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Soil Management & Air Monitoring Plan Fairchild Drive Rowhouse Project

MV Viewpoint 2013, Inc. Phase II
Mountain View, California

Submitted to:

U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street
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1.0 INTRODUCTION AND OBJECTIVES

This Soil Management & Air Monitoring Plan (SM&AMP) has been prepared by GEOLOGICA, Inc. (GEOLOGICA) on behalf of MV Viewpoint 2013, Inc. (MV Viewpoint) to describe soil management and air monitoring procedures to be used during redevelopment activities on the approximately 1.8 acre property located east of Tyrella Avenue, between Fairchild Drive and Evandale Avenue, in Mountain View, CA (see Figure 1 for Site Location). Phase II of the planned property redevelopment will include construction of a seven (7) building, 35-unit townhouse project (see Phase II Development Site Plan, Figure 2). In addition, the City of Mountain View intends to develop an approximately 0.25 acre park in the southeast corner of the property. The subject property comprises assessor parcel numbers (APN) 160-07-003 and APN # 160-07-004.

The SM&AMP describes procedures to manage soils potentially contaminated with residual volatile organic compounds (VOCs), metals and petroleum-related constituents and to monitor, assess, and mitigate potential vapor releases from potentially contaminated soil, if encountered during construction activities at the property, during planned redevelopment construction process. This SMP has been prepared based on known conditions and contains a summary of background information and environmental conditions; additional description of this information is presented in the following reports:

- Phase I Environmental Site Assessment (Phase I ESA) prepared by Light, Air & Space (LA&S) in 2012 (LA&S, 2012).
- Subsurface Investigation Findings Report (Phase II ESA) prepared by LA&S (LA&S, 2014).

The overall objective of the SM&AMP is to provide guidelines for the protection of human health and the environment during construction earthwork activities. The SM&AMP will be available to site workers prior to the implementation of any applicable subsurface intrusion, soil stockpiling, soil off-hauling, or soil importing. Based upon our review of property conditions and development plans, the objective of this Plan is to present procedures for short-term (i.e., during construction activities) management of residual constituents present in soil, groundwater, and soil vapor on the property.

Terms used in this SM&AMP and contact information include the following:

Term	Organization	Contact	Phone	email	Description
Owner	MV Viewpoint 2013, Inc.	Josh Vrotsos	(408) 762-7108	jvrotsos@dividendhomes.com	the property owner for the construction period
EPA	Superfund Division	Alana Lee	(415) 972-3141	Lee.Alana@epa.gov	Oversight agency for MEW Superfund Area and TCE issues
City	Planning Department	Diana Pancholi	(650) 903-6306	Diana.Pancholi@mountainview.gov	Planning/ Development Issues
County	SCCDEH	Jennifer Kaahaaina	(408) 918-4795	Jennifer.Kaahaaina@deh.sccgov.org	Oversight agency for non-VOC issues
Engineer	BKF Engineers	Patrick Chan	(408) 467-9188	pchan@bkf.com	the project Civil Engineer
Consultant	GEOLOGICA INC.	Brian Aubry	(415) 722-3629	baubry@geologicagroup.com	The Project Environmental Consultant
Contractor	Dividend Homes Inc.	Rod Martin	(408) 779-5900	rmartin@dividendhomes.com	Party conducting on-site construction activities as engaged by the Owner

2.0 BACKGROUND

2.1 Site Description

The Project Site is comprised of two parcels, identified as Assessor's Parcel Numbers (APN) 160-07-003 and 160-07-004, totaling approximately (1.8) acres. Parcel 160-07-003, with an area of approximately 0.72 acre, is located at 133 Fairchild Drive and is east of Tyrella Avenue between Fairchild Drive to the north and Evandale Avenue to the south. Parcel 160-07-004, with an area of approximately 1.08 acres, is located at 149 Fairchild Drive adjacent to the east side of Parcel 160-07-003 between Fairchild Drive and Evandale Avenue and abuts the west side of an apartment property.

2.2 Site History

According to tax records, Parcel 160-07-003 was first developed in 1949 and Parcel 160-07-004 in 1948. A 1948 aerial photograph shows several mobile homes on the property. A 1956 aerial

photo shows more mobile homes and a paved parking area. By the 1968 aerial photograph all of the subject property has mobile homes on it. There is a one story wood-frame house which is the manager's office/residence and approximately ten wood-frame former motel rooms now rented out as residential units along the east side of the property. Prior to 1948 both land parcels were farmed and used for agricultural row crops.

2.3 Development Plans

The pending redevelopment project, scheduled to begin in the spring of 2016 consists of demolishing the current site buildings and constructing an at-grade townhouse project with seven (7) building clusters, of which five (5) buildings (4, 6, 7, 8 and 9) have five (5) townhouses each, Building 5 has six (6) townhouses and Building 10 has four (4) townhouses (see Figure 2). As shown on Figure 2, there also will be a semi-circular driveway, parking spots, landscaped areas and a future city park.

2.3.1 Site Preparation

The Owner will engage an appropriately licensed contractor to conduct asbestos & lead abatement activities, as needed, and demolish existing structures on the property under a demolition permit with the City of Mountain View. Much of the existing pavement and existing utilities will be removed during redevelopment activities. The majority of existing utilities including natural gas, water, electric, and telephone lines are expected to be located within 3 feet of ground surface. Existing storm water conveyance and sanitary sewer pipelines may be present at depths of 4 feet or greater. However, exact depths of existing utilities will be determined during planned demolition activities.

2.3.2 Earthworks

According to earthwork estimates provided to LA&S from the project Civil Engineer, the project has an anticipated net surplus of soil of approximately 500 cubic yards (cy) that will be exported offsite. The various excavating and grading activities will inherently involve a larger soil volume, which may include temporary onsite stockpiling. However, to meet various City and general subsurface utility construction requirements, there will be some import of sand bedding/backfill material.

2.3.3 New Utility Construction

As noted above, the majority of new utilities including natural gas, water, electric, and telephone lines are expected to be constructed within 3 feet of ground surface. Proposed locations and depths of planned storm water conveyance, water, and sanitary sewer trenches and joint utility (natural gas, television, telephone, and cable) trenches may be constructed to depths of 4 foot or greater as shown on Figure 2.

3.0 PERTINENT ENVIRONMENTAL CONDITIONS

Based on the Phase I ESA results and reconnaissance of the property, no evidence of historic hazardous material use or storage was identified on the subject property. However, the subject property is located within the Middlefield-Ellis-Whisman (MEW) Superfund Study Area (MEW Site) and west of the regional TCE shallow groundwater contamination plume boundary as shown on Figure 3. In 2012, previously undiscovered MEW Site contamination was identified to the west of the presumed MEW regional TCE shallow groundwater contamination plume boundary (west and east of the subject property). EPA and MEW Site parties have been conducting investigations in this area to characterize this contamination, and EPA has recently designated this area as Operable Unit 3 (OU3) of the MEW Site. Investigative work to characterize the contamination in OU3 is underway, and future cleanup work is expected to address the contamination in this area. The MEW Site remedy includes activities to contain and clean up subsurface contamination as well as actions to prevent that subsurface contamination from entering into overlying buildings. A map prepared by EPA presents TCE concentrations in shallow groundwater is shown on Figure 3. The subject property is within the OU3 Vapor Intrusion Evaluation Area.

Because of the proximity of the property to the areas of potentially impacted soil vapor and groundwater associated with the MEW Site, environmental investigations to assess soil vapor and groundwater conditions were conducted at the Project Site in support of the pending redevelopment activities, with details provided in the two LA&S reports cited in the SMP Introduction. This remainder of this section discusses the pertinent findings of the environmental investigations conducted on the property.

3.1 Chemicals in Soil Vapor

In March 2014, soil vapor samples were collected at a depth of six feet bgs from six (6) locations (LAS-SV-4, LAS-SV-5, LAS-SV-6, LAS-SV-7, LAS-SV-8 and LAS-SV-9) within planned residential building footprints and were analyzed for VOCs (LA&S, 2014). Sampling locations are shown on Figure 4; results are summarized in Table 1. The principal VOCs detected in the samples were TCE, which was reported in five of the six samples and a duplicate sample at concentrations ranging from 12 to 1,200 micrograms per cubic meter (ug/m^3) and tetrachloroethene (PCE), which was reported at a concentration of 6.5 ug/m^3 in one sample. The EPA Record of Decision Amendment for the Vapor Intrusion Pathway (EPA, August 2010) set the residential indoor air cleanup level for TCE at 1 ug/m^3 for the MEW Superfund Area. EPA's 2015 Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air identified a default attenuation factor of 0.03 for VOC migration from soil vapor to indoor air, indicating that TCE concentrations in soil vapor greater than 33 ug/m^3 pose a potential concern for vapor intrusion.

3.2 Chemicals in Groundwater

In March 2014, groundwater "grab" samples were also collected from six locations (LAS-GW-4, LAS-GW-5, LAS-GW-6, LAS-GW-7, LAS-GW-8 and LAS-GW-9) within the planned residential building footprints. Three depth-discrete groundwater "grab" samples were collected at each location. Sampling locations are shown on Figure 4; groundwater sample results are summarized in Table 2. TCE was the primary groundwater constituent found, with detectable concentrations up to 9.3 micrograms per liter (ug/L) in twelve (12) of the eighteen (18) samples.

4.0 GUIDELINES FOR HEALTH AND SAFETY DURING CONSTRUCTION

A Health and Safety Plan (HASP) shall be prepared on a task-by-task basis by the Contractor performing any construction that would require subsurface work at the Project property excluding general post-development maintenance activities (e.g., landscaping and irrigation system repair). The HASP shall summarize health and safety considerations for the Project work relative to the chemical constituents detected in site media, and describe personal protective equipment and monitoring requirements, as well as physical hazards that may be associated with each task.

