VI MITIGATION AND CONCEPTUAL VI ASSESSMENT PLAN

Stillwater Holdings Chevron: Marcus Whitman Hotel & 106 2nd Ave Building

Prepared for: Stillwater Holdings, LLC

Project No. AS230442 • November 17, 2023 DRAFT

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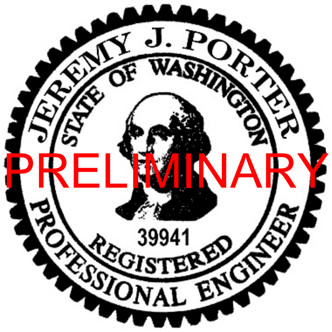

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1 Introduction

Aspect Consulting has prepared this Draft Vapor Intrusion Mitigation and Conceptual Vapor Intrusion Assessment Plan on behalf of Stillwater Holdings, LLC to present the approach to mitigate vapor intrusion (VI) in the Marcus Whitman Hotel (Hotel), located at 6 W Rose Street, and the commercial building located at 106 N 2nd Avenue (106 Building) in Walla Walla, Washington. The Hotel and the 106 Building are located to the southwest and northwest, respectively, of the Stillwater Holdings Chevron, a Chevron-branded fuel station located at 7 E Rose Street, owned by Stillwater Holdings, LLC (herein referred to as the Subject Property). The Stillwater Holdings Chevron is a Washington State Department of Ecology (Ecology) cleanup site (Cleanup Site ID: 16913; aka Bill Singer's Chevron [Cleanup Site ID: 11516]) because of historical and suspected recent releases of petroleum hydrocarbons.

On September 14, 2023, petroleum-like odors were observed in the basements of the Hotel and the 106 Building. Testing of air quality within the basement of the Hotel by the City of Walla Walla Fire Department identified elevated concentrations of volatile organic compounds (VOCs) and combustible gas concentrations at 93 percent of the Lower Explosive Limit (LEL) (Ecology, 2023[1]). Further investigation identified gasoline as light non-aqueous phase liquid (LNAPL) in a sump, drywell, and vault in the Hotel and in a sump in the 106 Building. Elevated concentrations of VOCs and combustible gases were also measured in indoor air in the 106 Building and in the U.S. Post Office building located on the north side of the 106 Building at 128 N 2nd Avenue (Ecology, 2023). Ecology, and their contractor Clean Harbors, responded and conducted spill response actions that included building ventilation and LNAPL/fluid recovery from building sumps.

Ecology investigated the source of the gasoline through the collection and forensic analysis of product samples and advancement of exploratory soil borings (Ecology, 2023). The results of Ecology's investigation resulted in the October 3, 2023 letter, *Technical assistance regarding gasoline release from 7 E. Rose Street, Walla Walla*, to Wine Country Store, LLC c/o Ben Kleban from Sam Hunn, Regional Supervisor, Ecology Eastern Regional Office Spill Prevention, Preparedness, and Response Program. The letter alleges that the source of the gasoline is the Wine Country Store. The Ecology letter requests that further investigation be completed by Stillwater Holdings, LLC to assess the full extent of contamination.

As described above, building ventilation was implemented at the 106 Building and Hotel as a temporary VI mitigation measure during spill response, but a more permanent VI mitigation system is desired to provide more efficient control of soil vapors with less disruption to the buildings and operations. This more permanent system would be

[1] Washington State Department of Ecology, 2023, Incident Briefing ICS 201-CG, Marcus Whitman Hotel Hazmat Response 091423, October 2, 2023.

operated until the source of vapors in soil and groundwater have been adequately addressed.

This plan has been prepared to present the general approach for VI mitigation in the Hotel and 106 Building. Mitigation is not intended to address the source of VOCs but will be implemented to reduce VI impacts to the 106 Building and Hotel. General VI mitigation typically consists of one, or a combination of the following: 1) minimizing the intrusion of vapors into a building by creating a pressure gradient; 2) minimizing the intrusion of vapors into a building through preferential migration pathways using a physical vapor barrier; and 3) treating or diluting contaminated indoor air. Based on our current understanding of Site conditions, we expect that a combination of sub-slab depressurization and sealing of preferential pathways will sufficiently reduce VI impacts. Testing would be performed to confirm VI mitigation performance.

Fluid recovery was conducted as part of the spill response to minimize petroleum vapors in buildings where wastewater control structures are located. Both the Hotel Sump and the 106 Building Sump are currently being emptied manually, along with the Hotel Vault and an abandoned stormwater lift station located outside of the Hotel. LNAPL is no longer being recovered or observed in wastewater control structures. Based on current conditions, fluid recovery does not appear to be providing any benefit to VI mitigation. The sealing and ventilation of the 106 Building Sump (described in Section 2.2.1) and the Hotel Sump (described in Section 3.2.4) will mitigate the potential for vapors that collect in the structures to impact indoor air. Pumping from the Hotel Sump and 106 Building Sump is expected to continue as needed as part of building maintenance. There is no apparent benefit to ongoing removal of water from the abandoned stormwater lift station or the Vault and, once decommissioned in accordance with Section 3.2.1, water recovery from the Vault will not be feasible. To allow the Sumps to operate normally (with regular discharge to the city sanitary sewer), Aspect will collect and analyze water samples; evaluate wastewater discharge criteria; and design, construct and operate treatment systems at both properties. Future wastewater discharge will be conducted in accordance with a City of Walla Walla Wastewater Discharge Permit. The water treatment plan will be provided in a separate work plan.

This work plan describes planned VI mitigation and assessment activities, and is organized as follows:

- **Section 2 – 106 Building** describes pertinent conditions and initial VI assessment and mitigation activities in the 106 Building.
- **Section 3 – Marcus Whitman Hotel** describes pertinent conditions and initial VI assessment and mitigation activities in the Hotel.
- **Section 4 – Vapor Intrusion Assessment** describes the overall approach to assessment of vapor intrusion including a summary of the activities described in Sections 2 and 3 and additional planned testing.

For expediency, vapor intrusion assessment and mitigation activities will be conducted concurrently, as described further below.

2 106 Building

The 106 Building is currently vacant and consists of three levels of office space, including a basement level, street level, and a second floor. Petroleum-like odors in the 106 Building were first noted in a basement room located on the southwest end of the building that contains a stormwater sump. A sewer sump, located on the northeast end of the building, has not contained petroleum-like odors.

2.1 Vapor Controls

The current vapor control measures consist of collection of vapors from inside the stormwater sump and ventilation of the stormwater sump room. The sump is currently covered by plastic sheeting that is sealed around the edges with tape. A blower collects vapors from inside the sump and transports them through temporary ducting to the exterior of the second floor of the building for discharge.

The current, temporary vapor control measures have reportedly been successful at mitigating VOCs in indoor air to below the 5 parts per million (ppm) action level that was determined by the City of Walla Walla for the Hotel basement during the spill response.[2] The following work will be completed as an initial mitigation step and to evaluate the need for, and collect data and information to inform design of, a more permanent VI mitigation system:

1. Seal and vent the stormwater sump, as described in Section 2.2.1, to mitigate potential preferential transport and migration of petroleum vapors from the stormwater system (via piping) and potential volatilization of petroleum vapors from petroleum-contaminated stormwater that collects in the sump.
2. Conduct a preliminary sub-slab soil gas investigation to evaluate conditions beneath the concrete floor slab as described in Section 2.3.

If the results of the VI assessment indicate a potential VI risk from sub-slab soil gas, additional investigation work will be completed as descried in Section 2.4 to design and implement a permanent VI mitigation system.

