RECEIVED
By Alameda County Environmental Health 1:34 pm, Dec 14, 2017

December 13, 2017

RE: Work Plan for Soil Vapor Investigation dated October 31, 2017
217 North N Street, Livermore, CA
Case Number: RO0003271

I declare, under penalty of perjury, that the information and/or recommendations contained in the above-referenced workplan are true and correct to the best of my knowledge.

Signature

Polo Munoz
Company Officer or Legal Representative Name

Project Manager, MidPen Housing Corp.
Title

12/13/17
Date

PES Environmental, Inc.
Engineering & Environmental Services

October 31, 2017

1569.002.01.001

A Report Prepared for:

MidPen Housing Corporation
Attention: Mr. Apolonio Munoz
303 Vintage Park Drive, Suite 250
Foster City, California 94404

For Submittal to Oversight Agency:

Alameda County Environmental Health
Attention: Ms. Dilan Roe, PE
1131 Harbor Bay Parkway
Alameda, California 94502

Received by: _____
Date: _____

Subject: Work Plan for Soil Vapor Investigation
217 North N Street
Livermore, California

Dear Ms. Roe:

This *Work Plan for Soil Vapor Investigation* (Work Plan) has been prepared by PES Environmental, Inc. (PES) on behalf of MidPen Housing Corporation (MidPen) for the vacant property located at 217 North N Street in Livermore, California (the site or subject property). The site location is shown on Plate 1, and the site plan is shown on Plate 2. The property is planned to be redeveloped with residential townhomes.

Alameda County Environmental Health (ACEH) has requested that a soil vapor investigation be conducted at the subject property to confirm that elevated soil vapor conditions are not present beneath the site.

The proposed scope of work is presented below.

PROPOSED SCOPE OF WORK

The scope of work for the investigation includes the following activities: (1) field preparation tasks; (2) collection and analysis of soil vapor samples; and (3) reporting.

Field Preparation Activities

The following activities will be performed prior to the commencement of field sampling activities:

- Prepare a Site-specific Health and Safety Plan in accordance with applicable occupational safety and health requirements;
- A drilling permit from the Zone 7 Water Agency is not required because the soil vapor borings will be shallower than 10 feet bgs and groundwater is not anticipated to be encountered in the borings;
- Contact Underground Services Alert for public utility clearance;
- Retain and schedule drilling and laboratory subcontractors; and
- Contract with a private underground utility locating service to clear all proposed sampling locations of subsurface utilities.

Field Investigation

The temporary soil vapor sampling probes will be installed with a direct-push rig operated by TEG Northern California Inc. (TEG) of Rancho Cordova, California. The samples will be collected at a depth of approximately 5 below ground surface (bgs). TEG is a licensed contractor possessing a valid C-57 water well contractor's license issued by the State of California. All subsurface investigation work will be conducted under the supervision of a California-registered geologist or engineer.

Soil vapor sampling procedures will be consistent with the most current guidance document: *Advisory - Active Soil Gas Investigations* (*Advisory*), published by the California Environmental Protection Agency (Department of Toxic Substances Control [DTSC], California Regional Water Quality Control Board – Los Angeles Region, and RWQCB – San Francisco Region), dated July 2015[1]. Prior to sampling, PES will verify that no significant rainfall event (of greater than 0.5 inches, as described in the *Advisory*) had occurred within a 5–day period of the soil vapor sampling event.

The proposed soil vapor sample locations and potential step-out locations are shown on Plate 2. As shown on this plate, soil vapor samples will initially be collected beneath each of 10 proposed townhome buildings, and based on the sample results, additional soil vapor samples may be collected from the pre-selected step-out locations to further characterize

[1] DTSC, 2015. *Advisory - Active Soil Gas Investigations*. Jointly developed by the California Environmental Protection Agency Department of Toxic Substances Control (DTSC), and the California Regional Water Quality Control Board – Los Angeles Region (LARWQCB) and RWQCB - San Francisco Region (SFRWQCB). July.

conditions beneath the site. As shown on Plate 2, the initial soil vapor locations beneath the eight larger proposed townhome buildings will be staggered.

Soil vapor samples will be obtained using a Geoprobe-type tooling to bore an approximately 1-inch diameter hole to a depth of approximately 5.5 feet bgs. After the desired depth is reached, the tooling will be removed, and a vapor sampling assembly will be installed in the borehole. The sampling assembly will include a porous probe tip (e.g., 50-micron stainless-steel), small diameter (e.g., ¼-inch) Teflon™ tubing, and a vapor tight, sealable top-cap. Backfill materials will include a 1-foot thick sand pack extend above and below the probe tip, a 1-foot thick dry granular bentonite above the sand pack, and hydrated bentonite to the ground surface. The soil vapor probes will be sampled after a minimum two-hour equilibrium period.

