PHASE II ENVIRONMENTAL SITE ASSESSMENT
WATERFRONT DEVELOPMENT CORPORATION LIMITED
LOT WDC-1, KING STREET
DARTMOUTH, NOVA SCOTIA

JWEL NSD 18009-200

PROJECT NO. NSD18009-200

REPORT TO

WATERFRONT DEVELOPMENT CORPORATION LIMITED

ON

PHASE II ENVIRONMENTAL SITE ASSESSMENT
LOT WDC-1, KING STREET
DARTMOUTH, NOVA SCOTIA

JACQUES WHITFORD ENVIRONMENT LIMITED
3 SPECTACLE LAKE DRIVE
DARTMOUTH, NOVA SCOTIA B3B 1W8
TEL: 902-468-7777
FAX: 902-468-9009

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TABLE OF CONTENTS

Page No.

1.0 INTRODUCTION 1

1.1 Regulatory Framework 1

1.2 Background 2

1.3 Site Description 2

1.4 Scope of Work 3

2.0 METHODOLOGY 4

2.1 Subsurface Investigation 4

2.2 Laboratory Analyses 4

3.0 RESULTS OF THE SUBSURFACE INVESTIGATION 5

3.1 Stratigraphy 5

3.2 Groundwater Conditions 5

3.3 Liquid Phase Petroleum Hydrocarbons 6

3.4 Soil Vapour Concentrations 6

3.5 Laboratory Analysis Results 6

3.5.1 Laboratory Analysis of Soil Samples 6

3.5.2 Laboratory Analysis of Groundwater Samples 7

3.6 Discussion 7

4.0 CONCLUSIONS 8

5.0 RECOMMENDATIONS 8

6.0 CLOSURE 9

LIST OF TABLES, FIGURES, APPENDICES

Tables

Table 1	Laboratory Analysis Schedule	5
Table E-1	Soil Petroleum Hydrocarbon Results	Appendix E
Table E-2	Soil Metals Chemistry	Appendix E
Table E-3	Soil PAH Chemistry	Appendix E
Table E-4	Groundwater Petroleum Hydrocarbon Chemistry	Appendix E
Table E-5	Groundwater Metals Chemistry	Appendix E
Table E-6	Groundwater PAH Chemistry	Appendix E

Figures and Drawings

Figure 1	General Site Location and Topography	Appendix A
Drawing No. NSD18009-200-1	Site Plan and Sampling Location	Appendix A
Drawing No. NSD18009-200-2	Groundwater Contours and Flow Direction	Appendix A

Appendices

Appendix A	Figures
Appendix B	Tier I Lookup Table Criteria Applicability
Appendix C	Ecological Receptor Screening Checklist
Appendix D	Test Pit and Borehole Records
Appendix E	Laboratory Analytical Results

EXECUTIVE SUMMARY

Jacques Whitford Environment Limited (JWEL) was retained by Ms. D. Corbin of Waterfront Development Corporation Limited (WDCL) to conduct an Environmental Site Assessment (ESA) at Lot WDC-1, King Street in Dartmouth, Nova Scotia. The purpose of the investigation was to assess soil and groundwater conditions on the site with respect to potential contaminants identified from previous site assessments including the July 31, 2003 *Phase I Environmental Site Assessment* completed by JWEL, and conduct a Phase II ESA in support of the proposed sale of the property.

The subsurface investigation was carried out in two phases between August 5 and 6, 2003 and on August 14, 2003. It consisted of the completion of 3 boreholes, the excavation of nine test pits, the collection of select soil samples and 3 water samples, and surveying.

Based on the findings of our investigation the following conclusions have been made:

- The stratigraphy generally comprised fill material, consisting of sand, gravel and cobbles with some brick and wood, over slate bedrock.

- Groundwater was encountered at a depth of approximately 5.43 to 7.30 m in the previously installed monitoring wells. The groundwater elevation measurements indicate that the groundwater flow direction is to the east at a hydraulic gradient of 0.03 m/m.

- Ecological habitats are not present within 150 m of the site. Based on the ecological receptor screening, further evaluation of ecological receptors is not required.

- Metal impacts were identified in soil samples (arsenic and lead) and groundwater samples (copper and lead) collected from the site. These impacts are expected to be associated with the fill material present throughout the site as the impacts were relatively common over the site.

- PAH impacts were identified in three soil samples, with a number of different parameters exceeding the applicable guidelines in sample TP8 GS2. Only relatively low levels of PAHs were encountered, suggesting an association with the fill material on site.

Based upon these conclusions the following recommendations have been made:

- Based upon the presence of elevated levels of select metals and PAHs it is considered that the production of a risk management plan is required for the site. Given the proposed end-use of the site it is not anticipated that significant risks to human or ecological receptors are present,

however, the production of a risk management plan will assist in the protection of these receptors following redevelopment of the site. The risk management plan will likely require further groundwater monitoring to confirm groundwater conditions post-redevelopment.

- Following completion of the risk management plan a certificate of compliance could be issued for the site.

This report is subject to the limitations presented in the closure, Section 6.0.

1.0 INTRODUCTION

Jacques Whitford Environment Limited (JWEL) was retained by Ms. D. Corbin of Waterfront Development Corporation Limited (WDCL) to conduct an Environmental Site Assessment (ESA) at Lot WDC-1, King Street in Dartmouth, Nova Scotia. The purpose of the investigation was to assess soil and groundwater conditions on the site with respect to potential contaminants identified from previous site assessments including the July 31, 2003 *Phase I Environmental Site Assessment* completed by JWEL, and conduct a Phase II ESA in support of the proposed sale of the property.

This report is organized in six sections. Section 1 presents background information about the site, explains the regulatory guidelines and their applicability, and describes the scope of work. Section 2 summarises the methodology used for the subsurface investigation. Section 3 provides results of the subsurface investigations. A summary of the investigation and recommendations are provided in Sections 4 and 5, respectively. Section 6 discusses the limitations of the assessment and its findings. Supporting information is provided in the appendices at the end of this report.

1.1 Regulatory Framework

The Nova Scotia Department of the Environment and Labour (NSDEL) adopted risk-based guidelines for petroleum hydrocarbon contaminated sites. The *Guidelines for the Management of Contaminated Sites in Nova Scotia* (March, 1996) sets the framework for management, and the Atlantic RBCA Reference Documentation for Petroleum Impacted Sites Version 1.0 contains risk based Tier I criteria (Tier I) for evaluating sites contaminated with petroleum hydrocarbons. These criteria are contained in Tier I *Look Up Tables* that are based on default conditions for *typical* sites. The criteria are classified by receptor characteristics, groundwater usage, soil type, and fuel type. Users of the Tier I Look Up tables are required to ensure that their site conditions are similar to the default site conditions used to generate the screening criteria. If significant differences exist, site specific remedial criteria should be determined for the site.

An assessment of the applicability of the Tier I Look Up Tables for the subject property is presented in Appendix B. Based on the identified site conditions, the Tier I criteria are considered applicable to the study area, and criteria for a commercial receptor, non-potable groundwater, and sand/gravel soil have been used.

In accordance with the NSDEL Guideline, the Ecological Receptor Screening Checklist has been completed (Appendix C). There are considered to be no ecological habitats located within 150 metres of the site, with the closest potential habitat being the Halifax Harbour, and associated Dartmouth Shipyards approximately 183 m to the south. Therefore, we would recommend that no further assessment of impacts to ecological receptors be carried out.

There are no provincial guidelines for metals, polycyclic aromatic hydrocarbons (PAH) or volatile organic compounds (VOCs), however, federal guidelines are available. The Canadian Council of Ministers of the Environment (CCME) Recommended Canadian Soil Quality Guidelines (updated 2002) are risk-based and are typically used as a preliminary means of evaluating soil.

As there are no applicable provincial or federal regulatory criteria for metals and PAHs in groundwater at a commercial non-potable site (and for some polycylic aromatic hydrocarbons in soil), Jacques Whitford has utilized the Ontario Ministry of the Environment's (MOE) *Guidelines for Use at Contaminated Sites in Ontario* (revised February, 1997) Table B criteria for an industrial/commercial land use in a non-potable groundwater condition with coarse textured soils. The MOE Table B soil and groundwater criteria are protective against exposure from vapours which may migrate to indoor air, and protective for aquatic receptors in surface waters which could be affected by the discharge of groundwater.

Jacques Whitford has applied the MOE Table B criteria for other environmental investigations where no applicable provincial or federal criteria exist, and has obtained regulatory acceptance.

1.2 Background

A Phase I ESA was completed in July 2003 by JWEL. The principle findings of this investigation were that there could be impacts present on the site associated with the former residential and commercial properties on the site. In particular, following the removal of these buildings the site was infilled and graded to its current level and configuration. Other potential sources of impacts to the site could include a garage, blacksmiths and sheet metal works located upgradient of the site in the past. Also, an underground gasoline tank was identified to the north of the intersection of Portland Street and King Street.

Attention was drawn to the fact that bedrock maps indicate the site to be located over an area of high acid generation potential.

Three monitor wells were located on the site. No information on the previous investigation associated with these wells is available for use in this report. However, groundwater samples were collected from these wells due to their proximity to our proposed borehole locations.

1.3 Site Description

The Lot WDC-1, King Street site is legally described by the Service Nova Scotia and Municipal Relations as PID No. 00108902 (Figure 1, Appendix A). The property, which is located at the junction of King Street, Prince Street and Alderney Drive in Dartmouth, Nova Scotia and has an areal extent of approximately 0.54 hectares is currently used as a parking lot. Land-use surrounding the site comprises

residential to the east and west and commercial (Royal Bank and CIBC Bank) to the north. Alderney Drive forms the southern boundary of the site with Halifax Harbour beyond it. A booth for the parking attendant is present on the northeast boundary of the site.

The Site has been graded and slopes gradually to the south and east before dropping sharply to the street level along Prince Street, Alderney Drive and the southeastern boundary of King Street. The area immediately adjoining the Site to the northwest generally slopes to the northeast but is at a higher elevation due to a retaining wall and the site being graded differently.

Based on the Dartmouth Topographic Map 01 446600 63 560 and the observed site topography, regional surface drainage (anticipated groundwater flow direction) appears to be south to east towards Halifax Harbour.

