

BC Housing Management Commission,
Suite 201 – 3440 Douglas Street, Victoria, BC V8Z 3L5
Via Email: kziebarth@bchousing.org

Attention: Kirsten Ziebarth - Project Technologist

Subject:

**Performance Verification Plan (PVP) for:
350 Prideaux Street Human Health and Ecological Risk Assessment, Nanaimo,
B.C.**

On behalf of the BC Housing Management Commission, 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 property at 350 Prideaux Street, Nanaimo, BC (herein referred to as “the Site”).

The Site is classified as **Type 2** based on risk assessment conditions and risk management measures required at this parcel.

The PVP presents the principal risk controls (as identified in Schedule B of the CofC) that apply at the Site parcel to ensure the CofC for this parcel remains valid. This PVP is based on the assumption that the current conditions at the Site do not change in future.

BACKGROUND

An application for a risk-based CofC will be submitted for the Site parcel. The human health and ecological risk assessment (HHERA, ARCADIS, 2016) for the Site parcel shows that there are no operable exposure pathways for 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 so that the exposure pathway between receptors at grade and the residual soil contamination at depth is eliminated.

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

Date:

October 2016

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Our Ref:

2576-1501

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The management area at Area of Environmental Concern (AEC) 1a of the Site is described in metes and bounds as:

- *That portion of 350 Prideaux Street, commencing on the west property line 5.0 metres southeast of the northwest corner of Lot 1, Section 1, Nanaimo District, Plan 27926, heading southeast along the boundary of said Lot for 9 metres, thence perpendicular to said boundary towards the northeast of said Lot for 18 metres, thence perpendicular to said line in a northwesterly direction for 9 metres, thence perpendicular to said line in a southwesterly direction for 18 metres to the point of commencement.*

The management area at AEC 1b of the Site is described in metes and bounds as:

- *That portion of 350 Prideaux Street, commencing on the west property line 15 metres northwest of the southwest corner of Lot 1, Section 1, Nanaimo District, Plan 27926, heading northwest along the boundary of said Lot for 15 metres, thence perpendicular to said boundary towards the northeast of said Lot for 9.0 metres, thence perpendicular to said line in a southeasterly direction for 15 metres, thence perpendicular to said line in a southwesterly direction for 9.0 metres to the point of commencement.*

REQUIRED RISK CONTROLS

Site conditions

- (a) *Current intrinsic controls consisting of compliant surface soil (current natural barriers, ≥ 1 m thickness) must remain in place over identified subsurface residual nickel contamination (AEC 1a, AEC 1b) at the Site (see management areas for the condition on Figure 4);*
- (b) *Deep rooting vegetation (i.e., plants that root >1 m below ground surface) will not be established over identified subsurface residual nickel contamination in AEC 1a and AEC 1b at the Site (see management areas for the condition on Figure 4);*
- (c) *Any new buildings at the Site will be slab on grade construction.*

REQUIRED PVP ELEMENTS FOR RISK CONTROLS AND RATIONALE

MANDATORY COMMUNICATION

Required PVP elements to implement risk management controls are discussed below, together with rationale for selecting PVP elements. There is a requirement for mandatory communication with the Site owner/operator to ensure that:

Site conditions

- (a) *Current intrinsic controls consisting of compliant surface soil (current natural barriers, ≥ 1 m thickness) remain in place over identified subsurface residual contamination (AEC 1a, AEC 1b) at the Site (see management areas for the condition on Figure 4);*

Nickel soil contamination remains in place at depth (>1 m bgs) at the Site. The risk assessment for the Site indicates that exposure pathways for terrestrial ecological receptors and human receptors at grade are inoperative under these conditions.

- (b) *Deep rooting vegetation (rooting depth > 1 m bgs) will not be established over identified subsurface residual contamination in AEC 1a and AEC 1b at the Site (see management areas for the condition on Figure 4).*

Nickel soil contamination remains in place at depth (>1 m bgs) at the Site. Given the present lack of deep rooting vegetation over residual nickel contamination at AEC 1a and AEC 1b, the risk assessment did not quantitatively evaluate the potential for unacceptable risk to deep rooting vegetation if established in these areas in future. To eliminate the potential for this ecological risk, instituting a prohibition on the establishment of deep rooting plants in management areas of AEC 1a and AEC 1b is considered an appropriate risk management action.

