



**ENVIRONMENTAL BASELINE AND EXIT
ASSESSMENTS**

**FOR TENANTS OF THE VANCOUVER FRASER PORT
AUTHORITY**

Table of Contents

1	Introduction	3
2	Typical Environmental Process	4
3	VFPA Project Permits, Submissions and Approvals	4
3.1	VFPA Project Permits	4
3.2	Report Submission and Approval	5
4	Approved Consultants and Qualifications	5
5	Applicable Criteria	5
6	Components of an Environmental Baseline and Exit Assessment for VFPA	6
6.1	Environmental Baseline	6
TABLE 1.	Environmental Baseline Components for VFPA	6
6.2	Exit Assessments	6
TABLE 2.	Environmental Exit Assessment Components for VFPA	8
7	General Methodology	9
7.1	Phase I ESAs	9
7.2	Phase II ESAs	9
7.3	Phase III ESAs	9
7.4	Remedial Plans	9
7.5	Use of Previous Reports	9
7.6	VFPA Input	9
8	Example Table of Contents for Phase I & Phase II ESAS	10
8.1	Phase I ESA Annotated Table of Contents	10
8.2	Phase II ESA Annotated Table of Contents	12
9	Dive Survey Guidelines	13
10	Electronic Formats	14
11	Survey Specification for Test Hole Locations	14
11.1	Horizontal Coordinates	14
11.2	Elevations	14
11.3	Topography	14
11.4	Deliverables	14
12	Information Sources	15
12.1	Federal Regulations, Criteria, and Guidance	15
12.2	British Columbia Regulations and Guidance	15
13	VFPA Contact Information	15

1 Introduction

This document establishes standards for conducting Environmental Baseline and Exit Assessments for Vancouver Fraser Port Authority (VFPA) property. If you have an agreement with the VFPA that requires completion of these assessments, this document applies to you.

An environmental assessment protects both Tenants and VFPA by identifying environmental liabilities associated with a property. Any owner or occupier, past or present, can be held financially responsible for site contamination.

In order to protect all Tenants and VFPA, an environmental site assessment (site characterization) will be required at the start and end of a lease to document the condition of the property. The term "Baseline" is used to reflect that these environmental site assessments are triggered at the commencement of a lease. The assessment at the end of a lease has been termed an "Exit" assessment.

Environmental Baseline and Exit Assessments must be conducted by experienced environmental consultants and should provide an environmental characterization of the site, including, but not limited to, historical and current background information, as well as soil, groundwater, surface water and sediment quality information.

Site characterization typically follows a staged approach. The first stage or Phase I Environmental Site Assessment (ESA), typically includes a review of site history, current and historical site practices, aerial photos, property plans (i.e. fire insurance maps), neighbouring property usage and on-site identification of hazardous materials and/or practices. Potential contaminants of concern and specific areas of concern are identified in preparation for a Phase II ESA.

For most sites under industrial occupancy, a Phase II will be required. Typically, a Phase II involves sampling of soil, sediment, groundwater, surface water and/or building materials, etc. to assess the nature and extent of contamination, if any, and to document the site condition.

On occasion, if the Baseline Assessment is part of a lease renewal process, Supplemental Site Investigations (SSI) or Detailed Site Investigations (DSI) may be requested to re-assess and/or delineate previously identified contamination.

In certain cases, a dive survey may be requested in addition to, or in lieu of a traditional baseline assessment. This may be the case for lease areas that are only waterlot, or when the upland activities have little to no risk to surface or groundwater. The intent of the dive survey is to characterize anthropogenic debris deposited into the waterlot that may be impacting aquatic life. Based on the findings of the dive survey, a clean-up (removal and disposal) of the debris may be requested by VFPA as part of the baseline process.

Baseline results are filed for future reference. These results can be updated, at the request of VFPA or on the Tenant's initiative, at regular intervals throughout the term of the lease. This may include sampling and testing groundwater wells to ensure that the Tenant's activities are not having a detrimental effect on the site, and as an early warning of potential impacts related to operations or incidents on site or on adjacent sites.