1.4 Scope of Work

The scope of work for the Phase II ESA consisted of the following:

- Conducting a test pit investigation consisting of nine test pit excavations to investigate the potential for contaminants in the soil and fill at the site.
- Conducting a borehole investigation consisting of three boreholes to investigate the potential for contaminants in the soil and to evaluate the geological sequence beneath the site.
- Collection of groundwater samples from three monitor wells located on site in the vicinity of the newly installed boreholes.
- Collecting representative soil samples from each test pit and borehole.
- Submission of selected soil samples for laboratory analysis based on the history of the area, a visual review of each soil sample and the measured soil vapour concentrations.
- Preparation of a report detailing all observations and conclusions made during the investigation.

2.0 METHODOLOGY

2.1 Subsurface Investigation

The subsurface investigation was carried in two phases between August 5 and 6 and on August 14, 2003.

A total of three boreholes (BH1 to BH3) were completed, using a rubber tired all-terrain drill rig supplied by Logan Geotechnical Inc. of Stewiacke, Nova Scotia, under the supervision of JWEL personnel. The boreholes were drilled to depths of 2.5 to 6.7 metres below ground surface (mbgs). The locations of the monitoring wells are shown on Drawing No. NSD18009-200-1 in **Appendix A**. Subsurface conditions encountered in the boreholes were logged by JWEL field personnel at the time of drilling. The locations of the monitoring wells were established in the field by JWEL personnel using conventional survey techniques.

A total of nine test pits (TP1 to TP9) were excavated, using a track mounted backhoe supplied by Paddy's Excavation Ltd. of Waverley, Nova Scotia, under the supervision of JWEL personnel. The test pits were excavated to depths of 0.9 to 2.1 mbgs. The locations of the test pits are shown on Drawing No. NSD18009-200-1 in **Appendix A**. Subsurface conditions encountered in the test pits were logged by JWEL field personnel at the time of excavating. The locations of the test pits were established in the field by JWEL personnel using conventional survey techniques.

Soil samples were recovered from the test pits and boreholes at frequent intervals over their respective depths. The recovered soil samples were stored in clean glass containers and returned to our Dartmouth office to be screened for soil vapour concentrations using a Gastector Model 1238 (with a methane eliminator). Based on the measured soil vapour concentrations, field observations, and historical site activities, selected soil samples were submitted to PSC Analytical laboratory (PSC) in Bedford, Nova Scotia for laboratory analysis.

Groundwater samples were collected from each of the existing monitoring wells following well development. Groundwater samples were submitted to PSC for laboratory analysis.

2.2 Laboratory Analyses

The laboratory analysis schedule completed for this assessment is presented in Table 1 below:

Table 1 Laboratory Analysis Schedule

Potential Environment Concern	Sample Location	Sample Matrix	
		Soil	Groundwater
General fill material on site	TP1, TP3, TP4, TP5, TP7, BH1-3, MW1, MW2, MW3	TPH/BTEX, Metals, PAH (1)	Metals (3), PAH (1)
Migration of potential impacts off-site	MW2, MW3, TP2, TP8, TP9	TPH/BTEX, Metals, PAH (2)	TPH/BTEX (2)
Potential migration of off-site impacts onto site	MW1, TP6, TP7	TPH/BTEX, PAH (2)	TPH/BTEX (1)

Note: The following methodologies were utilized by PSC in analysis of the soil and groundwater samples:
TPH = total petroleum hydrocarbons by GC/FID Atlantic PIRI
BTEX = benzene, toluene, ethyl benzene, and xylenes by purge and trap GC/PID, Atlantic PIRI
PAH = Polyaromatic hydrocarbons by GC/MS, EPA method 8270A;
Metals Scan by ICP-MS, EPA method 30508

3.0 RESULTS OF THE SUBSURFACE INVESTIGATION

3.1 Stratigraphy

The stratigraphic information recorded during the investigation is presented on the Borehole and Test Pit Records in Appendix D. In general, the stratigraphy at the site was found to comprise fill material over bedrock. Bedrock was only positively identified in BH1. The test pits were extended to a depth where no further progress was possible due to the presence of slate bedrock or what appeared to be large boulders.

Fill in BH1 and BH2 was found to comprise loose, brown coarse sand and gravel with slate cobbles, brick and wood which extended to a depth of approximately 4 m. Fill encountered in BH3 was similar but inferred bedrock was encountered at 2.5m below grade.

Fill in the test pits generally the same as in the boreholes, but also with wood, brick and metal present in TP3, wood and bricks in TP8 and organics and brick in TP9.

Where bedrock was positively identified (BH1) it was found to comprise blue/grey slate. This is consistent with the bedrock present in out crops along Alderney Drive.

3.2 Groundwater Conditions

The groundwater elevations in the previously installed (by others) monitor wells measured on August 6, 2003 prior to sampling the monitoring wells were 5.55 mbg, 5.43 mbg and 7.30 mbg for MW1, MW2

and MW3 respectively. The groundwater elevation measurements for August 6, 2003 indicate that the groundwater flow direction is to the east at a hydraulic gradient of 0.03 m/m. The groundwater elevation contours and dominant direction of groundwater flow are shown on Drawing No. NSD18009-200-2 in **Appendix A**.

3.3 Liquid Phase Petroleum Hydrocarbons

Liquid phase petroleum hydrocarbons were not observed in any of the boreholes or test pits completed during this investigation.

3.4 Soil Vapour Concentrations

The soil vapour concentration measured in each of the soil samples is provided on the Borehole and Test Pit Records in Appendix D. The vapour concentrations measured ranged from 0 ppm to 40 ppm.

Soil vapour concentrations vary with both fuel type and age, and it should be noted that the readings are intended to provide only a qualitative indication of volatile hydrocarbon levels and are not directly equivalent to soil analytical results.

3.5 Laboratory Analysis Results

The results of the laboratory analysis of soil and groundwater samples obtained from this investigation are presented in Tables E-1 to E-3, and E-4 to E-6, respectively, in **Appendix E**.

3.5.1 Laboratory Analysis of Soil Samples

TPH/BTEX

Hydrocarbon analysis was conducted on nine soil samples collected from the test pits. Of these samples six had detectable petroleum hydrocarbon concentrations, with TPH (total petroleum hydrocarbons) ranging from 26 mg/kg to 1500 mg/kg. Only three exhibited any BTEX concentrations. No samples were found to have concentrations of petroleum hydrocarbon in excess of the applicable NSDEL Tier I criteria. Hydrocarbons were principally identified by the lab as lube oil. The hydrocarbon analysis results for the soil samples are presented in Table E-1 in Appendix E.

Metals

Fourteen soil samples (and one duplicate) were submitted for metals analysis: three from the boreholes and eleven from the test pits. All of these samples contained concentrations of arsenic in excess of the

applicable guidelines. In addition, six of the samples contained lead in excess of its guideline. The metals analysis results for the soil samples are presented in Table E-2 in Appendix E.

PAH Analysis

Five soil samples (and one duplicate) were submitted for PAH analysis: of these samples, TP8 GS2 contained elevated concentrations of eight PAHs, including benzo(a)pyrene. Elevated concentrations of benzo(a)pyrene were also recorded in TP6 GS2 (and dup) and TP9 GS3. No other occurrences of elevated concentrations of PAHs were recorded. The PAH analysis results for the soil samples are presented in Table E-3 in Appendix E.

3.5.2 Laboratory Analysis of Groundwater Samples

TPH/BTEX

Hydrocarbon analysis was conducted on three groundwater samples (MW1 to MW3). Two of the groundwater samples exhibited petroleum hydrocarbon concentrations ranging from 0.07 mg/l (MW3) to 2.2 mg/l (MW2), neither of which exhibited any BTEX concentrations above laboratory detection limits. None of the petroleum hydrocarbon concentrations exceeded the applicable NSDEL Tier I criteria in the groundwater samples collected. The hydrocarbon analysis results for the groundwater samples are presented in Table E-4 in Appendix E.

Metals

Three groundwater samples were submitted for metals analysis: MW1 to MW3. With the exception of copper and lead in MW1, all of the groundwater samples exhibited non-detectable metals concentrations or satisfied the applicable criteria. The metals analysis results for the groundwater samples are presented in Table E-5 in Appendix E.

PAH Analysis

One groundwater sample was submitted for PAH analysis: MW2. All of the parameters tested for satisfied the applicable criteria. The PAH analysis results for the groundwater samples are presented in Table E-6 in Appendix E.

3.6 Discussion

The results of the laboratory anlaysis on soil and groundwater at the site indicates that only metals in soil (arsenic and lead) and groundwater (copper and lead) and PAHs in three soil samples exceeded the applicable guideline levels. No petroleum hydrocarbon impacts in excess of the applicable guidelines

were encountered. The presence of impacts was not isolated to any particular area of the site and were most likely related to the presence of fill material on the site rather than the migration of impacts onto the site from off-site sources.

4.0 CONCLUSIONS

An Environmental Site Assessment (ESA) was completed at Lot WDC-1, King Street in Dartmouth, Nova Scotia, by JWEL on behalf of Ms. Devery Corbin of Waterfront Development Corporation Limited. The conclusions of this assessment are summarized below.

- The stratigraphy generally comprised fill material, consisting of sand, gravel and cobbles with some brick and wood, over slate bedrock.

- Groundwater was encountered at a depth of approximately 5.43 to 7.30 m in the previously installed monitoring wells. The groundwater elevation measurements indicate that the groundwater flow direction is to the east at a hydraulic gradient of 0.03 m/m.

- Ecological habitats are not present within 150 m of the site. Based on the ecological receptor screening, further evaluation of ecological receptors is not required.

- Metal impacts were identified in soil samples (arsenic and lead) and groundwater samples (copper and lead) collected from the site. These impacts are expected to be associated with the fill material present throughout the site as the impacts were relatively common over the site.

- PAH impacts were identified in three soil samples, with a number of different parameters exceeding the applicable guidelines in sample TP8 GS2. Only relatively low levels of PAHs were encountered, suggesting an association with the fill material on site.

5.0 RECOMMENDATIONS

Based upon the presence of elevated levels of select metals and PAHs it is considered that the production of a risk management plan is required for the site. Given the proposed end-use of the site it is not anticipated that significant risks to human or ecological receptors are present, however, the production of a risk management plan will assist in the protection of these receptors following redevelopment of the site. The risk management plan will likely require further groundwater monitoring to confirm groundwater conditions post-redevelopment.

Following completion of the risk management plan a certificate of compliance could be issued for the site.

6.0 CLOSURE

This report has been prepared for the sole benefit of Waterfront Development Corporation Limited. The report may not be used by any other person or entity without the express written consent of Jacques Whitford Environment Limited (JWEL) and Waterfront Development Corporation Limited.

