

APPENDIX F: ENVIRONMENTAL ASSESSMENTS



EXCELLENCE IN
ENVIRONMENTAL
CONSULTING
SERVICES



**ENHANCED PHASE 1
ENVIRONMENTAL SITE ASSESSMENT
CANADIAN COAST GUARD NAVIGATIONAL AID
L.L. 488.0
BRIGHTON REAR RANGE
BRIGHTON, ONTARIO**

Prepared for:

**DEPARTMENT OF FISHERIES AND OCEANS
CENTRAL AND ARCTIC REGION**

and

**PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA**

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EXECUTIVE SUMMARY

XCG Consultants Ltd. (XCG) was retained by Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans (DFO), Central and Arctic Region, to carry out an Enhanced Phase 1 Environmental Site Assessment (ESA) of the Brighton Rear Range Navigation Aid (L.L.488.0) in the Town of Brighton, Northumberland County, Ontario. The navigation aid is located on the north side of Harbour Street, west of Cedar Street in Brighton. The property consists of a 15.24 metre by 15.24 metre square portion (Part 1) with a 2.44 metre by 38.1 metre access way (Part 2) from Harbour Street. A chain link fence with a locked gate encompasses the structure. The 18.0 metre beacon is centred in the square portion of the property. The station consists of a white skeleton tower with a fluorescent orange triangular daymark with a black vertical stripe and a navigational light. The tower is mounted on four concrete blocks that form a 3.15 metre square.

The objectives of this Enhanced Phase I ESA were as follows:

- Identify and document actual or potential contamination to assist in reducing the uncertainty regarding potential environmental liabilities.
- Develop a National Classification System (NCS) score for the site, where required.
- Develop an indicative estimate of liability for the site as per the Treasury Board requirements, where feasible.
- Provide the input data for the Department of Fisheries and Oceans' (DFO) Real Property Information System for Contaminated Sites (RPISCS) Module.

The Crown expropriated the property on which this skeleton tower is located in 1934. According to Mr. Ted Nickel of CCG, the present structure has been on this site since 1952. The back light of the original Brighton Range Lights, which were constructed in 1891, was actually located on a wooden crib in the waters of Presqu'île Bay. The range lights were relocated during the 1950's and the present structure was constructed. The site has been serviced with hydroelectric power since the navigation light was built, according to Mr. Nickel. With the recent development of the residential homes in the vicinity of the navigation aid, a chain link fence was erected around the structure for safety. A 100-Watt incandescent bulb, located in the DLD 300-mm lantern, provides the navigational light.

Soil samples were retrieved from the ground adjacent to the foundation of the Navigational Aid. The analytical results indicate a number of metal criteria exceedances of applicable Environmental Quality criteria were identified in the area in the vicinity of the navigation aid. The applicable Environmental Quality criteria considered at this site were the Ontario Ministry of the Environment (MOE) Table F guidelines for all other land use, and the Canadian Council of Ministers of the Environment (CCME) guidelines for residential/parkland redevelopment. A comparison was also made to the MOE Table A guidelines, which may not be strictly applicable given the possible shallow depth of overburden on the subject site, but which may still be considered to be protective of human health provided that contaminant leaching to groundwater can be eliminated as a pathway of concern.

In summary, the results of this Enhanced Phase I investigation of the area in the vicinity of the navigation aid at Brighton Rear Range indicate that the concentrations of some metals in soil (hexavalent chromium and thallium) exceed the provincial Table F guidelines for all other land use, and/or federal guidelines for residential/parkland redevelopment.

Based on analytical results and the site visit observations, the approximate quantity of impacted soil (metals contamination) in the vicinity of the navigation aid is estimated to range between 12

and 120 cubic metres. The quantitative estimate of this volume is based on seven (including one duplicate) soil samples that were analyzed. No regulatory requirements exist necessitating any action to be taken for continued existing use of the property. However, it is recommended that a Phase 2 subsurface sampling program be implemented to further delineate the volume of contaminated soil. Also, since the property directly adjacent to the boundary of the site is accessible by members of the general public, possibly including children, a screening level risk assessment should be performed to determine whether potential exposures to the contaminants found at elevated concentrations are within acceptable limits and thus, whether any remedial action is required at this time.

Two remedial options have been identified for possible implementation in the event that any exposure concerns are identified or if future plans for the site are contingent upon meeting provincial and/or federal clean-up guidelines. For soils impacted by inorganic contaminants (i.e. metallic elements), the first option would be to clean up the affected soils to generic CCME residential/parkland criteria or possibly background levels (Table F). This, in practical terms, would likely involve removal of soil in the vicinity of the navigation aid at this site to bedrock or to a depth where background levels would be attained. The second option would be to place clean soil cover over the affected areas. A site-specific risk assessment (SSRA) would be required for the second option since contaminants may be left in place at levels above Table F, and the MOE generic guidelines (i.e. Tables A, B, C, and D) do not cover situations where there is less than 2 m of soil over bedrock.

The CCME, National Classification System for Contaminated Sites score for the metal-contaminated area of the site was 52 (± 4). This score falls within the Class 2 designation (some action likely required). For this property, it was determined that *indicative* estimate of liability was required, based on the CCME NCSCS classification for the impacted area on the subject site (Class 2). An evaluation of remedial options for the contaminated area identified on the subject property was conducted, and a preferred remedial option was selected. The *indicative* estimate of liability, based on the estimated cost of the preferred remedial option for the contaminated area identified on the property, is \$48,300 for the area in the vicinity of the navigation aid.

The presence of lead in painted surfaces (at concentrations above 0.5%) of the Brighton Rear Range site was confirmed through analysis of paint samples taken during the site visit. Evidence of "flaking" paint was noted on the surfaces of the Navigational Aid. The presence of lead in paint is primarily a concern if the paint is disturbed by sanding during building renovations or during demolition activities or if the structure, or part thereof, is used or inhabited by pre-school children. Under provincial regulations, the only requirement for further action is specified by the *Occupational Health and Safety Act*, which requires that contractors be notified of the presence of lead (and other designated substances) in a building at the tendering stage so that appropriate measures can be taken by the contractor to protect workers from excessive exposure. The presence of metals in paint has also likely contributed to elevated levels of metals in surficial soils in the vicinity of the structure at this site. Appropriate precautionary measures (use of polyethylene drop sheets, filtered exhaust for power tools, etc.) should be implemented during any future painting and maintenance activities to ensure that lead and other metallic elements present in paint applications do not contaminate soils.

A fill pile, possibly relocated soil from development of the surrounding subdivision, is located approximately 3 metres southwest of the subject site. No other non-hazardous debris was observed near the structure. The fill pile has an approximate volume of 20 to 25 cubic metres, based on visual observation.

No archaeological sites are known to have been identified on the station to date. There are no known significant or protected natural areas on the property or in the near vicinity.

| CONTENTS | | Page |
|---|--|------|
| EXECUTIVE SUMMARY | | EX-1 |
| CONTENTS | | i |
| TABLES | | ii |
| LIST OF APPENDICES | | ii |
| | | |
| 1.0 INTRODUCTION | | 1 |
| 1.1 Assessment Objectives | | 1 |
| | | |
| 2.0 ASSESSMENT METHODOLOGY | | 3 |
| 2.1 Research | | 3 |
| 2.2 Consultation | | 3 |
| 2.3 Site Reconnaissance | | 4 |
| 2.3.1 Health and Safety Plan | | 5 |
| 2.4 Sampling and Analytical Testing | | 5 |
| 2.4.1 Quality Assurance/Quality Control (QA/QC) | | 6 |
| 2.5 Regulations and Guidelines for Environmental Compliance | | 7 |
| 2.6 Assessment Limitations | | 10 |
| | | |
| 3.0 GENERAL PROPERTY INFORMATION | | 12 |
| | | |
| 4.0 LAND USE PROFILE | | 13 |
| 4.1 Land Use History | | 13 |
| 4.2 Heritage Status | | 14 |
| 4.3 Land Use: Adjacent Property | | 14 |
| | | |
| 5.0 PHYSICAL CHARACTERISTICS | | 16 |
| 5.1 Geology and Topography | | 16 |
| 5.2 Soils | | 16 |
| 5.3 Sediment | | 20 |
| 5.4 Surface Water | | 20 |
| 5.5 Groundwater | | 20 |
| | | |
| 6.0 BIOLOGICAL CHARACTERISTICS | | 21 |
| 6.1 Vegetation | | 21 |
| 6.2 Fish and Fish Habitat | | 21 |
| 6.3 Wildlife | | 21 |
| | | |
| 7.0 STRUCTURES & IMPROVEMENTS | | 22 |
| 7.1 Inventory of Structures | | 22 |
| 7.2 Structures - Environmental Issues | | 22 |
| 7.3 Easements/Site Services | | 23 |
| | | |
| 8.0 MATERIALS STORED, USED, OR DISCARDED | | 24 |
| 8.1 Aboveground Storage Tanks | | 24 |
| 8.2 Underground Storage Tanks | | 24 |
| 8.3 Hazardous Materials/Waste | | 24 |
| 8.4 Non-Hazardous Materials/Waste | | 24 |
| 8.5 Placement of Fill, Dredged Materials | | 24 |

CONTENTS

Page

| | | |
|------|---|----|
| 9.0 | CCME NATIONAL CLASSIFICATION SYSTEM FOR CONTAMINATED SITES | 25 |
| 10.0 | REMEDIAL OPTIONS AND TREASURY BOARD LIABILITY ESTIMATE..... | 26 |
| 10.1 | Areas of Contamination | 26 |
| 10.2 | Remedial Options Evaluation..... | 26 |
| 10.3 | Treasury Board Liability Estimate | 27 |
| 11.0 | REAL PROPERTY INFORMATION SYSTEM FOR CONTAMINATED SITES (RPISCS) MODULE..... | 29 |
| 12.0 | SUMMARY..... | 30 |
| 13.0 | RECOMMENDATIONS..... | 33 |

TABLES

| | | |
|---------|--|----|
| TABLE 1 | Summary of Analytical Results for Selected Metals in Soil..... | 18 |
| TABLE 2 | Summary of Analytical Results for Lead in Soil..... | 19 |
| TABLE 3 | Summary of Analytical Results for Lead in Paint..... | 23 |

LIST OF APPENDICES

| | |
|---|--|
| A | Site Photographs |
| B | Figure 1 (Site Plan) Figure 2 (Site Location Plan) Topographical Map Aerial Photographs |
| C | Sample Log Notes: Paint Samples Sample Log Notes: Soil Samples Laboratory Certificates of Analysis |
| D | Communication Records |
| E | CCME National Classification System for Contaminated Sites |
| F | Remedial Alternative Cost Estimates and Treasury Board Liability Estimate Information |
| G | Real Property Information System for Contaminated Sites (RPISCS) Module |
| H | References |
| I | Environmental Site Assessor Qualifications |

1.0 INTRODUCTION

XCG Consultants Ltd. (XCG) was retained by Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans (DFO), Central and Arctic Region, to carry out an Enhanced Phase 1 Environmental Site Assessment (ESA) of the Brighton Rear Range Navigation Aid in Brighton, Ontario. The navigation aid is located on the north side of Harbour Street, west of Cedar Street in Brighton. The property consists of a 15.24 metre by 15.24 metre square portion (Part 1) with a 2.44 metre by 38.1 metre access way (Part 2) from Harbour Street. A chain link fence with a locked gate encompasses the structure. The 18.0 metre beacon is centred in the square portion of the property. The station consists of a white skeleton tower with a fluorescent orange triangular daymark with a black vertical stripe and a navigational light (see Photo 1). A 100-Watt incandescent bulb, located in the DLD 300-mm lantern, provides the navigational light. The tower is mounted on four concrete blocks that form a 3.15 metre square.

The Crown expropriated the property on which this skeleton tower is located in 1934. According to Mr. Ted Nickel of CCG, the present structure has been on this site since 1952. The back light of the original Brighton Range Lights, which were constructed in 1891, was actually located on a wooden crib in the waters of Presqu'île Bay. The range lights were relocated during the 1950's and the present structure was constructed. The site has been serviced with hydroelectric power since the navigation light was built, according to Mr. Nickel. With the recent development of the residential homes in the vicinity of the navigation aid, a chain link fence was erected around the structure for safety. A 100-Watt incandescent bulb, located in the DLD 300-mm lantern, provides the navigational light.

1.1 Assessment Objectives

The objectives of this Enhanced Phase I ESA were as follows:

- Identify and document actual or potential contamination to assist in reducing the uncertainty regarding potential environmental liabilities.
- Develop a National Classification System (NCS) score for the site, where required.
- Develop an indicative estimate of liability for the site as per the Treasury Board requirements, where feasible.
- Provide the input data for the Department of Fisheries and Oceans' (DFO) Real Property Information System for Contaminated Sites (RPISCS) Module.

In general, ESAs are completed in phases. The Phase I ESA typically involves research and records review, consultation and interviews, as well as visual site reconnaissance. A Phase I ESA report will indicate whether any further investigative work is needed to achieve an adequate environmental assessment of the property.

A Phase II ESA generally includes a more detailed field investigation (subsurface sampling, analytical testing, etc.) in order to gain a better understanding of the environmental condition of the subject property. A Phase III ESA generally involves the remediation of environmental contamination on the subject property.

The assessment of the Brighton Rear Range Navigation Aid (L.L. 488.0) generally follows the procedures of a Phase I ESA, using Canadian Standards Association (CSA) Standard Z768-94 as a guideline. However, as an exception, a title search was not conducted as this exercise was found not to be practical. In addition, limited sampling and confirmatory testing of building materials and soils were carried out in accordance with PWGSC requirements.

This report presents the results of this assessment and provides conclusions regarding the environmental conditions existing at the site, based on the information presented, at the time of the site reconnaissance. Recommendations pertaining to the need for further environmental assessment are also provided, if required.

2.0 ASSESSMENT METHODOLOGY

The evaluation of the site consisted of four basic components: background research; consultation with individuals and agencies associated with the property; a site visit (which included both visual evaluation and sampling); and analytical testing and interpretation of results.

2.1 Research

Information was collected and reviewed from the following sources:

- Canadian Coast Guard, Department of Fisheries and Oceans
Prescott Base, Prescott, Ontario
 - administration, operations, and maintenance files; title documents.
- Geomatics Canada, Department of Natural Resources
National Air Photo Library, Ottawa, Ontario
 - Aerial photographs 1962, 1986, 1995
- Federal Topographic Map
 - Trenton 31 C/4 Ed. 6, 1:50,000
 - Energy, Mines and Resources Canada
- Map 2544, Bedrock Geology of Ontario, Southern Sheet, 1991.
Ontario Ministry of Northern Development and Mines.
- Map 2556, Quaternary Geology of Ontario, Southern Sheet, 1991.
Ontario Ministry of Northern Development and Mines.
- www.mnr.gov.on.ca/MNR/nhic
 - Natural Heritage Information Centre
- www.mnr.gov.on.ca/MNR/Parks
 - Ministry of Natural Resources
- www.parkscanada.pch.gc.ca
 - list of heritage buildings
- www.rom.on.ca/ontario
 - endangered species information

2.2 Consultation

In an effort to obtain information pertaining to the subject property and vicinity, the following agencies and/or individuals were contacted:

- Canadian Coast Guard, Department of Fisheries and Oceans
Ted Nickel – Real Property Officer, Prescott CCG
 - Provided information on history of the Navigational Aid.
- Canadian Coast Guard, Department of Fisheries and Oceans
Chuck Lemaire – Level of Service Officer, Marine Navigational Services, Prescott CCG
 - Provided information on history of the Navigational Aid.

- Canadian Coast Guard, Department of Fisheries and Oceans
Geoff Fortier – Service Technician, Marine Navigational Services, Prescott CCG
- Provided information on history of the Navigational Aid.
- Ontario Ministry of Environment
Peterborough District Office, Peterborough, Ontario
Michael Longpre – Environmental Officer for Brighton Area
– Was contacted but had no information regarding the subject property.
- Ontario Ministry of Natural Resources
Kingston District Office, Kingston, Ontario
Todd Norris – District Ecologist
– Provided information resources on habitats and populations in the area.
- Ontario Ministry of Natural Resources
Lake Ontario Management Unit, Glenora Research Station, Glenora, Ontario
Alistair Mathers – Management Biologist
- Provided information resources on habitats and populations in the area.
- Brighton Public Utilities Commission
Russ Jandciu - Manager
- Provided information on drinking water supplies in the Brighton Area.

Copies of correspondence and communication records are included in Appendix D.

2.3 Site Reconnaissance

The site was visited by Ms. Janet Noyes of XCG on December 20, 2000. The site was road accessible with a short walk to the site. Weather conditions at the time of the site visit were sunny with a temperature of approximately -10°C. General site characteristics were observed and documented, and a limited sampling program was conducted, as discussed in Section 2.4. A site plan (Figure 1) and a site location plan (Figure 2) are provided in Appendix B. Selected photographs taken during the site visit are presented in Appendix A.

2.3.1 Health and Safety Plan

A health and safety plan was maintained throughout the field program. All field workers were instructed on the protocols of the plan and the proper use of personal protective equipment. Worker health and safety standards were assured by following stringent safety precautions in accordance with the applicable sections specified under the Canada Labour Code and the Canada Health and Safety Act.

Potential hazards for this project included exposure to contaminated soil and building materials containing designated substances during inspection and sampling. Throughout the duration of the field activities, the following sections of the XCG Health and Safety Plan were adopted, as a minimum: site procedures, work procedures, hazard evaluation and control (including sub-sections on contaminant information, cold and heat stress, and physical hazard controls), and emergency response plan.

In addition, where appropriate, survival suits, including personal flotation devices, were supplied to XCG field personnel.

2.4 Sampling and Analytical Testing

Soil samples were collected using a rock pick and a shovel, which were cleaned between sampling locations to reduce the risk of cross-contamination. Individual sealable plastic bags were used to collect the soil samples. The samples were then identified and logged for physical properties. Representative samples were immediately placed in glass jars with Teflon lined lids to prevent loss of volatile compounds. A soil sample log is included in Appendix C. Sample analyses, locations, and analytical results are summarized in Section 5.2.3.

Paint samples of the exterior paint were collected at this site to provide an indication of the type and variability of paints used on CCG structures. A utility knife was used to scrape the paint in an unobtrusive area down to the base material of the structure. The paint flakes were collected in twist lock sample bags and identified and logged.

No materials suspected to contain asbestos were observed during the site visit and, as such, no samples of suspected asbestos-containing material were collected.

Sampling activities conducted while on site included the collection of eight soil samples and one paint sample. Seven (including one duplicate) soil samples and the paint sample were submitted for analytical testing to Environmental Technology Research Laboratories Inc. (ETRL) in Kingston.

The rationale for the analyses performed on the samples submitted is summarized in the points below:

- in areas surrounding the structure where contamination of soil by paint was suspected, analyses of metals and lead were performed because these are parameters that are present in older paint types;
- in areas where the structure was painted, analyses of lead were performed because this parameter is present in many painted surfaces dating from before the mid- to late-1970's.

The sampling program is summarized in the table below.

| SAMPLE DESIGNATORS | LOCATION | MATRIX | ANALYSIS PERFORMED |
|--------------------|--|--------|--------------------|
| CCG 488.0 N | 1 metre north of the northern exterior member of the structure. | Soil | Table A Metals |
| CCG 488.0 S | 2 metres south of the southern exterior member of the structure. | Soil | Table A Metals |
| CCG 488.0 E | 2 metres east of the eastern exterior member of the structure. | Soil | None |
| CCG 488.0 W | 2 metres west of the western exterior member of the structure. | Soil | Lead |
| CCG 488.0 NE | 5.5 metres northeast of the northeast corner of the base of the structure. | Soil | Lead |
| CCG 488.0 NW | 5.5 metres northwest of the northwest corner of the base of the structure. | Soil | None |
| CCG 488.0 SE | 5.5 metres southeast of the southeast corner of the base of the structure. | Soil | Lead |
| CCG 488.0 SW1 | 5.5 metres southwest of the southwest corner of the base of the structure. | Soil | Table A Metals |
| CCG 488.0 SW2 | Duplicate of SW1 | Soil | Table A Metals |
| CCG 488.0 WBSS | White paint on the bottom of the structure on the south side. | Paint | Lead |

NOTES:

Metals analysis includes ICAP and hydrides (As, Se, Hg)

The laboratory Certificates of Analysis are included in Appendix C. Soil sample locations are plotted on the site plan (Figure 1) provided in Appendix B.

2.4.1 Quality Assurance/Quality Control (QA/QC)

A quality assurance and quality control (QA/QC) program was implemented to address the office and field programs. Duplicate soil samples at CCG 488.0 SW were collected and submitted for analyses of Table A metals for QA/QC purposes. The duplicated sets agreed within a variance of 16%, which is considered to be acceptable in soil samples, due to their heterogeneity. Therefore this indicates that there was a satisfactory degree of precision in the laboratory results.

As a minimum, samplers were thoroughly cleaned before collecting subsequent samples to reduce the risk of cross-contamination between sampling. For all sampling locations, logs containing all pertinent information were prepared (see Appendix C) and collected samples were placed in appropriate containers immediately upon retrieval. Soil classification was completed in accordance with applicable sections of the Canadian Foundation Engineering Manual (CFEM). Field sampling and equipment decontamination was completed in accordance with applicable Environment Canada protocols and applicable industry practices. An analytical laboratory that is accredited by the Canadian Association for Environmental Analytical Laboratories (CAEAL) performed all laboratory chemical analyses.

All paint samples collected were placed in individual plastic bags, identified and logged for location, base material (if applicable), physical properties and quantity present. Soil samples were collected using a stainless steel hand trowel or shovel, placed in individual 250-mL glass jars or sealable plastic bags (as appropriate), identified, and logged for physical properties. Duplicate soil samples utilized for screening purposes were collected and placed in containers in the same manner. Soil samples were selected for laboratory analysis based on visual and olfactory observations, combined with screening results.

A chain of custody form accompanied the samples at all points of handling. Samples were preserved until delivered to ETRL Laboratory in Kingston, Ontario, for analytical testing.

2.5 Regulations and Guidelines for Environmental Compliance

Analytical results of samples collected on site and the compliance status of various environmental issues were compared to the applicable regulations and/or guidelines described below. If the regulation and/or guideline do not apply to this site, it is stated as such, with the reason, and the regulation and/or guideline is not discussed further in this report.

| | |
|---------------------|---|
| 2.5.1 LEAD IN PAINT | <p><i>The Federal Hazardous Products Act</i> (1976) limits the quantity of lead permissible in newly manufactured paints to 0.5% (5,000 ppm). Paints having a lead content greater than 0.5% (5,000 ppm) are thus considered to be lead-based.</p> <p>Lead is a Designated Substance under the Ontario <i>Occupational Health and Safety Act</i> (O.Reg. 843/90, as amended by O. Reg. 519/92 and O. Reg. 389/00). While it does not strictly regulate lead-based paint, the <i>Regulation respecting Lead</i> sets limits on exposure to airborne lead for workers in industrial operations. The Act also requires that a list of designated substances present at a project site be provided to all bidders at the project bidding stage.</p> <p>It is likely that lead paint was used on the structure on site as it was installed before 1976. There is a possibility of lead impacts in the soil on site in the vicinity of the structure.</p> |
| 2.5.2 SOIL | <p>Soil sample analytical results were compared to the Table F criteria for all other land use published in the Ontario Ministry of the Environment (MOE) <i>Guideline for Use at Contaminated Sites in Ontario</i> (September, 1998) and the residential/ parkland land use in the Canadian Council of Ministers of the Environment (CCME) <i>Canadian Environmental Quality Guidelines</i> (1999). Table F provides background soil criteria, which may be used at any site, including potentially sensitive sites (i.e. less than 2 metres of overburden). A comparison was also made to the MOE Table A guidelines, which are not strictly applicable given the shallow depth of overburden on the subject site, but which may still be considered to be protective of human health provided that contaminant leaching to groundwater can be eliminated as a pathway of concern.</p> |
| 2.5.3 AIR EMISSIONS | <p>There are no sources of air emissions at the site, therefore O.Reg. 346 (Air) and O.Reg. 337 (Ambient Air Quality Criteria) do not apply.</p> |
| 2.5.4 POTABLE WATER | <p>There is no potable water supplied to this site, and there are no water wells located on-site. Therefore, O.Reg. 933 (Wells) and the Ontario Drinking Water Objectives do not apply to this site.</p> |

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| 2.5.5 SEWERS | Sewer service is not provided to the site and is not required, as liquid wastes are not generated at the site. Therefore, the municipal sewer by-law does not apply to this site. |
| 2.5.6 WASTE GENERATION AND DISPOSAL | No waste is generated at the site, therefore Ontario Regulation 347 (governing waste generation, manifesting, shipment, disposal) does not apply to this site. Also, Ontario Regulations 102/94 (Waste Audits and Waste Reduction Work Plans) and 103/94 (Source Separation Programs) do not apply to this site. The Ontario Environmental Protection Act (EPA), R.S.O. 1990, Part V, covers waste disposal, and applies to the subject site with respect to historical disposal of waste on site. |
| 2.5.7 SPILLS | No spills have been reported at the site. Therefore, Ontario Environmental Protection Act (EPA), Sections 13, 15, 17, 92, and 93, O.Reg. 675/88 Classification and Exemption of Spills, and O.Reg. 360 (Spills) do not apply to this site. Also, the Ontario Water Resources Act, R.S.O. 1990, Chapter O.40 does not apply to the site as there no discharges from processes to surface water or groundwater from the site. For these reasons, the federal Fisheries Act is also not considered to be applicable, given that there is no evidence of any discharges of contaminants to surface water having occurred. |
| 2.5.8 FUEL STORAGE | <p>Aboveground tanks or tank systems are governed by the Canadian Council of Ministers of the Environment's (CCME's) <i>Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products</i> (CCME-EPC-LST-71E, August 1994). The Code of Practice applies to all outside aboveground storage tank systems with a capacity of more than 230 L used for the storage of petroleum products, including gasoline, diesel fuel, aviation fuel, kerosene, naphtha, lubricating oil, fuel oil and engine oil, but excluding propane, paint and solvents. Any tank or tank system having a capacity greater than 4,000 L must be registered with the authority having jurisdiction. Tank systems containing fuel oil for heating or emergency power generation must also be constructed, installed and maintained in accordance with CAN/CSA-B139-00, <i>Installation Code for Oil-Burning Equipment</i>.</p> <p>Provincially, the following acts and regulations apply to fuel storage tank systems: the Fuel Oil Code (O. Reg. 329) of the Energy Act, the Gasoline Handling Code (O.Reg. 521/93), and the Gasoline Handling Act (R.S.O. 1990).</p> <p>No heating fuel or motor fuel is stored at the subject site, therefore the above acts and regulations do not apply.</p> |
| 2.5.9 DANGEROUS GOODS | No dangerous goods are generated or used at the facility, therefore the Transportation of Dangerous Goods Act (Canada), R.S.O. 1992, does not apply. |
| 2.5.10 PESTICIDES | The storage and use of pesticides in Ontario is regulated under the Ontario Pesticides Act, R.S.O. 1990, Chapter P.11. No historical use of pesticides at the site is known. |

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|-----------------------------------|---|
| <p>2.5.11 PRIORITY SUBSTANCES</p> | <p>The National Pollutant Release Inventory (NPRI), made under the Canadian Environmental Protection Act, Subsection 16 (1), has requirements for the reporting of the manufacture or use of 178 "Priority Substances." None of these substances are used or manufactured at the site, therefore the NPRI regulation does not apply.</p> |
| <p>2.5.12 HEALTH AND SAFETY</p> | <p>The Ontario Health and Safety Act, R.S.O. 1990, Chapter O.1, O.Reg. 851 (Industrial Establishments), and O. Reg. 860 (Workplace Hazardous Material Information Systems) do not apply to the subject site as there are no workers at the site on a full or part-time basis. CCG personnel only visit the site occasionally every year to perform minor maintenance activities. In the event that major structural work or demolition work was required at the site, the entities involved in completing this work would be required to comply with the above legislation. There are currently no plans to complete work of this nature on the site.</p> |
| <p>2.5.13 ASBESTOS</p> | <p>Asbestos-containing products were used extensively until the mid-1970s in friable building construction materials (thermal pipe and tank insulation, for example). Asbestos was used in non-friable materials such as vinyl floor tile, cement board, cement pipe, etc., to later dates. Some non-friable asbestos-containing products are still being manufactured today.</p> <p>Public Works and Government Services Canada (PWGSC) DM Directive 057 – Asbestos Management outlines procedures for the evaluation of ACMs and recommendations for control. The Ontario Ministry of Labour (MOL) considers any material which contains greater than 0.5% asbestos fibre (by Polarized Light Microscopy method) to be an asbestos-containing material for the purposes of application of the requirements of the <i>Regulation Respecting Asbestos on Construction Projects and in Buildings and Repair Operations</i> (O. Reg. 838/90, as amended by O. Reg. 510/92).</p> <p>Disposal of asbestos waste is governed by O. Reg. 347/90. The <i>Transportation of Dangerous Goods Act</i> and Regulations prescribe additional requirements related to the transportation of asbestos waste.</p> <p>The above acts and regulations do not apply to the site as no asbestos has been identified on-site.</p> |
| <p>2.5.14 PCBs</p> | <p>Equipment containing solids or fluids with a polychlorinated biphenyl (PCB) concentration greater than 50 ppm is considered to be PCB-containing. There is no regulatory requirement to remove PCB-containing equipment from service, however, a review of regulatory requirements (O. Reg. 362/90, SOR/92-507 Canadian Environmental Protection Act) should be undertaken for all PCB-containing equipment present and the equipment should be properly identified and labelled. The regulation regarding the disposal of waste containing PCBs is O.Reg. 347. Neither of these regulations applies at this site as no PCBs have been identified at the site.</p> |

| | |
|--|--|
| <p>2.5.15 OZONE DEPLETING SUBSTANCES</p> | <p>The <i>Federal Halocarbon Regulations</i> assist in the development of strategic plans for the use, control and phase-out of ODSs and their halocarbon alternatives for operations under federal jurisdiction. In addition, the Montreal Protocol is an international agreement for the reduction and elimination of the use of ODSs. Maintenance of ODS containing equipment is regulated by the federal <i>Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems</i>. Provincial regulations under the Ontario Environmental Protection Act include O. REG. 356 (ODS regulation in general); O. REG. 189/94 (refrigerants regulation); O. REG. 413/94 (halon fire extinguishing equipment); O. REG. 717/94 (solvents regulation); and O. REG. 718/94 (sterilants regulation).</p> <p>There is no known equipment on-site, which contains ozone-depleting substances, therefore, the above acts and regulations do not apply.</p> |
| <p>2.5.16 FIRE PROTECTION</p> | <p>Guidelines for fire protection of buildings and structures containing fuel tanks is contained in the National Fire Code of Canada, 1995. There are no fuel tanks at the subject property, therefore this regulation does not apply to this site.</p> |

2.6 Assessment Limitations

A title search and legal survey of the subject property were beyond the scope of this environmental site assessment. Therefore, all information regarding the property description is based on existing information, which is presumed to be accurate.

The intent of this report is to provide coverage of the entire area of the CCG property at Brighton Rear Range Navigation Aid. The on-site investigation work, however, was limited to the core areas of the site (i.e. in the vicinity of the existing and historic structures), since these are the areas where contamination, if present, would be expected.

It should be noted that this Enhanced Phase 1 Environmental Site Assessment (ESA) focused on identifying any environmental damages as they relate to existing or potential future environmental liabilities relating specifically to the Canadian Coast Guard Navigation aid located at L.L. 488.0 Brighton Rear Range Navigation Aid, Brighton, Ontario. It was not intended to be a detailed audit of all past or current operations. No sampling or chemical analysis of air or water was undertaken as part of this assessment. The soil sampling that was done was limited to a few specific locations and, as such, conditions between and beyond these locations may vary from those found at the locations that were sampled. Detailed subsurface investigations in subsequent phases or studies may encounter conditions not apparent at this time.

The scope of work for the Enhanced Phase 1 ESA meets and/or exceeds the Canadian Standards Association (CSA) Standard Z768-94. The conclusions presented in this report are professional opinions based upon a records review, visual observations, and limited information provided by persons knowledgeable about past and current activities on this site. As such, XCG cannot be held responsible for environmental conditions at the site that were not apparent from the available information.

The scope of this report is limited to the matters expressly covered. This report is prepared for the sole benefit of the Department of Fisheries and Oceans and Public Works and Government Services Canada and may not be relied upon by any other person or entity without written authorization of XCG Consultants Ltd. As such, the scope of services performed in the execution of this investigation may not be appropriate to satisfy needs of other users, and any use or reuse of this document or the findings, conclusions, or recommendations represented herein is at the sole risk of said users.

3.0 GENERAL PROPERTY INFORMATION

| | | |
|-------------------------|-----------------|--|
| 1. COMMON NAME | | Brighton Rear Range |
| 2. LIGHT LIST NO. | | 488.0 |
| 3. CCG REGION | | Central & Arctic |
| 4. CCG DISTRICT | | Prescott |
| 5. DFRP REFERENCE # | | 33164 |
| 6. LOCATION | PROVINCE | Ontario |
| | WATERWAY | Presqu'île Bay, Lake Ontario |
| | REGION/DISTRICT | Northumberland County |
| | MUNICIPALITY | Town of Brighton |
| | ADDITIONAL | North side of Harbour Street, West of Cedar Street |
| 7. GEOG. CO-ORDINATES | | Lat.: 44° 01' 22" N LONG.: 77° 43' 45" W |
| 8. PROPERTY DESCRIPTION | | The navigation aid is situated on the North side of Harbour Street, West of Cedar Street. The property consists of a 15.24 m x 15.24 m square with a 2.44 m x 38.1 m access way from Harbour Street. |
| 9. TOTAL PROPERTY AREA | | 0.032 ha |
| 10. NO. OF STRUCTURES | | One white skeleton tower with fluorescent orange daymark with vertical black stripe and navigational light. |
| 11. OPERATIONAL STATUS | | Unattended navigation aid. |
| 12. PRESENT CUSTODIAN | | Canadian Coast Guard, Central and Arctic Region. Department of Fisheries and Oceans. |

4.0 LAND USE PROFILE

4.1 Land Use History

The following briefly summarizes the history of land use at the subject property, as determined from files maintained at the Canadian Coast Guard Base in Prescott, Ontario, provided by PWGSC staff, and the sources noted in Section 2.0.

| DATE | LAND USE/NOTABLE EVENT |
|---------|---|
| 1934 | Land expropriated by the crown. |
| 1952 | Lighted skeleton tower navigation aid constructed. |
| Present | <ul style="list-style-type: none"> station operates as unattended navigation light |
| Future | <ul style="list-style-type: none"> station to continue as unattended navigation light. |

Although the site has operated as an unattended navigation aid for approximately 67 years, there are potential environmental concerns that may need to be addressed. These relate to the potential for the presence of surface or subsurface contamination from the lead-based paint that was likely used on the structure. The following issues of potential concern were reviewed, and appear not to represent significant environmental concerns with respect to the subject property:

- With respect to possible hydrocarbon contamination, no ASTs or USTs were noted during the site inspection. It is not expected, based on the historical information review, that either ASTs or USTs have ever been present on the subject site.
- With respect to the possible presence of asbestos-containing materials (ACMs), no ACMs were observed during the site inspection. It is not expected, based on the historical information review, that ACMs have ever been present on the subject site.
- With respect to the possible presence of ozone-depleting substances (ODSs), no ODSs were noted during the site inspection. It is not expected, based on the historical information review, that ODSs have ever been present on the subject site.

