl tert-butyl ether (MTBE)	<0.1	<0.1	-	<0.1	<0.1	320	320
VPH	<10	<10	-	<10	<10	200	200
Extractable Hydrocarbons (mg/kg)							
EPH ₁₀₋₁₉ ³	<100	-	-	<100	-	1,000 ⁴	1,000 ⁴
EPH ₁₉₋₃₂ ³	<100	-	-	<100	-	1,000 ⁵	1,000 ⁵
LEPH	-	-	-	<100	-	1,000	1,000
HEPH	-	-	-	<100	-	1,000	1,000

Notes:

"<" indicates less than the laboratory detection limit.

Bold - indicates result exceeds the CSR PL or AL standards.

"-" indicates not analyzed or no standards established or not calculable

¹ Environmental Management Act, Contaminated Site Regulation (CSR), BC Reg. 375/96, deposited 1996/12/16, O.C. 1480/96, effective 1997/04/01 (includes all amendments up to B.C. Reg. 286/2010, effective 2010/04/10), Schedule 4, 5 and 10 - Urban Park Land use (PL) and Agricultural Land use (AL) Standards.

² % RPD - Relative Percent Difference calculated as: $[\text{Absolute Value}((\text{Original Value}) - (\text{Dup. Value})) / ((\text{Original Value}) + (\text{Dup. Value})) * 200]$.

Value not calculable if less than the detection limit or within 5 times the detection limit (i.e., practical quantification limit)

³ Results uncorrected for PAHs.

⁴ Compared to the Schedule 4 LEPH Standard.

⁵ Compared to the Schedule 4 HEPH Standard.

Table 1 (cont): Summary of Soil Analytical Results - Hydrocarbons
Peace River Regional District
Peace Valley Look Out

Sample Location	BH11-5			BH11-6	BH11-7	CSR Standards ¹	
Sample ID	BH11-5-4	BH11-E	% RPD ²	BH11-6-2	BH11-7-1		
Depth (m)	1.98 - 2.13	1.98 - 2.13		0.15 - 0.3	0.0 - 0.125	AL	PL
Date Sampled	04-Mar-11	04-Mar-11		04-Mar-11	04-Mar-11		
Non-Halogenated Volatiles (mg/kg)							
Benzene	<0.005	<0.005	-	<0.005	<0.005	10	10
Toluene	<0.02	<0.02	-	<0.02	<0.02	1.5	1.5
Ethylbenzene	<0.01	<0.01	-	<0.01	<0.01	1	1
Total Xylenes	<0.04	<0.04	-	<0.04	<0.04	0.1	5
Styrene	<0.03	<0.03	-	<0.03	<0.03	0.1	5
Methyl tert-butyl ether (MTBE)	<0.1	<0.1	-	<0.1	<0.1	320	320
VPH	<10	<10	-	<10	<10	200	200
Extractable Hydrocarbons (mg/kg)							
EPH ₁₀₋₁₉ ³	<100	-	-	<100	<100	1,000 ⁴	1,000 ⁴
EPH ₁₉₋₃₂ ³	<100	-	-	<100	<100	1,000 ⁵	1,000 ⁵
LEPH	-	-	-	-	-	1,000	1,000
HEPH	-	-	-	-	-	1,000	1,000

Notes:

"<" indicates less than the laboratory detection limit.

Bold - indicates result exceeds the CSR PL or AL standards.

"-" indicates not analyzed or no standards established or not calculable

¹ Environmental Management Act, Contaminated Site Regulation (CSR), BC Reg. 375/96, deposited 1996/12/16, O.C. 1480/96, effective 1997/04/01 (includes all amendments up to B.C. Reg. 286/2010, effective 2010/04/10), Schedule 4, 5 and 10 - Urban Park Land use (PL) and Agricultural Land use (AL) Standards.

² % RPD - Relative Percent Difference calculated as: $[\text{Absolute Value}((\text{Original Value})-(\text{Dup. Value})) / ((\text{Original Value})+(\text{Dup. Value})) * 200]$.

Value not calculable if less than the detection limit or within 5 times the detection limit (i.e., practical quantification limit)

³ Results uncorrected for PAHs.

⁴ Compared to the Schedule 4 LEPH Standard.

⁵ Compared to the Schedule 4 HEPH Standard.

TABLE 2: Summary of Soil Analytical Results - PAH's

**Peace River Regional District
Peace Valley Look Out**

Sample Location	BH11-3	CSR Standards ¹	
Sample ID	BH11-3-3		
Depth (m)	1.22 - 1.37	AL	PL
Date Sampled	4-Mar-11		
Polycyclic Aromatic Hydrocarbons (mg/kg)			
Acenaphthene	<0.05	-	-
Acenaphthylene	<0.05	-	-
Anthracene	<0.05	-	-
Benzo(a)anthracene	<0.05	0.1	1
Benzo(a)pyrene	<0.05	0.1	1
Benzo(b&j)fluoranthene	<0.05	0.1 ²	1
Benzo(g,h,i)perylene	<0.05	-	-
Benzo(k)fluoranthene	<0.05	0.1	1
Chrysene	<0.05	-	-
Dibenz(a,h)anthracene	<0.05	0.1	1
Fluoranthene	<0.05	-	-
Fluorene	<0.05	-	-
Indeno(1,2,3-cd)pyrene	<0.05	0.1	1
Naphthalene	<0.05	0.1	5
Phenanthrene	<0.05	0.10	5
Pyrene	<0.05	0.1	10

Notes:

"<" indicates less than the laboratory detection limit.

"-" indicates not analyzed or no standards established

Bold - indicates result exceeds the CSR PL or AL standards.

¹ Environmental Management Act, Contaminated Site Regulation (CSR), BC Reg. 375/96, deposited 1996/12/16, O.C. 1480/96, effective 1997/04/01 (includes all amendments up to B.C. Reg. 286/2010, effective 2010/04/10), Schedule 4 and 5 - Urban Park Land use (PL) and Agricultural Land use (AL) Standards.

² Result compared to benzo(b)fluoranthene.

TABLE 3: SUMMARY OF SOIL ANALYTICAL RESULTS - VOCs

Peace River Regional District

Peace Valley Look Out

Sample Location	BH11-7	CSR Standards ¹	
Sample ID	BH11-7-1		
Depth (m)	0.0 - 0.13	AL	PL
Date Sampled	04-Mar-11		
Chlorobenzenes			
1,2-dichlorobenzene	<0.03	0.1	1
1,3-dichlorobenzene	<0.03	0.1	1
1,4-dichlorobenzene	<0.03	0.1	1
Chlorobenzene	<0.03	0.1	1
Volatiles			
1,1,1,2-tetrachloroethane	<0.03	32	32
1,1,1-trichloroethane	<0.03	0.1	9
1,1,2,2-tetrachloroethane	<0.03	4.1	4.1
1,1,2-trichloroethane	<0.03	0.1	5
1,1-dichloroethane	<0.03	0.1	5
1,1-dichloroethene	<0.03	0.1	5
1,2-dichloroethane	<0.03	0.1	5
1,2-dichloropropane	<0.03	0.1	5
Bromodichloromethane	<0.05	8.2	8.2
Bromoform	<0.05	320	620
Bromomethane	<0.3	3.9	3.9
Carbon tetrachloride	<0.03	0.1	5
Chlorodibromomethane	<0.05	11	11
Chloroethane	<0.1	30	30
Chloroform	<0.05	0.1	5
Chloromethane	<0.1	47	47
cis-1,2-dichloroethene	<0.03	0.1	5
cis-1,3-dichloropropene	<0.05	0.1	5
Dibromoethane	<0.03	0.32	0.32
Dichloromethane	<0.1	0.1	5
Tetrachloroethene	<0.03	0.1	5
trans-1,2-dichloroethene	<0.03	0.1	5
trans-1,3-dichloropropene	<0.05	0.1	5
Trichloroethene	<0.01	0.1	5
Trichlorofluoromethane	<0.2	390	390
Vinyl chloride	<0.06	0.79	0.79

Notes:

"<" indicates less than the laboratory detection limit.

Bold - indicates result exceeds the CSR PL or AL standards.

¹ Environmental Management Act, Contaminated Site Regulation (CSR), BC Reg. 375/96, deposited 1996/12/16, O.C. 1480/96, effective 1997/04/01 (includes all amendments up to B.C. Reg. 286/2010, effective 2010/04/10), Schedule 4, 5 and 10 - Urban Park Land use (PL) and Agricultural Land use (AL) Standards.

Table 4: Summary of Soil Analytical Results - Metals
Peace River Regional District
Peace Valley Look Out

Sample Location	BH11-1	BH11-2	BH11-3	CSR Standards ¹	
Sample ID	BH10-1-1	BH10-2-2	BH10-3-1		
Depth (m)	0.15 - 0.3	0.91 - 1.07	0.0 - 0.15	AL	PL
Date Sampled	04-Mar-11	4-Mar-11	04-Mar-11		
Physical Parameters					
pH	8.09	7.97	7.77	-	-
Total Metals (mg/kg)					
Aluminum	12,600	12,100	8,240	-	-
Antimony	0.6	0.5	0.7	20	20
Arsenic	8.1	12	7.4	15	20
Barium	121	167	266	400	1,000
Beryllium	0.8	0.7	0.6	4	4
Bismuth	0.2	0.2	0.1	-	-
Cadmium	0.48	0.38	0.44	3	3
Calcium	33,200	10,100	22,600	-	-
Chromium	22	21	17	50	60 ² , 65 ³
Cobalt	10.7	11.2	6.8	40	50
Copper	24.1	27.6	19.0	150	150
Iron	22,000	25,700	23,700	-	-
Lead	12.2	14.7	14.2	350	500
Lithium	21	20	11	1,600	1,600
Magnesium	7,650	5,600	6,050	-	-
Manganese	225	211	295	1,800	1,800
Mercury	0.05	0.07	<0.05	0.6	15
Molybdenum	1.5	1.4	1.5	5	10
Nickel	33	33.8	23.2	150	100
Phosphorus	581	643	695	-	-
Potassium	2000	1,850	1230	-	-
Selenium	1.1	0.7	0.8	2	3
Silver	0.18	0.19	3.91	20	20
Sodium	765	1220	256	-	-
Strontium	96.5	58	63.8	47,000	47,000
Thallium	0.17	0.18	0.12	2	-
Tin	0.6	0.6	1.1	50	50
Titanium	18	18	30	-	-
Uranium	1.68	1.89	0.85	16	16
Vanadium	43	37	30	200	200
Zinc	86	105	96	200	450
Zirconium	5.3	4.9	1.9	-	-

Notes:

"<" indicates less than the laboratory detection limit.

"-" indicates not analyzed or no standards established.

¹ Environmental Management Act, Contaminated Site Regulation (CSR), BC Reg. 375/96, deposited 1996/12/16, O.C. 1480/96, effective 1997/04/01 (includes all amendments up to B.C. Reg. 286/2010, effective 2010/04/10), Schedule 4, 5 and 10 - Urban Park Land use (PL) and Agricultural Land use (AL) Standards.

³ Standard is for Chromium VI.

⁴ Standard is for Chromium III.

Table 4 (cont): Summary of Soil Analytical Results - Metals
Peace River Regional District
Peace Valley Look Out

Sample Location	BH11-5	BH11-6	BH11-7	CSR Standards ¹	
Sample ID	BH10-5-1	BH10-6-3	BH10-7-1		
Depth (m)	0.05 - 0.15	0.91 - 1.07	0.0 - 1.25	AL	PL
Date Sampled	04-Mar-11	4-Mar-11	4-Mar-11		
Physical Parameters					
pH	7.97	8.17	7.9	-	-
Total Metals (mg/kg)					
Aluminum	12,100	11,800	10900	-	-
Antimony	0.6	0.8	0.8	20	20
Arsenic	10	8.5	8.1	15	20
Barium	179	296	290	400	1,000
Beryllium	0.8	0.6	0.7	4	4
Bismuth	0.2	0.2	0.2	-	-
Cadmium	0.44	0.81	0.47	3	3
Calcium	10,500	31,100	20000	-	-
Chromium	22	21	21	50	60 ² , 65 ³
Cobalt	12	11.6	8.9	40	50
Copper	27.9	25.3	23.9	150	150
Iron	24,800	24,800	25300	-	-
Lead	14.5	14.4	15.3	350	500
Lithium	20	21	15	1,600	1,600
Magnesium	7,510	10,000	6360	-	-
Manganese	297	456	331	1,800	1,800
Mercury	0.07	0.05	0.05	0.6	15
Molybdenum	1.5	1.6	1.8	5	10
Nickel	37	38.1	34.3	150	100
Phosphorus	653	787	616	-	-
Potassium	1,890	1,750	1420	-	-
Selenium	0.9	0.8	<0.5	2	3
Silver	0.2	0.2	0.33	20	20
Sodium	1,300	580	263	-	-
Strontium	65.5	90.5	64.4	47,000	47,000
Thallium	0.19	0.25	0.15	2	-
Tin	0.6	0.4	0.6	50	50
Titanium	21	46	22	-	-
Uranium	2.05	1.33	0.99	16	16
Vanadium	39	39	42	200	200
Zinc	96	102	87	200	450
Zirconium	4.8	3.7	2.9	-	-

Notes:

"<" indicates less than the laboratory detection limit.

"-" indicates not analyzed or no standards established.

¹ Environmental Management Act, Contaminated Site Regulation (CSR), BC Reg. 375/96, deposited 1996/12/16, O.C. 1480/96, effective 1997/04/01 (includes all amendments up to B.C. Reg. 286/2010, effective 2010/04/10), Schedule 4, 5 and 10 - Urban Park Land use (PL) and Agricultural Land use (AL) Standards.

³ Standard is for Chromium VI.

⁴ Standard is for Chromium III.

Appendix A
Photographs



Photo #1 – Looking north from the center of the Property.



Photo #2 – Bank on east side of the Property, looking towards the east.



Photo #3 – Looking south from the southwest corner of the Property.



Photo #4 – Looking west from the center of the Property.



Photo #5 – View of abandoned vehicles at the bottom of the bank on the east side of the Property (photo taken looking east).



Photo #6 – The Property (photo taken looking north from the south edge of the Property)



Photo #7 – View of abandoned vehicles on the south edge of the Property (photo taken looking south). Concrete blocks in drainage ditch on northeast corner of the



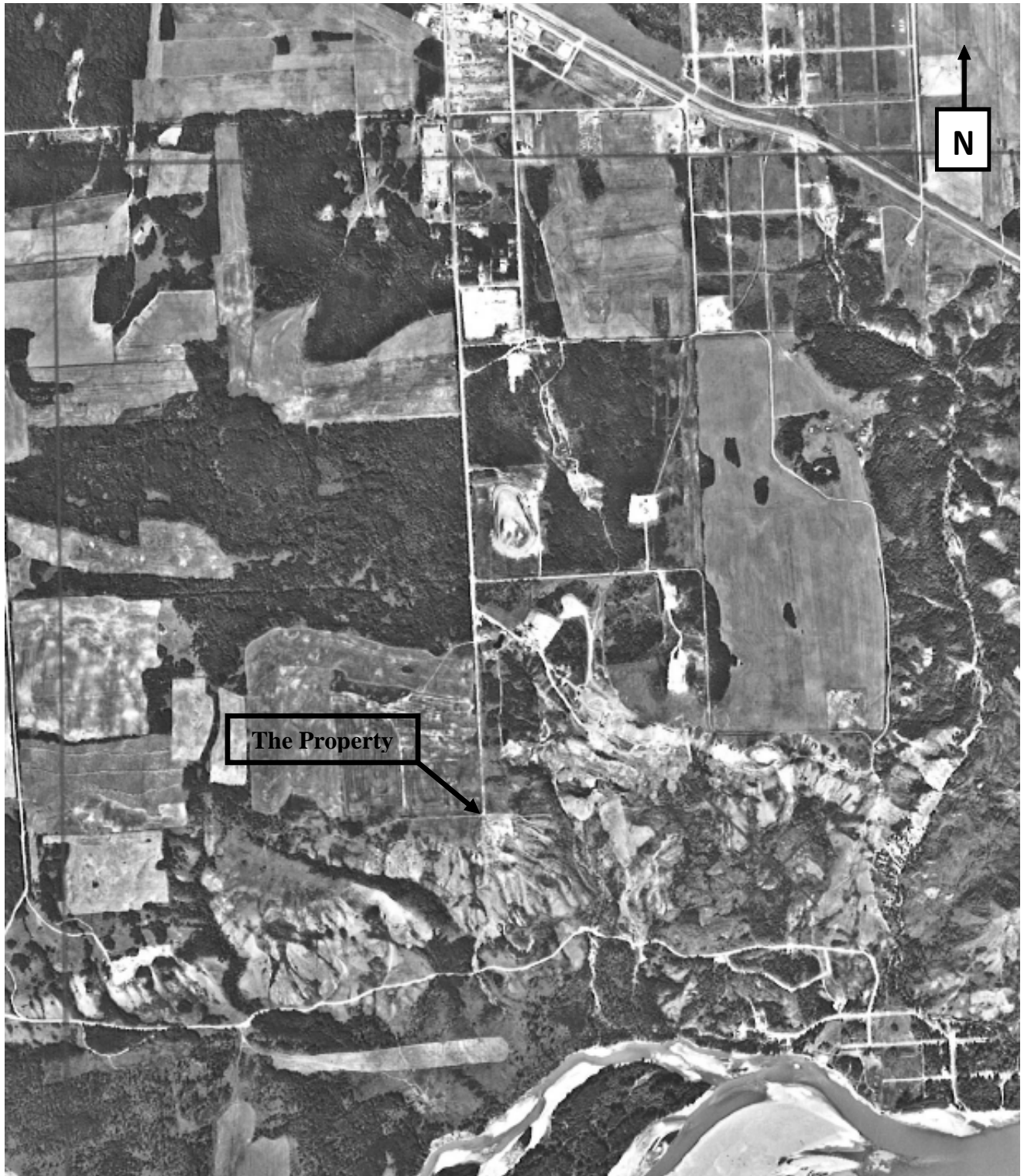
Photo #8 – View of concrete blocks in drainage ditch on northeast corner of the Property (photo taken looking east).