Any use which a third party makes of this report, or any reliance on decisions made based on it, are the responsibility of such third parties. Jacques Whitford Environment Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the best technical judgement of JWEL based on the data obtained from the work. The conclusions are based on the site conditions encountered by JWEL at the time the work was performed at the specific testing and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on the soil and groundwater conditions, as well as the history of the site reflecting natural, construction and other activities. In addition, analysis has been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, Jacques Whitford Environment Limited cannot warrant against undiscovered environmental liabilities.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

This report was prepared by Tony Windsor, M.Sc., AKC, MInstPet and reviewed by Donald A Carey, M.A.Sc., P.Eng., FGS.

Respectfully submitted,

JACQUES WHITFORD ENVIRONMENT LIMITED

Tony Windsor, M.Sc., AKC, MInstPet
Project Manager

Donald A Carey, M.A.Sc., P.Eng., FGS
Senior Technical Reviewer

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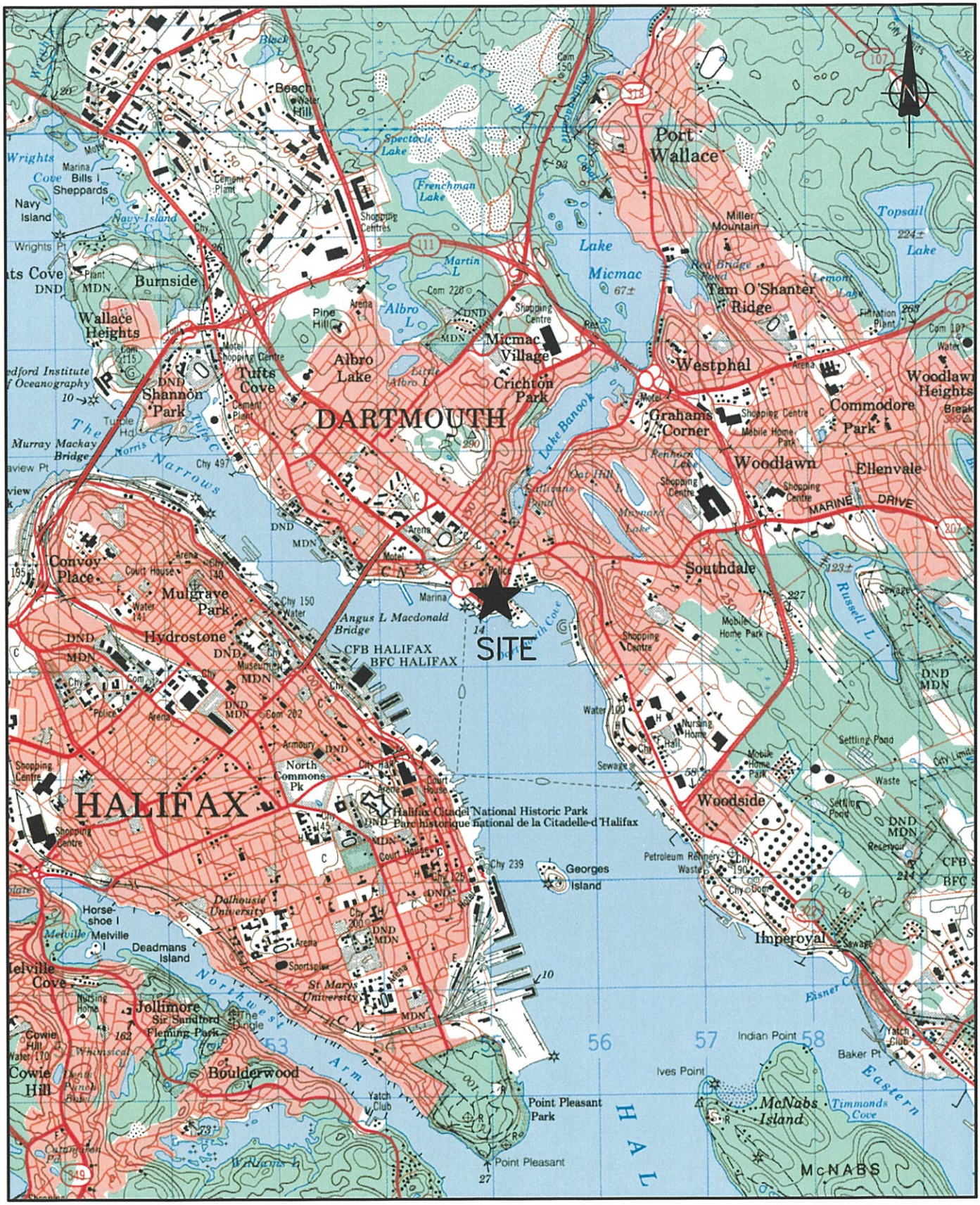
APPENDIX A