All applicable Federal, State, and local regulations and codes relating to health and safety shall be adhered to by the Contractor. The Contractor shall adhere to all sections of the California Occupational Safety and Health Administration (Cal OSHA) regulations contained in Title 8 of the California Code of Regulations (8 CCR) as they apply to on-site activities. Further, it is recommended that all Contractors evaluate the need for Proposition 65 notifications to their workers. It is the responsibility of the Contractor to ensure that these standards and other precautions, as necessary, will be implemented throughout the course of the intrusive work at the Project Site.

Since TCE has been detected in soil vapor and groundwater beneath the Project Site, Contractors engaged in the trenching and utility installation work must, as a precaution required by EPA, implement an air monitoring program to evaluate the presence of TCE in the worker breathing zone area. Additionally, it is recommended that in-trench mechanical ventilation be provided as a standard work practice for any time that a worker needs to enter the trenches or excavations exceeding a depth of 3 feet.

5.0 AIR MONITORING PROCEDURES

Air monitoring to protect worker safety and safeguard the health of nearby residents will be conducted during any task that involves excavation to a depth of 4 feet or greater as required by the EPA. The air monitoring program will be supervised by a California-registered Industrial Hygienist. Air monitoring may also be required if unexpected conditions are encountered during construction activities including visual or olfactory indications of contamination and the

presence of underground storage tanks or other unexpected subsurface features or structures. Monitoring procedures, action levels, and contingency plans are described below.

5.1 Work Area Monitoring, Action Levels, & Response Actions

Real-time work area monitoring will be conducted to identify in-trench worker's potential exposure to TCE during any time that personnel enter utility trenches or excavations that are open to depths of 4 feet or greater. Monitoring will be conducted in the worker's breathing zone using a portable gas chromatograph such as the SRI Model 8610 gas chromatograph with an electron capture detector (ECD) unit, or equivalent. The real-time VOC monitoring equipment shall be capable of detecting TCE at a concentration of 1 ug/m^3 or less. VOC monitoring in the worker's breathing zone will be conducted:

- Immediately prior to the first time workers enter an excavation or trench;
- At no less than hourly intervals thereafter during normal work hours, or,
- Whenever trench or excavation work exposes visual or olfactory indications of contamination.

EPA stipulated Worker Breathing Zone TCE Response Action Levels are detailed below.

Worker Breathing Zone TCE Action Levels

TCE Accelerated Response Action Levels	Action to Take if Trigger Level Exceeded
8 hour work day: 8 µg/m^3 or greater	Take measures to reduce exposure while work continues. Notify EPA within 24 hours.
10 hour work day: 7 µg/m^3 or greater	

TCE Urgent Response Action Levels	Action to Take if Trigger Level Exceeded
8 hour work day: 24 µg/m^3 or greater	Evacuate workers from the area or provide respirator protection to prevent additional exposure. Notify EPA immediately.
10 hour work day: 21 µg/m^3 or greater	

The highest TCE concentrations are expected in the period following initial excavation of a trench to a depth greater than four feet, or in the event that groundwater percolates into an open trench. Natural Ventilation, that is, delaying or discontinuing work in an area for a sufficient time to allow vapor levels to be reduced to acceptable levels based on real-time monitoring in many cases may be adequately protective of in-trench worker safety. However, in the event that any of the above Action Levels are exceeded for more than 10 minutes, the following Construction Response Actions may be implemented to reduce vapor emissions.

- Application of Water: Application of water will often reduce vapor levels. Water trucks will be on site to provide water for dust control and soil conditioning for compaction and can also be used to mitigate vapor emissions.

- Application of Foam: Application of foams can often reduce vapor levels. For example, Rusmar Foam Technology offers several foams products for different uses and associated application equipment. Biodegradable foams developed for this application encapsulate VOC-impacted soil or groundwater and impede offgassing to ambient air.

- Mechanical Ventilation: In the event the above response actions do not result in attenuated TCE levels, mechanical ventilation using large industrial fan units will be used to ventilate trenches and direct air flow off the Property to the north towards Fairchild Drive, away from existing residential or commercial structures.

- Higher Level PPE: Higher levels of worker personal protective equipment, i.e., suitably fitted respirators equipped with the appropriate filter cartridges per the Health and Safety Plan can be implemented, such as Level C or B personal protective equipment per 29 CFR 1910.134. Note, this alternative can only be implemented if the workers are appropriately trained to utilize PPE as described in the site specific Health & Safety Plan.

- Trench Excavation Covering: Exposed trenches, exhibiting elevated TCE/VOC levels may be covered with plastic sheeting, or trench plates. Trench covering will be maintained until VOC levels are shown to have dissipated. Trench excavation covering may be implemented in the event that trenches need to be left open overnight or over the weekend to reduce offgassing to ambient air. Trench excavation covering will be mandatory if perimeter monitoring described in **Section 5.2** indicates that Perimeter Monitoring Response Action Levels are exceeded.

5.2 Perimeter Monitoring, Action Levels, & Response Actions

Ambient air monitoring will be conducted at the property perimeter during any activity that may involve completion of excavations to depths of 4 ft bgs or greater. Real-time perimeter monitoring will be conducted to identify rapid increases in TCE concentrations in ambient air, for example as might occur immediately following excavation of a new deep trench or excavation. Real-time perimeter monitoring will be conducted using a portable gas chromatograph such as the SRI Model 8610 gas chromatograph with an electron capture detector (ECD) unit, or equivalent as described in **Section 5.1**. In addition, to evaluate potential average exposure concentrations as well as public exposure during non-working hours, passive vapor samples will be collected using Radiello 130 Solvent Sorbent Cartridges or equivalent. The passive vapor samplers will be deployed immediately prior to starting an excavation expected to extend to a depth of 4 feet or greater and retrieved at the end of the same work week. If trench work will take more than one week, additional passive ambient air samples will be collected at the rate of one per week per sampling station, with a five day continuous sample collection

duration. Real-time perimeter air monitoring and passive ambient air samples will be collected at three locations around the perimeter of the property on the east, south, and west approximately as shown on Figure 5. The perimeter samples or VOC measurements will be collected closest to occupied residences or businesses on the property perimeter. Sampling locations may be adjusted based on proximity to active excavation areas, wind direction, and other factors.

VOC monitoring along the property perimeter will be conducted:

- Immediately after the first time workers open a new excavation or trench;
- At least hourly thereafter during normal work hours;
- After any change in weather (falling barometric pressure, change in wind direction or velocity) that may affect monitoring expected monitoring results; and,
- After any change in site conditions as may be noted by visual observation or sense of smell.

EPA stipulated Perimeter Monitoring Ambient Air Action Levels are detailed below.

Perimeter TCE Ambient Air Response Action Levels

TCE Accelerated Response Action Levels	Action to Take if Trigger Level Exceeded
2 $\mu g/m^3$ or greater	Take measures to reduce vapor emissions as discussed in **Section 5.1.** Notify EPA within 24 hours of preliminary results.

TCE Urgent Response Action Levels	Action to Take if Trigger Level Exceeded
6 $\mu g/m^3$ or greater	Stop work, Cover excavations and soil stockpiles, and, Re-evaluate construction and excavation practices. Notify EPA immediately.

6.0 GENERAL SOIL MANAGEMENT PROCEDURES

Soil handling procedures to be following during and after intrusive site construction are provided below. The procedures summarized below do not apply to standard post-construction activities conducted on site (e.g., final landscaping, landscape maintenance, etc.).

6.1 Notification Requirements

Notification shall be made to the appropriate agency if specific environmental issues are encountered. Potential notification scenarios include:

- Notification to the Santa Clara County Department of Environmental Health (SCCDEH) if an unknown underground containment structure (e.g., underground storage tank [UST]) is encountered; and/or,

- Notification to the SCCDEH and EPA if a zone of unexpectedly high contamination (of any form) is encountered.

Notification to the appropriate agency shall be made by the General Contractor, Consultant, or project Engineer, or other designated representative; however, any notifications by the aforementioned to a regulatory agency or third party shall follow communication with the Owner. The EPA is the lead regulatory agency for the MEW Superfund Area and MEW Site-related contamination; SCCDEH has lead jurisdiction on other non-MEW Site contamination if encountered (UST, gasoline, fuel, metals, or pesticides).

In addition, the Owner will provide a written notice to nearby residents and businesses of planned demolition, subsurface excavation, and construction activities at least one week in advance of the planned activities. Each notice will describe the planned activity, what the residents may observe, potential impacts, monitoring procedures, trigger levels for response action, and planned response actions as appropriate. The notice will provide a phone number and email address for further information.

6.2 Site Access Control

Access to areas where excavations are being made, or are open, or any potentially contaminated soil is exposed for any reason, shall be limited from unauthorized access via a fence, or other appropriate means, surrounding the construction and associated soil stockpile areas.

6.3 Concrete and Asphalt Removal

The Contractor will break up asphalt and concrete exposed at the surface with hoe rams and jackhammers or other standard heavy equipment. It is anticipated that crushed asphalt will be loaded into dump trucks and off-hauled to a local asphalt recycling facility. Concrete debris will be loaded into dump trucks and off-hauled to a Class M non-hazardous landfill or concrete recycling facility. Dust control measures, described in Section 6.5 below, will be followed to minimize generation and offsite migration of nuisance dust during clearing and grubbing activities.

