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# SOIL VAPOR INVESTIGATION REPORT

**60 Charlton Street  
New York, New York  
Manhattan Block 580, Lot 19  
E-288: Hudson Square Rezoning  
CEQR No. 12DCP045M  
OER Project No. 18EH-N112M**

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## **1.0 INTRODUCTION**

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. (Langan) prepared this Soil Vapor Investigation (SVI) report on behalf of APF Charlton Owner LP for 60 Charlton Street, New York, New York (the site). The SVI was conducted on November 2, 2017, and consisted of the installation of temporary soil vapor sampling points and the collection and laboratory analysis of soil vapor and indoor and ambient air samples. The SVI was performed in accordance with a Soil Vapor Investigation Work Plan (SVIWP) that was prepared by Langan and submitted to the New York City Office of Environmental Remediation (NYCOER) on October 31, 2017. The NYCOER approved the work plan on November 1, 2017.

This report is organized as follows:

Section 2.0: Describes the site background

Section 3.0: Presents the field investigation methodology

Section 4.0: Presents the findings of the investigation

Section 5.0: Presents conclusions and recommendations based on the investigation findings

## **2.0 BACKGROUND**

### **2.1 Site Location, Current Use, and Proposed Development Plan**

The site is located at 60 Charlton Street in the SoHo neighborhood of New York, New York, and is identified as Block 580, Lot 19 on the Manhattan Borough Tax Map. The site occupies an area of about 7,500 square feet and is bound by Charlton Street to the north, Varick Street to the east, a 7-story industrial building to the south, and a 20-story hotel to the west. The property is developed with a six-story commercial building (ground floor retail with office space above) with one cellar level and is currently vacant. The latest certificate of occupancy document available in the New York City Department of Buildings (NYCDOB) online records lists the basement use as storage with a boiler room and the above-ground floor uses as a restaurant and loading dock (first floor) and factories, storage, and offices (floors two through six). The surrounding area is primarily characterized by commercial and residential buildings. A site location map is provided as Figure 1 and a site plan is presented as Figure 2.

The proposed development will include constructing five or six stories atop the existing building. The building will remain occupied by commercial tenants; however, the cellar will be converted to create space for a future retail tenant(s). Excavation is assumed to be limited to possible expansion of footings, pits for ejectors or elevators, and drilling associated with

additional foundation elements. The project will not involve deepening the existing building cellar. Preliminary development plans are included in Appendix A.

## **2.2 Regulatory History and Previous Studies**

The site is under the regulatory oversight of the NYCOER pursuant to a noise and hazardous materials E-Designation (E-288) assigned by the New York City Department of City Planning (NYCDP) as a part of the March 2013 Hudson Square Rezoning (City Environmental Quality Review [CEQR] No. 12DCP045M). This E-designation requires an assessment of environmental conditions and provisions for use of outside noise-attenuating windows and alternate means of ventilation. All requirements are subject to review and approval by the NYCOER. The NYCDOB is restricted from issuing building permits for the property until the NYCOER has issued a Notice to Proceed (NTP) or Notice of No Objection (NNO) to the NYCDOB.

The following previous environmental studies have been performed at the site:

1. June 21, 2017 Phase I Environmental Site Assessment (ESA) prepared by ATC Group Services, LLC (ATC)
2. June 26, 2017 Phase I ESA prepared by CBRE, Inc. (CBRE)
3. October 5, 2017 Preliminary Waste Characterization Report prepared by Langan

ATC and CBRE indicated that the Phase I ESAs were conducted in accordance with ASTM International Standard Practice for Environmental Site Assessments E1527-13 and the United States Environmental Protection Agency (USEPA) All Appropriate Inquiry (AAI) Rule. The Phase I ESAs did not identify any recognized environmental conditions (RECs) at the site.

A preliminary waste characterization was performed concurrently with a geotechnical investigation by Langan in August 2017 to inform the handling, transport and disposal of excess soil generated during the planned excavation. Two grab soil samples and one composite soil sample were collected for laboratory analysis. The grab soil samples were collected from two discrete locations at two test pits and were analyzed for NYSDEC- and New Jersey Department of Environmental Protection (NJDEP)-list volatile organic compounds (VOCs) by USEPA method 8260C, NJDEP-list extractable petroleum hydrocarbons (EPH) by NJDEP EPH method 10/08, Revision 3, total petroleum hydrocarbons (TPH) – gasoline range organics (GRO) by USEPA method 8015C, and total solids by standard method 2540G. The composite sample was generated by combining soil collected at five discrete depths, across two test pits. The composite sample consisted of representative material collected from 0 to 5 feet below the cellar slab and was analyzed for the following parameters:

1. NYSDEC- and NJDEP-list metals by USEPA methods 6010B/7471A
2. NYSDEC- and NJDEP-list semivolatile organic compounds (SVOCs) by USEPA method 8270D
3. Total cyanide by USEPA method 9010C/9012A
4. Hexavalent and trivalent chromium by USEPA method 7196A and calculation
5. Polychlorinated biphenyls (PCBs) by USEPA method 8082A
6. Pesticides by USEPA method 8081B
7. Herbicides by EPA Method 8151A
8. Toxicity characteristic leaching procedure (TCLP) metals by USEPA method 1311/6010B
9. Paint filter by USEPA method 9095B

Historic fill, which was primarily reconstituted native material, was encountered at the test pits to about 6 feet below the cellar slab and generally consisted of brown, medium sand, with varying amounts of silt, gravel, cobble, concrete and brick. A layer of medium-dense sand with trace amounts of silt and gravel was encountered below the fill layer in a geotechnical boring. Staining, odors, and photoionization detector (PID) readings above background, or other evidence of a potential petroleum or chemical release, were not apparent within the boring or test pits. Soil analytical results were compared to NYSDEC Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use (UU) Soil Cleanup Objectives (SCOs) and Part 371 Maximum Concentration of Contaminants for the Toxicity Characteristic.

Concentrations of VOCs, SVOCs, PCBs, herbicides, pesticides, and metals did not exceed the Part 375 UU SCOs in any samples. The results of TCLP metals analyses suggested that excavated material will not be considered a Resource Conservation and Recovery Act (RCRA) characteristic hazardous waste. The paint filter analysis result was negative.

Copies of the Phase I ESAs and Preliminary Waste Characterization Report are included in Appendix B.

## **2.3 Geology**

The site falls within the Hartland Formation and is underlain by Manhattan Schist. According to geologic maps published by United States Geological Survey, the surficial material native to lower Manhattan consists of stratified and/or unstratified Pleistocene glacial deposits. The general subsurface profile consists of miscellaneous fill overlying medium to fine sand. The boring installed during the geotechnical investigation terminated within a medium dense sand layer about 52 feet below the existing cellar grade. Bedrock was not encountered during the

geotechnical investigation. According to available information from other projects in the area, bedrock is estimated at about 70 to 90 feet below sidewalk grade.

## **2.4 Hydrogeology**

Groundwater flow is typically topographically influenced, as shallow groundwater tends to originate in areas of topographic highs and flows toward areas of topographic lows, such as rivers, stream valleys, ponds, and wetlands. A broader, interconnected hydrogeologic network often governs groundwater flow at depth or in the bedrock aquifer. Groundwater depth and flow direction are also subject to hydrogeologic and anthropogenic variables such as precipitation, evaporation, extent of vegetation cover, and coverage by impervious surfaces. Other factors influencing groundwater include depth to bedrock, the presence of artificial fill, and variability in local geology and groundwater sources or sinks.

Groundwater measurements collected at a geotechnical groundwater observation well on August 28 and September 14, 2017 indicate that groundwater depth varies from about 8 to 11.5 feet below the cellar slab. Regional groundwater flow is assumed to be to the northwest toward the Hudson River, located about 1,500 feet west of the site.

## **3.0 SOIL VAPOR INVESTIGATION**

The subsurface investigation consisted of the installation of temporary soil vapor sampling points and the collection and laboratory analysis of soil vapor and indoor and ambient air samples. A sample summary is provided in Table 1.

### **3.1 Field Investigation and Methodology and Sample Analysis**

Four soil vapor probes (SV01 to SV04) were installed to a depth of about 5 feet bgs within the cellar of the building. Three of the probes were installed within the footprint of the proposed commercial tenant area, and one probe was installed north of this area within a proposed mechanical equipment area. The probes were installed using a D868 electric jackhammer. The probes were installed in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006, updated May 2017). Soil vapor probes were comprised of a 2-inch-long polyethylene implant threaded into polyethylene tubing. The annulus (i.e., the sampling zone) around the probe was filled with clean sand to within two inches of surface grade. The remainder of the annulus was filled to grade surface with a hydrated bentonite seal.

As a quality assurance/quality control (QA/QC) measure, an inert tracer gas (helium) was introduced into an above-grade sampling chamber to document that the soil vapor sampling

points were properly sealed above the target sampling depth, thereby preventing infiltration of ambient air to the sub-surface. Helium concentrations of less than 10 percent prior to sampling were considered sufficient to document seal integrity.