Appendix B

Aerial Photographs



Aerial photograph dated 1950



Aerial photograph dated 1967

Peace River Regional District
Stage 1 and Limited Stage 2 Preliminary Site Investigations
Peace Valley Lookout

Aerial Photograph 2

20003.001
March 2011

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Aerial photograph dated 1976

Peace River Regional District
Stage 1 and Limited Stage 2 Preliminary Site Investigations
Peace Valley Lookout

Aerial Photograph 3

20003.001
March 2011

FOCUS



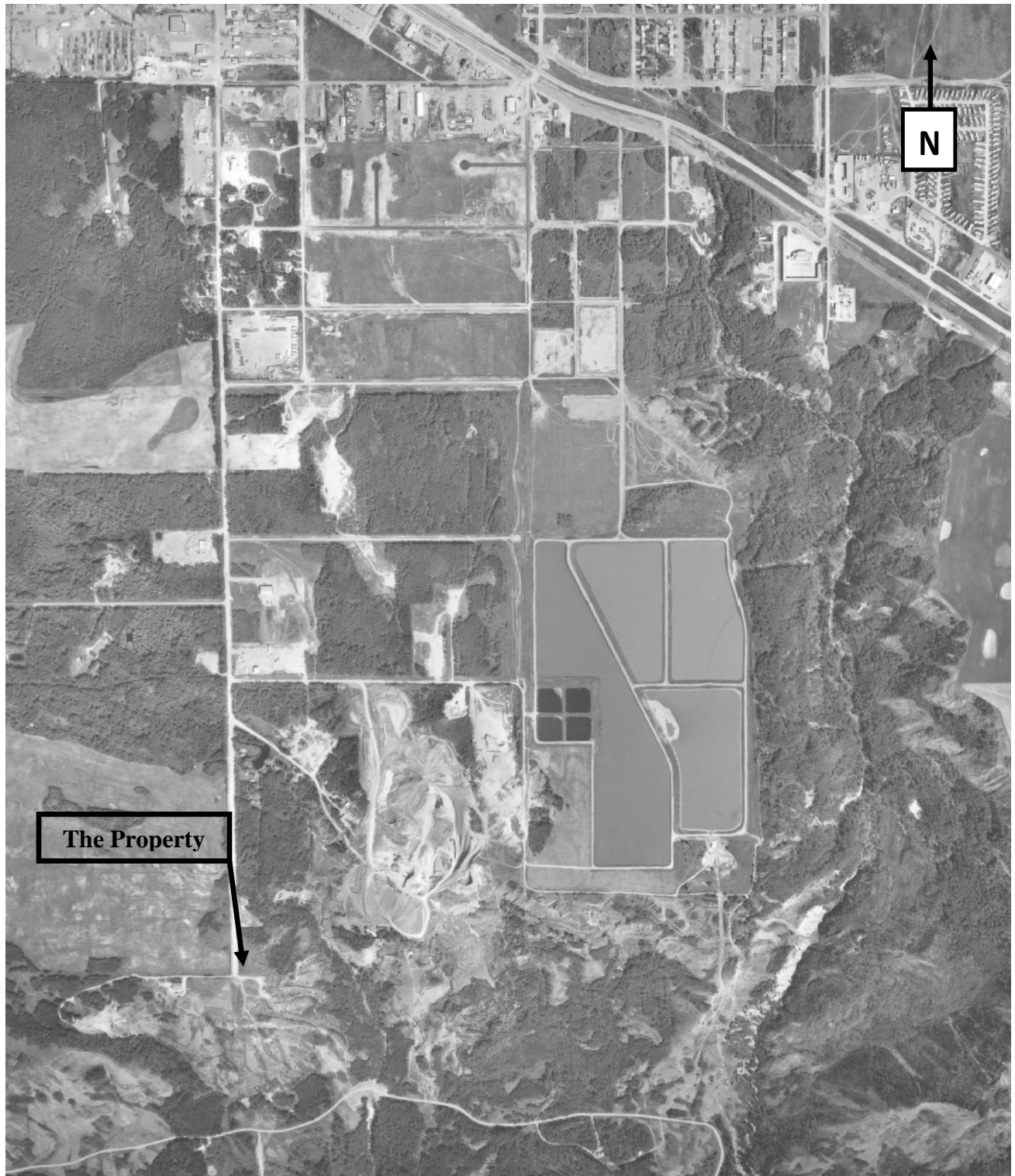
Aerial photograph dated 1979

Peace River Regional District
Stage 1 and Limited Stage 2 Preliminary Site Investigations
Peace Valley Lookout

Aerial Photograph 4

20003.001
March 2011

FOCUS



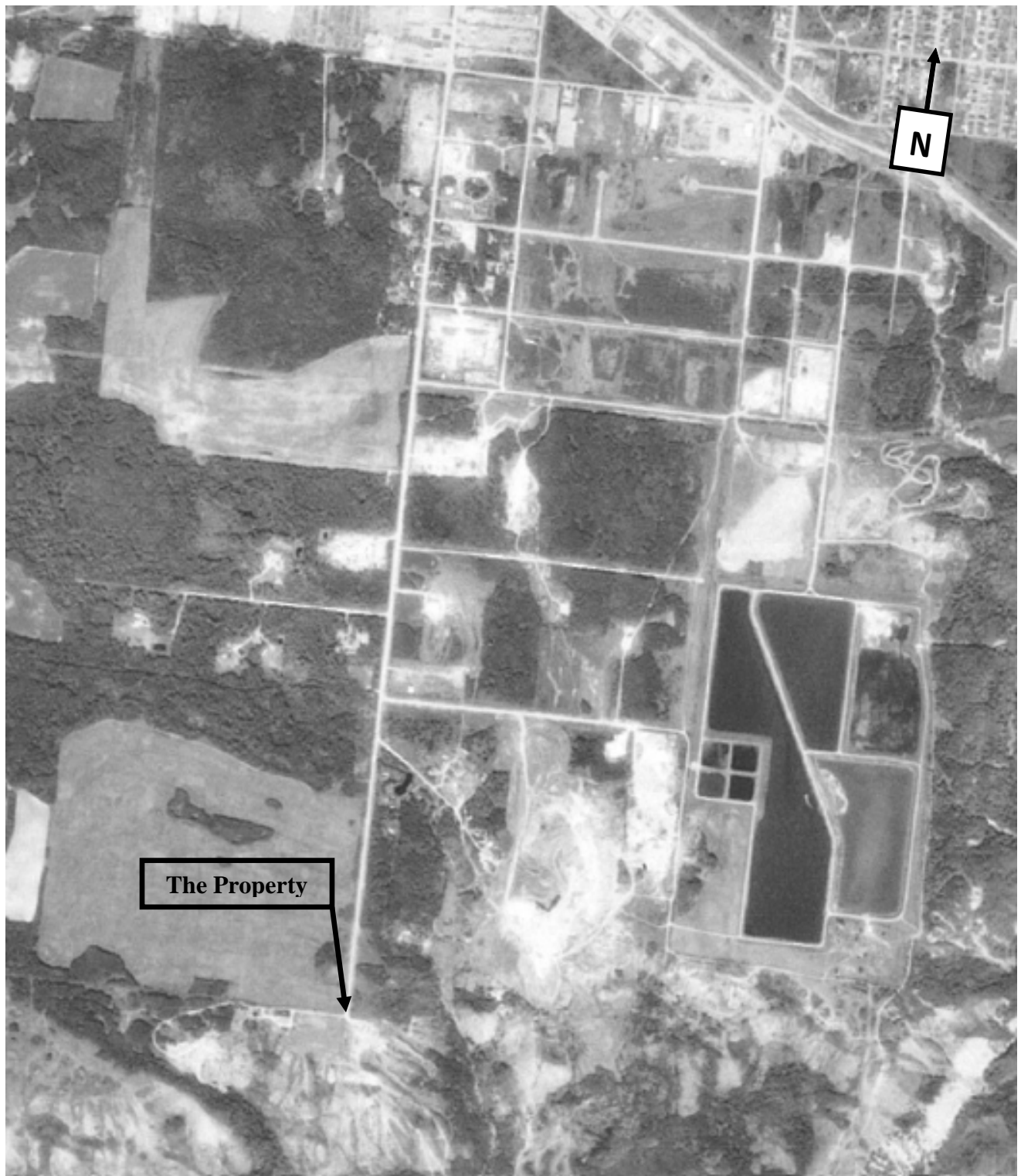
Aerial photograph dated 1981

Peace River Regional District
Stage 1 and Limited Stage 2 Preliminary Site Investigations
Peace Valley Lookout

Aerial Photograph 5

20003.001
March 2011

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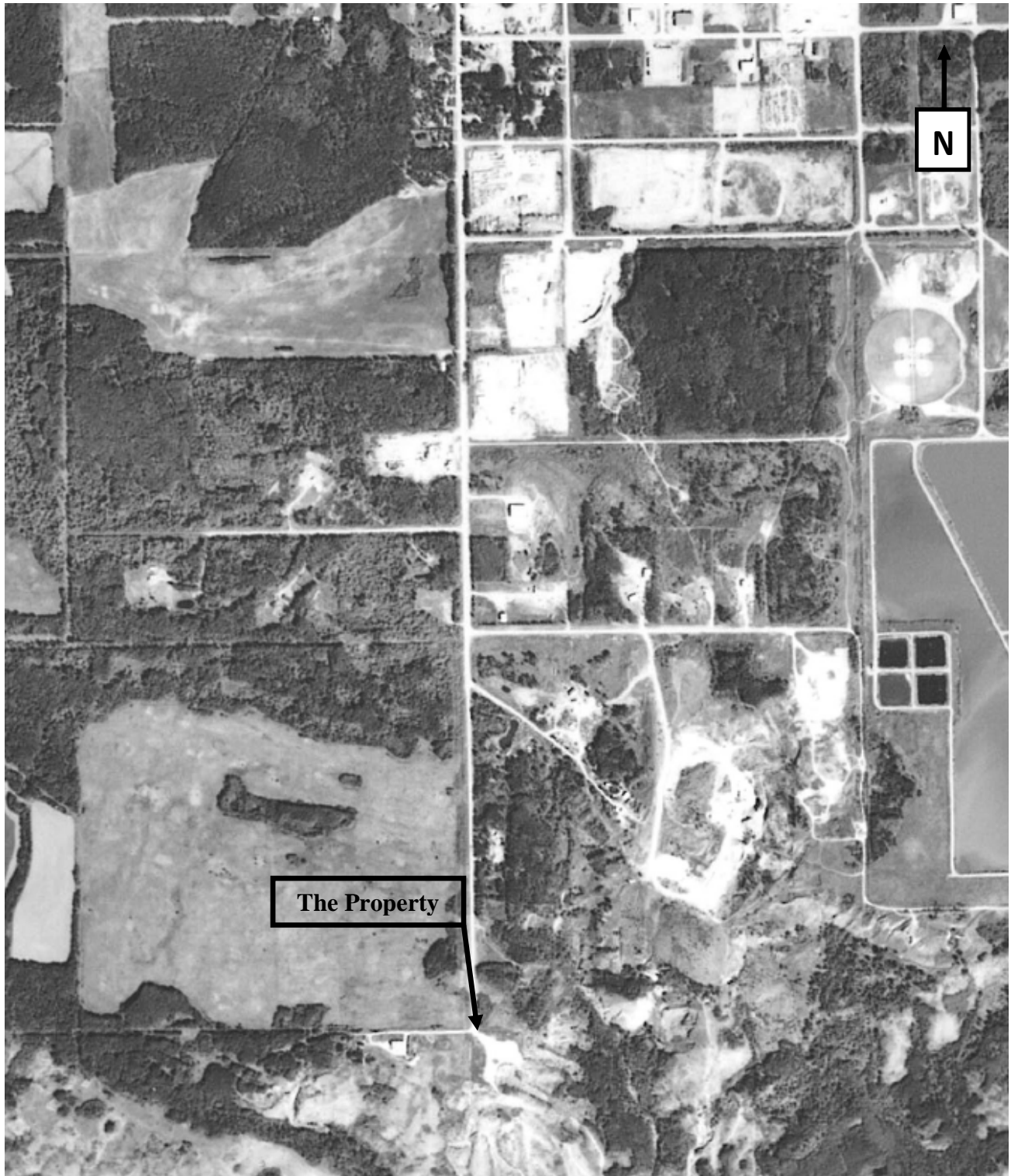
Aerial photograph dated 1986

Peace River Regional District
Stage 1 and Limited Stage 2 Preliminary Site Investigations
Peace Valley Lookout

Aerial Photograph 6

20003.001
March 2011

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Aerial photograph dated 1996

Peace River Regional District
Stage 1 and Limited Stage 2 Preliminary Site Investigations
Peace Valley Lookout

Aerial Photograph 7

20003.001
March 2011

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Aerial photograph dated 2009

Peace River Regional District
Stage 1 and Limited Stage 2 Preliminary Site Investigations
Peace Valley Lookout

Aerial Photograph 8

20003.001
March 2011

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Appendix C

Regional District Records

OFFICE OF: Development Services

Mar 4, 2011

EWD File No. 20003

EWD Consulting Corp.

10707 101 Avenue

Fort St. John, BC V1J 5J4

Emailed: ewd@ewdcorp.com

Re: N ½ of SW ¼ of 19-83-18?

Here is the information you requested regarding the above noted property:

1. There are no records of any environmental concerns or related information on file. The Regional District does not have jurisdiction over environmental issues and does not keep these kinds of records. Best to contact the Ministry of Environment.
2. There are no fire department records on file. The Regional District does not keep this information. Best to contact the Fort St. John Fire Department as the subject property is within their fire service area.
3. The subject property is zoned A-2 (Large Agricultural Holdings Zone) within Peace River Regional District Zoning By-law No. 1343, 2001.
4. The Regional District has no water or sewer infrastructure in this area.
5. There are no permits of any kind on file for the subject property.
6. There are no plans of any kind on file for the subject property.
7. There are no records of any fill, illegal dumping, or miscellaneous use of the property on file. Regarding the present use and development of the property, a site visit has not been conducted of the subject property, and information regarding the present use and siting has not been provided in sufficient detail to make a determination with respect to compliance. There are no outstanding enforcement files or work orders on file for this subject property, and the Regional District is not considering taking any enforcement action on this subject property, at this time.

It should be noted that the information provided in this letter has been limited to a review of our property records files, building inspection files and the applicable zoning bylaw.

Sincerely,



Timothy Donegan

North Peace Land Use Planner

Timothy Donegan

Land Use Planner



Peace River Regional District

9505 100th Street

Fort St. John, BC V1J 4N4

Tel: 250-785-8084

Fax: 250-785-1125

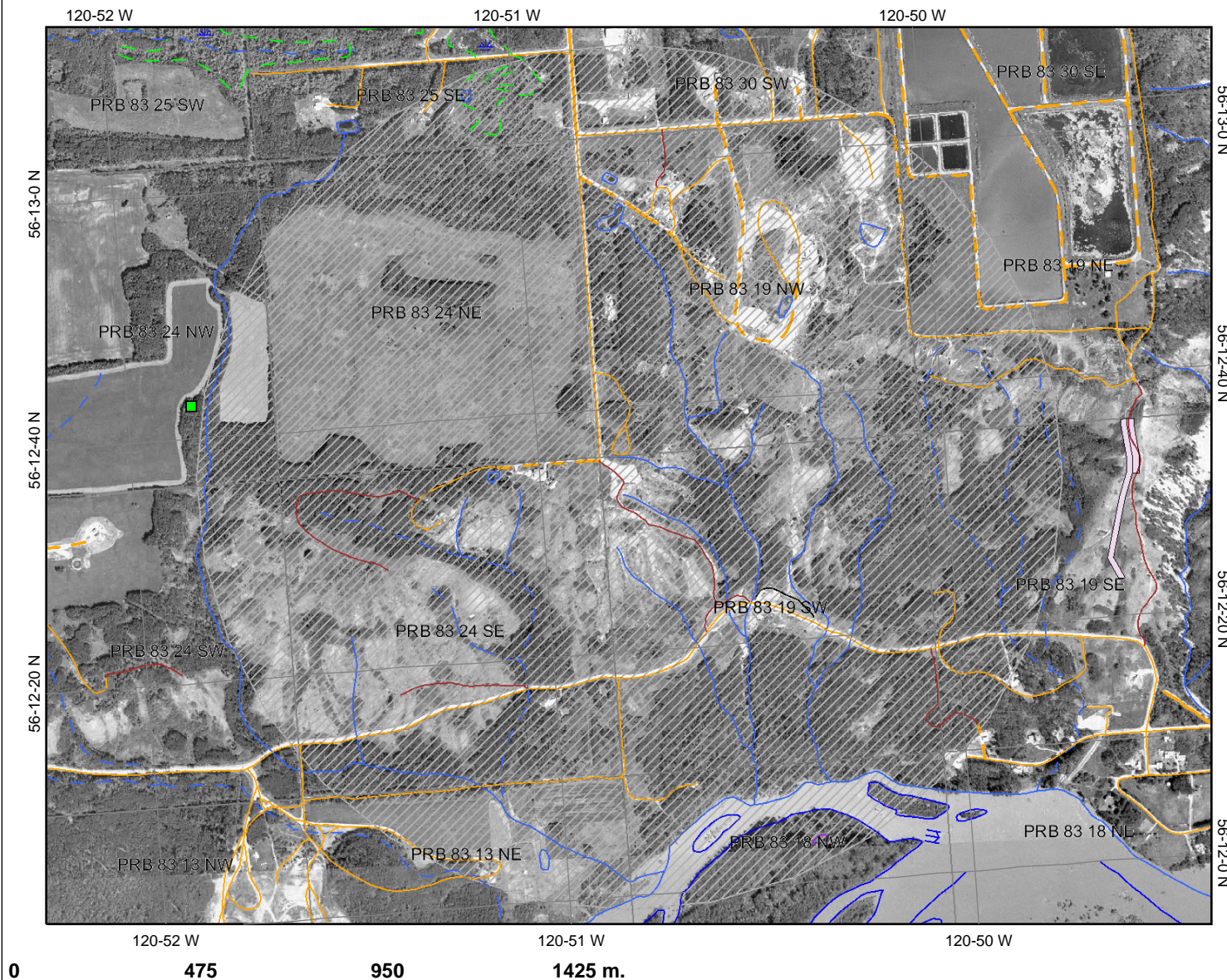
tim.donegan@prrd.bc.ca

www.prrd.bc.ca

Appendix D

Oil and Gas Search Results

Oil and Gas Search Result



Legend

- Well Sites
- Survey Parcel Right of Ways
- Transportation - Points (TRIM)
- Helipad
- Transportation - Lines (TRIM)
- Airfield
- Airport
- Airstrip
- Airport.Abandoned
- Ferry Route
- Road (Gravel Undivided) - 1 Lane
- Road (Gravel Undivided) - 2 Lanes
- Road (Gravel Undivided) - U/C - 1 Lane
- Road (Gravel Undivided) - U/C - 2 Lanes
- Road (Paved Divided) - Not Elevated - 1 Lane Each Way
- Road (Paved Divided) - Not Elevated - 2 Lanes Each Way
- Road (Paved Divided) - U/C - Not Elevated - 2 Lanes Each Way
- Road (Paved Undivided) - Not Elevated - 1 Lane
- Road (Paved Undivided) - Not Elevated - 2 Lanes
- Road (Paved Undivided) - Not Elevated - 4 Lanes
- Road (Paved Undivided) - U/C - Not Elevated - 4 Lanes
- Road (Unimproved)
- Cut (Roadway)
- Embankment/Fill (Roadway)
- Trail
- Bridge - Foot
- Bridge - Trestle
- Tunnel
- Bridge
- Rail Line (Double Track)