6.4 Groundwater Management

Construction related dewatering is not anticipated during planned property clearance or construction activities. Groundwater was encountered at depths of 8.5 to 9.5 feet bgs during the March 2014 subsurface investigation field program. Pre-construction grading activities are expected to raise the site grade by 2 feet. The maximum anticipated utility trench depth for the Phase 2 project is expected to be on the order of 7 to 10 feet bgs; consequently, it is unlikely that

groundwater will be encountered during utility construction. However, because TCE has been found in groundwater underlying the property, appropriate precautions must be undertaken by the construction contractors to minimize worker and public exposure to contaminated groundwater and soil vapor containing TCE arising from impacted groundwater. In the unlikely event that soil is removed from a trench completed below the groundwater table, the excavated soil should be screened and tested as described in Section 6.6 below, to determine proper handling procedures. Ambient air within and near all trenches that are advanced deep enough to encounter groundwater should be screened for TCE/VOCs as described in Section 5. In addition, property perimeter monitoring will be conducted during periods when trenches or excavations are open to depths of four feet bgs or greater.

If dewatering is needed for any reason during construction, produced water will be contained in appropriate containers brought to the Property for that purpose, tested, and disposed of appropriately. If approved by the City of Mountain View, produced water may be discharged to the local sanitary sewer. In the event that produced groundwater cannot be discharged to the sanitary sewer, the water will be disposed of at an appropriately licensed off-site Treatment, Storage & Disposal Facility. In no case will produced groundwater be discharged on the ground or to the storm drain.

6.5 Dust Control

Whenever earthwork activities occur in dry weather, dust control measures must be implemented to minimize dust generation. General dust control measures recommended by the Bay Area Air Quality Management District and other authorities include:

- Apply water as needed to maintain soil moisture and minimize dust generation daily;
- For trucks hauling affected soil within the site, cover the soil or maintain at least two feet of freeboard;
- Sweep all paved access roads, parking areas, and staging areas as needed;
- Sweep streets if visible soil material is carried onto adjacent public streets;
- Restrict non-essential traffic to compacted roadways and capped portions of the site;
- Limit vehicle speeds to 15 miles per hour on unpaved portions of the site;
- Minimize drop heights while loading transportation vehicles; and
- Cover exposed soil or stockpiles and secure with temporary fencing or other means.

The Contractor is responsible for the mitigation of dust during construction activities. If visible dust is observed at the perimeter of the Project Site as a result of on-site construction activities or if sensitive receptors are present during construction activities, the Contractor must enhance mitigation measures. The Owner may require the Contractor to perform and document formal dust monitoring.

6.6 Guidelines for Soil Management

Although chemically impacted soil is not expected on the property, suspect soil may be identified (e.g., based on visual staining or olfactory evidence), especially following the removal of existing surface and subsurface features. Conservatively, the Contractor shall follow the soil management guidelines at all times, including when evaluating the on-site reuse of soil (Section 6.6.5), the off-site disposal of soil (Section 6.6.6), or the import of fill material for on-site use (Section 6.6.7).

6.6.1 Soil Excavation and Screening

Any activities that will disturb the soil, other than post-construction final landscaping installation and maintenance activities, shall be conducted in accordance with the Contractor-prepared HASP, as specified in Section 4 above. Soil VOC screening will be conducted whenever trenching or excavations are advanced to depths of 4 feet or greater. VOC screening samples will be collected from every 5 cy of soil excavated or from every 10 linear feet (LF) of trench excavated to 4 ft bgs or greater. VOC screening will also be conducted in the event that visual or olfactory indications of contamination in soil or if groundwater is encountered. VOC screening will be conducted by placing a representative sample of soil in a sealed zip-lock plastic bag. After equilibrating for approximately 10 minutes at room temperature, a PID will be used to screen the sample for the presence of VOCs. Screening will be conducted using a properly calibrated PID containing a 10.6eV lamp and capable of reading parts per billion (e.g., ppbRAE Plus, ppbRAE 3000, or equivalent). <u>Excavated soil that has continuous readings of 500 ppbv or greater for at least 10 seconds should be considered potentially contaminated soil and stock-piled separately from presumed "clean" soil and covered with plastic.</u>

Any impacted, or even potentially-affected, soil brought to the surface by grading, excavation, or trenching should be managed in accordance with all applicable provisions of the State of California and/or federal law. The stockpiling and on-site reuse of excavated soil should be conducted as specified below.

6.6.2 In-Situ Soil Sampling and Analysis

Potentially impacted soil, determined based on staining, odors, PID readings or chemical analysis, shall be segregated from presumed "clean" soil. The trenches and/or excavations from which potentially impacted soil originates shall be sampled to evaluate the presence of contaminants of concern. For this, the Project Environmental Consultant will collect representative soil samples from every 10 LF of trench from which suspect soil originated. The samples will be collected from the trench sidewalls at the mid-point of the trench depth, unless other locations are deemed necessary based on visual or olfactory indications of contamination. Soil samples collected for VOC analysis will be collected using the EPA Method 5035 protocol and submitted to a California-certified analytical laboratory for analysis for VOCs by EPA Method 8260. In the event that impacts from metals, petroleum hydrocarbons, or other non-

VOCs are suspected, representative soil samples will be collected into suitable laboratory provided sample containers and analyzed by a California-certified laboratory using standard EPA methods, e.g., EPA Method 8015M for petroleum hydrocarbons or EPA Method 6010 for metals.

6.6.3 Impacted Soil Assessment and Removal

In the unlikely event that laboratory chemical testing reveals the presence of potential contaminants of concern in soil samples collected from trenches or excavation sidewalls, the appropriate regulatory agency (EPA for TCE and related compounds, SCCDEH for petroleum hydrocarbon or metals) shall be contacted within 24 hours of receipt of testing results. Based on testing results and discussion with the regulatory agency, additional action including additional sampling and analysis or removal of impacted soil may be required. The following criteria will be used to evaluate the significance of testing results:

- MEW Site soil clean up levels for TCE (500 micrograms per kilogram) and other MEW Site chemicals of concern;
- For non-VOCs and VOCs for which site cleanup levels do not exist, the most current version of EPA Region 9 Regional Screening Levels (RSLs) for Residential soils or the most current version of the California Human Health Screening Levels (CHHSLs) (California EPA, 2010), whichever is more stringent (i.e. lower), with consideration for established background levels for metals.

6.6.4 Soil Stockpiling

Potentially impacted soil, determined based on staining, odors, or chemical analysis, shall be segregated from other soils. Potentially impacted soil will be stockpiled on plastic sheeting. All stockpiled soil shall be securely covered with plastic sheeting at the end of each work day to minimize fugitive dust generation. Soil stockpiles will be surrounded by straw batting to prevent discharge of soil moisture or rainfall runoff. The method of covering can be determined based on the anticipated time that the stockpiles will be in place, weather conditions, regulatory requirements (i.e. storm water management plans), and other practical factors such as the size of the stockpiles.

If the stockpiled soil is formally found to contain chemicals of potential concern it should be fenced or otherwise protected, and clearly distinguished, prior to being disposed of off-site at an appropriate licensed disposal facility.

6.6.5 On-Site Reuse of Soil

Excavated on-site soil exhibiting evidence of impact based on PID screening and/or excavation sampling results, visual inspection, or olfactory inspection will require additional chemical testing prior to being re-used on site. The specific chemicals to be tested for, and the number of samples to be tested will be evaluated on a case-by-case basis determined by the Project

Environmental Consultant. Soil approved for reuse on-site must meet the criteria identified in Section 6.6.3, i.e., MEW Site Soil Cleanup Levels, EPA Regional 9 RSLs, or CA EPA CHHSLs for Residential Land Use. Testing procedures are described in the SAP.

6.6.6 Off-Site Soil Disposal or Reuse

Excess soil to be disposed of offsite must be profiled for constituents as requested by the appropriate receiving landfill facility (e.g., hazardous, non-hazardous, or recycling) identified for disposal. It is anticipated that testing will be required to evaluate, at a minimum, the presence of metals and VOCs. Additionally, although not identified as a constituent of concern, it is likely that an offsite disposal facility would require analysis for the presence of petroleum hydrocarbons and heavy metals. Non-hazardous soil disposed of offsite can only be taken to a disposal facility pre-approved by the Owner.

If soil is to be considered for re-use off-site at another location, the basis for this consideration must be evaluated and determined by the Owner and its Consultant. No soil may be reused off site without written 'as is' acceptance by the receiving party and consent of the Owner. All soil designated for export off site must meet the minimum requirements for soil sampling and analysis as described in the Department of Toxic Substances Control (DTSC) 2011 guidance document "*Import Advisory Clean Import Fill Material*".

6.6.7 Imported Fill Material

All imported fill material must meet the criteria identified in Section 6.6.3, i.e., MEW Site Soil Cleanup Levels, EPA Regional 9 RSLs, or CA EPA CHHSLs for Residential Land Use. Except for virgin commercial bulk materials (e.g., non-recycled bedding sand from a quarry), representative soil samples shall be collected and analyzed to confirm that the proposed import material meets Residential Land Use criteria. The specific chemicals to be tested for and the number of samples to be tested will be evaluated on a case-by-case basis determined by the Consultant. No import soil except said virgin commercial materials may be used on site without the specific consent of the Owner.

6.7 Storm Water Management

Prior to mobilization, the Contractor shall prepare a storm water pollution prevention plan (SWPPP) to address requirements for erosion prevention and storm water management during their work in accordance with Water Board and/or State Water Resources Control Board (SWRCB) requirements. Storm water pollution controls implemented at the property shall be based on Best Management Practices (BMPs), such as those described in the Erosion and Sediment Control Field Manual (Water Board, 2002). Specific practices that should be implemented to reduce the sediment load of storm water runoff from the property include installing storm water control devices (e.g., earth berms, silt fences, or straw waddles) around the

perimeter of unpaved areas until final caps are constructed, and protecting existing catch basins with silt fences, fiber rolls, waddles, or gravel bags.