Each soil vapor point was purged using a RAE Systems MultiRAE® meter at a rate of less than 2 liters per minute (L/min) to evacuate three sample tubing volumes prior to sample collection. Soil vapor samples were collected into laboratory-supplied, batch-certified 2.7-Liter Summa® canisters that were calibrated for 120 minutes of sampling. Indoor air samples (IA01 and IA02) and an ambient air sample (AA01) were collected concurrently with the soil vapor samples. Indoor air samples IA01 and IA02 were co-located with soil vapor probes SV01 and SV02, respectively, and were collected to assess if soil vapor intrusion pathways exist. Ambient air sample AA01 was collected at the southeast side of the site along Varick Street to assess ambient air conditions and determine whether conditions existed at the site during soil vapor sampling that could have potentially interfered with sampling results. Indoor and ambient air samples were collected at a height above the floor in the sampling areas to represent the breathing zone (about 3 to 5 feet).

Upon completion of sampling, the soil vapor probes were removed and boreholes were backfilled with clean sand to grade and the surfaces patched with concrete. Soil vapor probe construction and sampling logs and indoor and ambient air sampling logs are included in Appendix B and sampling locations are shown on Figure 2.

The Summa® canisters were labeled and transported via courier to Alpha under chain-of-custody protocol for analysis of VOCs by USEPA method TO-15.

## **4.0 OBSERVATIONS AND RESULTS**

### **4.1 Soil Vapor Sample Results**

No standard currently exists for soil vapor samples in New York State. The soil vapor results were compared to decision matrices presented in the NYSDOH Guidance Document, which provide evaluation criteria for the VOCs tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), carbon tetrachloride, 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (c-1,2-DCE), methylene chloride, and vinyl chloride. Each matrix presents a comparison of sub-slab vapor and indoor air data for these VOCs and, based on the relationship between sub-slab vapor and indoor air concentrations, provides recommendations for actions, such as monitoring or mitigation. A summary of the soil vapor and indoor and ambient analytical results is provided in Table 2 and a copy of the analytical laboratory results is provided in Appendix C. Figure 2 summarizes the analytical results for the compounds listed in the NYSDOH Matrices at each sampling location. Taking into account the proposed change of use

in the cellar to occupied retail space, and the corresponding changes in HVAC systems that will be necessary, the dynamics across the cellar slab to the sub-slab soil vapor will be altered. For this reason soil vapor samples were collected in order to evaluate overall sub-slab soil vapor contaminant accumulation potential. The soil vapor probes do not provide an accurate representation of current contaminant accumulation beneath the building slab. Likewise, once new HVAC systems have been installed, new cross-slab conditions may be established, further altering the potential for contaminant accumulation and intrusion at the slab. As such, below the soil vapor probe contaminant concentrations are used to represent sub-slab soil vapor concentrations for general comparison purposes; however, these cannot be directly extrapolated. Additionally, the vapor samples were collected for a two-hour period in accordance with the October 2017 Soil Vapor Investigation Work Plan; however, this does not represent the 8-hour exposure scenario that would govern the proposed use.

*Decision Matrix A* of the NYSDOH Guidance Document addresses TCE, 1,1-DCE, c-1,2-DCE, and carbon tetrachloride.

- 1,1-DCE was not detected in any of the soil vapor or indoor air samples.
- c-1,2-DCE was not detected in either of the indoor air samples and was only detected in one of the soil vapor samples, SV03, at a concentration of 3.38 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), below the minimum NYSDOH Guidance Document matrix value at which action would be required.
- Carbon tetrachloride was detected in three of the four soil vapor samples at concentrations ranging from 1.69  $\mu\text{g}/\text{m}^3$  at SV02 to 2.13  $\mu\text{g}/\text{m}^3$  at SV01, and in indoor air samples IA01 and IA02 at concentrations of 0.579 and 0.598  $\mu\text{g}/\text{m}^3$ , respectively. Carbon tetrachloride was detected at the greatest concentration in the ambient air sample AA01 (3.76  $\mu\text{g}/\text{m}^3$ ), indicating that the indoor air sample results may be affected by ambient air conditions. Although carbon tetrachloride was detected in indoor air at a concentration above the minimum NYSDOH Guidance Document matrix value at which action would be required, when taking into account the soil vapor concentration (less than 6  $\mu\text{g}/\text{m}^3$ ) and ambient air results, no further action is required.
- TCE was detected in soil vapor samples SV01, SV02, and SV03 at concentrations of 36, 41.9, and 70.4  $\mu\text{g}/\text{m}^3$ , respectively. TCE was not detected in SV04. TCE was detected in indoor air sample IA01 at a concentration of 0.15  $\mu\text{g}/\text{m}^3$  and was not detected in sample IA02. Although TCE was detected in soil vapor samples SV01 and SV02 at concentrations above the minimum NYSDOH Guidance Document matrix value at which action would be required (6  $\mu\text{g}/\text{m}^3$ ), when taking into account the indoor air



concentration (not detected or less than  $0.2 \mu\text{g}/\text{m}^3$ ), the Soil Vapor/Indoor Air Matrix A recommends no further action relative to the SV01 and SV02 results. With respect to the concentration at SV03 (above  $60 \mu\text{g}/\text{m}^3$ ), the NYSDOH Guidance Document Soil Vapor/Indoor Air Matrix A recommends vapor intrusion mitigation. The relative absence of TCE in indoor air, under current HVAC conditions, compared to soil vapor concentration indicates that soil vapor intrusion was not occurring at the time of sampling.