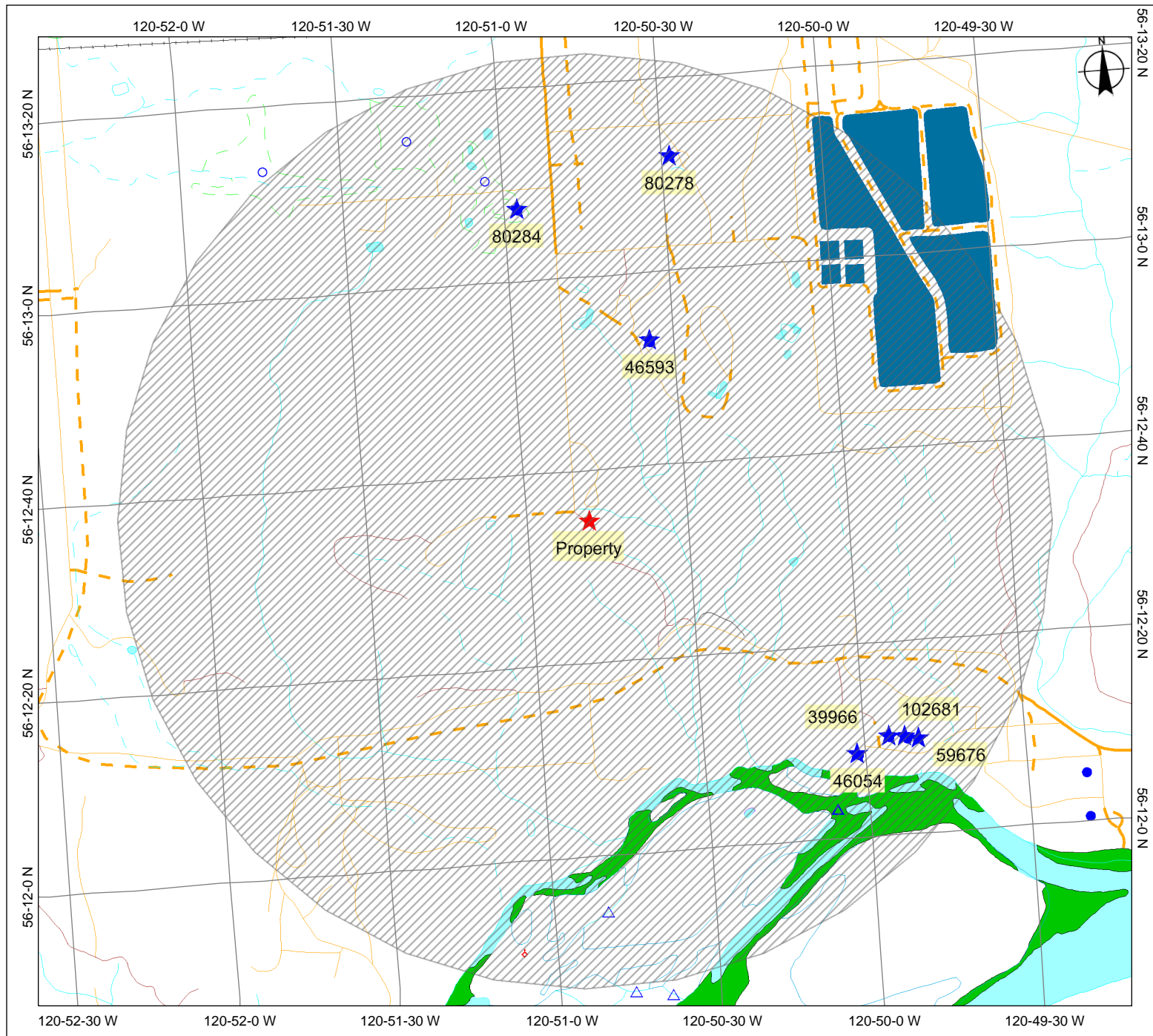


Scale: 1:15,970

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Appendix E

Groundwater Well Search



Water Wells Search Results (1.5km)

Legend

Water - River, Canal, etc. - Colour Themed (1:20,000)

Canal
River or Stream - Definite

Water - River, Canal, etc. - Outlined (1:20,000)

Canal
River or Stream - Definite

Water - Lake, Reservoir, etc. - Colour Themed (1:20,000)

Mine - Tailing Pond
Lake - Definite

Reservoir - Definite

Water - Lake, Reservoir, etc. - Outlined (1:20,000)

Mine - Tailing Pond
Lake - Definite

Reservoir - Definite

Water - Wetlands - Colour Themed (1:20,000)

Flooded Land - Inundated

Marsh

Swamp

Water - Wetlands - Outlined (1:20,000)

0 250 500 m.

Scale: 1:20,000

Colour Filled (1:20,000)

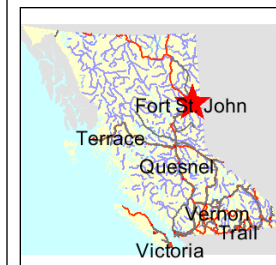
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Datum/Projection: NAD83, Albers Equal Area Conic

Key Map of British Columbia





Report 1 - Detailed Well Record

<p>Well Tag Number: 80284</p> <p>Owner: DARWIN KILBREATH</p> <p>Address:</p> <p>Area:</p> <p>WELL LOCATION: PEACE RIVER Land District District Lot: Plan: 32730 Lot: 1 Township: 83 Section: 25 Range: 49 Indian Reserve: Meridian: Block: Quarter: Island: BCGS Number (NAD 27): 094A026223 Well: 2</p> <p>Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Private Domestic Observation Well Number: Observation Well Status: Construction Method: Diameter: 6 inches Casing drive shoe: Well Depth: 303 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: N File Info Flag: N Sieve Info Flag: N Screen Info Flag: Y</p> <p>Site Info Details: Other Info Flag: Other Info Details:</p>	<p>Construction Date: 1999-10-30 00:00:00.0</p> <p>Driller: Jacob's Water Wells Well Identification Plate Number: Plate Attached By: Where Plate Attached:</p> <p>PRODUCTION DATA AT TIME OF DRILLING: Well Yield: .5 (Driller's Estimate) U.S. Gallons per Minute Development Method: Pump Test Info Flag: N Artesian Flow: Artesian Pressure (ft): Static Level: 67 feet</p> <p>WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM):</p> <p>Water Utility: Water Supply System Name: Water Supply System Well Name:</p> <p>SURFACE SEAL: Flag: N Material: Method: Depth (ft): Thickness (in):</p> <p>WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:</p>																				
<table border="1"> <thead> <tr> <th>Screen from</th> <th>to feet</th> <th>Type</th> <th>Slot Size</th> </tr> </thead> <tbody> <tr> <td>81</td> <td>101</td> <td></td> <td>20</td> </tr> <tr> <td>281</td> <td>301</td> <td></td> <td>20</td> </tr> <tr> <td>0</td> <td>0</td> <td></td> <td>0</td> </tr> <tr> <td>0</td> <td>0</td> <td></td> <td>0</td> </tr> </tbody> </table>	Screen from	to feet	Type	Slot Size	81	101		20	281	301		20	0	0		0	0	0		0	
Screen from	to feet	Type	Slot Size																		
81	101		20																		
281	301		20																		
0	0		0																		
0	0		0																		
<table border="1"> <thead> <tr> <th>Casing from</th> <th>to feet</th> <th>Diameter</th> <th>Material</th> <th>Drive Shoe</th> </tr> </thead> <tbody> <tr> <td>null</td> <td>null</td> <td>0</td> <td>null</td> <td>null</td> </tr> </tbody> </table>	Casing from	to feet	Diameter	Material	Drive Shoe	null	null	0	null	null											
Casing from	to feet	Diameter	Material	Drive Shoe																	
null	null	0	null	null																	
<p>GENERAL REMARKS: @ 82' WATER COME IN @ .5 GPM NO INCREASE TO 303,@ 288' PUMP DIDN'T GO FURTHER SE</p> <p>LITHOLOGY INFORMATION: From 0 to 13 Ft. GUMBO CLAY From 13 to 51 Ft. SOFT CLAY From 51 to 54 Ft. GRAVEL CLAY MIXTURE From 54 to 60 Ft. SOFT SANDSTONE From 60 to 68 Ft. GRAVEL CLAY MIXTURE From 68 to 79 Ft. SOFT CLAY From 79 to 303 Ft. SHALE</p>																					

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Report 1 - Detailed Well Record

Well Tag Number: 80278	Construction Date: 1999-06-29 00:00:00.0		
Owner: DAN CANTLON	Driller: Jacob's Water Wells		
Address:	Well Identification Plate Number:		
Area:	Plate Attached By:		
WELL LOCATION:	Where Plate Attached:		
PEACE RIVER Land District	PRODUCTION DATA AT TIME OF DRILLING:		
District Lot: Plan: 24738 Lot: 6	Well Yield: 11 (Driller's Estimate) U.S. Gallons per Minute		
Township: 83 Section: 30 Range: 18	Development Method:		
Indian Reserve: Meridian: Block:	Pump Test Info Flag: N		
Quarter:	Artesian Flow:		
Island:	Artesian Pressure (ft):		
BCGS Number (NAD 27): 094A026223 Well: 3	Static Level: 177 feet		
Class of Well:	WATER QUALITY:		
Subclass of Well:	Character:		
Orientation of Well:	Colour:		
Status of Well: New	Odour:		
Well Use: Private Domestic	Well Disinfected: N		
Observation Well Number:	EMS ID:		
Observation Well Status:	Water Chemistry Info Flag:		
Construction Method:	Field Chemistry Info Flag:		
Diameter: 6 inches	Site Info (SEAM):		
Casing drive shoe:	Water Utility:		
Well Depth: 323 feet	Water Supply System Name:		
Elevation: 0 feet (ASL)	Water Supply System Well Name:		
Final Casing Stick Up: inches	SURFACE SEAL:		
Well Cap Type:	Flag: N		
Bedrock Depth: feet	Material:		
Lithology Info Flag: N	Method:		
File Info Flag: N	Depth (ft):		
Sieve Info Flag: N	Thickness (in):		
Screen Info Flag: Y	WELL CLOSURE INFORMATION:		
Site Info Details:	Reason For Closure:		
Other Info Flag:	Method of Closure:		
Other Info Details:	Closure Sealant Material:		
	Closure Backfill Material:		
	Details of Closure:		

Screen from	to feet	Type	Slot Size
168	208		20
0	0		0
0	0		0

Casing from	to feet	Diameter	Material	Drive Shoe
null	null	0	null	null

GENERAL REMARKS:
TRICKLE OF WATER @ 48', SHALE FRACTURED @ 196' PRODUCING .5 GPM

LITHOLOGY INFORMATION:

From	0 to	13 Ft.	CLAY W 40% COARSE GRAVEL
From	13 to	105 Ft.	GRAVEL & SAND W 35% CLAY
From	105 to	113 Ft.	CLAY W SOME GRAVEL & SAND
From	113 to	184 Ft.	CLEAN GRAVEL
From	177 to	184 Ft.	WB GRAVEL
From	184 to	194 Ft.	SOFT CLAY OR SHALE
From	194 to	323 Ft.	SHALE

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Report 1 - Detailed Well Record

Well Tag Number: 59676 Owner: JOHN SCHOLTON Address: Area: FORT ST. JOHN WELL LOCATION: PEACE RIVER Land District District Lot: Plan: 14194 Lot: 3 Township: Section: Range: Indian Reserve: Meridian: Block: 1 Quarter: Island: BCGS Number (NAD 27): 094A026221 Well: 3 Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Private Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Casing drive shoe: Well Depth: 98 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Site Info Details: Other Info Flag: Other Info Details:	Construction Date: 1991-05-24 00:00:00.0 Driller: Anderson Air Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 15 (Driller's Estimate) Gallons per Minute (U.S./Imperial) Development Method: Pump Test Info Flag: Y Artesian Flow: Artesian Pressure (ft): Static Level: WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:		
Screen from	to feet	Type	Slot Size
Casing from	to feet	Diameter	Material
Drive Shoe			
GENERAL REMARKS:			
LITHOLOGY INFORMATION: From 0 to 92 Ft. MED GREY CLAY-SOME ROCK From 92 to 94 Ft. SANDY GRAVEL From 94 to 98 Ft. GRAVEL			

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Report 1 - Detailed Well Record

<p>Well Tag Number: 46593</p> <p>Owner: HARVEY BLAIR</p> <p>Address:</p> <p>Area: FORT ST JOHN</p> <p>WELL LOCATION:</p> <p>PEACE RIVER Land District</p> <p>District Lot: Plan: Lot:</p> <p>Township: 83 Section: 19 Range: 18</p> <p>Indian Reserve: Meridian: Block:</p> <p>Quarter: NW</p> <p>Island:</p> <p>BCGS Number (NAD 27): 094A026223 Well: 1</p> <p>Class of Well:</p> <p>Subclass of Well:</p> <p>Orientation of Well:</p> <p>Status of Well: New</p> <p>Well Use: Private Domestic</p> <p>Observation Well Number:</p> <p>Observation Well Status:</p> <p>Construction Method: Unknown Constr</p> <p>Diameter: 6.0 inches</p> <p>Casing drive shoe:</p> <p>Well Depth: 450 feet</p> <p>Elevation: 0 feet (ASL)</p> <p>Final Casing Stick Up: inches</p> <p>Well Cap Type:</p> <p>Bedrock Depth: 80 feet</p> <p>Lithology Info Flag:</p> <p>File Info Flag:</p> <p>Sieve Info Flag:</p> <p>Screen Info Flag:</p> <p>Site Info Details:</p> <p>Other Info Flag:</p> <p>Other Info Details:</p>	<p>Construction Date: 1980-11-11 00:00:00.0</p> <p>Driller: H. & W. Aqua Drilling</p> <p>Well Identification Plate Number:</p> <p>Plate Attached By:</p> <p>Where Plate Attached:</p> <p>PRODUCTION DATA AT TIME OF DRILLING:</p> <p>Well Yield: 0 (Driller's Estimate)</p> <p>Development Method:</p> <p>Pump Test Info Flag:</p> <p>Artesian Flow:</p> <p>Artesian Pressure (ft):</p> <p>Static Level:</p> <p>WATER QUALITY:</p> <p>Character:</p> <p>Colour:</p> <p>Odour:</p> <p>Well Disinfected: N</p> <p>EMS ID:</p> <p>Water Chemistry Info Flag:</p> <p>Field Chemistry Info Flag:</p> <p>Site Info (SEAM):</p> <p>Water Utility:</p> <p>Water Supply System Name:</p> <p>Water Supply System Well Name:</p> <p>SURFACE SEAL:</p> <p>Flag:</p> <p>Material:</p> <p>Method:</p> <p>Depth (ft):</p> <p>Thickness (in):</p> <p>WELL CLOSURE INFORMATION:</p> <p>Reason For Closure:</p> <p>Method of Closure:</p> <p>Closure Sealant Material:</p> <p>Closure Backfill Material:</p> <p>Details of Closure:</p>			
Screen from	to feet	Type	Slot Size	
Casing from	to feet	Diameter	Material	Drive Shoe
GENERAL REMARKS:				
<p>LITHOLOGY INFORMATION:</p> <p>From 0 to 40 Ft. clay</p> <p>From 40 to 80 Ft. gravel</p> <p>From 80 to 450 Ft. bedrock shale</p>				

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Report 1 - Detailed Well Record

Well Tag Number: 46054 Owner: ART DENNISON (KRESS) Address: OLD FORT Area: FORT ST JOHN WELL LOCATION: PEACE RIVER Land District District Lot: Plan: 14194 Lot: 1 Township: 83 Section: 18 Range: 18 Indian Reserve: Meridian: Block: 2 Quarter: Island: BCGS Number (NAD 27): 094A026221 Well: 1 Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Unknown Constr Diameter: 6.0 inches Casing drive shoe: Well Depth: 110 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: 110 feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Site Info Details: Other Info Flag: Other Info Details:	Construction Date: 1980-09-09 00:00:00.0 Driller: B. & W. Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 8 (Driller's Estimate) Gallons per Minute (U.S./Imperial) Development Method: Pump Test Info Flag: Artesian Flow: Artesian Pressure (ft): Static Level: 60 feet WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:		
Screen from	to feet	Type	Slot Size
Casing from	to feet	Diameter	Material
Drive Shoe			
GENERAL REMARKS:			
LITHOLOGY INFORMATION: From 0 to 60 Ft. clay From 60 to 100 Ft. clay and gravel, tight From 100 to 110 Ft. gravel From 110 to 0 Ft. bedrock From 0 to 0 Ft. source of water: 12 GPM at 110'			

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Report 1 - Detailed Well Record