FIGURES

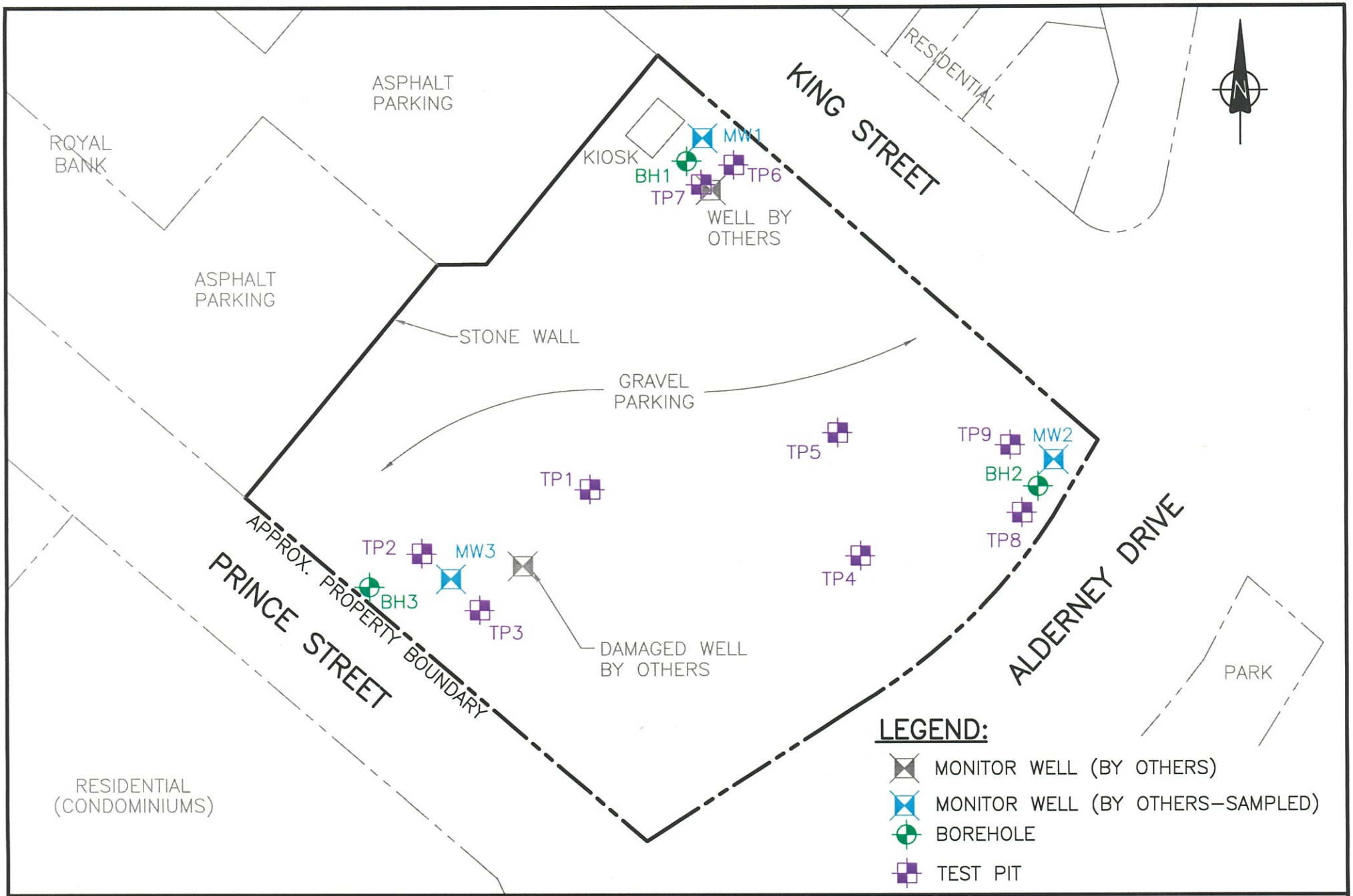


GENERAL SITE LOCATION AND TOPOGRAPHY

SCALE 1:50000

NSD18008

FIGURE 1



WATERFRONT DEVELOPMENT CORPORATION LIMITED

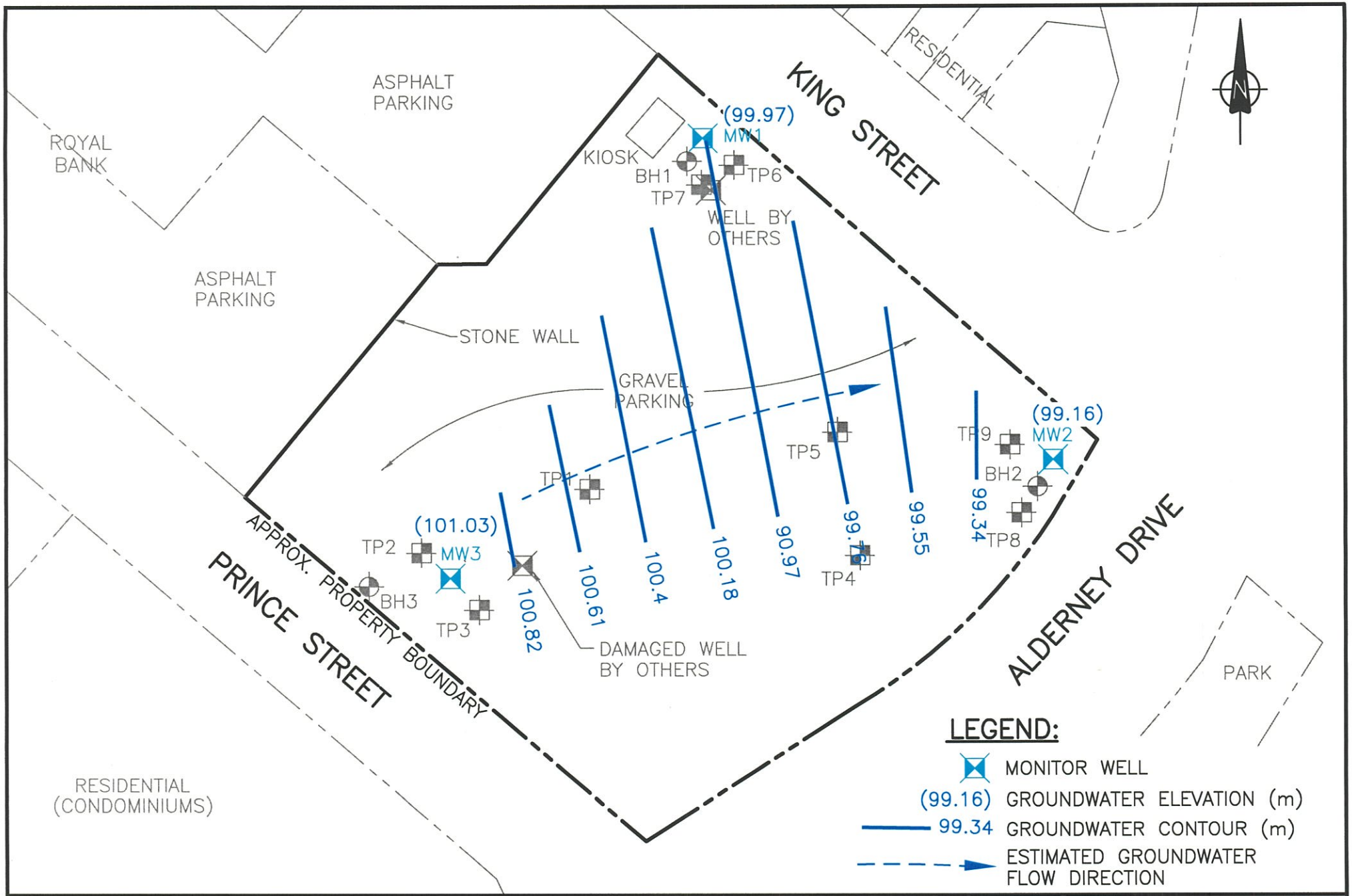
PHASE II ENVIRONMENTAL SITE ASSESSMENT

LOT WDC–1, KING STREET, DARTMOUTH, NS

SITE PLAN AND SAMPLING LOCATIONS

Scale :	Dwn. By:	App'd:
1:600	P.J.SOO	
Date: 2003/09/03	Drawing No.: NSD18009–200–1	

Jacques Whitford



WATERFRONT DEVELOPMENT CORPORATION LIMITED

PHASE II ENVIRONMENTAL SITE ASSESSMENT

LOT WDC–1, KING STREET, DARTMOUTH, NS

GROUNDWATER CONTOURS & FLOW DIRECTION

Scale :	Dwn. By:	App'd:
1:600	P.J.SOO	
Date: 2003/09/03	Drawing No.: NSD18009–200–2	

Jacques Whitford

APPENDIX B

TIER I LOOKUP TABLE CRITERIA APPLICABILITY

APPLICABILITY OF THE NSDEL TIER I LOOK UP TABLES

The Atlantic PIRI committee Tier I Look Up Tables are based on default input factors for *typical* sites. Users of the Tier I Look Up Tables are required to ensure that their site is *typical* and that conditions are similar to the default input factors.

The PIRI documentation provides a number of factors to consider to determine the applicability of the Tier I Look Up Tables. These factors are evaluated in the table below:

Table B.1 Applicability of Tier I Look Up Tables

Constraint	Applies?	Rationale
Is there any liquid free product known or reasonably suspected to be in contact with the site soils, groundwater, sewer line, septic system, etc?	No	Liquid product was not observed during the Phase II ESA subsurface investigation.
Is any further activity required from the Ecological Screening Document?	No	Ecological habitats are not located within 150 m.
Is there any impacted water known or reasonably suspected to be in bedrock?	No	Samples collected from MW1, MW2 and MW3 did not indicate the presence of impacts above guidelines, with the exception of naturally occurring substances e.g aluminum, iron
Is the seasonal high water table at or above any impacted basement floor?	No	No basements currently present or expected to go below high water table in future.
Are there any known or reasonably suspected compounds of concern on site that are not identified in the look up table?	Yes	Elevated metals and PAH concentrations were detected in the soil and elevated metal concentrations were detected in the groundwater.
Do any groundwater resource protection policies (ie. Protected aquifer or water shed for future drinking water use) apply to the area of the site or plume?	No	The area is serviced by a municipal water supply. No municipal or provincial protection policies are known to apply to this area.
Do the site conditions significantly differ from those of the default parameters?	No	The site conditions are such that the Tier I Look Up Tables in addition to applicable CCME criteria are conservative for this site.

If the answer to any of the above questions is Yes, the Look Up table may not be applicable and consequently it is necessary to develop site-specific remedial criteria using a Tier II or a Tier III approach.

The Look-up tables are considered applicable. Metals and PAHs have been screened against alternative guidelines.

APPENDIX C

ECOLOGICAL RECEPTOR SCREENING CHECKLIST

REFERENCE GUIDELINES

FOR

ECOLOGICAL RECEPTOR SCREENING

IN ATLANTIC CANADA

ATLANTIC PARTNERS IN RBCA IMPLEMENTATION

PURPOSE

This document provides guidance for conducting an Ecological Receptor Screening at a site impacted with hydrocarbons. This is a qualitative evaluation designed to determine whether or not additional data is required to quantify risks to ecological receptors through a tiered Ecological Risk Assessment (ERA).

This protocol is to be used in conjunction with the Atlantic RBCA Risk Assessment process.

The components of this screening assessment consist of a check list format to identify the potential receptors at risk and the presence of exposure pathways.

These practices are consistent with the recommended tiered approach from the National Contaminated Sites Remediation Program (NCSRP) as published by Environment Canada

The following guidelines are intended to be the minimum requirements for a screening assessment. They should in no way be construed as limiting, if your professional judgment determines that additional or different evaluation is required for a specific site.

INTRODUCTION

The components of this evaluation are divided into two steps. Step 1 identifies presence of ecological receptors on or adjacent to the site, within a distance of 150 meters. This distance is subject to professional judgment.

Step 2 determines the potential for the ecological receptors to be exposed to hydrocarbon compounds . Ecological receptor exposure to risk from chemical compounds requires all of the following to be satisfied:

- presence of receptors,
- potential pathways and
- presence of toxicity.

Further ERA activities should not be required if one of these conditions is missing.

1) ECOLOGICAL HABITAT

Are any of the following within 150 meters of the site:

YES/NO

NO	Wetland habitats such as marshes, swamps, tidal flats, beaches
NO	Aquatic habitats such as rivers, lakes or streams
NO	Forested habitats (50 acres or more)
NO	Grassland habitats
NO	Provincial/National parks or ecological reserve
NO	Rare, threatened or endangered species populations
NO	Other critical or sensitive habitat for wildlife, migratory species

If the answer is NO to ALL questions, then no habitat of potential concern is identified. There is no further action required.

If the answer to any question is "YES", then proceed to the next step, Exposure Assessment.

2) EXPOSURE ASSESSMENT

YES/NO

Can dissolved hydrocarbons in groundwater reach any receptor habitat identified above now or in the future?

Can LNAPL (Light Non Aqueous Phase Liquids) reach receptor habitat identified above?

Can hydrocarbons reach receptor habitat identified above via surface runoffs?

If the site soils or surface water are not accessible due to pavement or other barriers, skip the next two questions.

Is there a potential for direct absorption of contaminants through skin?

Is there a potential for oral consumption of contaminated soils, water, plants?

Have hydrocarbons, associated with the site being investigated, been known to be present in any of the soils, sediments, surface water of the receptor habitats identified above at concentrations greater than CCME ecologically-based guidelines?

If the answer to any questions above is YES, then further assessment is required.

Additional data should be gathered to enhance the knowledge of the site-specific situation such as; fate and transport of contaminants, description of the receptor of concerns, preliminary toxicity estimates and mitigation options. (Tiered ERA)

The results of this screening assessment should be documented in reports prepared by the Site Professional. It should detail answers to the questions above and provide documentation or rationale for the answers provided.

References:

1) ASTM, Standard Provisional Guide for Risk-based Corrective Action, PS104-98, Appendix x5 Qualitative Ecological Exposure Assessment, ASTM publication, 1998

2) BRITISH COLUMBIA Ministry of Environment, Lands and Parks, 1998. Guidance and Checklist for Tier 1 Ecological Risk Assessment of Contaminated Sites in British Columbia. Landis et al.. January 1998.

3) ENVIRONMENT CANADA, 1994. A Framework for Ecological Risk Assessment at Contaminated Sites in Canada: Review and Recommendations. Scientific series No 199, C. Gaudet, EVS Environment Consultants, ESSA Environmental and Social Systems Analysts, Ottawa Ont. 1994

APPENDIX D

TEST PIT &
BOREHOLE RECORDS

TEST PIT RECORD

TP1

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.
PROJECT No. NSD18009
LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS
TEST PIT No. TP1
DATES: DUG 2003/07/31 WATER LEVEL N/A
DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
		GRADE								
0		Loose, light brown sand and gravel, some silt: FILL			GS	1	10	-	N	
					GS	2	10	*	N	
					GS	3	15	**	N	
1		End of test pit. NOTE: * Denotes sample submitted for METALS and TPH/BTEX analysis ** Denotes sample submitted for METALS and PAH analysis								
2										
3										
4										
5										
6										
7										
8										

App'd Sep 8 2003 13:20:28

HM 03/09/08

TEST PIT RECORD

TP2

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.
PROJECT No. NSD18009
LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS
TEST PIT No. TP2
DATES: DUG 2003/07/31 WATER LEVEL N/A
DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
0		GRADE								
		Compact, coarse sand and gravel with silt: FILL			GS	1	10	-	N	
					GS	2	15	-	N	
					GS	3	15	MET. TPH BTEX	N	
1		End of test pit.								
2										
3										
4										
5										
6										
7										
8										

App'd Sep 4 2003 12:54:41

HM 03/09/04

TEST PIT RECORD

TP3

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.