While the work above is in progress, the current ventilation system will continue to operate as needed to meet the 5 ppm indoor action level for VOCs. Ventilation parameters such as extraction locations, flow rates, and clean air makeup may be adjusted to maximize performance.

2.2 Preferential Pathway Mitigation

The only known preferential migration pathway for petroleum vapors to be entering the 106 Building is the stormwater sump. The mitigation measures proposed to reduce VI from the stormwater sump are described below.

[2] City of Walla Walla Development Services, 2023, Amended Notice, Report and Order Regarding Unsafe Structure, October 6, 2023.

2.2.1 Stormwater Sump

The round, concrete stormwater sump is approximately 3-feet in diameter and 6 feet deep. Two pipes are connected to the sump, one on the northwest and one on the northeast. During initial spill response, Clean Harbors reportedly traced both pipes from the sump. The northwest pipe reportedly dead ends beyond the footprint of the 106 Building but information regarding the end of the pipe was not available. The northeast pipe reportedly connects to the building on the north-adjoining parcel, which is currently owned and operated by the US Postal Service as a post office. Large gate valves that appear to correspond to these two pipes are located within separate vaults next to the stormwater sump. The valves are seized and cannot be operated. During normal operation, the stormwater sump pump reportedly discharges water to the city sanitary sewer to prevent flooding of the 106 Building basement. During October and November 2023, the sump was being filled by water discharging from the northeast pipe, and was dewatered multiple times per day by Clean Harbors.

Figure 1. *View of 106 Building Sump and Gate Valves (looking south)*

The following work will be conducted to permanently mitigate vapors in the sump from entering the 106 Building,

- Install a permanent vapor-proof cover with sealed openings around the stormwater and air discharge piping.
- Design and construct a permanent system to vent the sump and discharge collected vapors to outdoor air through a ventilation system. The ventilation system effluent will be tested to determine whether treatment is required to meet the air discharge criteria described in Appendix B.

2.3 Preliminary Sub-Slab Soil Gas Investigation

The detailed scope of work for the preliminary sub-slab soil gas investigation of the 106 Building is presented in Appendix A. The work includes installation and sampling of sub-slab vapor pins to allow for the analysis of contaminants in the air space immediately beneath the floor slab of the building that have not been evaluated as part of the spill response activities. Initial sampling activities will establish current conditions and aid in pilot study design considerations (see Section 2.4).

This investigation will also include removal of basement concrete cores at two potential sub-slab vent locations to allow for confirmation of sub-slab physical conditions depicted on architectural foundation plans. Plans show the basement floor slab as underlain by 4-inches of crushed base-course, followed by a geotechnical vapor barrier (likely Visqueen® or similar), which is underlain by an additional 3-inch-thick layer of capillary break (typically a granular material like sand; not specified in plans). Aspect will document the granular material specifications, condition and thickness of the geotechnical plastic sheet vapor barrier and underlying granular capillary material specifications and moisture content.

If the results of the preliminary sub-slab soil gas investigation suggest a potential VI risk from petroleum hydrocarbons in soil gas, the pilot study described in Section 2.4 will be conducted to design and implement a VI mitigation system.

2.4 Sub-Slab Depressurization/Venting Pilot Study

Preliminary mitigation design considerations for the 106 Building are focused on a sub-slab depressurization/venting system (SSDS/SSVS). The SSDS/SSVS design parameters and applicability will be determined during the preliminary investigation (see Section 2.3) and pilot study. Pilot study procedures are detailed in Appendix B.

2.4.1 Sub-slab Vent and Installation

Initial pilot test activities will include step and constant rate testing on 2 sub-slab vent locations. Preliminary vent locations will be the core locations discussed in Section 2.3 and will be located north of the hot sump in the supply-mail room, and one location on the eastern wall of the former "investor-reporting" office. Venting locations may be adjusted after the first round of sub-slab gas analytical data is reviewed and sub-slab conditions are observed.

Based on a review of the architectural sub-slab specifications, venting construction options considered will be:

- Shallow vents extending only into the crushed base-course.
- Vents extending into the crushed-base course and underlying granular capillary material (approximately 7-inches).
- Vents that include a larger diameter concrete core and removal of crushed base-course, capillary material, and underlying soil to a depth of 1- to 2-feet. The void space would be backfilled with pea gravel (or other permeable fill) and then the last foot will be backfilled with compacted ¾ minus crushed rock.

For each vent, 4-inch diameter schedule 40 PVC with 0.020-inch (or other based on physical properties evaluation) slot screen will be installed in the void created by removal of the hardscape and/or sub-slab soil and connected to a 4-inch diameter PVC riser extending to approximately 6-inches above the slab grade. The concrete will then be repaired to match the surrounding slab surface. Vents will be capped with a 4-inch air-tight well cap.

Pressure response monitoring will be conducted using approximately 8 sub-slab vapor pin locations. The number of vapor pins utilized will be adjusted during pilot testing depending on pressure response observed. Pins will be located at distances between approximately 5 to 80-feet from the sub-slab vents (varies between distances from the two vents). The exact locations of the monitoring points will be determined based on the observed conditions/obstacles in the tenant space.

3 Marcus Whitman Hotel

The original thirteen-story tower of the Hotel, located at the west corner of the intersection of N 2nd Avenue and Rose Street, was constructed in 1928. A basement underlies the original portion of the Hotel and includes operations/utility rooms (electrical room, boiler room, air handler room, etc.), shop rooms used for various types of building maintenance, and miscellaneous storage rooms and spaces. In the east corner of the basement, a lower-level basement (referred to as the sub-basement or bat cave) contains a partial dirt floor and is used for miscellaneous storage of construction materials and hotel supplies. Figure 1 is a photograph of a hand-drawn schematic drawing of the basement layout and provides further information about the uses there.

Water has been observed at very shallow depths beneath the exposed dirt floor of the sub-basement in the Hotel (less than 12 inches below ground surface [bgs]). Given the relative elevation of the dirt floor to groundwater observed in explorations completed in the Hotel vicinity, it is likely that groundwater is located not far below the exposed dirt floor during seasonal high groundwater conditions. The soil located above the water table may, depending on groundwater conditions, reflect the capillary fringe – a subsurface layer where water is wicked upward in pore spaces due to capillary forces. Where groundwater has been impacted by releases of petroleum hydrocarbons, this upward wicking of water into the vadose (unsaturated) zone can be a source of VOCs to soil gas, as petroleum hydrocarbons volatilize from water, and to soil, as petroleum hydrocarbon molecules sorb to soil particles.

One primary objective of the work described below is to evaluate VI contribution from preferential pathways and VI contribution from sub-slab soil gas in order to minimize or eliminate VI contribution from preferential pathways and design a permanent system to mitigate VI from sub-slab soil gas.

3.1 Vapor Control

The current vapor control measures consist of ventilation of the southern portion of the Hotel basement, including the sub-basement. Temporary blowers collect vapors from the basement using temporary ducting and discharge them through permanent ducting running from the sub-basement to the exterior of the building at street level on Rose Street. Additionally, proprietary vapor suppression compounds and plastic sheeting have been used by Clean Harbors in an attempt to reduce VI through portions of the unfinished dirt floor in the sub-basement.

Clean Harbors applied Micro-Blaze® Emergency Liquid Spill Control to the exposed dirt floor of the sub-basement. This product is marketed as a proprietary combination of wetting agents, nutrients, and microbes used for the bioremediation of hydrocarbons and vapor suppression. Wetting agents are surfactants that reduce surface tension of a liquid and allow it to spread over, or penetrate, a surface more easily. When used in the presence of LNAPL, a wetting agent can increase LNAPL solubility and mobility. While the product appears to have provided some vapor suppression effectiveness, based on reported decreases in VOC concentrations in indoor air by Clean Harbors, the effect on contaminant mobilization is unknown.