<p>Well Tag Number: 39966</p> <p>Owner: RANDY MERK (GATTIN)</p> <p>Address: OLD FORT</p> <p>Area: FORT ST JOHN</p> <p>WELL LOCATION:</p> <p>PEACE RIVER Land District</p> <p>District Lot: Plan: 14194 Lot: 1</p> <p>Township: 83 Section: 18 Range: 18</p> <p>Indian Reserve: Meridian: Block: 1</p> <p>Quarter:</p> <p>Island:</p> <p>BCGS Number (NAD 27): 094A026221 Well: 2</p> <p>Class of Well:</p> <p>Subclass of Well:</p> <p>Orientation of Well:</p> <p>Status of Well: New</p> <p>Well Use: Unknown Well Use</p> <p>Observation Well Number:</p> <p>Observation Well Status:</p> <p>Construction Method: Drilled</p> <p>Diameter: 4.5 inches</p> <p>Casing drive shoe:</p> <p>Well Depth: 120 feet</p> <p>Elevation: 0 feet (ASL)</p> <p>Final Casing Stick Up: inches</p> <p>Well Cap Type:</p> <p>Bedrock Depth: feet</p> <p>Lithology Info Flag:</p> <p>File Info Flag:</p> <p>Sieve Info Flag:</p> <p>Screen Info Flag:</p> <p>Site Info Details:</p> <p>Other Info Flag:</p> <p>Other Info Details:</p>	<p>Construction Date: 1978-06-29 00:00:00.0</p> <p>Driller: I . & M. Drilling</p> <p>Well Identification Plate Number:</p> <p>Plate Attached By:</p> <p>Where Plate Attached:</p> <p>PRODUCTION DATA AT TIME OF DRILLING:</p> <p>Well Yield: 0 (Driller's Estimate)</p> <p>Development Method:</p> <p>Pump Test Info Flag:</p> <p>Artesian Flow:</p> <p>Artesian Pressure (ft):</p> <p>Static Level:</p> <p>WATER QUALITY:</p> <p>Character:</p> <p>Colour:</p> <p>Odour:</p> <p>Well Disinfected: N</p> <p>EMS ID:</p> <p>Water Chemistry Info Flag:</p> <p>Field Chemistry Info Flag:</p> <p>Site Info (SEAM):</p> <p>Water Utility:</p> <p>Water Supply System Name:</p> <p>Water Supply System Well Name:</p> <p>SURFACE SEAL:</p> <p>Flag:</p> <p>Material:</p> <p>Method:</p> <p>Depth (ft):</p> <p>Thickness (in):</p> <p>WELL CLOSURE INFORMATION:</p> <p>Reason For Closure:</p> <p>Method of Closure:</p> <p>Closure Sealant Material:</p> <p>Closure Backfill Material:</p> <p>Details of Closure:</p>			
Screen from	to feet	Type	Slot Size	
Casing from	to feet	Diameter	Material	Drive Shoe
<p>GENERAL REMARKS:</p> <p>LOW IN IRON, MUD CLOGGED</p> <p>LITHOLOGY INFORMATION:</p> <p>From 0 to 26 Ft. brown clay and rock mix</p> <p>From 26 to 29 Ft. hard stringer</p> <p>From 29 to 70 Ft. rock</p>				

From	70 to	78 Ft.	very hard stringer
From	78 to	120 Ft.	gravel and rock

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Report 1 - Detailed Well Record

Well Tag Number: 102681 Owner: SCHOLTEN Address: Area: WELL LOCATION: PEACE RIVER Land District District Lot: Plan: 14194 Lot: 2 & 3 Township: Section: Range: Indian Reserve: Meridian: Block: 4 Quarter: Island: BCGS Number (NAD 27): 094A026221 Well: Class of Well: Water supply Subclass of Well: Domestic Orientation of Well: Vertical Status of Well: New Well Use: Private Domestic Observation Well Number: Observation Well Status: Construction Method: Diameter: inches Casing drive shoe: Y Well Depth: 40 feet Elevation: feet (ASL) Final Casing Stick Up: 84 inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: Y File Info Flag: N Sieve Info Flag: N Screen Info Flag: N Site Info Details: Other Info Flag: Other Info Details:	Construction Date: 1993-07-15 00:00:00.0 Driller: Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 30 (Driller's Estimate) U.S. Gallons per Minute Development Method: Air lifting Pump Test Info Flag: N Artesian Flow: Artesian Pressure (ft): Static Level: 11 feet WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Y Field Chemistry Info Flag: Site Info (SEAM): Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: N Material: Bentonite clay and steel casing Method: Depth (ft): Thickness (in): Liner from To: feet WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:
---	--

Screen from	to feet	Type	Slot Size
Casing from	to feet	Diameter	Material
0	40	6	Steel
			Drive Shoe
			Y

GENERAL REMARKS:
 MEASUREMENTS FROM GROUND LEVEL. PERFORATIONS: 18'-26' MILLS KNIFE BENTONITE PLUG ON BOTTOM OF SEAL. WATER ANALYSIS: IRON 7 MG/L CHLORIDE 1'

LITHOLOGY INFORMATION:
 From 0 to 8 Ft. overburden
 From 8 to 15 Ft. COARSE GRAVEL W/ CLAY
 From 15 to 17 Ft. COARSE GRAVEL W/ CLAY WET
 From 17 to 40 Ft. COARSE-EXTRA COARSE GRAVEL 30 Gallons per Minute (U.S./Imperial)

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Appendix F

BC Online Site Registry Search

As Of: FEB 20, 2011 BC Online: Site Registry 11/02/25
For: PE29908 EWD CONSULTING CORP 10:18:41
Folio: Page 1

Area Nil Search

As of FEB 20, 2011, no records from Site Registry
fall within 0.5 kilometers of coordinates
Latitude 56 degrees, 12 minutes, 34.5 seconds, and
Longitude 120 degrees, 50 minutes, 48.8 seconds.

You have been charged for this information.

Sites may be revealed by searching with alternate search methods. For example,
a site not revealed in an Area search may be revealed by searching with another
piece of information such as PID, PIN, address or Crown Lands File Number

Appendix G

Borehole Logs

Stage 1 and Limited Stage 2 PSI		Peace River Regional District		BOREHOLE NO: BH11-1	
Peace Valley Lookout Point		Solid Stem Auger		PROJECT NO: 20003.001	
Fort St. John, BC					
SAMPLE TYPE DISTURBED NO RECOVERY SPT A-CASING SHELBY TUBE CORE					
BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	USC	SOIL SYMBOL	MOISTURE CONTENT	PLASTIC M.C. LIQUID		UNCONFINED (kPa)		POCKET PEN. (kPa)	Backfill	Depth (ft)
							20	40	50	100			
0	SAND AND GRAVEL (FILL) - Some silt, poor gradation, low plasticity, frozen, brown		1-1	FILL									0
	CLAY - silty, silt pockets, low plasticity, light brown		1-2	CL-CI									
1	- clay content increases		1-3	CL-CI									5
2	- becomes soft, mottling, moisture increases		1-4	CL-CI									
			1-5	CL-CI									
3	EOH @ 3.05 m No Well Installed Backfilled with Drill Cuttings												10
4													15
5													16



LOGGED BY: JF	COMPLETION DEPTH: 3.05m
REVIEWED BY: JG	COMPLETE: 04/03/2011
DRAWING NO:	Page 1 of 1

Stage 1 and Limited Stage 2 PSI		Peace River Regional District		BOREHOLE NO: BH11-2	
Peace Valley Lookout Point		Solid Stem Auger		PROJECT NO: 20003.001	
Fort St. John, BC					
SAMPLE TYPE <input checked="" type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input checked="" type="checkbox"/> SPT <input type="checkbox"/> A-CASING <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> CORE					
BACKFILL TYPE <input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	USC	SOIL SYMBOL	MOISTURE CONTENT	PLASTIC M.C. LIQUID		UNCONFINED (kPa)		Backfill	Depth (ft)
							20	40	50	100		
0	SAND AND GRAVEL (FILL) - Some silt, poor gradation, low plasticity, frozen, grey to brown CLAY - silty, silt pockets, trace gravel, moist, brown		2-1 (2-1 Dup)	FILL								0
1			2-2	CL-CI								
	- increased clay, firm, medium plasticity		2-3	CL-CI								5
2			2-4	CL-CI								
	- trace gravel											
3	EOH @ 3.05 m No Well Installed Backfilled with Drill Cuttings											10
4												15
5												16



LOGGED BY: JF	COMPLETION DEPTH: 3.05m
REVIEWED BY: JG	COMPLETE: 04/03/2011
DRAWING NO:	Page 1 of 1

Stage 1 and Limited Stage 2 PSI		Peace River Regional District		BOREHOLE NO: BH11-3	
Peace Valley Lookout Point		Solid Stem Auger		PROJECT NO: 20003.001	
Fort St. John, BC					

SAMPLE TYPE	<input checked="" type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input checked="" type="checkbox"/> SPT <input type="checkbox"/> A-CASING <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> CORE
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND

Depth (m)

0

1

2

3

4

5

SOIL DESCRIPTION

SAND AND GRAVEL (FILL)

- Some silt, poor gradation, low plasticity, frozen, grey to brown

CLAY

- some silt, firm, medium plasticity, mottles, some gypsum crystals, frozen

CLAY

- silt pockets, sand pockets, trace organics, medium plasticity, oxidation, mottles, moist

- moisture increases

EOH @ 3.05 m

NO Well Installed

Backfilled with Drill Cuttings

SAMPLE TYPE

SAMPLE NUMBER

USC

SOIL SYMBOL

MOISTURE CONTENT

PLASTIC M.C. LIQUID

20 40 60 80

◆ UNCONFINED (kPa) ◆

50 100 150 200

▲ POCKET PEN. (kPa) ▲

100 200 300 400

Backfill

Depth (ft)

0

5

10

15

16

<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>3-1 FILL </p> <p>3-2 CL-CI </p> <p>3-3 CL-CI </p> <p>3-4 CL-CI </p> <p>3-5 CL-CI </p> </div> <div style="width: 5%; text-align: center;"> <p>3</p> <p>4</p> <p>5</p> </div> </div>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>LOGGED BY: JF</p> <p>REVIEWED BY: JG</p> <p>DRAWING NO:</p> </div> <div style="width: 55%;"> <p>COMPLETION DEPTH: 3.05m</p> <p>COMPLETE: 04/03/2011</p> <p>Page 1 of 1</p> </div> </div>
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GEOTECHNICAL 20003.001 BOREHOLE LOGS.GPJ EBA.GDT 30/3/11

GEOTECHNICAL 20003.001 BOREHOLE LOGS.GPJ EBA.GDT 30/3/11

Stage 1 and Limited Stage 2 PSI		Peace River Regional District		BOREHOLE NO: BH11-6	
Peace Valley Lookout Point		Solid Stem Auger		PROJECT NO: 20003.001	
Fort St. John, BC					
SAMPLE TYPE <input checked="" type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input checked="" type="checkbox"/> SPT <input type="checkbox"/> A-CASING <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> CORE					
BACKFILL TYPE <input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	USC	SOIL SYMBOL	MOISTURE CONTENT	PLASTIC M.C. LIQUID		UNCONFINED (kPa)		POCKET PEN. (kPa)	Backfill	Depth (ft)
							20 40 60 80		50 100 150 200				
0	SAND AND GRAVEL (FILL) - Some silt, poor gradation, low plasticity, frozen, grey to brown		6-1	FILL									0
	SILT - loose and light brown		6-2	ML									
1			6-3	ML									
	CLAY - silty, medium plasticity, firm, gypsum crystals, moist, dark brown		6-4	CL-ML									5
2	CLAY - some gravel, silt pockets, some silt, mottles		6-5 (D)	CL-CI									
	Clay - silt pockets, brown		6-6	CL-CI									
3	EOH @ 3.05 M NO Well Installed Backfilled with Drill Cuttings												10
4													15
5													16



LOGGED BY: JF	COMPLETION DEPTH: 3.05m
REVIEWED BY: JG	COMPLETE: 04/03/2011
DRAWING NO:	Page 1 of 1

GEOTECHNICAL 20003.001 BOREHOLE LOGS.GPJ EBA.GDT 30/3/11

Appendix H

Laboratory Analytical Results

Your P.O. #: 20003.001
Your Project #: 20003.001
Your C.O.C. #: F109563, F129834, F109562, F129821

Attention: Jodi Fleming
EWD CONSULTING CORP.
10707 101 AVENUE
FORT ST. JOHN, BC
CANADA V1J 5J4

Report Date: 2011/03/11

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B117992
Received: 2011/03/08, 13:20

Sample Matrix: Soil
Samples Received: 13

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE Soil LH, VH, F1 SIM/MS	4	2011/03/08	2011/03/09	BBY8-SOP-00010	EPA SW846 8260C
BTEX/MTBE Soil LH, VH, F1 SIM/MS	1	2011/03/08	2011/03/10	BBY8-SOP-00010	EPA SW846 8260C
BTEX/MTBE Soil LH, VH, F1 SIM/MS	1	2011/03/10	2011/03/10	BBY8-SOP-00010	EPA SW846 8260C
BTEX/MTBE Soil LH, VH, F1 SIM/MS	1	2011/03/11	2011/03/10	BBY8-SOP-00010	EPA SW846 8260C
Elements by ICPMS (total)	6	2011/03/09	2011/03/09	BBY7SOP-00004	Based on EPA 200.8
Moisture	7	N/A	2011/03/09	BBY8SOP-00017	Ont MOE -E 3139
Moisture	1	N/A	2011/03/11	BBY8SOP-00017	Ont MOE -E 3139
PAH in Soil by GC/MS (SIM)	1	2011/03/08	2011/03/11	BBY8SOP-00022	Based on EPA 8270D
Total LMW, HMW, Total PAH Calc	1	N/A	2011/03/11		PAHTOT-S
pH (2:1 DI Water Extract)	6	2011/03/09	2011/03/10	BBY6SOP-00028	Carter, SSMA 16.2
CSR VH C6-C10 in Soil by GC/FID	1	2011/03/09	2011/03/09	BBY8SOP-00011	Based on EPA SW8260C
EPH less PAH in Soil By GC/FID	1	N/A	2011/03/11		
BC Hydrocarbons in Soil by GC/FID	1	2011/03/08	2011/03/09	BBY8SOP-00029	Based BCCSR Method 3
BC Hydrocarbons in Soil by GC/FID	4	2011/03/08	2011/03/10	BBY8SOP-00029	Based BCCSR Method 3
VOCs in Soil by HS GC/MS	1	2011/03/08	2011/03/09	BBY8-SOP-0009/R18	Based on EPA 8260C
Volatile HC-BTEX	1	N/A	2011/03/09		
Volatile HC-BTEX	6	N/A	2011/03/10		
Volatile HC-BTEX	1	N/A	2011/03/11		

* Results relate only to the items tested.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Amanda Hart, Burnaby Customer Service
Email: AHart@maxxam.ca
Phone# (604) 639-2605

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

PHYSICAL TESTING (SOIL)

Maxxam ID		AC1986	AC1992	AC2025	AC2031	AC2037	AC2042	AC2051		AD0213		
Sampling Date		2011/03/04	2011/03/04	2011/03/04	2011/03/04	2011/03/04	2011/03/04	2011/03/04		2011/03/04		
	Units	BH11-2-1	BH11-3-3	BH11-4-3	BH11-5-4	BH11-6-2	BH11-7-1	BH11-E	QC Batch	BH11-2-1 DUP	RDL	QC Batch
Physical Properties												
Moisture	%	14	21	19	21	14	9.4	10	4689512	14	0.3	4698565

TOTAL PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		AC1986		AC2031		AC2037		AC2042		
Sampling Date		2011/03/04		2011/03/04		2011/03/04		2011/03/04		
	Units	BH11-2-1	QC Batch	BH11-5-4	QC Batch	BH11-6-2	QC Batch	BH11-7-1	RDL	QC Batch
Hydrocarbons										
EPH (C10-C19)	mg/kg	<100	4695161	<100	4697218	<100	4693661	<100	100	4693636
EPH (C19-C32)	mg/kg	<100	4695161	<100	4697218	<100	4693661	<100	100	4693636
Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	82	4695161	88	4697218	95	4693661	90		4693636

RDL = Reportable Detection Limit

Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

BCCSR BTEX/VPH BY HS IN SOIL (SOIL)

Maxxam ID		AC1986	AC1992		AC2025	AC2031	AC2037	AC2051		AD0213		
Sampling Date		2011/03/04	2011/03/04		2011/03/04	2011/03/04	2011/03/04	2011/03/04		2011/03/04		
	Units	BH11-2-1	BH11-3-3	QC Batch	BH11-4-3	BH11-5-4	BH11-6-2	BH11-E	QC Batch	BH11-2-1 DUP	RDL	QC Batch
Volatiles												
VPH (VHW6 to 10 - BTEX)	mg/kg	<10	<10	4688721	<10	<10	<10	<10	4688721	<10	10	4699089
Methyl-tert-butylether (MTBE)	mg/kg	<0.1	<0.1	4691510	<0.1	<0.1	<0.1	<0.1	4692489	<0.1	0.1	4691510
Benzene	mg/kg	<0.005	<0.005	4691510	<0.005	<0.005	<0.005	<0.005	4692489	<0.005	0.005	4691510
Toluene	mg/kg	0.02	<0.02	4691510	<0.02	<0.02	<0.02	<0.02	4692489	<0.02	0.02	4691510
Ethylbenzene	mg/kg	<0.01	<0.01	4691510	<0.01	<0.01	<0.01	<0.01	4692489	<0.01	0.01	4691510
m & p-Xylene	mg/kg	0.04	<0.04	4691510	<0.04	<0.04	<0.04	<0.04	4692489	<0.04	0.04	4691510
o-Xylene	mg/kg	<0.04	<0.04	4691510	<0.04	<0.04	<0.04	<0.04	4692489	<0.04	0.04	4691510
Styrene	mg/kg	<0.03	<0.03	4691510	<0.03	<0.03	<0.03	<0.03	4692489	<0.03	0.03	4691510
Xylenes (Total)	mg/kg	0.04	<0.04	4691510	<0.04	<0.04	<0.04	<0.04	4692489	<0.04	0.04	4691510
VH C6-C10	mg/kg	<10	<10	4691510	<10	<10	<10	<10	4692489	<10	10	4691510
Surrogate Recovery (%)												
4-BROMOFLUOROBENZENE (sur.)	%	83	81	4691510	100	101	99	101	4692489	81		4691510
D10-ETHYLBENZENE (sur.)	%	100	104	4691510	97	96	94	98	4692489	93		4691510
D4-1,2-DICHLOROETHANE (sur.)	%	114	113	4691510	108	107	107	107	4692489	103		4691510
D8-TOLUENE (sur.)	%	92	91	4691510	98	97	97	97	4692489	96		4691510

RDL = Reportable Detection Limit

Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

LEPH & HEPH FOR CSR IN SOIL (SOIL)