In addition, all Contractors shall store fuel and chemicals in such a manner that prevents accidental spills from impacting storm water. The Contractor should be aware of potential chemical impacts in shallow soil, as determined by visual, olfactory, or PID observations, and take protective measures to minimize storm water runoff over impacted areas. In no instance should suspected chemically-impacted water be discharged to the street or storm drain system.

6.8 Unanticipated Subsurface Conditions

It is possible that unknown, historical subsurface features and structures may remain on the property. If present, these structures or features may be encountered during construction activities. In addition, chemicals other than those previously identified may be present in soil on the property. Unanticipated subsurface conditions may include, but not be limited to, the following:

- USTs or suspicious underground piping
- Groundwater wells
- Concrete vaults
- Chemically-affected soil or groundwater that emits suspicious odors
- Visually-impacted soil

Whenever unanticipated conditions are encountered, the Contractor shall stop work in that area, secure the work area, and notify the Owner or its representative of the situation before any further action is taken. Further action may include removal or in-place abandonment of subsurface structures, or characterization and appropriate handling of soil potentially affected by chemicals.

Further action will be taken in consultation with EPA, Santa Clara County Department of Environmental Health, the City of Mountain View, and other appropriate regulatory agencies, as needed. No action shall be taken by the Contractor with regard to the unanticipated condition unless expressly authorized by the Owner, or their other authorized representative. Work can proceed in the area upon notification from the Owner, the Consultant, or other authorized representative.

Regardless of the above, the Contractor should comply with the requirements of the SSHSP at all times (refer to Section 4.0, above), in case unanticipated conditions are encountered during construction work.

7.0 RESPONSIBILITIES AND MODIFICATIONS

This section discusses responsibilities for managing this SM&AMP and the circumstances under which this SM&AMP may be modified.

The Owner shall oversee implementation of this SM&AMP for the subject redevelopment project. In addition, the Owner shall make available a copy of the SMP to Contractors engaging in applicable subsurface work activities, unless otherwise excluded herein. The Contractor shall be responsible for adhering to this SMP, following project specifications, and job and site safety. Each Contractor engaging in site work will be required to sign a letter of acknowledgement documenting receipt and agreement to the responsibilities and requirements set forth herein this SMP. Copies will be maintained in the Owner's files. Contractor also is responsible for providing a copy of the SMP to its subcontractors. The Consultant, on behalf of the Owner, may observe construction activities but is not responsible for directing or supervising the Contractor's operations or work.

This SMP was developed based on our understanding of current conditions at the Project Site and applicable regulations. It may be necessary to modify this SMP for any of several reasons including:

- Change in property use;
- Change in understanding of environmental conditions (e.g., newly identified chemicals);
- Intrusive activity that is not addressed in the SM&
- New chemical toxicity information for detected constituents at the site; or,
- New legal requirements.

8.0 LIMITATIONS

This SMP was developed to address previously detected constituents in soil, soil vapor and/or groundwater beneath the subject property and the immediate neighborhood, as summarized in Section 3.0 above. Point sample locations and laboratory results are inherently limited and do not provide a warranty as to the conditions that may exist throughout. Such a warranty is impossible to achieve. Conditions also change over time. This SM&AMP does not cover potential environmental issues that may be associated with the demolition of existing structures, such as the handling of any remaining on-site wastes and the potential presence of asbestos, lead-containing paint, or mold.

In preparing this SM&AMP, LA&S has relied upon certain information and documents prepared by others. To the extent that recommendations are based in whole or in part of such information, those recommendations are contingent on its accuracy and validity. LA&S assumes no responsibility for any consequences arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to LA&S. This SM&AMP and the affiliated work were performed according to standards of care that have been accepted by EPA Region 9, and State and local agencies for these plans and activities. It is expressly understood that while this SM&AMP is intended to provide guidance and establish a framework for the management of residual chemicals in soil, soil vapor, and groundwater to protect human health and the environment, this SM&AMP shall not create any warranties or obligations to LA&S as to implementation, adequacy, or success of such protective measures.

No representation is made to any future developer or property owner with respect to future site conditions, other than those specifically identified within this document. The use of this SM&AMP by third parties is entirely at their own risk.

9.0 REFERENCES

California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB-SF, 2002), *Erosion and Sediment Control Field Manual*, Fourth Edition, August 2002.

Geosyntec Consultants (Geosyntec, 2013), *Final Grab-Groundwater Assessment and Proposed Well Installations*, Middlefield-Ellis-Whisman Regional Groundwater Remediation Program, Mountain View, California, unpublished consultant report, September 12, 2013.

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EPA Memorandum - *EPA Response Action Levels and Recommendations to Address Near-Term Inhalation Exposures to TCE in Air from Subsurface Vapor Intrusion, June 30, 2014.*

EPA Memorandum - *Compilation of Information Relating to Early/Interim Actions at Superfund Sites and TCE IRIS Assessment.* Office of Superfund Remediation and Technology Innovation. August 27, 2014.

EPA Third Five-Year Review report for Middlefield-Ellis-Whisman (MEW) Superfund Study Area, Mountain View and Moffett Field, California. September 2014.

EPA, *OSWER Technical guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.* June 2015.

EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5, March 2001).

California Department of Toxic Substances Control (DTSC) Human and Ecological Risk Office (HERO), 2014. *Human Health Risk Assessment (HHRA) Note Number 5. Issue Health-based Indoor Air Screening Criteria for Trichloroethylene (TCE). August 21, 2014.*

TABLES

Table 1
SUMMARY OF SOIL VAPOR ANALYSIS DATA
Fairchild-Tyrella-Evandale Property
Mountain View

Concentrations in micrograms per cubic meter (ug/m^3)

								Screening Levels	
	LAS-SV-4 (3/12/14)	LAS-SV-5 (3/12/14)	LAS-SV-6 (3/12/14)	LAS-SV-7 (3/12/14)	LAS-SV-8 (3/12/14)	LAS-SV-9 (3/12/14)	LAS-SV-9R (3/12/14)	Indoor Air*	Subgrade Vapor**
VOCs									
TCE	**1,200**	**42**	**640**	**190**	< 4.9	**12**	**12**	1.0	33
PCE	**6.5**	< 6.4	< 6.8	< 6.9	< 6.2	< 6.6	< 6.6	0.4	13
cis-1,2-DCE	< 3.7	< 3.7	< 4.0	< 4.0	< 3.6	< 3.9	< 3.8	60	2,000
trans-1,2-DCE	< 3.7	< 3.7	< 4.0	< 4.0	< 3.6	< 3.9	< 3.8	60	2,000
Vinyl Choride	< 2.4	< 2.4	< 2.6	< 2.6	< 2.3	< 2.5	< 2.5	0.2	6.7
1,1-DCA	< 3.7	< 3.8	< 4.0	< 4.1	< 3.7	< 3.9	< 3.9	2.0	67
1,1-DCE	< 3.7	< 3.7	< 4.0	< 4.0	< 3.6	< 3.9	< 3.8	210	7,000
other (TO15 suite)	***	***	***	***	***	***	***	---	---
2-propanol ****	< 9.1	< 9.2	< 9.8	< 10	< 9.0	< 9.6	< 9.5	---	---

NOTES:
<3.7 - Not Detected; see laboratory reports for specific detection/reporting limits.
* Residential MEW site-wide indoor air screening levels for 7 VOCs of concern (EPA Record of Decision Amendment for the Vapor Intrusion Pathway, August 2010).
** Subgrade screening levels back-calculated using an attenuation factor of 0.03.
*** See lab report, variety of trace non-target VOCs found.
**** Leak check compound.

Table 2
SUMMARY OF GROUNDWATER ANALYSIS DATA
Fairchild-Tyrella-Evandale Property, Mountain View
concentrations in micrograms per Liter (ug/L)

SAMPLE #	Sample Depth (ft)	Sample Date	TCE	cis-1,2-DCE	Benzene	Toluene	Ethyl-benzene	Xylenes	Other VOCs*
LAS-GW-4A	8.5-10.5	Mar 3	**8.4**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-4B	24.5-26.5	Mar 3	**3.0**	< 0.5	< 0.5	**0.5**	< 0.5	< 0.5	ND
LAS-GW-4C	30-32	Mar 3	**9.3**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-4D	37-39	Mar 3	**2.0**	< 0.5	< 0.5	**0.5**	< 0.5	< 0.5	ND
LAS-GW-5A	21-23	Feb 28	**6.7**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-5B	31.5-33.5	Feb 27	< 0.5	< 0.5	< 0.5	**0.5**	< 0.5	< 0.5	ND
LAS-GW-6A/AA	22-24	Mar 11	**6.8/6.8**	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	ND
LAS-GW-6B	36-38	Mar 11	**2.0**	**1.7**	**1.2**	**1.1**	< 0.5	< 0.5	ND
LAS-GW-6C	55-57	***	---	---	---	---	---	---	---
LAS-GW-7A	8.5-10.5	Mar 11	**2.5**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-7B	23-25	Mar 11	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-7C	37.5-39.5	Mar 11	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-8A/AA	13-15	Feb 28	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	ND
LAS-GW-8B	23-25	Feb 28	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-8C	30.5-32.5	Feb 28	**1.1**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-9A	8-10	Feb 28	**1.6**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-9B	18.5-20.5	Feb 28	**5.9**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND
LAS-GW-9C/CC	30-32	Feb 27	**9.1/6.7**	<0.5/<0.5	<0.5/<0.5	<0.5/0.6	<0.5/<0.5	<0.5/<0.5	ND
WQGs			5	6	1	150	300	1,750	various