The current, temporary vapor control measures have reportedly been successful at mitigating VOCs in indoor air in the sub-basement to below the 5 ppm action level.

The following initial work to enhance the current vapor control measures will be completed:

1. Evaluate and decommission, abandon, or seal any features that are directly connected to waters of the state, as described in the introduction of Section 3.2.
2. Seal and vent the stormwater sump, as described in Section 3.2.4, to mitigate potential preferential transport and migration of petroleum vapors via piping and potential volatilization of petroleum vapors from petroleum-contaminated stormwater that collects in the sump.
3. Design and install a vapor barrier on exposed soil surfaces in the basement and sub-basement. In the sub-basement, installation of a chemically-resistant vapor barrier will be combined with an active venting system that will be tied into the current temporary ducting/venting system while longer term venting options are evaluated. The vapor barrier preliminary design is discussed in Section 3.2.5.

While additional VI mitigation work described above and below is in progress, the current ventilation system will continue to operate as needed to meet the indoor action level for VOCs. Ventilation parameters such as extraction locations, flow rates, and clean air makeup may be adjusted to maximize performance. After permanent VI mitigation measures have been installed, the ventilation system may be turned off and performance monitoring conducted to verify effectiveness of the permanent measures.

3.2 Preferential Pathway Mitigation

There are several locations where known historical features within the basement or sub-basement provide significant preferential pathways for contaminant vapors in soil gas to enter the hotel. These known features currently include the Sump, Drywell, Vault, Unknown Well, and dirt floor portion of the sub-basement, but others may be present.

The Hotel should conduct a building-wide evaluation of structures and features that are inactive, unpermitted, and/or noncompliant and known or suspected to be directly connected with and/or uncontrolled conduits to waters of the state and decommission or abandon them immediately in accordance with applicable state laws and regulations. Active structure and features that may be conduits to waters of the state should be retrofitted to meet current laws and regulations regarding surface seals.

Descriptions and photographs of the currently known features, along with recommendations for mitigating preferential vapor transport into the building, are provided in the following subsections.

3.2.1 Vault

The Vault is a large, subsurface concrete structure with an approximate 2-foot diameter, steel cover in the concrete floor slab of the basement. The Vault was reportedly used historically for cooling and its subsurface dimensions are unknown. The Vault is currently filled with construction rubble and debris that create a mound that is 2 to 3 feet below the cover. Water is visible within the Vault at approximately 5 feet below the cover. The Vault serves no known, current purpose and appears to be a direct, open conduit to groundwater. The Vault should be decommissioned or abandoned in accordance with applicable state laws and regulations.

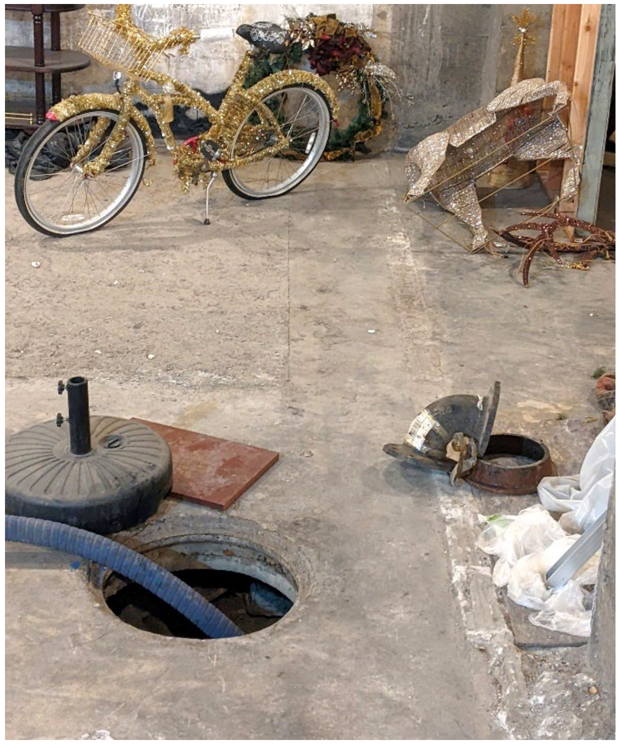


Figure 2. *Surface Access to the Vault*

Figure 3. *Interior View of the Vault*

3.2.2 Unknown Well

The Unknown Well is located within the dirt floor portion of the sub-basement and consists of an 18-inch diameter, white, plastic casing with visible, vertical slotted cuts at the approximate ground surface. The Unknown Well is uncovered, extends to a depth of approximately 2.5 feet bgs, and contains water at a depth just below the surrounding ground surface. The Unknown Well serves no known, current purpose and appears to be a direct, open conduit to groundwater. The Unknown Well should be decommissioned or abandoned in accordance with applicable state laws and regulations.

Figure 4. *Aboveground Portion of Unknown Well*

Figure 5. *Interior View of Unknown Well*

3.2.3 Drywell

The Drywell is a perforated, black plastic pipe that is approximately 24-inches in diameter and extends approximately 4 feet above the unfinished gravel floor of the sub-basement. The Drywell is approximately 6 feet deep. Water is visible in the bottom of the Drywell. Two pipes are visible entering the Drywell, the larger of the two is capped with a PVC cap. The purpose of the Drywell and origin and use of the visible pipes are unknown. The current purpose and use of the Drywell are unknown, and it may be a direct, open conduit to groundwater. The Hotel should evaluate the purpose and construction specifications of the Drywell and implement appropriate measures to protect waters of the state.

Figure 6. Exterior View of Drywell

Figure 7. Interior view of Drywell

3.2.4 Sump

The main Sump is a solid, rectangular concrete structure that is approximately 4-feet by 4-feet and extends to a depth of approximately 9 feet. The Sump collects water from unknown locations via a number of piping inlets located at variable depths within it. During normal operation, the Sump reportedly discharges water to the city sanitary sewer to prevent flooding of the Hotel basement. Shallow inlets to the Sump suggest that one purpose may be to collect and drain water from beneath the building sub-slab. Next to the main Sump is a small vault or sump that is approximately 2.5-feet by 4-feet in area.

The following work will be conducted to permanently mitigate vapors in the sump from entering the Hotel,

- Install a permanent vapor-proof cover with sealed openings around the stormwater and air discharge piping.
- Design and construct a permanent system to vent the sump and discharge collected vapors to outdoor air through a ventilation system. The ventilation system effluent will be tested to determine whether treatment is required to meet the air discharge criteria described in Appendix B.

Figure 8. *Interior View of Main Hotel Sump*

Figure 9. *Surface Access to Main Sump and Small Sump*

3.2.5 Sub-Basement Dirt Floor

There are two areas of the sub-basement where there is no foundation or finished floor and the surface is exposed soil. One area consists of a short, dirt ramp that extends up to a portion of unfinished floor that includes a lattice of rebar and underlying gravel and may have been prepared at some point in the past for the installation of a concrete floor (see the photo of the Drywell in Section 3.2.3). The other area is shown in the photo below and consists of an uneven soil surface in the sub-basement that is surrounded by various foundational elements.

The dirt ramp and unfinished floor portion of the basement will be capped in consultation with the Hotel to include an impermeable material that is consistent with their use of those areas.