- (c) *Any new buildings at the Site will be slab on grade construction.*

The risk assessment has considered and evaluated indoor air risks for human receptors based on the conditions of the existing building (slab on grade) onsite.

REQUIRED ACTIONS FOR REQUIRED PVP ELEMENTS

Actions required to address risk controls at the Site parcel 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:

Site conditions

- (a) *Current intrinsic controls consisting of compliant surface soil (current natural barriers, ≥ 1 m thickness) remain in place over identified subsurface residual contamination (AEC 1a, AEC 1b) at the Site (see management areas for the condition on Figure 4);*
- (b) *Deep rooting vegetation (>1 m bgs) will not be established over identified subsurface residual contamination in AEC 1a and AEC 1b at the Site (see management areas for the condition on Figure 4);*
- (c) *Any new buildings at the Site will be slab on grade construction.*

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, by the person(s) responsible for the Site, 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.

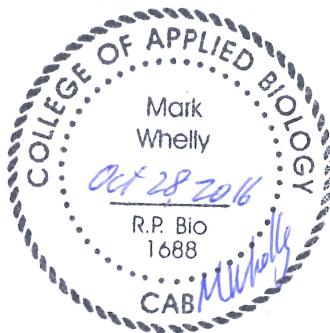
The opinions, advice and recommendations expressed in this performance verification plan have been made in accordance with generally accepted principles and practices as recognized by members of the applicable profession or discipline practicing at the same time and in the same or similar locations.

Yours truly,

ARCADIS Canada Inc.



Mark Whelley, M.Sc., R.P.Bio.
Principal Environmental Scientist
ARCADIS Canada Inc.