At the end of a lease, an Exit Assessment is conducted to determine any changes in the environmental condition of the site. This Exit Assessment is then compared to the original Baseline on file.

Prior to initiating any work, the Tenant and/or its consultants should consult with VFPA to discuss the scope of work and the planned resources. VFPA, as manager of federal real property, reserves the right to approve or reject a planned scope of work or the work produced. It is in the best interest of all parties to begin consultations with VFPA at an early stage.

The following sections provide more detailed guidance to Tenants and/or their consultants for conducting Environmental Baseline and Exit Assessments for VFPA.

2 Typical Environmental Process

At most industrial properties, it is unlikely that a Phase I Environmental Site Assessment (ESA) will conclude that there are no specific potential issues. The results of the Phase I are used in planning the Phase II investigation and in those cases where no specific target locations are identified, drilling locations can be selected in anticipation of the future operations and/or uses for the site (i.e., down gradient from a future fuel storage area, down gradient from the future paint shop, etc.). It should be noted that the investigations may cause disruption to current operations, but it is up to the Tenant to work with its environmental consultant to minimize disruptions.

As a minimum, the Phase II ESA will include a site-wide overview of groundwater conditions, with a minimum of three boreholes with permanently installed monitoring wells, a determination of the groundwater gradient (i.e., flow direction) and a characterization of the soil and groundwater quality. Where applicable, a characterization of the sediment in the adjacent foreshore and waterlot will also be included. The extent of the investigation work must be discussed with VFPA prior to the start of the investigations.

In cases where Phase II investigations determine that a Phase III ESA is warranted, the Tenant must contact VFPA. A Phase III is intended to provide more detail than the Phase II by delineating the extent and characterizing the nature of the contamination. The Phase III will include "step-out" sample locations for delineation. The number of "step-out" sample locations will depend on the areas of contamination identified in the Phase II.

3 VFPA Project Permits, Submissions and Approvals

Prior to initiating any work, the Tenant and/or its consultants, should consult with VFPA to discuss the scope of work and the planned resources. VFPA, as manager of federal real property, reserves the right to approve or reject a planned scope of work or the work produced. It is in the best interest of all parties to begin consultations with VFPA at an early stage.

3.1 VFPA Project Permits

For intrusive environmental work, including but not limited to drilling, test pitting, excavations and remediation projects, a VFPA Project Permit will be required prior to the start of work. The application form and guidelines can be found on the VFPA website at this location: <http://www.portvancouver.com/development-and-permits/project-and-environmental-reviews/>.

3.2 Report Submission and Approval

The reports are typically requirements of your agreement to occupy property managed by VFPA. The reports shall include VFPA as an addressee to the report, and any limitations section shall provide for VFPA to rely on the report in its entirety.

All reports, including drafts, generated for the assessments shall be submitted to VFPA for review and comment within 15 days of receipt by the Tenant. VFPA will provide a response indicating next steps or in cases where the requirements have been satisfied will indicate so. VFPA will provide a response within 30 days of receipt. If VFPA is not able to provide a response within that timeframe, it will indicate the expected time frame when a response will be available.

4 Approved Consultants and Qualifications

The Baseline and Exit Assessments must be conducted by experienced environmental consultants. Prior to engagement of an independent consultant by the Tenant, the qualifications of the consultant and the proposed scope of work will be subject to VFPA's review and approval. A list of VFPA's pre-qualified consultants is available for consultation, but other consultants may be engaged subject to VFPA's review and approval.

Typical qualifications that are required to complete these tasks effectively include:

- A firm specializing in environmental assessment and remediation, and with demonstrated expertise in foreshore marine assessments, typically in operation for over 5 years;
- A project manager or senior reviewer with a minimum of 10 years environmental assessment experience;
- A firm with extensive experience in both federal and BC environmental site assessments and audits; and
- A firm with a good track record supported by references.

5 Applicable Criteria

Chemistry analytical results will be compared to both federal and provincial criteria. The British Columbia provincial environmental regulations are neither identical to the federal regulations, nor directly applicable to VFPA; however, there are many circumstances where provincial laws and regulations have been harmonized and in some cases provincial standards may be the sole criteria available in Canada. Therefore, environmental information shall be compared with both the provincial and federal standards and guidelines.