Exposed soil in the sub-basement of the hotel will be covered with an impermeable, chemically-resistant vapor barrier that consists of the following basic components:

- A permeable gravel layer to provide a continuous, permeable zone beneath a vapor barrier membrane that allows soil vapor to flow to the collection piping. The gravel layer will have 4-inch nominal thickness and be composed of 3/4-inch diameter (or less) subangular clean material (gravel).
- A single run of sub-barrier, perforated, horizontal vent piping shall be installed in the gravel layer, traversing the length of the gravel layer, and consist of composite low-profile piping consisting of a three-dimensional vent core wrapped in a non-woven, needle punctured filler fabric (e.g., GEOVENT for Liquid Boot, e.drain 12ds for EPRO, or an equivalent product approved by the project engineer). The vent piping will be underlain and covered by a minimum of 1-inch gravel.
- The sub-barrier vent pipe will connect to a 4-inch diameter vent riser pipe that will protrude through the vapor barrier (protrusion will be properly sealed according to vapor barrier manufacture specifications).
- A vapor barrier will be installed over the gravel and vent pipe and shall be comprised of one of the following product systems: Liquid Boot by Cetco, E.Proformance by EPRO, or an equivalent product (approved by project engineer).
- The vapor barrier will be sealed to the surrounding concrete floor slab vertical walls, horizontal footings and around any fixed utility conduits or penetrations that cannot be removed.
- The upper surface of the vapor barrier membrane shall be protected by a protection layer, placed directly above the membrane, designed in consultation with the Hotel based on their use of the sub-basement. Prior to placing the protection layer material over the vapor barrier membrane, the project engineer shall inspect and test the membrane, observe smoke tests by Vapor Barrier Contractor/Applicator, and approve the vapor barrier.
- The 4-inch diameter riser will be connected to 4-inch PVC which will be routed and tied into the current basement ventilation system discussed in Section 3.1

Figure 10. *Unfinished Dirt Floor in Sub-Basement*

3.3 Sub-Slab Investigation/Pilot Testing

While efforts to seal preferential pathways through the basement floor slab (utility conduits, sumps, saw cuts, exposed soil surfaces etc.) are ongoing, an evaluation will be conducted to determine if SSDS/SSVS would be effective for remaining areas of the basement to augment and possibly remove the need for long term basement air-space ventilation. This evaluation will consist of a sub-slab investigation and evaluation of physical properties, and the SSDS/SSVS pilot study.

3.3.1 Sub-Slab Investigation and Physical Conditions Evaluation

This includes installation and sampling of approximately 7 sub-slab vapor pins to allow for the analysis of contaminants in the air space immediately beneath the basement slab of the Hotel building that have not been evaluated as part of the spill response activities. Initial sampling activities will establish current conditions and aid in pilot study design considerations. The vapor pin locations are preliminary, based on our current understanding of building conditions, and may be modified, if needed, to meet the investigation objectives more appropriately. The preliminary vapor pin locations have been selected to evaluate sub-slab conditions nearest the release (on the east side of the Hotel) and sub-slab VOC concentration gradients moving west, away from the release, as follows:

- SS01 in the southeast corner of the sub-basement, east of the Vault. This location will be dependent on slab thickness encountered during installation. Evenly spaced slab walls in this area indicate that slab thickness may preclude installation of a vapor pin.

- SS02 in the Area 33 Hallway. This location is north of the sub-basement and will allow for an evaluation of sub-slab conditions on the eastern side of the Hotel property, nearest to the suspected source of contamination.
- SS03 in the northeast corner of Area 30, adjacent and south of Area 42. This location is adjacent, west, and downgradient from the sub-basement.
- SS04 in the southwest portion of Area 14. This location is downgradient of SS02 and central to the building (east/west).
- SS05 in the Area 31 corridor, west of the Area 40 mechanical room. This location will provide coverage on the northeastern portion of the basement.
- SS06 in the western portion of Area 8 storage. This location is downgradient of SS04.
- SS07 in the Area 3 Electrical Room. This is the westernmost location in the basement and will allow for an evaluation of contaminant concentrations furthest from the release.

This investigation will also include 4-inch concrete cores through the basement slab (approximately 4 locations, see Section 3.3.2.1) for evaluation of sub-slab physical conditions. Aspect has not reviewed architectural foundation plans for the Hotel detailing sub-slab specifications, so the physical properties evaluation will focus on the following elements:

- Checking for the presence of non-native gravel and/or sand (typical base materials for slab pours). The evaluation of sub-slab material will include sieve particle size analysis to assist in the evaluation of screen-slot size for potential depressurization/venting pilot study parameters.
- Observing if a granular base material does not exist beneath the slab, Aspect will evaluate the soil lithology to determine if sufficient soil porosity exists for engineered depressurization methods.
- Visual Documentation of moisture content in the sub-slab material to determine if depressurization is viable (saturated conditions beneath the slab would decrease or eliminate porosity, a primary requirement for vacuum/depressurization propagation). A sample may be collected for moisture content testing.

The results of the sub-slab gas analytical and physical properties testing will help determine sub-slab design criteria and applicability.

3.3.2 SSDS/SSVS Pilot Testing

Pilot testing for SSDS/SSVS will follow procedures and resting schemes consistent with Appendix B. Pilot testing will include step and constant rate testing up to 4 sub-slab vent locations. Pressure response monitoring will be conducted using approximately 10 sub-slab vapor locations. Vapor pin locations will be distributed at varying distances between 5 and approximately 80-feet from vent locations to allow for pressure response data collection and may be adjusted based on observation during pilot testing activities.

The number of vapor pins utilized for pressure response will be adjusted during pilot testing depending on pressure response observed. Aspect anticipates that pressure response will be variable and dependent on known/undiscovered short-circuit pathways through the slab, the presence of foundation elements and footings beneath the slab that are currently uncharacterized/undocumented, and possible variations in sub-slab base material and/or soil.

3.3.2.1 Sub-Slab Vents

Sub-slab vent construction will be dependent on physical conditions observed beneath the slab. The preliminary construction design will consist of removing an approximate 12-inch concrete core and the underlying backfill/native gravel base material to a depth of approximately 2 feet, depending on the depth to groundwater and subsurface conditions observed. Hardscape material and sub-slab soil removed for the vent will be stored in drums on-site pending characterization. For each vent, a 1-foot section of 4-inch diameter schedule 40 PVC with 0.020-inch (or other based on physical properties evaluation) slot screen will be installed in the void created by removal of the hardscape and sub-slab soil and connected to a 4-inch diameter PVC riser extending to approximately 6-inches above the slab grade. The slotted pipe will be backfilled with pea gravel (or other permeable fill) and then the last foot will be backfilled with compacted ¾ minus crushed rock. The concrete will then be repaired to match the surrounding slab surface.

Vent locations will be placed near wall features to allow for routing of the vent pipe to and along the ceiling to the designed exterior location. Vents will be distributed in the four quadrants of the basement to allow for pressure response testing towards the perimeter of the building and overlap between the vent capture radiuses. The tentative locations are as follows:

- One vent in the northern portion of the basement, potentially located in Area 38 Storage or Area 37 Office
- One vent located in the Area 18 Telco room
- One vent in the northeastern corner of the Area 2 Air Handler Room.
- One vent along the eastern wall of the Area 14 Banquette Storage.

These vent locations may be adjusted based on conditions observed beneath the slab, updated review of building foundation plans, and considerations of follow-on design criteria (e.g., ability to route future vent piping, accessibility, and owner input).

3.4 Soil Sampling

The lower portion of exposed soil in the sub-basement covers an area of approximately 12 feet by 22 feet (approximately 264 square feet) with vertical, concrete foundation elements on two sides and two sides that are open to surrounding areas of the basement (see the photo in Section 3.2.5). During spill response, the highest concentrations of VOCs in indoor air were reportedly measured in this area of the basement.