PROJECT No. NSD18009

LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS

TEST PIT No. TP3

DATES: DUG 2003/07/31 WATER LEVEL N/A

DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
0		GRADE								
0		Loose, dark brown silty sand with gravel and wood, metal, brick and wire: FILL			GS	1	10	-	N	
					GS	2	15	-	N	
					GS	3	10	-	N	
1										
					GS	4	10	MET. TPH BTEX	N	
2		End of test pit.								
3										
4										
5										
6										
7										
8										

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HM 03/09/08

TEST PIT RECORD

TP4

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.

PROJECT No. NSD18009

LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS

TEST PIT No. TP4

DATES: DUG 2003/07/31 WATER LEVEL N/A

DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
		GRADE								
0		Loose, light brown silty sand with gravel: FILL			GS	1	10	-	N	
					GS	2	5	*	N	
					GS	3	10	-	N	
1		End of test pit. NOTE: * Denotes sample submitted for METALS and TPH/BTEX analysis								
2										
3										
4										
5										
6										
7										
8										

App'd Sep 8 2003 13:20:29

HM 03/09/08

TEST PIT RECORD

TP5

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.
PROJECT No. NSD18009
LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS
TEST PIT No. TP5
DATES: DUG 2003/07/31 WATER LEVEL N/A
DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
0		GRADE								
0		Loose, brown silty sand with gravel and cobbles: FILL			GS	1	10	-	N	
					GS	2	5	-	N	
1					GS	3	15	*	N	
2		End of test pit. NOTE: * Denotes sample submitted for METALS and TPH/BTEX analysis								
3										
4										
5										
6										
7										
8										

App'd Sep 8 2003 13:26:59

HM 03/09/08

TEST PIT RECORD

TP6

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.

PROJECT No. NSD18009

LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS

TEST PIT No. TP6

DATES: DUG 2003/07/31 WATER LEVEL N/A

DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
0		GRADE								
		Loose, dark brown coarse silty sand with cobbles and slate chips: FILL			GS	1	15	-	N	
					GS	2	15	MET PAH	N	
		Loose, light brown fine silty sand with cobbles: FILL								
1		Loose, dark brown coarse silty sand with cobbles and slate chips: FILL			GS	3	10	MET. TPH BTEX	N	
		End of test pit.								
2										
3										
4										
5										
6										
7										
8										

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HM 03/09/04

TEST PIT RECORD

TP7

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.
PROJECT No. NSD18009

LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS
TEST PIT No. TP7

DATES: DUG 2003/07/31 WATER LEVEL N/A
DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
		GRADE								
0		Loose, brown silty sand with gravel: FILL			GS	1	10	-	N	
					GS	2	10	-	N	
					GS	3	5	*	N	
1										
					GS	4	0	-	N	
2		End of test pit.								
		NOTE:								
		* Denotes sample submitted for METALS and TPH/BTEX and PAH analysis								
3										
4										
5										
6										
7										
8										

App'd Sep 8 2003 13:28:57

HM 03/09/08

TEST PIT RECORD

TP8

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.
PROJECT No. NSD18009
LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS
TEST PIT No. TP8
DATES: DUG 2003/07/31 WATER LEVEL N/A
DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
0		GRADE								
0		Loose, light brown silty sand with wood and bricks: FILL			GS	1	5	-	N	
					GS	2	5	PAH	N	
1					GS	3	0	MET. TPH BTEX	N	
		End of test pit.								
2										
3										
4										
5										
6										
7										
8										

HM 03/09/04

App'd Sep 4 2003 12:54:44

TEST PIT RECORD

TP9

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.
PROJECT No. NSD18009
LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS
TEST PIT No. TP9
DATES: DUG 2003/07/31 WATER LEVEL N/A
DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLE TYPE	SAMPLE NUMBER	VOC ppm (% LEL)	OTHER TESTS	HYDROCARBON ODOURS	REMARKS
0		GRADE								
0		Loose, dark brown silty sand with gravel, organics and brick: FILL			GS	1	5	-	N	
					GS	2	5	MET. TPH BTEX	N	
1					GS	3	5	PAH	N	
		End of test pit.								
2										
3										
4										
5										
6										
7										
8										

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HM 03/09/04

BOREHOLE RECORD

BH1

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.

PROJECT No. NSD18009

LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS

BOREHOLE No. BH1

DATES: BORING 2003/08/05

WATER LEVEL N/A

DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	SAMPLES OTHER TESTS	HYDROCARBON ODOUR	VOC ppm,(% LEL)	APPARENT MOISTURE CONTENT	WATER LEVEL	FREE HYDROCARBON	REMARKS
	99.98	GRADE				mm								
0		Loose, brown coarse sand and gravel with slate cobbles: FILL		SS	1	400	14	MET.	N	0	D		N	
1				SS	2	300	15	-	N	0	D		N	
				SS	3	0	11	-	N	-	D		N	
2				SS	4	400	18	-	N	0	D		N	
				SS	5	450	34	-	N	5	D		N	
3				SS	6	425	17	-	N	0	D		N	
	96.02			SS	7	250	50/0	-	N	5	D		N	
4		Blue/grey SLATE.												
5														
6	93.28													
		End of borehole.												
7														
8														

MBH/MW 03/09/04

App'd Sep 4 2003 12:54:8

BOREHOLE RECORD

BH2

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.

PROJECT No. NSD18009

LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS

BOREHOLE No. BH2

DATES: BORING 2003/08/05 WATER LEVEL N/A

DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	SAMPLES OTHER TESTS	HYDROCARBON ODOUR	VOC ppm,(% LEL)	APPARENT MOISTURE CONTENT	WATER LEVEL	FREE HYDROCARBON	REMARKS
	101.26	GRADE				mm								
0		Loose, brown sand with gravel and slate cobbles: FILL		SS	1	325	15	MET.	N	5	M		N	
1				SS	2	575	6	-	N	0	M		N	
				SS	3	0	4	-	N	0	D		N	
	99.46													
2		Loose, brown sand with gravel, brick and wood: FILL		SS	4	150	14	-	N	-	D		N	
				SS	5	325	15	-	N	0	D		N	
3				SS	6	300	23	-	N	0	D		N	
	97.30			SS	7	225	50/0	-	N	0	D		N	
4		End of borehole on inferred slate.												
5														
6														
7														
8														

App'd Sep 4 2003 12:54:9

MBH/MW 03/09/04

BOREHOLE RECORD

BH3

CLIENT WATERFRONT DEVELOPMENT CORPORATION LTD.
PROJECT No. NSD18009
LOCATION LOT WDC-1, KING STREET, DARTMOUTH, NS
BOREHOLE No. BH3
DATES: BORING 2003/08/06
WATER LEVEL N/A
DATUM ASSUMED

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	SAMPLES OTHER TESTS	HYDROCARBON ODOUR	VOC ppm,(% LEL)	APPARENT MOISTURE CONTENT	WATER LEVEL	FREE HYDROCARBON	REMARKS
	101.03	GRADE				mm								
0		Loose, brown sand with gravel and slate chips: FILL		SS	1	200	50/150	-	N	40	M		N	
				SS	2	225	50/0	MET.	N	40	D		N	
1				SS	3	125	50/0	-	N	40	D		N	
				SS	4	75	50/0	-	N	40	D		N	
2	98.53			SS	5	25	50/0	-	N	-	D		N	
		End of borehole on inferred slate.												
3														
4														
5														
6														
7														
8														

App'd Sep 4 2003 12:54:10

MBH/MW 03/09/04

APPENDIX E

LABORATORY ANALYTICAL RESULTS

Table E-1 **Soil Petroleum Hydrocarbon Chemistry**
Lot WDC-1, King Street, Dartmouth, NS
JWEL Project No. NSD18009-200

Sample ID	Sample Depth (mbg)	Date Collected	BTEX Parameters (mg/kg or ppm)				Total Petroleum Hydrocarbons (mg/kg or ppm)				Resemblance
			Benzene	Toluene	Ethyl-Benzene	Xylenes	C_6-C_{10} Gas	C_{10}-C_{21} Fuel	C_{21}-C_{32} Lube	Modified TPH	
TP1 GS2	0.3-0.6	14-Aug-03	nd	nd	nd	nd	nd	nd	nd	nd	-
TP2 GS3	0.6-0.9	14-Aug-03	nd	0.045	nd	nd	nd	nd	26	26	Lube oil range
TP3 GS4	0.9-2.1	14-Aug-03	nd	nd	nd	nd	nd	97	240	330	Lube oil fraction, interference from possible PAHs
TP4 GS2	0.3-0.6	14-Aug-03	nd	nd	nd	nd	nd	nd	nd	nd	-
TP5 GS3	0.6-1.5	14-Aug-03	nd	nd	nd	nd	nd	nd	nd	nd	-
TP6 GS3	0.6-1.5	14-Aug-03	nd	nd	nd	nd	nd	120	260	380	Lube oil range, interfence from possible PAHs
TP7 GS2	0.3-0.6	14-Aug-03	0.07	0.115	nd	0.173	nd	110	190	300	Lube oil range, interfence from possible PAHs
TP8 GS3	0.6-1.5	14-Aug-03	nd	nd	nd	nd	nd	500	980	1500	Lube oil fraction, interference from possible PAHs
TP9 GS2	0.3-0.6	14-Aug-03	0.236	0.779	0.149	0.971	5.5	470	980	1500	Gasoline fraction, Lube oil fraction, interference from possible PAHs
EQL			0.025	0.025	0.025	0.050	2.5	15.0	15.0	32.5	-
Surface Soil Screening Criteria (< 1mbg)			120	4800	2400	3200	-	-	-	3200 (gas) 1740 (fuel) 2800 (lube)	-
Subsurface Soil Screening Criteria (>1mbg)			1.4	34	20	25	-	-	-	360 (gas) 10,000 (fuel) 10,000 (lube)	-

Notes:

1. nd = below detectable limits
2. Modified TPH = total petroleum hydrocarbons excluding total BTEX
3. Screening Criteria = PIRI Tier I criteria from the Atlantic *Partnership In RBCA (Risk-Based Corrective Action) Implementation* Tier I Look Up Table (commercial property, non-potable groundwater use, sand-type soil)
4. (dup) = laboratory duplicate
5. mbg = metres below grade
6. EQL = laboratory estimated quantitation limit for routine analysis
7. **Bold** indicates exceedance of the PIRI Tier I screening criteria

Table E-4 Groundwater Petroleum Hydrocarbon Chemistry
Lot WDC-1, King Street, Dartmouth, NS
JWEL Project No. NSD18009-200