Prior to the collection of soil vapor samples from each probe, shut-in leak testing, purging, and sample train leak testing will be performed. The shut-in test will consist of assembling above-ground sampling apparatus (e.g., valves, lines and fittings downstream from the top of the probe), and evacuating the lines to a measured vacuum of approximately 100 inches of water column (in-H2O), then shutting the vacuum in with closed valves on opposite ends of the sampling train. A vacuum gauge will be used to assess if there is any observable loss of vacuum (for at least one minute) prior to purging and the collection of samples. If observable vacuum loss is noted, the sample train will be re-assembled, and the shut-in test will be repeated. This process will be repeated as necessary until a successful shut-in test has been performed.

A default of three purge volumes will be extracted prior to collecting the soil vapor samples. The stagnant air will be purged with a sampling syringe. The purge volume will be calculated using the volumes of: (1) the internal volume of the tubing; (2) the void space of the sand pack around the probe tip; and (3) the void space of the dry bentonite in the annular space. In accordance with the *Advisory*, purging and collection of soil vapor samples will be performed using a flow rate of 100 to 200 milliliters per minute (mL/min) and maintaining a low vacuum of less than 100 inches of water to mitigate ambient air breakthrough into samples.

Following completion of the shut-in leak test and purging, a shroud box will be positioned over the wellhead with the sample collection tubing passing through the bottom. Once in position, the sample train will be connected to a sampling syringe. The shroud box will then be charged by spraying the tracer propellant 1,1-difluoroethane (1,1-DFA) into the shroud box. The shroud box will be allowed to remain in place for the duration of sampling. A sampling syringe will be utilized to collect the soil vapor sample. Field quality assurance/quality control (QA/QC) samples for the investigation will consist of one duplicate sample per day and a daily probe blank sample. The duplicate sample will be collected concurrent with the collection of the primary sample.

The soil vapor samples will be analyzed by TEG's on-site mobile laboratory for volatile organic compounds (VOCs) and 1,1-DFA using U.S. Environmental Protection Agency (U.S. EPA) Test Method 8260B. Reporting limits for mobile laboratory analytes reported under the VOC analysis using U.S. EPA Test Method 8260B are provided on the table presented in Appendix A. The soil vapor analytical results will be compared to Regional Water Quality Control Board, San Francisco Bay Region (SFRWQCB) residential soil vapor Environmental Screening Levels (ESLs)[2] for human health risk levels (Table SG-1).

Soil cuttings and decontamination fluids generated during the soil vapor investigation will be temporarily stored on-site pending characterization and proper off-site disposal. Upon completion of sampling activities, each borehole will be grouted to the surface using neat cement.

REPORTING AND SCHEDULE

A description of the methods and procedures of the above-referenced scope of work will be presented in a report that provides tabulated data, illustrations, laboratory reports, findings of the completed scope of work, and recommendations, as appropriate.

The soil vapor sampling activities has been tentatively scheduled to take place on November 14 and 15, 2017.

We trust that this is the information you require. Please call either of the undersigned if you have any questions.

Yours very truly,

PES ENVIRONMENTAL, INC.