Maxxam ID		AC1992		
Sampling Date		2011/03/04		
	Units	BH11-3-3	RDL	QC Batch
Polycyclic Aromatics				
Naphthalene	mg/kg	<0.05	0.05	4697373
2-Methylnaphthalene	mg/kg	<0.05	0.05	4697373
Acenaphthylene	mg/kg	<0.05	0.05	4697373
Acenaphthene	mg/kg	<0.05	0.05	4697373
Fluorene	mg/kg	<0.05	0.05	4697373
Phenanthrene	mg/kg	<0.05	0.05	4697373
Anthracene	mg/kg	<0.05	0.05	4697373
Fluoranthene	mg/kg	<0.05	0.05	4697373
Pyrene	mg/kg	<0.05	0.05	4697373
Benzo(a)anthracene	mg/kg	<0.05	0.05	4697373
Chrysene	mg/kg	<0.05	0.05	4697373
Benzo(b&j)fluoranthene	mg/kg	<0.05	0.05	4697373
Benzo(k)fluoranthene	mg/kg	<0.05	0.05	4697373
Benzo(a)pyrene	mg/kg	<0.05	0.05	4697373
Indeno(1,2,3-cd)pyrene	mg/kg	<0.05	0.05	4697373
Dibenz(a,h)anthracene	mg/kg	<0.05	0.05	4697373
Benzo(g,h,i)perylene	mg/kg	<0.05	0.05	4697373
Low Molecular Weight PAH's	mg/kg	<0.05	0.05	4688719
High Molecular Weight PAH's	mg/kg	<0.05	0.05	4688719
Total PAH	mg/kg	<0.05	0.05	4688719
Surrogate Recovery (%)				
D10-ANTHRACENE (sur.)	%	86		4697373
D12-BENZO(A)PYRENE (sur.)	%	77		4697373
D8-ACENAPHTHYLENE (sur.)	%	88		4697373
D8-NAPHTHALENE (sur.)	%	89		4697373
TERPHENYL-D14 (sur.)	%	90		4697373
Calculated Parameters				
LEPH (C10-C19 less PAH)	mg/kg	<100	100	4688720
HEPH (C19-C32 less PAH)	mg/kg	<100	100	4688720
Hydrocarbons				
EPH (C10-C19)	mg/kg	<100	100	4697371
EPH (C19-C32)	mg/kg	<100	100	4697371
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	94		4697371

RDL = Reportable Detection Limit



Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		AC1981	AC1987	AC1990	AC2028	AC2038	AC2042		
Sampling Date		2011/03/04	2011/03/04	2011/03/04	2011/03/04	2011/03/04	2011/03/04		
	Units	BH11-1-1	BH11-2-2	BH11-3-1	BH11-5-1	BH11-6-3	BH11-7-1	RDL	QC Batch
Physical Properties									
Soluble (2:1) pH	pH Units	8.09	7.97	7.77	7.97	8.17	7.92	0.01	4692434
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	12600	12100	8240	12100	11800	10900	100	4692425
Total Antimony (Sb)	mg/kg	0.6	0.5	0.7	0.6	0.8	0.8	0.1	4692425
Total Arsenic (As)	mg/kg	8.1	12.0	7.4	10.0	8.5	8.1	0.2	4692425
Total Barium (Ba)	mg/kg	121	167	266	179	296	290	0.1	4692425
Total Beryllium (Be)	mg/kg	0.8	0.7	0.6	0.8	0.6	0.7	0.1	4692425
Total Bismuth (Bi)	mg/kg	0.2	0.2	0.1	0.2	0.2	0.2	0.1	4692425
Total Cadmium (Cd)	mg/kg	0.48	0.38	0.44	0.44	0.81	0.47	0.05	4692425
Total Calcium (Ca)	mg/kg	33200	10100	22600	10500	31100	20000	100	4692425
Total Chromium (Cr)	mg/kg	22	21	17	22	21	21	1	4692425
Total Cobalt (Co)	mg/kg	10.7	11.2	6.8	12.0	11.6	8.9	0.3	4692425
Total Copper (Cu)	mg/kg	24.1	27.6	19.0	27.9	25.3	23.9	0.5	4692425
Total Iron (Fe)	mg/kg	22000	25700	23700	24800	24800	25300	100	4692425
Total Lead (Pb)	mg/kg	12.2	14.7	14.2	14.5	14.4	15.3	0.1	4692425
Total Lithium (Li)	mg/kg	21	20	11	20	21	15	5	4692425
Total Magnesium (Mg)	mg/kg	7650	5600	6050	7510	10000	6360	100	4692425
Total Manganese (Mn)	mg/kg	225	211	295	297	456	331	0.2	4692425
Total Mercury (Hg)	mg/kg	0.05	0.07	<0.05	0.07	0.05	0.05	0.05	4692425
Total Molybdenum (Mo)	mg/kg	1.5	1.4	1.5	1.5	1.6	1.8	0.1	4692425
Total Nickel (Ni)	mg/kg	33.0	33.8	23.2	37.0	38.1	34.3	0.8	4692425
Total Phosphorus (P)	mg/kg	581	643	695	653	787	616	10	4692425
Total Potassium (K)	mg/kg	2000	1850	1230	1890	1750	1420	100	4692425
Total Selenium (Se)	mg/kg	1.1	0.7	0.8	0.9	0.8	<0.5	0.5	4692425
Total Silver (Ag)	mg/kg	0.18	0.19	3.91	0.20	0.20	0.33	0.05	4692425
Total Sodium (Na)	mg/kg	765	1220	256	1300	580	263	100	4692425
Total Strontium (Sr)	mg/kg	96.5	58.0	63.8	65.5	90.5	64.4	0.1	4692425
Total Thallium (Tl)	mg/kg	0.17	0.18	0.12	0.19	0.25	0.15	0.05	4692425
Total Tin (Sn)	mg/kg	0.6	0.6	1.1	0.6	0.4	0.6	0.1	4692425
Total Titanium (Ti)	mg/kg	18	18	30	21	46	22	1	4692425
Total Uranium (U)	mg/kg	1.68	1.89	0.85	2.05	1.33	0.99	0.05	4692425
Total Vanadium (V)	mg/kg	43	37	30	39	39	42	2	4692425
Total Zinc (Zn)	mg/kg	86	105	96	96	102	87	1	4692425
Total Zirconium (Zr)	mg/kg	5.3	4.9	1.9	4.8	3.7	2.9	0.5	4692425

RDL = Reportable Detection Limit

Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

CSR VOC + VPH IN SOIL (SOIL)

Maxxam ID		AC2042		
Sampling Date		2011/03/04		
	Units	BH11-7-1	RDL	QC Batch
Volatiles				
VPH (VHW6 to 10 - BTEX)	mg/kg	<10	10	4688721
Volatile Hydrocarbons				
CSR VH C6-C10	mg/kg	<10	10	4691466
Volatiles				
Chloromethane	mg/kg	<0.1	0.1	4691461
Vinyl chloride	mg/kg	<0.06	0.06	4691461
Bromomethane	mg/kg	<0.3	0.3	4691461
Chloroethane	mg/kg	<0.1	0.1	4691461
Trichlorofluoromethane	mg/kg	<0.2	0.2	4691461
1,1-dichloroethene	mg/kg	<0.03	0.03	4691461
Dichloromethane	mg/kg	<0.1	0.1	4691461
trans-1,2-dichloroethene	mg/kg	<0.03	0.03	4691461
1,1-dichloroethane	mg/kg	<0.03	0.03	4691461
cis-1,2-dichloroethene	mg/kg	<0.03	0.03	4691461
Chloroform	mg/kg	<0.05	0.05	4691461
1,1,1-trichloroethane	mg/kg	<0.03	0.03	4691461
1,2-dichloroethane	mg/kg	<0.03	0.03	4691461
Carbon tetrachloride	mg/kg	<0.03	0.03	4691461
Benzene	mg/kg	<0.005	0.005	4691461
Methyl-tert-butylether (MTBE)	mg/kg	<0.1	0.1	4691461
1,2-dichloropropane	mg/kg	<0.03	0.03	4691461
Trichloroethene	mg/kg	<0.01	0.01	4691461
Bromodichloromethane	mg/kg	<0.05	0.05	4691461
cis-1,3-dichloropropene	mg/kg	<0.05	0.05	4691461
trans-1,3-dichloropropene	mg/kg	<0.05	0.05	4691461
1,1,2-trichloroethane	mg/kg	<0.03	0.03	4691461
Toluene	mg/kg	<0.02	0.02	4691461
Chlorodibromomethane	mg/kg	<0.05	0.05	4691461
Dibromoethane	mg/kg	<0.03	0.03	4691461
Tetrachloroethene	mg/kg	<0.03	0.03	4691461
Chlorobenzene	mg/kg	<0.03	0.03	4691461
1,1,1,2-tetrachloroethane	mg/kg	<0.03	0.03	4691461
Ethylbenzene	mg/kg	<0.01	0.01	4691461
m & p-Xylene	mg/kg	<0.04	0.04	4691461
Bromoform	mg/kg	<0.05	0.05	4691461

RDL = Reportable Detection Limit



Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

CSR VOC + VPH IN SOIL (SOIL)

Maxxam ID		AC2042		
Sampling Date		2011/03/04		
	Units	BH11-7-1	RDL	QC Batch
Styrene	mg/kg	<0.03	0.03	4691461
o-Xylene	mg/kg	<0.04	0.04	4691461
Xylenes (Total)	mg/kg	<0.04	0.04	4691461
1,1,2,2-tetrachloroethane	mg/kg	<0.03	0.03	4691461
1,2-dichlorobenzene	mg/kg	<0.03	0.03	4691461
1,3-dichlorobenzene	mg/kg	<0.03	0.03	4691461
1,4-dichlorobenzene	mg/kg	<0.03	0.03	4691461
Surrogate Recovery (%)				
4-BROMOFLUOROBENZENE (sur.)	%	83		4691461
D10-ETHYLBENZENE (sur.)	%	76		4691461
D4-1,2-DICHLOROETHANE (sur.)	%	99		4691461
D8-TOLUENE (sur.)	%	93		4691461

RDL = Reportable Detection Limit

Maxxam Job #: B117992
Report Date: 2011/03/11

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Package 1	6.7°C
Package 2	7.3°C
Package 3	6.0°C
Package 4	5.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

General Comments

Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
4689512	Moisture	2011/03/09					<0.3	%	0.6	20		
4691461	4-BROMOFLUOROBENZENE (sur.)	2011/03/09	99	70 - 130	111	70 - 130	101	%				
4691461	D10-ETHYLBENZENE (sur.)	2011/03/09	84	50 - 130	93	50 - 130	103	%				
4691461	D4-1,2-DICHLOROETHANE (sur.)	2011/03/09	108	70 - 130	117	70 - 130	104	%				
4691461	D8-TOLUENE (sur.)	2011/03/09	102	70 - 130	102	70 - 130	104	%				
4691461	Chloromethane	2011/03/09	66	40 - 150	63	40 - 150	<0.1	mg/kg	NC	40		
4691461	Vinyl chloride	2011/03/09	66	40 - 150	71	40 - 150	<0.06	mg/kg	NC	40		
4691461	Bromomethane	2011/03/09	79	40 - 150	53	40 - 150	<0.3	mg/kg	NC	40		
4691461	Chloroethane	2011/03/09	78	40 - 150	93	40 - 150	<0.1	mg/kg	NC	40		
4691461	Trichlorofluoromethane	2011/03/09	78	40 - 150	81	40 - 150	<0.2	mg/kg	NC	40		
4691461	1,1-dichloroethene	2011/03/09	85	60 - 140	90	60 - 140	<0.03	mg/kg	NC	40		
4691461	Dichloromethane	2011/03/09	84	60 - 140	106	60 - 140	<0.1	mg/kg	NC	40		
4691461	trans-1,2-dichloroethene	2011/03/09	95	60 - 140	100	60 - 140	<0.03	mg/kg	NC	40		
4691461	1,1-dichloroethane	2011/03/09	92	60 - 140	97	60 - 140	<0.03	mg/kg	NC	40		
4691461	cis-1,2-dichloroethene	2011/03/09	83	60 - 140	90	60 - 140	<0.03	mg/kg	NC	40		
4691461	Chloroform	2011/03/09	80	60 - 140	98	60 - 140	<0.05	mg/kg	NC	40		
4691461	1,1,1-trichloroethane	2011/03/09	89	60 - 140	97	60 - 140	<0.03	mg/kg	NC	40		
4691461	1,2-dichloroethane	2011/03/09	106	60 - 140	114	60 - 140	<0.03	mg/kg	NC	40		
4691461	Carbon tetrachloride	2011/03/09	99	60 - 140	102	60 - 140	<0.03	mg/kg	NC	40		
4691461	Benzene	2011/03/09	99	60 - 140	106	60 - 140	<0.005	mg/kg	NC	40		
4691461	1,2-dichloropropane	2011/03/09	87	60 - 140	93	60 - 140	<0.03	mg/kg	NC	40		
4691461	Trichloroethene	2011/03/09	104	60 - 140	90	60 - 140	<0.01	mg/kg	NC	40		
4691461	Bromodichloromethane	2011/03/09	91	60 - 140	98	60 - 140	<0.05	mg/kg	NC	40		
4691461	cis-1,3-dichloropropene	2011/03/09	72	60 - 140	46 ^(1, 2)	60 - 140	<0.05	mg/kg	NC	40		
4691461	trans-1,3-dichloropropene	2011/03/09	76	60 - 140	35 ^(1, 2)	60 - 140	<0.05	mg/kg	NC	40		
4691461	1,1,2-trichloroethane	2011/03/09	98	60 - 140	103	60 - 140	<0.03	mg/kg	NC	40		
4691461	Toluene	2011/03/09	93	60 - 140	97	60 - 140	<0.02	mg/kg	NC	40		
4691461	Chlorodibromomethane	2011/03/09	88	60 - 140	95	60 - 140	<0.05	mg/kg	NC	40		
4691461	Dibromoethane	2011/03/09	90	60 - 140	96	60 - 140	<0.03	mg/kg	NC	40		
4691461	Tetrachloroethene	2011/03/09	118	60 - 140	99	60 - 140	<0.03	mg/kg	29.6	40		
4691461	Chlorobenzene	2011/03/09	93	60 - 140	98	60 - 140	<0.03	mg/kg	NC	40		
4691461	1,1,1,2-tetrachloroethane	2011/03/09	86	60 - 140	94	60 - 140	<0.03	mg/kg	NC	40		
4691461	Ethylbenzene	2011/03/09	99	60 - 140	100	60 - 140	<0.01	mg/kg	NC	40		
4691461	m & p-Xylene	2011/03/09	98	60 - 140	103	60 - 140	<0.04	mg/kg	NC	40		
4691461	Bromoform	2011/03/09	92	60 - 140	100	60 - 140	<0.05	mg/kg	NC	40		
4691461	Styrene	2011/03/09	98	60 - 140	105	60 - 140	<0.03	mg/kg	NC	40		
4691461	o-Xylene	2011/03/09	94	60 - 140	97	60 - 140	<0.04	mg/kg	NC	40		
4691461	1,1,2,2-tetrachloroethane	2011/03/09	86	60 - 140	93	60 - 140	<0.03	mg/kg	NC	40		
4691461	1,2-dichlorobenzene	2011/03/09	93	60 - 140	95	60 - 140	<0.03	mg/kg	NC	40		

Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
4691461	1,3-dichlorobenzene	2011/03/09	95	60 - 140	96	60 - 140	<0.03	mg/kg	NC	40		
4691461	1,4-dichlorobenzene	2011/03/09	93	60 - 140	96	60 - 140	<0.03	mg/kg	NC	40		
4691461	Methyl-tert-butylether(MTBE)	2011/03/09					<0.1	mg/kg	NC	40		
4691461	Xylenes (Total)	2011/03/09					<0.04	mg/kg	NC	40		
4691466	VH C6-C10	2011/03/09					<10	mg/kg	NC	50	75	60 - 140
4691510	4-BROMOFLUOROBENZENE (sur.)	2011/03/09	113	70 - 130	73	70 - 130	93	%			80	70 - 130
4691510	D10-ETHYLBENZENE (sur.)	2011/03/09	102	50 - 130	91	50 - 130	92	%			89	50 - 130
4691510	D4-1,2-DICHLOROETHANE (sur.)	2011/03/09	115	70 - 130	109	70 - 130	110	%			107	70 - 130
4691510	D8-TOLUENE (sur.)	2011/03/09	89	70 - 130	92	70 - 130	92	%			90	70 - 130
4691510	Benzene	2011/03/09	117	60 - 140	106	60 - 140	<0.005	mg/kg	NC	40		
4691510	Toluene	2011/03/09	96	60 - 140	90	60 - 140	<0.02	mg/kg	NC	40		
4691510	Ethylbenzene	2011/03/09	114	60 - 140	106	60 - 140	<0.01	mg/kg	NC	40		
4691510	m & p-Xylene	2011/03/09	112	60 - 140	109	60 - 140	<0.04	mg/kg	NC	40		
4691510	o-Xylene	2011/03/09	114	60 - 140	108	60 - 140	<0.04	mg/kg	NC	40		
4691510	VH C6-C10	2011/03/09					<10	mg/kg	NC	40	89	60 - 140
4691510	Methyl-tert-butylether(MTBE)	2011/03/09					<0.1	mg/kg	NC	40		
4691510	Styrene	2011/03/09					<0.03	mg/kg	NC	40		
4691510	Xylenes (Total)	2011/03/09					<0.04	mg/kg	NC	40		
4692425	Total Antimony (Sb)	2011/03/09	90	75 - 125	95	75 - 125	<0.1	mg/kg	NC	30	95	70 - 130
4692425	Total Arsenic (As)	2011/03/09	94	75 - 125	98	75 - 125	0.2, RDL=0.2	mg/kg	8.7	30	94	70 - 130
4692425	Total Barium (Ba)	2011/03/09	NC	75 - 125	96	75 - 125	<0.1	mg/kg	0.2	35	101	70 - 130
4692425	Total Beryllium (Be)	2011/03/09	94	75 - 125	94	75 - 125	<0.1	mg/kg	NC	30		
4692425	Total Cadmium (Cd)	2011/03/09	100	75 - 125	101	75 - 125	<0.05	mg/kg	NC	30	96	70 - 130
4692425	Total Chromium (Cr)	2011/03/09	NC	75 - 125	93	75 - 125	<1	mg/kg	0.4	30	97	70 - 130
4692425	Total Cobalt (Co)	2011/03/09	92	75 - 125	94	75 - 125	<0.3	mg/kg	1.6	30	90	70 - 130
4692425	Total Copper (Cu)	2011/03/09	NC	75 - 125	99	75 - 125	<0.5	mg/kg	1.5	30	85	70 - 130
4692425	Total Lead (Pb)	2011/03/09	96	75 - 125	96	75 - 125	<0.1	mg/kg	8.5	35	97	70 - 130
4692425	Total Lithium (Li)	2011/03/09	93	75 - 125	91	75 - 125	<5	mg/kg				
4692425	Total Manganese (Mn)	2011/03/09	NC	75 - 125	97	75 - 125	<0.2	mg/kg	0.6	30	99	70 - 130
4692425	Total Mercury (Hg)	2011/03/09	92	75 - 125	97	75 - 125	<0.05	mg/kg	NC	35		
4692425	Total Molybdenum (Mo)	2011/03/09	95	75 - 125	93	75 - 125	<0.1	mg/kg	6.6	35	102	70 - 130
4692425	Total Nickel (Ni)	2011/03/09	93	75 - 125	95	75 - 125	<0.8	mg/kg	0.9	30	92	70 - 130
4692425	Total Selenium (Se)	2011/03/09	95	75 - 125	101	75 - 125	<0.5	mg/kg	NC	30		
4692425	Total Silver (Ag)	2011/03/09	94	75 - 125	89	75 - 125	<0.05	mg/kg	NC	35		
4692425	Total Strontium (Sr)	2011/03/09	NC	75 - 125	93	75 - 125	<0.1	mg/kg	1.8	35	90	70 - 130
4692425	Total Thallium (Tl)	2011/03/09	96	75 - 125	96	75 - 125	<0.05	mg/kg	NC	30	89	70 - 130
4692425	Total Tin (Sn)	2011/03/09	99	75 - 125	92	75 - 125	<0.1	mg/kg	NC	35		
4692425	Total Titanium (Ti)	2011/03/09	NC	75 - 125	98	75 - 125	<1	mg/kg	0.9	35	98	70 - 130
4692425	Total Uranium (U)	2011/03/09	102	75 - 125	97	75 - 125	<0.05	mg/kg			88	70 - 130

Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
4692425	Total Vanadium (V)	2011/03/09	NC	75 - 125	98	75 - 125	<2	mg/kg	0.8	30	101	70 - 130
4692425	Total Zinc (Zn)	2011/03/09	NC	75 - 125	101	75 - 125	<1	mg/kg	0.3	30	85	70 - 130
4692425	Total Aluminum (Al)	2011/03/09					<100	mg/kg	1.1	35	99	70 - 130
4692425	Total Calcium (Ca)	2011/03/09					<100	mg/kg	0.6	30	91	70 - 130
4692425	Total Iron (Fe)	2011/03/09					<100	mg/kg	1.8	30	97	70 - 130
4692425	Total Magnesium (Mg)	2011/03/09					<100	mg/kg	5.1	30	92	70 - 130
4692425	Total Phosphorus (P)	2011/03/09					<10	mg/kg	8.0	30	91	70 - 130
4692425	Total Bismuth (Bi)	2011/03/09					<0.1	mg/kg	NC	30		
4692425	Total Potassium (K)	2011/03/09					<100	mg/kg	2.3	35		
4692425	Total Sodium (Na)	2011/03/09					<100	mg/kg	1.6	35		
4692425	Total Zirconium (Zr)	2011/03/09					<0.5	mg/kg	0.6	30		
4692434	Soluble (2:1) pH	2011/03/10			101	96 - 104			0.3	20		
4692489	4-BROMOFLUOROBENZENE (sur.)	2011/03/09	105	70 - 130	102	70 - 130	99	%			101	70 - 130
4692489	D10-ETHYLBENZENE (sur.)	2011/03/09	93	50 - 130	86	50 - 130	91	%			86	50 - 130
4692489	D4-1,2-DICHLOROETHANE (sur.)	2011/03/09	113	70 - 130	107	70 - 130	105	%			108	70 - 130
4692489	D8-TOLUENE (sur.)	2011/03/09	95	70 - 130	97	70 - 130	97	%			97	70 - 130
4692489	Benzene	2011/03/09	110	60 - 140	111	60 - 140	<0.005	mg/kg	NC	40		
4692489	Toluene	2011/03/09	101	60 - 140	105	60 - 140	<0.02	mg/kg	NC	40		
4692489	Ethylbenzene	2011/03/09	111	60 - 140	115	60 - 140	<0.01	mg/kg	NC	40		
4692489	m & p-Xylene	2011/03/09	113	60 - 140	118	60 - 140	<0.04	mg/kg	NC	40		
4692489	o-Xylene	2011/03/09	113	60 - 140	117	60 - 140	<0.04	mg/kg	NC	40		
4692489	VH C6-C10	2011/03/09					<10	mg/kg	NC	40	104	60 - 140
4692489	Methyl-tert-butylether(MTBE)	2011/03/09					<0.1	mg/kg				
4692489	Styrene	2011/03/09					<0.03	mg/kg	NC	40		
4692489	Xylenes (Total)	2011/03/09					<0.04	mg/kg	NC	40		
4693636	O-TERPHENYL (sur.)	2011/03/10	90	50 - 130	88	50 - 130	96	%				
4693636	EPH (C10-C19)	2011/03/10	91	50 - 130	90	50 - 130	<100	mg/kg	NC	40		
4693636	EPH (C19-C32)	2011/03/10	93	50 - 130	92	50 - 130	<100	mg/kg	NC	40		
4693661	O-TERPHENYL (sur.)	2011/03/09	95	50 - 130	97	50 - 130	99	%				
4693661	EPH (C10-C19)	2011/03/09	96	50 - 130	112	50 - 130	<100	mg/kg	NC	40		
4693661	EPH (C19-C32)	2011/03/09	103	50 - 130	110	50 - 130	<100	mg/kg	NC	40		
4695161	O-TERPHENYL (sur.)	2011/03/10	94	50 - 130	89	50 - 130	90	%				
4695161	EPH (C10-C19)	2011/03/10	88	50 - 130	94	50 - 130	<100	mg/kg	NC	40		
4695161	EPH (C19-C32)	2011/03/10	93	50 - 130	96	50 - 130	<100	mg/kg	NC	40		
4697218	O-TERPHENYL (sur.)	2011/03/10	86	50 - 130	91	50 - 130	96	%				
4697218	EPH (C10-C19)	2011/03/10	87	50 - 130	99	50 - 130	<100	mg/kg	NC	40		
4697218	EPH (C19-C32)	2011/03/10	85	50 - 130	95	50 - 130	<100	mg/kg	NC	40		
4697371	O-TERPHENYL (sur.)	2011/03/10	88	50 - 130	95	50 - 130	93	%				
4697371	EPH (C10-C19)	2011/03/10	90	50 - 130	97	50 - 130	<100	mg/kg	NC	40		

Maxxam Job #: B117992
Report Date: 2011/03/11

EWD CONSULTING CORP.
Client Project #: 20003.001

Your P.O. #: 20003.001
Sampler Initials: JF

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
4697371	EPH (C19-C32)	2011/03/10	93	50 - 130	100	50 - 130	<100	mg/kg	NC	40		
4697373	D10-ANTHRACENE (sur.)	2011/03/10	93	60 - 130	90	60 - 130	108	%				
4697373	D12-BENZO(A)PYRENE (sur.)	2011/03/10	92	60 - 130	80	60 - 130	83	%				
4697373	D8-ACENAPHTHYLENE (sur.)	2011/03/10	95	50 - 130	94	50 - 130	108	%				
4697373	D8-NAPHTHALENE (sur.)	2011/03/10	93	50 - 130	90	50 - 130	105	%				
4697373	TERPHENYL-D14 (sur.)	2011/03/10	94	60 - 130	92	60 - 130	112	%				
4697373	Naphthalene	2011/03/11	94	50 - 130	91	50 - 130	<0.05	mg/kg	NC	50		
4697373	2-Methylnaphthalene	2011/03/11	95	50 - 130	92	50 - 130	<0.05	mg/kg	NC	50		
4697373	Acenaphthylene	2011/03/11	92	50 - 130	90	50 - 130	<0.05	mg/kg	NC	50		
4697373	Acenaphthene	2011/03/11	94	50 - 130	92	50 - 130	<0.05	mg/kg	NC	50		
4697373	Fluorene	2011/03/11	93	50 - 130	94	50 - 130	<0.05	mg/kg	NC	50		
4697373	Phenanthrene	2011/03/11	92	60 - 130	91	60 - 130	<0.05	mg/kg	NC	50		
4697373	Anthracene	2011/03/11	94	60 - 130	93	60 - 130	<0.05	mg/kg	NC	50		
4697373	Fluoranthene	2011/03/11	93	60 - 130	98	60 - 130	<0.05	mg/kg	NC	50		
4697373	Pyrene	2011/03/11	97	60 - 130	92	60 - 130	<0.05	mg/kg	NC	50		
4697373	Benzo(a)anthracene	2011/03/11	87	60 - 130	84	60 - 130	<0.05	mg/kg	NC	50		
4697373	Chrysene	2011/03/11	92	60 - 130	86	60 - 130	<0.05	mg/kg	NC	50		
4697373	Benzo(b&j)fluoranthene	2011/03/11	91	60 - 130	90	60 - 130	<0.05	mg/kg	NC	50		
4697373	Benzo(k)fluoranthene	2011/03/11	96	60 - 130	95	60 - 130	<0.05	mg/kg	NC	50		
4697373	Benzo(a)pyrene	2011/03/11	92	60 - 130	90	60 - 130	<0.05	mg/kg	NC	50		
4697373	Indeno(1,2,3-cd)pyrene	2011/03/11	98	60 - 130	98	60 - 130	<0.05	mg/kg	NC	50		
4697373	Dibenz(a,h)anthracene	2011/03/11	92	60 - 130	86	60 - 130	<0.05	mg/kg	NC	50		
4697373	Benzo(g,h,i)perylene	2011/03/11	95	60 - 130	90	60 - 130	<0.05	mg/kg	NC	50		
4698565	Moisture	2011/03/11					<0.3	%	4.0	20		

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.


NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) - LCS outside acceptance criteria (10% of analytes failure allowed)

COMPANY NAME: Ewd Consulting		PH. #: 250-785-0560 E-mail: j.fleming@ewdcorp.com FAX #: 250-785-0565		B117992		ANALYSIS REQUEST F109563	
COMPANY ADDRESS: 10707 101 Avenue Fort St. John, BC Canada V1J 5J4		CLIENT PROJECT ID: (R) 20003.001		LAB USE ONLY			
SAMPLER NAME (PRINT): Jodi Fleming		PROJECT MANAGER: Cal Faminow		<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);"> BTEXS / VPH / MTBE LEPH / HEPH PAHs Metals EPA VOC / VPB </div> </div>			
FIELD SAMPLE ID	MAXXAM LAB # (Lab Use Only)	MATRIX					
		GROUND WATER SURFACE WATER SOIL OTHER	# CONTAINERS	DATE DD/MM/YY	TIME	HEADSPACE VAPOUR	
1 BH11-1-1		X	2	04/03/11			
2 BH11-1-2		X	2	04/03/11			
3 BH11-1-3		X	2	04/03/11			
4 BH11-1-4		X	2	04/03/11			
5 BH11-1-5		X	2	04/03/11			
6 BH11-2-1		X	2	04/03/11		X	
7 BH11-2-2		X	2	04/03/11			
8 BH11-2-3		X	2	04/03/11			
9 BH11-2-4		X	2	04/03/11			
10 BH11-3-1		X	2	04/03/11			
11 BH11-3-2		X	2	04/03/11			
12 BH11-3-3		X	2	04/03/11		XX	



B117992

TAT (Turnaround Time) <5 DAY TAT MUST HAVE PRIOR APPROVAL <small>*some exceptions apply please contact lab</small>		P.O. NUMBER / QUOTE NUMBER: 20003.001		SPECIAL DETECTION LIMITS / CONTAMINANT TYPE: <input type="checkbox"/> COME <input checked="" type="checkbox"/> CSR <input type="checkbox"/> ALBERTA TIER 1 <input type="checkbox"/> OTHER	
ACCOUNTING CONTACT:		SPECIAL REPORTING OR BILLING INSTRUCTIONS:		# JARS USED:	
RELINQUISHED BY SAMPLER: Jodi Fleming		DATE: 7/03/11		TIME: 1330	
RELINQUISHED BY:		DATE:		RECEIVED BY: R. Shaw	
RELINQUISHED BY:		DATE:		RECEIVED BY: 110308 0750	
RELINQUISHED BY:		DATE:		RECEIVED BY LABORATORY: C. ROSEN	

STANDARD 5 BUSINESS DAYS ☒

RUSH 3 BUSINESS DAYS ☐

RUSH 2 BUSINESS DAYS ☐

URGENT 1 BUSINESS DAY ☐

OTHER BUSINESS DAYS

CUSTODY RECORD

ARRIVAL TEMPERATURE °C: **767**

DUE DATE: **877 557**

LOG IN CHECK: **576**

F129834

**CUSTODY
RECORD**

ANALYSIS REQUEST F 109562

COMPANY NAME:
Ewo Consulting

COMPANY ADDRESS:
10707 101 avenue
Fort St. John, Bc Canada
V1J 5J4

PH # **250-786-0660**
E-mail: **jfleming@ewoconsulting.com**
FAX # **250-786-0565**

CLIENT PROJECT ID: (R)
20003.001

SAMPLER NAME (PRINT):
Jodi Fleming

PROJECT MANAGER:
Cal Faminow

FIELD SAMPLE ID	MAXXAM LAB # (Lab Use Only)	MATRIX					# CONTAINERS	SAMPLING			BTEX/V LEPH/1 PAHs Metals EPH VOC/1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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BTEX/UPH/MTBE
LEPH/HEPH
PAHs
Metals
EPH
VOC/UPH



5117592

TAT (Turnaround Time)
<5 DAY TAT MUST HAVE PRIOR APPROVAL
*some exceptions apply please contact lab

STANDARD 5 BUSINESS DAYS ☒
RUSH 3 BUSINESS DAYS ☐
RUSH 2 BUSINESS DAYS ☐
URGENT 1 BUSINESS DAY ☐

OTHER BUSINESS DAYS

PD. NUMBER / QUOTE NUMBER:
20003.001

ACCOUNTING CONTACT:

RELINQUISHED BY SAMPLER:
Jodi Fleming

RELINQUISHED BY:

RELINQUISHED BY:

SPECIAL DETECTION LIMITS / CONTAMINANT TYPE:
☐ CCME
☒ CSH
☐ ALBERTA TIER 1
☐ OTHER

SPECIAL REPORTING OR BILLING INSTRUCTIONS:

JARS USED:

LAB USE ONLY
ARRIVAL TEMPERATURE °C: **767**
DUE DATE: **877 557**
LOG IN CHECK:

DATE: **7/03/11** TIME: **1320** RECEIVED BY: **R. Day**
DATE: DATE: **11 03 2010** TIME: TIME: TIME: TIME: RECEIVED BY: **C. ROSEN**
DATE: DATE: DATE: DATE: RECEIVED BY LABORATORY:

CUSTODY RECORD

MAXXAM JOB #

ANALYSIS REQUEST

F129821

COMPANY NAME: EWD Consulting		PH # 250-785-0660 E-mail: j.fleming@ewdcorp.com FAX # 250-785-0665		CLIENT PROJECT ID: (#) 20003.001		LAB USE ONLY	
COMPANY ADDRESS: 10707-101 avenue Fort St. John, BC Canada V1J5J4		PROJECT MANAGER: Jodi Fleming		PROJECT MANAGER: Cal Faminow			
FIELD SAMPLE ID	MAXXAM LAB # (Lab Use Only)	MATRIX GROUNDWATER SURFACE WATER SOIL DEBRIS OTHER	# CONTAINERS	SAMPLING DATE TIME	HEADSPACE VAPOUR	BTEX / LH <input checked="" type="checkbox"/> BTEX / VPH <input checked="" type="checkbox"/> MTBE <input checked="" type="checkbox"/> VOCs / VPH <input checked="" type="checkbox"/> EPH <input checked="" type="checkbox"/> TEH <input type="checkbox"/> PAH <input checked="" type="checkbox"/> LEPH/HEPH <input checked="" type="checkbox"/> CCME-PHC (FRACTIONS 1-4 PLUS BTEX) CCME-PHCS (FRACTIONS 2-4) CCME BTEX (FRACTION 1 PLUS BTEX) PHENOLS BY AAAP <input type="checkbox"/> PHENOLS BY GC/MS <input type="checkbox"/> TOTAL OAG <input type="checkbox"/> MINERAL OAG <input type="checkbox"/> Dissolved Metals <input type="checkbox"/> Field Filtered? YES <input type="checkbox"/> NO <input type="checkbox"/> Field Preserved? YES <input type="checkbox"/> NO <input type="checkbox"/> Total Metals Field Preserved? YES <input type="checkbox"/> NO <input type="checkbox"/> NITRATE <input type="checkbox"/> NITRITE <input type="checkbox"/> AMMONIA <input type="checkbox"/> CHLORIDE <input type="checkbox"/> FLUORIDE <input type="checkbox"/> SULPHATE <input type="checkbox"/> TOTAL SUSPENDED SOLIDS (TSS) CYANIDE SAD <input type="checkbox"/> WAD <input type="checkbox"/> LEACHABLE LEAD (AA) <input type="checkbox"/> (TCLP) <input type="checkbox"/> LEACHABLE BTEX (AA) <input type="checkbox"/> (TCLP) <input type="checkbox"/> metals	
1 BH11-B				204/03/11			
2 BH11-C				204/03/11			
3 BH11-D				204/03/11			
4 BH11-E				104/03/11	X		
5							
6							
7							
8							
9							
10							
11							
12							



B117992

TAT (Turnaround Time)

<5 DAY TAT MUST HAVE PRIOR APPROVAL

*some exceptions apply please contact lab

STANDARD: 5 BUSINESS DAYS ☒
RUSH: 3 BUSINESS DAYS ☐
RUSH: 2 BUSINESS DAYS ☐
URGENT: 1 BUSINESS DAY ☐

OTHER BUSINESS DAYS

CUSTODY RECORD

P.O. NUMBER / QUOTE NUMBER:

20003.001

ACCOUNTING CONTACT:

SPECIAL DETECTION LIMITS / CONTAMINANT TYPE:

SPECIAL REPORTING OR BILLING INSTRUCTIONS:

☐ CCME
☐ CSR
☐ ALBERTA TIER 1
☐ OTHER

* SOIL JARS USED AND NOT SUBMITTED:

LAB USE ONLY

ARRIVAL TEMPERATURE °C: **767**
DUE DATE: **877**
576 **557**

LOG IN CHECK:

RELINQUISHED BY SAMPLER:

RELINQUISHED BY:

RELINQUISHED BY:

DATE:

7/03/11

DD/MM/YY

DATE:

DD/MM/YY

TIME:

1320

TIME:

TIME:

RECEIVED BY:

RECEIVED BY:

RECEIVED BY LABORATORY:

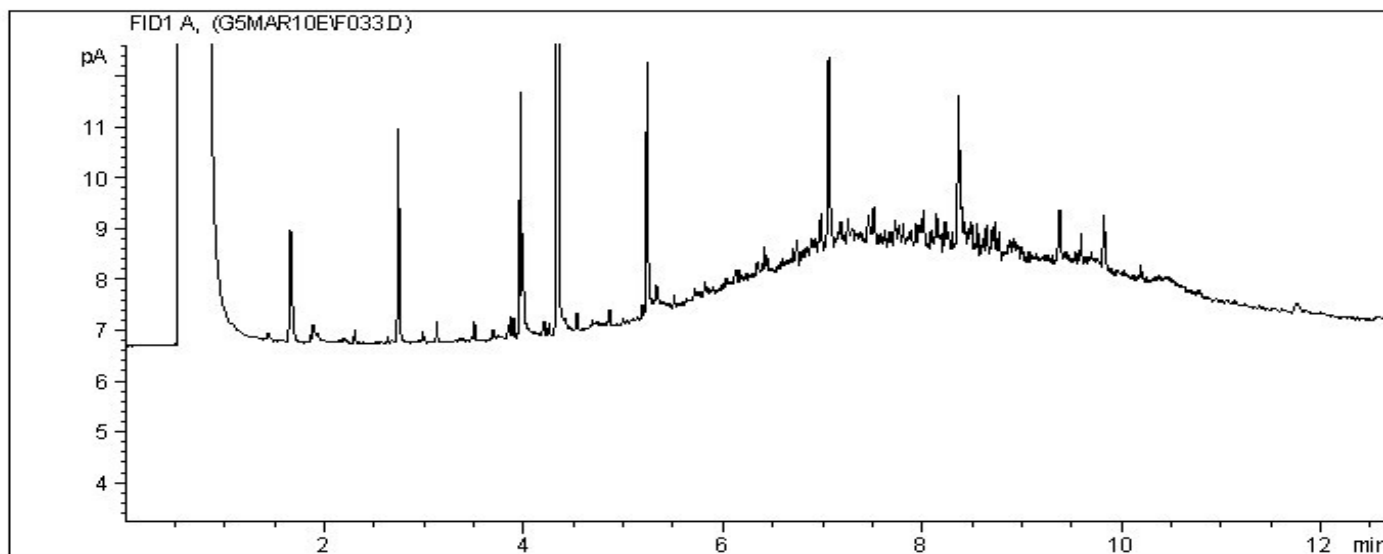
May
110308
5750
C. Foster

Report Date: 2011/03/11
Maxxam Job #: B117992
Maxxam Sample: AC2042

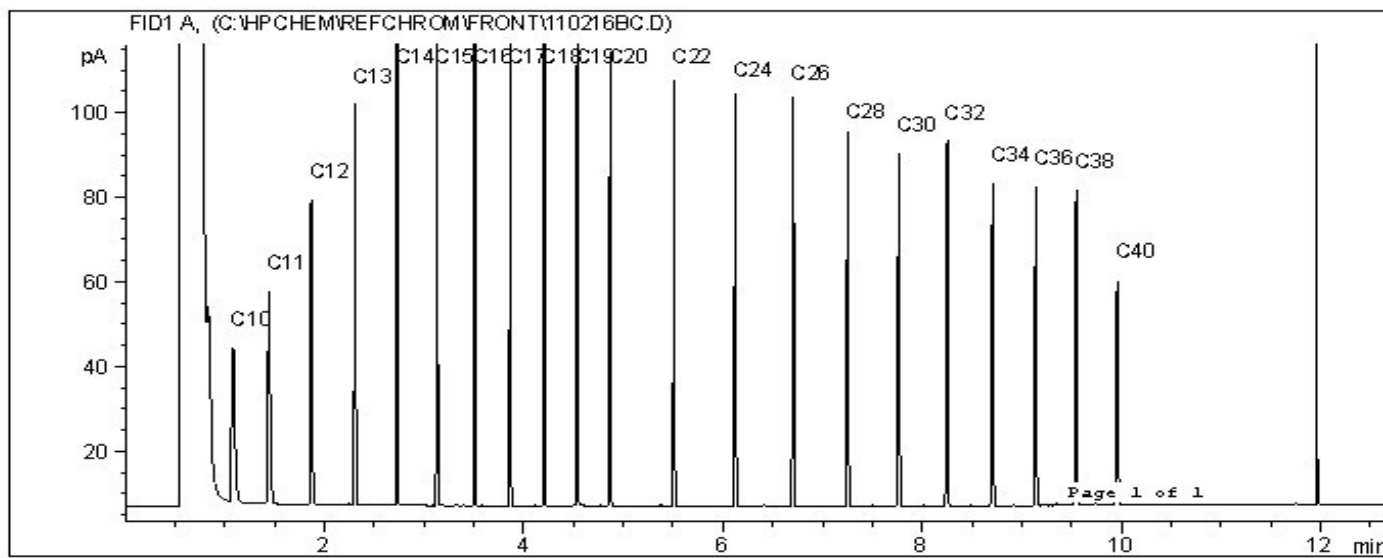
EWD CONSULTING CORP.
Client Project #: 20003.001

Client ID: BH11-7-1

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Appendix I

Environmental Report General Conditions

EWD Consulting Corp. (EWD)
ENVIRONMENTAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these “General Conditions”

1.0 USE OF REPORT

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EWD's client. EWD does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EWD's client unless otherwise authorized in writing by EWD. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EWD. Additional copies of the report, if required, may be obtained upon request.

2.0 LIMITATIONS OF REPORT

This report is based solely on the conditions which existed on site at the time of EWD's investigation. The client, and any other parties using this report with the express written consent of the client and EWD, acknowledge that conditions affecting the environmental assessment of the site can vary with time and that the conclusions and recommendations set out in this report are time sensitive.

The client, and any other party using this report with the express written consent of the client and EWD, also acknowledge that the conclusions and recommendations set out in this report are based on limited observations and testing on the subject site and that conditions may vary across the site which, in turn, could affect the conclusions and recommendations made.

The client acknowledges that EWD is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the client.

2.1 Information Provided to EWD by Others

During the performance of the work and the preparation of this report, EWD may have relied on information provided by persons other than the client. While EWD endeavors to verify the accuracy of such information when instructed to do so by the client, EWD accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

3.0 LIMITATION OF LIABILITY

The client recognizes that property containing contaminants and hazardous wastes creates a high risk of claims brought by third parties arising out of the presence of those materials. In consideration of these risks, and in consideration of EWD providing the services requested, the client agrees that EWD's liability to the client, with respect to any issues relating to contaminants or other hazardous wastes located on the subject site shall be limited as follows:

- (1) With respect to any claims brought against EWD by the client arising out of the provision or failure to provide services hereunder shall be limited to the amount of five times of fees paid by the client to EWD under this Agreement, whether the action is based on breach of contract or tort;
- (2) With respect to claims brought by third parties arising out of the presence of contaminants or hazardous wastes on the subject site, the client agrees to indemnify, defend and hold harmless EWD from and against any and all claim or claims, action or actions, demands, damages, penalties, fines, losses, costs and expenses of every nature and kind whatsoever, including solicitor-client costs, arising or alleged to arise either in whole or part out of services provided by EWD, whether the claim be brought against EWD for breach of contract or tort.

EWD Consulting Corp. (EWD)
ENVIRONMENTAL REPORT – GENERAL CONDITIONS

4.0 JOB SITE SAFETY

EWD is only responsible for the activities of its employees on the job site and is not responsible for the supervision of any other persons whatsoever. The presence of EWD personnel on site shall not be construed in any way to relieve the client or any other persons on site from their responsibility for job site safety.

5.0 DISCLOSURE OF INFORMATION BY CLIENT

The client agrees to fully cooperate with EWD with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The client acknowledges that in order for EWD to properly provide the service, EWD is relying upon the full disclosure and accuracy of any such information.

6.0 STANDARD OF CARE

Services performed by EWD for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Engineering judgement has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

7.0 EMERGENCY PROCEDURES

The client undertakes to inform EWD of all hazardous conditions, or possible hazardous conditions which are known to it. The client recognizes that the activities of EWD may uncover previously unknown hazardous materials or conditions and that such discovery may result in the necessity to undertake emergency procedures to protect EWD employees, other persons and the environment. These procedures may involve additional costs outside of any budgets previously agreed upon. The client agrees to pay EWD for any expenses incurred as a result of such discoveries and to compensate EWD through payment of additional fees and expenses for time spent by EWD to deal with the consequences of such discoveries.

8.0 NOTIFICATION OF AUTHORITIES

The client acknowledges that in certain instances the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EWD in its reasonably exercised discretion.

9.0 OWNERSHIP OF INSTRUMENTS OF SERVICE

The client acknowledges that all reports, plans, and data generated by EWD during the performance of the work and other documents prepared by EWD are considered its professional work product and shall remain the copyright property of EWD.

10.0 ALTERNATE REPORT FORMAT

Where EWD submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EWD's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by EWD shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by EWD shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of EWD's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EWD. The Client warrants that EWD's instruments of professional service will be used only and exactly as submitted by EWD.

The Client recognizes and agrees that electronic files submitted by EWD have been prepared and submitted using specific software and hardware systems. EWD makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

September 25, 2012

Northern Geo File No: NG820

Focus Surveys
10716 100TH Avenue
Fort St. John, BC
V1J 1Z3



Attention: Mr. Graham McCoubrey,

Re: Preliminary Desktop Geotechnical Assessment for Proposed Lookout Upgrade
Peace River Valley
Approximately LSD SW 1/4-19-083-18 W6M
100th Street, Fort St. John, BC

1.0 INTRODUCTION

Northern Geo Testing & Engineering Ltd. (Northern Geo) presents herein the results of our preliminary desktop geotechnical engineering study for the proposed developments at the Peace River Lookout, located approximately at LSD SW 1/4-19-083-18 W6M in Fort St. John, BC. This report provides a summary of the geotechnical conditions based upon review of available literature and based upon observations made during our ground-based visual assessment, and provides a summary of our comments and recommendations related to the proposed developments. Attachments to this report include a regional map and four ground-based photos. This report has been prepared for use by the Peace River Regional District (PRRD), and any third party decisions based upon this report are the responsibility of that third party.

1.1 General

At the request of Mr. Graham McCoubrey of Focus Corporation (Focus), Northern Geo has undertaken a preliminary desktop geotechnical assessment to evaluate the overall stability of the existing lookout in light of the new developments and upgrades proposed by the PRRD. The general location of the existing lookout is south of the southernmost end of 100th Street, south of the Fort St. John, BC city limit at the crest of the Peace River valley slope. Road access to the existing lookout is south from the Alaska Highway via 100th Street from Fort St. John, to the crest of the valley slope at the end of the existing gravel road. The area that was assessed and which is discussed below is shown on Figure 1 and Photos 1 and 4 (all attached at the end of this report).

The preliminary desktop geotechnical assessment consisted of visual observation of the terrain from the ground, a literature and map search of available geological and geotechnical information, a review of survey monitoring data provided by Focus, and a review of historical aerial photography of the area. Other investigations, including geotechnical drilling, reviews of other parts of the proposed developments,



soil sampling and stability modelling were not undertaken and were outside of the scope of the current geotechnical assessment.

The purposes of the preliminary desktop geotechnical assessment of the existing Peace River lookout were to provide geotechnical discussion and input into the following:

1. Evaluation of slope stability conditions based upon a visual assessment conducted on-site and upon available geological and geotechnical information.
2. The overall geotechnical feasibility of undertaking improvements and developments at the above noted location.
3. Identification of potential geotechnical and/or geological concerns in the above noted area that might preclude the construction of the proposed site developments.
4. Further geotechnical investigations if required.

1.2 Background & Methodology

On August 16, 2011, a preliminary ground-based visual geotechnical assessment of the existing lookout area was conducted on site to determine the general geotechnical conditions at the site, to determine the locations for an array of survey monitoring points, and to assess prior land use and previous earthworks/other improvements that have been ongoing at the site. A follow-up field visit to the site was undertaken on August 9, 2012 to review some of the improvements that had been undertaken during the spring and summer of 2012, and to assess changes in the stability conditions of several slide areas around the perimeter of the lookout area.

A review of available mapping and published regional geological information was also undertaken following the field work to supplement the field observations. Further historical data was obtained by reviewing stereographical aerial photographs in the archives at Front Counter BC in Fort St. John (photography from 1976, 1990 and 2005). A historical geotechnical report written in 1986 by Aquaterre Consultants Inc. was also reviewed to help determine the extent of previous geotechnical work in the area.

Additionally, a review of survey data provided by Focus was also undertaken to assess the observed movements at specific locations around the perimeter of the existing lookout. Many of the survey points were destroyed during fall and/or winter of 2011/2012 due to other activities being undertaken on the site (including but not limited to dumping of loose soil and fill into the slide areas, snow clearing operations, installation of new fences and site grading), and therefore there are some gaps in the available survey information.



2.0 SITE CONDITIONS

2.1 Location and Topography

The proposed developments at the Peace River lookout are located south of the city of Fort St. John, and the lookout at the crest of the valley slope is situated on the south edge of a nearly flat to gently sloping upland plateau approximately 220m above the Peace River channel elevation. Figure 1 shows the existing lookout and Photos 1 and 4 show selected terrain features.

2.2 Geology

2.2.1 Bedrock Geology

Published regional geological information¹ indicates that the study area along the Peace River at the lookout area is underlain by shales of the Shaftesbury Formation. Also known as the Sully Formation, the bedrock consists of dark grey, sideritic (iron-rich) marine shales. The Sully Formation shales tend to weather recessively and are generally low strength, with interbedded high plastic and bentonitic clay layers. The high plastic clay layers form sliding surfaces for numerous very large deep-seated slides in many areas of northeastern British Columbia, particularly along the Peace River and its tributaries. The clay layers are typically located approximately 200 meters below the bottom of the overlying Dunvegan Formation. This depth interval is typical of the depth of the Peace River valley in the study area, and numerous large deep-seated slides have been documented in the area.

The Sully Formation shales are present under the lower to middle valley slopes and valley bottom areas along the Peace River near the existing lookout. Sully Formation shale typically weathers recessively and is, therefore, often not exposed. However, it can be observed in the deeply incised draws to the east of the lookout. Based upon the available stereographical aerial photographs, survey monitoring, and field observations, deep-seated movement related to the bedrock does not appear to have retrogressed to the existing lookout. However, deep-seated movement has occurred in many areas around and adjacent to the lookout, and therefore it is still considered to be a significant factor with respect to the terrain stability at the site. Further discussion of the stability conditions at the site is presented below.

¹ Stott, D.F., 1982. *Lower Cretaceous Fort St. John Group and Upper Cretaceous Dunvegan Formation of the Foothills and Plains of Alberta, British Columbia, District of Mackenzie and Yukon Territory*. Geological Survey of Canada, Bulletin 328.



2.2.2 Surficial Geology

The following descriptions of the surficial soils are based upon literature review, and upon the visual geotechnical assessment which included the following:

1. Visual reconnaissance of soil exposures in the area including small road cuts and eroded river/creek banks.
2. Previous work done in the surrounding area.
3. Published geological mapping².

The surficial soil deposits observed at the lookout area include the following (from youngest to oldest):

Glaciolacustrine sediments: in this area consisting of clay with some thin silt varves and layers, these materials were deposited in the standing water of a glacial lake that was present during and/or following the last glaciation in the area. These soils tend to be layered, and consist mainly of medium to high plastic, silty clay. In previous geotechnical drilling investigations along the Peace River several kilometers further downstream, and to the north in the City of Fort St. John, the glaciolacustrine materials have been found to extend for up to several tens of metres. The glaciolacustrine soils overlie and/or contain pockets of glacial till and/or boulders that have been dropped into the glaciolacustrine deposit from floating ice.

Glacial Till: consisting of a medium plastic clay matrix with variable quantities of sand, gravel and occasional boulders, the clay till occurs in the upland areas beneath or within the glaciolacustrine sediments. The clay till is typically denser than the glaciolacustrine sediments and contains larger quantities of gravel, cobbles and boulders.

Interglacial sands and gravels: deposited by flowing meltwater between episodes of glaciation, these include the sand and gravel accumulations observed at the ground surface to the east of the lookout where sand and gravel extraction has occurred in the past. These deposits generally underlie the glaciolacustrine deposits and tills, but further upstream along the Peace River, these deposits have been observed within the till deposits.

2.2.3 Geological Setting

The Peace River lookout is within the preglacial valley of the Peace River which, in some areas, was much broader than the present-day valley. In northeastern BC overall, the valleys of the Peace River and its tributaries (including the Moberly River, the Beatton River, the Pine River and others), appear to have undergone extensive erosion prior to the last glaciation, which left the valleys deeper but also wider than the current valleys. During the multiple ice advances and retreats of the last glaciation, these valleys have been partially backfilled by a combination of glacial till, glaciofluvial and glaciolacustrine sediments. The glacial till and other sediments have, in places, buried the bedrock surface and any preglacial and interglacial sediments under a significant thickness of overburden.

² Mathews, W.H, 1978. *Surficial Geology, Charlie Lake, Peace River District, British Columbia*; Geological Survey of Canada, Map 1460A.



During and following the final deglaciation in the area, fluvial erosion by the Peace River and its tributaries has removed part of the valley fill and locally exposed the bedrock at the edges of the preglacial valley. However, in many areas along the Peace River, the preglacial valley remains infilled with a substantial thickness of clay till and glaciolacustrine sediments with relatively thin deposits of modern alluvial sediments (sands and gravels) in the present-day valley bottom. Erosion of the valley fill materials, and in some cases the underlying shale bedrock by the Peace River, has caused widespread landslide activity along much of the Peace River valley.

3.0 GEOTECHNICAL OBSERVATIONS, DISCUSSION AND RECOMMENDATIONS

3.1 General

Figure 1 and Photos 1 and 4 show the location of the Peace River lookout that was observed in the field and reviewed in the available literature and aerial photography.

3.2 Stability

There were numerous locations around the perimeter of the existing lookout and at locations along the Peace River visible from the lookout where slope movements were taking place. In general, three types of slope failures were observed to be occurring, or have been documented in the area:

1. Very large, deep-seated, slow moving translational slides in the weak shale of the Sully Formation.
2. Shallow to moderately-deep translational slides in silty clay soils.
3. Earthflows.

The various types of slides and the geotechnical implications with respect to current and future improvements at the lookout are discussed in the following sections.

3.2.1 Deep Seated Instability

Large natural deep-seated translational slides in the bedrock of the Sully Formation are present in many of the valleys in the Fort St. John area. Similar post-glacial slides are common in northeastern British Columbia and are typically hundreds to thousands of years old. The slides are several hundreds of meters to a few kilometers long and extend from the valley bottom to the upland areas.