The potential issues of environmental concern that have been identified on the subject site are outlined in the following table.

| KNOWN/POTENTIAL ENVIRONMENTAL CONCERN | ACTUAL/POSSIBLE USAGE |
|---------------------------------------|---|
| HEAVY METAL CONTAMINATION | <ul style="list-style-type: none"> Lead-based paints were in common usage until the late 1970s. Historic on-site structures may have been finished with lead-based paints. Flaking paint and paint removed by sand blasting can result in contaminated soil. |

In order to establish whether any past problems with respect to environmental compliance have been recorded by the MOE, XCG contacted Mr. Michael Longpre, of the MOE Peterborough District office. Mr. Longpre was asked if there are any files pertaining to this site. Mr. Longpre indicated that there are no files on this site and he does not recall the MOE responding to any incidents at the Navigation Aid site. An index request for this subject site was submitted to the Peterborough District Office and no response has been obtained at this point.

4.2 Heritage Status

Federal buildings 40 years or older qualify for review by the Federal Heritage Buildings Review Office (FHBRO). Buildings may be designated as either "Recognized" or "Classified" (highest level), based on the heritage value assessed. The federal custodian of declared heritage property must consult with the Federal Heritage Buildings Review Office (FHBRO) if a change in the condition or ownership of the building is proposed. Similarly, bridges, parkland, and waterways under federal jurisdiction may also be identified as having historical or cultural significance, and therefore can be subject to special management provisions.

Most archaeological resources (both documented and unexplored, but considered to have high potential) are catalogued and protected by the provincial Ministry of Citizenship, Culture, and Recreation (MCCR). The Cultural Resources Management Section at Parks Canada also catalogues archaeological resources, particularly in National Parks and surrounding lands. Restrictions may be placed on land use in areas with known or potential archaeological significance.

| | | |
|-------|--|--|
| 4.2.1 | STRUCTURES | The Brighton Rear Range navigation aid is not known to have heritage status designation. |
| 4.2.2 | LAND/WATERWAY | No archaeological sites have been identified in the area to date. |
| 4.2.3 | ARCHAEOLOGICAL FEATURES CULTURAL SIGNIFICANCE | No archaeological sites have been identified on the station to date. |

4.3 Land Use: Adjacent Property

While reviewing the land use history of the subject property, past and present land uses on adjacent properties were also examined with respect to the potential for off-site impacts. The site location plan (Figure 2) and site plan (Figure 1) provided in Appendix B should be consulted to assist in interpretation. The following table summarizes adjacent land use.

| DESCRIPTION OF ADJACENT LANDS | PAST OWNER/USE | PRESENT OWNER/USE |
|--|--|---|
| NORTH <i>Residential homes</i> | undeveloped land | <ul style="list-style-type: none"> Residential homes |
| WEST <i>Empty Lot and Residential homes</i> | undeveloped land | <ul style="list-style-type: none"> Empty Lot Residential homes |
| EAST <i>Residential homes</i> | undeveloped land | <ul style="list-style-type: none"> Residential homes |
| SOUTH <i>Harbour Street and Open waters of Presqu'île Bay</i> | commercial and recreational navigation and fishing | <ul style="list-style-type: none"> Navigation - pleasure. Commercial and sport fishing. |

In order to establish whether any past problems with respect to environmental conditions on adjacent properties have been recorded by the MOE, XCG contacted Mr. Micheal Longpre, the Environmental Officer for the Brighton Area at the Peterborough District office. Mr. Longpre

indicated that he does not recall the MOE responding to any incidents at any neighbouring properties around Brighton Rear Range Navigation Aid.

5.0 PHYSICAL CHARACTERISTICS

5.1 Geology and Topography

| | |
|-----------------------|---|
| 5.1.1 GEOLOGY | The bedrock geology of the subject site area consists of middle ordovician sedimentary rocks, which are characterized by limestone, dolostone, shale, arkose and sandstone of the Ottawa and Simcoe Groups and the Shadow Lake Formation. Soil cover in the area consists of pleistocene glaciolacustrine deposits of sand and gravelly sand from nearshore and beach deposits. |
| 5.1.2 SITE TOPOGRAPHY | The site topography is flat with no evident grade. |

5.2 Soils

| | |
|----------------------------|--|
| 5.2.1 PHYSICAL DESCRIPTION | The depth of soil overlying the bedrock was undetermined. There were no exposed outcrops evident in the vicinity. Samples collected suggest that local soil materials are predominantly dark brown, organic-rich sands. |
| 5.2.2 USE | <p>Residential/parkland land use criteria were selected for the purpose of comparison of soil analytical results. The site is utilized for the operation of a marine navigational light aid. However, the surrounding properties contain residential homes in close proximity to the site with some undeveloped land located to the west. For this reason, residential/parkland criteria were considered to be appropriate.</p> <p>However, since the soil overburden may be less than 2 m, it may be considered as a potentially sensitive site and the generic provincial remediation criteria do not necessarily apply. Because of this, the MOE Table F Soil Background Concentrations were also used as a standard of comparison for the analytical results.</p> <p>A comparison was also made to the MOE Table A guidelines, which are not strictly applicable given the possible shallow depth of overburden on the subject site, but which may still be considered to be protective of human health provided that contaminant leaching to groundwater can be eliminated as a pathway of concern.</p> |

| 5.2.3 ENVIRONMENTAL QUALITY INFORMATION | | | |
|--|--|---------------------------|--|
| <i>Location* (Sample Designator)</i> | <i>Description</i> | <i>Analysis Conducted</i> | <i>Summary of Results (i.e., values which exceed criteria)**</i> |
| CCG 488.0 N | 1 metre north of the northern exterior member of the structure. | Table A Metals | <ul style="list-style-type: none"> • chromium (VI) – 3.0 ug/g • thallium – 1.50 ug/g |
| CCG 488.0 S | 2 metres south of the southern exterior member of the structure. | Table A Metals | <ul style="list-style-type: none"> • chromium (VI) – 4.0 ug/g • thallium – 1.06 ug/g |
| CCG 488.0 E | 2 metres east of the eastern exterior member of the structure. | None | |
| CCG 488.0 W | 2 metres west of the western exterior member of the structure. | Lead | <ul style="list-style-type: none"> • None |

| | | | |
|------------------|--|----------------|--------|
| CCG 488.0 NE | 5.5 metres northeast of the northeast corner of the base of the structure. | Lead | • None |
| CCG 488.0 NW | 5.5 metres northwest of the northwest corner of the base of the structure. | None | |
| CCG 488.0 SE | 5.5 metres southeast of the southeast corner of the base of the structure. | Lead | • None |
| CCG 488.0 SW1 | 5.5 metres southwest of the southwest corner of the base of the structure. | Table A Metals | • None |
| CCG 488.0 SW2 | Duplicate of SW1 | Table A Metals | • None |

NOTES:

Metals analysis includes ICAP and hydrides: (As, Se, and Hg)

* Sample locations are presented on the site plan in Appendix B.
Analytical results are presented in Tables 1 and 2.
Laboratory reports are provided in Appendix D.

** Criteria for residential/parkland use specified by CCME *Environmental Quality Guidelines* (1999), for all other land use as specified by MOE *Guidelines for Use at Contaminated Sites in Ontario* (September 1998) – Table F, and for residential/parkland land use as specified by MOE *Guidelines for Use at Contaminated Sites in Ontario* (September 1998) – Table A.

The analytical results from all of the soil sampling are presented in Table 1 (Metals) and Table 2 (Lead). It is expected that the elevated levels of chromium that were detected in the soil samples originated from older paint that was used on the structure and then scraped off during routine maintenance work.

A quality assurance and quality control (QA/QC) program was implemented to address the office and field programs. Blind duplicate soil samples at CCG 488.0 SW (labelled SW1 and SW2) were collected and submitted for analyses of Table A metals for QA/QC purposes. The results for the individual parameters within the duplicated sets agreed within a variance of 0% to 33% with the exception of copper and lead. These two parameters differed by 83% and 74% respectively mainly due to the fact that they were not detected in the first sample, SW1, which leads to a large percentage difference between the two samples. Given the heterogeneity of the soils and the fact that the actual concentrations were close to the detection limits of the individual parameters, this is considered to be an acceptable and typical degree of variation in soil samples. Therefore this indicates that there was a satisfactory degree of precision in the laboratory results. Based on the above QA/QC findings, the analytical results for this investigation are considered to be representative and reproducible.

Table 1
Summary of Analytical Results in Soil Samples for Metals
LL 488.0 Brighton Rear Range, Brighton, Ontario
(all values in ppm unless noted)

| PARAMETER | MDL | CCG 488.0 N | CCG 488.0 S | CCG 488.0 SW1 | CCG 488.0 SW2 | MOE | | MOE TABLE F | CCME GUIDELINES |
|----------------|------|----------------|----------------|------------------|------------------|----------------------------|------------|----------------|--------------------|
| | | | | | | Resid./Parkland TABLE A | Background | | |
| Antimony | 0.6 | <0.6 | <0.6 | <1 | <1 | 13 | 1 | 20* | |
| Arsenic | 0.5 | 3.2 | 2.6 | 0.8 | 0.7 | 20 | 17 | 12 | |
| Barium | 1 | 156 | 97 | 42 | 51 | 750 | 210 | 500* | |
| Beryllium | 1 | <1 | <1 | <1 | <1 | 1.2 | 1.2 | 4* | |
| Boron | 0.2 | 0.3 | 0.3 | <0.2 | <0.2 | 1.5 | NV | NV | |
| Cadmium | 2 | <2 | <2 | <2 | <2 | 12 | 1.0 | 10 | |
| Chromium total | 1 | 28 | 19 | 8 | 10 | 750 | 71 | 64 | |
| Chromium (VI) | 1 | 3.0 | 4.0 | NA | NA | 8 | 2.5 | 0.4 | |
| Cobalt | 2 | 8 | 4 | 2 | 3 | 40 | 21 | 50* | |
| Copper | 1 | 10 | 7 | <1 | 6 | 225 | 85 | 63 | |
| Lead | 10 | 42 | 17 | <10 | 39 | 200 | 120 | 140 | |
| Mercury | 0.05 | 0.08 | 0.07 | 0.08 | 0.10 | 10 | 0.23 | 6.6 | |
| Molybdenum | 4 | <4 | <4 | <4 | <4 | 40 | 2.5 | 10* | |
| Nickel | 2 | 7 | 11 | 6 | 6 | 150 | 43 | 50 | |
| Selenium | 0.1 | 0.5 | 0.3 | 0.7 | 0.8 | 10 | 1.9 | 3* | |
| Silver | 1 | <1 | <1 | <1 | <1 | 20 | 0.42 | 20* | |
| Thallium | 0.1 | 1.50 | 1.06 | <1 | <1 | 4.1 | 2.5 | 1 | |
| Vanadium | 1 | 39 | 28 | 13 | 14 | 200 | 91 | 130 | |
| Zinc | 2 | 85 | 78 | 79 | 95 | 600 | 160 | 200 | |

NOTES:

MDL Laboratory Method Detection Limit

NV No Guideline concentration for this parameter

Bold Value exceeds one guideline

Bold Value exceeds two guidelines

Bold Value exceeds three guidelines

Table A MOE, "Guideline for Use at Contaminated Sites in Ontario," Table A surface soil criteria (coarse-grained) for residential/parkland land use in a potable groundwater situation

Table F MOE, "Guideline for Use at Contaminated Sites in Ontario," Table F Ontario Typical Range Soil Concentrations (Background)

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991

Table 2
Summary of Analytical Results in Soil Samples for Lead
LL 488.0 Brighton Rear Range, Brighton, Ontario
(all values in ppm unless noted)

| PARAMETER | MDL | CCG 488.0 W | CCG 488.0 NE | CCG 488.0 SE | MOE | | CCME GUIDELINES |
|-----------|-----|----------------|-----------------|-----------------|---------------------------|-----------------------|--------------------|
| | | | | | TABLE A Resid/Parkland | TABLE F Background | |
| Lead | 5 | 51 | 41 | 31 | 200 | 120 | 140 |

NOTES:

MDL Laboratory Method Detection Limit

NV No Guideline concentration for this parameter

Bold Value exceeds one guideline

Bold Value exceeds two guidelines

Bold Value exceeds three guidelines

Table A MOE, "Guideline for Use at Contaminated Sites in Ontario," Table A surface soil criteria (coarse-grained) for residential/parkland land use in a potable groundwater situation

Table F MOE, "Guideline for Use at Contaminated Sites in Ontario," Table F Ontario Typical Range Soil Concentrations (Background)

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991

5.3 Sediment

| | | | |
|-------|----------------------|---------|---|
| 5.3.1 | LOCATION & EXTENT | | There is no CCG water lot associated with this property. |
| 5.3.2 | PHYSICAL DESCRIPTION | | The sediments were not visible, as water was approximately 50 metres from the site. |
| 5.3.3 | SEDIMENT INFORMATION | QUALITY | No sediment quality information is available. |

5.4 Surface Water

| | | | |
|-------|-----------------------------------|---|--|
| 5.4.1 | OCCURRENCE DESCRIPTION | & | Presqu'île Bay is located directly south of the subject site. This is the closest surface water body. There are no lakes or other surface water bodies on or near the subject property. |
| 5.4.2 | USE | | The surface waters near to this site are used for commercial and recreational fishing and navigation. The distance from the subject site to the nearest surface water used for this purpose is approximately 50 to 100 metres. Although the town of Brighton uses water from the municipal distribution system, there may be houses along the water that use the lake water domestic purposes. The closest houses along the water would be approximately 50 to 100 metres from the site. |
| 5.4.3 | SURFACE WATER QUALITY INFORMATION | | Surface water quality samples were not collected, as there are no ponds or streams on the property. |

5.5 Groundwater

| | | | |
|-------|-------------------------|----------|--|
| 5.5.1 | DESCRIPTION, PARAMETERS | PHYSICAL | No wells are known to have been installed on the station. Groundwater was not encountered in any of the shallow holes advanced on site. |
| 5.5.2 | LOCAL USE | | There is no indication that the groundwater supply has ever been developed or used on the site. The distance from the subject site to the nearest possible user of groundwater is approximately 3 kilometres to the north where the town of Brighton has its wells for drinking water. The residential areas near the subject site obtain drinking water from a municipal water distribution system. |
| 5.5.3 | GROUNDWATER INFORMATION | QUALITY | No groundwater quality information is known to be available for the site. |

6.0 BIOLOGICAL CHARACTERISTICS

6.1 Vegetation

| | | |
|-------|-------------------------|---|
| 6.1.1 | AQUATIC/LITTORAL ZONE | The littoral (nearshore) area was not within the near vicinity of the property. It was visible from across the road but was not examined in detail. |
| 6.1.2 | WETLANDS/MARSHES | No significant wetlands have been identified on, or adjacent to, this site. |
| 6.1.3 | TERRESTRIAL | Terrestrial vegetation on site consisted mainly of grasses and small shrubs. The American Ginseng plant is listed as a threatened species in this area. |
| 6.1.4 | PESTICIDE/HERBICIDE USE | No historical or present use of pesticides or herbicides was identified at the subject site. |

6.2 Fish and Fish Habitat

| | | |
|-------|-----------------------------------|---|
| 6.2.1 | COMMON SPECIES KNOWN IN VICINITY | Common species of fish in the vicinity of the subject site include longnose gar, bowfin, northern pike, smallmouth and largemouth bass, walleye, gizzard shad, various minnow species, white sucker, brown bullhead, American eel, trout-perch, white perch, yellow perch, freshwater drum and several sunfishes. Lake sturgeon is also evident in the near vicinity. |
| 6.2.2 | HABITAT UTILIZATION | The property is not directly on the water so there is no habitat utilization of the property. |
| 6.2.3 | PROTECTED OR SIGNIFICANT HABITAT | The Channel Darter is listed as a threatened species in this area while the Big Mouth Buffalo and the River Redhorse are listed as vulnerable. |
| 6.2.4 | RECREATIONAL & COMMERCIAL FISHING | Recreational and commercial fishing takes place in proximity of the subject site. |

6.3 Wildlife

| | | |
|-------|----------------------------------|---|
| 6.3.1 | COMMON SPECIES | Common species in the area include beaver, muskrat, chipmunks, squirrels, voles, and other small mammals. Larger animals such as deer, coyote, and fox are also located in the area. There are over 70 listed common bird species found in this area and over 300 species have been sighted in Presqu'ile Provincial Park just 5 kilometres south. |
| 6.3.2 | HABITAT UTILIZATION OF PROPERTY | Given that fact that the property is fenced, it is assumed that only small mammals and birds would actually use the property. |
| 6.3.3 | PROTECTED OR SIGNIFICANT HABITAT | This site is not known to be a protected habitat and there are none within the near vicinity. The following animals are listed as species at risk in the area of the subject property. Endangered: Peregrine Falcon and the Eastern Cougar; Vulnerable: Black Tern, Caspian Tern, Cerulean Warbler, Least Bittern, Red Headed Woodpecker, Red Shouldered Hawk, Short Eared Owl, Yellow Breasted Chat, West Virginia White Butterfly, Gray Fox and the Southern Flying Squirrel. |
| 6.3.4 | HUNTING | Given the fact that this navigation aid is in a residential subdivision, it is not expected that there are hunting activities on the site. |

7.0 STRUCTURES & IMPROVEMENTS

7.1 Inventory of Structures

The only structure on-site consists of one skeleton tower enclosed with a chain link fence with a gate. The approximate location of the current structure is shown on the site plan (Figure 1) provided in Appendix B. Photographs of the structures are presented in Appendix A.

| STRUCTURE | LOCATION | WATER ¹ | DESCRIPTION/CONDITION | DATE |
|------------------|--------------------|--------------------|---|------------------|
| 1 Skeleton Tower | Centre of property | 50 m | The steel skeleton tower is painted white with a fluorescent orange triangular daymarker with a vertical black stripe. The structure is built upon four concrete footings. The structure appears to be in good condition. | 1950's or 1960's |

- Distance to water is a consideration for future projects that may be subject to the Canadian Environmental Assessment Act (CEAA).

7.2 Structures - Environmental Issues

The following table provides a summary of the environmental issues associated with the structure.

Note: Y - yes; presence confirmed
N - no; not a factor
U – unknown; not confirmed

1. LIGHT TOWER

| | | | |
|-----|---------------------------|---|--|
| .1 | AIR EMISSIONS | N | No sources of air emissions were noted at this site. |
| .2 | ASBESTOS | N | No potential asbestos-containing materials were observed. |
| .3 | LEAD | Y | The skeleton tower was installed before 1976 and lead-based paint has been confirmed to be present (see Table 3). A typical white paint sample was submitted from the Navigational Aid at Brighton Rear Range and was found to contain 22,800 ppm lead. This sample exceeds the 5,000 ppm limit. Estimates of the quantity of lead paint at this site are provided in the sample log included in Appendix C. |
| .4 | FUEL STORAGE | N | No fuel storage at this location. |
| .5 | MERCURY (ELEMENTAL) | N | No mercury-containing batteries were used to power the light in the past. |
| .6 | ODS | N | No known ODS at this location. |
| .7 | PCBs | N | No PCB-containing equipment observed inside the light tower. |
| .8 | WASTEWATER | N | No wastewater sources at this site. |
| .9 | POTABLE WATER SUPPLY | N | No current water supply for this site. |
| .10 | HAZARDOUS MATERIALS/WASTE | N | No containers of hazardous materials were noted near the light tower. |

| | | | |
|-----|-------------------------|---|--|
| .11 | NON-HAZARDOUS DEBRIS | Y | A fill pile, probably relocated soil from development of the surrounding subdivision, is located approximately 3 metres southwest of the subject site. No other non-hazardous debris was observed near the structure. The fill pile has an approximate volume of 20 to 25 cubic metres, based on visual observation. |
|-----|-------------------------|---|--|

Table 3 below provides the results of analyses of lead in samples of paint collected at the site.

Table 3
Summary of Analytical Results in Paint Samples for Lead
LL 488.0 Brighton Rear Range, Brighton, Ontario
(all values in ppm unless noted)

| PARAMETER | MDL | CCG 488.0 WBSS | HPA |
|-----------|-----|-------------------|-----------|
| | | | Guideline |
| Lead | 5 | 22800 | 5000 |

NOTES:

- MDL Laboratory Method Detection Limit
- Bold** Value exceeds guideline
- NV No Guideline concentration for this parameter
- HPA Federal *Hazardous Products Act* (1976)

7.3 Easements/Site Services

The site is serviced with hydroelectric power service. The site has no water services and does not produce wastewater.

8.0 MATERIALS STORED, USED, OR DISCARDED

8.1 Aboveground Storage Tanks

A review of existing information and observations made while on-site suggest no aboveground storage tanks are, or ever were, located on the subject property in the area of the steel tower structure.

8.2 Underground Storage Tanks

A review of existing information and observations made while on-site suggest no underground storage tanks are, or ever were, located on the subject property.

8.3 Hazardous Materials/Waste

A review of existing information and observations made while on-site suggest no hazardous materials or wastes are, or ever were, located on the subject property.

8.4 Non-Hazardous Materials/Waste

Although the ground was snow-covered during the site visit, there was no evidence of waste materials on the subject property.

8.5 Placement of Fill, Dredged Materials

A fill pile, probably relocated soil from development of the surrounding subdivision, is located approximately 3 metres southwest of the subject site. No other non-hazardous debris was observed near the structure. The fill pile has an approximate volume of 20 to 25 cubic metres, based on visual observation.

9.0 CCME NATIONAL CLASSIFICATION SYSTEM FOR CONTAMINATED SITES

XCG has completed the CCME National Classification System for Contaminated Sites (NCSCS) detailed evaluation form for the Brighton Rear Range Navigation Aid. The score for the metals-impacted area of the site was 52 (± 4). This score is designated as Class 2 (some action likely required). The CCME evaluation form is included as Appendix E.

10.0 REMEDIAL OPTIONS AND TREASURY BOARD LIABILITY ESTIMATE

10.1 Areas of Contamination

Eight soil samples were collected from the navigation aid site and seven (including one duplicate) were submitted for analysis. As indicated in Section 5.2, concentrations of some metals in exceedance of the applicable criteria were identified in two of the samples collected.

The following parameters were found to be present at concentrations greater than the CCME (residential/parkland) criteria: chromium (VI) and thallium. Chromium (VI) was present at concentrations greater than the MOE Table F (background) values.

The quantitative estimate of impacted soil on the subject site ranges between 12 and 120 cubic metres. Since this estimate is based on seven (including one duplicate) samples only, it is recommended that a Phase 2 subsurface sampling program be implemented to further delineate the contamination present on the site at the Brighton Rear Range Navigation Aid.

10.2 Remedial Options Evaluation

The "Guideline for Use at Contaminated Sites in Ontario" (MOE, February 1997 revision) outlines three approaches to site restoration which may be used when dealing with a contaminated site. The three approaches are:

- i) background;
- ii) generic; and
- iii) site-specific risk assessment

The background approach involves restoration of a site to ambient conditions as found in the natural environment, or to the levels which existed prior to site contamination, and may be used at any contaminated site. Background soil criteria are provided in Table F of the above-referenced guideline.

The generic approach involves the application of the soil and groundwater cleanup criteria listed in Tables A to D of the MOE guidelines. This approach cannot be used, however, at sites that are considered to be potentially sensitive. Potentially sensitive sites include those which may contain unique, highly sensitive receptors which may not have been considered in the development of the generic criteria (areas of natural or scientific interest (ANSI's); wetlands; fish habitat; habitat of vulnerable, threatened or endangered species of birds, wildlife, fish or plants; for example), or those where site conditions are such that there are less than 2 m of overburden and soil overlying the bedrock in the contaminated areas of the site. For potentially sensitive sites, the background approach can be applied, or a site-specific risk assessment can be carried out to develop appropriate criterion values.

The depth of soil overlying the bedrock is unknown but may be less than 2 metres across the subject site. If the depth to bedrock is less than 2 metres it would be necessary to apply the background approach to clean up criteria. Generic criteria may be used if the depth to bedrock is greater than 2 metres. Alternatively, a site-specific risk assessment may be conducted to develop appropriate cleanup criterion values for this site.

The results of the Enhanced Phase 1 investigation indicate areas on the subject property where concentrations of metals in soil exceed the provincial background criteria for soils. No regulatory requirements exist necessitating any action to be taken for continued existing use of the property. However, remediation of these impacts may be required in the future if they are found in a risk assessment to represent an unacceptable level of risk to human or non-human receptors, or if remediation of the land is required as a condition of a land transfer or other transaction.

For the area of impact referenced above, XCG has identified two remedial options for possible implementation in the event that any exposure concerns are identified or if any future redevelopment approvals are contingent upon meeting provincial cleanup guidelines.

1. The first option would be to clean up the affected soils to generic CCME residential/parkland criteria or possibly background levels (Table F) if the bedrock is encountered at a depth less than 2 metres. This option would likely involve removal of soil in the vicinity of the navigation aid at this site (which is approximately 12 to 120 m³) to a depth where clean up criteria are accomplished or bedrock. The cost to conduct this type of remediation at the contaminated area identified on the Brighton Rear Range site is:

- \$27,595 to \$48,300 for the area of the navigation aid site.

The above costs include the estimated cost to conduct a Phase 2 ESA to further delineate soil impacts, assess groundwater quality, and conduct a qualitative risk assessment. Breakdowns of the individual components of these cost estimates are provided in Appendix F.

2. The second option would be to place clean soil cover over the affected areas. A full site-specific risk assessment would be required for this second option since contaminants may be left in place at levels above Table F and the generic guidelines (i.e. Tables A, B, C, and D) do not cover situations where there is less than 2 metres of soil over bedrock. The cost to conduct this type of remediation at the contaminated area identified on the Brighton Rear Range site is:

- \$65,000 for the area of the navigation aid site.

The above cost includes the estimated cost to conduct a Phase 2 ESA to further delineate soil impacts, assess groundwater quality, and conduct a qualitative risk assessment. Breakdowns of the individual components of these cost estimates are provided in Appendix F.

For the area of environmental concern, Remedial Option 1 is considered to be the preferred remedial option on the basis of its lower cost.

10.3 Treasury Board Liability Estimate

The draft Treasury Board Policy on Accounting for Costs and Liabilities related to Contaminated Sites states that, "it is the policy of the government to account for costs and liabilities related to the management and restoration of environmentally contaminated sites when contamination occurs if the government is obliged, or is likely to be obliged to incur such costs":

- a) for reasons of public safety and health,

- b) to be in compliance with an act or regulation issued by the government, (federal, provincial or municipal) in Canada or abroad, or
- c) due to contractual arrangements.

As such, an estimate of the liability associated with the Brighton Rear Range Navigation Aid site was made based on the requirements of the Treasury Board. The estimate was made based on the procedures discussed in “Appendix G of Chapter 2-1 of the *Treasury Board Manual, Information and Administration Management Component, Capital Plans, Projects and Procurement, 1994/07/08*”.

An evaluation of remedial options for the contaminated sites identified on the subject property was conducted, and a preferred remedial option was selected for the area of contamination. Assumptions made in developing the cost estimates for the preferred remedial options are presented in Section 10.2. As discussed in Section 9, the CCME NCSCS classification for the area of impact on the subject site was determined to be Class 3, and on this basis it is believed that an *indicative* estimate of liability is required for this site. For this property, the *indicative* estimate of liability, based on the estimated cost of the preferred remedial options for the contaminated area identified on the property, is:

- \$48,300 for the metals-impacted area on the navigation aid site.

The guidelines used to make this estimate are included in Appendix F.

11.0 REAL PROPERTY INFORMATION SYSTEM FOR CONTAMINATED SITES (RPISCS) MODULE

Based on the results of the Enhanced Phase 1 ESA, site data was entered into the RPISCS Module. Output from the module, showing the key environmental information entered for the subject site, is included in Appendix G. This output includes property description information, a summary of the environmental concerns on-site, the CCME NCSCS score (see Section 9.0), and the Treasury Board Estimate of Liability (see Section 10.0).

12.0 SUMMARY

XCG Consultants Ltd. (XCG) was retained by Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans, Central and Arctic Region, to carry out an Enhanced Phase 1 Environmental Site Assessment (ESA) of the Brighton Rear Range Navigation Aid (L.L.488.0) in the Town of Brighton, Northumberland County, Ontario. The navigation aid is located on the north side of Harbour Street, west of Cedar Street in Brighton. The property consists of a 15.24 metre by 15.24 metre square portion (Part 1) with a 2.44 metre by 38.1 metre access way (Part 2) from Harbour Street. A chain link fence with a locked gate encompasses the structure. The 18.0 metre high beacon is centred in the square portion of the property. The station consists of a white skeleton tower with a fluorescent orange triangular daymark with a black vertical stripe and a navigational light. The tower is mounted on four concrete blocks that form a 3.15 metre square.

The Crown expropriated the property on which this skeleton tower is located in 1934. According to Mr. Ted Nickel of CCG, the present structure has been on this site since 1952. The back light of the original Brighton Range Lights, which were constructed in 1891, was actually located on a wooden crib in the waters of Presqu'île Bay. The range lights were relocated during the 1950's and the present structure was constructed. The site has been serviced with hydroelectric power since the navigation light was built, according to Mr. Nickel. With the recent development of the residential homes in the vicinity of the navigation aid, a chain link fence was erected around the structure for safety. A 100-Watt incandescent bulb, located in the DLD 300-mm lantern, provides the navigational light.

No archaeological sites are known to have been identified on the station to date. There are no known significant or protected natural areas on the property or in the near vicinity.

A site visit was conducted by XCG personnel on December 20, 2000. Three environmental concerns were identified as a result of this assessment, and are listed below in order of priority. Summaries of the National Classification System for Contaminated Sites results and Treasury Board Liability Estimate are also listed.

Contaminated Soil

The applicable Environmental Quality criteria considered at this site were the Ontario Ministry of the Environment (MOE) Table F guidelines for all other land use, and the Canadian Council of Ministers of the Environment (CCME) guidelines for residential/parkland redevelopment. A comparison was also made to the MOE Table A guidelines, which may not be applicable given the possible shallow depth of overburden on the subject site, but which may still be considered to be protective of human health provided that contaminant leaching to groundwater can be eliminated as a pathway of concern.

In the near vicinity of the navigation aid a number exceedances of applicable Environmental Quality criteria of some metals were identified. Based on analytical results and the site visit observations, the approximate quantity of impacted soil present at this site ranges between 12 and 120 cubic metres. The quantitative estimate is based on seven (including one duplicate) soil samples. It is therefore recommended that a Phase 2 subsurface sampling program be implemented to delineate the amount of contaminated soil on the subject site.

No regulatory requirements exist necessitating any action to be taken for continued existing use of the property. However, remediation of these impacts may be required in the future if they are found in a risk assessment to represent an unacceptable level of risk to human or non-human

receptors, or if remediation of the land is required as a condition of a land transfer or other transaction.

For the area of impact referenced above, XCG has identified two remedial options for possible implementation in the event that any exposure concerns are identified or if any future redevelopment approvals are contingent upon meeting provincial cleanup guidelines.

1. The first option would be to clean up the affected soils to generic CCME residential/parkland criteria or possibly background levels (Table F) if the bedrock is encountered at a depth less than 2 metres. This option would likely involve removal of soil in the vicinity of the navigation aid at this site (which is approximately 12 to 120 m³) to a depth where clean up criteria are accomplished or bedrock. The cost to conduct this type of remediation at the contaminated area identified on the Brighton Rear Range site is:

- \$27,595 to \$48,300 for the area of the navigation aid site.

The above costs include the estimated cost to conduct a Phase 2 ESA to further delineate soil impacts, assess groundwater quality, and conduct a qualitative risk assessment. Breakdowns of the individual components of these cost estimates are provided in Appendix F.

2. The second option would be to place clean soil cover over the affected areas. A full site-specific risk assessment would be required for this second option since contaminants may be left in place at levels above Table F and the generic guidelines (i.e. Tables A, B, C, and D) do not cover situations where there is less than 2 metres of soil over bedrock. The cost to conduct this type of remediation at the contaminated area identified on the Brighton Rear Range site is:

- \$65,000 for the area of the navigation aid site.

The above cost includes the estimated cost to conduct a Phase 2 ESA to further delineate soil impacts, assess groundwater quality, and conduct a qualitative risk assessment. Breakdowns of the individual components of these cost estimates are provided in Appendix F.

For the area of environmental concern, Remedial Option 1 is considered to be the preferred remedial option on the basis of its lower cost.

Lead Paint

The presence of lead in painted surfaces (at concentrations above 0.5%) of Brighton Rear Range site has been confirmed from analytical results from this Navigational Aid site. Some evidence of “flaking” paint was noted on the surfaces of the Navigational Aid. The presence of lead in paint is primarily a concern if the paint is disturbed by sanding during building renovations or during demolition activities or if the structure, or part thereof, is used or inhabited by pre-school children. Under provincial regulations, the only requirement for further action is specified by the *Occupational Health and Safety Act*, which requires that contractors be notified of the presence of lead (and other designated substances) in a building at the tendering stage so that appropriate measures can be taken by the contractor to protect workers from excessive exposure. The presence of metals in paint has also likely contributed to elevated levels of metals in surficial soils in the vicinity of the buildings at this site.

Fill of Unknown Origin

A fill pile, possibly relocated soil from development of the surrounding subdivision, is located approximately 3 metres southwest of the subject site. No other non-hazardous debris was observed near the structure. The fill pile has an approximate volume of 20 to 25 cubic metres, based on visual observation.

National Classification System for Contaminated Sites

The CCME, National Classification System for Contaminated Sites score for the area surrounding the navigation aid (metals contamination) was 52 (± 4). This score is designated as Class 2 (some action likely required).

Treasury Board Liability Estimate

An evaluation of remedial options for the contaminated site identified on the subject property was conducted, and a preferred remedial option was selected for the area of contamination. As discussed in Section 9, the CCME NCSCS classification for the area of impact on the subject site was determined to be Class 3, and on this basis it is believed that an *indicative* estimate of liability is required for this site. For this property, the *indicative* estimate of liability, based on the estimated cost of the preferred remedial option for the contaminated area identified on the property, is:

- \$48,300 for the metals-impacted area on the navigation aid site.