Notes:

* Volatile Organic Compounds; specifically those reported under EPA Method 8260B

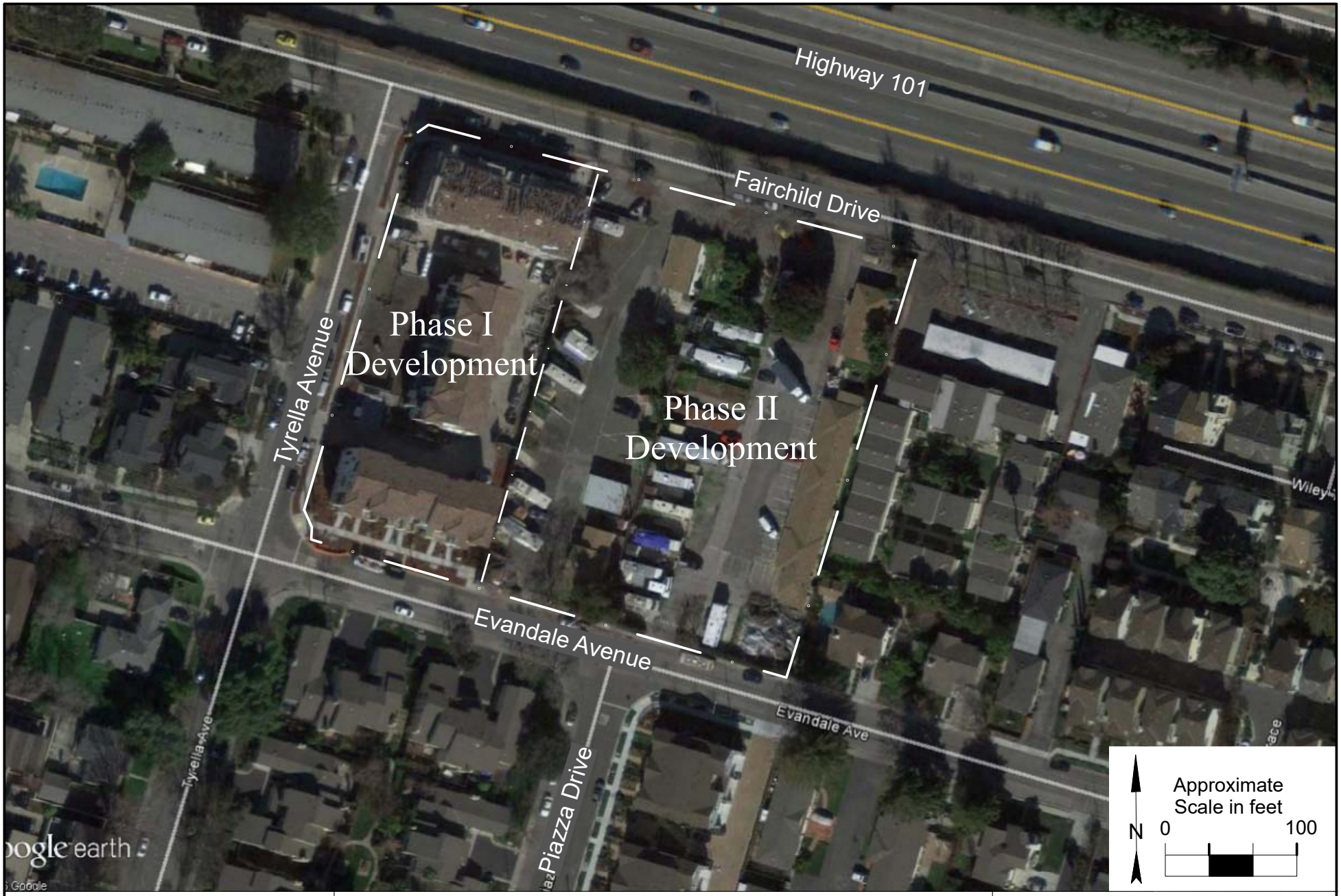
** See laboratory report for sample 254326-003; several VOCs found in this sample of suspect condition (all <150 ug/L).

*** Tried to sample this interval twice, on March 10 and 11, 2014 but thin, limited lenses did not yield water. TCE Trichloroethylene DCE Dichloroethylene

ND Not Detected; see laboratory reports for specific reporting limits.

WQGs Water Quality Goals (California drinking water maximum contaminant levels)

FIGURES



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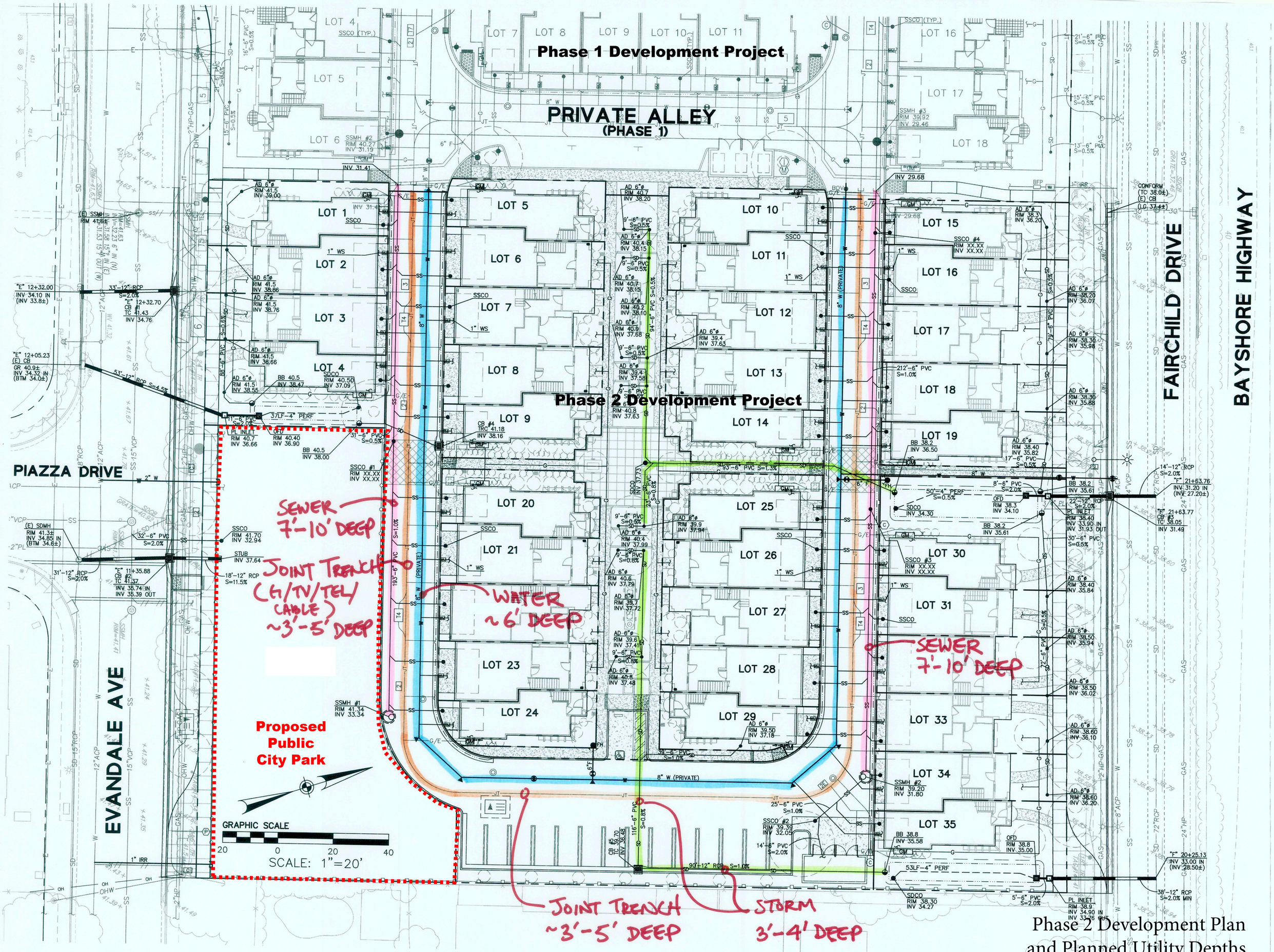
Oakland, California

