

The Salvation Army  
2 Overlea Boulevard, Toronto, ON M4H 1P4

Via email: Andrzej\_Wodkiewicz@can.salvationarmy.org

**Attention: Andrzej Wodkiewicz - Project Coordinator**

Subject:

**Performance Verification Plan (PVP) for:  
1580 and 1590 Fitzgerald Avenue, Courtenay, B.C., Human Health and  
Ecological Risk Assessment**

ARCADIS Canada Inc. (ARCADIS), has prepared this Performance Verification Plan (PVP) to meet the requirements of a risk-based Certificate of Compliance (CofC) for the above referenced site on behalf of The Salvation Army. Type 2 risk assessment conditions and risk management measures for this site are required.

This PVP is based on the assumption that the current site conditions do not change.

## **BACKGROUND**

An application for a risk-based CofC will be submitted for the site. The risk assessment shows that there are no operable exposure pathways to contamination in groundwater and soil for select terrestrial (ecological and human at grade) and aquatic receptors. Contamination has been remediated onsite to risk-based standards. The risk assessment is based in part on the conditions that a physical barrier remains over residual contamination so that the pathway between receptors and the source is eliminated.

Intrinsic and institutional controls are required in the management area identified at the Site to eliminate or passively mitigate risks to select human and ecological receptors at the Site under current and future parcel circumstances or uses.

The management area at the Site is described in metes and bounds as:  
Starting at the Northwest corner of Lot A, Section 41, Comox District, Plan 7449:  
Thence 136°19'00" for 15.792 Metres; the point of commencement.  
Thence 136°19'00" for 27.500 Metres;  
Thence 226°19'00" for 5.000 Metres;  
Thence 316°19'00" for 12.500 Metres;

Imagine the result

Date:

February 20, 2016

Contact:

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Our Ref:

2030-1204

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Thence 226°19'00" for 12.500 Metres;  
Thence 316°19'00" for 10.000 Metres;  
Thence 226°19'00" for 10.000 Metres;  
Thence 316°19'00" for 5.000 Metres;  
Thence 46°19'00" for 27.500 Metres;  
Returning to the point of commencement.

Risk controls upon which the HHERA is based are described in this PVP.

### REQUIRED RISK CONTROLS

- 1. Before completing any future excavations at the Site an Environmental Professional should be consulted to ensure that contaminated soils encountered are addressed in a manner consistent with the British Columbia Contaminated Sites Regulation.*
- 2. Current intrinsic controls consisting of compliant surface soil (current natural barriers, >1 m thickness), or current asphalt covers and concrete building slabs (site features incorporated into the risk assessment) remain in place over identified residual contamination (see attached Figures 6 and 7 of the HHERA with the identified management area of the condition).*
- 3. Site groundwater must not be used as a potable water resource.*
- 4. Deep rooting vegetation will not be established over the area of residual contamination (see attached Figures 6 and 7 of the HHERA with the identified management area of the condition).*
- 5. Basements in any new buildings onsite will not extend beyond the maximum depth (0.6 m bgs) of the existing basement area evaluated in the risk assessment.*

### REQUIRED PVP ELEMENTS FOR REQUIRED RISK CONTROLS AND RATIONALE

#### MANDATORY COMMUNICATION

Contamination remains in place in soil and groundwater located >1 m bgs under uncovered portions of the Site, and/or >0.5 m bgs under concrete slab floors of the

current onsite building. The risk assessment has assessed the Site and operable exposure pathways for human and ecological receptors under these conditions.

The risk assessment for the Site indicates that exposure pathways for terrestrial ecological receptors and human receptors at grade (e.g. site visitors, maintenance workers, future residents, church staff) are inoperative in areas of residual contamination under these conditions.

There is a requirement for mandatory communication with the Site owner/operator to ensure that:

1. *An Environmental Professional should be consulted for future excavations in the area of residual site contamination to ensure that contaminated media encountered is addressed in a manner consistent with the British Columbia Contaminated Sites Regulation. Future excavation in the area of residual contamination may require management of contaminated media (e.g. offsite relocation or disposal) in accordance with the BC CSR.*
2. *Site conditions must be maintained (i.e. paved areas, building footprint, and surface grade) over the AEC 1 area of residual contamination (see attached Figures 6 and 7 of the HHERA with the identified management area of the condition). The risk assessment assumes that exposure pathways are inoperative for human and ecological receptors at grade under these conditions.*
3. *Groundwater must not be used as a potable water resource. The risk assessment assumes that this exposure pathway is inoperative because the site and area is currently serviced by an alternate community water source, and no drinking water wells currently exist on the property or within 500m of the property. Site groundwater is shallow, not currently used as a drinking water resource, and groundwater contamination is stable and delineated to a limited area measuring approximately 50 m<sup>2</sup> area above a bedrock aquitard. It is considered unlikely that shallow contaminated groundwater would be used as a potential future drinking water source even if a drinking water well were installed onsite.*
4. *Deep rooting vegetation (root depth > 1 m bgs) is not established over the area of residual contamination (see attached Figures 6 and 7 of the HHERA*

*with the identified management area of the condition*). The absence of deep rooting vegetation onsite is an assumption applied in the risk assessment.

5. *Basements in any new buildings onsite will not extend beyond the maximum depth (0.6 m bgs) of the existing basement area evaluated in the risk assessment*. The risk assessment has considered and evaluated indoor air risks for human receptors based on this assumption.

### REQUIRED ACTIONS FOR REQUIRED PVP ELEMENTS

Actions required to address risk controls at the Site include the imposition of an advisory as item (a) in clause 2 of Schedule B of any Certificate of Compliance issued for the Site that:

1. *Before completing any future excavations at the Site, an Environmental Professional should be consulted to ensure that contaminated soils encountered are addressed in a manner consistent with the British Columbia Contaminated Sites Regulation.*
2. *Current intrinsic controls of compliant surface soil (current natural barriers, >1 m thickness), or current asphalt covers and concrete building slabs (site features incorporated into the risk assessment) remain in place over identified residual contamination (see attached Figures 6 and 7 of the HHERA with the identified management area of the condition).*
3. *Site groundwater must not be used as a potable water resource.*
4. *Deep rooting vegetation will not be established over the area of residual contamination (see attached Figures 6 and 7 of the HHERA with the identified management area of the condition).*
5. *Basements in any new buildings onsite will not extend beyond the maximum depth (0.6 m bgs) of the existing basement area evaluated in the risk assessment.*

Record keeping requirements related to this PVP include maintenance of up to date records of performance verification actions and results for the Site being maintained by the responsible person (or their agents). If requested by the Director, responsible person(s) must provide these records to the BC MOE. As well, if requested by the

Director, the responsible person(s) must provide a signed statement on whether conditions set out in Schedule B of the CofC are being met.

Notification of the Director is required in the case that the subject of the Schedule B advisory is breached.

**CLOSURE**

We trust this PVP meets the requirements stated in the risk assessment.