Remediation criteria will be determined on a case-by-case basis and will consider federal, provincial, and federal-provincial harmonized criteria.

Federal and/or provincial land-use, surface water, groundwater, sediment and soil vapour criteria used for assessment and/or remediation will be selected on a case-by-case basis in consultation with VFPA. The appropriate standards and guidelines are based on a variety of criteria, such as previous, current, future and adjacent land uses, specific activities, levels of contamination, legal aspects, etc.

All laboratory detection limits shall, as a minimum, meet the federal and provincial residential land use soil standards and marine aquatic life water and groundwater standards for all sample analyses.

6 Components of an Environmental Baseline and Exit Assessment for VFPA

6.1 Environmental Baseline

An environmental Baseline will be required if a suitable Baseline has not previously been conducted. An environmental Baseline for a new lease and an Exit Assessment being carried out for a previous occupancy on the same property may be combined, provided the assessment satisfies the individual companies' and VFPA's due diligence requirements, as the same or similar information is required for both. Given the nature of the activities normally carried out on VFPA property, environmental Baselines will include both Phase I and Phase II Environmental Site Assessments (ESAs). The results of a Phase I are used to plan the Phase II, following consultation with VFPA.

The following Table 1 provides a summary of the components of environmental investigations and the typical cost, time, and end point. Where provincial regulations use different terminology, those terms are provided for reference.

TABLE 1. Environmental Baseline Components for VFPA

Assessment Name(s)	Components	Typical Cost*	Time to complete	End Point or Result
Site Characterization - Phase I ESA (Stage 1 Preliminary Site Investigation (PSI))	Historical Investigations Current condition assessment or audit	\$5K to \$15K	2 to 4 weeks	Contact VFPA then, use results to plan Phase II ESA.
Site Characterization - Phase II ESA (Stage 2 PSI)	Soil, sediment, surface water, groundwater and/or air quality sampling at a coarse level to assess whether or not contamination is present	\$15K to \$60K	6 to 14 weeks	Contact VFPA then, 1) No Further Action or 2) Phase III ESA is warranted.
Phase III ESA (Detailed Site Investigation)	Detailed delineation of extent of contamination	\$25K to \$100K+	8 to 16 weeks	Contact VFPA, Site Remediation.

*Costs may vary or change with time. Costs are also dependent on the size and complexity of the site. These estimates are suggested order-of-magnitude only and should be verified by qualified independent sources.

6.2 Exit Assessments

An Exit Assessment reviews activities that may have altered the environmental conditions at the property during the term of the lease. In addition, it identifies practices that likely prevented or caused environmental impact during the lease.

Exit Assessments provide mutual protection for VFPA and the Tenant as they are used to assess the environmental conditions at the conclusion of the tenancy period. Environmental Baselines and Exit Assessments represent property condition surveys, primarily of facilities and operations that could affect soil, water and/or sediment. An assessment for hazardous building materials may be included, but the physical condition of buildings or structures is not part of these assessments.

If a Phase I was previously completed, an Exit Assessment does not require the historical review component of a Phase I; however, a Phase I Update will be required, including the following, as a minimum:

- An updated search of contaminated site databases;
- A review of information from an industry-standard source that was not previously available or not reviewed; and
- A description and environmental assessment of the environmentally relevant operations of the facility, processes at the facility, and location of equipment and storage during the lease period.

In most circumstances a Phase II will be required for an Exit Assessment. However, if a Phase II was previously completed, the scope of the Exit Assessment may be reduced to a re-sampling of the existing wells for those cases where:

- The results of the Phase I Update indicated no potential contamination associated with the operations; and
- The previous Phase II indicated no contaminants of concern, and VFPA accepts the results of the reduced scope Phase II as being sufficient at the time of the Exit Assessment; and
- VFPA agrees that a complete Phase II is not required.

The following Table 2 summarizes the components of an environmental Exit Assessment, including typical costs, time, and end points. Where provincial regulations use different terminology, those terms are provided for reference. Note that agreement must be obtained from VFPA for each step (prior to the next proposed action and at completion of each component).