Gary D. Thomas, P.G.
Associate Geologist

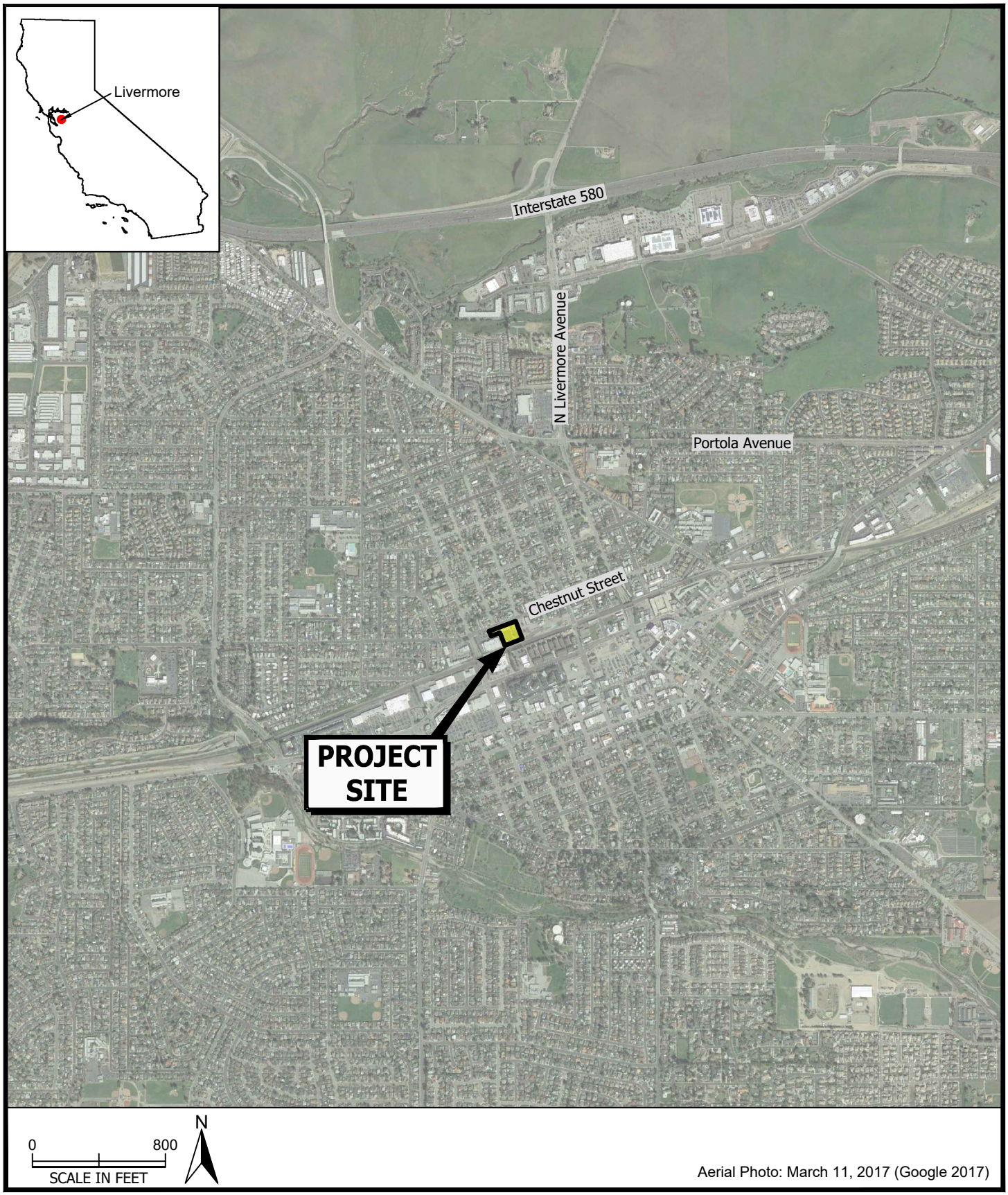
Carl J. Michelsen, P.G., C.HG
Principal Geochemist

[2] SFRWQCB, 2016. *February 2016, Rev. 3, Regional Water Quality Control Board, San Francisco Bay Region (SFRWQCB) Environmental Screening Levels (ESLs)*.

Attachments: Plate 1 – Site Location
Plate 2 – Site Plan and Proposed Soil Vapor Sample Locations