The unfinished, lower portion of exposed dirt floor in the sub-basement will be covered by an impermeable surface to mitigate the preferential pathway for VI into the Hotel basement, as described in Section 3.2.5. Prior to any construction, soil samples will be collected and analyzed for potential use in a future cleanup alternatives evaluation.

The exposed soil area will be segregated into 6 grids of approximate equal area. One exploration will be completed near the center of each grid using hand tools, either a hand auger, shovel, or trowel, to a depth of approximately 12 inches bgs or groundwater, whichever is shallower. One soil sample will be collected from each exploration for field screening and laboratory analysis of gasoline-range petroleum hydrocarbons by Northwest Method NWTPH-Gx and BTEX by US EPA Method 8021B.

3.5 Indoor Air Sampling

Indoor air sampling will be a component of the design and implementation of VI mitigation in the Hotel. The indoor air sampling will consist of the following:

1. Conduct a building survey to identify building use and significant building features above the basement level and evaluate preferential pathways from the basement to other levels of the Hotel, including the elevator shaft. This survey will include an evaluation of current heating and ventilation systems within the Hotel and identify air inlets and air exhausts.
2. Develop and execute an indoor air sampling plan based on the results of item 1.

This work will be conducted as soon as possible, while VI mitigation work in the basement is being planned and implemented and ventilation is ongoing. Future indoor air sampling will also be required to evaluate the effectiveness of VI mitigation measures. The scope of work for performance monitoring of VI mitigation will be developed following receipt of initial indoor air sampling results and implementation of VI mitigation measures.

4 Vapor Intrusion Assessment

Any VI assessment of the Hotel and 106 Building will be conducted in accordance with Ecology's Guidance for Evaluating Vapor Intrusion in Washington State (Ecology, 2022[3]). The purpose of any VI assessment completed will be to estimate the amount of indoor air contamination caused exclusively by vapor intrusion. Detailed sampling plans will be prepared to conduct any VI assessment activities in the Hotel and the 106 Building and submitted to Ecology and property owners for review and approval prior to any work.

Appendix A provides a detailed scope of work for a preliminary sub-slab soil gas investigation of the 106 Building, which will be conducted concurrently with the VI mitigation work (Section 2.2) and while ventilation is ongoing (Section 2.1). Section 3.3.1 describes initial sub-slab soil gas sampling in the Hotel, which will be conducted while ventilation is ongoing, to support VI mitigation design. Additional VI assessment work will be required in the future to evaluate and confirm the effectiveness of VI mitigation measures. The general VI assessment procedure, analytical approach, and screening criteria are presented in the following subsections. Specific VI assessment sampling and analysis or compliance monitoring plans will be developed as needed.

4.1 Initial VI Conceptual Site Model

Based on the petroleum-like odors and measurement of VOCs in indoor air in the Hotel and 106 Building, there is a likely subsurface source of volatile petroleum hydrocarbon compounds and a complete migration pathway for vapors from the source to be impacting indoor air. Further investigation is warranted to fully develop the VI conceptual site model (CSM).

Migration pathways can include volatilization of petroleum hydrocarbon compounds from LNAPL, contaminated soil, and contaminated groundwater directly into buildings through cracks or openings in building construction. Preferential pathways for VI include interior sumps, earthen floors, unconnected floor drains, and utility line penetrations.

4.2 Indoor Air Sampling

Indoor air sampling will be completed using laboratory-prepared Summa canisters to collect time-weighted average data of contaminant concentrations in indoor air. All reasonable care will be taken to identify and remove background sources of indoor air contaminants prior to sampling, which may include paint, paint strippers, stain and polish, adhesives, cleaning solvents, chemical cleaning agents, diesel and oil, lubricants, air fresheners, and building materials. Additionally, indoor air sampling will include the collection of ambient air samples to evaluate potential contribution from background sources, such as vehicle exhaust from nearby roads, through outdoor air intake points.

[3] Washington State Department of Ecology, 2022, Guidance for Evaluating Vapor Intrusion in Washington State: Investigation and Remedial Action, Publication No. 09-09-047, March 2022.

4.3 Sub-Slab Soil Gas Sampling

Sub-slab soil gas sampling can help to estimate the VI contribution to measured indoor air concentrations from subsurface sources. Sub-slab soil gas data is unlikely to be useful to estimate VI contribution when there are significant openings in a building foundation because of the short-circuiting of air through those openings during sampling. Where determined to be appropriate and provide useful data and information, sub-slab soil gas sampling will be completed using laboratory-prepared Summa canisters to collect grab samples of soil gas from beneath building foundations.

4.4 Analytical Approach and Screening Criteria

Indoor air, ambient air, and soil gas samples will be analyzed using Massachusetts Department of Environmental Protection (MDEP) Method for Air Phase Hydrocarbons (APHs) and U.S. Environmental Protection Agency (EPA) Method TO-15 for BTEX and naphthalene. If possible, low-level analysis or Selective Ion Mode (SIM) analysis will be used to obtain the lowest achievable detection and reporting limits. Analytical results from air and soil gas sampling will be compared against applicable Model Toxics Control Act (MTCA) Method B cleanup and screening levels for commercial (worker) and unrestricted (residential) use for petroleum mixtures.

Table 1. Vapor Intrusion Screening Criteria

Analyte	Indoor Air Cleanup Levels (ug/m3)		Sub-Slab Soil Gas Screening Levels (ug/m3)	
	Residential	Commercial	Residential	Commercial
TPH	46 or site-specific	390 or site-specific	1,500	13,000
Benzene	0.32	1.5	11	50
Toluene	2,286	19,467	76,000	650,000
Ethylbenzene	457	3,893	15,000	130,000
Total Xylenes	45.7	389	1,500	13,000
Naphthalene	0.074	0.34	2.5	11

Note: ug/m3 = microgram per cubic meter

Additionally, under MTCA, cleanup levels for the protection of indoor air quality cannot exceed ten percent (10%) of the lower explosive limit for any hazardous substance, or mixture of hazardous substances (WAC 173-340-750(3)(b)(iii) and (4)(b)(iii)).