TABLE 2. Environmental Exit Assessment Components for VFPA

Assessment Name(s)	Components	Typical Cost*	Time to complete	End Point or Result
Phase I ESA (Stage 1 PSI) or Phase I ESA Update (if Phase I ESA previously conducted)	Historical Investigations. Current condition assessment or audit. Update of previous Phase I ESA	\$5K to \$15K	2 to 3 weeks	Contact VFPA then proceed to reduced scope of full Phase II OR if previous Phase II ESA not satisfactory to VFPA, proceed to Phase II.
Phase II ESA (Stage 2 PSI)	Soil, sediment, surface water, and/or groundwater sampling at a coarse level to assess contamination presence	\$15K to \$60K	6 to 12 weeks	Contact VFPA then, 1) No Further Action or 2) Phase III ESA, if warranted.
Phase III ESA (Detailed Site Investigation)	Detailed delineation of extent of contamination	\$25K to \$100K	8 to 16 weeks	Contact VFPA then proceed with Site Remediation.
Remediation	Planning and removal of contaminants from the site. Completion report.	\$25K to \$250K+	8 to 26 weeks	No Further Action.
Risk Assessment for Risk-Based Remediation	Assess whether contamination at the specific site poses a human or environmental risk for the use of the site. Management measures may be implemented to control the risk.	\$25K to \$75K+	8 to 16 weeks	Financial securities, insurance, etc. Legal Agreements Permits and Approvals from the Environmental Authorities and VFPA. Install risk management measures and monitor (for years). No end point.
	NOTE: VFPA must be consulted and approve of any risk-based remedial approaches prior to undertaking this approach. Typically this approach is only for lease renewals.			

*Costs may vary and change with time. Costs are also dependent on the size and complexity of the site. These estimates are suggested order-of-magnitude only and should be verified by qualified independent sources.

7 General Methodology

7.1 Phase I ESAs

Phase I ESAs should follow the approach outlined in Canada Standards Association (CAN/CSA) Standard Z768-01 *Phase I Environmental Site Assessment*. This approach is generally consistent with the first stage “preliminary site investigation” (Stage 1 PSI) requirements of Section 58(1)(a) of the British Columbia Contaminated Sites Regulation (CSR), which should also be used as a guide.

7.2 Phase II ESAs

Phase II ESAs should follow the approach outlined in Canada Standards Association (CAN/CSA) Standard Z769-00 *Phase II Environmental Site Assessment*. This approach is generally consistent with the second stage “preliminary site investigation” (Stage 2 PSI) requirements of Section 58(1)(b) of the BC CSR, which should also be used as a guide.

7.3 Phase III ESAs

Phase III ESAs shall meet the requirements of a Detailed Site Investigation, as described by Section 59 of the BC CSR and associated Technical Guidance Document No. 11.

7.4 Remedial Plans

Remedial Plans shall meet the BC CSR remedial plan requirements. VFPA as well as most Tenants would prefer a permanent solution for site contamination, thus limiting any ongoing liability and ensuring the protection of the land, water, and air quality of Port lands. This typically requires the removal or treatment of all contaminated soil, groundwater, and sediment. While tenanted lands may presently be in industrial use, lands that are adjacent to existing or future commercial, residential or park uses may require more stringent clean-up standards depending on the original condition of the site. The remediation standards will be defined based on discussions with VFPA on a case-by-case basis. Whether VFPA accepts a risk assessment or risk-based remedial approach will also be evaluated on a case-by-case basis.

7.5 Use of Previous Reports

Previous reports may be used to provide information for subsequent work. However, previous reports are considered valid for a limited time period. VFPA and most financial institutions consider that a Phase I, which is more than 12 months old, cannot be accepted without an update to account for changes in operations and information. For Phase II and other work involving investigations and analyses, properly collected data will likely be valid unless sampling or analytical protocols have changed or the contaminant or media are subject to changes with time. In addition, interpretations with respect to legislation often require updating to account for changes in regulatory limits. The previous reports do not require updating, but the information contained in them must be critically examined prior to use in future work.