OER communicated to Langan that TCE was also detected at elevated concentrations in groundwater samples collected at the adjacent property to the west (68 Charlton Street) during a 2013 subsurface investigation at the property. Decision Matrix B of the NYSDOH Guidance Document addresses PCE, 1,1,1-TCA, and methylene chloride.

- 1,1,1-TCA was not detected in any of the soil vapor samples.
- Methylene chloride was detected in soil vapor samples SV03 and SV04 at concentrations of  $2.22$  and  $2.31 \mu\text{g}/\text{m}^3$ , respectively, and in indoor air samples IA01 and IA02 at concentrations of  $2.22$  and  $2.57 \mu\text{g}/\text{m}^3$ , respectively. Methylene chloride was detected at the greatest concentration in ambient air sample AA01 ( $2.88 \mu\text{g}/\text{m}^3$ ), suggesting that the indoor air sample results may be affected by ambient air conditions. Methylene chloride was detected in the soil vapor or indoor air samples at concentrations below the minimum NYSDOH Guidance Document matrix value at which action would be required.
- PCE was detected in three of the four soil vapor samples at concentrations ranging from  $109 \mu\text{g}/\text{m}^3$  at SV01 to  $265 \mu\text{g}/\text{m}^3$  at SV03. PCE was detected in indoor air samples IA01 and IA02 at concentrations of  $0.997$  and  $0.671 \mu\text{g}/\text{m}^3$ , respectively. Although PCE was detected in soil vapor at a concentration above the minimum NYSDOH Guidance Document matrix value at which action would be required, when taking into account the indoor air concentrations (less than  $3 \mu\text{g}/\text{m}^3$ ), the Soil Vapor/Indoor Air Matrix B recommends no further action. The PCE concentrations in indoor air relative to the soil vapor concentrations indicate that soil vapor intrusion was not occurring, under current HVAC conditions, at the time of sampling.

OER communicated to Langan that PCE was also detected at elevated concentrations in soil and groundwater samples collected at the adjacent property to the west during the 2013 subsurface investigation. The NYSDOH Guidance Document Soil Vapor/Indoor Air Matrix B recommends mitigation of vapor intrusion based on the concentrations of PCE in soil vapor at the property.

*Decision Matrix C* of the NYSDOH Guidance document addresses vinyl chloride. Vinyl chloride was not detected in any of the soil vapor or indoor air samples.

Petroleum-related compounds were detected at concentrations above background in all of the soil vapor samples. The compounds benzene, toluene, ethylbenzene, and xylenes (collectively known as BTEX) were detected in soil vapor at a maximum concentration of 57.89  $\mu\text{g}/\text{m}^3$  (SV01) and in indoor air at a maximum concentration of 4.22  $\mu\text{g}/\text{m}^3$  (IA02). Applicable comparison criteria do not exist for these compounds in soil vapor.

## **5.0 CONCLUSIONS AND RECOMMENDATIONS**

Based on the findings described above, the following conclusions were made:

- No visual, olfactory, or instrumental signs of contamination were observed during probe installation or sampling.
- Chlorinated VOCs and petroleum-related compounds were detected in soil vapor and indoor air. Although indoor air data did not indicate the presence of soil vapor intrusion, if the NYSDOH matrices are applied to the soil vapor results, the TCE concentration in SV03 is the only soil vapor or indoor concentration indicating a mitigation response per the NYSDOH Guidance Document.

## **6.0 LIMITATIONS**

This report was prepared expressly for APF Charlton Owner LP for the property located at 60 Charlton Street, New York, New York, and for the objectives defined herein. Langan cannot assume responsibility for the use of this report for any property other than the specific site addressed in this report, or by any third party without specific written authorization from Langan.

The conclusions, opinions, and recommendations provided in this report are based on conditions ascertained from the analysis of a limited number of samples. Recommendations provided are contingent upon one another and no recommendation should be relied upon or considered effective independent of the others. Actual conditions encountered may differ substantially from those presented herein and should be brought to our attention whereby we may determine how such changes may affect our conclusions, opinions and recommendations.