13.0 RECOMMENDATIONS

1. A Phase 2 ESA should be conducted in the area of the navigation aid at Brighton Rear Range. The primary purpose of the Phase 2 ESA will be to delineate the contaminated soil in this area, and obtain an accurate estimate of its quantity. The Phase 2 ESA should also assess groundwater quality on the property.
2. The Phase 2 ESA should include a qualitative risk assessment focusing on the issues of environmental concern identified in the Phase 1 and 2 ESAs. A qualitative assessment of the risk associated with the area should be conducted in order to assist in the assignment of priorities for the clean-up of the impacted area. The qualitative risk assessment should also address the question of which generic clean-up criteria is the most appropriate one to be applied at the subject site.
3. With regard to the lead-based paint that exists on the navigational aid structure, appropriate precautionary measures (use of polyethylene drop sheets, filtered exhaust for power tools, etc.) should be implemented during any future painting and maintenance activities to ensure that lead and other metallic elements present in paint applications do not contaminate soils.

All of which is respectfully submitted,

XCG CONSULTANTS LTD.

Kevin Shipley, M.A.Sc., P.Eng., CEA
Associate, Senior Environmental Specialist

Janet Noyes, B.Sc., P. Eng.
Project Engineer

APPENDIX A:

Site Photographs



Photo 1. Brighton Rear Range Navigation Aid. View facing north.



Photo 2. Base of Navigation Aid within fenced area.





Photo 3. Presqu'ile Bay is viewed from the Navigation Aid facing south. Fill pile is evident on right side of photo.

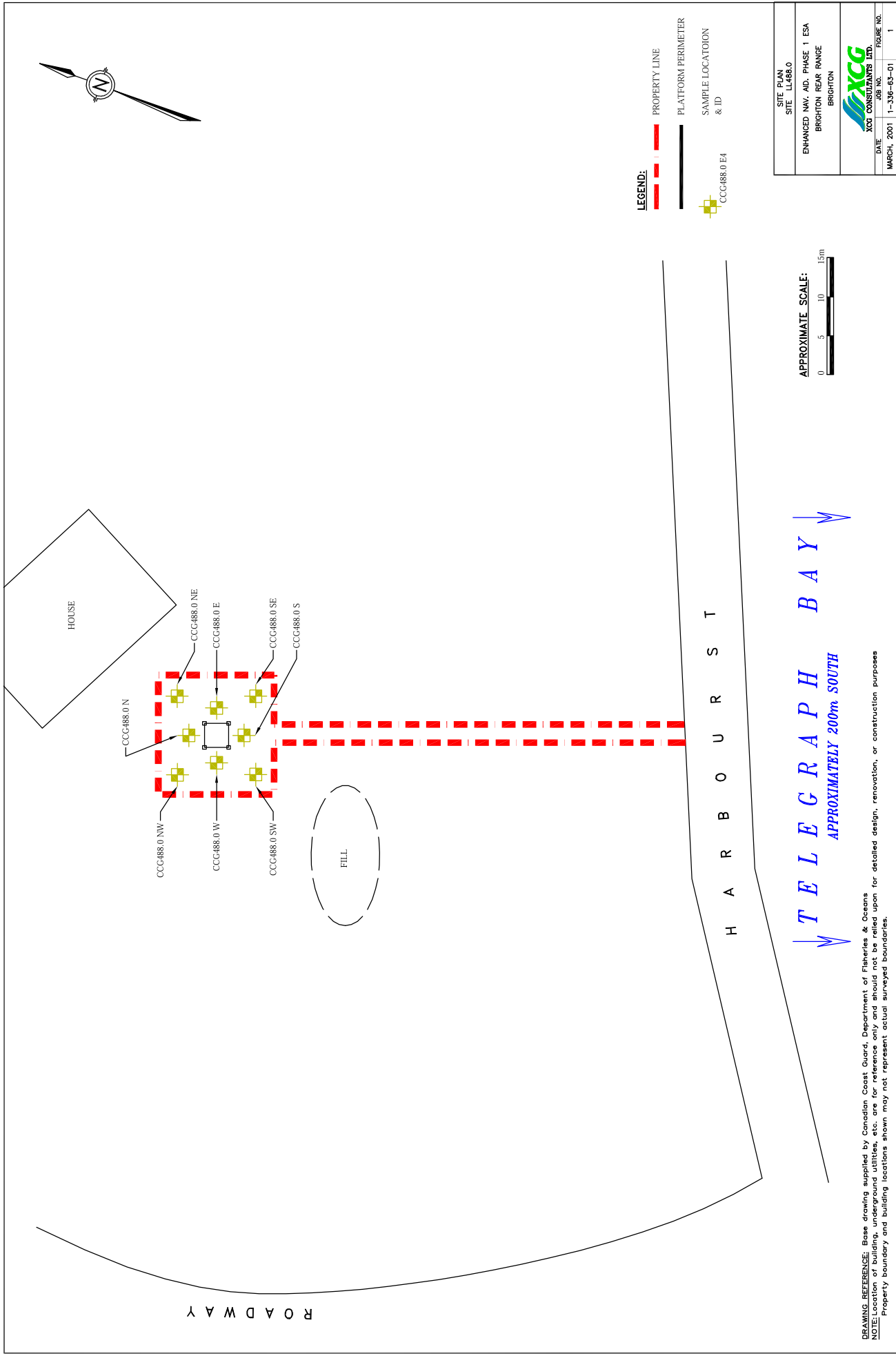


Photo 4. Control Panel at Brighton Rear Range.



APPENDIX B:

Figure 1 (Site Plan)
Figure 2 (Site Location Plan)
Topographical Map
Aerial Photographs



DRAWING REFERENCE: Base drawing supplied by Canadian Coast Guard, Department of Fisheries & Oceans
NOTE: Location of building, underground utilities, etc. are for reference only and should not be relied upon for detailed design, renovation, or construction purposes
 Property boundary and building locations shown may not represent actual surveyed boundaries.

TELEGRAPH BAY
 APPROXIMATELY 200m SOUTH

H A R B O R S T

R O A D W A Y

H O U S E


F I L L

LEGEND:
 - - - - - PROPERTY LINE
 _____ PLATFORM PERIMETER
 [Green Square] SAMPLE LOCATION & ID
 [Green Square] CCC488.0 E4

APPROXIMATE SCALE:
 0 5 10 15m



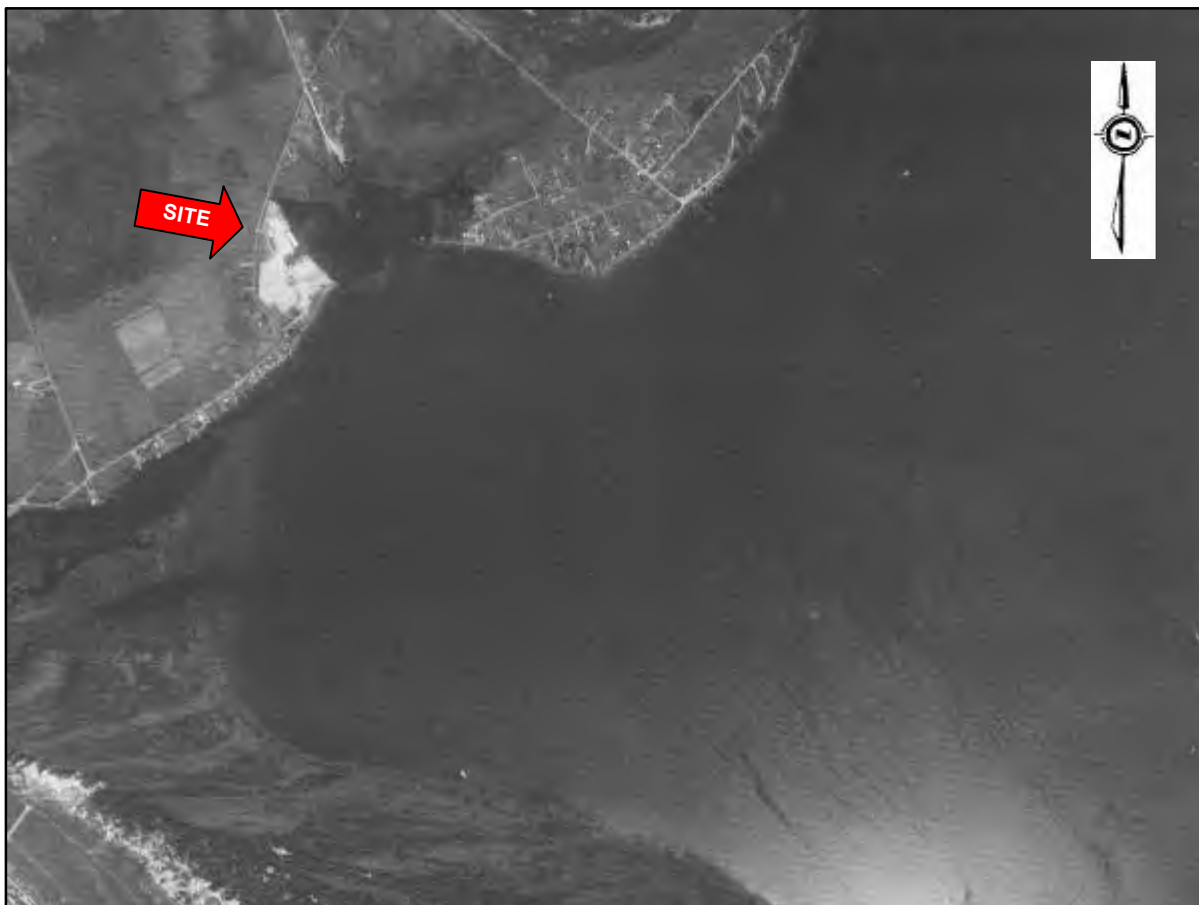
Map supplied by the Treasury Board of Canada
 Secretariat website: www.tbs-sct.gc.ca/dfpr-rbif/keyword-motcle.asp?Language=EN


| | |
|---|-------------|
| Figure 2. Site Location Map | |
| LL 488.0 | |
| Brighton Rear Range Navigation Aid Brighton, Ontario | |
|  XCG Consultants Ltd, | |
| Date | Job No. |
| March 2001 | 1-336-63-01 |



NTS Trenton 31 C/4 Edition 6

| | |
|--|-------------|
| Topographic Map | |
| LL 488.0 | |
| Brighton Rear Range Navigation Aid Brighton, Ontario | |
|  XCG Consultants Ltd., | |
| Date | Job No. |
| March 2001 | 1-336-63-01 |



| | |
|---|-------------|
| 1962 Aerial Photograph | |
| LL 488.0 | |
| Brighton Rear Range Navigation Aid Brighton, Ontario | |
|  XCG Consultants Ltd. | |
| Date | Job No. |
| March 2001 | 1-336-63-01 |



| | |
|---|-------------|
| 1986 Aerial Photograph | |
| LL 488.0 | |
| Brighton Rear Range Navigation Aid Brighton, Ontario | |
|  XCG Consultants Ltd, | |
| Date | Job No. |
| March 2001 | 1-336-63-01 |



| | |
|---|-------------|
| 1995 Aerial Photograph | |
| LL 488.0 | |
| Brighton Rear Range Navigation Aid Brighton, Ontario | |
|  XCG Consultants Ltd, | |
| Date | Job No. |
| March 2001 | 1-336-63-01 |

APPENDIX C:

**Sample Log Notes: Lead-Based
Paints**
**Sample Log Notes: Soil Samples
Laboratory Certificates of Analysis**

C-1 Sample Log Notes: Paint Samples

Brighton Rear Range Navigational Aid L.L. 488.0, 00-12-20

| SAMPLE | LOCATION/AFFECTED AREA | DESCRIPTION | BASE MATERIAL | CONDITION | LEAD* CONTENT | ARSENIC CONTENT | PCB CONTENT | ESTIMATED QTY. |
|----------------|--|-------------------------------|---------------|-----------|---------------|-----------------|-------------|--|
| CCG 488.0 WBSS | Bottom of Navigational Aid Light Tower | Several layers of white paint | metal | flaking | 22,800 ppm | not tested | not tested | Light tower painted white 50 m ² |

NOTE:

* The *Federal Hazardous Products Act* limits the amount of lead permissible in new interior paint to 0.5% or 5,000 ppm. While this limit does not apply to paints already applied, it is generally accepted as the level over which a paint is considered to be "lead-based,"

C-2 Sample Log Notes: Soil Samples

Brighton Rear Range Navigational Aid L.L. 488.0, 00-12-20

| SAMPLE | SOIL DESCRIPTION | DEPTH OF SAMPLE LOCATION (cm) | SOIL GAS VAPOUR READING (ppm) |
|--------------|--|-------------------------------|-------------------------------|
| CCG 488.0 E | Dark brown sandy, organic-rich topsoil | 20 | Not Sampled |
| CCG 488.0 N | Dark brown sandy, organic-rich topsoil | 20 | Not Sampled |
| CCG 488.0 W | Dark brown sandy, organic-rich topsoil | 20 | Not Sampled |
| CCG 488.0 W | Dark brown sandy, organic-rich topsoil | 20 | Not Sampled |
| CCG 488.0 SW | Dark brown sandy, organic-rich topsoil | 20 | Not Sampled |
| CCG 488.0 NW | Dark brown sandy, organic-rich topsoil | 20 | Not Sampled |
| CCG 488.0 SE | Dark brown sandy, organic-rich topsoil | 20 | Not Sampled |
| CCG 488.0 NE | Dark brown sandy, organic-rich topsoil | 20 | Not Sampled |

ENVIRONMENTAL TECHNOLOGY RESEARCH LABORATORIES INC.

| | |
|---------------------|-----------------------------|
| ETRL Record #: | 01-0154 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. |
| Source: | |
| Chain of Custody #: | 9888/9889 |
| Sample Matrix: | Soil |
| Date Submitted: | 10-Jan-01 |
| Date Reported: | 31-Jan-01 |

Decommissioning Metals

| PARAMETER | Units | MDL | Method Reference | Date Tested | Sample 9 | Sample 18 | Sample 21 |
|-----------------------|-------|------|------------------|-------------|----------|-----------|-----------|
| Antimony | ug/g | 0.6 | EPA7741 | 17-Jan-01 | <0.6 | <0.6 | <0.6 |
| Arsenic | ug/g | 0.5 | EPA7061 | 18-Jan-01 | 9.5 | 2.1 | 3.2 |
| Barium | ug/g | 1 | EPA200.7 | 25-Jan-01 | 4160 | 71 | 156 |
| Beryllium | ug/g | 1 | EPA200.7 | 25-Jan-01 | <1 | <1 | <1 |
| Boron (HWS) | ug/g | 0.2 | GFFA | 24-Jan-01 | 1.1 | 0.3 | 0.3 |
| Cadmium | ug/g | 2 | EPA200.7 | 25-Jan-01 | 8 | <2 | <2 |
| Chromium (Total) | ug/g | 1 | EPA200.7 | 25-Jan-01 | 22 | 10 | 28 |
| Chromium (hexavalent) | ug/g | 1.0 | HACH | 24-Jan-01 | 5.0 | 4.0 | 3.0 |
| Cobalt | ug/g | 2 | EPA200.7 | 25-Jan-01 | 5 | <2 | 8 |
| Copper | ug/g | 1 | EPA200.7 | 25-Jan-01 | 21 | <1 | 10 |
| Lead | ug/g | 10 | EPA200.7 | 25-Jan-01 | 50500 | 346 | 42 |
| Mercury | ug/g | 0.05 | EPA7471 | 25-Jan-01 | 0.11 | 0.07 | 0.08 |
| Molybdenum | ug/g | 4 | EPA200.7 | 25-Jan-01 | 4 | <4 | <4 |
| Nickel | ug/g | 2 | EPA200.7 | 25-Jan-01 | 12 | 4 | 7 |
| Selenium | ug/g | 1.0 | EPA7741 | 23-Jan-01 | 0.5 | 0.5 | 0.5 |
| Silver | ug/g | 1 | EPA200.7 | 25-Jan-01 | <1 | <1 | <1 |
| Thallium | ug/g | 0.10 | EPA7841 | 18-Jan-01 | 2.61 | 0.18 | 1.50 |
| Vanadium | ug/g | 1 | EPA200.7 | 25-Jan-01 | 22 | 9 | 39 |
| Zinc | ug/g | 2 | EPA200.7 | 25-Jan-01 | 9100 | 114 | 85 |

MDL is the Method Detection Limit

Sample 9 = CCG 429.0 B

Sample 18 = CCG 492.0 West

Sample 21 = CCG 488.0 N

CERTIFIED BY,


 Richard Hombek, Ph.D.
 President

ENVIRONMENTAL TECHNOLOGY RESEARCH LABORATORIES INC.

| | |
|---------------------|-----------------------------|
| ETRL Record #: | 01-0154 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. |
| Source: | |
| Chain of Custody #: | 9888/9889 |
| Sample Matrix: | Soil |
| Date Submitted: | 10-Jan-01 |
| Date Reported: | 31-Jan-01 |

Decommissioning Metals

| PARAMETER | Units | MDL | Method Reference | Date Tested | Sample 22 |
|-----------------------|-------|------|------------------|-------------|-----------|
| Antimony | ug/g | 0.6 | <i>EPA7741</i> | 17-Jan-01 | <0.6 |
| Arsenic | ug/g | 0.5 | <i>EPA7061</i> | 18-Jan-01 | 2.6 |
| Barium | ug/g | 1 | <i>EPA200.7</i> | 25-Jan-01 | 97 |
| Beryllium | ug/g | 1 | <i>EPA200.7</i> | 25-Jan-01 | <1 |
| Boron (HWS) | ug/g | 0.2 | <i>GFFA</i> | 24-Jan-01 | 0.3 |
| Cadmium | ug/g | 2 | <i>EPA200.7</i> | 25-Jan-01 | <2 |
| Chromium (Total) | ug/g | 1 | <i>EPA200.7</i> | 25-Jan-01 | 19 |
| Chromium (hexavalent) | ug/g | 1 | <i>HACH</i> | 24-Jan-01 | 4.0 |
| Cobalt | ug/g | 2 | <i>EPA200.7</i> | 25-Jan-01 | 4 |
| Copper | ug/g | 1 | <i>EPA200.7</i> | 25-Jan-01 | 7 |
| Lead | ug/g | 10 | <i>EPA200.7</i> | 25-Jan-01 | 17 |
| Mercury | ug/g | 0.05 | <i>EPA7471</i> | 23-Jan-01 | 0.07 |
| Molybdenum | ug/g | 4 | <i>EPA200.7</i> | 25-Jan-01 | <4 |
| Nickel | ug/g | 2 | <i>EPA200.7</i> | 25-Jan-01 | 11 |
| Selenium | ug/g | 1.0 | <i>EPA7741</i> | 23-Jan-01 | 0.3 |
| Silver | ug/g | 1 | <i>EPA200.7</i> | 25-Jan-01 | <1 |
| Thallium | ug/g | 0.10 | <i>EPA7841</i> | 18-Jan-01 | 1.06 |
| Vanadium | ug/g | 1 | <i>EPA200.7</i> | 25-Jan-01 | 28 |
| Zinc | ug/g | 2 | <i>EPA200.7</i> | 25-Jan-01 | 78 |

MDL is the Method Detection Limit

Sample 22 = CCG 488.0 S

CERTIFIED BY,


 Richard Hombek, Ph. D.
 President

ENVIRONMENTAL TECHNOLOGY RESEARCH LABORATORIES INC.

| | |
|---------------------|-----------------------------|
| ETRL Record #: | 01-0154 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. |
| Source: | |
| Chain of Custody #: | 9888/9889 |
| Sample Matrix: | Soil |
| Date Submitted: | 10-Jan-01 |
| Date Reported: | 31-Jan-01 |

| PARAMETER | Units | MDL | Method Reference | Date Tested | Sample 2 | Sample 4 | Sample 10 |
|-----------|-------|-----|------------------|-------------|----------|----------|-----------|
| Lead | ug/g | 10 | EPA200.7 | 16-Jan-01 | 26 | 29 | 3110 |

| PARAMETER | Units | MDL | Method Reference | Date Tested | Sample 11 | Sample 12 | Sample 17 |
|-----------|-------|-----|------------------|-------------|-----------|-----------|-----------|
| Lead | ug/g | 10 | EPA200.7 | 16-Jan-01 | 451 | 99 | 288 |

| PARAMETER | Units | MDL | Method Reference | Date Tested | Sample 19 | Sample 23 | Sample 24 |
|-----------|-------|-----|------------------|-------------|-----------|-----------|-----------|
| Lead | ug/g | 10 | EPA200.7 | 16-Jan-01 | 35 | 51 | 41 |

| PARAMETER | Units | MDL | Method Reference | Date Tested | Sample 25 | | |
|-----------|-------|-----|------------------|-------------|-----------|--|--|
| Lead | ug/g | 10 | EPA200.7 | 16-Jan-01 | 31 | | |

MDL is the Method Detection Limit

Sample 2 = CCG 450.0 East 4m
Sample 4 = CCG 450.0 NE 5m
Sample 10 = CCG 429.0 B
Sample 11 = CCG 429.0 C
Sample 12 = CCG 429.0 E

Sample 17 = CCG 492.0 North
Sample 19 = CCG 492.0 SW
Sample 23 = CCG 488.0 W
Sample 24 = CCG 488.0 NE
Sample 25 = CCG 488.0 SE

CERTIFIED BY,


 Richard Hombek, Ph. D.
 President

ENVIRONMENTAL TECHNOLOGY RESEARCH LABORATORIES INC.

| | |
|---------------------|-----------------------------|
| ETRL Record #: | 01-0154 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. |
| Source: | |
| Chain of Custody #: | 9888/9889 |
| Sample Matrix: | Paint |
| Date Submitted: | 10-Jan-01 |
| Date Reported: | 31-Jan-01 |

| PARAMETER | Units | MDL | Method Reference | Date Tested | Sample 5 | Sample 6 | Sample 7 |
|-----------|-------|-----|------------------|-------------|----------|----------|----------|
| Lead | ug/g | 50 | EPA200.7 | 11-Jan-01 | 26000 | 7000 | 12600 |

| PARAMETER | Units | MDL | Method Reference | Date Tested | Sample 15 | Sample 16 | Sample 20 |
|-----------|-------|-----|------------------|-------------|-----------|-----------|-----------|
| Lead | ug/g | 50 | EPA200.7 | 11-Jan-01 | 21100 | 12800 | 22800 |

MDL is the Method Detection Limit

Sample 5 = CCG 450.0 Top

Sample 6 = CCG 450.0 Bottom

Sample 7 = CCG 429.0 P.E.P. White

Sample 15 = CCG 492.0 Presquile Bottom

Sample 16 = CCG 492.0 Red Top

Sample 20 = CCG 488.0 W-B-S-S

CERTIFIED BY,


 Richard Hombek, Ph. D.
 President

ENVIRONMENTAL TECHNOLOGY RESEARCH LABORATORIES INC

133 Dalton Ave. Kingston, ON K7K 6C2 Tel: (613) 544-2001 Fax: (613) 544-2770 email: etrl@kingston.net

| | |
|---------------------|-----------------------------|
| ETRL Record #: | 01-0891 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. |
| Source: | 1-336-63-01 |
| Chain of Custody #: | 8556 |
| Sample Matrix: | Soil |
| Date Submitted: | 01-Mar-01 |
| Date Reported: | 07-Mar-01 |

Decommissioning Metals

| PARAMETER | Units | MDL | Method Reference | Date Tested | CCG 488.0 SW 1 | CCG 488.0 SW 2 | CCG 429.0 SW 1 |
|------------------|-------|------|------------------|-------------|-------------------|-------------------|-------------------|
| Antimony | ug/g | 1 | EPA7741 | 07-Mar-01 | <1 | <1 | <1 |
| Arsenic | ug/g | 0.5 | EPA7061 | 07-Mar-01 | 0.8 | 0.7 | 4.2 |
| Barium | ug/g | 1 | EPA200.7 | 05-Mar-01 | 42 | 51 | 193 |
| Beryllium | ug/g | 1 | EPA200.7 | 05-Mar-01 | <1 | <1 | <1 |
| Boron (HWS) | ug/g | 0.2 | GFFA | 06-Mar-01 | <0.2 | <0.2 | <0.2 |
| Cadmium | ug/g | 2 | EPA200.7 | 05-Mar-01 | <2 | <2 | <2 |
| Chromium (Total) | ug/g | 1 | EPA200.7 | 05-Mar-01 | 8 | 10 | 23 |
| Cobalt | ug/g | 2 | EPA200.7 | 05-Mar-01 | 2 | 3 | 5 |
| Copper | ug/g | 1 | EPA200.7 | 05-Mar-01 | <1 | 6 | 19 |
| Lead | ug/g | 10 | EPA200.7 | 05-Mar-01 | <10 | 39 | 584 |
| Mercury | ug/g | 0.05 | EPA7471 | 05-Mar-01 | 0.08 | 0.10 | 0.24 |
| Molybdenum | ug/g | 4 | EPA200.7 | 05-Mar-01 | <4 | <4 | <4 |
| Nickel | ug/g | 2 | EPA200.7 | 05-Mar-01 | 6 | 6 | 13 |
| Selenium | ug/g | 0.1 | EPA7741 | 07-Mar-01 | 0.7 | 0.8 | 1.0 |
| Silver | ug/g | 1 | EPA200.7 | 05-Mar-01 | <1 | <1 | <1 |
| Thallium | ug/g | 1 | EPA7841 | 05-Mar-01 | <1 | <1 | <1 |
| Vanadium | ug/g | 1 | EPA200.7 | 05-Mar-01 | 13 | 14 | 22 |
| Zinc | ug/g | 2 | EPA200.7 | 05-Mar-01 | 79 | 95 | 223 |

MDL is the Method Detection Limit

ug/g = micrograms per gram (parts per million)

CERTIFIED BY,



for Richard Hombek, Ph.D.
President

APPENDIX D:

Communication Records



ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date Feb 27/01 Time 4:30
Phone No. 1-800-558-0045
Project No. ~~1-800~~ 1-336-6301

To (A) MOE Peterborough.
 From (B) J. Noyes
Subject: CCG Sites in Region.

- Talked to Michael Longpre - Environmental Officer for Brighton Area.
- ~~Response~~. I confirmed that Brighton + Presquile were in his district.
(Including Proctor Point on High Bluff Island)
- He is not aware of any issues w/rt these sites but if I like he can send the list of sites off to Toronto for an index search.

FAX NUMBER: 755-4321.

- There were no files for these sites.





Canada
Coast Guard
Central & Arctic Region

Canada
Garde cotiere
Region du Centre et de l'Arctique

P. O. Box 1000,
401 King St. W.,
Prescott, Ontario.
K0E 1T0



| |
|-----------------|
| PAGE 1 OF 2 |
| FILE #: |
| DATE: Feb 27/01 |

FACSIMILE TRANSMITTAL FORM

| | | | |
|---------------------|----------------------------|---|----------------------------|
| TO: JANET NOYES | ROUTING SYMBOL/ COMPANY | FACSIMILE NO. (613) 542-0844 | LOCATION KINGSTON |
| FROM: TED NICKEL | ROUTING SYMBOL/ COMPANY | TELEPHONE # 613-925-2865, EXT. FACS: 613-925-5540 | LOCATION PRESCOTT, ONT. |

SPECIAL INSTRUCTIONS

Hi JANET
HERE'S YOUR FORM BACK WITH
REFERENCE "HISTORY" OF BATTERIES.
Cio!

Canada

**Canadian Coast Guard sites - Enhanced Phase I ESA
Conducted by XCG Consulting**

| Name | Body of Water | LL # | History of Batteries? | Other Historical Notes |
|---|------------------------------|--------|-----------------------|------------------------|
| Enhanced Phase I Environmental Site Assessments Lake Ontario, Detroit River and area | | | | |
| Brighton Rear Range | Lake Ontario | 488.0 | NO | |
| Brother Islands | Lake Ontario | 430.0 | YES | |
| Brother Islands West | Lake Ontario | 430.2 | YES | |
| Pig Point | Lake Ontario | 438.0 | YES | |
| Presqu'île Point | Lake Ontario | 492.0 | NO | |
| Prince Edward Point | Lake Ontario | 429.0 | YES | |
| Proctor Point | Lake Ontario | 492.2 | YES | |
| Sherman's Point | Lake Ontario | 450.0 | YES | |
| Telegraph Narrows | Lake Ontario | 459.0 | YES | |
| Mariatown | St. Lawrence Seaway | 259.0 | NO | |
| Aubry Island | St. Lawrence Seaway | 370.0 | YES | |
| Beaurivage Island | St. Lawrence Seaway | 369.0 | YES | |
| Chimney Island | St. Lawrence Seaway | 354.0 | YES | |
| De Wattville Island Front Range | Brockville narrows | 333.0 | YES | |
| Duck Rock Island | St. Lawrence Seaway | 359.0 | YES | |
| Gananoque Narrows West | St. Lawrence River | 365.2 | YES | |
| Grenadier Island | St. Lawrence River | 361.0 | YES | |
| Irvine Point | St. Lawrence Seaway | 380.0 | NO | |
| Irvine Point | St. Lawrence Seaway | 381.0 | NO | |
| Prince Regent Island | St. Lawrence River | 365.0 | YES | |
| Royal Island Light | St. Lawrence Seaway | 325.0 | YES | |
| Wood Island | St. Lawrence River | 362.0 | YES | |
| Deep River Inlet | Ottawa River | 1311.0 | YES | |
| Aylmer Island | Ottawa River - Lac Deschenes | 1299.0 | YES | |



ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date Feb 28/01 Time 1:20 ^{a.m.} ~~p.m.~~
Phone No. (613) 475-1830
Project No. 1-336-63-01

To (A) Russ Jandru Manager Brighton PDC.
 From (B) J Noyes
Subject: Brighton

- Where are the drinking water sources for Brighton.
- 1 1/2 miles north of town
- 2 wells + reservoirs
- no water is taken from Lake.





ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date Mar 1/01 Time 11:40 ^{a.m.} p.m.
Phone No. (613) 476-8733
Project No. 1-336-63-01
66-01

To (A) ~~Mike~~ Alistair Mathers - Management Biologist
 From (B) J. Noyes
Subject: Fish Species + sensitive areas

- He recommended that we look at the
Environmental Sensitivity Atlas for Lake Ontario's
Canadian Shore.

published by Environment Canada, 1993

ISBN: 0-662-20523-5

Environment Canada - Conservation + Protection Branch
Ontario Region.

25 St. Clair Ave E, Toronto.

- Harold Leaday - 4905 Dufferin St } contact
(416) 739-5912

- Other information can be found in the annual
report - fish community indexing - specific locations

- Check out: Great Lakes Fisheries website

- Annual Report: Chapter 3 - describes
nearshore Fish Communities

- Appendix B - list all sites/all species

- he'll send me the website address. - I gave him my
email address

- by Canadian Wildlife Service.

- by Park Naturalist at Pusquile

- Don Tyerman (613) 475-2204

- by Sandbanks - park superintendent

- Don Buckholtz (613) 393-3319 x 233





ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date March 1 Time 4:33
Phone No. 1-800-860-2122
Project No. _____

To (A) MOE - Ottawa
 From (B) XCG, Julia Senik
Subject: - Issues w/ CCG site
TOR - Rustad.

to call back tomorrow morning
63-521-3456
ext ~~226~~ 229
Andrew Polley

March 1 Time 4:46 pm.
ph: 1-800-622-6230 Canadian Government
Hotline.
Nancy

→ Fisheries and Oceans → Burlington
905-639-4844 8:15-4:15
website www.dfo-mpo.gc.ca/sch/hbrinfo.e.htm
→ Head office: 613-9993-0999 (8-8 pm)
200 Kent www.dfo-mpo.gc.ca

CCG Fisheries/Oceans Marine Aids to Navigation
SARNIA Al DION 519-383-1859 (8-4)
www.motmar.com

Environment Canada General Enquiries
~~1-800-668-6767~~ 1-800-668-6767 (8:30-4:30)
www.onec.gc.ca/or-home.htm
www.ec.gc.ca

howrence
✓ 87-Vision 2000 - 514-496-6851 (8:30-5)
Environment Canada.
www.slv2000.gc.ec.gc.ca





ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date March 2 Time 8:47 ^{a.m.} p.m.

Phone No. 1-819-997-4552

Project No. 1-336-63-01

To (A) LOUISE RECAUD (Environment Canada)
 From (B) JULIA SERINK

Subject: Issues with CCA sites

- contacted Louise Recaud
 - wanted to know of any environmental compliance issues with the CCA sites or the neighbouring properties
 - and of any complaints regarding the sites or the neighbouring properties

she told me to submit Access to Information Requests (\$5/request)

fax to 613-953-1099.

address to Rene Boulduc.

Access to Information and Privacy
Secretariat

Environment Canada

Terrasses De la Chaudiere

10 Wellington St.

4th floor

Hull, Quebec

K1A-0T13.





ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date Mar 2/01 Time 11:00 ^{a.m.} p.m.
Phone No. (613) 925-2865 x 263
Project No. 1-336-63-01

To (A) Ted Nickel.
 From (B) J. Noyes
Subject: Other CCG Sites.

- I called asking particular questions with regard to Telegraph Island: - not much info - have 1938 map - island is different shape - Crown bought land in 1875 - what was then? most info in the file pertains to range lights which are not part of this property at all.

- Ted: - not much info at all
- 1972 all files were archived at National Archives in Ottawa
- not many records were kept
- "Typically" this is what has happened at a lot of CCG sites from Toronto to Montreal.

- If sites had been owned by Transport there were possible wooden light-houses on property (Centre Bios, Telegraph etc)
- Early to mid 1950's - devolution - not as much traffic
- not needed - many were burned down.
- declared redundant
- 1965 - Seaway opened up - increased traffic
- 1967 - Flotilla for Expo from Toronto to Montreal
- Wanted to "look good" ∴ lots of new aids built along the path way.
- Wanted "Canadian" passageway.





ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date Mar 2/01 Time 2:50 a.m.
p.m.
Phone No. 531-5700
Project No. 1-336-63-01
66-01

To (A) J. Noyes
 From (B) Todd Norris - MNR Kingston
Subject: _____

- If we want to come down and search their files we are more than welcome to do so.
- The list we sent is large and he wouldn't have the time to compile it for us.
- He does know that cormorants, egrets are species of interest in area.
- Contact Canadian Wildlife Service.
- Check out websites - very informative - good start
 - NHIC web pages
 - ↳ lists vulnerable + threatened species
 - ↳ maps down to 1 sq km.
- cliff swallows at Prince Edward Point.





ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date March 5 Time 2:41 a.m.
p.m.