Sample ID & depth (mbg)	Date Collected	BTEX Parameters (mg/L or ppm)				Total Petroleum Hydrocarbons (mg/L or ppm)				Resemblance
		Benzene	Toluene	Ethyl-Benzene	Xylenes	C_6-C_{10} Gas	C_{10}-C_{21} Fuel	C_{21}-C_{32} Lube	Modified TPH	
MW1	8-Aug-03	nd	nd	nd	nd	nd	nd(0.06)	nd	nd	-
MW2	6-Aug-03	nd	nd	nd	nd	0.02	2	0.2	2.2	Weathered fuel oil fraction
MW3	6-Aug-03	nd	nd	nd	nd	nd	0.07	nd	0.07	Fuel Oil Range
EQL		0.025	0.025	0.025	0.050	2.5	15.0	15.0	32.5	-
PIRI Tier I criteria		4.7	20	20	20	-	-	-	20 (gas) 20 (diesel) 20 (lube)	-

Notes:

1. nd = below detectable limits
2. Modified TPH = total petroleum hydrocarbons excluding total BTEX
3. PIRI Tier I = criteria from the Atlantic *Partnership In RBCA (Risk-Based Corrective Action) Implementation* Tier I Look Up Table (commercial property, non-potable groundwater use, sand-type soil)
4. n/a = not applicable
5. mbg = metres below grade
6. EQL = laboratory estimated quantitation limit for routine analysis

Table E-5 **Groundwater Metals Chemistry**
Lot WDC-1, King Street, Dartmouth, NS
JWEL Project No. NSD18009-200

Parameter	EQL (µg/L)	MOE Guideline (µg/l)	Sample ID		
			MW1	MW2	MW3
			6-Aug-03	6-Aug-03	6-Aug-03
Aluminum	10	--	67000	3800	90
Antimony	2	16000	nd(20)	nd(20)	nd
Arsenic	2	480	25	nd(20)	nd
Barium	6	23000	380	77	52
Beryllium	2	53	nd(20)	nd(20)	nd
Bismuth	2	--	nd(20)	nd(20)	nd
Boron	5	50000	150	59	16
Cadmium	0.3	11	nd(3)	nd(3)	nd
Chromium	2	2000	130	nd(20)	nd
Cobalt	1	100	63	nd(10)	5
Copper	2	23	**210**	nd(20)	2
Iron	50	--	140000	14000	140000
Lead	0.5	32	**230**	6.1	nd
Manganese	2	--	1000	9700	920
Molybdenum	2	7300	32	nd(20)	nd
Nickel	2	1600	170	nd(20)	14
Selenium	2	50	nd(20)	nd(20)	nd
Silver	0.5	1.2	nd(5)	nd(5)	nd
Strontium	5	--	1700	660	280
Thallium	0.1	400	nd(1)	nd(1)	nd
Tin	2	--	nd(20)	nd(20)	nd
Titanium	2	--	34	150	4
Uranium	0.1	--	19	1.5	0.2
Vanadium	2	200	81	nd(20)	nd
Zinc	5	1100	680	nd(50)	58

Notes:

1. "--" = no criteria
2. nd = below detectable limits
3. MOE Guideline - Ontario Ministry of Environment Guideline for non-potable groundwater, Table B
4. EQL = laboratory estimated quantitation limit for routine analysis
5. **Bold** indicates exceedence of applicable guidline
6. ( ) Indiates elevated EQLs

Table E-6

Groundwater PAH Chemistry
Lot WDC-1, King Street, Dartmouth, NS
JWEL Project No. NSD18009-200

Parameter	EQL (µg/L)	MOE Guideline (µg/L)	Sample ID
			MW2
			6-Aug-03
Naphthalene	0.2	5900	0.2
2-Methylnaphthalene	0.05	13000	0.1
1-Methylnaphthalene	0.05	13000	11
Acenapththylene	0.02	2000	0.02
Acenapthene	0.01	1700	1.9
Fluorene	0.01	290	3
Phenanthrene	0.01	63	1.2
Anthracene	0.01	12	0.09
Fluoranthene	0.01	130	0.3
Pyrene	0.01	40	0.25
Benz(a)anthracene	0.01	5	0.13
Chrysene	0.01	3	0.12
Benzo(b)fluoranthene	0.01	7	0.06
Benzo(k)fluoranthene	0.01	0.4	0.06
Benzo(a)pyrene	0.01	1.9	0.07
Perylene	0.01	--	0.02
Indeno(1,2,3-cd)pyrene	0.01	0.27	0.02
Dibenz(a,h)anthracene	0.01	0.25	nd
Benzo(ghi)perylene	0.01	0.2	0.02

Notes:

1. "--" = no criteria
2. nd = below detectable limits
3. MOE Guideline - Ontario Ministry of Environment Guideline for non-potable groundwater, Table B
4. EQL = laboratory estimated quantitation limit for routine analysis

PSC ANALYTICAL SERVICES

Inorganic Parameters

Client : Jacques Whitford Environment Ltd. WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8 FAX # : 468-9009
PSC Project Number : 0313706H Printed : 2003/08/26
Client Project Number : NSD 18089 Reported : 2003/08/26

Matrix			Soil	Soil	Soil	Soil
Philip ID			03-H052562	03-H052563	03-H052564	03-H052565
Client ID			TP1 GS2	TP2 GS3	TP3 GS4	TP4 GS2
Date Sampled (y/m/d)			03/08/14	03/08/14	03/08/14	03/08/14
Date Received (y/m/d)			03/08/19	03/08/19	03/08/19	03/08/19
Analyte	Units	EQL				
HNO3 Peroxide Digestion		-	20030822-A	20030822-A	20030822-B	20030822-B
Aluminum	mg/kg	10	7600	9300	6500	11000
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	62.	50.	29.	54.
Barium	mg/kg	5.	20.	39.	62.	10.
Beryllium	mg/kg	2.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	nd	nd	nd	nd
Chromium	mg/kg	2.	13.	17.	13.	15.
Cobalt	mg/kg	1.	6.	4.	5.	6.
Copper	mg/kg	2.	24.	30.	19.	26.
Iron	mg/kg	50	50000	49000	27000	56000
Iron Recovery	%	-	90.	90.	80.	80.
Lead	mg/kg	0.5	22.	140	170	26.
Manganese	mg/kg	2.	290	290	280	250
Molybdenum	mg/kg	2.	6.	6.	3.	6.
Nickel	mg/kg	2.	11.	9.	12.	16.
Selenium	mg/kg	2.	nd	nd	nd	nd

Legend EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit.
ND = Not Detected, instrument did not detect anything above standard EQL.
ND ( ) = Not Detected at the elevated EQL specified, due to matrix interferences or sample pre-dilution.
- = Dash is reported when parameter not requested in sample.

Note : Soil results are expressed as air dry weight basis.
: Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters page : 3

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313706H
Client Project Number : NSD 18089

FAX # : 468-9009
Printed : 2003/08/26
Reported : 2003/08/26

Analyte	Units	EQL				
Matrix			Soil	Soil	Soil	Soil
Philip ID			03-H052566	03-H052567	03-H052568	03-H052569
Client ID			TP5 GS3	TP6 GS3	TP7 GS2	TP8 GS3
Date Sampled (y/m/d)			03/08/14	03/08/14	03/08/14	03/08/14
Date Received (y/m/d)			03/08/19	03/08/19	03/08/19	03/08/19
HNO3 Peroxide Digestion		-	20030822-B	20030822-B	20030822-B	20030822-B
Aluminum	mg/kg	10	11000	8800	11000	4500
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	92.	39.	48.	19.
Barium	mg/kg	5.	14.	100	110	58.
Beryllium	mg/kg	2.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	nd	nd	0.3	0.6
Chromium	mg/kg	2.	16.	15.	16.	9.
Cobalt	mg/kg	1.	5.	6.	5.	4.
Copper	mg/kg	2.	31.	33.	43.	14.
Iron	mg/kg	50	58000	33000	39000	15000
Iron Recovery	%	-	80.	80.	80.	80.
Lead	mg/kg	0.5	39.	300	340	320
Manganese	mg/kg	2.	350	460	300	210
Molybdenum	mg/kg	2.	5.	3.	4.	2.
Nickel	mg/kg	2.	12.	16.	12.	11.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	nd	21.	18.	51.

Legend EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit.
ND = Not Detected, instrument did not detect anything above standard EQL.
ND ( ) = Not Detected at the elevated EQL specified, due to matrix interferences or sample pre-dilution.
- = Dash is reported when parameter not requested in sample.

Note : Soil results are expressed as air dry weight basis.
: Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters page : 5

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313706H
Client Project Number : NSD 18089

FAX # : 468-9009
Printed : 2003/08/26
Reported : 2003/08/26

Matrix			Soil	Soil	Soil	Soil
Philip ID			03-H052570	03-H052571	03-H052572	03-H052573
Client ID			TP9 GS2	TP1 GS3	TP6 GS2	TP6 GS2 DUP
Date Sampled (y/m/d)			03/08/14	03/08/14	03/08/14	03/08/14
Date Received (y/m/d)			03/08/19	03/08/19	03/08/19	03/08/19
Analyte	Units	EQL				DUP
HNO3 Peroxide Digestion		-	20030822-B	20030822-B	20030822-B	20030822-B
Aluminum	mg/kg	10	9800	8000	9600	9300
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	56.	30.	59.	62.
Barium	mg/kg	5.	150	56.	83.	68.
Beryllium	mg/kg	2.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	0.3	nd	0.3	nd
Chromium	mg/kg	2.	17.	13.	16.	16.
Cobalt	mg/kg	1.	5.	2.	5.	5.
Copper	mg/kg	2.	50.	12.	36.	37.
Iron	mg/kg	50	47000	29000	49000	50000
Iron Recovery	%	-	80.	80.	80.	80.
Lead	mg/kg	0.5	970	52.	290	280
Manganese	mg/kg	2.	350	210	330	330
Molybdenum	mg/kg	2.	4.	5.	5.	5.
Nickel	mg/kg	2.	17.	5.	11.	12.
Selenium	mg/kg	2.	2.	nd	2.	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	13.	9.	16.	14.

Legend EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit.
ND = Not Detected, instrument did not detect anything above standard EQL.
ND ( ) = Not Detected at the elevated EQL specified, due to matrix interferences or sample pre-dilution.
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Note : Soil results are expressed as air dry weight basis.
: Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters page : 7

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3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313706H
Client Project Number : NSD 18089

FAX # : 468-9009
Printed : 2003/08/26
Reported : 2003/08/26

Certificate of Analysis

Method Summaries:

- Available Trace Metals in soils/sediments: Nitric/Peroxide Digestion. Ref:USEPA Method #3050B.

