Vapor Intrusion Mitigation Work Plan

Former French Way Cleaners
413 Euclid Avenue
Des Moines, Iowa

June 8, 2022

Prepared for:
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1.0 PROJECT UNDERSTANDING

The purpose of the Vapor Intrusion Mitigation Work Plan is to mitigate the previously identified vapor intrusion risks within the site structure. This Vapor Mitigation Work Plan provides the proposed methods and procedures for the installation of the vapor mitigation system at the subject site. The Vapor Mitigation Work Plan will be prepared for the IDNR Contaminated Site Section for review and approval under Iowa Administrative Code (IAC) 567 Chapter 133 (455B, 455E): Rules of Determining Cleanup Actions and Responsible Parties.

2.0 BACKGROUND

The facility is a former dry cleaner and a multi-unit residential building that consists of an approximate 9,742 square foot commercial and multi-unit residential building, one 4,888 square foot commercial retail and apartment building, and one 3,284 square foot warehouse, situated on approximately 0.46 acres of land. The existing structures located on the property were originally constructed circa 1910 and 1986. The site has operated as a dry-cleaning facility with onsite cleaning operations for approximately 73 years. The adjacent properties consist of a residential development to the north, commercial development to the west, a parking lot to the east, and Euclid Avenue to the south. During the Initial Site Assessment, analytical results obtained from the sub-slab vapor samples indicated samples collected from the northern portion of the site structure exhibit higher concentrations of tetrachloroethylene and trichloroethylene compared to samples collected from the southern portion of the building. For the concentration identified in the Sub-Slab 1 sample, the Cumulative Risk Calculator did not indicate an unacceptable cancer risk above 1.00. However, for Non-Cancer Risk Output by Target Organ, the Cumulative Risk Calculator did indicate a sum value of 1.03 for nerve as the target organ. For the concentration identified in the Sub-Slab 2 sample, the Cumulative Risk Calculator did identify a cancer risk of 17.01, above the acceptable risk of 1.00. The concentration identified in the Sub-Slab 2 samples also indicates sum values for non-cancer risk exceeding 1.00 for heart (143.83), immune (143.83), nerve (457.16) and development (143.83). For the concentration identified in the Sub-Slab 3 sample, the Cumulative Risk Calculator did not indicate an unacceptable cancer risk above 1.00. The concentration identified in the Sub-Slab 3 samples also indicates sum values for non-cancer risk by target organ below 1.00 for all target organs. For the concentration identified in the Sub-Slab 4 sample, the Cumulative Risk Calculator did indicate an unacceptable cancer risk of 1.91, above 1.00. The concentration identified in the Sub-Slab 4 samples also indicates sum values for non-cancer risk by target organ exceeding 1.00 for heart (13.36), immune (13.36), nerve (51.37) and development (13.36). An ambient air sample was collected within the site structure, near the area in which chemical was used during the dry-cleaning process. Analytical results obtained from the initial ambient air sample collected on April 21, 2021, indicated concentrations of tetrachloroethylene of 730 ug/m^3. The Cumulative Risk Calculator did indicate an acceptable cancer risk of 0.14. However, an unacceptable sum value for non-cancer risk by target organ exceeding 1.00 for nerve (3.75). Following the sample collection, dry-cleaning chemicals were identified within three large containers. Two of the containers were built into the industrial washers while one container was a storage tank that supplied the washers. The chemical, industrial washers, supply tank, and associated product piping have since been removed. A thorough cleaning of the floor has been conducted. Following the completion of the floor cleaning an additional ambient air sample was collected on December 21, 2021. The sample indicated a reduced concentration of tetrachloroethylene of 270 ug/ m^3. However, an unacceptable sum value for non-cancer risk by target

organ exceeding 1.00 for nerve (1.37). At this time, a Vapor Mitigation System is needed to ensure COCs are not allowed to enter the site structure and cause harm to human health.

3.0 VAPOR INTRUSION MITIGATION DESIGN

3.1 Design Overview

Mitigation via installation of an Sub-Slab Depressurization System (SSDS) is an adequate system to depressurize the area beneath the floor slab to prevent volatile COCs in groundwater and/or affected soil from entering the interior of the building. The SSDS will be installed in a total of four independently operated systems. Although each system will operate independently, each system will be installed in the same manner.