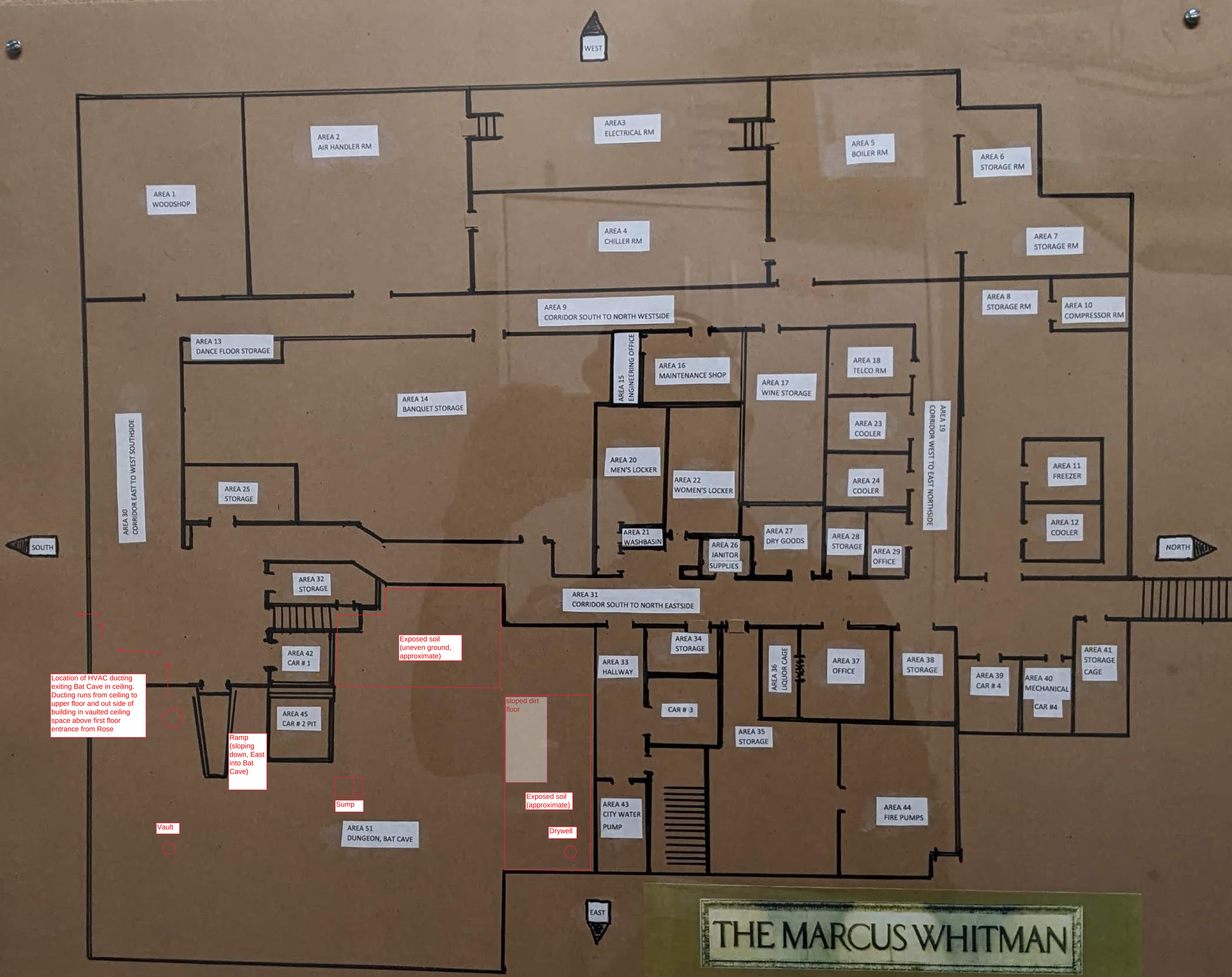
5 Limitations

Work for this project was performed for Stillwater Holdings, LLC (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix C titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

FIGURE



Drawing not to scale.
All locations are approximate.

APPENDIX A

Sampling and Analysis Plan Preliminary Sub-Slab Soil Gas Investigation, 106 Building

A. Sampling and Analysis Plan

A sub-slab soil gas investigation will be conducted to evaluate conditions beneath the concrete floor slab of the building located at 106 N 2nd Avenue in Walla Walla, Washington (herein referred to as the 106 Building). The work will be completed to evaluate the properties of sub-slab conditions, including type and porosity of sub-slab soil, the presence/absence of water, and concentrations of petroleum hydrocarbons and related volatile organic compounds (VOCs) in sub-slab soil gas to evaluate potential risk to indoor air from vapor intrusion and to develop and implement mitigation measures, if necessary.

A.1. Locations

Approximately eight permanent soil vapor pins will be installed in the basement. A subset[4] of the vapor pins will be sampled to evaluate current conditions, including the following locations:

- SSG-1 will be installed near the stormwater sump where VOCs have previously been measured in indoor air.
- SSG-2 will be installed in a presumed downgradient location from the stormwater sump.
- SSG-3 will be installed in the staff room to the west of the stormwater sump.
- SSG-4 will be installed in the office spaces to the east of the stormwater sump.
- SSG-5 will be installed in the office space located on the eastern side of the basement space.

The vapor pins will be installed in accordance with the manufacturer's Standard Operating Procedure (Attachment A) within the concrete slab at each location by drilling a 5/8-inch hole to a depth of approximately 3 to 6 inches, depending on the slab thickness, and installing a stainless-steel pin with a silicon seal.

The vapor pins will be flush with the concrete floor but will be installed outside of primary foot-traffic corridors to minimize potential trip hazards. The preliminary locations are shown on Figure A-1 and the final locations may be modified in the field at the time of the installation based on access limitations and flooring conditions.

In addition to the installation of permanent soil vapor pins, two larger diameter holes will be drilled in the concrete floor slab (Figure A-1) for evaluation of sub-slab conditions and serve as potential locations to establish sub-slab depressurization. These holes will be 4-inches in diameter and will be capped with an air-tight seal[5] while future application of

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[4] Remaining vapor pins will be utilized as part of sub-slab depressurization pilot testing, discussed in a separate memo.

[5] Air tight seal will consist of a 4-inch temporary well cap or a sand-backfill covered by tape-sealed plastic sheeting.

the coring locations are evaluated. Aspect will evaluate the sub-slab material, checking for the presence of non-native gravel and/or sand (typical base materials for slab pours); if a granular base material does not exist beneath the slab, Aspect will evaluate the soil lithology to determine if sufficient soil porosity exists for engineered depressurization methods. The evaluation of sub-slab material will include sieve particle size analysis to assist in the evaluation of screen-slot size for potential depressurization/venting parameters. Lastly, moisture content in the sub-slab material will be documented to determine if depressurization is viable (saturated conditions beneath the slab would decrease or eliminate porosity, a primary requirement for vacuum/depressurization propagation).

A.2. Sampling Methods

Soil gas samples will be collected from the vapor pins for the analysis for volatile petroleum hydrocarbon components in soil gas in the air space immediately beneath the floor slab of the building. The soil gas samples will be collected in accordance with the procedures described below.

The sampling train will be leak-tested prior to sampling using a shut-in test to verify there are no leaks in the fittings or connections. The leak test will consist of applying a vacuum, with a minimum vacuum of 10 inches of mercury, for a period of 5 minutes. If no change in vacuum is observed during the shut-in test, it will be assumed that the sampling train is free of leaks that could introduce ambient indoor air to the soil gas sample and sample collection will begin.

The vapor pin will be enclosed in a leak-testing shroud and a known concentration of helium tracer gas will be added to the shroud (approximately 25 to 30 percent). The selected concentration of tracer gas will be maintained within the shroud throughout the duration of sampling.

Prior to sample collection, the sample train will be purged at a rate of a 200 milliliters (mL) per minute using a low-flow pump until a total of approximately 500 mL of air has been removed. The purged soil gas will be collected in Tedlar® bags and field-screened for helium to ensure that leakage is less than 5 percent of the shroud concentration.

After confirming that no significant leakage is present in the sampling train or around the vapor extraction point seal, the soil gas sample will be collected.

A.3. Sample Collection and Handling

Soil gas samples collected for analysis of volatile petroleum hydrocarbon compounds will be collected using laboratory-supplied and individually certified, evacuated, 1-liter (L) Summa canisters fitted with 150 milliliters per minute (mL/min) flow regulators and dedicated sampling trains. The canisters valve will be opened and allowed to fill until the canister vacuum reaches -5 inches of mercury. Once sample collection is complete, the cannister valve will be closed and the pressure recorded as the final pressure. All measurements taken in the field will be recorded in a field log book.

A.4. Laboratory Methods

The soil gas samples will be submitted to ALS in Seattle, Washington for laboratory analysis in accordance with Ecology's guidance for evaluating vapor intrusion risk from petroleum hydrocarbons:

- Total petroleum hydrocarbons using Massachusetts Department of Environmental Protection (MDEP) Method Air Phase Hydrocarbons (APH).
- Benzene, toluene, ethylbenzene, xylenes (BTEX), and naphthalene using US Environmental Protection Agency (EPA) Method TO-15.