All work recorded herein has been done in accordance with normal professional standards using accepted testing technologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. The results relate only to the items tested. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis performed. There is no other warranty expressed or implied. Excess sample will be discarded upon expiry of hold time.

Analyses reviewed by:

Inorganics Manager : _____
Jerry Arenovich

Organic Parameters page : 2

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Bedford, NS Canada B4B 1G9
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Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313706H
Client Project Number : NSD 18089

FAX # : 468-9009
Printed : 2003/08/26
Reported : 2003/08/26

Matrix			Soil	Soil	Soil	Soil
Philip ID			03-H052566	03-H052567	03-H052568	03-H052569
Client ID			TP5 GS3	TP6 GS3	TP7 GS2	TP8 GS3
Date Sampled (y/m/d)			03/08/14	03/08/14	03/08/14	03/08/14
Date Received (y/m/d)			03/08/19	03/08/19	03/08/19	03/08/19
Analyte	Units	EQL				
TEH C11-32 Soil Event #		-	HN83	HN83	HN83	HN83
VPH in Soil Event #		-	HN67	HN67	HN67	HN67
Benzene	mg/kg	0.025	nd	nd	0.070	nd
Toluene	mg/kg	0.025	nd	nd	0.115	nd
Ethylbenzene	mg/kg	0.025	nd	nd	nd	nd
Xylenes	mg/kg	0.050	nd	nd	0.173	nd
C6 - C10 HC (less BTEX)	mg/kg	2.5	nd	nd	nd	nd
>C10-C21 (Fuel Range)	mg/kg	15.	nd	120	110	500
>C21-C32 (Lube Range)	mg/kg	15.	nd	260	190	980
Modified TPH - Tier 1	mg/kg	32.	nd	380	300	1500
TEH Surrogate (IBB)	% Rec.	-	95.	96.	97.	92.
TEH Surrogate (C32)	% Rec	-	91.	123.	127.	124.
VPH Surrogate (IBB)	% Rec.	-	95.	75.	76.	77.
Moisture	%	-	10.	11.	12.	16.

Note: The product resemblance comments are provided for general guidance only and may not be accurate. Resemblances are based on comparison with available reference standards. Due to chromatographic similarity of certain products, the influence of weathering effects and interference of non-petrogenic compounds, it is not always possible to positively identify products.

Notes: Modified TPH - Tier 1 (C6-C32) does not include BTEX

03-H052567	TP6 GS3	Lube oil range; interference from possible PAHs.
03-H052568	TP7 GS2	Lube oil range; interference from possible PAHs.
03-H052569	TP8 GS3	Lube oil fraction; interference from possible PAHs.

EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit. For soils, zero %moisture is assumed. The moisture corrected EQL = EQL/(1-(%moisture/100))
ND ( ) = Analyte was not detected above the EQL. Raised EQL listed in Parenthesis.
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REC = Surrogate Recovery Values are results of PSC quality control tests.
Note : Soil results are expressed on a dry weight basis.
: Biota results are expressed on a wet weight basis.

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Organic Parameters page : 4
Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8 FAX # : 468-9009
PSC Project Number : 0313706H Printed : 2003/08/26
Client Project Number : NSD 18089 Reported : 2003/08/26

Matrix			Soil	Soil	Soil	Soil
Philip ID			03-H052570	03-H052571	03-H052572	03-H052573
Client ID			TP9 GS2	TP1 GS3	TP6 GS2	TP6 GS2 DUP
Date Sampled (y/m/d)			03/08/14	03/08/14	03/08/14	03/08/14
Date Received (y/m/d)			03/08/19	03/08/19	03/08/19	03/08/19
Analyte	Units	EQL	(Continued from previous page)			
Fluoranthene	mg/kg	0.05	-	nd	6.3	5.0
Pyrene	mg/kg	0.05	-	nd	4.4	4.0
Benz[a]anthracene	mg/kg	0.05	-	nd	2.5	2.2
Chrysene	mg/kg	0.05	-	nd	2.5	2.3
Benzo[b]fluoranthene	mg/kg	0.05	-	nd	1.8	1.7
Benzo[k]fluoranthene	mg/kg	0.05	-	nd	1.8	1.7
Benzo[a]pyrene	mg/kg	0.05	-	nd	2.2	1.9
Perylene	mg/kg	0.05	-	nd	0.54	0.48
Indeno[1,2,3-cd]pyrene	mg/kg	0.05	-	nd	1.2	1.1
Dibenz[a,h]anthracene	mg/kg	0.05	-	nd	0.30	0.26
Benzo[ghi]perylene	mg/kg	0.05	-	nd	1.0	0.97
D8 Acenaphthylene Surr.	% Rec.	-	-	94.	84.	107.
D10 Anthracene Surr.	% Rec.	-	-	88.	85.	100.
D10 Pyrene Surr.	% Rec.	-	-	75.	85.	97.
D14 p-Terphenyl Surr.	% Rec.	-	-	83.	88.	97.
Moisture	%	-	9.	7.	11.	12.

Notes: Modified TPH - Tier 1 (C6-C32) does not include BTEX
03-H052570 TP9 GS2 Gasoline fraction.
03-H052570 TP9 GS2 Lube oil fraction; interference from possible PAHs.

EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit. For soils, zero %moisture is assumed. The moisture corrected EQL = EQL/(1-(%moisture/100))
ND ( ) = Analyte was not detected above the EQL. Raised EQL listed in Parenthesis.
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Event # = PSC Quality Control Reference number for QC samples run with your sample.
%REC = Surrogate Recovery Values are results of PSC quality control tests.
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: Biota results are expressed on a wet weight basis.

page verified

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200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Organic Parameters page : 6
Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313706H
Client Project Number : NSD 18089

FAX # : 468-9009
Printed : 2003/08/26
Reported : 2003/08/26

Matrix			Soil	Soil	Soil
Philip ID			03-H052574	03-H052575	03-H052576
Client ID			TP7 GS3	TP8 GS2	TP9 GS3
Date Sampled (y/m/d)			03/08/14	03/08/14	03/08/14
Date Received (y/m/d)			03/08/19	03/08/19	03/08/19
Analyte	Units	EQL	(Continued from previous page)		
D10 Pyrene Surr.	% Rec.	-	98.	92.	91.
D14 p-Terphenyl Surr.	% Rec.	-	101.	98.	95.
Moisture	%	-	9.	16.	11.

EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit. For soils, zero %moisture is assumed. The moisture corrected EQL = EQL/(1-(%moisture/100))
ND ( ) = Analyte was not detected above the EQL. Raised EQL listed in Parenthesis.
- = Dash is reported when parameter not requested in sample.
Event # = PSC Quality Control Reference number for QC samples run with your sample.
%REC = Surrogate Recovery Values are results of PSC quality control tests.
Note : Soil results are expressed on a dry weight basis.
: Biota results are expressed on a wet weight basis.

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PSC ANALYTICAL SERVICES

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Inorganic Parameters page : 1

Client : Jacques Whitford Environment Ltd. WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8 FAX # : 468-9009
PSC Project Number : 0313317H Printed : 2003/08/15
Client Project Number : NSD 18009 Reported : 2003/08/15

Matrix			Soil	Soil	Soil
Philip ID			03-H050645	03-H050646	03-H050647
Client ID			BH1 SS1	BH2 SS1	BH3 SS2
Date Sampled (y/m/d)			03/08/05	03/08/05	03/08/05
Date Received (y/m/d)			03/08/13	03/08/13	03/08/13
Analyte	**Units**	**EQL**			
HNO3 Peroxide Digestion		-	20030814-A	20030814-A	20030814-A
Aluminum	mg/kg	10	9900	9800	11000
Antimony	mg/kg	2.	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.
Arsenic	mg/kg	2.	36.	17.	74.
Barium	mg/kg	5.	120	44.	35.
Beryllium	mg/kg	2.	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd
Cadmium	mg/kg	0.3	0.4	nd	nd
Chromium	mg/kg	2.	18.	17.	20.
Cobalt	mg/kg	1.	6.	10.	6.
Copper	mg/kg	2.	43.	32.	48.
Iron	mg/kg	50	36000	30000	65000
Iron Recovery	%	-	90.	90.	90.
Lead	mg/kg	0.5	37	100	160
Manganese	mg/kg	2.	370	430	310
Molybdenum	mg/kg	2.	4.	2.	6.
Nickel	mg/kg	2.	13.	21.	12.
Selenium	mg/kg	2.	nd	nd	2.

Legend EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit.
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page verified _____

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Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313317H
Client Project Number : NSD 18009

FAX # : 468-9009
Printed : 2003/08/15
Reported : 2003/08/15

Certificate of Analysis

Method Summaries:

- Available Trace Metals in soils/sediments: Nitric/Peroxide Digestion. Ref:USEPA Method #3050B.

Approval of Inorganic Parameters:

Inorganics Manager : _____

Jerry Arenovich

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8

PSC Project Number : 0313213H
Client Project Number : NSD 18009

FAX # : 468-9009
Printed : 2003/08/19
Reported : 2003/08/19

Certificate of Analysis

Method Summaries :

- Extractable Hydrocarbons - Water: Hexane extraction. HP5890 GC/FID. Ref: Atlantic PIRI Guidelines for Laboratories, Draft 1.0, 1999.
- Volatile Petroleum Hydrocarbons - Water: Tekmar LSC2000. Autosampler. Varian 3400/Saturn II or HP6890 GC/MS. Ref: Atlantic PIRI Guidelines for Laboratories, Draft 1.0, 1999.

Conversions: 1 mg/L = 1000 ug/L = 1 part per million (ppm)
1 ug/L = 0.001 mg/L = 1 part per billion (ppb)

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Analyses reviewed by:

Organics Manager : James MacDonald

ANALYTICAL SERVICES

PSC Analytical Services Inc.