Phone No. 705-945-5906

Project No. 1-336-63-01

^{ND+M}
 To (A) ~~MNR~~ Office - Dan Farrow 1-336-66-61

From (B) JULIA SERINK

Subject: Wanted info to fill out ^{MND+M} ~~MNR~~ environmental Checklist

Dan Farrow - District Support Geologist for Saul St. Marie

^{MND+M}
Contacted ~~MNR~~ for information concerning complaints against CCG site - knowledge of spills/leaks occurring at the subject sites - if MNR has records of possible contamination of property by PCBs, CFCs etc.

Questionnaire was divided into sections told me where to get info for each section

① complaints etc - go to Mining lands website - townships - maps etc.

② mining lands / claims go to website: www.mci.mndm.gov.on.ca/claims/
/clm - intr CFM

③ Knowledge of spills/leaks on neighbouring properties - need permission!

④ Has the Ministry tested soils etc - must go to office in Tweed and look @ maps.





ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date March 6 Time 11:26 ^{a.m.} p.m.

Phone No. 416-739-5908.

Project No. 1-336-63-01

1-336-66-01

To (A) Steve Clements

From (B) Environment Canada

Subject: Highly Sensitive Classified Features

~~* email~~ - areas.
(escape) - description program.

* send maps with site.

fax # 416-739-4953

- he will look for more detailed information

March 13th.

Greg Mayberry from Environment Canada.

- looking into the highly sensitive classified features!





Environnement Canada
Terrasses de la Chaudière
10 Wellington Street, 4th Floor
Hull, Québec
K1A 0H3

FAXED

MAR 15 2001

Your File Votre référence

Our File Notre référence
A-2000-0322 / Ir

Ms. Julia Serink
Project Engineer
XCG Consultants Ltd.
33 Earl Street
Kingston, Ontario
K7L 2G4

Dear Ms. Serink:

This letter is in response to your request under the Access to Information Act (the Act) for:

"Environmental Compliance of the following Canadian Coast Guard Sites: Bath
Crow Lake; Grass Creek; Ivy Lea; Ivy Lea Inn;
Kingston (Treasure Island); North Port; Picton;
Seeleys Bay; Sharbot Lake; Trenton (Bay Marine);
Waupoos; Waupoos Island;
Wellers Bay; Wellington;
Westport; Brighton Rear Range;
Brothers Islands; Brothers Islands West;
Pig Point; Presqu'île Point;
Prince Edward Point; Proctor Point;
Sherman's Point; Telegraph Narrows"

I regret to inform you that after a thorough search and with the information provided, no records were found concerning this request.

As for "neighbouring properties", please be advised that without the name of the companies or owners with complete address of properties, we are unable to search for this information.

The Act grants you the right to file a complaint with the Information Commissioner, within one year of the receipt of your request, if you are not satisfied with our handling of your request. The address is:

Office of the Information Commissioner
112 Kent Street, 3rd Floor
Place de Ville, Tower B
Ottawa, Ontario
K1A 1H3

If you have any questions regarding this request, please contact Louise Ricard at (819) 994-4995.

Yours sincerely,

René Bolduc
Acting Access to Information
and Privacy Coordinator
Administration Directorate



ENVIRONMENTAL
ENGINEERING
SPECIALISTS

TELEPHONE CONVERSATION RECORD

Date Mar 28/01 Time 11:45 ^{a.m.} p.m.
Phone No. (613) 925-2865 x263
Project No. 1-336-63-01

To (A) Ted Nickel
 From (B) J. Noyes
Subject: Brighton Rear Range

- Could he give me specific date that it was constructed
- 1910 List of lights - Brighton Beck light # 1780 (part 1910s)
 - white square wood structure on wood cut-in water - not on present property
 - this was constructed in 1891. (45' above water)
- 1934 - still there.
- possible reason for expropriation could be in SCH at Brighton - right across road
- 1958 - temporary light (mast).
- 1952 - present steel structure was constructed
 - lighted with electricity.
- No Pesticides or Herbicides used on property to his knowledge.



APPENDIX E:

**CCME National Classification
System for Contaminated Sites**

Site Identification: Brighton Rear Range LL. 488.0

DETAILED EVALUATION FORM

Before completing this form, review instructions in text (Section 3.0).

I CONTAMINANTS CHARACTERISTICS (Maximum Total Score is 33)

Complete Sections A, B, C, and Special Considerations

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓) (see Subsection 3.7.1 in text).

| Factors | Scoring Guideline | Site Score | Totals |
|--|---------------------------|------------|----------------------------|
| A Degree of Hazard (max. 14) | | | |
| <ul style="list-style-type: none"> High concern contaminants - high concentration High concern contaminants - low concentration Medium concern contaminants - high concentration Medium concern contaminants - low concentration Low concern contaminants | (14) 11 8 5 3 | 14 ? ✓ | 14 Section A max. 14 |
| B Contaminant Quantity (area or volume of site contamination) (max. 10) | | | |
| <ul style="list-style-type: none"> >10 ha or 1000 m³ or drums of liquid 2 to 10 ha or 100 to 1000 m³ <2 ha or 100 m³ | 10 6 2 | 2 ? ✓ | 2 Section B max. 10 |
| C Physical State of Contaminants (max. 9) | | | |
| <ul style="list-style-type: none"> Liquid/gas Sludge Solid | 9 7 3 | 3 ? ✓ | 3 Section C max. 9 |
| Special Considerations | | | |
| Discretionary addition or subtraction to this category score (Contaminant Characteristics) by up to 6 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (33) or be lower than the minimum (0) allowable.) | | | |
| DETAILED RATIONALE MUST BE DOCUMENTED | | | |
| | -6 to +6 | — ✓ | — max. 6 |

I Total Site Score for CONTAMINANT CHARACTERISTICS Add:

| | Total '✓' | Total '2' | Total '✓' + '2' |
|------------------------|-----------|-----------|-----------------|
| Section A | 14 | - | 14 |
| Section B | 2 | - | 2 |
| Section C | 3 | - | 3 |
| Special Considerations | | | |
| TOTAL | 19 | 0 | 19 |

max. 33

Site Identification: 488-0

Site Identification: 488-0

DETAILED EVALUATION FORM (Cont'd)

II EXPOSURE PATHWAYS (Maximum Total Score is 33)

Complete Sections A, B, and C.

A Groundwater (Maximum Score is 11)

Score Section 1 (Known) OR 2 (Potential), and Section 3.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals |
|-------------|--|---|--|
| 1 | <p>Known Contamination of Groundwater at or beyond the Property Boundary (measured contamination of, or known contact with groundwater (max 11))</p> <ul style="list-style-type: none"> Groundwater significantly exceeds CDWG (by >2x) or known contact of contaminants with groundwater Between 1 and 2x CDWG or probable contact with groundwater Meets Canadian Drinking Water Guidelines <p>If impact on groundwater is not known, complete 2</p> | <p>11 6 0</p> <p>— ✓</p> | <p>Section 1 max. 11</p> |
| OR 2 | <p>Potential for Groundwater Contamination (max. 11)</p> <p>a) Engineered subsurface containment (max. 4)</p> <ul style="list-style-type: none"> No containment Partial containment Full containment <p>b) Thickness of confining layer over aquifer (max.15)</p> <ul style="list-style-type: none"> 3 m or less 3 to 10 m >10 m <p>c) Hydraulic conductivity of the confining layer (max. 15)</p> <ul style="list-style-type: none"> >10⁻⁴ cm/sec 10⁻⁴ to 10⁻⁶ cm/sec <10⁻⁶ cm/sec <p>d) Annual rainfall (max. 1)</p> <ul style="list-style-type: none"> >1,000 mm 600 mm 400 mm 200 mm <p>e) Hydraulic conductivity of aquifer(s) of concern (max.3)</p> <ul style="list-style-type: none"> >10⁻² cm/sec 10⁻² to 10⁻⁴ cm/sec <10⁻⁴ cm/sec | <p>(4) 2 0</p> <p>1.5 1 0</p> <p>1.5 1 0.5</p> <p>1 0.6 0.4 0.2</p> <p>3 1.5 0.5</p> <p>4 ? ✓ 0.75 ? ✓ 0.75 ? ✓ 0.8 ? ✓ 1.5 ? ✓</p> | <p>Section 2 max. 11</p> |
| | | | <p>78 Section 2 max. 11</p> |

Special Considerations

- 3 Discretionary addition or subtraction to this sub-category score (Surface Water Pathway) by up to 4 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (11) or be lower than the minimum (0) allowable.)

DETAILED RATIONALE MUST BE DOCUMENTED

-4 to +4
Section 3
max. 4

| | Section 1 or 2 | Add: | Total '✓' | Total '??' | Total '✓' + '??' |
|-----------------------|----------------|------|-----------|-------------|------------------------|
| B Surface Water Total | | | <u>7</u> | <u>0.75</u> | <u>7.75</u> |
| | Section 3 | | <u>-</u> | <u>-</u> | <u>-</u> |
| | TOTAL | | <u>7</u> | <u>0.75</u> | <u>7.75</u> |
| | | | | | <small>max. 11</small> |

Site Identification: 4880

DETAILED EVALUATION FORM (Cont'd)

II EXPOSURE PATHWAYS (cont'd)

C Direct Contact (Maximum Score is 11)

Score **Section 1 (Known)** OR **2 (Potential)**, and **Section 3**.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals |
|-------------------------------|--|--------------------------------------|----------------------|
| I | Known Contamination of Media Off-site (max. 11) <ul style="list-style-type: none"> Known contamination of media (soil, sediment, air) off-site due to direct contact with contaminated soil, dust, air, etc. (vector transported should also be considered) Strongly suspected contamination of media (soil, sediment, air) off-site No contamination of media off-site If impact due to direct contact is not known, complete 2 | 11 6 0 | Section 1 max. 11 |
| OR 2 | Potential for Direct Human and/or Animal Contact (max. 11) a) Airborne Emissions (gases, vapours, contaminated dust, etc.) (max. 5) <ul style="list-style-type: none"> Known or suspected airborne emissions impacting on neighbouring properties (see User's Guide) Airborne emissions generally restricted to site No airborne emissions b) Accessibility of Site (Ability to Contact Materials) (max.4) <ul style="list-style-type: none"> Limited barriers to prevent site access; contaminants not covered Moderate accessibility or no intervening barriers; containments are covered Controlled access or remote location and containments are covered c) Hazardous soil gas migration from the site (max. 2) <ul style="list-style-type: none"> Contaminants are putrescible and soil permeability is high Site contaminants are putrescible and soil permeability is high No putrescible contaminants at the site | 5 3 0 4 3 0 2 0 | Section 2 max. 11 |
| Special Considerations | | | |
| 3 | Discretionary addition or subtraction to this sub-category score (Direct Contact Pathway) by up to 4 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (11) or be lower than the minimum (0) allowable.) DETAILED RATIONALE MUST BE DOCUMENTED | -4 to +4 | Section 3 max. 4 |

| | | Add: | Section 1 or 2 Section 3 TOTAL | Total '✓' | Total '○' | Total '✓' + '○' |
|-----------|---|------|---|---|--|---|
| C | Direct Contact Total | | | <u>0</u> | <u>0</u> | <u>0</u> |
| | | | | <u>0</u> | <u>0</u> | <u>0</u> |
| | | | | <u>0</u> | <u>0</u> | <u>0</u> |
| | | | | | | max. 11 |
| II | Total Site Score for EXPOSURE PATHWAYS | Add: | A Groundwater B Surface Water C Direct Contact TOTAL | <u>4.8</u> <u>7</u> <u>0</u> <u>11.8</u> | <u>3.0</u> <u>0.75</u> <u>0</u> <u>3.75</u> | <u>7.8</u> <u>7.75</u> <u>0</u> <u>15.55</u> |
| | | | | | | max. 33 |

Site Identification: _____ 488.0

Site Identification: 4880

DETAILED EVALUATION FORM (Cont'd)

III RECEPTORS (Maximum Total Score is 34)

Complete Sections A and B.

A Human and Animal Uses (Maximum Score is 18)

Score Section 1 (Known) OR 2 (Potential), and Section 3.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals |
|-------------|---|--|---|
| 1 | <p>Known Impact on Humans or Animals (max. 18) Known adverse impact on humans or domestic animals as a result of the contaminated site (see User's Guide)</p> <ul style="list-style-type: none"> • Known adverse effect on humans or domestic animals • Strongly suspected adverse effect on humans or domestic animals <p>If adverse effect on humans is not known, complete 2</p> | <p>18 15</p> <p>— ✓</p> | <p>Section 1 max. 18 B Class 1</p> |
| OR 2 | <p>Potential for Impact on Humans or Animals (max. 18) Drinking Water Supply (max. 9) (groundwater or surface water; private, commercial or municipal supply) Complete Section i) (Known) OR ii) (Potential)</p> <p>i) Known impact on drinking water supply (max. 9) (see User's Guide) Drinking water supply is known to be adversely affected as a result of site contamination</p> <ul style="list-style-type: none"> • Known contamination of drinking water supply (to levels exceeding CDWG) • Strongly suspected contamination of drinking water supply • Drinking water supply is known not to be contaminated <p>If impact on drinking water is not known, complete ii)</p> <p>ii) Potential for impact on drinking water supply (max. 9)</p> <ul style="list-style-type: none"> ■ Proximity to drinking water supply (max. 6) <ul style="list-style-type: none"> • 0 to <100 m • 100 to 300 m • 300 m to <1 km • 1 to 5 km ■ "Availability" of alternate drinking water supply (max. 3) <ul style="list-style-type: none"> • Alternate drinking water supply is not available • Alternate drinking water supply difficult to obtain • Alternate drinking water supply available | <p>9 7 0</p> <p>— ✓</p> | |
| | | <p>6 5 4 (3)</p> <p>3 2 (0.5)</p> | <p>3 ? ✓ 0.5 ? ✓</p> |

Factors

b) Other Water Resources (max. 4)
(groundwater or surface water)

Complete Section i) (Known) OR ii) (Potential)

i) Known impact on water resources (max. 4) (see User's Guide)
Water resources (used for recreational purposes, commercial food preparation, livestock watering, irrigation and other food chain uses) is known to be adversely affected as a result of site contamination

- Water resource is known to be contaminated above CWQG
- Water resource is strongly suspected to be contaminated above CWQG
- Water resource is not known to be contaminated

If impact on drinking water is not known, complete ii)

4
3
0

ii) Potential for impact on water resources (max. 4)

■ Proximity to water resources used for activities listed above (max. 2)

- 0 to <100 m
- 100 to 300 m
- 300 m to <1 km
- 1 to 5 km

2
1.5
1
0.5

■ Use of water resources (max. 2)

If multiple uses, give highest score automatically
use following table

Frequency of Use

Frequent Occasional

Water Use

| | | |
|--|-----|-----|
| Recreational (swimming, fishing, etc.) | 2 | 1 |
| Commercial food preparation | 1.5 | 0.8 |
| Livestock watering | 1 | 0.5 |
| Irrigation | 1 | 0.5 |
| Other domestic or food chain uses | 0.5 | 0.3 |
| Not currently used but likely future use | 0.5 | 0.2 |

1.5 ?

Scoring
Guideline

Site
Score

Totals

Site Identification: 4880

DETAILED EVALUATION FORM (Cont'd)

III RECEPTORS (cont'd)

A Human and Animal Uses (cont'd)

Score **Section 1 (Known) OR 2 (Potential)**, and **Section 3**.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------------|--------------|----------------------|----------|--------------------|--|--|--|------------|--------------|------------|--|-------------|---|-----|---|--|--------------|---|---|-----|--|-----------------|---|---|-----|--|-----------------------|---|---|-----|----|
| c) Direct Human Exposure (max. 5) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Complete Section I) (Known) OR ii) (Potential) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>i) Known contamination of land used by humans (max.) (see User's Guide)</p> <ul style="list-style-type: none"> Known contamination of land used for agricultural or residential/parkland/school purposes above AG or R/P EQC values (5) Known contamination of land used for commercial or industrial purposes above AG or R/P EQC values 3.5 Land is known not to be contaminated 0 <p>If impact on drinking water is not known, complete ii)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ii) Potential human exposure through land use give highest score to worst case scenario (max. 5) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p><input checked="" type="checkbox"/> Use of land at and surrounding site Determine uses(s) of land at and surrounding site and assign score using following table</p> <table border="1"> <thead> <tr> <th rowspan="2">Land Use</th> <th colspan="4">Distance from Site</th> </tr> <tr> <th>0 - <300 m</th> <th>300m - <1 km</th> <th>1 km - 5km</th> <th></th> </tr> </thead> <tbody> <tr> <td>Residential</td> <td>5</td> <td>4.5</td> <td>3</td> <td></td> </tr> <tr> <td>Agricultural</td> <td>5</td> <td>4</td> <td>2.5</td> <td></td> </tr> <tr> <td>Parkland/School</td> <td>4</td> <td>3</td> <td>1.5</td> <td></td> </tr> <tr> <td>Commercial/Industrial</td> <td>3</td> <td>1</td> <td>0.5</td> <td>11</td> </tr> </tbody> </table> | | | | Land Use | Distance from Site | | | | 0 - <300 m | 300m - <1 km | 1 km - 5km | | Residential | 5 | 4.5 | 3 | | Agricultural | 5 | 4 | 2.5 | | Parkland/School | 4 | 3 | 1.5 | | Commercial/Industrial | 3 | 1 | 0.5 | 11 |
| Land Use | Distance from Site | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 - <300 m | 300m - <1 km | 1 km - 5km | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Residential | 5 | 4.5 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Agricultural | 5 | 4 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parkland/School | 4 | 3 | 1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Commercial/Industrial | 3 | 1 | 0.5 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Section 2 max. 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Special Considerations

3 Discretionary addition or subtraction to this sub-category score (Impact on Human and Animal Receptors) by up to 5 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (18) or be lower than the minimum (0) allowable.)

DETAILED RATIONALE MUST BE DOCUMENTED

-5 to +5

Section 3
max. 5

| A | Total Human and Animal Receptors | Add: | Section 1 or 2 | Total '✓' | Total '○' | Total '✓' + '○' |
|---|----------------------------------|------|----------------|-----------|-----------|-----------------|
| | | | | <u>11</u> | <u>1</u> | <u>12</u> |
| | | | Section 3 | <u>1</u> | <u>1</u> | <u>2</u> |
| | TOTAL | | | <u>12</u> | <u>2</u> | <u>14</u> |
| | | | | | | max. 18 |

Site Identification: _____ 488-0

Site Identification: _____

4880

DETAILED EVALUATION FORM (Cont'd)

III RECEPTORS (cont'd)

B Environmental Receptors (Maximum Score is 16)

Score **Section 1 (Known)** **OR 2 (Potential)**, and **Section 3**.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals |
|-------------------------------|---|------------------|-----------------------------|
| I | Known Adverse Impact on the Environment as a Result of the Contaminated Site (max. 16) | | Section 1 max. 16 |
| | <ul style="list-style-type: none"> Known adverse impact on sensitive environment Evidence of stress on aquatic species, or vegetative stress on trees, crops or plant life located on properties neighbouring the site Strongly suspected adverse impact on sensitive environment If impact due to direct contact is not known, complete 2 | 16 14 12 | ✓ |
| OR 2 | Potential for Impact on Sensitive Environments (max. 16) | | |
| | a) Distance from the site to the nearest sensitive environment (max. 10) (e.g., sensitive aquatic environment, nature preserve, habitat for endangered species, sensitive forest reserves, national parks or forests, etc.) <ul style="list-style-type: none"> 0 to <500 m 500 to 2 km 2 to <5 km 5 to 10 km | 10 6 2 | 0.5 ? ✓ |
| | b) Groundwater (max.6) Distance to an important or susceptible groundwater resource (e.g. recharge area) <ul style="list-style-type: none"> 0 to <500 m 500 to 2 km 2 to <5 km 5 to 10 km | 6 4 2 1 | 6 ? ✓ |
| | | | 6.5 Section 2 max. 16 |
| Special Considerations | | | |
| 3 | Discretionary addition or subtraction to this sub-category score (Environmental Receptors) by up to 5 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (16) or be lower than the minimum (0) allowable.) | -5 to +5 | ✓ |
| | DETAILED RATIONALE MUST BE DOCUMENTED | | Section 3 max. 5 |

| | Add: | Section 1 or 2 Section 3 TOTAL | Total '✓' | Total '○' | Total '✓' + '○' |
|---|-------------|--------------------------------------|--------------------------------|------------------|------------------------|
| B | | | | | |
| Total Environmental Receptors | | | <u>6.5</u> | <u>-</u> | <u>6.5</u> |
| | | | <u>-</u> | <u>-</u> | <u>-</u> |
| | | TOTAL | <u>6.5</u> | <u>-</u> | <u>6.5</u> |
| | | | | | max. 16 |
| II | | | | | |
| Total Site Score for ENVIRONMENTAL RECEPTORS | Add: | A | Human and Animal Use | Total '○' | Total '✓' + '○' |
| | | B | Environmental Receptors | | |
| | | | TOTAL | | |
| | | | <u>11</u> | <u>0</u> | <u>11</u> |
| | | | <u>6.5</u> | <u>0</u> | <u>6.5</u> |
| | | | <u>17.5</u> | <u>0</u> | <u>17.5</u> |
| | | | | | max. 34 |

Site Identification: 488 0

Site Identification: Brighton Rear Range 488.0

DETAILED EVALUATION FORM (Cont'd)

FINAL SCORE SHEET AND SITE CATEGORIES

| Factor Categories | Category Score (CS) ('✓', '?') | Estimated Score (ES) ('?', only) | Total Category Score (CS) | Total Estimated Score (ES) |
|---|--------------------------------|----------------------------------|---------------------------|----------------------------|
| I CONTAINMENT CHARACTERISTICS (33) | 19 | 0 | Total = 19 | ± 0 |
| II EXPOSURE PATHWAYS (33) | | | | |
| A Groundwater (11) | 7.8 | 3.0 | | |
| B Surface Water (11) | 7.75 | 0.75 | | |
| C Direct Contact (11) | 0 | 0 | | |
| Total | 15.55 | 3.75 | Total = 15.55 | ± 3.75 |
| III RECEPTORS (34) | | | | |
| A Human and Animal (18) | 11 | 0 | | |
| B Environment (16) | 6.5 | 0 | | |
| Total | 17.5 | 0 | Total = 17.5 | ± 0 |
| Total | 52.05 | | Total = 52.05 | ± 3.75 |

TOTAL SCORE FOR THE SITE(S) (TS)
 (Sum of scores marked '✓' and '?', rounded to nearest whole number)

ESTIMATED SCORE FOR SITE(ES)
 (Sum of scores marked '?', i.e. score estimated or unknown)

| SITE SCORE | CLASS | RISK POTENTIAL | ACTION REQUIRED |
|------------|---------|----------------|-----------------|
| 70 - 100 | Class 1 | High | Yes |
| 50 - 69 | Class 2 | Medium | Likely |
| 38 - 49 | Class 3 | Medium Low | Maybe |
| ≤ 37 | Class 4 | Low | Not Likely |

CLASSIFICATION (1, 2, 3, or N)
 If ES ≥ 1.5, then site is categorized as 1 (insufficient information to classify site)

2

APPENDIX F:

Remedial Alternative Cost Estimates
and Treasury Board Liability
Estimate Information

COST ESTIMATES FOR REMEDIAL OPTIONS Brighton Rear Range Navigation Aid, L.L. 488.0

February 27, 2001

A. **COSTING OF REMEDIAL OPTIONS FOR IMPACTED SOIL IN AREA OF NAVIGATIONAL AID**

There are approximately 12 to 120 cubic metres (24 to 240 tonnes) of soil impacted with selected metals in this area of concern. Two remedial options were considered:

1. Excavation and disposal at a licensed off-site disposal facility;
2. Isolation, containment, and Risk Management approach.

A brief description of each of these remedial options is provided in the following sections.

A.1 **Excavation and Disposal at a Licensed Off-site Disposal Facility**

This scenario involves the excavation of 24 to 240 tonnes of impacted soil, transport of the impacted soil to an off-site licensed disposal facility, backfilling the excavation with clean soil, collection and analysis of verification samples, and reporting.

Five to ten verification samples would be collected from the walls and base of the excavation along with an Ontario Reg. 347 Leachate Test for landfill disposal. The excavated soil would be disposed of at an MOE-licensed facility registered to receive contaminated waste. Following excavation, clean fill would be imported to the site and placed in the excavated areas.

| | |
|---|-----------------------------|
| Excavation, haulage, and disposal of metals-impacted soil @ \$50/tonne | \$1,200 to \$12,000 |
| Rental of excavation equipment and associated labour (\$1,000/day for 1 to 2 days) | \$1,000 to \$2,000 |
| Ontario Reg. 347 test on excavated soil | \$250 |
| Soil verification testing @ \$85/set (5 to 10 sets) | \$425 to \$850 |
| Backfill and compaction @ \$30/tonne | \$720 to \$7,200 |
| Clean-up supervision | \$3,000 |
| Disbursements | \$3,000 |
| Clean-up management and reporting | \$3,000 to \$5,000 |
| Phase 2 ESA to further delineate impacts and assess groundwater and sediment quality, including a qualitative risk assessment | \$15,000 |
| TOTAL ESTIMATED COST (excluding GST) | \$27,595 to \$48,300 |

A.2 Isolation, Containment, and Risk Management Approach

This remedial option involves isolation of the impacted soil using containment and control technologies, combined with a risk management approach involving a site specific risk assessment (SSRA).

An SSRA could be completed in order to support a Level 2 risk management approach. In this case, most or all of the existing contamination would remain on-site and engineering control measures (i.e. containment) would be implemented to manage the risks associated with the contamination.

| | |
|---|-----------------|
| Phase 2 ESA to further delineate impacts and assess groundwater and sediment quality, including a qualitative risk assessment | \$15,000 |
| SSRA Labour Costs and Disbursements | \$20,000 |
| Allowance for containment and control technologies | \$30,000 |
| TOTAL ESTIMATED COST (excluding GST) | \$65,000 |

The nature of the containment or control technologies required (if any are required) will be determined following completion of the full SSRA. XCG has included an allowance of \$30,000 as part of the cost estimate.

NOTE:

It was assumed for costing purposes for Options 1 and 2 that approximately 24 to 240 tonnes of soils exceeding applicable guidelines/criteria will be encountered. Based on the little information this is currently available, the actual quantities may be outside of this range.

SUMMARY OF REMEDIAL OPTIONS

| A Cost of Remedial Options for Impacted Soil in Navigation Aid Area | |
|--|----------------------|
| A-1 Excavation and Off-Site Disposal | \$27,595 to \$48,300 |
| A-2 Isolation, Containment, and Risk Management Approach | \$65,000 |

INFORMATION SOURCES:

1. Pricing for excavation equipment rental, transportation, and disposal was based on rental rates from H.R. Doornekamp, Kingston, Ontario.

APPENDIX G:

Real Property Information System
for Contaminated Sites (RPISCS)
Module

The RPIS database information for this site has not been included in this report because it is understood that some revisions have been made to the database by PWGSC. The database information for this site, generated from the current version of the database maintained by PWGSC, should be inserted here.

APPENDIX H:

References

References

Brighton Rear Range Navigational Aid L.L. 488.0, 00-12-20

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14. [National Classification System for Contaminated Sites](#), Canadian Council of Ministers of the Environment, year unknown.

APPENDIX I:

Environmental Site Assessor
Qualifications

ASSESSOR QUALIFICATIONS:

Janet K. Noyes, B.Sc., P.Eng. Project Engineer

Janet Noyes has worked in the environmental engineering field since 1987. Ms. Noyes's professional experience has included Phase 1 and Phase 2 Environmental Site Assessments at a variety of different sites in Ontario, including vehicle maintenance and parts storage facilities, commercial plazas, and commercial office building developments.

Ms. Noyes has also participated in many surface water and groundwater modelling projects including assimilative capacity studies, master drainage plans, storm water management reports, site specific risk assessments for groundwater flow, contaminant fate transport assessments and land fill monitoring reports. These projects have been for sites located in Ontario, Connecticut, Ohio and Germany. Ms. Noyes has also contributed to a fish population study for the Ohio River in the United States. In addition, Ms. Noyes has completed Phase 1 and Phase 2 Environmental Site Assessments on municipal, industrial and commercial sites.

Ms. Noyes has attained her Bachelors degree in Civil Engineering at Queen's University and she has taken graduate level courses in water resources engineering also at Queen's. Janet is a member of the Professional Engineers of Ontario.

REVIEWER QUALIFICATIONS:

Kevin B. Shipley, M.A.Sc., P.Eng., CEA Associate

Kevin Shipley has worked in the environmental engineering field as an environmental engineer and project manager since 1986. Mr. Shipley's work has included Phase 1 and Phase 2 Environmental Site Assessments, Environmental Compliance Audits, preparation and implementation of Remedial Action Plans, industrial and municipal Wastewater Treatment, Hydrogeological Studies, and Tank Pulls.

Mr. Shipley has managed many high-profile projects, including the decommissioning of a 12-hectare industrial site in Waterloo requiring extensive soil and groundwater remediation and demolition of an old plant building, as well as three Environmental Baseline Studies at major airports in Ontario. In addition, Mr. Shipley has completed over 100 Phase 1 and Phase 2 Environmental Site Assessments on heavy industrial, light industrial, commercial, institutional, and residential sites.

In 1996, Mr. Shipley applied for and obtained his certification as a Certified Environmental Auditor (CEA). Mr. Shipley is a member of the Professional Engineers of Ontario (PEO).

Mr. Shipley has attained his Bachelors and Masters degrees in Civil Engineering at the University of Waterloo.



EXCELLENCE IN
ENVIRONMENTAL
CONSULTING
SERVICES



**PHASE 3
ENVIRONMENTAL SITE ASSESSMENT
CANADIAN COAST GUARD LIGHT STATION
L.L. 488.0 BRIGHTON REAR RANGE
BRIGHTON, ONTARIO
Presqu'île Bay, Lake Ontario**

DFRP Reference # 33164

Prepared for:

**CANADIAN COAST GUARD
DEPARTMENT OF FISHERIES AND OCEANS
CENTRAL AND ARCTIC REGION**

and

**PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA**

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February 14, 2002
XCG File #1-336-82-01

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EXECUTIVE SUMMARY

XCG Consultants Ltd. (XCG) was retained by Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans Canada (DFO), Central and Arctic Region, to carry out a Phase 3 Environmental Site Assessment (ESA) of the Brighton Rear Range Navigation Aid (L.L.488.0) in the Town of Brighton, Northumberland County, Ontario. The navigation aid is located on the north side of Harbour Street, between Walas and Marine Streets in Brighton. The property consists of a 15.24 metre by 15.24 metre square portion (Part 1) with a 2.44 metre by 38.1 metre access way (Part 2) from Harbour Street. A chain link fence with a locked gate encompasses the structure. The 18.0 metre beacon is centred in the square portion of the property. The station consists of a white skeleton tower with a fluorescent orange triangular daymark with a black vertical stripe and a navigational light. The tower is mounted on four concrete blocks that form a 3.15 metre square.

The Federal Crown expropriated the property on which this skeleton tower is located in 1934. According to Mr. Ted Nickel of CCG, the present structure has been on this site since 1952. The back light of the original Brighton Range Lights, which were constructed in 1891, was actually located on a wooden crib in the waters of Presqu'île Bay. The range lights were relocated during the 1950's and the present structure was constructed. The site has been serviced with hydroelectric power since the navigation light was built, according to Mr. Nickel. With the recent development of the residential homes in the vicinity of the navigation aid, a chain link fence was erected around the structure for safety. A 100-Watt incandescent bulb, located in the DLD 300-mm lantern, provides the navigational light.

During the first round of the Phase 3 investigations, twenty soil samples including two duplicates (for QA/QC purposes) were collected and submitted to Environmental Technology Research Laboratories (ETRL) for metals analyses. Of these twenty, fifteen were surficial soil samples and five were samples from the deeper boreholes on the subject property. One of these deeper samples was a duplicate sample and one of the surficial samples was a duplicate.

A total of ten boreholes were drilled on the subject property, four during the first phase and six during the follow-up phase of the investigation. A monitoring well was installed in one of the first four boreholes. Three of the original boreholes were drilled using a hand held jackhammer with split spoon samplers and one borehole was drilled with a portable pneumatic auger drill. During the Phase 3 ESA, two groundwater samples (including one duplicate) were collected from borehole 488-DH3 (MW1) northeast of the structure and analyzed for metals. The follow-up investigations in January 2002 included the advancement of six additional boreholes within the fenced area of the subject property. Thirty soil samples including three duplicates were collected from these boreholes and twenty of these (including two duplicates) were submitted to ETRL for metals analyses.

The applicable Environmental Quality criteria for soils considered at this site were the Ontario Ministry of the Environment (MOE) Table B guidelines for industrial/commercial land use, and the Canadian Council of Ministers of the Environment (CCME) guidelines for commercial redevelopment. The groundwater samples were compared to the Criteria for Water – Community Supply in the Canadian Council of Ministers of the Environment (CCME) document entitled Canadian Environmental Quality Guidelines (1999), and the MOE Table B non-potable groundwater criteria published in the Ontario Ministry of the Environment (MOE) Guideline for Use at Contaminated Sites in Ontario (February 1997).

None of the thirty-eight soil samples submitted for metals analysis during the Phase 3 ESA, indicated concentrations of metals above the CCME commercial/industrial criteria. Two samples

taken from the fill layer during the follow up investigation exceeded the beryllium guideline for the MOE Table B industrial/commercial criteria. The Enhanced Phase 1 ESA on the property had revealed two surficial soil samples with chromium VI and thallium exceedances of the CCME commercial criteria, but no MOE Table B exceedances.

The two groundwater samples indicated concentrations of barium, chromium, and lead in exceedance of the CCME community supply criteria. Copper, lead, vanadium, and zinc concentrations in the groundwater exceeded the MOE Table B criteria.

Based on the analytical data (from the Enhanced Phase 1 and Phase 3 ESAs) and visual observations of the subject site, there are indications that a subsurface soil horizon is affecting the surficial groundwater on the property. Although the surficial soil samples that were collected and the deeper subsurface soil samples (1.2 to 1.7 metres) that were retrieved during the initial Phase 3 investigations did not exhibit levels of metals contamination above the CCME commercial criteria (with the exception of chromium VI and thallium in two samples collected during the Enhanced Phase 1 ESA), the elevated concentrations of metals in the groundwater samples indicate that there is likely a source for these metals in the soil, probably in a depth range between 0.1 metres and 1.2 metres.

In the subsequent boreholes that were completed on site during the follow-up investigations, a fill layer with a thickness ranging from 0.1 metres to 0.4 metres was noted. A dark brown silty sand or sandy silt indicated the original topsoil of the once swampy land. Underlying this level is a grey sandy clay with stones. The layers above the dark brown level indicate the fill at the surface. There are varying layers of clay and sand fill with some topsoil on the surface. All of these layers seem to have large stones within them.