Fairchild Drive Rowhouse Project

APN # 160-07-003 and 160-07-004
Mountain View, California

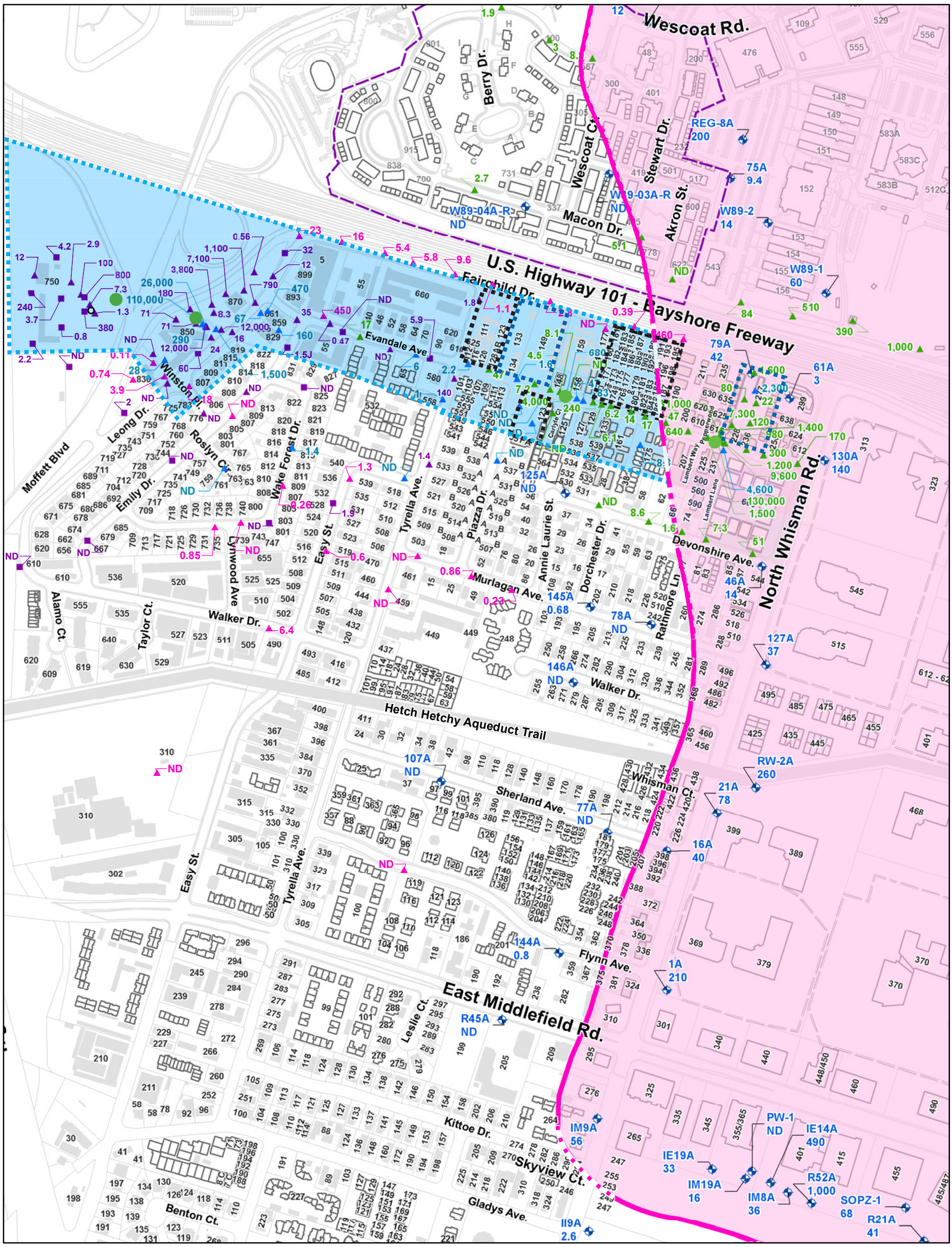
Site Location Map

Figure 1



Phase 2 Development Plan
and Planned Utility Depths

Figure 2



LEGEND

- Slurry Wall (Underground)
- Further groundwater investigation is ongoing (2014) to delineate the 5 ppb TCE plume boundary. Upon completion the figure will be updated.
- Vapor Intrusion Study Area – estimated TCE in groundwater > 5 parts per billion (ppb) (updated based on 2013 groundwater results)
- OU3 Vapor Intrusion Evaluation Area
- Homes built with vapor intrusion control systems.
- Planned developments with vapor intrusion control systems (not yet built).
- Wescoat Village Residential Area (New homes built in 2006 with vapor intrusion control system.)
- TCE Groundwater Hot Spot

Note:
Only selected monitoring well data used to estimate Vapor Intrusion Study Area boundary are shown.

Grab Groundwater Locations

- 2014 EPA grab groundwater location
- 2013 EPA grab groundwater location
- 2012/2013 MEW grab groundwater location
- 2011 EPA grab groundwater location
- 2005 EPA grab groundwater location

The result shown is the maximum TCE concentration in ppb from grab groundwater samples to 40 feet below ground surface.

Groundwater Monitoring Well Locations

- Groundwater monitoring well location

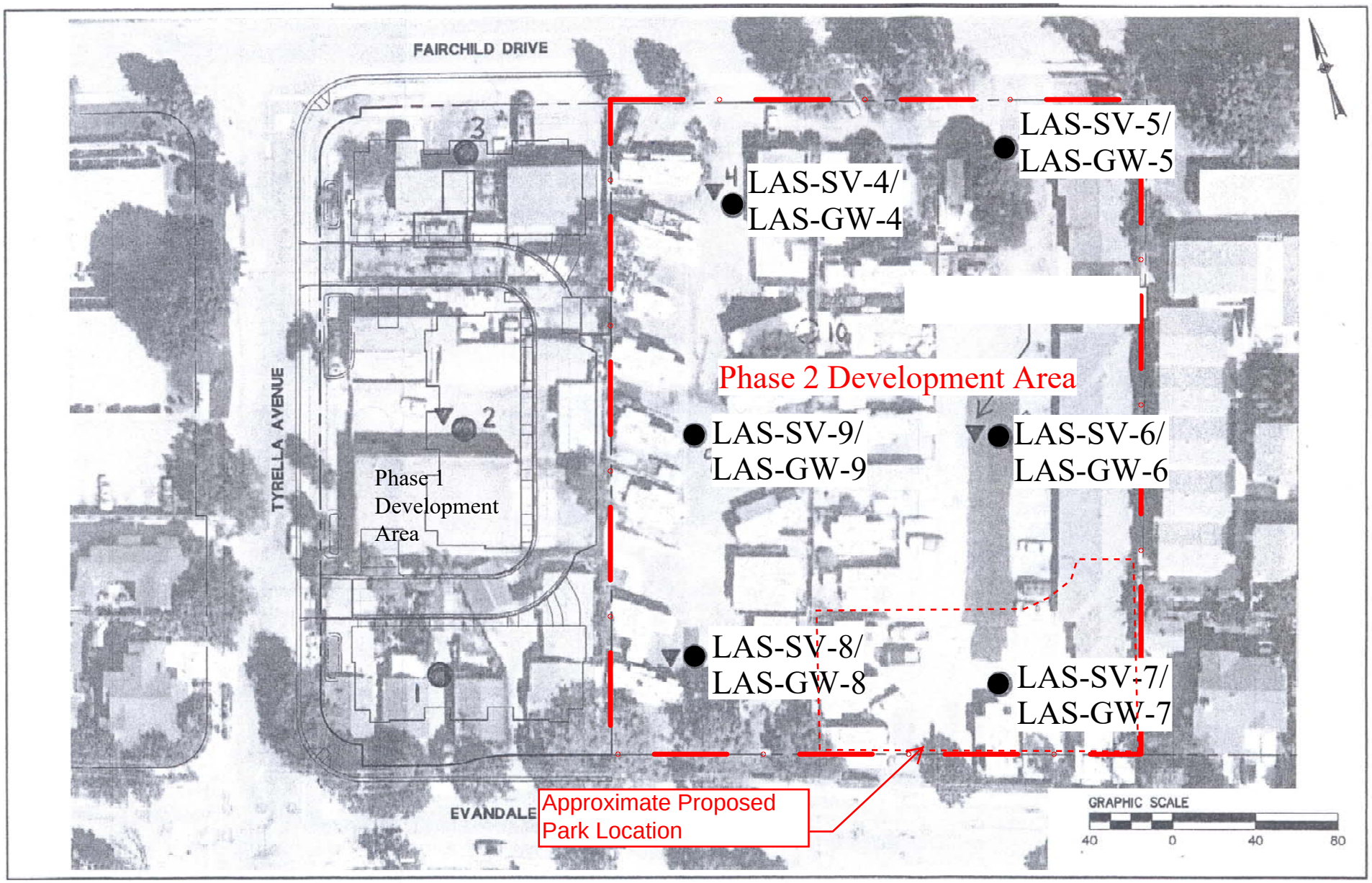
The result shown is the TCE concentration in ppb from groundwater monitoring well samples collected in 2013.

ND = Not Detected (below 0.5 ppb TCE)