Quality Assurance Data for TEH by GC/FID

Matrix: Water

Date: August 15, 2003 (from: August 15, 2003)

Event Number: HM83

Compound	QCA Target mg/L	QCA % Recovery	QCB Target mg/L	QCB % Recovery	Method Blank mg/L
TEH (>C10-C32)	8	96	8	94	< 0.2

HE
Analyst

Manager

PSC Analytical Services
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3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313213H
Client Project Number : NSD 18009

FAX # : 468-9009
Printed : 2003/08/19
Reported : 2003/08/19

Matrix	Water
Philip ID	03-H050267
Client ID	MW1
Date Sampled (y/m/d)	03/08/08
Date Received (y/m/d)	03/08/12

Analyte	Units	EQL	(Continued from previous page)
Strontium	ug/L	5.	1700
Thallium	ug/L	0.1	nd(1.)
Tin	ug/L	2.	nd(20)
Titanium	ug/L	2.	34.
Uranium	ug/L	0.1	19.
Vanadium	ug/L	2.	81.
Zinc	ug/L	5.	680

03-H050267 MW1 Elevated reporting limits for trace metals due to a high calcium and chloride content.

Legend
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ANALYTICAL SERVICES

Organic Parameters page : 1

AUG 2 2 2003

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313061H
Client Project Number : NSD 18009

WINDSOR, TONY
FAX # : 468-9009
Printed : 2003/08/14
Reported : 2003/08/14

Matrix			Water	Water
Philip ID			03-H049697	03-H049698
Client ID			MW2	MW3
Date Sampled (y/m/d)			03/08/06	03/08/06
Date Received (y/m/d)			03/08/08	03/08/08
Analyte	**Units**	**EQL**		
TEH C11-32 Water Event #		-	HM55	HM55
VPH Water Event #		-	HM68	HM68
Benzene	mg/L	0.001	nd	nd
Toluene	mg/L	0.001	nd	nd
Ethylbenzene	mg/L	0.001	nd	nd
Xylenes	mg/L	0.002	nd	nd
C6 - C10 HC {less BTEX}	mg/L	0.01	0.02	nd
>C10-C21 (Fuel Range)	mg/L	0.05	2.0	0.07
>C21-C32 (Lube Range)	mg/L	0.1	0.2	nd
Modified TPH - Tier 1	mg/L	0.2	2.2	nd
VPH Surrogate (IBB)	% Rec.	-	92.	98.
TEH Surrogate (IBB)	% Rec.	-	96.	96.
TEH Surrogate (C32)	% Rec	-	85.	98.
PAH in Water Event #		-	HM56	-
Naphthalene	ug/L	0.2	0.2	-
2-Methylnaphthalene	ug/L	0.05	0.10	-
1-Methylnaphthalene	ug/L	0.03	11.	-
Acenaphthylene	ug/L	0.01	0.03	-
Acenaphthene	ug/L	0.01	1.9	-
Fluorene	ug/L	0.01	3.0	-

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%REC = Surrogate Recovery Values are results of PSC quality control tests.
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PSC Project Number : 0313061H
Client Project Number : NSD 18009

FAX # : 468-9009
Printed : 2003/08/14
Reported : 2003/08/14

Note: The product resemblance comments are provided for general guidance only and may not be accurate. Resemblances are based on comparison with available reference standards. Due to chromatographic similarity of certain products, the influence of weathering effects and interference of non-petrogenic compounds, it is not always possible to positively identify products.

Naphthalene and methylnaphthalene(s) are commonly found in water method blanks at low concentrations. For these compounds only, sample results have been blank corrected.

Notes: Modified TPH - Tier 1 (C6-C32) does not include BTEX

03-H049697	MW2	PAH surrogates not within acceptance limits. Sample was repeated with similar results.PAH sample contained sediment.
03-H049697	MW2	Weathered fuel oil fraction. TEH sample contained sediment.
03-H049698	MW3	Fuel oil range. TEH sample decanted due to sediment.

EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit. For soils, zero %moisture is assumed. The moisture corrected EQL = EQL/(1-(%moisture/100))

ND ( ) = Analyte was not detected above the EQL. Raised EQL listed in Parenthesis.

\- = Dash is reported when parameter not requested in sample.

Event # = PSC Quality Control Reference number for QC samples run with your sample.

%REC = Surrogate Recovery Values are results of PSC quality control tests.

Note : Soil results are expressed on a dry weight basis.

: Biota results are expressed on a wet weight basis.

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PSC ANALYTICAL SERVICES

Inorganic Parameters page : 1

Client : Jacques Whitford Environment Ltd. WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8 FAX # : 468-9009
PSC Project Number : 0313061H Printed : 2003/08/14
Client Project Number : NSD 18009 Reported : 2003/08/14

Matrix	Water
Philip ID	03-H049697
Client ID	MW2
Date Sampled (y/m/d)	03/08/06
Date Received (y/m/d)	03/08/08

Analyte	Units	EQL	
Total Water Digest		-	20030811-B
Aluminum	ug/L	10	3800
Antimony	ug/L	2.	nd(20)
Arsenic	ug/L	2.	nd(20)
Barium	ug/L	5.	77.
Beryllium	ug/L	2.	nd(20)
Bismuth	ug/L	2.	nd(20)
Boron	ug/L	5.	59.
Cadmium	ug/L	0.3	nd(3.)
Chromium	ug/L	2.	nd(20)
Cobalt	ug/L	1.	nd(10)
Copper	ug/L	2.	nd(20)
Iron	ug/L	50	14000
Lead	ug/L	0.5	6.1
Manganese	ug/L	2.	9700
Molybdenum	ug/L	2.	nd(20)
Nickel	ug/L	2.	nd(20)
Selenium	ug/L	2.	nd(20)
Silver	ug/L	0.5	nd(5.)

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Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0313061H
Client Project Number : NSD 18009

FAX # : 468-9009
Printed : 2003/08/14
Reported : 2003/08/14

Certificate of Analysis

Method Summaries:

- Total Recoverable Metals Digest: Homogenization/Digestion. Ref: USEPA Method #200.2
- Trace Metals in Aqueous Samples: Elan 5000 ICP-MS. Ref: USEPA Method #200.8
- Total Metals in Water: Digestion/ICP-MS. Ref: USEPA 200.8

Conversions: 1 mg/L = 1000 ug/L = 1 part per million (ppm)
1 ug/L = 0.001 mg/L = 1 part per billion (ppb)

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Approval of Inorganic Parameters:

Inorganics Manager : _____
Jerry Arenovich

ANALYTICAL SERVICES

PSC Analytical Services Inc.

Quality Assurance Data for Polycyclic Aromatic Hydrocarbons

Matrix: Water

Date: August 12, 2003

Event Number: HM56

Compound	QCA Target µg/L	QCA % Recovery	QCB Target µg/L	QCB % Recovery	Method Blank µg/L
Naphthalene	1.0	90	1.0	90	< 0.2
2-Methylnaphthalene	1.0	85	1.0	85	< 0.05
1-Methylnaphthalene	1.0	94	1.0	94	< 0.05
Acenaphthylene	1.0	110	1.0	110	< 0.01
Acenaphthene	1.0	110	1.0	110	< 0.01
Fluorene	1.0	97	1.0	97	< 0.01
Phenanthrene	1.0	110	1.0	100	< 0.01
Anthracene	1.0	110	1.0	110	< 0.01
Fluoranthene	1.0	90	1.0	89	< 0.01
Pyrene	1.0	86	1.0	86	< 0.01
Benzo[a]anthracene	1.0	110	1.0	110	< 0.01
Chrysene	1.0	100	1.0	100	< 0.01
Benzo[b]fluoranthene	1.0	100	1.0	100	< 0.01
Benzo[k]fluoranthene	1.0	100	1.0	100	< 0.01
Benzo[a]pyrene	1.0	110	1.0	110	< 0.01
Perylene	1.0	100	1.0	100	< 0.01
Indeno[123-cd]pyrene	1.0	110	1.0	100	< 0.01
Dibenz[ah]anthracene	1.0	100	1.0	100	< 0.01
Benzo[ghi]aerylene	1.0	110	1.0	110	< 0.01
Surrogates					
d-8 Acenaphthylene		*96*		*97*	
d-10 Anthracene		*99*		*100*	
d-10 Pyrene		*95*		*95*	
d-14 Terphenyl		*96*		*95*	

Note: Naphthalene and methylnaphthalene(s) are commonly found in water method blanks at low concentrations. For these compounds only, QC results have been blank corrected.

Analyst

Manager

PSC ANALYTICAL SERVICES

Inorganic Parameters page : 1

Client : Jacques Whitford Environment Ltd. WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8 FAX # : 468-9009
PSC Project Number : 0314413H Printed : 2003/09/03 (Event 658)
Client Project Number : NSD 18009 Reported : 2003/09/03

Matrix	Water
Philip ID	03-H055770
Client ID	MW3
Date Sampled (y/m/d)	03/08/06
Date Received (y/m/d)	03/08/29

Analyte	Units	EQL	
Total Water Digest		-	20030902-A
Aluminum	ug/L	10	90
Antimony	ug/L	2.	nd
Arsenic	ug/L	2.	nd
Barium	ug/L	5.	52.
Beryllium	ug/L	2.	nd
Bismuth	ug/L	2.	nd
Boron	ug/L	5.	16.
Cadmium	ug/L	0.3	nd
Chromium	ug/L	2.	nd
Cobalt	ug/L	1.	5.
Copper	ug/L	2.	2.
Iron	ug/L	50	140000
Lead	ug/L	0.5	nd
Manganese	ug/L	2.	920
Molybdenum	ug/L	2.	nd
Nickel	ug/L	2.	14.
Selenium	ug/L	2.	nd
Silver	ug/L	0.5	nd

Legend EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit.
ND = Not Detected, instrument did not detect anything above standard EQL.
ND ( ) = Not Detected at the elevated EQL specified, due to matrix interferences or sample pre-dilution.
\- = Dash is reported when parameter not requested in sample.

Note : Soil results are expressed as air dry weight basis.
: Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters page : 3

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.WINDSOR, TONY
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0314413H
Client Project Number : NSD 18009

FAX # : 468-9009
Printed : 2003/09/03 E658
Reported : 2003/09/03

Certificate of Analysis

Method Summaries:

- Total Recoverable Metals Digest: Homogenization/Digestion. Ref: USEPA Method #200.2
- Trace Metals in Aqueous Samples: Elan 5000 ICP-MS. Ref: USEPA Method #200.8
- Total Metals in Water: Digestion/ICP-MS. Ref: USEPA 200.8

Conversions: 1 mg/L = 1000 ug/L = 1 part per million (ppm)
1 ug/L = 0.001 mg/L = 1 part per billion (ppb)

All work recorded herein has been done in accordance with normal professional standards using accepted testing technologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. The results relate only to the items tested. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis performed. There is no other warranty expressed or implied. Excess sample will be discarded upon expiry of hold time.

Analyses reviewed by:
Inorganics Manager : Jerry Arenovich