Yours truly,

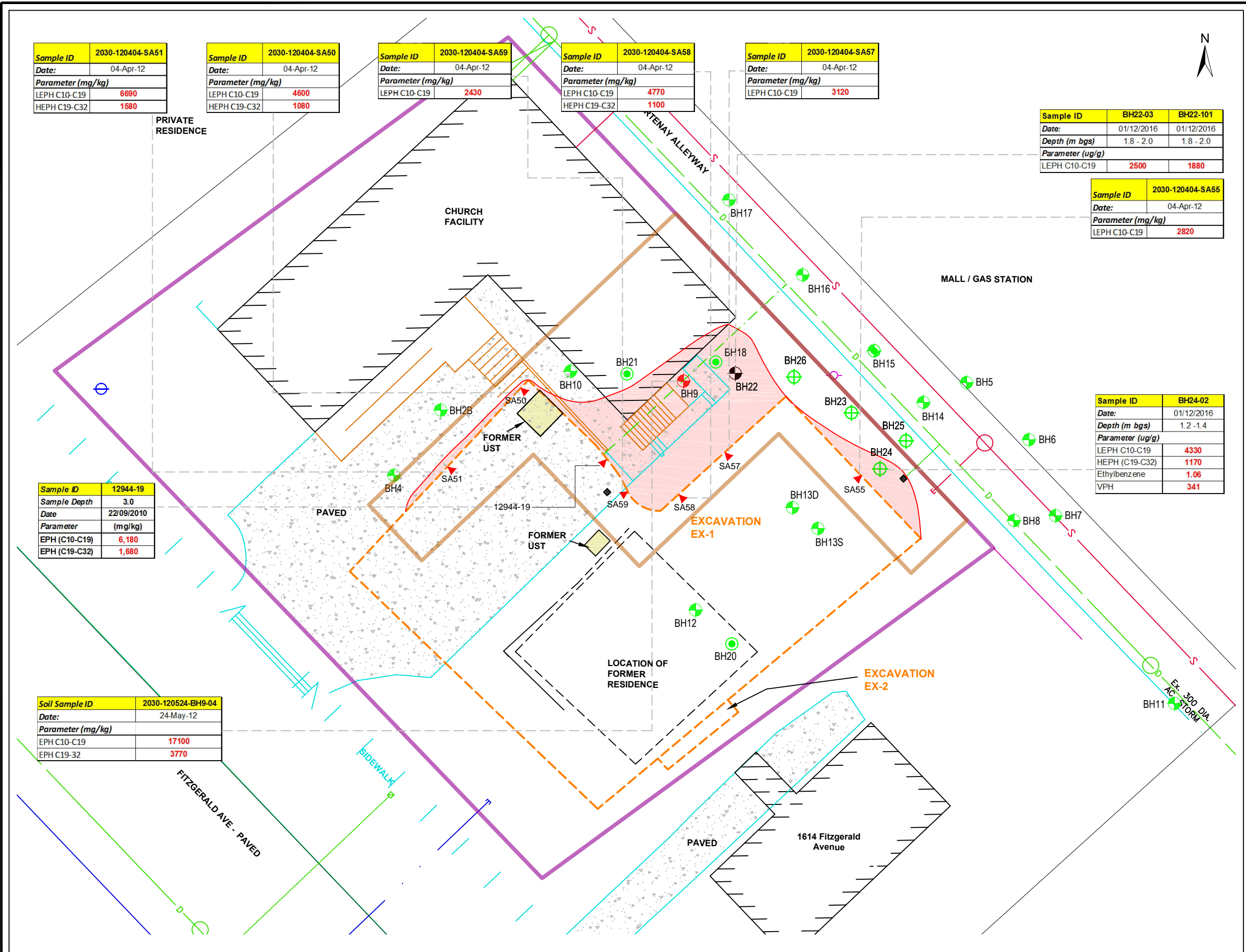
**ARCADIS Canada Inc.**



Meagan Gourley, M.E.T., R.P.Bio.  
Sr. Consultant, Toxicology  
ERM Canada for ARCADIS Canada Inc.

Attachments: Excerpt Figures 6 and 7 from the HHERA Report (ARCADIS, 2016) with the Identified Management Area for Risk Control Conditions.

Figure 6 Z:\WORK\Projects\2030 - 1580 Fitzgerald Ave (Sally Ann)\1204 Risk Assessment\CAD\CAD for HHERA\February 2016\2030-1001\_recover\_recover.dwg



Sample ID	2030-120404-SA51
Date:	04-Apr-12
Parameter (mg/kg)	
LEPH C10-C19	6690
HEPH C19-C32	1580

Sample ID	2030-120404-SA50
Date:	04-Apr-12
Parameter (mg/kg)	
LEPH C10-C19	4600
HEPH C19-C32	1080

Sample ID	2030-120404-SA59
Date:	04-Apr-12
Parameter (mg/kg)	
LEPH C10-C19	2430

Sample ID	2030-120404-SA58
Date:	04-Apr-12
Parameter (mg/kg)	
LEPH C10-C19	4770
HEPH C19-C32	1100

Sample ID	2030-120404-SA57
Date:	04-Apr-12
Parameter (mg/kg)	
LEPH C10-C19	3120

Sample ID	BH22-03	BH22-101
Date:	01/12/2016	01/12/2016
Depth (m bgs)	1.8 - 2.0	1.8 - 2.0
Parameter (ug/g)		
LEPH C10-C19	2500	1880

Sample ID	2030-120404-SA55
Date:	04-Apr-12
Parameter (mg/kg)	
LEPH C10-C19	2820

Sample ID	12944-19
Sample Depth	3.0
Date	22/09/2010
Parameter	(mg/kg)
EPH (C10-C19)	6,180
EPH (C19-C32)	1,680

Sample ID	BH24-02
Date:	01/12/2016
Depth (m bgs)	1.2 - 1.4
Parameter (ug/g)	
LEPH C10-C19	4330
HEPH (C19-C32)	1170
Ethylbenzene	1.06
VPH	341

Soil Sample ID	2030-120524-BH9-04
Date:	24-May-12
Parameter (mg/kg)	
EPH C10-C19	17100
EPH C19-C32	3770