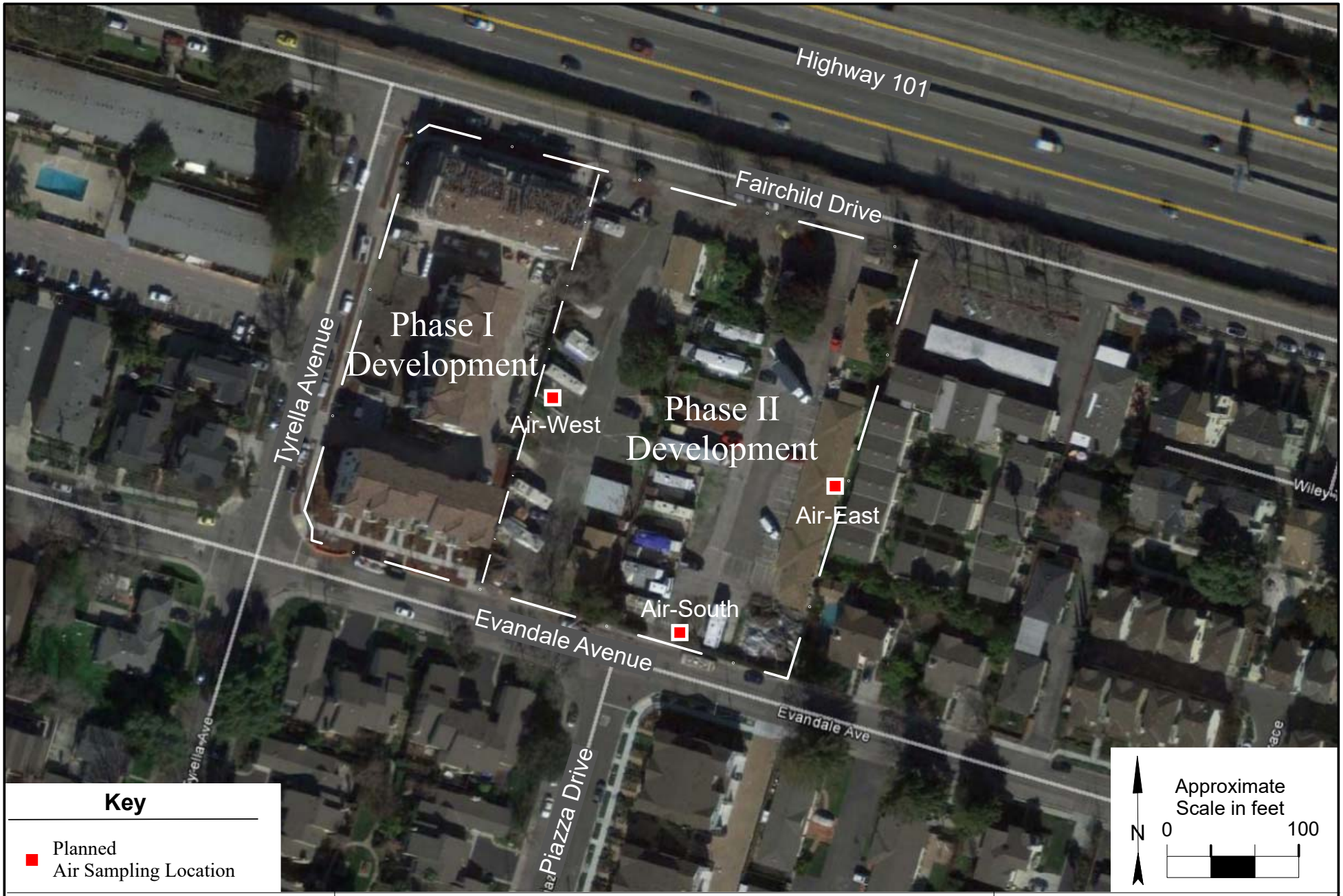
TCE Shallow Groundwater Results
Residential Areas in Vicinity of
MEW Superfund Site
Mountain View, and Moffett Field, CA

Figure 3

BAO \\ZINFANDEL\PROJ\USENVIRONMENTALPROTE\385122\GIS\MAPFILES\2014\AUG_MEETING\TCE_GWRESULTSINSHALLOWGW.MXD MCLAYWAR 8/15/2014
ES080811113812BAO_TCE_GWResultsShallowGW_updated_102815



2014 Soil Vapor and
Groundwater Sampling Locations
Figure 4



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Fairchild Drive Rowhouse Project

APN # 160-07-003 and 160-07-004
Mountain View, California

Proposed Perimeter Ambient Air Monitoring Locations

Figure 5

APPENDIX A
Sampling and Analysis Plan

Sampling and Analysis Plan
Fairchild Drive Rowhouse Project
(MV Viewpoint 2013 Inc. Phase II)

APN # 160-07-003 and 160-07-004
Mountain View, California

Prepared for:

MV Viewpoint 2013, Inc.

By:

GEOLOGICA

May 3, 2016

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Attachment A – Ambient Air Monitoring Equipment Calibration Procedures

Attachment B – Passive Air Sampler Procedures

Attachment C – PID Calibration Procedures

1.0 INTRODUCTION & PURPOSE

The purpose of this Sampling and Analysis Plan (SAP) is to describe field sampling procedures and data gathering methods that will be used to support the soil management activities planned for the project. This SAP will be used by field personnel as a reference for sampling and analysis of soil during construction activities.

2.0 SAMPLING OBJECTIVES

The planned field sampling program will include limited soil and ambient air screening and sampling.

2.1 Soil Sampling Objectives

Soil sampling will generally be associated with two activities:

- Trenching activities that entail excavation to a depth of 4 feet or greater; and,
- Stockpile Soil Characterization.

As described in **Section 6.6.2** of the Soil Management Plan (SMP), a field screening process will be conducted to identify the presence of impacted soil whenever trenching or excavations are advanced to depths of 4 feet or greater or if groundwater is encountered in a trench. Excavated soil may also be tested to determine appropriate disposal or reuse.

2.2 Ambient Air Sampling Objectives

Ambient air monitoring will be conducted at the property perimeter during any activity that may involve completion of excavations to depths of 4 ft bgs or greater. Real-time perimeter monitoring will be conducted to identify rapid increases in TCE concentrations in ambient air, for example as might occur immediately following excavation of a new deep trench or excavation. Real-time perimeter monitoring will be conducted using a portable gas chromatograph such as the SRI Model 8610 gas chromatograph with an electron capture detector (ECD) unit, or equivalent as described in **Section 3.1**. In addition, to evaluate potential average exposure concentrations as well as public exposure during non-working hours, passive vapor samples will be collected using Radiello 130 Solvent Sorbent Cartridges or equivalent.

3.0 FIELD SCREENING

3.1 Soil Screening Procedures

Any activities that will disturb the soil, other than post-construction final landscaping installation and maintenance activities, shall be conducted in accordance with the project-specific

SMP. Soil VOC screening will be conducted whenever trenching or excavations are advanced to depths of 4 feet or greater. VOC screening samples will be collected from every 5 cy of soil excavated or from every 10 linear feet (LF) of trench excavated to 4 ft bgs or greater. VOC screening will also be conducted in the event that visual or olfactory indications of contamination in soil or if groundwater is encountered. GEOLOGICA will observe the subsurface activities to identify discoloration or odors as evidence of possible soil impacts. Field screening for volatile organic compounds (VOCs) will be conducted by placing a representative sample of soil in a sealed zip-lock plastic bag and taking a reading with a hand held photo-ionization detector (PID). Screening will be conducted using a properly calibrated PID containing a 10.6eV lamp and capable of reading parts per billion. Depending on field screening results, actions will be taken as follows:

- In-trench soil samples that have continuous readings of 500 ppbv or greater for at least 10 seconds shall be considered "potentially contaminated soil" and will require additional testing.

- Excavated soil that has continuous readings of 500 ppbv or greater for at least 10 seconds should be considered potentially contaminated soil and stock-piled separately from presumed "clean" soil and covered with plastic.

General use and calibration procedures for the PID are described in **Attachment A**.

3.2 Ambient Air Screening Procedures

At any time that workers are working in an excavation, vapor monitoring will be conducted in the breathing zone of workers for the presence of VOCs using gas chromatogram (GC) – based real-time VOC detection unit. This unit allows real-time monitoring of TCE at a detection limit at or below 0.5 ug/m3. Action levels and response protocols will be implemented for workers as described in the SMP. In accordance with manufacture's specifications, the unit will be calibrated on a daily basis as described in **Attachment B**.

During the work day, the field monitor will record VOC readings in the breathing zone of workers on a continuous basis (at least one reading every 30 minutes) while work is underway. Each reading will be a minimum of one minute in duration. The following real-time screening levels are used to determine if workers can enter the area and if response actions are required.

- If the VOC readings in the work area are non-detect, workers can enter the area and no or mitigation actions are required.

- If any VOC reading in the work area is detected, but does not exceed the EPA Region 9 recommended commercial guidance levels of 7 $\mu g/m^3$, workers can continue work in the area. However, the field monitor will continue to collect VOC readings at a

minimum of 15-minute intervals to determine if the elevated levels persist in the work area.

- If any VOC reading in the work area that exceeds 7 $\mu g/m^3$ is sustained for one minute, work will stop and all workers will be immediately evacuated from the area. At no time will workers occupy the area when high readings persist.

- After mitigation is implemented and VOC testing are reviewed, the field monitor, utilizing proper levels of personal protective equipment per the Health and Safety Plan, shall collect readings at a minimum of 15-minute intervals to determine if the vapor levels in the work area have been reduced or eliminated. At no time will workers occupy the area when high readings persist.

- At the end of each workday, the field monitor will ensure that all data has been secured and stored for later use.

4.0 SAMPLE LOCATIONS AND FREQUENCY

This section discusses the locations and frequency of soil samples that may be collected for analytical testing.

4.1 In-situ Trench Soil Sampling

Additional in-situ trench soil sampling shall be conducted if any soil is considered potentially contaminated based on the field VOC screening described in **Section 3**, visual, or olfactory indications of potential contamination. GEOLOGICA will collect representative soil samples from every 10 linear feet (LF) of trench from which suspect soil originated. The samples will be collected from the trench sidewalls at the mid-point of the trench depth, unless other locations are deemed necessary based on visual or olfactory indications of contamination.

4.2 Stockpile Soil Sampling

Sampling to characterize excavated soil will be conducted if considered potentially contaminated based on the field VOC screening described in **Section 3**, visual, or olfactory indications of potential contamination. GEOLOGICA will collect representative soil samples soil for potential landfill disposal depending on receiving facility acceptance criteria but typically one 4-point composite sample will be collected per 50 to100 cubic yards of soil. Depending on soil acceptance criteria of specific treatment facilities and/or landfills; laboratory analyses will be performed to meet profiling requirements.

4.3 Ambient Air Sampling

Passive vapor samples will be collected using Radiello 130 Solvent Sorbent Cartridges or equivalent. The passive vapor samplers will be deployed immediately prior to starting an excavation expected to extend to a depth of 4 feet or greater and retrieved at the end of the same work week. If trench work will take more than one week, additional passive ambient air samples will be collected at the rate of one per week per sampling station, with a five day continuous sample collection duration. Real-time perimeter air monitoring and passive ambient air samples will be collected at three locations around the perimeter of the property on the east, south, and west approximately as shown on **Figure 5** of the SAP. The perimeter samples or VOC measurements will be collected closest to occupied residences or businesses on the property perimeter. Sampling locations may be adjusted based on proximity to active excavation areas, wind direction, and other factors.