7.6 VFPA Input

VFPA approval of the environmental consultant is required prior to the start of any work. VFPA must be consulted during planning of the assessments to clarify the process and timelines. In addition, VFPA has data on some sites, including site plans, historical information, and other pertinent environmental information, which may be helpful to the

Tenants. The Tenant should contact VFPA prior to initiating environmental site assessment work to ascertain if information is available that will assist in the preparation of the report. In addition, because VFPA will require that site plans be provided for addition to the electronic drawing base map, it will likely be necessary to obtain an electronic base plan from VFPA.

For the planning of intrusive investigations, in all cases and especially for areas in contact with or potentially affecting marine habitat, the Tenant and/or its consultant must consult with VFPA well in advance. VFPA will conduct an internal project review and assess if a Burrard Environmental Review Committee (BERC) review is necessary. Examples of work requiring BERC review include sampling of foreshore or sub-tidal areas; sampling over, in, or beside the water; sediment sampling; and sampling of drains or drainage ditches. In all cases, approval by VFPA is required before conducting all intrusive investigations.

8 Example Table of Contents for Phase I & Phase II ESAS

8.1 Phase I ESA Annotated Table of Contents

The following provides a typical table of contents for a Phase I report. Italicized comments detail minimum information to be included in the section. This is not an exhaustive listing but a framework indicating the level of detail that is expected by VFPA.

Title Page

[address report to lessee and VFPA]

Executive Summary

[list major findings as Areas of Potential Environmental Concern (APECs)]

1.0 Introduction

[company completing ESA, purpose]

2.0 Scope of Work

[summarize scope of work and objectives, define scope with respect to industry standards (e.g., CSA Phase I ESA standard), note any additions or deletions from standard scope]

3.0 Previous Assessments

[provide summary of previous Phase I ESA(s) and/or results of other environmental investigations]

4.0 Historical Information

4.1 Site Description

[legal description, civic address, area of site, name and type of operation presently on site]

4.2 Records Review

[site and adjacent properties within 500 m of Site, to date prior to development, include copies of reviewed records in appendix]

- aerial photographs *[maximum 10 year intervals, historic site usage, tanks, pits, fill, etc.]*
- historical title and/or Tenant list *[from date prior to development]*
- fire insurance maps or plans *[as available]*
- BC Site Registry *[search within 1 km of Site]*
- geology and topography *[geology map and/or geotechnical reports on stratigraphy, fill material]*

- environmental permits and regulatory information *[air emissions, water discharge, water treatment, hazardous material storage, fuel storage tanks, orders, charges, prosecutions, investigations]*

5.0 Site Visit and Interviews

5.1 Facility and Process Description

5.2 Fuel Storage Tanks

[number, location, volume, age, product, installation compliance with CCME Code of Practice (or subsequent regulations), former tank locations and information, vent pipes, fill pipes, tank integrity testing results]

5.3 Hazardous Material Storage

[products, waste, containment volume, compliance with applicable codes, regulations, and good practice]

5.4 Maintenance Activities

[activities undertaken, hazardous materials used or generated, waste disposal]

5.5 Sandblasting

[location, waste deposition and control, materials removed and expected contaminants]

5.6 Oil/water Separators, Storm and Floor Drains, Outfalls

[location, condition, influent material, discharge location]

5.7 Air Emissions

[observed emissions, odours]

5.8 Controlled Substances

[PCBs, asbestos, lead, ozone depleting substances, radioactive sources]

5.9 Interviews

[at least one person at operation directly involved in environmental issues, document interviews with others – interview information can be in a separate section or incorporated with assessed item]

5.10 Adjacent Land Use

[use, areas of potential environmental concern]

6.0 Summary of Findings

[describe APECs, Potential Contaminants of Concern (PCOC), summarize information leading to APEC]

7.0 Conclusions and Recommendations

[summarize APECs, PCOCs, and Recommended Action in a table format, estimate of cost for additional investigation]

8.0 References

Figures and Tables *[if not included in body of report]*

Appendices

Land Title Records

Aerial Photographs *[one from each year reviewed with the site outlined]*

Site Photographs

Site Visit Documentation *[copy of checklist, if used]*

Documentation of Interviews

Copies of Historical Information *[fire insurance plans, directories]*

Storage Tank Report

8.2 Phase II ESA Annotated Table of Contents

The following provides a typical table of contents for a Phase II report. Italicized comments detail minimum information to be included in the section. This is not an exhaustive listing but a framework indicating the level of detail that is expected by VFPA. Phase III reports would follow a similar format but would include more detail of contaminant delineation and characteristics.