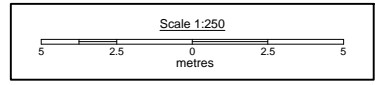
**LEGEND**

- Site Boundary
- Excavation Boundary
- Former UST
- Existing Building
- Utility - Storm Sewer
- Utility - Sanitary Sewer
- Hydro Pole
- Manhole
- Monitoring Well
- Soil Vapour Probe
- Nested Soil Vapour Probe
- Borehole
- Wall Sample
- Municipal Water Connection (Approx. Location)
- Area of Environmental Concern (AEC 1)
- Management Area #1

All Analytical Results are less than the Applicable Standards.  
 One or More Analytical Results is greater than the Applicable Standards.

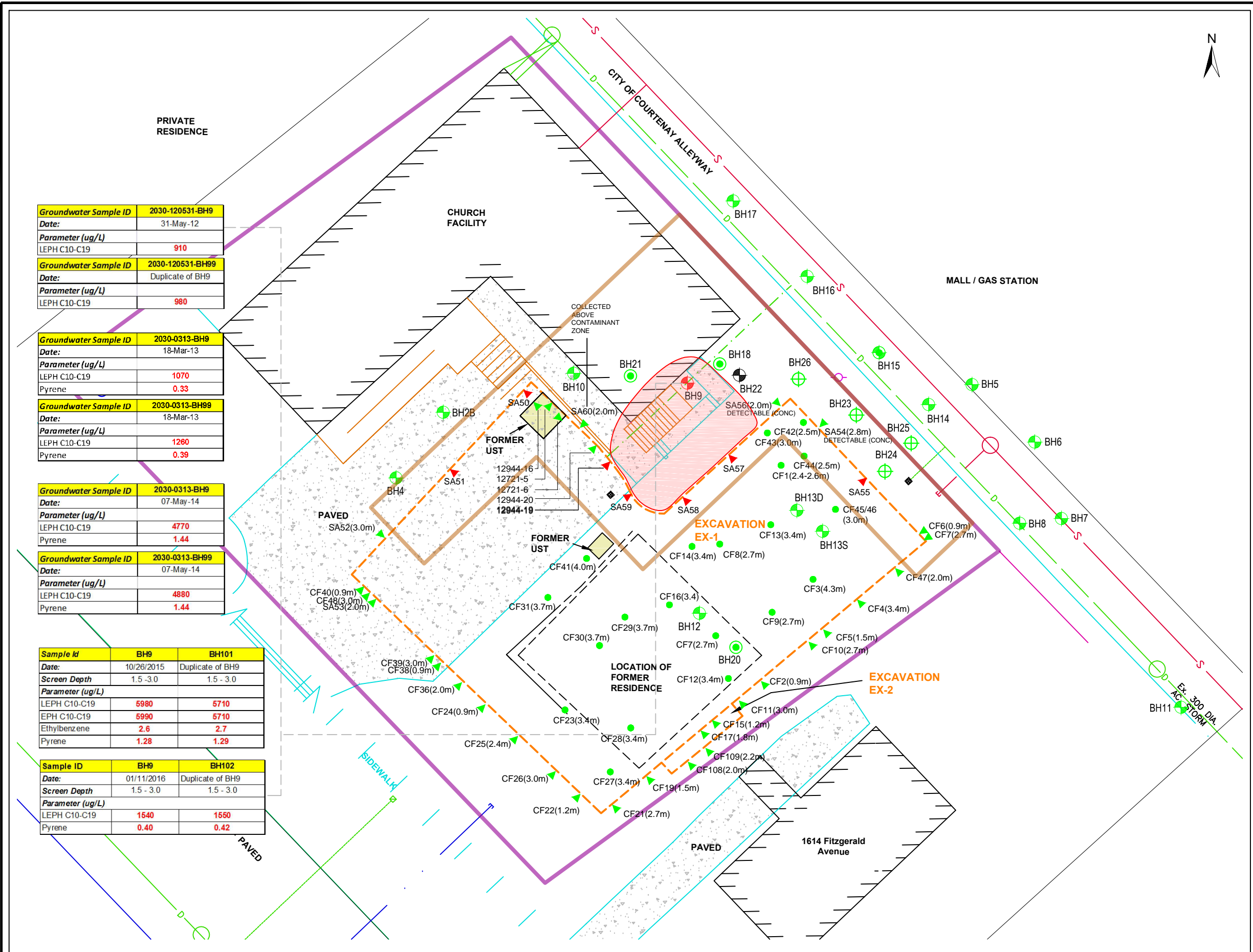
AEC #1 COCs:  
 LEPH, HEPH, EPH<sub>C10-C19</sub>, EPH<sub>C19-C32</sub>, VPH, ethylbenzene