Each layer in each borehole was sampled and no CCME metals criteria were exceeded. Even though the groundwater samples from the site indicated heavy metal contamination, no significant levels of these metals were found on the federal property. It is likely that other areas of the fill on the surrounding lands are contributing to the elevated metals concentrations in the groundwater, however, the source for these contaminants was not determined to be on the Rear Range property.

As part of the 2001 Enhanced Phase 1 ESA, the CCME National Classification System (NCSCS) for Contaminated Sites scores were calculated for one issue of concern on-site. The score (metals contamination) was 52 ± 3.75 . This score for the area surrounding the navigational aid falls within the Class 2 designation (some action likely required).

Based on the new information obtained during the Phase 3 ESA and the follow-up investigations, an updated NCSCS score was calculated based on the presence of the contaminated groundwater. The score for metals contamination was 59 ± 6 . This score falls within the Class 2 designation of medium risk potential with some action likely required.

No remediation action plan or management plan is to be recommended at this time. Further investigation of the groundwater contamination on the subject property would have to be carried out on the surrounding private property to determine the source of the contamination. Therefore the Treasury Board liability estimate was set to \$0 as there is no liability associated with this site.

CONTENTS

| | |
|--|----|
| EXECUTIVE SUMMARY | i |
| CONTENTS | v |
| TABLES | vi |
| LIST OF APPENDICES | vi |
| | |
| 1.0 INTRODUCTION | 1 |
| 1.1 Scope and Assessment Objectives | 1 |
| 1.2 Assessment Limitations | 3 |
| 2.0 DESCRIPTION OF THE SITE | 4 |
| 2.1 Previous Environmental Reports | 4 |
| 2.2 Land Use Profile | 5 |
| 3.0 SELECTION OF APPLICABLE ENVIRONMENTAL QUALITY GUIDELINES OR STANDARDS | 6 |
| 4.0 SUBSURFACE INVESTIGATION | 7 |
| 4.1 Methodology | 7 |
| 4.1.1 <i>Site Reconnaissance</i> | 7 |
| 4.1.2 <i>Subsurface Investigations</i> | 7 |
| 4.1.3 <i>Health and Safety Plan</i> | 8 |
| 4.1.4 <i>QA/QC Analysis</i> | 8 |
| 4.2 Results | 9 |
| 4.2.1 <i>General Observations</i> | 9 |
| 4.2.2 <i>Analytical Results</i> | 10 |
| 4.2.3 <i>QA/QC Results</i> | 10 |
| 4.3 Interpretation of Results | 20 |
| 4.4 Discussion | 20 |
| 5.0 CONTAMINATED SITE SUMMARY | 21 |
| 5.1 Identification of Contaminated Sites | 21 |
| 5.2 NCS Classification Summary | 21 |
| 5.3 Real Property Information System for Contaminated Sites (RPISCS) Module ... | 21 |
| 6.0 REMEDIAL ACTION PLAN WITH LIABILITY COST ESTIMATE | 22 |
| 7.0 CONCLUSIONS AND RECOMMENDATIONS | 23 |
| 7.1 Summary | 23 |
| 7.2 Conclusions | 23 |
| 7.2.1 <i>CCME National Classification System for Contaminated Sites (NCSCS)</i> | 24 |
| 7.2.2 <i>Treasury Board Liability Estimates</i> | 24 |
| 7.3 RECOMMENDATIONS | 25 |
| 8.0 REFERENCES | 26 |

CONTENTS (CONT'D)

TABLES

| | | |
|---------|---|----|
| TABLE 1 | Summary of Analytical Results for Selected Metals in Soil..... | 11 |
| TABLE 2 | Summary of Analytical Results for Selected Metals in Groundwater | 17 |
| TABLE 3 | Summary of Analytical Results for Selected Metals in Soil from the Enhanced Phase 1 ESA | 18 |
| TABLE 4 | Summary of Analytical Results for Lead in Soil from the Enhanced Phase 1 ESA | 19 |

LIST OF APPENDICES

| | |
|---|---|
| A | Figure 1 (Site Plan) |
| B | Borehole Logs |
| C | Laboratory Certificates of Analysis including QA/QC Results |
| D | Current CCME National Classification System for Contaminated Sites (NCSCS) Forms |
| E | Real Property Information System for Contaminated Sites (RPISCS) Module Information |
| F | Soil Sample Log Information |

1.0 INTRODUCTION

XCG Consultants Ltd. (XCG) was retained by Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans Canada (DFO), Central and Arctic Region, to carry out a Phase 3 Environmental Site Assessment (ESA) of the Brighton Rear Range Navigation Aid in Brighton, Ontario.

1.1 Scope and Assessment Objectives

In general, ESAs are completed in phases. A Phase 1 ESA consists of a historical review to identify all areas of potential environmental concern and corresponding contaminants of potential concern associated with the previous use of the property. A Phase 1 report will indicate whether any remedial work is required, or if further (Phase 2) work is needed to achieve an adequate assessment of the property. A Phase 2 ESA generally includes a more detailed field investigation (subsurface sampling, further analytical testing, etc.) in order to gain a better understanding of the environmental condition of the subject property. Considering the DFO specific context where the majority of the sites are remote, an "Enhanced Phase 1" (otherwise called a Phase 1/Phase 2 ESA) can be completed to ensure cost efficiency. This "Enhanced Phase 1" or "Phase 1/Phase 2 ESA", typically involves research, consultation, visual reconnaissance, limited sampling, and confirmatory testing.

A Phase 3 ESA consists of a sampling program conducted after contamination has been confirmed at a site, to delineate the extent of the contamination and to prepare a remedial action plan or risk management plan. A liability cost estimate for implementation is also included with a Phase 3 report.

The current assessment of the Brighton Rear Range light station follows the procedures of a Phase 3 ESA, including subsurface sampling and further analytical testing. The overall objective of the Phase 3 ESA was to delineate the areas of potential environmental concern identified during the Enhanced Phase 1 ESA. The field work was conducted in general accordance with XCG's letter proposal entitled "*Revised Proposal for Phase III Environmental Site Assessments at Six Department of Fisheries and Oceans Properties, Ontario,*" dated September 21, 2001. PWGSC provided authorization to proceed with this Phase 3 investigation. Minor modifications were made in the field based on site observations. The planned scope of work for the Phase 3 ESA, as outlined in the proposal, included the following:

- Drilling one borehole to a depth of 1.5 metres below the groundwater table, near the navigational aid structure;
- Installing monitoring well in borehole;
- After allowing at least one day for groundwater to enter the monitoring well, developing the well and collecting one groundwater sample;
- Submitting one groundwater sample for laboratory analysis of Table A Metals;
- Collecting twenty (20) shallow soil samples using hand-sampling equipment, extending out from the structure to a maximum distance of about 30 metres away. About 75% of these samples were to be collected within 15 metres of the structure and 25% of the samples were to be taken at discrete depths up to 2 metres below the ground surface;
- Submitting twenty-five (25) soil samples (including two or three QA/QC blind duplicates) for laboratory analyses of selected parameters: Table A metals;

- Reviewing and interpreting analytical results to identify exceedances of Federal and Provincial criteria;
- Delineating the impacted areas on the site plan and estimating the minimum and maximum volumes of impacted soil on-site;
- Completing an updated National Classification System Site Summary;
- Preparing a Remedial Action Plan or Risk Management Plan;
- Preparing an indicative estimate of liability;
- Completing the RPISCS information module; and
- Preparing a report documenting the findings of the above tasks.

The conclusions drawn from the Enhanced Phase 1 and the preliminary Phase 3 investigations revealed that there were indications that a subsurface soil horizon could possibly be affecting the surficial groundwater on the property. Surficial soil samples of fill material and deeper soil samples within the native soil did not exhibit concentrations of metals exceeding applicable criteria. Elevated concentrations of metals in the groundwater samples indicated that there was likely a source for these metals in the soil, probably in a depth range between 0.15 metres and 1.2 metres.

A Follow-Up Phase III ESA intrusive investigation task was conducted in accordance with the proposal titled "Proposal for Follow-Up Phase III Environmental Site Assessment Investigations at Department of Fisheries and Oceans Property, Brighton Rear Range Brighton, Ontario" and the requirements outlined in Section 2.1 of the ToR. The planned scope of work for the follow-up Phase III ESA, as outlined in the proposal, included the following:

- Advancing six boreholes using a jackhammer with a split spoon attachment within the fenced area of the subject property. The boreholes will be drilled through the fill layer into the native soil of the site and split spoon samples of the soils encountered in these boreholes will be collected. The samples collected will be placed in suitable sample containers appropriate for the types of analyses to be performed. Based on any evidence of staining and visual appearance, three soil samples from each borehole will be selected for analysis. In every case, these soil samples will be collected from a depth of between 0.15 to 1.2 metres below grade. One sample from each borehole will consist of native material from immediately below the base of the fill layer (i.e. presumably the former ground surface, prior to the placement of the fill). Any samples that are not submitted for analyses will be archived so they can be analyzed later if needed.
- Worst-case or representative samples will be analyzed at a laboratory for the parameters outlined in Table 1. Eighteen soil samples will be analyzed at a laboratory for Table A metals. The samples will be submitted to Environmental Technology Research Laboratory (ETRL) in Kingston, which has accreditation from the Canadian Association of Environmental Analytical Laboratories (CAEAL). On the chain of custody form submitted to the laboratory with the samples, XCG will indicate the criteria to be used as a standard of comparison (as shown in Section 2.1 of the TOR and in the follow-up email of September 5, 2001) and will specify that the detection limits used must be appropriate for interpretation of the results based on these criteria.
- For the purpose of quality assurance and quality control (QA/QC), two blind duplicate soil samples will be collected and submitted to the laboratory for analysis of Table A metals.
- The analytical results will be reviewed and interpreted (using, as a standard of comparison, the criteria listed in the TOR and in the follow-up email of September 5) in order to estimate

the volume of contaminated soil (if any) at the site. Maximum and minimum volume estimates will be prepared, and the impacted area (if any) will be delineated on a site plan.

The information collected with this Follow-Up investigation will be incorporated into the report for the subject site, a draft of which was submitted to PWGSC on December 6, 2001, and the following tasks from the original proposal for the Phase III ESA at this site will be reviewed and updated according to the new information.

1.2 Assessment Limitations

All information regarding the property description is based on the site visit observations and existing 2001 Enhanced Phase 1 ESA information.

The intent of this report is to provide coverage of the entire area of the DFO property at Brighton Rear Range Navigational Aid. The on-site subsurface investigation work, however, was limited to the core areas of the site (i.e. in the vicinity of previously identified areas of concern), since these are the areas where contamination, if present, would be expected.

This Phase 3 Subsurface Investigation focused on identifying any environmental damages as they relate to existing or potential future environmental liabilities relating specifically to the investigated areas of the Canadian Coast Guard property located at Brighton Rear Range, Brighton, Ontario. The conclusions drawn from the Phase 3 Subsurface Investigation work were based on information obtained at selected observation and sampling locations on October 31, 2001 and January 15, 2002. In addition, the conclusions were based on the parameters that were chemically analyzed. Conditions between and beyond these locations may become apparent, during future investigations or on-site work, which could not be detected or anticipated at the time of this study. The sample locations were chosen based upon visual observations on-site and information provided in the 2001 XCG Enhanced Phase 1 ESA.

The scope of this report is limited to the matters expressly covered. This report is prepared for the sole benefit of the Department of Fisheries and Oceans and Public Works and Government Services Canada, and may not be relied upon by any other person or entity without written authorization of XCG Consultants Ltd. As such, the scope of services performed in the execution of this investigation may not be appropriate to satisfy needs of other users, and any use or reuse of this document or the findings, conclusions, or recommendations represented herein is at the sole risk of said users.

2.0 DESCRIPTION OF THE SITE

The Brighton Rear Range Navigation Aid is located in the Town of Brighton, Northumberland County, Ontario. The navigation aid is on the north side of Harbour Street, between Walas and Marine Streets. The property consists of a 15.24 metre by 15.24 metre square portion (Part 1) with a 2.44 metre by 38.1 metre access way (Part 2) from Harbour Street. A chain link fence with a locked gate encompasses the structure. The 18.0 metre beacon is centred in the square portion of the property. The station consists of a white skeleton tower with a fluorescent orange triangular daymark with a black vertical stripe and a navigational light. The tower is mounted on four concrete blocks that form a 3.15 metre square.

The Federal Crown expropriated the property on which this skeleton tower is located in 1934. According to Mr. Ted Nickel of CCG, the present structure has been on this site since 1952. The back light of the original Brighton Range Lights, which were constructed in 1891, was actually located on a wooden crib in the waters of Presqu'île Bay. The range lights were relocated during the 1950's and the present structure was constructed. The site has been serviced with hydroelectric power since the navigation light was built, according to Mr. Nickel. With the recent development of the residential homes in the vicinity of the navigation aid, a chain link fence was erected around the structure for safety. A 100-Watt incandescent bulb, located in the DLD 300-mm lantern, provides the navigational light.

Currently, the light station is unattended and consists of the fenced navigational aid. A site plan (Figure 1) is included in Appendix A.

During the Phase III Follow-Up Investigations on the property, Mr. Mark Walas, owner of the surrounding vacant land, visited the job site. He recalled that this area, including the CCG property, was at one time very swampy with small scrub cedar bushes growing on it. Approximately twenty-five years ago, during the mid 1970's the swampy land was filled to elevate the land and reduce the wetland area. He was unable to determine where the fill had originated, but speculated that some fill may have come from Harbour Street upgrades when the sewer and water lines were installed.

2.1 Previous Environmental Reports

The following Enhanced Phase 1 ESA was reviewed:

- *XCG Consultants Ltd.* "Enhanced Phase 1 Environmental Site Assessment, LL 488.0 Brighton Rear Range, Brighton, Ontario." *March 2001.*

The conclusions of the 2001 Enhanced Phase 1 ESA report are summarized below:

- The site has been impacted by historical use as an unattended navigational aid.
- Soil collected in the area surrounding the structure exceeded the CCME remediation guidelines for chromium VI and thallium and exceeded the MOE Table F remediation guidelines for chromium VI.
- Lead-based paints were identified on painted surfaces at the structure. A sample of the white paint used on the exterior of the navigational aid structure had a lead content of 22,800 parts per million (ppm).

The laboratory results from this investigation are included in Tables 3 and 4 of this report.

2.2 Land Use Profile

The following is a brief summary of the historic land use of Brighton Rear Range Navigation Aid, as described in the Enhanced Phase 1 ESA (XCG 2001). The current and future uses of the property are also stated.

| DATE | LAND USE/NOTABLE EVENT |
|------------|---|
| 1934 | Land expropriated by the federal crown. |
| 1952 | Lighted skeleton tower navigation aid constructed. |
| mid 1970's | Property and surrounding area filled with construction and excavation wastes from surrounding areas. |
| Present | <ul style="list-style-type: none">• station operates as unattended navigation light. |
| Future | <ul style="list-style-type: none">• station to continue as unattended navigation light. |

3.0 SELECTION OF APPLICABLE ENVIRONMENTAL QUALITY GUIDELINES OR STANDARDS

Soil sample analytical results were compared to the following criteria:

- Criteria for commercial land use in the Canadian Council of Ministers of the Environment (CCME) document entitled Canadian Environmental Quality Guidelines (1999);
- Criteria for commercial land use in the CCME document entitled Interim Canadian Environmental Quality Criteria for Contaminated Sites (September 1991);
- MOE Table B criteria for industrial/commercial land use published in the Ontario Ministry of the Environment (MOE) Guideline for Use at Contaminated Sites in Ontario (February 1997);

Groundwater analytical results were compared to the following criteria and objectives:

- Criteria for Water – Community Supply in the Canadian Council of Ministers of the Environment (CCME) document entitled Canadian Environmental Quality Guidelines (1999); and
- MOE Table B non-potable groundwater criteria published in the Ontario Ministry of the Environment (MOE) Guideline for Use at Contaminated Sites in Ontario (February 1997).

With respect to soil, the CCME 1991 criteria were only considered in cases of parameters that did not have more recent CCME criteria. Contaminated sites were identified based on exceedances of CCME (commercial/industrial) criteria, and exceedances of MOE Table B where no CCME guidelines exist.

Criteria for commercial land use were considered appropriate for the subject property because of its use for the purpose of operating a navigational aid. The non-potable MOE Table B criteria are considered to be appropriate because the surrounding area obtains its water supply from a municipal water distribution system, which obtains its water from two wells approximately 3 kilometres north of the Town of Brighton, far upgradient of the subject site.

It is noted that the CCME Community Supply criteria for water are not necessarily appropriate for application at the subject site, because the groundwater in the area is not used as a drinking water supply. However, no other more applicable water criteria are available from the CCME, therefore the Community Supply criteria were used for comparison purposes.

4.0 SUBSURFACE INVESTIGATION

The on-site field investigations were conducted on October 31, 2001 and January 15, 2002. Sampling activities were conducted by Mr. Dale White and Ms. Janet Noyes of XCG in November and Ms. Noyes in January. Ms. Suzanne L'Heureux, of PWGSC, observed the subsurface investigations in January 2002. A description of the field investigation methodology used is provided below.

4.1 Methodology

4.1.1 Site Reconnaissance

The site was visited by XCG field personnel on October 31, 2001 and January 15 2002. The site was accessible directly by vehicle from Harbour Street in Brighton. Climatic conditions were cool and overcast with light rain in the afternoon in November and cold and raining in January. General site characteristics were observed and documented, and sampling programs were conducted, as discussed in Section 1.1. Site plan and site location maps are provided in Appendix A. The site is located approximately 100 metres north of the Lake Ontario shoreline on Presqu'île Bay in Brighton, Ontario.

4.1.2 Subsurface Investigations

The first borehole advancement program was conducted on October 31, 2001. GET Drilling was contracted to advance three boreholes using a hand held jackhammer with split spoon samplers and one borehole was drilled with a portable pneumatic auger drill. The selection of this drilling equipment was based on the inaccessibility of the site for a CME 55 truck-mounted drilling rig. Also, using this equipment did not introduce additional water into the boreholes (which would be the case using typical rock coring methods). This reduced the volume of water to be purged out of the well and reduced the amount of time necessary to obtain a sample given the slow recovery of the soils in the surrounding area.

The follow-up borehole advancement program was conducted on January 15, 2002. GET Drilling was also contracted for this drilling program and the six boreholes were advanced using a portable jackhammer with a split spoon attachment.

Each borehole was logged for stratigraphy, soil structure and visual and olfactory evidence of contamination. XCG's borehole excavation observations and soil classifications are provided on the borehole logs contained in Appendix D. The locations of the boreholes are illustrated on Figure 1.

The depth of the boreholes varied from 0.83 metres (488-BH3) to 2.3 metres (488-BH1) below the ground surface. During the first sampling program, the first borehole (488-DH1) was drilled to a depth of 2.0 metres with the pneumatic auger drill. A jackhammer mounted on a split spoon sampling tool was able to achieve approximately the same depth (1.7 metres in 488-DH2 and 488-DH3) in less time than the pneumatic auger drill, so the jackhammer was used for the subsequent boreholes. Refusal to advance beyond 1.2 metres was encountered in the fourth borehole location (488-DH4). Observation of the split spoon sample at this location determined that a large piece of aggregate rock had been encountered and the location of the borehole was moved. Again, refusal was encountered, this time at a depth of 0.5 metres. Water was present in the boreholes at approximately 0.5 metres below ground surface and, after half an hour, the groundwater level reached almost to the ground surface. A well (MW1) was installed in 488-DH3.

MW1 was given half an hour to recover and then groundwater sampling was completed. A duplicate groundwater sample was also collected.

A hand auger was used to collect surficial soil samples in this investigation, and was cleaned between sampling locations to prevent cross-contamination. Soil samples were visually classified and logged for soil structure, and visual evidence of contamination.

During the first round of the Phase 3 investigations, twenty soil samples (including two duplicates) were collected from the upper 0.15 m layer of soil and all of them were submitted for laboratory analyses. The sampling locations, test soil parameters, and analytical program are summarized in Appendix F. The soil samples were stored in plastic bottles, placed in coolers (containing ice/cooler packs), and delivered to Environmental Technology Research Laboratories (ETRL) Laboratories in Kingston, Ontario, for analytical testing.

Two groundwater samples (including one duplicate) were also collected during the first round of the Phase 3 investigation and were submitted for laboratory analysis. The groundwater samples were stored in plastic bottles, placed in coolers (containing ice/cooler packs), and delivered to ETRL Laboratories in Kingston, Ontario for analytical testing.

During the second round of borehole advancement at the subject site, large stones were encountered in boreholes 2, 3, 4 and 5, which resulted in refusal of the equipment to continue further in the borehole. With the exception of borehole 3, all holes extended to a depth of at least 1.2 metres. A total of thirty soil samples were taken at various depths amongst the six boreholes. Of these, twenty were selected to be submitted for laboratory analysis of Table A metals. These samples included two blind duplicates for QA/QC analysis. The samples were submitted to ETRL in Kingston for laboratory analysis.

Figure 1 (Appendix A) contains a site plan that shows the Phase 3 ESA sampling locations.

4.1.3 Health and Safety Plan

A health and safety plan was maintained throughout the field program. All field workers were instructed on the protocols of the plan and the proper use of personal protective equipment. Worker health and safety standards were assured by following stringent safety precautions in accordance with the applicable sections specified under the Canada Labour Code and the Canada Health and Safety Act.

Potential hazards for this project included exposure to contaminated soil and building materials containing designated substances during the site inspection and sampling program. Throughout the duration of the field activities, the following sections of the General Health and Safety Policy were adopted, as a minimum: site safety; Ontario Occupational Health and Safety Act (OHSA); first aid; Workplace Hazardous Materials Information System (WHMIS); and work over/around water.

4.1.4 QA/QC Analysis

A quality assurance and quality control (QA/QC) program was implemented to address the office and field programs. During the initial program, two blind field duplicates of soil samples and one blind duplicate of a groundwater sample were analyzed for QA/QC purposes. The blind duplicate samples were identified as 488-10, 488-17, and 488-22; they were duplicates of the following respective samples: 488-9, 488-16 and 488-21. As part of these procedures, a lab blank and QC standards were analyzed during the testing of the samples. A minimum of 10% of the samples

were to be submitted for QA/QC purposes. From the first round of sampling, a total of twenty-two samples were submitted from Brighton Rear Range and of these three were duplicates.

During the follow-up investigations, a minimum of 10% of the submitted samples were blind duplicates for QA/QC purposes. The blind duplicate samples were identified as 488-BH1-4 and 488-BH3-#13, they were the duplicates of the following respective samples: 488-BH1-3 and 488-BH3-12.

As a minimum, samplers were thoroughly cleaned before collecting subsequent samples to reduce the risk of cross-contamination between sampling. For all sampling locations, logs containing all pertinent information were prepared (see Appendix F) and collected samples were placed in appropriate containers immediately upon retrieval. Soil classification was completed in accordance with applicable sections of the Canadian Foundation Engineering Manual (CFEM). Field sampling and equipment decontamination was completed in accordance with applicable Environment Canada protocols and applicable industry practices. All laboratory chemical analyses were performed by an analytical laboratory that is accredited by the Canadian Association for Environmental Analytical Laboratories (CAEAL).

Surficial soil samples were collected using a stainless steel hand auger, placed in sterilized plastic bottles, identified, and logged for physical properties. Duplicate soil samples utilized for screening purposes were collected and placed in containers in the same manner. Soil samples were selected for laboratory analysis based on visual observations combined with screening results.

A chain of custody form accompanied the samples at all points of handling. Samples were preserved by storing in a cooler until delivered to ETRL Laboratory in Kingston, Ontario, for analytical testing.

4.2 Results

4.2.1 General Observations

During the site inspection, it was noted that most of the ground surface on the subject property was covered with a mixed, stony material, indicating that fill had been deposited in the entire area of the undeveloped parcel of land that the navigation aid is situated on. During the drilling of the boreholes within the site boundaries, the fill was evident in the borehole observations. Approximately 0.1 to 0.4 metres of fill overlies the entire site, with a deeper fill layer found in the southeastern corner of the subject property. This observation was substantiated during the drilling of 488-DH4 in the southeast corner of the property. Two separate holes were attempted (488-DH4 #1 and 488-DH4-#2) but refusal was encountered at 1.2 metres where aggregate rock was found (488-DH4-#1) and refusal was encountered at 0.5 metres on the second trial (488-DH4-#2). Both boreholes exhibited fill characteristics over their full depths on examination of the split spoon samples. These were the only significant differences on the site noted since the 2001 Enhanced Phase 1 ESA, during which the ground surface was snow covered.

Although the subject property is very close to Presqu'île Bay, the ground surface on the site actually slopes gradually to the north, away from the larger body of water. This land grading is due to the deposition of the fill in the vacant properties surrounding the subject site and the site itself. A poorly defined swale runs along the northern fence line of the subject property, which appears to convey surficial drainage from the vacant property to a roadside drainage ditch along Marine Drive. This drainage ditch, in turn drains towards the larger water body of Presqu'île Bay. MW1 was installed very close to this swale in the northeast corner of the subject property. In all of the boreholes that were drilled on the subject site, the groundwater was encountered at elevations just below the ground surface. Given the proximity of the surficial groundwater to the ground

surface, it is possible that the surface drainage from the surrounding filled area contributes to the quality of the groundwater.

The native material beneath the fill layer appears to be a dark brown sandy silt overlying a grey sandy clay with stones. These layers were evident in all of the boreholes. The brown sandy silt would be consistent with what was at one time a swampy area underlain by a sandy clay retaining layer.

4.2.2 Analytical Results

A total of twenty soil samples including two duplicates (for QA/QC purposes) were submitted to ETRL for analyses during the first round of subsurface sampling. All twenty soil samples were analyzed for Table A metals. Two groundwater samples were also analyzed for metals. Of the thirty samples retrieved from the follow-up investigations, twenty soil samples were submitted for analysis of Table A metals. Summaries of the analytical results for metals in soils are presented in Table 1, and metals in groundwater in Table 2. Laboratory certificates of analyses are provided in Appendix C. A summary of the exceedances of applicable criteria found in each soil sample is provided in Appendix F.

The analytical results from the Enhanced Phase 1 ESA report are also listed in this report in Tables 3 and 4.

4.2.3 QA/QC Results

The variance in concentrations for the individual parameters analyzed in the duplicate soil samples generally ranged from about 0 to 56%, which is considered representative. Six individual parameters ranged in duplicate differences of 62% to 97%. Although these differences are high, the trend of the individual parameters is consistent and most of these parameters are slightly above detection limits. The heterogeneity of the soil is attributed to these differences. The analytical results of the laboratory duplicate samples did not significantly deviate from the original samples. Further, the results of ETRL's internal QA/QC program (i.e. blanks and recoveries of QC standards) were considered representative and reproducible.

Table 1
Summary of Analytical Results for Selected Metals in Soil
Brighton Rear Range Light, L.L. 488.0, Brighton, Ontario

| PARAMETER (µg/g) | MDL | 488-1 | 488-2 | 488-3 | 488-4 | 488-5 | 488-6 | 488-7 | CCME COMMERCIAL | MOE TABLE B COM/IND |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------|------------------------|
| Antimony | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.4 | 0.2 | 0.5 | 40* | 40 |
| Arsenic | 1 | 2 | 1 | <1 | <1 | 3 | 2 | 2 | 12 | 40 |
| Barium | 1 | 160 | 69 | 774 | 50 | 78 | 91 | 49 | 2000* | 1500 |
| Beryllium | 0.2 | 0.8 | 0.4 | 0.2 | 0.2 | 0.4 | 0.5 | 0.3 | 8* | 1.2 |
| Boron (HWE) | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | NV | 2.0 |
| Cadmium | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 22 | 12 |
| Chromium | 1 | 26 | 12 | 7 | 12 | 14 | 16 | 8 | 87 | 750 |
| Cobalt | 1 | 12 | 5 | 5 | 5 | 6 | 7 | 5 | 300* | 80 |
| Copper | 1 | 17 | 7 | 4 | 6 | 11 | 12 | 11 | 91 | 225 |
| Lead | 1 | 32 | 19 | 12 | 14 | 75 | 45 | 31 | 260 | 1000 |
| Mercury | 0.005 | 0.038 | 0.027 | 0.026 | 0.093 | 0.090 | 0.071 | 0.050 | 24 | 10 |
| Molybdenum | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 40* | 40 |
| Nickel | 1 | 16 | 4 | 1 | 5 | 9 | 10 | 4 | 50 | 150 |
| Selenium | 0.1 | <0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.5 | 0.2 | 10* | 10 |
| Silver | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 40* | 40 |
| Thallium | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 1 | 32 |
| Vanadium | 1 | 37 | 20 | 13 | 14 | 19 | 25 | 15 | 130 | 200 |
| Zinc | 1 | 102 | 45 | 31 | 43 | 77 | 77 | 87 | 360 | 600 |

NOTES:

MDL Laboratory Method Detection Limit

NV No Guideline concentration for this parameter

Table B MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Shipley

Bold Value exceeds one guideline

Bold Value exceeds two guidelines

MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Shipley

Table 1 (Cont'd)
Summary of Analytical Results for Selected Metals in Soil
Brighton Rear Range Light, L.L. 488.0, Brighton, Ontario

| PARAMETER (µg/g) | MDL | 488-8 (DH 1 6') | 488-9 | 488-10 Dup 488-9 | 488-11 | 488-12 | 488-13 | 488-14 (DH 2 5'6") | CCME COMMERCIAL | MOE TABLE B COM/IND |
|---------------------|-------|--------------------|-------|---------------------|--------|--------|--------|-----------------------|--------------------|------------------------|
| Antimony | 0.2 | 0.3 | 0.2 | 0.4 | 0.4 | 0.4 | 0.2 | 0.4 | 40* | 40 |
| Arsenic | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 12 | 40 |
| Barium | 1 | 34 | 53 | 32 | 49 | 91 | 82 | 22 | 2000* | 1500 |
| Beryllium | 0.2 | 0.2 | <0.2 | 0.2 | 0.3 | 0.6 | 0.5 | 0.2 | 8* | 1.2 |
| Boron (HWE) | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | NV | 2.0 |
| Cadmium | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 22 | 12 |
| Chromium | 1 | 4 | 2 | 6 | 10 | 19 | 15 | 6 | 87 | 750 |
| Cobalt | 1 | 7 | 1 | 4 | 5 | 16 | 12 | 2 | 300* | 80 |
| Copper | 1 | 1 | 4 | 5 | 4 | 29 | 26 | 2 | 91 | 225 |
| Lead | 1 | 19 | 7 | 6 | 26 | 27 | 17 | 27 | 260 | 1000 |
| Mercury | 0.005 | 0.005 | 0.024 | 0.026 | 0.038 | 0.054 | 0.048 | 0.008 | 24 | 10 |
| Molybdenum | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 40* | 40 |
| Nickel | 1 | <1 | 2 | 2 | 6 | 12 | 9 | 8 | 50 | 150 |
| Selenium | 0.1 | <0.1 | 0.2 | 0.3 | 0.2 | 0.3 | 0.4 | <0.1 | 10* | 10 |
| Silver | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 40* | 40 |
| Thallium | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 1 | 32 |
| Vanadium | 1 | 7 | 11 | 14 | 16 | 31 | 23 | 8 | 130 | 200 |
| Zinc | 1 | 25 | 26 | 28 | 45 | 203 | 67 | 32 | 360 | 600 |

NOTES:

MDL Laboratory Method Detection Limit

NV No Guideline concentration for this parameter

Table B MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Shipley

Bold Value exceeds one guideline

Bold Value exceeds two guidelines

MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Shipley

Table 1 (Cont'd)
Summary of Analytical Results for Selected Metals in Soil
Brighton Rear Range Light, L.L. 488.0, Brighton, Ontario

| PARAMETER (µg/g) | MDL | 488-15 | 488-16 (DH 3 5'6") | 488-17 Dup 488-16 | 488-18 | 488-19 | 488-20 (DH 4 4') | CCME COMMERCIAL | MOE TABLE B COM/IND |
|---------------------|-------|--------|-----------------------|----------------------|--------|--------|---------------------|--------------------|------------------------|
| Antimony | 0.2 | 0.4 | 0.4 | 0.4 | 0.6 | 0.4 | 0.3 | 40* | 40 |
| Arsenic | 1 | 2 | 2 | 2 | 1 | <1 | 3 | 12 | 40 |
| Barium | 1 | 78 | 24 | 16 | 169 | 11 | 124 | 2000* | 1500 |
| Beryllium | 0.2 | 0.5 | 0.2 | <0.2 | 0.8 | <0.2 | 0.7 | 8* | 1.2 |
| Boron (HWE) | 1 | <1 | <1 | 1 | <1 | <1 | <1 | NV | 2.0 |
| Cadmium | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 22 | 12 |
| Chromium | 1 | 14 | 9 | 4 | 27 | 2 | 26 | 87 | 750 |
| Cobalt | 1 | 10 | 3 | <1 | 17 | 2 | 17 | 300* | 80 |
| Copper | 1 | 14 | 11 | 2 | 19 | 2 | 12 | 91 | 225 |
| Lead | 1 | 31 | 6 | 10 | 34 | 5 | 25 | 260 | 1000 |
| Mercury | 0.005 | 0.035 | 0.010 | 0.011 | 0.015 | 0.012 | 0.008 | 24 | 10 |
| Molybdenum | 1 | 1 | <1 | <1 | <1 | <1 | <1 | 40* | 40 |
| Nickel | 1 | 10 | 13 | 5 | 20 | 2 | 16 | 50 | 150 |
| Selenium | 0.1 | 0.3 | <0.1 | <0.1 | 0.1 | <0.1 | 0.1 | 10* | 10 |
| Silver | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 40* | 40 |
| Thallium | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 1 | 32 |
| Vanadium | 1 | 24 | 5 | 5 | 36 | 4 | 39 | 130 | 200 |
| Zinc | 1 | 144 | 36 | 1 | 28 | 14 | 63 | 360 | 600 |

NOTES:

MDL Laboratory Method Detection Limit

NV No Guideline concentration for this parameter

Table B MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Shipley

Bold Value exceeds one guideline

Bold Value exceeds two guidelines

MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Shipley

Table 1 (Cont'd)
Summary of Analytical Results for Selected Metals in Soil
Brighton Rear Range Light, L.L. 488.0, Brighton, Ontario

| PARAMETER (µg/g) | MDL | 488-BH1 #1 | 488-BH1 #2 | 488-BH1 #3 | 488-BH1 #4 Dup #3 | 488-BH2 #8 | 488-BH2 #9 | 488-BH3 #10 | CCME COMMERCIAL | MOE TABLE B COM/IND |
|---------------------|-------|------------|------------|------------|----------------------|------------|------------|-------------|--------------------|------------------------|
| Antimony | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 40* | 40 |
| Arsenic | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 12 | 40 |
| Barium | 1 | 31 | 73 | 152 | 164 | 83 | 71 | 27 | 2000* | 1500 |
| Beryllium | 0.2 | <0.2 | 0.3 | 0.8 | 0.8 | 0.4 | 0.4 | <0.2 | 8* | 1.2 |
| Boron (HWE) | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | NV | 2.0 |
| Cadmium | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 22 | 12 |
| Chromium | 1 | 5 | 14 | 28 | 30 | 14 | 14 | 5 | 87 | 750 |
| Cobalt | 1 | 6 | 6 | 16 | 16 | 11 | 10 | 18 | 300* | 80 |
| Copper | 1 | 8 | 13 | 23 | 19 | 15 | 11 | 23 | 91 | 225 |
| Lead | 1 | 9 | 18 | 6 | 7 | 33 | 11 | 18 | 260 | 1000 |
| Mercury | 0.005 | 0.024 | 0.035 | 0.014 | 0.025 | 0.034 | 0.016 | <0.005 | 24 | 10 |
| Molybdenum | 1 | 1 | 2 | <1 | <1 | 2 | <1 | 3 | 40* | 40 |
| Nickel | 1 | <1 | 8 | 20 | 20 | 7 | 11 | <1 | 50 | 150 |
| Selenium | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.3 | 0.3 | <0.1 | 10* | 10 |
| Silver | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 40* | 40 |
| Thallium | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 1 | 32 |
| Vanadium | 1 | 12 | 20 | 48 | 47 | 24 | 25 | 9 | 130 | 200 |
| Zinc | 1 | 12 | 56 | 49 | 50 | 88 | 45 | 10 | 360 | 600 |

NOTES:

MDL Laboratory Method Detection Limit

NV No Guideline concentration for this parameter

Table B MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Robertson

Bold Value exceeds one guideline

Bold Value exceeds two guidelines

Table 1 (Cont'd)
Summary of Analytical Results for Selected Metals in Soil
Brighton Rear Range Light, L.L. 488.0, Brighton, Ontario

| PARAMETER (µg/g) | MDL | 488-BH3 #12 | 488-BH3 #13 Dup #12 | 488-BH3 #14 | 488-BH3 #15 | 488-BH4 #16 | 488-BH4 #17 | 488-BH4 #18 | CCME COMMERCIAL | MOE TABLE B COM/IND |
|---------------------|-------|-------------|------------------------|-------------|-------------|-------------|-------------|-------------|--------------------|------------------------|
| Antimony | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 40* | 40 |
| Arsenic | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 12 | 40 |
| Barium | 1 | 199 | 148 | 144 | 57 | 72 | 233 | 255 | 2000* | 1500 |
| Beryllium | 0.2 | 0.8 | 0.7 | 0.6 | 0.3 | 0.4 | 1.1 | 0.9 | 8* | 1.2 |
| Boron (HWE) | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | NV | 2.0 |
| Cadmium | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 22 | 12 |
| Chromium | 1 | 30 | 24 | 22 | 13 | 17 | 39 | 36 | 87 | 750 |
| Cobalt | 1 | 18 | 15 | 14 | 13 | 11 | 22 | 22 | 300* | 80 |
| Copper | 1 | 21 | 14 | 18 | 8 | 11 | 22 | 29 | 91 | 225 |
| Lead | 1 | 27 | 15 | 62 | 11 | 16 | 18 | 14 | 260 | 1000 |
| Mercury | 0.005 | 0.022 | 0.022 | 0.006 | 0.005 | 0.026 | 0.032 | 0.008 | 24 | 10 |
| Molybdenum | 1 | 2 | 1 | <1 | 2 | 1 | <1 | 2 | 40* | 40 |
| Nickel | 1 | 20 | 18 | 15 | 1 | 11 | 29 | 29 | 50 | 150 |
| Selenium | 0.1 | 0.3 | 0.3 | 0.3 | 0.1 | 0.3 | 0.4 | 0.3 | 10* | 10 |
| Silver | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 40* | 40 |
| Thallium | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 1 | 32 |
| Vanadium | 1 | 41 | 37 | 33 | 14 | 29 | 55 | 47 | 130 | 200 |
| Zinc | 1 | 130 | 66 | 139 | 16 | 58 | 82 | 66 | 360 | 600 |

NOTES:

MDL Laboratory Method Detection Limit

NV No Guideline concentration for this parameter

Table B MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Robertson

Bold Value exceeds one guideline

Bold Value exceeds two guidelines

MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Robertson

Table 1 (Cont'd)
Summary of Analytical Results for Selected Metals in Soil
Brighton Rear Range Light, L.L. 488.0, Brighton, Ontario

| PARAMETER (µg/g) | MDL | 488-BH5 #21 | 488-BH5 #22 | 488-BH5 #23 | 488-BH6 #25 | 488-BH6 #26 | 488-BH6 #28 | CCME COMMERCIAL | MOE TABLE B COM/IND |
|---------------------|-------|-------------|-------------|-------------|-------------|-------------|-------------|--------------------|------------------------|
| Antimony | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 0.2 | <0.2 | 40* | 40 |
| Arsenic | 1 | 1 | 3 | 2 | <1 | 2 | 4 | 12 | 40 |
| Barium | 1 | 105 | 346 | 131 | 11 | 79 | 372 | 2000* | 1500 |
| Beryllium | 0.2 | 0.5 | 1.4 | 0.5 | <0.2 | 0.4 | 1.4 | 8* | 1.2 |
| Boron (HWE) | 1 | <1 | <1 | <1 | <1 | <1 | <1 | NV | 2.0 |
| Cadmium | 1 | <1 | 1 | <1 | <1 | <1 | <1 | 22 | 12 |
| Chromium | 1 | 20 | 54 | 21 | 4 | 17 | 56 | 87 | 750 |
| Cobalt | 1 | 13 | 37 | 12 | 3 | 13 | 32 | 300* | 80 |
| Copper | 1 | 10 | 38 | 17 | 3 | 16 | 33 | 91 | 225 |
| Lead | 1 | 13 | 21 | 9 | <1 | 1 | 20 | 260 | 1000 |
| Mercury | 0.005 | 0.013 | 0.021 | 0.001 | 0.005 | 0.044 | 0.021 | 24 | 10 |
| Molybdenum | 1 | 1 | 1 | 2 | <1 | 1 | 2 | 40* | 40 |
| Nickel | 1 | 15 | 43 | 11 | 1 | 1 | 44 | 50 | 150 |
| Selenium | 0.1 | 0.1 | 0.1 | 0.1 | <0.1 | 0.3 | 0.3 | 10* | 10 |
| Silver | 0.5 | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 40* | 40 |
| Thallium | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 1 | 32 |
| Vanadium | 1 | 35 | 74 | 31 | 8 | 28 | 74 | 130 | 200 |
| Zinc | 1 | 40 | 99 | 33 | 11 | 49 | 95 | 360 | 600 |

NOTES:

MDL Laboratory Method Detection Limit

NV No Guideline concentration for this parameter

Table B MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.

*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.

**Dup Indicates duplicate analysis on sample.

Chemical Data reviewed by Kevin Robertson

Bold Value exceeds one guideline

Bold Value exceeds two guidelines

Bold Table B surface soil criteria (coarse-grained) for industrial/commercial land use in a non-potable groundwater situation

Table 2
Summary of Analytical Results for Selected Metals in Groundwater
Brighton Rear Range Light, L.L. 488.0, Brighton, Ontario

| PARAMETER (µg/l) | MDL | 488-21 | 488-22 Dup 488-21 | MOE TABLE B | CCME COMMUNITY WATER SUPPLY |
|---------------------|-----|-------------|----------------------|----------------|--------------------------------|
| Antimony | 1 | 1 | 1 | 16000 | 6 |
| Arsenic | 1 | 21 | 17 | 480 | 25* |
| Barium | 5 | 6470 | 397 | 23000 | 1000 |
| Beryllium | 5 | 30 | 15 | 53 | NV |
| Boron (HWE) | 10 | 480 | 360 | 50000 | 5000* |
| Cadmium | 10 | <10 | <10 | 11 | 5 |
| Chromium | 10 | 1090 | 580 | 2000 | 50 |
| Cobalt | 10 | <10 | <10 | 100 | NV |
| Copper | 10 | 390 | 140 | 23 | <1000 (AO) |
| Lead | 100 | 1500 | 1000 | 32 | 10 |
| Mercury | 0.1 | <0.1 | <0.1 | 0.12 | 1 |
| Molybdenum | 20 | <20 | 70 | 7300 | NV |
| Nickel | 20 | 610 | 460 | 1600 | NV |
| Selenium | 1 | 4 | 3 | 50 | 10 |
| Silver | 10 | <10 | <10 | 1.2 | NV |
| Thallium | 10 | <10 | <10 | 400 | NV |
| Vanadium | 5 | 775 | 445 | 200 | NV |
| Zinc | 10 | 6270 | 3430 | 1100 | <5000 (AO) |

NOTES:

- MDL Laboratory Method Detection Limit
 - NV No Guideline concentration for this parameter
 - Table B MOE, "Guideline for Use at Contaminated Sites in Ontario," Table B groundwater criteria for non-potable groundwater situation
 - CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.
 - *CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991.
 - **Dup Indicates duplicate analysis on sample.
 - AO Aesthetic Objective
- Chemical Data reviewed by Kevin Shipley

Table 3
Summary of Analytical Results in Soil Samples for Metals from Enhanced Phase 1 ESA
LL 488.0 Brighton Rear Range, Brighton, Ontario
(all values in ppm unless noted)

| PARAMETER | MDL | CCG 488.0 | | | | CCG 488.0 SW2 | MOE | | MOE TABLE F | CCME GUIDELINES |
|----------------|------|-------------|-------------|------|----------------|---------------|------------|---------------|-------------|-----------------|
| | | N | S | SW1 | Resid/Parkland | | Background | Resid./Parkid | | |
| Antimony | 0.6 | <0.6 | <0.6 | <1 | <1 | <1 | 13 | 1 | 20* | |
| Arsenic | 0.5 | 3.2 | 2.6 | 0.8 | 0.7 | 0.7 | 20 | 17 | 12 | |
| Barium | 1 | 156 | 97 | 42 | 51 | 51 | 750 | 210 | 500* | |
| Beryllium | 1 | <1 | <1 | <1 | <1 | <1 | 1.2 | 1.2 | 4* | |
| Boron | 0.2 | 0.3 | 0.3 | <0.2 | <0.2 | <0.2 | 1.5 | NV | NV | |
| Cadmium | 2 | <2 | <2 | <2 | <2 | <2 | 12 | 1.0 | 10 | |
| Chromium total | 1 | 28 | 19 | 8 | 10 | 10 | 750 | 71 | 64 | |
| Chromium (VI) | 1 | 3.0 | 4.0 | NA | NA | NA | 8 | 2.5 | 0.4 | |
| Cobalt | 2 | 8 | 4 | 2 | 3 | 3 | 40 | 21 | 50* | |
| Copper | 1 | 10 | 7 | <1 | 6 | 6 | 225 | 85 | 63 | |
| Lead | 10 | 42 | 17 | <10 | 39 | 39 | 200 | 120 | 140 | |
| Mercury | 0.05 | 0.08 | 0.07 | 0.08 | 0.10 | 0.10 | 10 | 0.23 | 6.6 | |
| Molybdenum | 4 | <4 | <4 | <4 | <4 | <4 | 40 | 2.5 | 10* | |
| Nickel | 2 | 7 | 11 | 6 | 6 | 6 | 150 | 43 | 50 | |
| Selenium | 0.1 | 0.5 | 0.3 | 0.7 | 0.8 | 0.8 | 10 | 1.9 | 3* | |
| Silver | 1 | <1 | <1 | <1 | <1 | <1 | 20 | 0.42 | 20* | |
| Thallium | 0.1 | 1.50 | 1.06 | <1 | <1 | <1 | 4.1 | 2.5 | 1 | |
| Vanadium | 1 | 39 | 28 | 13 | 14 | 14 | 200 | 91 | 130 | |
| Zinc | 2 | 85 | 78 | 79 | 95 | 95 | 600 | 160 | 200 | |

NOTES:

MDL Laboratory Method Detection Limit
NV No Guideline concentration for this parameter

Bold Value exceeds one guideline
Bold Value exceeds two guidelines
Bold Value exceeds three guidelines

Table A MOE, "Guideline for Use at Contaminated Sites in Ontario," Table A surface soil criteria (coarse-grained) for residential/parkland land use in a potable groundwater situation
Table F MOE, "Guideline for Use at Contaminated Sites in Ontario," Table F Ontario Typical Range Soil Concentrations (Background)
CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.
*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991
Chemical Data reviewed by Kevin Shipley

Table 4
Summary of Analytical Results in Soil Samples for Lead from Enhanced Phase 1 ESA
LL 488.0 Brighton Rear Range, Brighton, Ontario
(all values in ppm unless noted)

| PARAMETER | MDL | CCG 488.0 W | CCG 488.0 NE | CCG 488.0 SE | MOE | | CCME GUIDELINES |
|-----------|-----|----------------|-----------------|-----------------|---------------------------|-----------------------|--------------------|
| | | | | | TABLE A Resid/Parkland | TABLE F Background | |
| Lead | 5 | 51 | 41 | 31 | 200 | 120 | 140 |

NOTES:

MDL Laboratory Method Detection Limit
NV No Guideline concentration for this parameter

Bold Value exceeds one guideline
Bold Value exceeds two guidelines
Bold Value exceeds three guidelines

Table A MOE, "Guideline for Use at Contaminated Sites in Ontario," Table A surface soil criteria (coarse-grained) for residential/parkland land use in a potable groundwater situation
Table F MOE, "Guideline for Use at Contaminated Sites in Ontario," Table F Ontario Typical Range Soil Concentrations (Background)
CCME Canadian Council of Ministers of the Environment, "Canadian Environmental Quality Guidelines," 1999.
*CCME Canadian Council of Ministers of the Environment, "Interim Canadian Environmental Quality Criteria for Contaminated Sites", September 1991
Chemical Data reviewed by Kevin Shiple

4.3 Interpretation of Results

During the initial investigations, none of the twenty soil samples submitted for metals analysis during the Phase 3 ESA indicated concentrations of metals above the CCME commercial criteria or the MOE Table B industrial/commercial criteria. The Enhanced Phase 1 ESA on the property had revealed two surficial soil samples with chromium VI and thallium exceedances of the CCME commercial criteria, but no MOE Table B exceedances.

The two groundwater samples indicated concentrations of barium, chromium, lead and zinc in exceedance of the CCME community supply criteria. Copper, lead, vanadium, and zinc concentrations in the groundwater exceeded the MOE Table B criteria.

The follow-up investigations revealed that two of the twenty submitted samples exceeded one MOE Table B criteria and no CCME commercial criteria for soil. Beryllium concentrations exceeded the Table B guidelines in boreholes 5 and 6.

4.4 Discussion

Based on the analytical data (from the Enhanced Phase 1 and Phase 3 ESAs) and visual observations of the subject site, there are indications that a subsurface soil horizon is affecting the surficial groundwater on the property. Although the surficial soil samples that were collected and the deeper subsurface soil samples (1.2 to 1.7 metres) that were retrieved during the initial Phase 3 investigations did not exhibit levels of metals contamination above the CCME commercial criteria (with the exception of chromium VI and thallium in two samples collected during the Enhanced Phase 1 ESA), the elevated concentrations of metals in the groundwater samples indicate that there is likely a source for these metals in the soil, probably in a depth range between 0.1 metres and 1.2 metres.

In the subsequent boreholes that were completed on site during the follow-up investigations, a fill layer with a thickness ranging from 0.1 metres to 0.4 metres was noted. A dark brown silty sand or sandy silt indicated the original topsoil of the once swampy land. Underlying this level is a grey sandy clay with stones. The layers above the dark brown level indicate the fill at the surface. There are varying layers of clay and sand with some topsoil on the surface. All of these layers seem to have large stones within them.

Each layer in each borehole was sampled and no CCME metals criteria were exceeded. Even though the groundwater samples from the site indicated heavy metal contamination, no significant levels of these metals were found on the federal property. It is likely that other areas of the fill on the surrounding lands are contributing to the elevated metals concentrations in the groundwater, however, the source for these contaminants was not determined to be on the Rear Range property.

5.0 CONTAMINATED SITE SUMMARY

5.1 Identification of Contaminated Sites

Based on the analytical results from the XCG 2001 Enhanced Phase 1 ESA, and the XCG 2001 Phase 3 ESA, one contaminated site (CS-1) on the subject site has been identified. This identification was due to the fact that the surficial groundwater has been impacted by barium, chromium, copper, lead, vanadium, zinc, and thallium as indicated by the groundwater exceedances of both CCME community water supply and MOE Table B criteria (in the case of groundwater). The actual source of the metals was concluded to be from an off-site location.

5.2 NCS Classification Summary

As part of the 2001 Enhanced Phase 1 ESA, the CCME National Classification System (NCSCS) for Contaminated Sites scores were calculated for one issue of concern on-site. The score (metals contamination) was 52 ± 3.75 . This score for the area surrounding the navigational aid falls within the Class 2 designation (some action likely required).

Based on the new information obtained during the Phase 3 ESA and the follow-up investigations, an updated NCSCS score was calculated based on the presence of the contaminated groundwater. The score for metals contamination was 59 ± 6 . This score falls within the Class 2 designation of medium risk potential with some action likely required.

5.3 Real Property Information System for Contaminated Sites (RPISCS) Module

Based on the results of the Phase 3 ESA, site data was entered into the RPISCS Module. Output from the module, showing the key environmental information entered for the subject site, is included in Appendix E. This output includes property description information, a summary of the environmental concerns on-site, and the Treasury Board Estimate of Liability, if available.

6.0 REMEDIAL ACTION PLAN WITH LIABILITY COST ESTIMATE

No remediation action plan or management plan is to be recommended at this time. Further investigation of the groundwater contamination on the subject property would have to be carried out on the surrounding private property to determine the source of the contamination. Therefore the Treasury Board liability estimate was set to \$0 as there is no liability associated with this site.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary

XCG Consultants Ltd. (XCG) was retained by Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans Canada (DFO), Central and Arctic Region, to carry out a Phase 3 Environmental Site Assessment (ESA) of the Brighton Rear Range Navigation Aid in Brighton, Ontario. The Brighton Rear Range Navigation Aid is located in the Town of Brighton, Northumberland County, Ontario. The navigation aid is on the north side of Harbour Street, between Walas and Marine Streets. The property consists of a 15.24 metre by 15.24 metre square portion (Part 1) with a 2.44 metre by 38.1 metre access way (Part 2) from Harbour Street. A chain link fence with a locked gate encompasses the structure. The 18.0 metre beacon is centred in the square portion of the property. The station consists of a white skeleton tower with a fluorescent orange triangular daymark with a black vertical stripe and a navigational light. The tower is mounted on four concrete blocks that form a 3.15 metre square.

During the first phase of the investigation, twenty soil samples including two duplicates (for QA/QC purposes) were collected and submitted to Environmental Technology Research Laboratories (ETRL) for metals analyses. Of these twenty, fifteen were surficial soil samples and five were samples from the deeper boreholes on the subject property. One of these deeper samples was a duplicate sample and one of the surficial samples was a duplicate.

A total of ten boreholes were drilled on the subject property, four during the first phase and six during the follow-up phase of the investigation. A monitoring well was installed in one of the first four boreholes. Three of the original boreholes were drilled using a hand held jackhammer with split spoon samplers and one borehole was drilled with a portable pneumatic auger drill. During the Phase 3 ESA, two groundwater samples (including one duplicate) were collected from borehole 488-DH3 (MW1) northeast of the structure and analyzed for metals. The follow-up investigations in January 2002 included the advancement of six additional boreholes within the fenced area of the subject property. Thirty soil samples including three duplicates were collected from these boreholes and twenty of these (including two duplicates) were submitted to ETRL for metals analyses.

The applicable Environmental Quality criteria for soils considered at this site were the Canadian Council of Ministers of the Environment (CCME) guidelines for commercial redevelopment and the Ontario Ministry of the Environment (MOE) Table B guidelines for industrial/commercial land use. The groundwater samples were compared to the Criteria for Water – Community Supply in the Canadian Council of Ministers of the Environment (CCME) document entitled Canadian Environmental Quality Guidelines (1999), and the MOE Table B non-potable groundwater criteria published in the Ontario Ministry of the Environment (MOE) Guideline for Use at Contaminated Sites in Ontario (February 1997).

7.2 Conclusions

None of the thirty-eight soil samples submitted for metals analysis during the Phase 3 ESA, indicated concentrations of metals above the CCME commercial/industrial criteria. Two samples taken from the fill layer during the follow up investigation exceeded the beryllium guideline for the MOE Table B industrial/commercial criteria. The Enhanced Phase 1 ESA on the property had revealed two surficial soil samples with chromium VI and thallium exceedances of the CCME commercial criteria, but no MOE Table B exceedances.

The two groundwater samples indicated concentrations of barium, chromium, lead and zinc in exceedance of the CCME community supply criteria. Copper, lead, vanadium, and zinc concentrations in the groundwater exceeded the MOE Table B criteria.

Based on the analytical data (from the Enhanced Phase 1 and Phase 3 ESAs) and visual observations of the subject site, there are indications that a subsurface soil horizon is affecting the surficial groundwater on the property. Although the surficial soil samples that were collected and the deeper subsurface soil samples (1.2 to 1.7 metres) that were retrieved during the initial Phase 3 investigations did not exhibit levels of metals contamination above the CCME commercial criteria (with the exception of chromium VI and thallium in two samples collected during the Enhanced Phase 1 ESA), the elevated concentrations of metals in the groundwater samples indicate that there is likely a source for these metals in the soil, probably in a depth range between 0.1 metres and 1.2 metres.

In the subsequent boreholes that were completed on site during the follow-up investigations, a fill layer with a thickness ranging from 0.1 metres to 0.4 metres was noted. A dark brown silty sand or sandy silt indicated the original topsoil of the once swampy land. Underlying this level is a grey sandy clay with stones. The layers above the dark brown level indicate the fill at the surface. There are varying layers of clay and sand fill with some topsoil on the surface. All of these layers seem to have large stones within them.

Each layer in each borehole was sampled and no CCME metals criteria were exceeded. Even though the groundwater samples from the site indicated heavy metal contamination, no significant levels of these metals were found on the federal property. It is likely that other areas of the fill on the surrounding lands are contributing to the elevated metals concentrations in the groundwater, however, the source for these contaminants was not determined to be on the Rear Range property.

7.2.1 CCME National Classification System for Contaminated Sites (NCSCS)

As part of the 2001 Enhanced Phase 1 ESA, the CCME National Classification System (NCSCS) for Contaminated Sites scores were calculated for one issue of concern on-site. The score (metals contamination) was 52 ± 3.75 . This score for the area surrounding the navigational aid falls within the Class 2 designation (some action likely required).

Based on the new information obtained during the Phase 3 ESA and the follow-up investigations, an updated NCSCS score was calculated based on the presence of the contaminated groundwater. The score for metals contamination was 59 ± 6 . This score falls within the Class 2 designation of medium risk potential with some action likely required.

7.2.2 Treasury Board Liability Estimates

No remediation action plan or management plan is to be recommended at this time. Further investigation of the groundwater contamination on the subject property would have to be carried out on the surrounding private property to determine the source of the contamination. Therefore the Treasury Board liability estimate was set to \$0 as there is no liability associated with this site.

7.3 RECOMMENDATIONS

1. There are no further recommendations for this site.

All of which is respectfully submitted,

XCG CONSULTANTS LTD.

Kevin Shipley, M.A.Sc., P.Eng., CEA

Associate, Senior Environmental Specialist

Janet Noyes, B.Sc., P. Eng.

Project Engineer

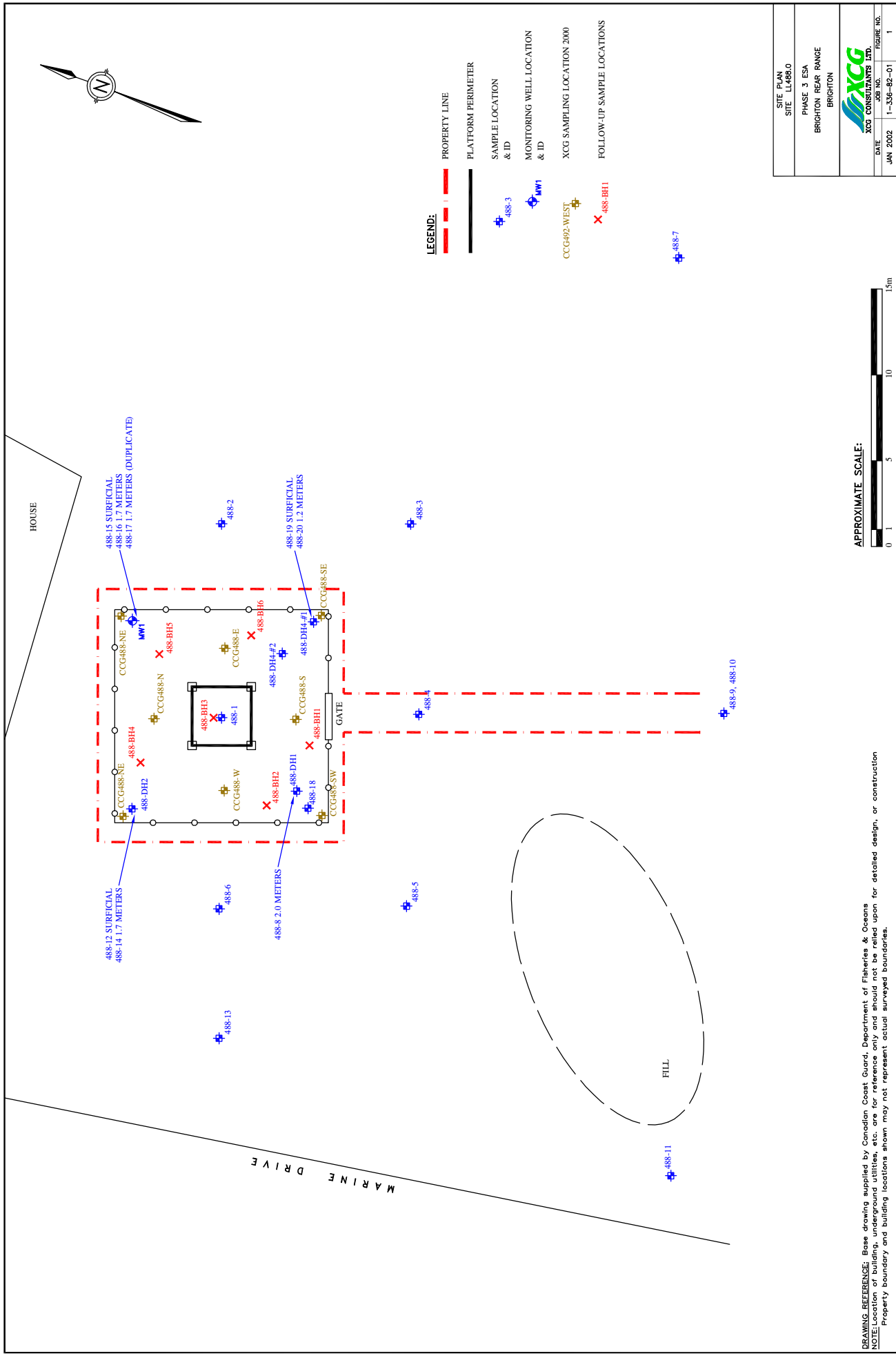
8.0 REFERENCES

1. XCG Consultants Ltd. "*Enhanced Phase 1 Environmental Site Assessment, L.L. 488.0, Brighton Rear Range, Brighton, Ontario*" March 2001.
2. Ministry of the Environment, "*Guidelines for Use at Contaminated Sites in Ontario*", February 1997.
3. Canadian Council of Ministers of the Environment, "*Canadian Environmental Quality Guidelines*," 1999.
4. Canadian Council of Ministers of the Environment, "*Interim Canadian Environmental Quality Criteria for Contaminated Sites*", September 1991

APPENDIX A:

Figure 1 (Site Plan)


Figure 2 (Site Location Map)



DRAWING REFERENCE: Base drawing supplied by Canadian Coast Guard, Department of Fisheries & Oceans
NOTE: Location of building, underground utilities, etc. are for reference only and should not be relied upon
 Property boundary and building locations shown may not represent actual surveyed boundaries.



Map supplied by the Treasury Board of Canada
 Secretariat website: www.tbs-sct.gc.ca/dfp-rbif/keyword-motcle.asp?Language=EN

| | |
|---|-------------|
| Figure 2. Site Location Map | |
| LL 488.0 | |
| Brighton Rear Range Navigation Aid Brighton, Ontario | |
|  XCG Consultants Ltd, | |
| Date | Job No. |
| March 2001 | 1-336-63-01 |

APPENDIX B:

Borehole Logs



Project No: 1-336-82-01

Project: Six DFO Phase III ESAs

Client: PWGSC & CCG

Location: Brighton Rear Range

Log of Well 488-DH3 MW1

Driller: GET Drilling

Borehole Diameter: 2"

Drill Method: Jack Hammer

Start Date: Oct. 31, 2001

Checked By:

Sample Method: Split Spoon

Completed: Oct. 31, 2001

Logged By: JKN

| Depth | Sample No. | N-Value | Sample Type | Sample Name | Graphic Log | Geology Description | Depth/Elev (m) | Well Completion | Well Details |
|-------|------------|---------|-------------|-------------|-------------|---|----------------|-----------------|------------------------------|
| 0 | | | | | | Ground Surface | 0 | | |
| 0 | 1 | | SS | 488-15 | | Fill | -0.15 | | 1ft Stand Pipe |
| 1 | | | | | | Sand Wet Grey-Brown Silty Sand | | | 2ft Bentonite |
| 2 | | | | | | Till Wet Grey Silty Sandy Clayey Till With Gravel | | | 2.5ft Riser |
| 3 | | | | | | | | | 3ft Slotted Screen |
| 4 | | | | | | | | | Annular Space Sand Filled |
| 5 | | | | | | Clay Wet Grey Clay | -1.4 | | End Cap |
| 5 | 2,3 | | SS | 488-16 | | | -1.7 | | |
| 6 | | | | | | End of Borehole | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |

Groundwater Elevation:

T.O.P Elevation:

Ground Surface Elevation:

Monitoring Well Log



Project No: 1-336-82-01

Project: Six DFO Phase III ESAs

Client: PWGSC & CCG

Location: Brighton Rear Range

Log of Borehole 488-DH1

Driller: GET Drilling

Drill Method: Pneumatic Auger Drill

Sample Method: Grab




Borehole Diameter: 4"

Start Date: Oct. 31, 2001

Completed: Oct. 31, 2001

Checked By:

Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|---|---|----------------|
| 0 | | | | | | Ground Surface | 0 |
| 1 | | | | |  | Fill | -0.46 |
| 2 | | | | |  | Clay Wet Grey-Brown Sandy Clay | -0.91 |
| 3 | | | | |  | Clay Wet Grey Silty Clay | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | 1 | | | 488-8 | | | -1.8 |
| 7 | | | | | | End of Borehole | |
| 8 | | | | | | | |



Project No: 1-336-82-01

Project: Six DFO Phase III ESAs

Client: PWGSC & CCG

Location: Brighton Rear Range

Log of Borehole 488-DH2

Driller: GET Drilling

Drill Method: Jack Hammer

Sample Method: Split Spoon

Borehole Diameter: 2"

Start Date: Oct. 31, 2001

Completed: Oct. 31, 2001

Checked By:

Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|-------------|---|----------------|
| 0 | | | | | | Ground Surface | 0 |
| | 1 | | | 488-12 | | Fill | -0.15 |
| | | | | | | Sand Brown Silty Sand | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | Till Wet Grey Silty Sandy Clayey Till With Gravel | |
| 4 | | | | | | | -1.4 |
| 5 | | | | | | Clay Wet Grey Clay | |
| | 2 | | | 488-14 | | | -1.7 |
| | | | | | | End of Borehole | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |



Project No: 1-336-82-01

Project: Six DFO Phase III ESAs

Client: PWGSC & CCG

Location: Brighton Rear Range

Log of Borehole 488-DH4

Driller: GET Drilling

Drill Method: Jack Hammer

Sample Method: Split Spoon

Borehole Diameter: 2"

Start Date: Oct. 31, 2001

Completed: Oct. 31, 2001

Checked By:

Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|-------------|--------------------------------|----------------|
| 0 | | | | | | Ground Surface | 0 |
| 0 | 1 | | | 488-19 | | Fill | -0.61 |
| 1 | | | | | | | |
| 2 | | | | | | Fill Grey Clayey Silty Sand | -1.2 |
| 3 | 2 | | | 488-20 | | | |
| 4 | | | | | | End of Borehole | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |



Project No: 1-336-82-01
 Project: Brighton Rear Range
 Client: PWGSC
 Location: Brighton

Log of Borehole BH-1

Driller: GET Drilling
 Drill Method: Jack Hammer
 Sample Method: Split Spoon

Borehole Diameter: 2"
 Start Date: January 15, 2002
 Completed: January 15, 2002

Checked By:
 Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|-------------|---|----------------|
| 0 | | | | | | Ground Surface | 0 |
| 0 | | | | | | Topsoil | -0.091 |
| 0 | | | | | | Sand Brown Sand No Odours or Staining | -0.27 |
| 1 | 1 | | | | | Sand Grey Sand with Stones No Odours or Staining | -0.41 |
| 2 | 2 | | | | | Silt Dark Brown Organic Sandy Silt | -0.76 |
| 3 | 3,4 | | | | | Sand Brown Sand No Staining or Odours | -1.1 |
| 4 | 5 | | | | | Clay Grey Sandy Clay with Stones Brown Staining at 5.5 ft | |
| 6 | 6 | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | End of Borehole | -2.3 |

Ground Surface Elevation:

Borehole Log



Project No: 1-336-82-01
Project: Brighton Rear Range
Client: PWGSC
Location: Brighton

Log of Borehole BH-2

Driller: GET Drilling

Borehole Diameter: 2"

Drill Method: Jack Hammer

Start Date: January 15, 2002

Checked By:

Sample Method: Split Spoon

Completed: January 15, 2002

Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|-------------|--|----------------|
| 0 | | | | | | Ground Surface | 0 |
| | | | | | | Topsoil | -0.091 |
| 1 | 8 | | | | | Sand Brown Sand with Stones No Odours or Staining | -0.4 |
| 2 | 9 | | | | | Silt Dark Brown Sandy Silt No Odours or Staining | -0.76 |
| 3 | | | | | | | |
| 4 | 10 | | | | | Clay Grey Sandy Clay with Stones No Odours or Staining | |
| 5 | | | | | | | |
| 6 | 11 | | | | | | -1.7 |
| 7 | | | | | | End of Borehole | |
| 8 | | | | | | | |

Ground Surface Elevation:

Borehole Log

Sheet: 1 of 1



Project No: 1-336-82-01
 Project: Brighton Rear Range
 Client: PWGSC
 Location: Brighton

