

1.0 PERFORMANCE ASSESSMENT FINDINGS

- *The Stage 1 Findings are “Additional Information Required”.*

2.0 DOCUMENTS REVIEWED

2.1 Submitted Reports

- *Summary of Site Condition*, prepared by Jeff Taylor / Active Earth Engineering Ltd., dated November 2015;
- *Stage 1 and 2 Preliminary Site Investigation – 4253-4295 Dunbar Street, Vancouver, BC*, prepared by Active Earth Engineering Ltd., dated December 2013;
- *Stage 1 and 2 Preliminary Site Investigation – 4205-4245 Dunbar Street, Vancouver, BC*, prepared by Active Earth Engineering Ltd., dated December 2013;
- *Test Pit Investigation - 4219-4295 Dunbar Street, Vancouver, BC*, prepared by Active Earth Engineering Ltd., dated July 2015; and,
- *Supplemental Site Investigation - City of Vancouver Dedication Adjacent to 4219-4295 Dunbar Street, Vancouver, BC*, prepared by Active Earth Engineering Ltd., dated August 2015.

2.2 Additional Documents

- *None provided.*

3.0 ADMINISTRATIVE AND DETAILED SCREENING (SOSC, DRAFT PRELIMINARY DETERMINATION, ETC.)

4.0 IDENTIFICATION OF APECS/PCOCS

The submission was made with two portions of the application presented under separate cover. For the purposes of this review, the separate portions were referred to as the Northern and Southern Portions of the application.

Stage 1 Findings #1 – Determination of APECs and PCOCs

Based on review of the above documents, the APECs selected for the Northern portion of the application are adequate to determine the presence or absence of any potential PCOCs at the Site. As a note, APEC 1 – Former Drycleaners should have been presented as three separate APECs. That being said, the inclusion of them as a single APEC does not prevent or obstruct the development of a Stage 2 PSI that would adequately determine the presence or absence of PCOCs. However, it is key to the historical periods of operation for each individual dry cleaner.

Based on review of the above documents, the APECs selected for the Southern portion of the application are generally adequate to determine the presence or absence of any

potential PCOCs at the Site. The dry cleaner located to the North of the Southern parcel was not considered to be an APEC for the southern portion. This was based on the absence of any contamination from the Stage 2 investigation completed on the Northern portion. However, the groundwater flow direction in the Northern investigation is due south. Based on the groundwater flow direction, the dry cleaners directly to the North should be considered an APEC regardless of the results of the Stage 2 on the Northern Portion. The Stage 2 investigation appears to take this into consideration as groundwater samples from AE13-MW1A and AE13-MW2D were analysed for VOCs even though VOCs were not considered to be PCOCs for the southern portion.

4.1.1 Additional Information Required

No further information is required from the AP with respect to the APECs and PCoCs.

5.0 DELINEATION AND CHARACTERIZATION OF AECS AND PCOC/COC

5.1 Stage 1 Findings #1 – Determination of Applicable Groundwater Standards

There is some confusion in the determination on applicable groundwater standards. The Summary of Site Conditions and the SSI report indicate that DW applies. The reports for the northern and southern portion indicate that DW does not apply. As the SoSCs indicate DW applies, it is assumed that these standards were used for the submission, but it is not clear.

The groundwater investigation did not reach the underlying aquifer and appears to have only intersected the perched groundwater table (as per GW description in report). This perched groundwater table is described as being discontinuous and seasonal. With respect to the dry cleaners, the groundwater wells are not ideally located, as they are located cross-gradient or a significant distance down-gradient. It is understood that the buildings on the site made locating the wells laterally difficult, but it would not inhibit the ability to drill a well to the regional aquifer.

On the northern portion, only three samples were collected where the groundwater samples were considered to be reliable (see comments in table on page 35 of Report for the Northern Portion). Considering the complexity of the hydrogeologic regime and the complexity of the contaminants at the Site (i.e. DNAPLs), it seems that the number of reliable samples is low. For the northern portion and road dedication along Dunbar Street, seven well locations with five nested completions were installed. Of the twelve wells installed, water was only encountered in five wells, namely AE13-MW1B, AE13-MW3B, AE13-MW4B, AE13-MW, and AE15-MW12D. The former dry cleaners at 4205 and 4231 Dunbar Street cover a spatial area 15 m across by 20 m (north to south) and have only one cross-gradient well at AE13-4B which provides little indication of groundwater quality with respect to this APEC.

The highest concentration of VOCs in groundwater were observed in AE13-9A which is located up-gradient to the site. In addition, the comments in the report indicate that the well was likely not at static conditions. The Stage 1 did not identify any up-gradient potential sources of VOCs. This data does not seem consistent with the conceptual site model developed for the Site.