Title Page

[address report to lessee and VFPA]

Executive Summary

[list major findings as APECs]

1.0 Introduction

[company completing ESA, purpose]

2.0 Background

[provide summary of all previous environmental work conducted and include a Table of Areas of Potential Environmental Concern]

4.0 Scope of Work

[summarize scope of work and objectives, define scope with respect to industry standards (e.g., CSA Phase II ESA standard), note any additions or deletions from standard scope]

3.0 Site Description

[legal description, civic address, area of site, describe the boundaries of the property and refer to a legal plan, site lease status, name and type of operation presently on site and other land uses on site and surrounding areas]

5.0 Selection of Applicable Environmental Quality Guidelines/Standards

[outlines the rationale for the selection of guidelines/standards used in the numerical comparison of laboratory data – consult with VFPA on appropriate standards]

4.0 Methodology

[drill and monitoring well installation methods, monitoring well development, sample collection, Quality Assurance/Quality Control (QA/QC) sampling]

6.0 Results

[physical and chemical observations and results in soil, water, soil vapour, sediment]

7.0 QA/QC Assessment

8.0 Summary of Findings and Discussion

[Table of APECs, Areas of Environmental Concern (AECs), Contaminants of Concern (COCs), media, summarize information leading to AEC and/or removal of APEC]

9.0 Environmental Cost Estimate

- **Baseline Assessments** *[provide estimate and brief rationale to conduct the next phase/stage of assessment work within a -50% to +100% cost estimate]*
- **Exit Assessments** *[provide estimate and brief rationale to conduct the next phase/stage of assessment work and/or remediation within a -50% to +100% cost estimate]*

10.0 Conclusions and Recommendations

[summarize APECs, PCOCs, and Recommended Action in a table format, including criteria and highlighting exceedances]

11.0 References

Tables

Figures *[All reports showing sample location drawings and figures must come with one full-site drawing in a standard printer or plotter size suited to the size of the plan data.]*

Appendices

Chain of Custody Forms

Field Data Collection Forms and Results

Original Lab Results *[with Certificates of Analysis, QA/QC results and labelled chromatographs]*

Photographs

Field Methods

QA/QC Procedures

Monitoring Well/Borehole Logs *[Accurately represent the screen length, stick-up, groundwater level with date and time, total length, depth to refusal (if attained), as well as the profile of the surrounding soil. Hydrocarbon vapour screening results must be included on the well monitoring well/borehole logs. This information may also be tabulated elsewhere in the report in addition to being included on these diagrams.]*

9 Dive Survey Guidelines

In certain instances a dive survey may be requested in addition to, or in lieu of a traditional baseline assessment. The following steps summarize the dive survey process and provide guidelines for the completion of the dive survey and associated clean up activities.

1. Certified professional *commercial* divers are retained by the tenant. We do not have a list of preferred dive companies at this time.
2. Once the dive is complete, a brief report is submitted to VFPA Environmental Programs and consists of the following details:
 - a. Basic information – date, time, tide cycle (if applicable), location, study area, approximate water depth or range of water depths, etc.
 - b. Debris observed – depending on the size of the site, sometimes this is done by transect, otherwise it is more of a general description. A list of all the anthropogenic debris is given. If woodwaste is noted, it should be described in terms of its coarseness, thickness of the layer (if applicable), and the amount of sedimentation that has occurred.
 - c. If the diver is able and qualified, the marine life observed can be noted. This is helpful, but the objective of the dive is to note debris, not to complete a biophysical survey¹. It should be noted if the debris is notably inhabited by aquatic life.
 - d. Photographic evidence of the debris is required if the conditions aren't too turbid.
3. The dive survey report is reviewed by VFPA Environmental Programs, who also determines if debris removal is required. If so, a VFPA project permit application is submitted by the tenant or their consultant for the debris clean-up work. The application form and guidelines can be found on the VFPA website at this location: <http://www.portmetrovancover.com/working-with-us/permitting/project-and-environmental-reviews/>.
4. Once the project permit has been given, the clean-up process is initiated. Any debris collected and moved to land must be recycled or disposed of properly at a permitted