Log of Borehole BH-3

Driller: GET Drilling

Borehole Diameter: 2"

Drill Method: Jack Hammer

Start Date: January 15, 2002

Checked By:

Sample Method: Split Spoon

Completed: January 15, 2002

Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|-------------|--|----------------|
| 0 | | | | | | Ground Surface | 0 |
| | | | | | | Topsoil | -0.091 |
| 1 | 12,13 | | | | | Sand Brown Sand with Stones No Odours or Staining | -0.4 |
| 2 | 14 | | | | | Silt Dark Brown Sandy Silt | -0.73 |
| | 15 | | | | | Stone Sand Blue Coloured Stone and Sand | -0.84 |
| 3 | | | | | | End of Borehole | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |

Ground Surface Elevation:

Borehole Log

Sheet: 1 of 1



Project No: 1-336-82-01
Project: Brighton Rear Range
Client: PWGSC
Location: Brighton

Log of Borehole BH-4

Driller: GET Drilling
Drill Method: Jack Hammer
Sample Method: Split Spoon

Borehole Diameter: 2"
Start Date: January 15, 2002
Completed: January 15, 2002

Checked By:
Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|-------------|---|----------------|
| 0 | | | | | | Ground Surface | 0 |
| | | | | | | Topsail | -0.091 |
| | 16 | | | | | Silt Dark Brown Silt | -0.21 |
| | | | | | | | |
| 1 | 17 | | | | | Sand Dark Brown Silty Sand | -0.49 |
| | | | | | | | |
| 2 | 18 | | | | | | |
| | | | | | | | |
| 3 | 19 | | | | | Clay Grey Sandy Clay with Stones Large Stones at 3.5 Feet | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| | 20 | | | | | | -1.8 |
| 6 | | | | | | Stone Large Stone | -1.8 |
| | | | | | | End of Borehole | |
| 7 | | | | | | | |
| 8 | | | | | | | |

Ground Surface Elevation:

Borehole Log

Sheet: 1 of 1



Project No: 1-336-82-01
Project: Brighton Rear Range
Client: PWGSC
Location: Brighton

Log of Borehole BH-5

Driller: GET Drilling
Drill Method: Jack Hammer
Sample Method: Split Spoon

Borehole Diameter: 2"
Start Date: January 15, 2002
Completed: January 15, 2002

Checked By:
Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|-------------|--|----------------|
| 0 | | | | | | Ground Surface | 0 |
| 0 | | | | | | Topsoil | -0.15 |
| 0 | | | | | | Sand | |
| 0.3 | | | | | | Dark Brown Silty Sand | -0.3 |
| 0.4 | 21 | | | | | Sand | -0.4 |
| 0.4 | | | | | | Brown Sand | |
| 0.53 | 22 | | | | | Clay | -0.53 |
| 0.53 | | | | | | Brown Sandy Clay | |
| 0.76 | | | | | | Clay | |
| 0.76 | 23 | | | | | Grey Clay | -0.76 |
| 1.1 | | | | | | Clay Grey Sandy Clay With Stones | |
| 1.1 | 24 | | | | | | -1.1 |
| 4 | | | | | | End of Borehole | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |

Ground Surface Elevation:

Borehole Log

Sheet: 1 of 1



Project No: 1-336-82-01
Project: Brighton Rear Range
Client: PWGSC
Location: Brighton

Log of Borehole BH-6

Driller: GET Drilling

Borehole Diameter: 2"

Drill Method: Jack Hammer











Start Date: January 15, 2002

Checked By:

Sample Method: Split Spoon

Completed: January 15, 2002

Logged By: JKN

| Depth | Sample No. | N-Value | Recovery (%) | Vapour Reading | Graphic Log | Geology Description | Depth/Elev (m) |
|-------|------------|---------|--------------|----------------|---|---|----------------|
| 0 | | | | | | Ground Surface | 0 |
| | | | | | | <i>Topsoil</i> | |
| | 25 | | | |  | <i>Sand</i> Brown Sand | -0.2 |
| 1 | | | | |  | | |
| | 26 | | | |  | <i>Sand</i> Dark Brown Silty Sand with Stones | |
| 2 | | | | |  | | -0.7 |
| | 27 | | | |  | <i>Clay</i> Dark Brown Silty Clay | -0.81 |
| 3 | | | | |  | <i>Clay</i> Brown Clay | -1 |
| 4 | 28_30 | | | |  | | |
| | 29 | | | |  | | |
| 5 | | | | |  | <i>Clay</i> Grey Sandy Clay With Stones | |
| | 31 | | | |  | | -1.8 |
| 6 | | | | | | End of Borehole | |
| 7 | | | | | | | |
| 8 | | | | | | | |

Ground Surface Elevation:

Borehole Log

Sheet: 1 of 1

APPENDIX C:

Laboratory Certificates of Analysis

| | |
|----------------------------|--|
| ETRL Record #: | 01-5031 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 17186 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 31-Oct-01 |
| Date Reported: | 14-Nov-01 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|-------|-------|-------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | 488-1 | 488-2 | 488-3 |
| Antimony | EPA7041 | µg/g | 0.2 | 14-Nov-01 | 0.2 | 0.2 | 0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 14-Nov-01 | 2 | 1 | <1 |
| Barium | EPA6010 | µg/g | 1 | 14-Nov-01 | 160 | 69 | 774 |
| Beryllium | EPA6010 | µg/g | 0.2 | 14-Nov-01 | 0.8 | 0.4 | 0.2 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 14-Nov-01 | 1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 14-Nov-01 | 26 | 12 | 7 |
| Cobalt | EPA6010 | µg/g | 1 | 14-Nov-01 | 12 | 5 | 5 |
| Copper | EPA6010 | µg/g | 1 | 14-Nov-01 | 17 | 7 | 4 |
| Lead | EPA6010 | µg/g | 1 | 14-Nov-01 | 32 | 19 | 12 |
| Mercury | EPA7471 | µg/g | 0.005 | 14-Nov-01 | 0.038 | 0.027 | 0.026 |
| Molybdenum | EPA6010 | µg/g | 1 | 14-Nov-01 | 1 | <1 | <1 |
| Nickel | EPA6010 | µg/g | 1 | 14-Nov-01 | 16 | 4 | 1 |
| Selenium | EPA7741 | µg/g | 0.1 | 14-Nov-01 | <0.1 | 0.1 | 0.1 |
| Silver | EPA6010 | µg/g | 0.5 | 14-Nov-01 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 14-Nov-01 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 14-Nov-01 | 37 | 20 | 13 |
| Zinc | EPA6010 | µg/g | 1 | 14-Nov-01 | 102 | 45 | 31 |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)



Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

| | |
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| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|-------|-------|-------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | 488-4 | 488-5 | 488-6 |
| Antimony | EPA7041 | µg/g | 0.2 | 14-Nov-01 | 0.2 | 0.4 | 0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 14-Nov-01 | <1 | 3 | 2 |
| Barium | EPA6010 | µg/g | 1 | 14-Nov-01 | 50 | 78 | 91 |
| Beryllium | EPA6010 | µg/g | 0.2 | 14-Nov-01 | 0.2 | 0.4 | 0.5 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 14-Nov-01 | 12 | 14 | 16 |
| Cobalt | EPA6010 | µg/g | 1 | 14-Nov-01 | 5 | 6 | 7 |
| Copper | EPA6010 | µg/g | 1 | 14-Nov-01 | 6 | 11 | 12 |
| Lead | EPA6010 | µg/g | 1 | 14-Nov-01 | 14 | 75 | 45 |
| Mercury | EPA7471 | µg/g | 0.005 | 14-Nov-01 | 0.093 | 0.090 | 0.071 |
| Molybdenum | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Nickel | EPA6010 | µg/g | 1 | 14-Nov-01 | 5 | 9 | 10 |
| Selenium | EPA7741 | µg/g | 0.1 | 14-Nov-01 | 0.1 | 0.3 | 0.5 |
| Silver | EPA6010 | µg/g | 0.5 | 14-Nov-01 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 14-Nov-01 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 14-Nov-01 | 14 | 19 | 25 |
| Zinc | EPA6010 | µg/g | 1 | 14-Nov-01 | 43 | 77 | 77 |

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| Chain of Custody #: | 17186 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 31-Oct-01 |
| Date Reported: | 14-Nov-01 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|-------|-------|-------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | 488-7 | 488-8 | 488-9 |
| Antimony | EPA7041 | µg/g | 0.2 | 14-Nov-01 | 0.5 | 0.3 | 0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 14-Nov-01 | 2 | 1 | 1 |
| Barium | EPA6010 | µg/g | 1 | 14-Nov-01 | 49 | 34 | 53 |
| Beryllium | EPA6010 | µg/g | 0.2 | 14-Nov-01 | 0.3 | 0.2 | <0.2 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 14-Nov-01 | 8 | 4 | 2 |
| Cobalt | EPA6010 | µg/g | 1 | 14-Nov-01 | 5 | 7 | 1 |
| Copper | EPA6010 | µg/g | 1 | 14-Nov-01 | 11 | 1 | 4 |
| Lead | EPA6010 | µg/g | 1 | 14-Nov-01 | 31 | 19 | 7 |
| Mercury | EPA7471 | µg/g | 0.005 | 14-Nov-01 | 0.050 | 0.005 | 0.024 |
| Molybdenum | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Nickel | EPA6010 | µg/g | 1 | 14-Nov-01 | 4 | <1 | 2 |
| Selenium | EPA7741 | µg/g | 0.1 | 14-Nov-01 | 0.2 | <0.1 | 0.2 |
| Silver | EPA6010 | µg/g | 0.5 | 14-Nov-01 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 14-Nov-01 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 14-Nov-01 | 15 | 7 | 11 |
| Zinc | EPA6010 | µg/g | 1 | 14-Nov-01 | 87 | 25 | 26 |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)



Certified by
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| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 17186 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 31-Oct-01 |
| Date Reported: | 14-Nov-01 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|--------|--------|--------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | 488-10 | 488-11 | 488-12 |
| Antimony | EPA7041 | µg/g | 0.2 | 14-Nov-01 | 0.4 | 0.4 | 0.4 |
| Arsenic | EPA7060A | µg/g | 1 | 14-Nov-01 | 1 | 1 | 2 |
| Barium | EPA6010 | µg/g | 1 | 14-Nov-01 | 32 | 49 | 91 |
| Beryllium | EPA6010 | µg/g | 0.2 | 14-Nov-01 | 0.2 | 0.3 | 0.6 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 14-Nov-01 | 6 | 10 | 19 |
| Cobalt | EPA6010 | µg/g | 1 | 14-Nov-01 | 4 | 5 | 16 |
| Copper | EPA6010 | µg/g | 1 | 14-Nov-01 | 5 | 4 | 29 |
| Lead | EPA6010 | µg/g | 1 | 14-Nov-01 | 6 | 26 | 27 |
| Mercury | EPA7471 | µg/g | 0.005 | 14-Nov-01 | 0.026 | 0.038 | 0.054 |
| Molybdenum | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Nickel | EPA6010 | µg/g | 1 | 14-Nov-01 | 2 | 6 | 12 |
| Selenium | EPA7741 | µg/g | 0.1 | 14-Nov-01 | 0.3 | 0.2 | 0.3 |
| Silver | EPA6010 | µg/g | 0.5 | 14-Nov-01 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 14-Nov-01 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 14-Nov-01 | 14 | 16 | 31 |
| Zinc | EPA6010 | µg/g | 1 | 14-Nov-01 | 28 | 45 | 203 |

MDL is the Method Detection Limit

µg/g = micrograms per gram (parts per million)



Certified by


Steve Garrett, Lab Manager

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| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 17186 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 31-Oct-01 |
| Date Reported: | 14-Nov-01 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|--------|--------|--------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | 488-13 | 488-14 | 488-15 |
| Antimony | EPA7041 | µg/g | 0.2 | 14-Nov-01 | 0.2 | 0.4 | 0.4 |
| Arsenic | EPA7060A | µg/g | 1 | 14-Nov-01 | 1 | 2 | 2 |
| Barium | EPA6010 | µg/g | 1 | 14-Nov-01 | 82 | 22 | 78 |
| Beryllium | EPA6010 | µg/g | 0.2 | 14-Nov-01 | 0.5 | 0.2 | 0.5 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 14-Nov-01 | 15 | 6 | 14 |
| Cobalt | EPA6010 | µg/g | 1 | 14-Nov-01 | 12 | 2 | 10 |
| Copper | EPA6010 | µg/g | 1 | 14-Nov-01 | 26 | 2 | 14 |
| Lead | EPA6010 | µg/g | 1 | 14-Nov-01 | 17 | 27 | 31 |
| Mercury | EPA7471 | µg/g | 0.005 | 14-Nov-01 | 0.048 | 0.008 | 0.035 |
| Molybdenum | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | 1 |
| Nickel | EPA6010 | µg/g | 1 | 14-Nov-01 | 9 | 8 | 10 |
| Selenium | EPA7741 | µg/g | 0.1 | 14-Nov-01 | 0.4 | <0.1 | 0.3 |
| Silver | EPA6010 | µg/g | 0.5 | 14-Nov-01 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 14-Nov-01 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 14-Nov-01 | 23 | 8 | 24 |
| Zinc | EPA6010 | µg/g | 1 | 14-Nov-01 | 67 | 32 | 144 |

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| | |
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| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 17186 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 31-Oct-01 |
| Date Reported: | 14-Nov-01 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|--------|--------|--------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | 488-16 | 488-17 | 488-18 |
| Antimony | EPA7041 | µg/g | 0.2 | 14-Nov-01 | 0.4 | 0.4 | 0.6 |
| Arsenic | EPA7060A | µg/g | 1 | 14-Nov-01 | 2 | 2 | 1 |
| Barium | EPA6010 | µg/g | 1 | 14-Nov-01 | 24 | 16 | 169 |
| Beryllium | EPA6010 | µg/g | 0.2 | 14-Nov-01 | 0.2 | <0.2 | 0.8 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | 1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 14-Nov-01 | 9 | 4 | 27 |
| Cobalt | EPA6010 | µg/g | 1 | 14-Nov-01 | 3 | <1 | 17 |
| Copper | EPA6010 | µg/g | 1 | 14-Nov-01 | 11 | 2 | 19 |
| Lead | EPA6010 | µg/g | 1 | 14-Nov-01 | 6 | 10 | 34 |
| Mercury | EPA7471 | µg/g | 0.005 | 14-Nov-01 | 0.010 | 0.011 | 0.015 |
| Molybdenum | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | <1 |
| Nickel | EPA6010 | µg/g | 1 | 14-Nov-01 | 13 | 5 | 20 |
| Selenium | EPA7741 | µg/g | 0.1 | 14-Nov-01 | <0.1 | <0.1 | 0.1 |
| Silver | EPA6010 | µg/g | 0.5 | 14-Nov-01 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 14-Nov-01 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 14-Nov-01 | 5 | 5 | 36 |
| Zinc | EPA6010 | µg/g | 1 | 14-Nov-01 | 36 | 1 | 28 |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)



Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 01-5031 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 17186 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 31-Oct-01 |
| Date Reported: | 14-Nov-01 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|--------|--------|--|
| PARAMETER | Method Reference | Units | MDL | Date Tested | 488-19 | 488-20 | |
| Antimony | EPA7041 | µg/g | 0.2 | 14-Nov-01 | 0.4 | 0.3 | |
| Arsenic | EPA7060A | µg/g | 1 | 14-Nov-01 | <1 | 3 | |
| Barium | EPA6010 | µg/g | 1 | 14-Nov-01 | 11 | 124 | |
| Beryllium | EPA6010 | µg/g | 0.2 | 14-Nov-01 | <0.2 | 0.7 | |
| Boron (HWS) | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | |
| Cadmium | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | |
| Chromium (Total) | EPA6010 | µg/g | 1 | 14-Nov-01 | 2 | 26 | |
| Cobalt | EPA6010 | µg/g | 1 | 14-Nov-01 | 2 | 17 | |
| Copper | EPA6010 | µg/g | 1 | 14-Nov-01 | 2 | 12 | |
| Lead | EPA6010 | µg/g | 1 | 14-Nov-01 | 5 | 25 | |
| Mercury | EPA7471 | µg/g | 0.005 | 14-Nov-01 | 0.012 | 0.008 | |
| Molybdenum | EPA6010 | µg/g | 1 | 14-Nov-01 | <1 | <1 | |
| Nickel | EPA6010 | µg/g | 1 | 14-Nov-01 | 2 | 16 | |
| Selenium | EPA7741 | µg/g | 0.1 | 14-Nov-01 | <0.1 | 0.1 | |
| Silver | EPA6010 | µg/g | 0.5 | 14-Nov-01 | <0.5 | <0.5 | |
| Thallium | EPA279.2 | µg/g | 0.2 | 14-Nov-01 | <0.2 | <0.2 | |
| Vanadium | EPA6010 | µg/g | 1 | 14-Nov-01 | 4 | 39 | |
| Zinc | EPA6010 | µg/g | 1 | 14-Nov-01 | 14 | 63 | |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)



Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 01-5031 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 17186 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | water |
| Date Submitted: | 31-Oct-01 |
| Date Reported: | 14-Nov-01 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|--------|-------------|---------|---------|--|
| PARAMETER | Method Reference | Units | MDL | Date Tested | 488-21 | 488-22 | |
| Antimony | EPA7041 | mg/L | 0.001 | 13-Nov-01 | 0.001 | 0.001 | |
| Arsenic | EPA7060A | mg/L | 0.001 | 13-Nov-01 | 0.021 | 0.017 | |
| Barium | EPA6010 | mg/L | 0.005 | 13-Nov-01 | 6.47 | 3.97 | |
| Beryllium | EPA6010 | mg/L | 0.005 | 13-Nov-01 | 0.030 | 0.015 | |
| Boron (HWS) | EPA6010 | mg/L | 0.01 | 13-Nov-01 | 0.48 | 0.36 | |
| Cadmium | EPA6010 | mg/L | 0.01 | 13-Nov-01 | <0.01 | <0.01 | |
| Chromium (Total) | EPA6010 | mg/L | 0.01 | 13-Nov-01 | 1.09 | 0.58 | |
| Cobalt | EPA6010 | mg/L | 0.01 | 13-Nov-01 | <0.01 | <0.01 | |
| Copper | EPA6010 | mg/L | 0.01 | 13-Nov-01 | 0.39 | 0.14 | |
| Lead | EPA6010 | mg/L | 0.1 | 13-Nov-01 | 1.5 | 1.0 | |
| Mercury | EPA7471 | mg/L | 0.0001 | 13-Nov-01 | <0.0001 | <0.0001 | |
| Molybdenum | EPA6010 | mg/L | 0.02 | 13-Nov-01 | <0.02 | 0.07 | |
| Nickel | EPA6010 | mg/L | 0.02 | 13-Nov-01 | 0.61 | 0.46 | |
| Selenium | EPA7741 | mg/L | 0.001 | 13-Nov-01 | 0.004 | 0.003 | |
| Silver | EPA6010 | mg/L | 0.01 | 13-Nov-01 | <0.01 | <0.01 | |
| Thallium | EPA279.2 | mg/L | 0.01 | 13-Nov-01 | <0.01 | <0.01 | |
| Vanadium | EPA6010 | mg/L | 0.005 | 13-Nov-01 | 0.775 | 0.445 | |
| Zinc | EPA6010 | mg/L | 0.01 | 13-Nov-01 | 6.27 | 3.43 | |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)




Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 02-0328 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 12787 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 16-Jan-02 |
| Date Reported: | 24-Jan-02 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|----------|----------|----------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | Sample 1 | Sample 2 | Sample 3 |
| Antimony | EPA7041 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 24-Jan-02 | 1 | 2 | 2 |
| Barium | EPA6010 | µg/g | 1 | 24-Jan-02 | 31 | 73 | 152 |
| Beryllium | EPA6010 | µg/g | 0.2 | 24-Jan-02 | <0.2 | 0.3 | 0.8 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 24-Jan-02 | 5 | 14 | 28 |
| Cobalt | EPA6010 | µg/g | 1 | 24-Jan-02 | 6 | 6 | 16 |
| Copper | EPA6010 | µg/g | 1 | 24-Jan-02 | 8 | 13 | 23 |
| Lead | EPA6010 | µg/g | 1 | 24-Jan-02 | 9 | 18 | 6 |
| Mercury | EPA7471 | µg/g | 0.005 | 24-Jan-02 | 0.024 | 0.035 | 0.014 |
| Molybdenum | EPA6010 | µg/g | 1 | 24-Jan-02 | 1 | 2 | <1 |
| Nickel | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | 8 | 20 |
| Selenium | EPA7741 | µg/g | 0.1 | 24-Jan-02 | 0.1 | 0.2 | 0.1 |
| Silver | EPA6010 | µg/g | 0.5 | 24-Jan-02 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 24-Jan-02 | 12 | 20 | 48 |
| Zinc | EPA6010 | µg/g | 1 | 24-Jan-02 | 12 | 56 | 49 |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)

Sample 1= 488-BH1 #1
Sample 2= 488-BH1 #2
Sample 3= 488-BH1 #3



 Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 02-0328 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 12787 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 16-Jan-02 |
| Date Reported: | 24-Jan-02 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|----------|----------|----------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | Sample 4 | Sample 5 | Sample 6 |
| Antimony | EPA7041 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 24-Jan-02 | 2 | 2 | 1 |
| Barium | EPA6010 | µg/g | 1 | 24-Jan-02 | 164 | 83 | 71 |
| Beryllium | EPA6010 | µg/g | 0.2 | 24-Jan-02 | 0.8 | 0.4 | 0.4 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 24-Jan-02 | 30 | 14 | 14 |
| Cobalt | EPA6010 | µg/g | 1 | 24-Jan-02 | 16 | 11 | 10 |
| Copper | EPA6010 | µg/g | 1 | 24-Jan-02 | 19 | 15 | 11 |
| Lead | EPA6010 | µg/g | 1 | 24-Jan-02 | 7 | 33 | 11 |
| Mercury | EPA7471 | µg/g | 0.005 | 24-Jan-02 | 0.025 | 0.034 | 0.016 |
| Molybdenum | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | 2 | <1 |
| Nickel | EPA6010 | µg/g | 1 | 24-Jan-02 | 20 | 7 | 11 |
| Selenium | EPA7741 | µg/g | 0.1 | 24-Jan-02 | 0.1 | 0.3 | 0.3 |
| Silver | EPA6010 | µg/g | 0.5 | 24-Jan-02 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 24-Jan-02 | 47 | 24 | 25 |
| Zinc | EPA6010 | µg/g | 1 | 24-Jan-02 | 50 | 88 | 45 |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)

Sample 4= 488-BH1 #4
Sample 5= 488-BH2 #8
Sample 6= 488-BH2 #9



Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 02-0328 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 12787 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 16-Jan-02 |
| Date Reported: | 24-Jan-02 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|----------|----------|----------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | Sample 7 | Sample 8 | Sample 9 |
| Antimony | EPA7041 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 24-Jan-02 | 2 | 2 | 2 |
| Barium | EPA6010 | µg/g | 1 | 24-Jan-02 | 27 | 199 | 148 |
| Beryllium | EPA6010 | µg/g | 0.2 | 24-Jan-02 | <0.2 | 0.8 | 0.7 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 24-Jan-02 | 5 | 30 | 24 |
| Cobalt | EPA6010 | µg/g | 1 | 24-Jan-02 | 18 | 18 | 15 |
| Copper | EPA6010 | µg/g | 1 | 24-Jan-02 | 23 | 21 | 14 |
| Lead | EPA6010 | µg/g | 1 | 24-Jan-02 | 18 | 27 | 15 |
| Mercury | EPA7471 | µg/g | 0.005 | 24-Jan-02 | <0.005 | 0.022 | 0.022 |
| Molybdenum | EPA6010 | µg/g | 1 | 24-Jan-02 | 3 | 2 | 1 |
| Nickel | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | 20 | 18 |
| Selenium | EPA7741 | µg/g | 0.1 | 24-Jan-02 | <0.1 | 0.3 | 0.3 |
| Silver | EPA6010 | µg/g | 0.5 | 24-Jan-02 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 24-Jan-02 | 9 | 41 | 37 |
| Zinc | EPA6010 | µg/g | 1 | 24-Jan-02 | 10 | 130 | 66 |

MDL is the Method Detection Limit
µg/g = micrograms per gram (parts per million)

Sample 7= 488-BH3 #10

Sample 8= 488-BH3 #12

Sample 9= 488-BH3 #13

SB →

Certified by
Steve Garrett, Lab Manager
Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 02-0328 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 12787 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 16-Jan-02 |
| Date Reported: | 24-Jan-02 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|-----------|-----------|-----------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | Sample 10 | Sample 11 | Sample 12 |
| Antimony | EPA7041 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 24-Jan-02 | 2 | 2 | 2 |
| Barium | EPA6010 | µg/g | 1 | 24-Jan-02 | 144 | 57 | 72 |
| Beryllium | EPA6010 | µg/g | 0.2 | 24-Jan-02 | 0.6 | 0.3 | 0.4 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 24-Jan-02 | 22 | 13 | 17 |
| Cobalt | EPA6010 | µg/g | 1 | 24-Jan-02 | 14 | 13 | 11 |
| Copper | EPA6010 | µg/g | 1 | 24-Jan-02 | 18 | 8 | 11 |
| Lead | EPA6010 | µg/g | 1 | 24-Jan-02 | 62 | 11 | 16 |
| Mercury | EPA7471 | µg/g | 0.005 | 24-Jan-02 | 0.006 | 0.005 | 0.026 |
| Molybdenum | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | 2 | 1 |
| Nickel | EPA6010 | µg/g | 1 | 24-Jan-02 | 15 | 1 | 11 |
| Selenium | EPA7741 | µg/g | 0.1 | 24-Jan-02 | 0.3 | 0.1 | 0.3 |
| Silver | EPA6010 | µg/g | 0.5 | 24-Jan-02 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 24-Jan-02 | 33 | 14 | 29 |
| Zinc | EPA6010 | µg/g | 1 | 24-Jan-02 | 139 | 16 | 58 |

MDL is the Method Detection Limit

µg/g = micrograms per gram (parts per million)

Sample 10= 488-BH3 #14

Sample 11= 488-BH3 #15

Sample 12= 488-BH4 #16

SB →

Certified by

Steve Garrett, Lab Manager


Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 02-0328 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 12787 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 16-Jan-02 |
| Date Reported: | 24-Jan-02 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|-----------|-----------|-----------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | Sample 13 | Sample 14 | Sample 15 |
| Antimony | EPA7041 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 24-Jan-02 | 2 | 2 | 1 |
| Barium | EPA6010 | µg/g | 1 | 24-Jan-02 | 233 | 255 | 105 |
| Beryllium | EPA6010 | µg/g | 0.2 | 24-Jan-02 | 1.1 | 0.9 | 0.5 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 24-Jan-02 | 39 | 36 | 20 |
| Cobalt | EPA6010 | µg/g | 1 | 24-Jan-02 | 22 | 22 | 13 |
| Copper | EPA6010 | µg/g | 1 | 24-Jan-02 | 22 | 29 | 10 |
| Lead | EPA6010 | µg/g | 1 | 24-Jan-02 | 18 | 14 | 13 |
| Mercury | EPA7471 | µg/g | 0.005 | 24-Jan-02 | 0.032 | 0.008 | 0.013 |
| Molybdenum | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | 2 | 1 |
| Nickel | EPA6010 | µg/g | 1 | 24-Jan-02 | 29 | 29 | 15 |
| Selenium | EPA7741 | µg/g | 0.1 | 24-Jan-02 | 0.4 | 0.3 | 0.1 |
| Silver | EPA6010 | µg/g | 0.5 | 24-Jan-02 | <0.5 | <0.5 | 0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 24-Jan-02 | 55 | 47 | 35 |
| Zinc | EPA6010 | µg/g | 1 | 24-Jan-02 | 82 | 66 | 40 |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)

Sample 13= 488-BH4 #17
Sample 14= 488-BH4 #18
Sample 15= 488-BH5 #21




 Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 02-0328 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 12787 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 16-Jan-02 |
| Date Reported: | 24-Jan-02 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|-----------|-----------|-----------|
| PARAMETER | Method Reference | Units | MDL | Date Tested | Sample 16 | Sample 17 | Sample 18 |
| Antimony | EPA7041 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Arsenic | EPA7060A | µg/g | 1 | 24-Jan-02 | 3 | 2 | <1 |
| Barium | EPA6010 | µg/g | 1 | 24-Jan-02 | 346 | 131 | 11 |
| Beryllium | EPA6010 | µg/g | 0.2 | 24-Jan-02 | 1.4 | 0.5 | <0.2 |
| Boron (HWS) | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | <1 |
| Cadmium | EPA6010 | µg/g | 1 | 24-Jan-02 | 1 | <1 | <1 |
| Chromium (Total) | EPA6010 | µg/g | 1 | 24-Jan-02 | 54 | 21 | 4 |
| Cobalt | EPA6010 | µg/g | 1 | 24-Jan-02 | 37 | 12 | 3 |
| Copper | EPA6010 | µg/g | 1 | 24-Jan-02 | 38 | 17 | 3 |
| Lead | EPA6010 | µg/g | 1 | 24-Jan-02 | 21 | 9 | <1 |
| Mercury | EPA7471 | µg/g | 0.005 | 24-Jan-02 | 0.021 | 0.001 | 0.005 |
| Molybdenum | EPA6010 | µg/g | 1 | 24-Jan-02 | 1 | 2 | <1 |
| Nickel | EPA6010 | µg/g | 1 | 24-Jan-02 | 43 | 11 | 1 |
| Selenium | EPA7741 | µg/g | 0.1 | 24-Jan-02 | 0.1 | 0.1 | <0.1 |
| Silver | EPA6010 | µg/g | 0.5 | 24-Jan-02 | <0.5 | <0.5 | <0.5 |
| Thallium | EPA279.2 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | <0.2 |
| Vanadium | EPA6010 | µg/g | 1 | 24-Jan-02 | 74 | 31 | 8 |
| Zinc | EPA6010 | µg/g | 1 | 24-Jan-02 | 99 | 33 | 11 |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)

Sample 16= 488-BH5 #22
Sample 17= 488-BH5 #23
Sample 18= 488-BH6 #25



 Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

| | |
|----------------------------|--|
| ETRL Record #: | 02-0328 |
| Contact: | Janet Noyes |
| Client: | XCG Consultants Ltd. 33 Earl St. Kingston, ON K7L 2G4 |
| Source: | Brighton (613) 542-5888 |
| Chain of Custody #: | 12787 |
| PO #: | 1-336-82-01 |
| Sample Matrix: | Soil |
| Date Submitted: | 16-Jan-02 |
| Date Reported: | 24-Jan-02 |

| MOE "Guideline For Use at Cominated Sites in Ontario" | | | | | | | |
|---|------------------|-------|-------|-------------|-----------|-----------|--|
| PARAMETER | Method Reference | Units | MDL | Date Tested | Sample 19 | Sample 20 | |
| Antimony | EPA7041 | µg/g | 0.2 | 24-Jan-02 | 0.2 | <0.2 | |
| Arsenic | EPA7060A | µg/g | 1 | 24-Jan-02 | 2 | 4 | |
| Barium | EPA6010 | µg/g | 1 | 24-Jan-02 | 79 | 372 | |
| Beryllium | EPA6010 | µg/g | 0.2 | 24-Jan-02 | 0.4 | 1.4 | |
| Boron (HWS) | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | |
| Cadmium | EPA6010 | µg/g | 1 | 24-Jan-02 | <1 | <1 | |
| Chromium (Total) | EPA6010 | µg/g | 1 | 24-Jan-02 | 17 | 56 | |
| Cobalt | EPA6010 | µg/g | 1 | 24-Jan-02 | 13 | 32 | |
| Copper | EPA6010 | µg/g | 1 | 24-Jan-02 | 16 | 33 | |
| Lead | EPA6010 | µg/g | 1 | 24-Jan-02 | 1 | 20 | |
| Mercury | EPA7471 | µg/g | 0.005 | 24-Jan-02 | 0.044 | 0.021 | |
| Molybdenum | EPA6010 | µg/g | 1 | 24-Jan-02 | 1 | 2 | |
| Nickel | EPA6010 | µg/g | 1 | 24-Jan-02 | 1 | 44 | |
| Selenium | EPA7741 | µg/g | 0.1 | 24-Jan-02 | 0.3 | 0.3 | |
| Silver | EPA6010 | µg/g | 0.5 | 24-Jan-02 | <0.5 | <0.5 | |
| Thallium | EPA279.2 | µg/g | 0.2 | 24-Jan-02 | <0.2 | <0.2 | |
| Vanadium | EPA6010 | µg/g | 1 | 24-Jan-02 | 28 | 74 | |
| Zinc | EPA6010 | µg/g | 1 | 24-Jan-02 | 49 | 95 | |

MDL is the Method Detection Limit
 µg/g = micrograms per gram (parts per million)

Sample 19= 488-BH6 #26
Sample 20= 488-BH6 #28



Certified by
 Steve Garrett, Lab Manager
 Address all inquiries to the Lab Manager

APPENDIX D

**Current National Classification
System for Contaminated Sites**

Site Identification: Brighton Rear Range LL488.0

DETAILED EVALUATION FORM

Before completing this form, review instructions in text (Section 3.0).

I CONTAMINANTS CHARACTERISTICS (Maximum Total Score is 33)

Complete Sections A, B, C, and Special Considerations

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓) (see Subsection 3.7.1 in text).

| Factors | Scoring Guideline | Site Score | Totals |
|---|---------------------------|---------------|----------------------------|
| A Degree of Hazard (max. 14) | | | |
| <ul style="list-style-type: none"> High concern contaminants - high concentration High concern contaminants - low concentration Medium concern contaminants - high concentration Medium concern contaminants - low concentration Low concern contaminants | (14) 11 8 5 3 | 14 ? ✓ | 14 Section A max. 14 |
| B Contaminant Quantity (area or volume of site contamination) (max. 10) | | | |
| <ul style="list-style-type: none"> >10 ha or 1000 m³ or drums of liquid 2 to 10 ha or 100 to 1000 m³ <2 ha or 100 m³ | 10 6 2 | 5 ✓ | 5 Section B max. 10 |
| C Physical State of Contaminants (max. 9) | | | |
| <ul style="list-style-type: none"> Liquid/gas Sludge Solid | 9 7 (3) | 3 ? ✓ | 3 Section C max. 9 |
| Special Considerations | | | |
| Discretionary addition or subtraction to this category score (Contaminant Characteristics) by up to 6 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (33) or be lower than the minimum (0) allowable.) | | | |
| DETAILED RATIONALE MUST BE DOCUMENTED | -6 to +6 | — ✓ | — max. 6 |

1 Total Site Score for CONTAMINANT CHARACTERISTICS Add:

| | Total '✓' | Total '2' | Total '✓' + '2' |
|------------------------|-----------|-----------|-----------------|
| Section A | 14 | 1 | 14 |
| Section B | 5 | 5 | 5 |
| Section C | 3 | 1 | 3 |
| Special Considerations | 5 | 1 | 5 |
| TOTAL | 17 | 5 | 22 |

max. 33

Site Identification: 488.0

Site Identification: LL 488.0

DETAILED EVALUATION FORM (Cont'd)

II EXPOSURE PATHWAYS (Maximum Total Score is 33)
Complete Sections A, B, and C.