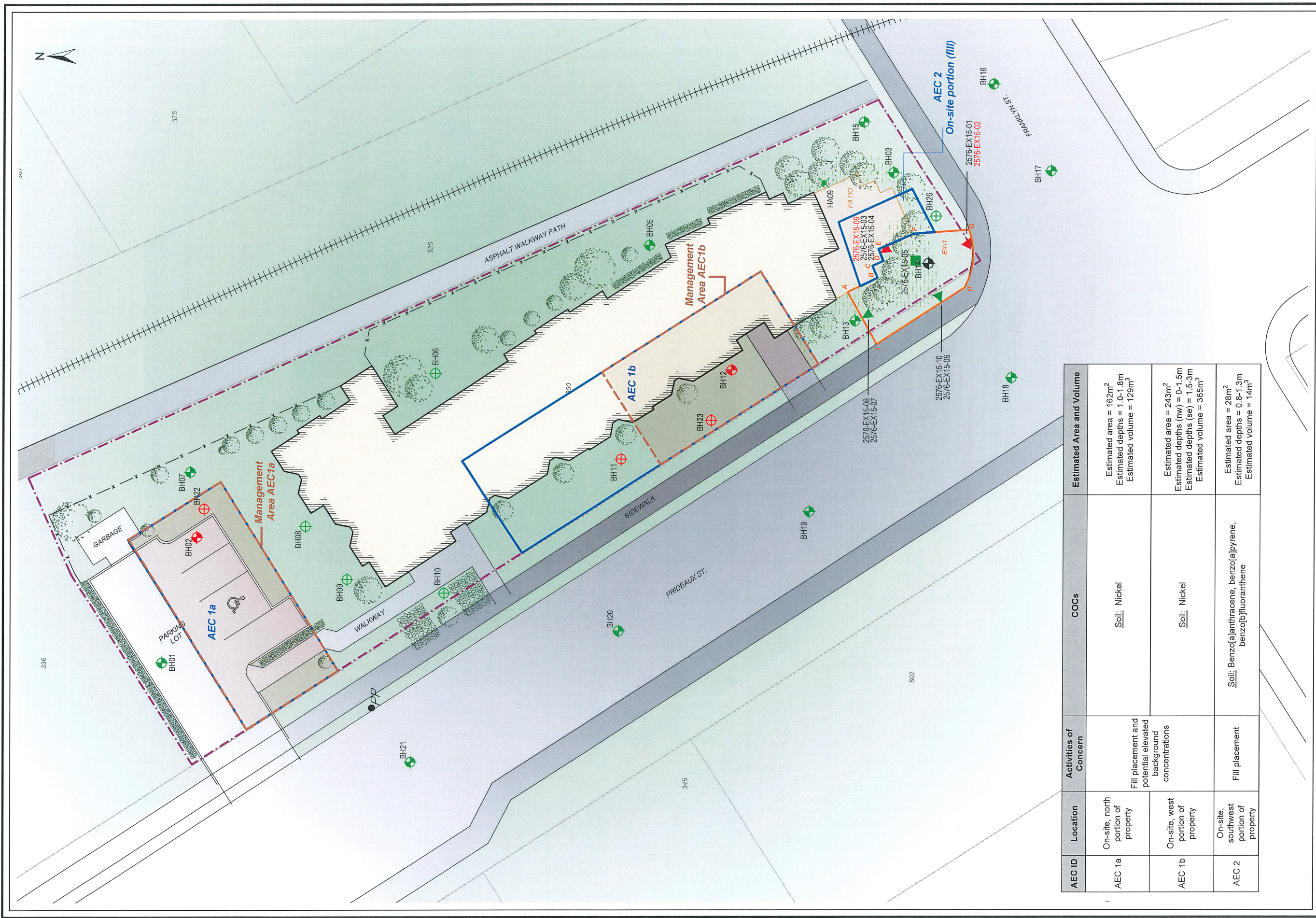


Attachments

Excerpt Figure 4 from the HHERA Report (ARCADIS, 2016) with the Identified Management Areas for Risk Control Conditions.

References

ARCADIS Canada Inc. March 2016. Human Health and Ecological Risk Assessment, 350 Prideaux Street, Nanaimo, BC.



AEC ID	Location	Activities of Concern	COCs	Estimated Area and Volume
AEC 1a	On-site, north portion of property	Fill placement and potential elevated background concentrations	Soil: Nickel	Estimated area = 162m ² Estimated depths = 1.0-1.8m Estimated volume = 129m ³
AEC 1b	On-site, west portion of property		Soil: Nickel	Estimated area = 243m ² Estimated depths (nw) = 0-1.5m Estimated depths (se) = 1.5-3m Estimated volume = 365m ³
AEC 2	On-site, southwest portion of property	Fill placement	Soil: Benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene	Estimated area = 28m ² Estimated depths = 0.8-1.3m Estimated volume = 14m ³

LEGEND

	Site Boundary		Monitoring Well Decommissioned
	Lot Boundary		Test Pit
	Existing Structure		Hand Auger
	Fence		Confirmatory Wall Sample
	Railway		Confirmatory Floor Sample
	Vegetation		One or More Analytical Results is Greater than the Applicable Soil Standards
	Powerpole with Transformers		All Analytical Results are Less than the Applicable Soil Standards
	Borehole		
	Monitoring Well		

Area of Environmental Concern

- Area of Environmental Concern
- Excavation Boundary
- Management Area

Sources:
 - Legal Description: Plan 27926, Lot 1, Section 1, Nanaimo District.

Scale 1:300
 0 3 6 metres

Title: AREAS OF ENVIRONMENTAL CONCERN (AECs) AND RESIDUAL SOIL CONTAMINATION

Project: HHERA
 350 PRIDEAUX ST., NANAIMO, BC

Client: B.C. HOUSING MANAGEMENT COMMISSION

Project Number: 2576-1501
Drawn By: NRCB
Rev. Size: 11X17
Date: MARCH 2016

ARCADIS

FIGURE 4