¹ Biophysical surveys are requested as part of the baseline process from time to time in special instances. This will be communicated to the tenant on a case-by-case basis.

landfill or recycling facility. This should be documented in an e-mail or a brief report. Photo documentation is required.

10 Electronic Formats

As a minimum, VFPA requires a complete submission of the report in Adobe Acrobat PDF format. VFPA may request electronic versions of chemical data in Excel format and site plan information in ESRI, DXF and AutoCAD format.

11 Survey Specification for Test Hole Locations

In order to create a seamless and integrated record of all borehole, monitoring well and/or test pit data (collectively referred to as test holes), VFPA requires that the location of all test holes be surveyed and meet the following specifications:

11.1 Horizontal Coordinates

The horizontal positions of all test holes shall be fixed with an accuracy of one (1) metre or better and NAD83 Universal Transverse Mercator (UTM) coordinates provided. Any acceptable survey method may be used; including differential GPS, provided sufficient checks are made and the requisite accuracy is attained. If traditional survey methods are employed the boreholes should be tied to the Provincial Integrated Survey Network and/or to the VFPA Survey Network.

11.2 Elevations

Ground elevations of test hole positions shall be provided, related either to Geodetic or Chart datum, to an accuracy of better than 0.10 metres. The elevation survey may be carried out by spirit levelling from the nearest VFPA or integrated survey monument or by trigonometrical heighting (vertical angles). Notwithstanding the foregoing, if high grade GPS equipment is employed, and the specified accuracy can be attained using this equipment, then GPS generated elevations may be acceptable. All elevations must be checked either by double levelling or by other acceptable survey methods.

When obtaining elevations for monitoring wells, the top of casing elevation and ground surface elevation must be clearly recorded. At the sole discretion of VFPA, the specification for seabed sediment samples may be relaxed.

11.3 Topography

Docks, buildings, fences and other improvements close to test holes should be surveyed; as a guideline, it is suggested that detail within 30 metres of test holes be located. However, if test holes are close to lease boundaries it shall not be necessary to access neighbouring properties. Furthermore, if current topographic information exists on VFPA or other digital mapping, the requirement to survey topographic detail may be waived.

11.4 Deliverables

A plan of the test hole survey shall be submitted as hard copy and a digital file (DWG or acceptable alternative), together with a digital coordinate list of the boreholes, monitoring wells and/or test pits comprising Name, Eastings, Northings and Elevation. The digital plan shall be based on the UTM system.

12 Information Sources

The following are some, but not all, sources of information that may apply to a property within VFPA jurisdiction. Note that new, revised or amended legislation may be brought into effect from time to time.

12.1 Federal Regulations, Criteria, and Guidance

- CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products, PN1326
- Canada-wide Standards for Petroleum Hydrocarbons in Soil, Endorsed by Ministers of the Environment
- National Fire Code of Canada
- Canada Marine Act
- Canadian Environmental Protection Act
- Fisheries Act
- Transport of Dangerous Goods Act
- Canada Labour Code
- CCME Environmental Quality Guidelines
- Directors Criteria for Contaminated Sediment

12.2 British Columbia Regulations and Guidance

- Contaminated Sites Regulation, BC Reg. 375/96
- Technical Guidance on Contaminated Sites, Checklist For Reviewing a Preliminary Site Investigation (PSI)
- Technical Guidance on Contaminated Sites, Checklist For Reviewing a DSI - Detailed Site Investigation

13 VFPA Contact Information

We encourage you to contact staff in the VFPA Environmental Programs department who can help you through these environmental assessments.

Please call VFPA Environmental Programs at 604.665.9082, fax at 1-866-284-4271, or email environmentalprograms@portvancouver.com.