A Groundwater (Maximum Score is 11)
Score Section 1 (Known) OR 2 (Potential), and Section 3.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals |
|--|------------------------|------------|----------------------|
| 1 Known Contamination of Groundwater at or beyond the Property Boundary (measured contamination of, or known contact with groundwater (max 11)) | | | |
| <ul style="list-style-type: none"> Groundwater significantly exceeds CDWG (by >2x) or known contact of contaminants with groundwater Between 1 and 2x CDWG or probable contact with groundwater Meets Canadian Drinking Water Guidelines If impact on groundwater is not known, complete 2 | 11 6 0 | 11 | Section 1 max. 11 |
| OR 2 Potential for Groundwater Contamination (max. 11) | | | |
| a) Engineered subsurface containment (max. 4) | | | |
| <ul style="list-style-type: none"> No containment Partial containment Full containment | 4 2 0 | — ? ✓ | |
| b) Thickness of confining layer over aquifer (max. 15) | | | |
| <ul style="list-style-type: none"> 3 m or less 3 to 10 m >10 m | 1.5 1 0 | — ? ✓ | |
| c) Hydraulic conductivity of the confining layer (max. 15) | | | |
| <ul style="list-style-type: none"> >10⁻⁴ cm/sec 10⁻⁴ to 10⁻⁶ cm/sec <10⁻⁶ cm/sec | 1.5 1 0.5 | — ? ✓ | |
| d) Annual rainfall (max. 1) | | | |
| <ul style="list-style-type: none"> >1,000 mm 600 mm 400 mm 200 mm | 1 0.6 0.4 0.2 | — ? ✓ | |
| e) Hydraulic conductivity of aquifer(s) of concern (max. 3) | | | |
| <ul style="list-style-type: none"> >10⁻² cm/sec 10⁻² to 10⁻⁴ cm/sec <10⁻⁴ cm/sec | 3 1.5 0.5 | — ? ✓ | Section 2 max. 11 |

Special Considerations

- 3 Discretionary addition or subtraction to this sub-category score (Groundwater Pathway) by up to 4 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this sub-category to exceed the maximum (11) or be lower than the minimum (0) allowable.)

DETAILED RATIONALE MUST BE DOCUMENTED

-4 to +4

✓

Section
max. 4

| | Add: | Section 1 or 2 Section 3 TOTAL | Total ✓ | Total ? | Total ✓ + ? max. 11 |
|---|------|---|---------|---------|------------------------|
| A | | | 11 | 0 | 11 |
| | | | - | - | - |
| | | | 11 | 0 | 11 |
| | | | | | max. 11 |

Site Identification: L.L. 488.0

DETAILED EVALUATION FORM (Cont'd)

II EXPOSURE PATHWAYS (cont'd)

B Surface Water (Maximum Score is 11)

Score Section 1 (Known) OR 2 (Potential), and Section 3.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals |
|--|------------------------|------------|------------------------------|
| I Observed or Measured Contamination of Water/Effluent Discharged from Site (max. 11) | | | |
| <ul style="list-style-type: none"> Known or strongly suspected to exceed CWQG by >2x Known or strongly suspected to be between 1 and 2x CWQG Meets Canadian Drinking Water Guidelines | 11 6 0 | — ✓ | Section 1 max. 11 |
| OR 2 Potential for Surface Water Contamination (max. 11) | | | |
| a) Surface containment (max. 5) | | | |
| <ul style="list-style-type: none"> No containment Partial containment Full containment | 5 3 0.5 | 5 ? 0 | |
| b) Distance to perennial surface water (max.3) | | | |
| <ul style="list-style-type: none"> 0 to <100 m 100 - 300 m >300 m | 3 2 0.5 | 2 ? 0 | |
| c) Topography (max. 1.5) | | | |
| <ul style="list-style-type: none"> Contaminants above ground level and slope is steep Contaminants at or below ground level and slope is steep Contaminants above ground level and slope is flat Contaminants at or below ground level and slope is flat | 1.5 1.2 0.8 0 | 0.8 ? 0 | |
| d) Run-off potential (see nomograph at end of Appendix D) (max. 1) | | | |
| <ul style="list-style-type: none"> >1,000 mm rainfall and low permeability surface material 500 - 1000 mm rainfall and moderately permeable surface material < 500 mm rainfall and highly permeable surface material | 1 0.6 0.2 | 0.5 ? ✓ | |
| e) Flood potential (max.0.5) | | | |
| <ul style="list-style-type: none"> 1 in 2 years 1 in 10 years 1 in 50 years | 0.5 0.3 0.1 | 0.25 ? ✓ | 8.55 Section 2 max. 11 |

Special Considerations

- 3 Discretionary addition or subtraction to this sub-category score (Surface Water Pathway) by up to 4 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (11) or be lower than the minimum (0) allowable.)

DETAILED RATIONALE MUST BE DOCUMENTED

-4 to +4

✓

Section 3
max. 4

| | Section 1 or 2 | Add: | Section 3 | TOTAL | Total '✓' | Total '0' | Total '✓' + '0' |
|-----------------------|----------------|------|-----------|-------|-----------|-----------|-----------------|
| B Surface Water Total | | | | | 7.8 | 0.75 | 8.55 |
| | | | | | - | - | - |
| | | | | | 7.8 | 0.75 | 8.55 |
| | | | | | | | max. 11 |

Site Identification: 488.0

Site Identification: LL 488-0

DETAILED EVALUATION FORM (Cont'd)

II EXPOSURE PATHWAYS (cont'd)

C Direct Contact (Maximum Score is 11)
Score Section 1 (Known) OR 2 (Potential), and Section 3.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals |
|---|-------------------|-------------|----------------------|
| 1 Known Contamination of Media Off-site (max. 11) | | | |
| <ul style="list-style-type: none"> Known contamination of media (soil, sediment, air) off-site due to direct contact with contaminated soil, dust, air, etc. (vector transported should also be considered) Strongly suspected contamination of media (soil, sediment, air) off-site No contamination of media off-site If impact due to direct contact is not known, complete 2 | 11 6 0 | — — ✓ | Section 1 max. 11 |
| OR 2 Potential for Direct Human and/or Animal Contact (max. 11) | | | |
| a) Airborne Emissions (gases, vapours, contaminated dust, etc.) (max. 5) <ul style="list-style-type: none"> Known or suspected airborne emissions impacting on neighbouring properties (see User's Guide) Airborne emissions generally restricted to site No airborne emissions | 5 3 0 | 0 0 0 | Section 2 max. 11 |
| b) Accessibility of Site (Ability to Contact Materials) (max. 4) <ul style="list-style-type: none"> Limited barriers to prevent site access; contaminants not covered Moderate accessibility or no intervening barriers; containments are covered Controlled access or remote location and containments are covered | 4 3 0 | 0 0 0 | Section 2 max. 11 |
| c) Hazardous soil gas migration from the site (max. 2) <ul style="list-style-type: none"> Contaminants are putrescible and soil permeability is high Site contaminants are putrescible and soil permeability is high No putrescible contaminants at the site | 2 1 0 | 0 0 0 | Section 2 max. 11 |

Special Considerations

3 Discretionary addition or subtraction to this sub-category score (Direct Contact Pathway) by up to 4 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (11) or be lower than the minimum (0) allowable.)

DETAILED RATIONALE MUST BE DOCUMENTED

-4 to +4

Section 3
max. 4

| | | | Total '✓' | Total '2' | Total '✓' + '2' |
|-----------|---|------------------|-------------|-------------|-----------------|
| C | Direct Contact Total | | | | |
| | Add: | Section 1 or 2 | <u>0</u> | <u>0</u> | <u>0</u> |
| | | Section 3 | <u>-</u> | <u>-</u> | <u>-</u> |
| | | TOTAL | <u>0</u> | <u>0</u> | <u>0</u> |
| | | | | | max. 11 |
| II | Total Site Score for EXPOSURE PATHWAYS | | | | |
| | Add: | A Groundwater | <u>11</u> | <u>0</u> | <u>11</u> |
| | | B Surface Water | <u>7.8</u> | <u>0.75</u> | <u>8.55</u> |
| | | C Direct Contact | <u>0</u> | <u>0</u> | <u>0</u> |
| | | TOTAL | <u>18.8</u> | <u>0.75</u> | <u>19.55</u> |
| | | | | | max. 33 |

Site Identification: 488 0

Site Identification: LL 4880

DETAILED EVALUATION FORM (Cont'd)

- III RECEPTORS** (Maximum Total Score is 34)
 Complete Sections A and B.
A Human and Animal Uses (Maximum Score is 18)
 Score **Section 1 (Known) OR 2 (Potential)**, and **Section 3**.
 If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals | |
|--|-------------------|-----------------|--------------------------------------|--|
| I Known Impact on Humans or Animals (max. 18) Known adverse impact on humans or domestic animals as a result of the contaminated site (see User's Guide) <ul style="list-style-type: none"> Known adverse effect on humans or domestic animals Strongly suspected adverse effect on humans or domestic animals If adverse effect on humans is not known, complete 2 | 18 15 | — ✓ | Section 1 max. 18 0 Class 1 | |
| OR 2 Potential for Impact on Humans or Animals (max. 18) <p>a) Drinking Water Supply (max. 9) (groundwater or surface water; private, commercial or municipal supply) Complete Section i) (Known) OR ii) (Potential)</p> <p>i) Known impact on drinking water supply (max. 9) (see User's Guide) Drinking water supply is known to be adversely affected as a result of site contamination</p> <ul style="list-style-type: none"> Known contamination of drinking water supply (to levels exceeding CDWG) Strongly suspected contamination of drinking water supply Drinking water supply is known not to be contaminated If impact on drinking water is not known, complete ii) | 9 7 0 | — ✓ | | |
| <p>ii) Potential for impact on drinking water supply (max. 9)</p> <ul style="list-style-type: none"> Proximity to drinking water supply (max. 6) <ul style="list-style-type: none"> 0 to <100 m 100 to 300 m 300 m to <1 km 1 to 5 km <p>■ "Availability" of alternate drinking water supply (max. 3)</p> <ul style="list-style-type: none"> Alternate drinking water supply is not available Alternate drinking water supply difficult to obtain Alternate drinking water supply available | 6 5 4 3 | — 3 ? ✓ | | |
| | | 3 2 0.5 ? | — 0.5 ? ✓ | |

| Factors | Scoring Guideline | Site Score | Totals | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|------------|------------------|--|----------|------------|--|---|---|-----------------------------|-----|-----|--------------------|---|-----|------------|---|-----|-----------------------------------|-----|-----|--|-----|-----|--|--|
| b) | Other Water Resources (max. 4) (groundwater or surface water) | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Complete Section i) (Known) OR ii) (Potential) | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>i) Known impact on water resources (max. 4) (see User's Guide) Water resources (used for recreational purposes, commercial food preparation, livestock watering, irrigation and other food chain uses) is known to be adversely affected as a result of site contamination</p> <ul style="list-style-type: none"> Water resource is known to be contaminated above CWQG 4 Water resource is strongly suspected to be contaminated above CWQG 3 Water resource is not known to be contaminated 0 <p>If impact on drinking water is not known, complete ii)</p> | — | ✓ | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>ii) Potential for impact on water resources (max. 4)</p> <ul style="list-style-type: none"> Proximity to water resources used for activities listed above (max. 2) <ul style="list-style-type: none"> 0 to <100 m 2 100 to 300 m 1.5 300 m to <1 km 1 1 to 5 km 0.5 Use of water resources (max. 2) If multiple uses, give highest score automatically use following table | 1.5 | 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th rowspan="2">Water Use</th> <th colspan="2">Frequency of Use</th> </tr> <tr> <th>Frequent</th> <th>Occasional</th> </tr> </thead> <tbody> <tr> <td>Recreational (swimming, fishing, etc.)</td> <td>2</td> <td>1</td> </tr> <tr> <td>Commercial food preparation</td> <td>1.5</td> <td>0.8</td> </tr> <tr> <td>Livestock watering</td> <td>1</td> <td>0.5</td> </tr> <tr> <td>Irrigation</td> <td>1</td> <td>0.5</td> </tr> <tr> <td>Other domestic or food chain uses</td> <td>0.5</td> <td>0.3</td> </tr> <tr> <td>Not currently used but likely future use</td> <td>0.5</td> <td>0.2</td> </tr> </tbody> </table> | Water Use | Frequency of Use | | Frequent | Occasional | Recreational (swimming, fishing, etc.) | 2 | 1 | Commercial food preparation | 1.5 | 0.8 | Livestock watering | 1 | 0.5 | Irrigation | 1 | 0.5 | Other domestic or food chain uses | 0.5 | 0.3 | Not currently used but likely future use | 0.5 | 0.2 | | |
| Water Use | Frequency of Use | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Frequent | Occasional | | | | | | | | | | | | | | | | | | | | | | | | |
| Recreational (swimming, fishing, etc.) | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Commercial food preparation | 1.5 | 0.8 | | | | | | | | | | | | | | | | | | | | | | | | |
| Livestock watering | 1 | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Irrigation | 1 | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Other domestic or food chain uses | 0.5 | 0.3 | | | | | | | | | | | | | | | | | | | | | | | | |
| Not currently used but likely future use | 0.5 | 0.2 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.5 | 0 | | | | | | | | | | | | | | | | | | | | | | | |

Site Identification: 1.L.488.0

DETAILED EVALUATION FORM (Cont'd)

III RECEPTORS (cont'd)

A Human and Animal Uses (cont'd)

Score **Section 1 (Known) OR 2 (Potential)**, and **Section 3.**

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------|--------------------|-----------------------------|--|--|------------|--------------|------------|--|-------------|---|-----|---|--|--------------|---|---|-----|--|-----------------|---|---|-----|--|-----------------------|---|---|-----|--|-------------|-------------------------------------|
| <p>c) Direct Human Exposure (max. 5)</p> <p>Complete Section i) (Known) OR ii) (Potential)</p> <ul style="list-style-type: none"> i) Known contamination of land used by humans (max.) (see User's Guide) • Known contamination of land used for agricultural or residential/park/land/school purposes above AG or R/P EQC values 5 • Known contamination of land used for commercial or industrial purposes above AG or R/P EQC values 3.5 • Land is known not to be contaminated 0 <p>If impact on drinking water is not known, complete ii)</p> | | <p>— ✓</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>ii) Potential human exposure through land use give highest score to worst case scenario (max. 5)</p> <p><input checked="" type="checkbox"/> Use of land at and surrounding site</p> <p>Determine uses(s) of land at and surrounding site and assign score using following table</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th rowspan="2">Land Use</th> <th colspan="4">Distance from Site</th> </tr> <tr> <th>0 - <300 m</th> <th>300m - <1 km</th> <th>1 km - 5km</th> <th></th> </tr> </thead> <tbody> <tr> <td>Residential</td> <td align="center">5</td> <td align="center">4.5</td> <td align="center">3</td> <td></td> </tr> <tr> <td>Agricultural</td> <td align="center">5</td> <td align="center">4</td> <td align="center">2.5</td> <td></td> </tr> <tr> <td>Parkland/School</td> <td align="center">4</td> <td align="center">3</td> <td align="center">1.5</td> <td></td> </tr> <tr> <td>Commercial/Industrial</td> <td align="center">3</td> <td align="center">1</td> <td align="center">0.5</td> <td></td> </tr> </tbody> </table> | Land Use | Distance from Site | | | | 0 - <300 m | 300m - <1 km | 1 km - 5km | | Residential | 5 | 4.5 | 3 | | Agricultural | 5 | 4 | 2.5 | | Parkland/School | 4 | 3 | 1.5 | | Commercial/Industrial | 3 | 1 | 0.5 | | <p>5 70</p> | <p>11 Section 2 max. 18</p> |
| Land Use | | Distance from Site | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 - <300 m | 300m - <1 km | 1 km - 5km | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Residential | 5 | 4.5 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Agricultural | 5 | 4 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parkland/School | 4 | 3 | 1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Commercial/Industrial | 3 | 1 | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Special Considerations</p> <p>3 Discretionary addition or subtraction to this sub-category score (Impact on Human and Animal Receptors) by up to 5 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (18) or be lower than the minimum (0) allowable.)</p> <p>DETAILED RATIONALE MUST BE DOCUMENTED</p> | | <p>— ✓</p> | <p>Section 3 max. 5</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| A | Total Human and Animal Receptors | Add: | Section 1 or 2 | Total '✓' | Total '○' | Total '✓' + '○' |
|---|----------------------------------|------|----------------|-----------|-----------|----------------------|
| | | | | <u>11</u> | <u>0</u> | <u>11</u> |
| | | | Section 3 | <u>-</u> | <u>-</u> | <u>-</u> |
| | TOTAL | | | <u>11</u> | <u>0</u> | <u>11</u> max. 18 |

Site Identification: 488-0

Site Identification: LL-488.0

DETAILED EVALUATION FORM (Cont'd)

III RECEPTORS (cont'd)

B Environmental Receptors (Maximum Score is 16)
 Score **Section 1 (Known)** OR **2 (Potential)**, and **Section 3**.

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓).

| Factors | Scoring Guideline | Site Score | Totals | |
|--|---|--|----------------------|----------------------|
| I Known Adverse Impact on the Environment as a Result of the Contaminated Site (max. 16) | <ul style="list-style-type: none"> Known adverse impact on sensitive environment Evidence of stress on aquatic species, or vegetative stress on trees, crops or plant life located on properties neighbouring the site Strongly suspected adverse impact on sensitive environment If impact due to direct contact is not known, complete 2 | 16 14 12 | Section 1 max. 16 | |
| | OR 2 Potential for Impact on Sensitive Environments (max. 16) | a) Distance from the site to the nearest sensitive environment (max. 10) (e.g., sensitive aquatic environment, nature preserve, habitat for endangered species, sensitive forest reserves, national parks or forests, etc.) | 10 6 2 0.5 | Section 2 max. 16 |
| | | <ul style="list-style-type: none"> 0 to <500 m 500 to 2 km 2 to <5 km 5 to 10 km | 0.5 ? ✓ | |
| | | b) Groundwater (max. 6) Distance to an important or susceptible groundwater resource (e.g. recharge area) | 6 4 2 1 | |
| <ul style="list-style-type: none"> 0 to <500 m 500 to 2 km 2 to <5 km 5 to 10 km | | 6 ? ✓ | | |
| Special Considerations | | | | |
| 3 | Discretionary addition or subtraction to this sub-category score (Environmental Receptors) by up to 5 points based on technical judgement of the user. (Special considerations scores must not cause the total score for this category to exceed the maximum (16) or be lower than the minimum (0) allowable.) | -5 to +5 | Section 3 max. 5 | |
| DETAILED RATIONALE MUST BE DOCUMENTED | | | | |

| B | Total Environmental Receptors | Add: | Section 1 or 2 | Section 3 | TOTAL | Total '✓' | Total '??' | Total '✓' + '??' |
|---|-------------------------------|------|----------------|-----------|-------|-----------|------------|------------------|
| | | | | | | 6.5 | 0 | 6.5 |
| | | | | | | - | - | - |
| | | | | | | 6.5 | 0 | 6.5 |
| | | | | | | | | max. 16 |

| II | Total Site Score for ENVIRONMENTAL RECEPTORS | Add: | A | B | Human and Animal Use | Environmental Receptors | TOTAL | Total '✓' | Total '??' | Total '✓' + '??' |
|----|--|------|---|---|----------------------|-------------------------|-------|-----------|------------|------------------|
| | | | | | | | | 11 | 0 | 11 |
| | | | | | | | | 6.5 | 0 | 6.5 |
| | | | | | | | | 17.5 | 0 | 17.5 |
| | | | | | | | | | | max. 34 |

Site Identification: 488.0

Site Identification: L-L-488-0

DETAILED EVALUATION FORM (Cont'd)

FINAL SCORE SHEET AND SITE CATEGORIES

| Factor Categories | Category Score (CS) ('✓' + '?') | Estimated Score (ES) ('?' only) | Total Category Score (CS) | Total Estimated Score (ES) |
|---|---------------------------------|---------------------------------|---------------------------|----------------------------|
| I CONTAINMENT CHARACTERISTICS (33) | 22 | 5 | Total = 22 | ± 5 |
| II EXPOSURE PATHWAYS (33) | | | | |
| A Groundwater (11) | 11 | 0 | | |
| B Surface Water (11) | 8.55 | 0.75 | | |
| C Direct Contact (11) | 0 | 0 | | |
| Total | 19.55 | 0.75 | Total = 19.6 | ± 0.8 |
| III RECEPTORS (34) | | | | |
| A Human and Animal (18) | 11 | 0 | | |
| B Environment (16) | 6.5 | 0 | | |
| Total | 17.5 | 0 | Total = 17.5 | ± 0 |
| | | | 59.1 | ± 5.8 |

TOTAL SCORE FOR THE SITE(S) (TS)
 (Sum of scores marked '✓' and '?', rounded to nearest whole number)
ESTIMATED SCORE FOR SITE(ES)
 (Sum of scores marked '?', i.e. score estimated or unknown)

| SITE SCORE | CLASS | RISK POTENTIAL | ACTION REQUIRED |
|------------|---------|----------------|-----------------|
| 70 - 100 | Class 1 | High | Yes |
| 50 - 69 | Class 2 | Medium | Likely |
| 38 - 49 | Class 3 | Medium Low | Maybe |
| ≤ 37 | Class 4 | Low | Not Likely |

CLASSIFICATION (1, 2, 3, or N)
 If ES ≥ 15, then site is categorized as 1 (insufficient information to classify site)

2

APPENDIX E

Real Property Information System
for Contaminated Sites (RPISCS)
Module Information

Contaminated Sites Summary

Thursday, February 21, 2002

RPIS
CS MODULE

Region: Central/Arctic

| | | | |
|-----------------|------------------------------|-----------------------|-----------|
| Site Name | Brighton Range Rear (LL#488) | Site Number | C F 00038 |
| Site Descriptor | Rear Range | List of Lights Number | 488 |
| Province | Ontario | Land Descriptor Unit | 33164 |
| Sector | Canadian Coast Guard | Status | Active |
| | | Custodian | F&OCG |

| | | | |
|----------------|-------------------------------------|-------------|----------|
| Site Location | Part Lot 1, broken front conc.. | | |
| Street Address | Part Lot 1, Broken front Concession | | |
| City | Brighton | Postal Code | |
| Latitude | 44-01-18 | Longitude | 77-43-49 |

| | | | |
|------------------------|---------------------|-----------|-----|
| Contaminated Site Name | Brighton Rear Range | CS Number | 001 |
| Status | Under Assessment | | |

| | | | |
|----------------------|--|----------------------|--|
| Regional File Number | | National File Number | |
|----------------------|--|----------------------|--|

| | | | | | | | |
|---------------------------|---------------------------------|---|----|-----------|----|----|----|
| Location of Contamination | In the vicinity of the Nav-Aid. | | | | | | |
| Latitude | 44 | 1 | 18 | Longitude | 77 | 43 | 49 |

| | |
|-------------|--|
| Action Plan | |
|-------------|--|

| | |
|------------------------|--|
| Additional Information | Results which are below the detection limit were taken to be half the method detection limit. PWGSC revised EA6 (under A-Description), EB4 (under B-Activities), EE4, EE5 and EE8 (under E-NCSCS Rating) and EF2, EF3, and EF4 (under F-Expenditures), March 23, 2001. The Phase III ESA conducted by XCG on October 31, 2001, concluded that a follow-up Phase III is required to further delineate the contamination and assess groundwater quality (December 6, 2001). The estimated cost to conduct a follow-up Phase III ESA is \$15,000. |
|------------------------|--|

Contaminated Site Issues

Thursday, February 21, 2002

RPIS
CS MODULE

Region: Central/Arctic

| | | | |
|-----------------|------------------------------|-------------|-----------|
| Site Name | Brighton Range Rear (LL#488) | Site Number | C F 00038 |
| Site Descriptor | Rear Range | | |
| Province | Ontario | | |

| | | | |
|------------------------|---------------------|-----------|-----|
| Contaminated Site Name | Brighton Rear Range | CS Number | 001 |
|------------------------|---------------------|-----------|-----|

| | | | |
|----------------------|--------------|---------|---------|
| Contaminant Category | Heavy Metals | Specify | |
| Last Updated | | | 12/6/01 |

Impacts

| | | | | | | | |
|----------|-------------------------------------|--------|--------|---------------|-------------------------------------|--------|--------|
| Soil | <input checked="" type="checkbox"/> | Status | Actual | Ground Water | <input checked="" type="checkbox"/> | Status | Actual |
| Sediment | <input type="checkbox"/> | Status | | Surface Water | <input type="checkbox"/> | Status | |
| Air | <input type="checkbox"/> | Status | | | | | |

Sources

| | | | | | |
|---------------|--------------------------|-----------------|-------------------------------------|----------------------------|--------------------------|
| Batteries | <input type="checkbox"/> | Storage Tank(s) | <input type="checkbox"/> | Hazardous Const. Materials | <input type="checkbox"/> |
| Landfill | <input type="checkbox"/> | Fuel Cache | <input type="checkbox"/> | Waste Storage Area | <input type="checkbox"/> |
| Dumping/Waste | <input type="checkbox"/> | Other (Specify) | <input checked="" type="checkbox"/> | Chemical Storage Area | <input type="checkbox"/> |
| Unknown | <input type="checkbox"/> | | | | |
| | | | | | Lead based paint chips |

Contaminated Site Activities

Thursday, February 21, 2002

Region: Central/Arctic

Site Number: C F 00038 Site Name: Brighton Range Rear (LL#488) Site Descriptor: Rear Range Province: Ontario Sector: Canadian Coast Guard

Contaminated Site Name: Brighton Rear Range Status: Under Assessment CS Number: 001

Activity Level Activity Description C

Phase 1 - Site Information Assessment
Phase 3 - Detailed Testing Program and Re

Enhanced Phase 1 ESA with soil sampling.

On October 31, 2001, XCG Consultants conducted a Phase III ESA at Brighton Rear Range. Four boreholes were drilled and one monitoring well was installed. Twenty soil samples were collected (nine of which were collected from the boreholes) and were submitted for metals analysis. A groundwater sample (including a duplicate) was collected and submitted for metal analysis.

A follow-up investigation was conducted in January 2002. The follow-up investigations included the advancement of six more boreholes with the jackhammer within the fenced area of the subject property. Thirty additional soil samples including three duplicates were collected and twenty of these (including two duplicates) were submitted to ETRL for metals analyses. These samples were retrieved from the six additional boreholes that were advanced in January 2002.

Classification

Thursday, February 21, 2002

Region: Central/Arctic

| Site Number | Site Name | Site Descriptor | Province | Sector |
|------------------------|------------------------------|------------------|----------------------------------|-----------------------------|
| C F 00038 | Brighton Range Rear (LL0488) | Rear Range | Ontario | Canadian Coast Guard |
| Contaminated Site Name | | Status | CS Number | |
| Brighton Rear Range | | Under Assessment | 001 | |
| System | Score | Estimated | Classification | Completion Date |
| NCSCS | 59 | 6 | Class 2 - Action Likely Required | Thursday, December 06, 2001 |

Comments

No remediation action plan or management plan is to be recommended at this time. Further investigation of the groundwater contamination on the subject property would have to be carried out on the surrounding private property to determine the source of the contamination. Therefore the Treasury Board liability estimate was set to \$0 as there is no liability associated with this site.

APPENDIX F

Soil Sample Log Information

| Sample ID | Location | Depth of Soil Sample (m) | Significant Observations | Test Soil Parameters | Exceedances |
|--------------------|--|--------------------------|--|----------------------|-------------|
| 488-1 | Centre of property | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-2 | 4 m E of centre of east fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-3 | 4 m SE of SE corner of fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-4 | 4 m S of centre of south fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-5 | 4 m SW of SW corner of fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-6 | 4 m west of centre of west fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-7 | 19 m SE of SE corner of fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-8 | 488-DH1 (2.0 m deep) 4 m SW of SW corner of structure | 2.0 | Wet grey silty clay | Metals | None |
| 488-9 | 21 m S of centre of south fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-10 (Dup 488-9) | 21 m S of centre of south fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-11 | 19 m SW of SW corner of fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |

| Sample ID | Location | Depth of Soil Sample (m) | Significant Observations | Test Soil Parameters | Exceedances |
|------------------------|--|--------------------------|--|----------------------|-------------|
| 488-12 | 488-DH2 (Surficial Soil) 5.5 m NW of NW corner of structure | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-13 | 11.5 m west of centre of west fence | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-14 | 488-DH2 (1.7 m deep) 5.5 m NW of NW corner of structure | 1.7 | Wet grey clay | Metals | None |
| 488-15 | 488-DH3 (Surficial Soil) 5.5 m NE of NE corner of structure | 0.2 | Dark brown organic fill. No odours or staining noted. | Metals | None |
| 488-16 | 488-DH3 (1.7 m deep) 5.5 m NE of NE corner of structure | 1.7 | Wet grey clayey till | Metals | None |
| 488-17 (Dup of 488-16) | 488-DH3 (1.7 m deep) 5.5 m NE of NE corner of structure | 1.7 | Wet grey clayey till | Metals | None |
| 488-18 | 5 m SW of SW corner of structure | 0.2 | Dark brown fill with sand and gravel. No odours or staining noted. | Metals | None |
| 488-19 | 488-DH4 (Surficial Soil) 3 m SE of SE corner of structure | 0.2 | Dark brown organic fill. No odours or staining noted. | Metals | None |
| 488-20 | 488-DH4 (1.2 m deep) 3 m SE of SE corner of structure | 1.2 | Grey Till with rocks and stones | Metals | None |
| 488-BH1-#1 | 3.4m S of SW corner of structure | 0.3 | Grey Sand with Stones | Metals | None |

| Sample ID | Location | Depth of Soil Sample (m) | Significant Observations | Test Soil Parameters | Exceedances |
|---------------------------|---|--------------------------|---|----------------------|-------------|
| 488-BH1-#2 | 3.4m S of SW corner of structure | 0.6 | Dark Brown Sandy Silt | Metals | None |
| 488-BH1-#3 | 3.4m S of SW corner of structure | 0.8 | Brown Sand | Metals | None |
| 488-BH1-#4 Dup of #3 | 3.4m S of SW corner of structure | 0.8 | Brown Sand | Metals | None |
| 488-BH1-#5 | 3.4m S of SW corner of structure | 1.1 | Grey Sandy Clay with Stones | None | |
| 488-BH1-#6 | 3.4m S of SW corner of structure | 1.1 | Grey Sandy Clay with Stones – some brown staining | None | |
| 488-BH2-#8 | 3.6m N and 1m E of SW corner of fence | 0.25 | Brown Sand with Stones | Metals | None |
| 488-BH2-#9 | 3.6m N and 1m E of SW corner of fence | 0.5 | Dark Brown Sandy Silt | Metals | None |
| 488-BH2-#10 | 3.6m N and 1m E of SW corner of fence | 1.1 | Grey Sandy Clay with Stones | Metals | None |
| 488-BH2-#11 | 3.6m N and 1m E of SW corner of fence | 1.6 | Grey Sandy Clay with Stones | None | |
| 488-BH3-#12 | Centre of property | 0.3 | Brown Sand with Stones | Metals | None |
| 488-BH3-#13 Dup of #12 | Centre of property | 0.3 | Brown Sand with Stones | Metals | None |
| 488-BH3-#14 | Centre of property | 0.6 | Dark Brown Sandy Silt | Metals | None |
| 488-BH3-#15 | Centre of property | 0.8 | Blue Coloured Stone with Sand | Metals | None |
| 488-BH4-#16 | 3m N and 1m W of NW corner of structure | 0.1 | Dark Brown Silt | Metals | None |

| Sample ID | Location | Depth of Soil Sample (m) | Significant Observations | Test Soil Parameters | Exceedances |
|-------------|---|--------------------------|-----------------------------------|----------------------|----------------------|
| 488-BH4-#17 | 3m N and 1m W of NW corner of structure | 0.3 | Dark Brown Silty Sand | Metals | None |
| 488-BH4-#18 | 3m N and 1m W of NW corner of structure | 0.5 | Grey Sandy Clay with stones | Metals | None |
| 488-BH4-#19 | 3m N and 1m W of NW corner of structure | 0.9 | Grey Sandy Clay with stones | None | |
| 488-BH4-#20 | 3m N and 1m W of NW corner of structure | 1.7 | Grey Sandy Clay with stones | None | |
| 488-BH5-#21 | 2.7 m NE of NE corner of structure | 0.3 | Brown Sand | Metals | None |
| 488-BH5-#22 | 2.7 m NE of NE corner of structure | 0.45 | Brown Sandy Clay | Metals | • beryllium 1.4 ug/g |
| 488-BH5-#23 | 2.7 m NE of NE corner of structure | 0.7 | Grey Clay | Metals | None |
| 488-BH5-#24 | 2.7 m NE of NE corner of structure | 1.0 | Grey Sandy Clay with stones | None | |
| 488-BH6-#25 | 3 m E of SE corner of structure | 0.1 | Brown Sand | Metals | None |
| 488-BH6-#26 | 3 m E of SE corner of structure | 0.5 | Dark Brown Silty Sand with Stones | Metals | None |
| 488-BH6-#27 | 3 m E of SE corner of structure | 0.7 | Dark Brown Silty Clay | None | |
| 488-BH6-#28 | 3 m E of SE corner of structure | 0.9 | Brown Clay | Metals | • beryllium 1.4 ug/g |
| 488-BH6-#29 | 3 m E of SE corner of structure | 1.1 | Grey Sandy Clay with Stones | None | |

| Sample ID | Location | Depth of Soil Sample (m) | Significant Observations | Test Soil Parameters | Exceedances |
|----------------------------------|---------------------------------------|--------------------------|--------------------------------|----------------------|-------------|
| 488-BH6- #30 Dup of #28 | 3 m E of SE corner of structure | 0.9 | Brown Clay | None | |
| 488-BH6- #31 | 3 m E of SE corner of structure | 1.5 | Grey Sandy Clay with Stones | None | |

NOTES:

Metals analysis includes hydrides: (As, Se, and Hg)

* Sample locations are presented on the site plan in Appendix A.
Analytical results are presented in Tables 1 and 2.
Laboratory reports are provided in Appendix C.

** Criteria for residential/parkland use specified by CCME *Environmental Quality Guidelines* (1999), for all other land use as specified by MOE *Guidelines for Use at Contaminated Sites in Ontario* (September 1998) – Table B.