Based upon past investigation of deep-seated slides elsewhere along the Peace River which included the use of installed instrumentation, the near-horizontal high plastic clay beds sometimes found within the Sully Formation may form the basal failure surface. The slides typically retrogress back into the overlying sandstones and/or overburden sediments, producing tension cracks.



The deep-seated slides previously investigated in the area typically exhibited the following characteristics:

1. The slides were relatively deep-seated with maximum depths below the upper valley slopes of up to 200m or more. The toes and lower parts of the slides appeared to be close to or below the valley bottom or river elevation.
2. The slide crests usually extended a short distance back into the upland area. Tension cracks along the crests of the valley slopes indicated the approximate upper extent of the slides.
3. Within the slide masses, there were numerous features related to sliding activity including grabens (downdropped blocks), tension areas and side scarps, as well as smaller and shallower secondary slides. Many of the blocks within the deep-seated slides were very large and relatively intact, although they had been subject to appreciable translational movement.
4. The slides typically moved at slow rates (few to several mm/year to less than 1 m/year). However, during extended periods of unfavorable precipitation and/or rapid snow melt, similar deep-seated slides have been known to move up to several tens of meters in one day.

3.2.2 Shallow Translational Slides & Earthflows

Shallow to moderately deep-seated slope failures (shallow in comparison to the deep-seated slides) are also common along the Peace River, and active examples were visible extending up to the south edge of the lookout. These are typically translational slides with depths ranging from a few meters to perhaps 10 to 20 m, lateral extents of 20 to 100 m, and lengths of 50 to 100 m or more. The smaller translational slides typically move more rapidly than the larger deep-seated slides and movements in excess of 1 to 3 meters per year may occur, particularly during years of unfavorable precipitation. In extreme cases, some of the smaller translational slides may move several meters in a day.

Many of the shallow to moderately deep-seated slides occur as secondary slides within the deep-seated slide areas. Weakening of the soils due to the movement of the larger slides and appreciable groundwater seepage along the boundaries of the deep-seated slide blocks may be factors in the development of many of the smaller slides.

Earthflows are similar to the shallow translational slides except that more or less complete disruption of the overall soil fabric has occurred, resulting in a flowing soil mass, rather than slide blocks. Earthflows typically occur in wet soils containing considerable proportions of silt, clay and/or organic material. They generally tend to occur in areas where seepage has been significant or where surface water has been redirected to flow into areas of loose or disrupted soils. Evidence of recent earthflows was observed along the south, east and southeast sides of the lookout where it appeared that loose soils had been dumped into previous slide areas in an uncontrolled manner. The dumped material had subsequently become weakened by rainfall runoff, and slid down the valley slope. The movement rates may be in the range of a few meters per week to several meters per day, depending upon rainfall amounts.



3.3 General Implications of Slides Relative to Lookout Improvements

As discussed in the foregoing, there are three types of sliding that are occurring, or have occurred, near or adjacent to the existing Peace River lookout. All three of these types of slides appear to have the potential to negatively impact the existing lookout area; however, from visual review of the site on the ground during the summers of 2011 and 2012, the slides appear to have affected only the perimeter of the site. Review of historical stereographical aerial photography³ indicates that human activity has caused changes in the stability conditions around the south, east and southeast perimeters of the site due to uncontrolled dumping of loose/high moisture level soils and other debris, and changes have been made to the surface drainage conditions by ditching and road surface upgrades. This soil dumping and additional surface drainage appear to have caused accelerations in the movement and retrogression rates of the shallow to moderately deep slides and earthflow slides, as evidenced by open tension cracks and recent earthflows (see Photos 1 to 4), and the need to reconstruct the new chain-link fencing with an additional setback from the crest of the slope after slide activity had removed support from the fence foundations.

While a geotechnical report by others⁴ has indicated that deep seated slides may have affected parts of the Old Fort Subdivision (located downslope from the existing lookout), and that this sliding could retrogress further upslope in future, at the time of this writing, the deep-seated sliding does not appear to have retrogressed upslope to the lookout area, based solely upon visual review of the site. Survey monitoring by Focus suggests that there has been some soil movement in the area between August 2011 and July of 2012; however, no clear conclusion can be drawn from the data to clearly indicate or preclude the occurrence of deep-seated movement during the time period that the survey monitoring was undertaken.

There is evidence of active shallow to moderately deep sliding and earthflows occurring around the perimeter of the site as shown in Photos 1 to 4. Survey monitoring by Focus appears to indicate that there are small movements occurring around the perimeter of the lookout, although the movements were only in the 1 to 2mm range. Therefore it is considered that while survey monitoring has probably detected the shallower movements, the dataset appears too small to draw definite conclusions, and hence surveying over a longer period of time may be necessary.

Based upon visual assessment, the active shallow to moderately deep-seated slides could, over time, retrogress further upslope and into the site if drainage conditions were subject to change, slope geometry were to change (due to dumping of more fill into the slides), or particularly if additional drainage were to be directed into the active slides. The deep seated sliding occurring regionally along the Peace River could, in theory, also retrogress onto the site in response to changes in the Peace River channel or in response to extreme weather events.

³ Front Counter British Columbia; 1976 - BC7836 Photo # 300/301; 1990 - 15BCB90002 Photo #66/67; 2005 - 15BCC05129 Photo # 50/51.

⁴ Aquaterre Consultants Inc., 1986, *Hazard Assessment Report Old Fort Subdivision South of Fort St. John, British Columbia*; Peace River-Liard Regional District, File Number 85072.



In summary, there is the potential for slide movements to affect the site at some time in the future given its very close proximity to active sliding. Since slide activity usually occurs slowly, and since there are often signs of movement initiation in the form of changes in ground surface topography and/or tension cracks, the risk of slide activity at the lookout which could cause danger to the public is considered to be low, but it is definitely not zero. Therefore it is critical that PRRD must recognize that there is some inherent risk in further developing the lookout area, and by inviting additional people to visit the site.

In the interests of helping to improve public safety and for “due diligence” purposes, it is recommended that PRRD should continue some form of annual monitoring of the site, and appropriate signage should be posted along the access route and on the existing fences warning the public of the potential for slides at the site. As well, the fences should be maintained and set back as necessary if additional shallow slides occur which threaten to reduce that stability of the fence.

It is considered that the most effective and cost efficient type of monitoring for the site would be have experienced PRRD personnel visually monitor the site on a monthly basis, and to seek geotechnical advice if changes are noted. Additionally, PRRD may wish to consider the installation of permanent survey monitoring points that could be monitored annually to check for changes in the ground surface over the whole area of the site. Should annual survey monitoring show significant changes, then additional monitoring could be undertaken at shorter intervals, and/or ground investigations, possibly including geotechnical drilling and Slope Indicator installations could be considered. As discussed in previous correspondences, Slope Indicators are costly to install and monitor, and while they give very detailed movement data to significant depths, they only provide that data for a localized location, whereas survey monitoring can return data over a larger area at a reasonable cost. Further, Slope Indicator installations would be difficult to protect from damage and vandalism, which appears to be a consideration at this site. Should future survey monitoring show that movements in the lookout area are changing or increasing, or if additional developments are proposed for the site in the future, PRRD may wish to obtain additional geotechnical advice and possibly install Slope Indicators at specific locations.

Northern Geo File No.: NG820
Preliminary Desktop Geotechnical Assessment for Peace
River Lookout.
Fort St. John, BC
September 25, 2012



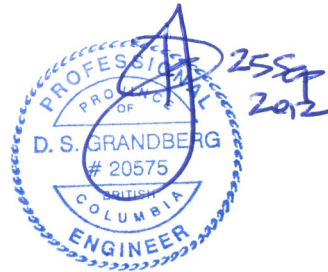
4.0 CONCLUSION

The recommendations presented in the foregoing geotechnical report are based upon a geotechnical evaluation of the conditions observed during the site investigations noted, and which were undertaken at the request of Focus Surveys. If geotechnical conditions other than those described above are encountered during subsequent phases of the project, Northern Geo Testing and Engineering Ltd. should be notified and be given the opportunity to review the current recommendations and make revisions where necessary.

This geotechnical report has been prepared for the exclusive use of Focus Surveys, the Peace River Regional District and its representatives for specific application to the above-described study area. Any use of this report by others, or any reliance on or decisions made based upon it, are the responsibility of such third parties. Northern Geo Testing and Engineering Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based upon this geotechnical report. It has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

Respectfully submitted,

Northern Geo Testing and Engineering Ltd.



Per:
Dustin McDonald, P.Eng.
Geotechnical Engineer

Darryl Grandberg, P.Eng.
Senior Geotechnical Engineer

Attachments: Figure 1
Photos 1 and 4

PEACE VALLEY LOOKOUT

REMEDIAL OPTIONS REPORT: A SUMMARY OF COMPLETED WORK AND SUGGESTED NEXT STEPS

Project number 060300016



Submitted to:
Peace River Regional District
PO Box 810
1981 Alaska Avenue
Dawson Creek, BC
V1G 4H8

Prepared by:
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10716 100 Avenue
Fort St. John, BC
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October 2012

January 29, 2018

FOCUS

1.0 INTRODUCTION

Focus Corporation (FOCUS) has prepared this report for the Peace River Regional District (PRRD) as part of the proposal signed in September 2011. The information found in this report has been collected and summarized from the recently completed environmental and geotechnical studies. The report also provides cost estimates and next steps for remediation at the property. The cost estimates and recommendations in this report are to be used by the PRRD to determine if they will purchase the parcel of land and convert it to a regional park.

2.0 BACKGROUND

The PRRD is considering the purchase of a parcel of crown land where the Peace Valley Lookout is currently located (Slide 2.1). The intention is that the parcel be converted into a regional park. In considering the purchase, the PRRD is evaluating the property's potential for development and determining the possible costs to remediate any negative site issues. The following issues have been identified as part of this process:

- Is it feasible to convert the lookout into a regional park?
- Are there significant potential environmental issues?
- If a significant environmental issue does exist, what are the estimated costs to remediate it?
- Are there any significant geotechnical issues with slope stability?
- If a significant geotechnical issue does exist, what are the estimated costs to remediate it?
- Pending the results of the environment and geotechnical investigations, is the development of the site as a park financially viable?



Slide 2.1: The current Peace Valley Lookout

To help answer these questions, the PRRD commissioned the following studies:

- 1) **Feasibility Study:** Focus completed a feasibility study in March 2010. Focus was awarded the project after the initial Request for Proposal from the PRRD that closed October 8, 2009.
- 2) **Stage One Preliminary Site Investigation (PSI) and Limited Stage Two PSI Studies.** Completed by Focus in March 2011 as part of the Preliminary Site Investigation Proposal that was dated February 28, 2011.
- 3) **Preliminary Desktop Geotechnical Assessment:** Completed in September of 2012 by Northern Geo Testing and Engineering Ltd.

The Feasibility Study was the first assignment completed. The study recommended that a geotechnical study, environmental assessment, and a drainage and runoff study be completed before the PRRD moves ahead with plans to purchase the parcel. Next, the Phase One and Limited Phase Two Preliminary Site Investigations (PSIs) were completed and a report was submitted to the PRRD. Lastly, Northern Geo Testing and Engineering Ltd. (Northern Geo) completed their Geotechnical investigation and finalized the report in September of 2012.

In addition to these studies, there has been work done by others at the site. In the fall of 2011, the Ministry of Transportation and Infrastructure (MoTI) did a significant amount of work on the site. They removed the existing household garbage, car hulks (old vehicles) and appliances that had been dumped at the site. MoTI also placed fill in some areas, installed rip rap, and hydro-seeded to help prevent further erosion (Slide 2.2a and 2.2b). (It is not known if these measures were engineered.) Finally, MoTI installed fencing near the edge of the bank, picnic tables, and a sign.



Slide 2.2a: MOTI has made some improvements to the site such as placing fill and rip rap.



Slide 2.2b: Rip rap installed in the drainage ditch to the left of the viewing area

The PRRD will use the summary and costs contained in this report to determine if the development of the park is financially viable.

3.0 REPORT OBJECTIVES:

The purpose of this report is to outline a remedial options action plan and the estimated costs for the site based on the results from the investigations. For the purposes of this report, we will focus on the preliminary site investigations, geotechnical study and results from site visits carried out since the PSIs were completed.

4.0 SUMMARIZED STUDY RESULTS:

This section summarizes the results of the studies completed on the site.

Since the parcel had been used as a landfill in the past, the soils, groundwater and surface water were assessed for contamination. The following identifies the testing results of the Preliminary Site Investigations:

- Property has been used for dumping of municipal waste and abandoned vehicles for years. The potential for environmental impairment to the property from illegal dumping is to be considered moderate.
 - In British Columbia, contamination limits are based on the type of land use. There are six different land use categories identified in the British Columbia Contaminated Sites Regulation. FOCUS considers Agricultural Land Use (AL) and Parks Land Use (PL) to be applicable to the property based on existing and proposed land use. Standards based on this land use designation were used in the environmental assessment.
 - All concentrations of BTEXS, VPH, VOCs, EPHs, PAHs, LEPH and HEPH and/or metals from the twelve soil samples were found to be below the acceptable CSR AL and PL Standards.
- Therefore, it was determined that the buried landfill waste, cars, and appliances did not have a significant negative impact on the soils, ground water, or surface water.

In addition to the soils and groundwater testing that was conducted, two site visits were completed in May of 2012. The site visit conducted on May 18, 2012 noted that there was some erosion along the south-east bank at the existing fence line (Slide 3.1). The May 31st follow-up visit noted that this same location had continued to slump. Enough soil movement had occurred that two fence posts were hanging in the air as the bank was no longer there to support them. In that area, the bank looked very unstable, and with more precipitation, the bank will continue to slump, leaving more of the fence unsupported. The fence has since been repaired and moved back into a stable ground area.



Slide 3.1: Bank erosion had left two fence posts unsupported

Along other areas of the bank, there is evidence of significant surface erosion where surface water has created concentrated flow paths along the bank. Although MoTI has hydro-seeded and installed rip rap, it is too early to tell if these measures will be effective enough to prevent further erosion and slumping.

It was also noted during these two site visits that while the visible surface garbage had been cleaned up, there are still some vehicles and appliances at the bottom of the slope, adjacent to the river, although not visible from the top of the lookout (Slide 3.2). This may not be the case in the fall when the leaves are gone, and the sight-lines are opened up.



Slide 3.2: Car hulks and old appliances can be found at the bottom of the slope.

Northern Geo completed their investigation of the site in September. Focus worked with the consultant to establish a survey grid for the set-up of their slope monitoring study. Once a month, Focus surveyed these points and provided the results to Northern Geo for their investigation. Northern Geo's report identified a low risk of danger to public due to a slide. They also reported that the recent earthflow and movement observed was mostly likely due to erosion of loose soil dumped in an uncontrolled manner. The extent of the movement is likely only shallow to moderately deep.

5.0 CONCLUSIONS:

Based on these results, FOCUS recommends the following actions to improve the site:

a. Clean-up and Disposal of Car Hulks and Appliances:

MoTI has removed the vehicles and appliances within visible sight lines. There are still some existing vehicles and appliances at the base of the bank, but they are not visible from behind the fence at the lookout. At this time, it is not deemed essential to remove this surface garbage on account of aesthetics or environmental reasons. (A fence and rip rap have been installed which will likely prevent further dumping

of waste off the lookout as vehicles can no longer access the bank.) It would be at the PRRD discretion as to whether they wish to remove the large items or not. Estimated costs to undertake this optional action can be found in Table 5.1.

b. Clean-up of Surface Garbage (litter):

The only visible garbage on the site is litter that has been deposited since MoTI completed their work. FOCUS recommends cleaning up the litter that has been left on the site since MoTI complete their work. (i.e.: fast food and beverage containers). This could be completed as part of a scheduled maintenance plan including maintenance of picnic tables, signs, and the clean-up for garbage that accumulates on site. A clean, well-respected site helps to deter others from littering or vandalizing. Costs to undertake the clean-up and disposal of garbage, maintain picnic tables, and signs can be found in Table 5.1.

c. Installation of Garbage Bins:

It is recommended that the PRRD install garbage receptacles at the site. Costs to install garbage receptacles can be found in Table 5.1.

d. Preventative Plan

FOCUS recommends that monitoring of the site take place. If the garbage issue persists, a further measure that could be taken involves installing one or two fake cameras around the site and assign stating the area is being monitored by a surveillance camera. This has been known to encourage people to clean-up after themselves. It will also help to limit the amount of vandalism that could occur on site. Costs to undertake a long term monitoring program consisting of monthly site visits can be found in Table 5.1.

e. Drainage Study to Prevent Further Surface Erosion

The major geotechnical concern for this site is drainage and surface erosion. It is our recommendation that the PRRD completes a surface erosion and drainage study and report. From this a storm water management plan should be implemented so that runoff does not continue to flow over the banks causing erosion and

further slumping. An estimate of the cost to complete a storm water drainage study and management plan can be found in Table 5.1.

f. Geotechnical Recommendations:

Due to the potential for slide movement to occur, it is recommended that annual monitoring of slope movement be implemented. As per Northern Geo's report, it is recommended that staff from PRRD monitor the slope (take photographs) monthly for visual changes. If changes are noted, it is recommended to seek Geotechnical advice. This task could be incorporated into the monthly maintenance plan.

To ensure public safety, it is recommended that the current fence be maintained and signs be installed warning the public of the potential for slides to occur. If additional shallow slides occur, a setback of the fence should be provided to maintain the stability of the fence.

Table 5.1

Item Description	Cost
a. Removal of remaining car hulks and appliances at bottom of slope (optional)	\$25,000
b. Site maintenance program (including clean-up of litter, maintenance of tables, and signs)	\$8,000 (annually)
c. Installation of bins	\$5,000
d. Monthly monitoring for litter and vandalism prevention	\$6,000 (annually)
e. Drainage study	\$7,000
f. Geotechnical monitoring	\$3,000 (annually unless combined with maintenance visits)

6.0 NEXT STEPS

After reviewing the results of the site Investigations and geotechnical reports, Focus does not see any significant issues at the lookout location. There is, however, one last action that should be undertaken prior to concluding the feasibility review of the parcel:

1. Focus recommends completing the drainage study before the purchase of the land. By completing this study, the PRRD will have estimated costs to mitigate the surface runoff issues that are still affecting the slope.

7.0 Closing

We trust this short report has summarized the results of work completed for the site and provides relevant information regarding the potential purchase of the lookout. We are more than happy to discuss these results in further detail with you at any time and expand on the remediation suggestions, estimated costs and next steps.

Sincerely,

FOCUS CORPORATION



Britney Garberg, EIT
Project Engineer



Pam Astbury, P. Eng.
Senior Review

FOCUS