The samples collected from AE13-MW5 exceeded the applicable standards for B(a)P on two consecutive sampling events. In addition to the B(a)P, there are several other PAHs that

exceeded the method detection limits. The rationale given is that the sample was impacted by a minimal saturated thickness and sedimentation. The rationale provided should be expanded.

A test pitting program was completed during the decommissioning of the buildings. No samples were collected as it appears as though the program was only completed to determine the presence/absence of furnace oil USTs. Given the restricted access to ideal sampling locations during the previous investigations, it would have been advantageous to collect soil samples in the vicinity of the former dry cleaners after the buildings had been removed.

5.1.1 Additional Information Required

Please clarify the applicable groundwater standards for the Site.

Please provide a more detailed rationale as to why the groundwater sampling program is adequate given the complexity of the PCOCs and the hydrogeologic regime. This rationale should include a detailed conceptual site model and include a discussion on pathways that have led to the concentrations in AE13-MW9A and rationale as to why the inclusion of test pitting samples for dry cleaning solvents was not completed upon removal of the buildings.

Please provide a more detailed rationale as to why PAHs in groundwater do not represent contamination at the Site.

6.0 SOIL VAPOUR

6.1 Stage 1 Findings #1 – Appropriate Attenuation Factor Used

Various wells located in key locations were not analysed for vapours related to dry cleaning operations, such as, AE13-SV1 and AE15-SV11 on the northern portion and AE13-SV1 on the southern portion. Given the complexity of the hydrogeology and the complexity of the PCOCs, it would have been advantageous to have had multiple lines of evidence to show the absence of contamination in locations where samples would have been desired, but could not be collected due to the presence of buildings.

The reports indicate that elevated vapour concentrations were observed in AE13-SV9, but the borehole log for AE13-SV9 could not be located in the report.

The report indicates that the laboratory erroneously combined the samples collected from AE13-MW4B and AE13-SV8. Although they are reported as a combined sample, the entire contribution of contaminants could have theoretically come from a single well, as such, the presentation of the results is not a conservative assumption.

The attenuation factors selected appear to only contemplate the pre-development scenario. Based on a future scenario including a parking garage the attenuation factors selected should be adjusted.

Vapour probe AE15-SV11 is the closest location used to investigate the former dry cleaner at 4205 Dunbar Street, yet a vapour sample was not collected from this location. The nested wells AE15-MW11S/D were both dry and groundwater could not be sampled. This dry

cleaner is directly up-gradient of the site, is considered an off-site APEC, and yet no essential investigation was completed where VOCs were identified as PCOCs.

6.1.1 Additional Information Required

Please provide additional rationale as to why the vapour sampling program adequately demonstrates the absence of contamination at the Site. Particularly provide rationale as to why AE13-SV1 and AE15-SV11 on the northern portion and AE13-SV1 on the southern portion were not sampled.

Please provide the borehole log for AE13-SV9.

Please provide explanation for the lack of a groundwater and soil vapour investigation of the former dry cleaner at 4205 Dunbar Street.

Further evaluation of the AE13-MW4B and AE13-SV8 should be provided to verify that the concentrations are below the applicable standards under a conservative scenario.

Please provide rationale supporting appropriate attenuation factors for all samples collected at the Site under the future use contemplated in the application.

6.2 Stage 1 Findings #2 – Detected VOCs in AE13-MW4B

Detectable concentrations of perchloroethylene (PCE) and trichloroethylene (TCE) were identified in a vapour sample from AE13-MW4B, located near the rear of the former dry cleaner at 4231 Dunbar Street, which operated for 35 years (i.e. 1930 to 1965). Based on detection of dry cleaning solvents in soil vapour at a cross-gradient location to the former operation, this is indicative of a subsurface release. This should have prompted further groundwater investigation within the footprint of the former dry cleaner given there are no monitoring wells located directly down-gradient of this APEC.

6.2.1 Additional Information Required

Please provide rationale as to why further assessment of groundwater was not required for this APEC given the soil vapour findings and the 35-year operational history of the former on-site dry cleaner.

7.0 FINDINGS CONCLUSIONS

7.1.1 Stage 1 Findings

The Stage 1 Findings are “Additional Information Required”.

8.0 LIMITATIONS

This review was conducted for the exclusive use in a performance assessment of an Approved Professional submission to the Ministry of Environment. The report is intended to provide a technical review and opinion of information provided in the documents referenced above respecting the adequacy of the environmental site investigations and remediation conducted at the subject site in terms of obtaining a regulatory instrument. This report is not meant to represent a warranty, or a legal opinion regarding compliance with applicable laws. The reviewer makes no other representation or warranty as to the accuracy or completeness of the information provided.

This review followed the standard of care expected of professionals undertaking similar work in British Columbia under similar conditions. The reviewer's conclusions and opinions are entirely based on the information provided. The reviewer has relied on the accuracy and completeness of the background materials upon which the reported information was based, and is not responsible for errors or omissions in such background materials.

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