Route To Roof Area (Wall Penetrations)
FILE ROOM
SSG-2
W
M
UP
dumb-waiter
safe
mail drop
SSD pilot test point
SSD pilot test point
Under Option in Fixed Enclosure
UP
MICRO-FILMING
SSG-5
Estimated GW Flow Direction
INVESTOR REPORTING
M-F OFFICE
STORAGE
MERIDIAN MORTGAGE CORP.
WALLA WALLA, WA.
SSG-1
SSG-3
STAFF
SUPPLY-MAIL ROOM
MECHANICAL ROOM
BASEMENT FLOOR PLAN
SCALE 1/4" = 1'0"
FILM STORAGE
sump
Hot Sump
ASS'T VICE PRES.
SSG-4
SSD pilot test point
SSD pilot test point
SMITH MOSMAN ASSOCIATES
A I A ARCHITECTS PLANNERS
Route To Roof Area (Wall Penetrations)
10 SEPTEMBER 1991

Standard Operating Procedure

Installation and Extraction

Vapor Pin® Sampling Device

Scope & Purpose

Scope

This standard operating procedure describes the installation and extraction of the Vapor Pin® Sampling Device for use in sub-slab soil-gas sampling.

Purpose

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the Vapor Pin® Sampling Device.

Equipment Needed

- Vapor Pin® Sampling Device
- Vapor Pin® Sleeves
- Vapor Pin® Cap
- Installation/Extraction Tool
- Rotary Hammer Drill
  - ⅝-Inch (16mm) diameter hammer bit
  - 1½-Inch (38mm) diameter hammer bit for flush mount applications
- ¾-Inch (19mm) diameter bottle brush
- Wet/Dry Vacuum with HEPA filter (optional)
- Dead Blow Hammer
- VOC-free hole patching material (hydraulic cement) and a putty knife or trowel
  - This is for repairing the hole following the extraction of the Vapor Pin® Sampling Device

Installation Procedure

1. Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.
2. Set up wet/dry vacuum to collect drill cuttings.
3. For a temporary installation, drill a ⅝-inch (16mm) diameter hole through the slab and approximately 1-inch (25mm) into the underlying soil to form a void. The hole must be ⅝-inch (16mm) in diameter to ensure a seal.
   - If a flush mount installation is required, drill a 1½-inch (38mm) diameter hole at least 1¾-inches (45mm) into the slab. We highly recommend using the Stainless Steel Drilling Guide and to reference the Standard Operating Procedure Drilling Guide & Secure Cover.
4. Remove the drill bit, brush the hole with the bottle brush and remove the loose cuttings with the vacuum.
5. Assemble the Vapor Pin® Sampling Device and Vapor Pin® Sleeve (Figure 1).
6. Place the lower end of the Vapor Pin® Sampling Device assembly into the drilled hole. Place the small hole located in the handle of the Installation/Extraction Tool, over the Vapor Pin® to protect the barb fitting and tap the Vapor Pin® into place using a dead blow hammer (Figure 2). Make sure the Installation/Extraction Tool is aligned parallel to the Vapor Pin® to avoid damaging the barb.
   - During installation, the Vapor Pin® Sleeve may form a slight bulge between the slab and the Vapor Pin® Sampling Device shoulder.
7. Place the Vapor Pin® Cap on the Vapor Pin® to prevent vapor loss prior to sampling (Figure 3).
8. For flush mount installations, cover the Vapor Pin® with a flush mount cover, using either the plastic cover or the optional Stainless Steel Secure Cover (Figure 4).
9. Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to re-equilibrate prior to sampling.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

Sampling

1. Remove the Vapor Pin® Cap and connect your sample tubing to the barb fitting of the Vapor Pin® Sampling Device.
2. Create a connection by using a short piece of Tygon™ tubing to join the Vapor Pin® Sampling Device with the Nylaflow tubing (Figure 5). Put the Nylaflow tubing as close to the Vapor Pin® Sampling Device as possible to minimize contact between soil gas and Tygon™ tubing. You do not **have** to use Nyflaflow tubing, any stiff tubing will suffice.
3. Prior to sampling, conduct a leak test in accordance with applicable guidance. If a leak test is not specified, refer to the SOP Leak Testing the Vapor Pin® Sampling Device, via Mechanical Means (Figure 6). For flush-mount installations, distilled water can be poured directly into the 1½ inch (38mm) hole.

Figure 5.

Figure 6.

Figure 7.

Extraction Procedure & Reuse Notes

1. Remove the protective cap, and thread the Installation/Extraction Tool onto the Vapor Pin® Sampling Device (Figure 7). Turn the tool clockwise continuously, don't stop turning, the Vapor Pin® Sampling Device will feed into the bottom of the Installation/Extraction Tool and will extract from the hole like a wine cork, **DO NOT PULL!**
2. Fill the void with hydraulic cement and smooth with a trowel or putty knife.
3. Prior to reuse, remove the silicon Vapor Pin® Sleeve and Vapor Pin® Cap and discard. Decontaminate the Vapor Pin® Sampling Device in a Alconox® solution, then heat in an oven to a temperature of 265° F (130°C). For Stainless – ½ hour, Brass 8 minutes.

APPENDIX B

Sub-Slab Pilot Study Procedures

B. Sub-Slab Depressurization/Venting Pilot Study

A SSDS/SSVS pilot study will evaluate the following design criteria:

- Collect volumetric air flow rates and pressure data relative to an applied vacuum. Data collected will allow for an evaluation of: (1) required extraction flow rates; and (2) pressure distribution around sub-slab vents corresponding to various applied vacuums and extraction flow rates (generally referred to as "radius of capture"); and
- Collect sub-slab soil vapor samples for analytical analysis to estimate the petroleum related volatile organic compound (VOC) mass removal rates for sizing of the engineered emission control systems (if needed).

B.1. Pilot Study Equipment

A rental blower will be used for the pilot testing. The blower system will consist of a blower capable of providing a range of vacuum and flow rates (up to approximately 100 standard cubic feet per minute). The vents will be connected to the blower and vapor abatement equipment using PVC piping and heavy-wall flexible tubing. Conveyance piping will be sized adequately to minimize flow restrictions and pressure losses. Depending on the chemical analytical results of the sub-slab investigation, vapor abatement equipment (30-gallon drum with granular activated carbon) may be utilized as a conservative measure to prevent emissions. The pilot test will allow for an evaluation of vapor abatement needs (if any) in the full scale design.

B.2. Vacuum Tests

Pressure readings will be collected using a handheld manometer from each vent and all pressure response monitoring points prior to extraction activities to evaluate baseline pre-extraction pressure distribution properties.

B.2.1. Sub-slab Venting Step Testing

Vacuum step tests are designed to test the range of applied vacuum that can be imposed on the sub-slab vadose zone and to observe the resulting vapor flow rates and pressure/vacuum distribution. The step test will begin with a low vacuum of approximately 5 inches of water column ("in-H2O") applied at the sub-slab vent. If no response is observed in any monitoring points, the vacuum will be stepped up in a regular sequence until a response is observed. A response will be defined as 1 percent of the extraction pressure, or a minimum of 0.05 in-H2O vacuum. Each subsequent step will be taken only when monitoring responses remain stable for two sequential readings obtained 15 minutes apart. The step sequence will be continued for each sub-slab vent until the operational capacity of the vacuum blower is maximized.

Field VOC monitoring using a photoionization detector (PID) will be conducted during the early portion of each step to establish VOC removal rates under rapidly changing venting conditions. Vacuum responses will also be recorded at each monitoring probe more frequently at the beginning of each step, and then at a decreasing rate over time because the rate of vacuum response typically decreases with time.