The SSDS depressurizes the ground immediately below the slab by using an exhaust blower that will generate sufficient negative pressure to prevent the flux of air from the soil, through the slab, and into the building. This type of system is applicable to a wide variety of VOCs that migrate through soil, largely through diffusion.

The SSDS decreases the pressure below the building slab by drawing air from the subsurface. Negative subsurface pressure induces the flow of air and VOCs between the building and slab downward, through the slab, and into the subsurface. An exhaust blower draws the air and VOCs from the subsurface and vents them to the ambient air via an exhaust stack located on the roof of the building. Negative pressure is applied to the subsurface at sumps installed at locations determined by a EcoSource during the site assessment activities. The exhaust fan is connected to the sumps via risers and piping network. The blower size will be determined by diagnostic testing after the installed piping and sump network.

3.2 Diagnostic Testing

Diagnostic testing will be conducted after the installation of the sub-slab monitoring ports and the piping and sump network. The results of the diagnostic testing will be used by EcoSource to develop an SSDS blower specific to the Building that will mitigate vapor intrusion. A detailed summary of diagnostic testing performed will be included in the draft Post-Installation Vapor Intrusion Mitigation Report.
The scope of work for the diagnostic testing includes:

- Sealing all cracks and other floor penetrations;
- Cover the floor, beneath the false floor, in a 6 mil cross woven membrane, any seams will be sealed with a butyl tape, designed for the membrane;
- Connecting a pilot test blower to both of the sumps with a vacuum/flow control gate valve near the vacuum blower to apply a controlled vacuum to the sumps;
- Measuring the negative soil vapor pressure at each of the sub-slab monitoring ports using a manometer, while multiple static vacuum pressures are applied and measured at the sumps; and
- Measuring the exhaust flow and vacuum reading at the pilot test blower while multiple static vacuum pressures are applied.

The negative soil vapor pressure readings collected at each of the sub-slab monitoring ports, as well as the pilot test blower vacuum and flow readings, will be used to determine blower size required to depressurize the Building. During the diagnostic testing, all doors and other large openings into the building will be closed, and the Building HVAC/heating system will operate under normal operation. A minimal negative soil vapor pressure of 0.025-inches of water column measured under the slab will be used as the criteria for blower selection.

3.3 Design Components

Sump locations are proposed evenly spaced in the northern portion beneath the false floor, west portion within the storage area, beneath the former equipment locations and in the basement. All within the Building to facilitate simple routing of the sumps and piping, and limit impact to occupant operations. The exhaust fans will be mounted on the west side of the building on the roof along with the exhaust stacks. The exhaust stacks will extend above the roof surface. Sumps will be networked via piping through the building.

The design components and locations were determined from site investigation and communication with the developer, with respect to future plans within the Building. The SSDS includes sumps, risers and piping, exhaust blower, exhaust stack, and monitoring ports. Each of these components is discussed below.

3.3.1 Sumps

Sumps provide the interface between the subsurface and the suction applied by the exhaust blower. Each sump will consist of a 4-inch-diameter slotted schedule 40 polyvinyl chloride (PVC) pipe extended in a 5-inch-diameter subslab cavity that will extend 14 inches below the bottom of the Building floor slab. The 4-inch-diameter slotted PVC pipe will extend 6 inches below the bottom of the Building floor slab. The 4-inch diameter slotted PVC pipe will extend though the slab with solid wall PVC pipe and will be sealed to the slab to prevent air from being drawn from the interior of the Building. A schematic of each sump location is presented on a site map in **Appendix A**.

3.3.2 Risers and Piping

Risers and piping will provide the conduit from the sumps to the exhaust blower, which will be mounted on the roof of the Building. Risers will be connected to the sump with a Fernco rubber coupling and will extend from the sump at ground level, up adjacent walls, and will be routed through the west side of the Building. The Fernco rubber coupling's hose clamps will have silicon sealant applied to the hose clamp screw heads to prevent tampering and removal. The point at which the piping network penetrates the south side of the Building will be sealed with flashing and waterproof sealant. Risers and pipe network will be securely fastened to walls with pipe supports to provide the pipe network structural support. Piping and risers will be labeled "Depressurization System Pipe for Indoor Air Protection" at least once in every room, and next to the exhaust blower.