Appendix A – TEG Mobile Laboratory Reporting Limits and SFRWQCB Soil Vapor ESLs

PLATES

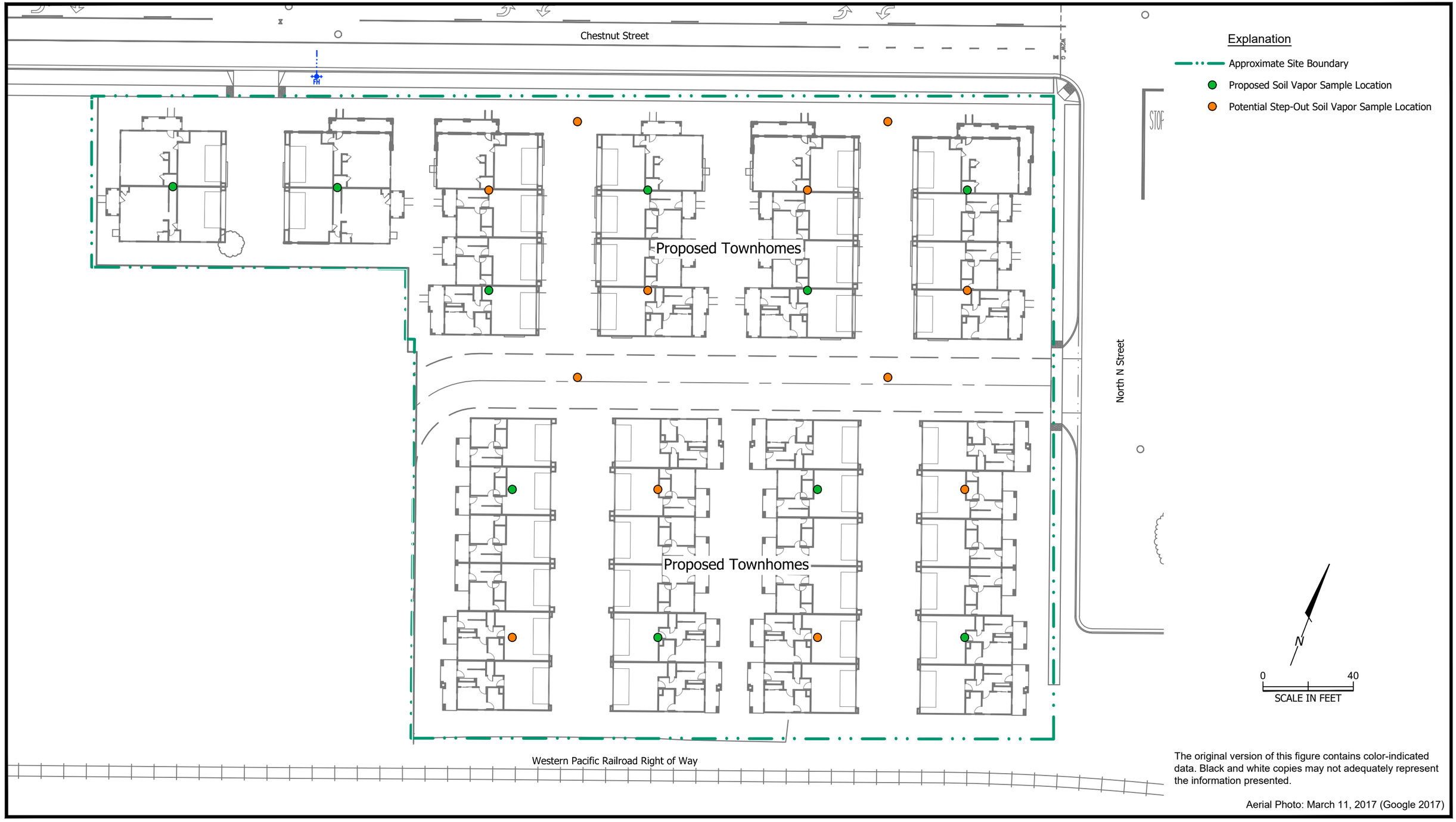


PES Environmental, Inc.
Engineering & Environmental Services

Site Location
Soil Vapor Sampling Work Plan
217 North N Street
Livermore, California

PLATE
1

1569.002.01.001	156900201001_SGSWP_1	GDT	10/17
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE



The original version of this figure contains color-indicated data. Black and white copies may not adequately represent the information presented.

Aerial Photo: March 11, 2017 (Google 2017)

PES Environmental, Inc.
Engineering & Environmental Services

Site Plan and Proposed Soil Vapor Sample Locations
Soil Vapor Sampling Work Plan
217 North N Street
Livermore, California

PLATE
2

1569.002.01.001	156900201001_SGSWP_2	GDT	10/17
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE

APPENDIX A

TEG MOBILE LABORATORY REPORTING LIMITS AND SFRWQCB SOIL VAPOR ESLs

Table A-1
Mobile Laboratory Reporting Limits and Soil Vapor ESLs
Reporting Limits

Volatile Organic Compound Analyte	TEG Mobile Laboratory U.S. EPA Method 8260B Reporting Limits ($\mu g/m^3$)	Residential Soil Vapor ESLs (Human Health Risk Levels) (Table SG-1) ($\mu g/m^3$)
Dichlorodifluoromethane	100	NE
Vinyl Chloride	9	4.7
Chloroethane	100	5,200,000
Trichlorofluoromethane	100	NE
1,1-Dichloroethene	100	37,000
1,1,2- Trichloro-trifluoroethane	100	NE
Methylene Chloride	100	510
trans-1,2-Dichloroethene	100	42,000
1,1-Dichloroethane	100	880
cis-1, 2-Dichloroethene	100	4,200
Chloroform	60	61
1,1,1-Trichloroethane	100	520,000
Carbon Tetrachloride	30	33
1,2-Dichloroethane	50	54
Benzene	35	48
Trichloroethene	100	240
Toluene	200	160,000
1,1,2-Trichloroethane	85	88
Tetrachloroethene	100	240
Ethylbenzene	100	560
1,1,1,2-Tetrachloroethane	100	190
m,p-Xylene	200	52,000
o-Xylene	100	52,000
1,1,2,2-Tetrachloroethane	100	240

Notes:

mg/m^3 = Micrograms per cubic meter

February 2016, Rev. 3, Regional Water Quality Control Board, San Francisco Bay Region (SFRWQCB) Environmental Screening Levels (ESLs).

NE = Not established