B.2.2. Constant Rate Tests

Constant rate tests will be performed for each vent once the step tests are completed and flow/vacuum combinations are evaluated. The goals of the constant rate tests are as follows:

- Assess the long-term equilibrium pressure distribution and estimate the radius of capture for the sub-slab vent;
- Determine flow estimates using a handheld anemometer (TSI or similar) for each sub-slab vent that will provide optimum depressurization of the slab; and
- Provide an estimate of the VOC removal rate for Department of Ecology (DOE) air quality program permitting, if necessary. This will include PID readings at the influent and corresponding quality control samples collected for laboratory analysis. Samples will be collected during active vacuum application using a vacuum pump with Tedlar bags and/or summa cannisters.

The decision to terminate the test will be based primarily on the level of equilibration of pressure with each of the sub-slab vents and monitoring probes. Equilibration is defined as less than 10 percent change between readings for two consecutive measurements taken at regular intervals.

Pilot sub-slab vents may be abandoned at the termination of the pilot test or be left in place for incorporation to the full-scale system. This decision will be made based on the data collected from the pilot test full-scale system design specifications.

B.3. Full Scale Design Concept

Sub-slab venting pilot test results will be incorporated and presented in final design specifications, which will include the number and location of sub-slab vents, the estimated flow rate for each vent, the proposed operating vacuum, the estimated VOC emission rate, and an updated cost estimate.

Based on Aspect's prior experience with design and installation of sub-slab venting systems, we assume that full scale design will include the following components:

- 4-inch diameter Schedule 40 PVC pipe connection from an exterior location to the selected vent (or vents, multiple). Sub-slab vent locations will be installed near interior walls so that vent piping can be run up interior walls to the ceiling (Hotel) or into the drop tile ceiling space (106 Building). Vent piping will be directed to exterior system infrastructure (detailed below). Locations under consideration for placement of the exterior infrastructure will prioritize equipment accessibility and safety and discharge requirements; this will be determined based on conversations with the property owner and design constraints.

- 4-inch diameter Schedule 40 PVC vent pipe will be connected via threaded connections (where vertical) and PVC glue at horizontal connections. Depending on vent pipe routing, location and potential hazards, cast-iron vent pipe may be considered. The pipe will be marked at 5-foot intervals with the text "CAUTION: Sub-Slab Vent Pipe, Potentially Hazardous Volatile Compounds, Immediately Notify Building Owner if Damaged." printed in 2-inch letters.
- The vent pipe will be routed to an exterior equipment location which will include the system blower, treatment vessels (if required) and system monitoring components. The blower is likely to be an XP regenerative ring-type blower, with explosion proof motor (if needed). The cutsheet of a typical blower for this system is included as an attachment. The blower size will be evaluated based on vacuum application and venting requirements determined during the pilot study.
- The blower system will be supplied with inlet and outlet silencers to minimize noise disruption to the property and surrounding properties. A noise enclosure may be required depending on the final blower size selected and noise level restrictions. The blower will be connected to the property power supply using a dedicated circuit by a licensed electrician. The power supply will include a local disconnect and On/Off switch.
- A remote vacuum pressure meter (https://www.vaportrac.com/, or similar) will be installed upstream to the blower on the 4-inch pipe section (see Plate 3) to monitor the normal/design operating vacuum pressure of the system. The pressure meter will provide remote telemetry and alert the building owner and/or project engineer of blower malfunction.
- The outlet of the blower will be connected to granular activated carbon (GAC) treatment vessels, if needed, determined during the pilot study and baseline sampling activities.
- 3/8-inch threaded plugs and sample taps on the PVC vent pipe upstream of the blower/treatment, and downstream of the blower/treatment will be included to monitor influent concentrations and treatment effectiveness (if needed), and to monitor system flow rates using a handheld anemometer (TSI Hot Wire or similar).

B.4. Full Scale System Operations and Monitoring

Prior to full scale system start-up, baseline sub-slab soil gas and indoor/ambient air sampling will be conducted to determine baseline conditions. This will include collection of up to four sub-slab and four corresponding indoor air samples and up to two ambient air samples. The air samples will be collected in accordance with the procedures described in Section 4.

After baseline testing, startup testing will begin. First, the electrical circuit will be turned on and the voltage at the starter will be measured to confirm that the proper voltage is present. The blower motor will then be "bump" started for a short period of time to test proper operation. If the blower appears to operate correctly, it will be turned on with the air inlet open for approximately 10 minutes and several measurements will be collected including voltage and motor amperage draw, vacuum or pressure at various points in the system, and the system flow rate. The air inlet will be slowly closed and the measurements taken again under more typical operating flow and vacuums. Any deviations in the measurements from the design values will be investigated. During this short operating period, the pipeline will be also inspected for any signs of leaks or excessive vibration.

Initial system start-up will then begin and include the following start-up monitoring:

- Vacuums and PID readings at the monitoring points (approximately 8 in total);
- Flowrate of the SSVS/SSDS; and
- Influent, mid-fluent (if the GAC vessels are warranted and present), and effluent vacuum and PID readings at the SSVS/SSDS.

This monitoring will continue on an hourly basis for up to 4 hours after system start-up.

System monitoring will be conducted on a monthly-basis for 3 months after startup (or other frequency as required by Ecology). If the data from these monthly monitoring events continue to demonstrate the design vacuum over the building footprint and the concentrations in the extracted vapor remain stable or decrease, monitoring will then be performed quarterly for up to 2 years (or other as determined by Ecology).

B.5. Air Quality Discharge Criteria

Any VI mitigation design and implementation will consider the applicable air discharge criteria. During pilot testing activities, data will be collected to determine potential emissions of contaminants of concern and any compliance required under Ecology Notice of Construction (NOC) and associated permit regulations. This data will be collected during the baseline sub-slab investigation, step testing and constant rate testing.

The data will be utilized to determine if VOC emissions exceed WAC 173-400-110 (5)(a)(i), Table 110(5) requirement not-to-exceed total VOC emissions of 2 tons/year. Additionally, individual compound concentrations, particularly benzene and ethylbenzene, will be used to determine if emissions exceed criteria specified in WAC 173-460-150.

If concentrations do not exceed the criteria listed above, a technical memorandum will be provided detailing exemption data and associated calculations.

APPENDIX C

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND USE GUIDELINES

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting, LLC (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and recognized standards of professionals in the same locality and involving similar conditions.

Services for Specific Purposes, Persons and Projects

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the subject property. The report is not intended to make any representation concerning title or ownership to the subject property. If real property records were reviewed, they were reviewed for the sole purpose of determining the subject property's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the subject property, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and subject property. This report should not be applied for any purpose or project except the purpose described in the Agreement.

This Report Is Project-Specific

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

Environmental Regulations Are Not Static

Some hazardous substances or petroleum products may be present near the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time (for example, Phase I ESA reports are applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Historical Information Provided by Others

Aspect has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data does not provide definitive information with regard to all past uses, operations or incidents affecting the subject property or adjacent properties. Aspect makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others.

Exclusion of Mold, Fungus, Radon, Lead, and HBM

Aspect's services do not include the investigation, detection, prevention or assessment of the presence of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detection, assessment, prevention or abatement of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Aspect's services also do not include the investigation or assessment of hazardous building materials (HBM) such as asbestos, polychlorinated biphenyls (PCBs) in light ballasts, lead based paint, asbestos-containing building materials, urea-formaldehyde insulation in on-site structures or debris or any other HBMs. Aspect's services do not include an evaluation of radon or lead in drinking water, unless specifically requested.