Piping will connect risers to the exhaust blower mounted to the roof of the Building. All of the piping will connect to form one network, and will be angled so that the connection to the exhaust blower is at

the highest point and the connection to each sump riser is at the lowest point. Piping will be angled to prevent low spots where water vapor could condense into pools. Piping will consist 4-inch-diameter schedule 40 PVC pipe.

3.3.3 Exhaust Blower

The exhaust blower will provide the suction to the sumps via the risers and piping of the SSDS. The specifications for the exhaust blower will be determined by EcoSource based on information collected during the diagnostic testing to be conducted at the Building. The exhaust blower will be mounted to a raised platform on the roof of the Building. Vibration isolators will be used between the exhaust blower platform and the building to prevent vibration and excess noise. The exhaust blower will be connected to piping and the exhaust stack. Diagnostic testing flow and vacuum data collected will be used to determine the size of exhaust blower needed.

3.3.4 Exhaust Stack

The exhaust stack will discharge the VOCs/air emissions to the ambient air at a height that does not pose a threat to human health or the environment. Constructed of PVC, the exhaust stack will effectively extend the exhaust blower outlet to a height approximately 1 foot above the building roof line. The exhaust stack will attach to the exhaust blower, be routed up the northwest side of the Building, and discharge 1 foot above the roof line. The exhaust stack will be angled 45 degrees off vertical from approximately 4 feet above roof level, and the outlet will be cut on the vertical to prevent precipitation from entering the exhaust stack while continuing to exhaust VOC vapors/air. The exhaust stack discharge point will be at least 10 feet from any window, door, or other opening into an occupied space, and from any HVAC/ventilation inlet.

3.3.5 Sub-slab Monitoring Ports

Three sub-slab monitoring ports will be installed for measuring pressure below the Building floor slab. Each sub-slab monitoring port consists of a brass barbed tube adaptor, 1/8-inch ball valve, and 1/8-inch brass pipe with perforations below the slab. The sub-slab monitoring port will be sealed in the slab to prevent air from being drawn from interior of the Building. The sub-slab monitoring ports will be installed in an area to prevent tripping hazards and protect from damage. Except during monitoring events, each sub-slab monitoring port's ball valve will be closed, and the handle will be removed and stored. During diagnostic and post-construction testing, the sub-slab monitoring ports will be used to determine vacuum below the slab. The proposed locations of the monitoring ports are depicted on the site map in **Appendix A**.

3.4 Post-Installation Performance/Confirmation Testing

Upon completion of the SSDS installation at the Building, pressure field extension testing and air sampling will be conducted to confirm that the SSDS is adequately depressurizing the immediate subsurface.

3.4.1 Pressure Field Extension Testing

A post-construction round of negative pressure measurements will be collected with the SSDS running to determine if the SSDS is adequately depressurizing the sub-slab.

The sub-slab monitoring ports used during the diagnostic pilot testing will be used to monitor post-installation monitoring. Using a manometer, the negative soil vapor pressure at each sub-slab monitoring port will be recorded. A minimal negative sub-slab pressure measurement of 0.025-inch water column will be used as pass/fail criteria. Sub-slab pressure measurements collected at sub-slab monitoring ports will be recorded and presented in the post-installation Vapor Intrusion Mitigation Report.

3.4.2 Air Sampling

Indoor and outdoor ambient air samples will be collected approximately 1 month after start-up of the SSDS. Air samples will be collected at the approximate sampling locations used during previous investigations using either Summa canisters or other appropriate sampling method. Samples will be analyzed for volatile COCs using U.S. Environmental Protection Agency Method TO-15. All sampling will be performed in general accordance with the standard operating procedures established during completion of the Site Assessment Report (SAR), modified if necessary to accommodate relevant changes in sampling protocols. If the sampling protocols change in response to updated regulatory standards, the Sampling and Analysis Plan will be amended and submitted to IDNR for concurrence prior to performing sampling activities.