Parameters	BC CSR RL	BC CSR Sch. 11	Units
LEPH C10-C19	1,000	1,000	ug/g
HEPH C19-C32	1,000	1,000	ug/g
EPH C10-C19	1,000	1,000	ug/g
EPH C19-C32	1,000	1,000	ug/g
Ethylbenzene	1	1	ug/g
VPHs	200	200	ug/g



Title: RESIDUAL SOIL CONTAMINATION AEC 1			
Project: HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT 1580 FITZGERALD AVENUE, COURTENAY, BC			
Owner: THE SALVATION ARMY			
Project Number: 2030-1204	Drawn By: NS	Plot Size: 11x17	Date: FEBRUARY 2016
			FIGURE 6





Groundwater Sample ID	2030-120531-BH9
Date:	31-May-12
Parameter (ug/L)	
LEPH C10-C19	910

Groundwater Sample ID	2030-120531-BH99
Date:	Duplicate of BH9
Parameter (ug/L)	
LEPH C10-C19	980

Groundwater Sample ID	2030-0313-BH9
Date:	18-Mar-13
Parameter (ug/L)	
LEPH C10-C19	1070
Pyrene	0.33

Groundwater Sample ID	2030-0313-BH99
Date:	18-Mar-13
Parameter (ug/L)	
LEPH C10-C19	1260
Pyrene	0.39

Groundwater Sample ID	2030-0313-BH9
Date:	07-May-14
Parameter (ug/L)	
LEPH C10-C19	4770
Pyrene	1.44

Groundwater Sample ID	2030-0313-BH99
Date:	07-May-14
Parameter (ug/L)	
LEPH C10-C19	4880
Pyrene	1.44

Sample Id	BH9	BH101
Date:	10/26/2015	Duplicate of BH9
Screen Depth	1.5 - 3.0	1.5 - 3.0
Parameter (ug/L)		
LEPH C10-C19	5980	5710
EPH C10-C19	5990	5710
Ethylbenzene	2.6	2.7
Pyrene	1.28	1.29

Sample ID	BH9	BH102
Date:	01/11/2016	Duplicate of BH9
Screen Depth	1.5 - 3.0	1.5 - 3.0
Parameter (ug/L)		
LEPH C10-C19	1540	1550
Pyrene	0.40	0.42

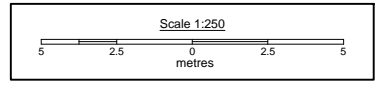
**LEGEND**

- Site Boundary
- Excavation Boundary
- Former UST
- Existing Building
- Utility - Storm Sewer
- Utility - Sanitary Sewer
- Hydro Pole
- Manhole
- Monitoring Well
- Soil Vapour Probe
- Nested Soil Vapour Probe
- Borehole
- Wall Sample
- Floor Sample
- CF Confirmatory Sample
- SA Characterization Sample
- CF(2.7m) Confirmatory Sample Identification and Sample Depth
- Municipal Water Connection (Approx. Location)
- Area of Environmental Concern (AEC 1)
- Area to be Delineated
- Management Area #1
- All Analytical Results are less than the Applicable Standards.
- One or More Analytical Results is greater than the Applicable Standards.

AEC #1 COCs:

LEPH, EPH<sub>C10-C19</sub>, pyrene, ethylbenzene

Parameters	BC CSR (Awf)	BC CSR (DW)	Units
LEPH C10-C19	500	NS	ug/L
EPH C10-C19	5000	5000	ug/L
Ethylbenzene	2000	2.4	ug/L
Pyrene	0.2	NS	ug/L



**Title:** RESIDUAL GROUNDWATER CONTAMINATION AEC 1

**Project:** HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT 1580 FITZGERALD AVENUE, COURTENAY, BC

**Owner:** THE SALVATION ARMY

Project Number: 2030-1204	Drawn By: NS	Plot Size: 11X17	Date: FEBRUARY 2016
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**ARCADIS**

FIGURE 7