Results of air sampling will be compared to the relevant IDNR Cumulative Risk Calculator to determine if further action is necessary to protect human health and whether additional samples are required to confirm the performance of the SSDS. The air sampling results will also be presented in the post-installation Vapor Intrusion Mitigation Report described in Section 4.0.

4.0 REPORTING

4.1 Post-Installation Vapor Intrusion Mitigation Report

A post-installation Vapor Intrusion Mitigation Report describing the data collection, design, and installation of the SSDS within the Building, and results of the initial air sampling event will be prepared by EcoSource and submitted to Euclid Foresight for review within 45 days of receipt of post-installation ambient air analytical data. Following review and approval by Euclid Foresight, the report will be provided to IDNR for review and comment. The report will include:

- A summary of the results of the data collection used for the design of the SSDS;
- The final as-built design of the SSDS;
- A brief narrative of the scope of work and procedures followed for installation of the SSDS;
- A summary of the field activities;
- Operation parameters for the SSDS; and
- Figures depicting the final design, including the number, location, and configuration of SSDS components.

The final as-built design drawings will be provided to IDNR and the building owner upon completion and in advance of the report above for their use.

4.2 Vapor Intrusion Inspection, Monitoring, Maintenance Work Plan

The Vapor Intrusion Inspection, Monitoring, and Maintenance Work Plan (VIIMM Work Plan) will propose continuing operational maintenance, inspection, and monitoring tasks for the Building. The VIIMM Work Plan will be submitted 4 weeks from the completion of the SSDS at the Building. EcoSource will meet with the building owner representatives following installation of the SSDS to present the details of the system construction and operations along with contact information in the event the system shuts down. A more detailed training session will follow completion of the VIIMM.

5.0 SCHEDULE

The following is a tentative schedule for implementing the Vapor Intrusion Mitigation Work Plan assuming IDNR approval by June 20, 2022; budget approval and obtaining an access agreement with the current property owner by June 20, 2022, and working with Euclid Foresight on a schedule for best days and times to complete installation:

- Complete Installation of SSDS – July 2022
- Submit Post Installation Vapor Intrusion Mitigation Report – August 2022
- Draft Vapor Intrusion Inspection, Monitoring, Maintenance Work Plan – August 2022

Please note that this schedule is tentative and will be dependent upon EcoSource personnel availability, subcontractor availability, timing of laboratory results, weather, etc. EcoSource will provide updates during the activities and update the schedule for the IDNR and Euclid Foresight as necessary.

6.0 GENERAL COMMENTS

6.1 Standard of Care

EcoSource's services will be performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. EcoSource makes no warranties, either express or implied, regarding the findings, conclusions or recommendations. Please note that EcoSource does not warrant the work of laboratories, regulatory agencies or other third parties supplying information used in the preparation of the report. These services will be performed in accordance with the scope of work agreed upon with you, our client, as reflected in our proposal.

6.2 Additional Scope Limitations

Findings, conclusions, and recommendations resulting from these services are based upon information derived from the onsite activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of

hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, non-detectable, or not present during these services, and we cannot represent that the Site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during these investigations. Subsurface conditions may vary from those encountered at specific borings or wells or during other surveys, tests, assessments, investigations, or exploratory services; the data, interpretations, findings, and our recommendations are based solely upon data obtained at the time and within the scope of these services. Future site activities may determine the need for additional site work outside of the scope of this Work Plan and/or our proposal and lengthen the project schedule. In addition, following review of the Vapor Intrusion Mitigation Work Plan the IDNR may require additional site work outside of the scope of these services.

If you have any questions regarding the Vapor Intrusion Mitigation Work Plan, please contact us at 515.250.6695.

Sincerely,

EcoSource, LLC

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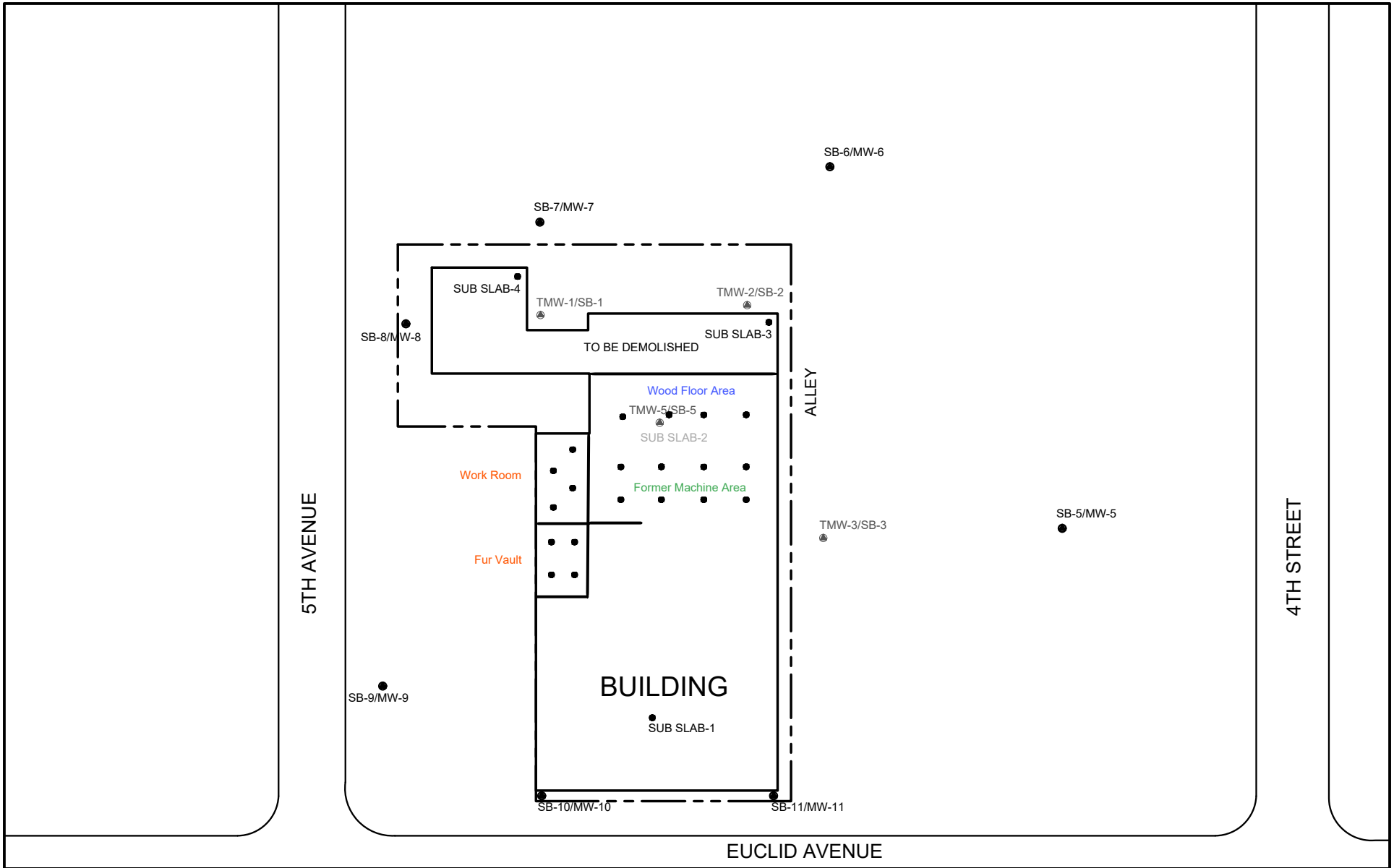

SITE MAP

June 2022

ATT 1

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0 SCALE 50 FT.

FORMER FRENCH WAY CLEANERS
413 EUCLID AVENUE
DES MOINES, IOWA

WATER SUPPLY
GAS LINE
SANITARY SEWER
UNDERGROUND PIPING
PROPERTY BOUNDARY
FLOW DIRECTION

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