5.0 SAMPLE DESIGNATION

Soil samples sent to analytical testing laboratories will be assigned a unique sample identification number according to the conventions described below. Sample numbers will be recorded in a dedicated field notebook, and on the chain-of-custody (COC) at the time of sample collections. A complete description of the sample, conditions/circumstances of the sample, date and time, and sample location will also be recorded in the field notebook.

5.1 In-Situ Trench Sample Designation

In-situ trench soil samples will be assigned a unique number that includes the trench location and purpose. For example, sample TRSS-1 indicates that this is the first soil sample collected from the sanitary sewer excavation. The sample location will be indicated on a map prepared in the field, and will be referenced to the sample number and description in the field notebook.

5.2 Stockpile Soil Sample Designation

Stockpile soil samples will be assigned a unique number that includes the stockpile location. For example, sample SP-1 indicates the soil sample was collected from stockpile #1. The sample location will be indicated on a stockpile soil map prepared in the field, and will be referenced to the sample number and description in the field notebook.

5.3 Ambient Air Sample Designation

Ambient air samples will be assigned a unique number that includes the sampling location and date collected. For example, a sample collected at the eastern perimeter sampling location on May 30 will be labeled Air-East_3-30. The sample location will be indicated on a

map prepared in the field, and will be referenced to the sample number and description in the field notebook.

6.0 SAMPLING PROCEDURES AND EQUIPMENT

The following sections describe sampling equipment and procedures related to soil sampling at the property. This section also discusses equipment blank sampling and decontamination procedures for sampling equipment.

6.1 In-Situ Trench Soil Sampling Procedures

In the event that potentially contaminated soil is encountered during of construction activities, soil samples from the sidewalls of the trench. Soil sampling shall be performed at a minimum rate of every 10 LF within the area suspected of contamination. Unless otherwise indicated by soil screening, samples shall be collected at a depth midway to the bottom of the trench. Representative soil samples will be collected directly from the excavation sidewall into suitable laboratory provided sample containers and shipped to the analytical laboratory including COC documentation.

The sampling procedure for VOCs is required to follow EPA Method 5035 and EPA Region 9's Guidelines for Sampling and Analysis of VOCs in Soils. Soil samples will be submitted to a California-certified laboratory for VOC analysis using EPA method 8260. In the event that impacts from metals, petroleum hydrocarbons, or other non-VOCs are suspected, representative soil samples will be collected into suitable laboratory provided sample containers and analyzed by a California-certified laboratory using standard EPA methods, e.g., EPA Method 8015M for petroleum hydrocarbons or EPA Method 6010 for metals.

6.2 Stockpile Soil Sampling Procedure

Stockpiled soil may need to be tested depending on its intended use. Soil to be disposed of off-site will be sampled and analyzed in accordance with the requirements of the proposed receiving facility. Stockpiled soil previously determined to be potentially impacted based on field screening results or visual or olfactory indications of contamination that is proposed for on-site reuse must be sampled for VOCs using the EPA Method 5035 collection procedure as described above at the rate of one sample per 10 cubic yards of soil. Stockpile soil samples will be collected into appropriate laboratory supplied containers using clean sampling equipment. The samples will be placed in a cooler maintained at 4 degrees Celsius (Cº) with ice. Sample labeling, delivery, and chain-of-custody documentation will be completed per **Sections 7.1** through **7.3** below.

6.3 Passive Air Sampling Procedures

Passive vapor samples will be collected using Radiello Solvent Sorbent Cartridges. There are three parts to the Radiello system: the adsorbing cartridge, the diffusive body, and the supporting plate. To set up the sampler, open the protective plastic tube containing the adsorbent cartridge, and draw the cartridge out from the tube and place it in the diffusive body. The lower part of the diffusive body holds a seat for the central positioning of the cartridge. The cartridge must be inserted fully into the diffusive body. The diffusive body should be kept in a vertical position as it is threaded into the supporting plate. Once the diffusive body with absorbing cartridge is attached to the supporting plate, sampling will begin. Place the sampling assembly on the location to be monitored. The start time and date should be recorded on the barcode label. When sampling is considered complete, record end time and date on the barcode label. Remove the cartridge from the diffusive body and return it to the plastic shipping tube. Peel off the label and stick it onto the tube such that the barcode is parallel to the axis of the tube. The diffusive body and supporting plate may be reused after washing with soapy solution (2% alkaline detergent in deionized water) to remove dust particles.

6.4 Decontamination Procedures

Any non-dedicated sampling equipment (i.e. stainless steel trowels or hand augers) will be decontaminated between samples to prevent cross-contamination between samples. Sampling equipment will be with a non-phosphate detergent such as Alconox™. Decontamination water will be collected and placed in a 55-gallon drum or wastewater holding tanks. The following steps will be used to decontaminate sampling equipment:

- Wash with a non-phosphate detergent and water solution to remove visible contamination from the equipment. Fill a 5-gallon bucket approximately 3/4 full and dilute with a non-phosphate detergent as directed by the manufacturer. Use a dedicated long-handled brush to assist with cleaning.

- Rinse with potable water to decrease the gross contamination. Use a dedicated long-handled brush to assist with cleaning of equipment. Frequent changing of this water will increase its effectiveness.

- Rinse with de-ionized water. Periodic changing of this water is required.

7.0 SAMPLE LABLING, DELIVERY, AND CHAIN-OF-CUSTODY

This section describes how samples will be labeled and transported to the analytical laboratory.

7.1 Sample Labeling

Laboratory Sample labels will be filled out using permanent ink affixed to each sample container. Samples will be placed into plastic resealable bags to protect the sample from moisture during transit. Sample labels will contain the following information:

- Unique sample identification number,
- Sample collection date,
- Time of sample collection,
- Project Name/Number,
- Sampler initials,
- Analyses to be performed,
- Preservation method, if needed.

7.2 Sample Delivery

Samples will be picked up either in the field or at the environmental consultant's office by the analytical laboratory. Soil samples will kept at 4° C in a cooler with ice. Ambient air samples will not be refrigerated. Once COC documentation has been completed and signed by the laboratory-assigned courier, then transfer of the samples will take place.

7.3 Chain-of-Custody

The chain-of-custody will provide a written record of sample possession from the time of sample collection until it is analyzed. The following information will be recorded on COC forms:

- Project name, number, location, and contact information;
- Client information,
- Project Manager,
- Sample Identification,
- Date and Time sample was collected,
- Sample type,
- Number of sample containers,
- Required analytical tests,
- Any sample specific remarks or observations,
- Number of samples to be delivered to the laboratory,
- Transfer signature of relinquishing samples,
- Courier/laboratory representative signature with date/time of accepting samples,
- Condition of samples during shipment (e.g. stored with ice, etc.),
- Written request for electronic files,
- Information regarding sample storage/disposal,
- Turn-around-time for analytical results.

8.0 FIELD QUALITY ASSURANCE/ QUALITY CONTROL

Field Quality Assurance/Quality control (QA/QC) soil samples will be collected and analyzed during trenching and stockpile sampling.

8.1 Field Duplicate Samples

Field duplicates will provide an assessment of the overall precision of the sampling collection and analysis process. Duplicate samples consist of the same matrix as the primary samples and will be collected at the same time and location with the same sampling techniques. Duplicate samples will be collected at the frequency of one per 10 soil samples collected. The duplicate sample name will be similar to, but unique from, the other primary samples, ensuring the identity of the duplicate samples are unknown to the analytical laboratory.

Because landfills do not require duplicate samples for soil characterization, duplicate soil samples will not be collected during soil stockpiles characterization activities.

8.2 Equipment Rinsate Samples

If non-disposable sampling equipment is being used, equipment rinsate samples will be collected to evaluate the effectiveness of the decontamination procedure and possible cross-contamination during sampling events. Equipment rinsate samples will be collected once every day. Subsequent to equipment decontamination, distilled water will be decanted over the sampling equipment in the appropriate containers. Rinsate samples will be collected, placed in appropriate pre-cleaned containers supplied by the analytical laboratory, and analyzed for the same constituents as the field samples.

9.0 SITE MANAGEMENT AND RECORD KEEPING

Sampling information will be recorded on chain-of-custody forms, in a dedicated field logbook, and on the appropriate excavation or stockpile map/plan. These documents will be completed in the field at the time of sample collection. Entries will be legible and recorded in indelible blue or black ink. A dedicated bound field logbook with consecutively numbered pages will be assigned to this project. If it is necessary to transfer the logbook to another person, the person relinquishing the logbook will sign and date the last page used and the person receiving the logbook will sign and date the next page to be used. At a minimum, the logbook will contain the following information:

- Project name and location,
- Date and time of entries,
- Personnel in attendance, any visitors to the site,
- General weather conditions,
- Work performed on a daily basis,
- Field observations,
- Sampling information (ID, date/time collected, location, analysis, sample description),

- Field measurements data (air monitoring results, calibration records, and any problems encountered),
- Descriptions of deviations to SAP, if any problems were encountered,
- QA/QC relative activities and identification of QA/QC samples,
- Record of any requests by regulatory agencies, clients or subcontractors,
- Any other events that may affect sampling and analysis.

ATTACHMENT A

Ambient Air Monitoring Equipment Calibration Procedures

Attachment A
Ambient Air Monitoring Equipment Calibration Procedures

1 INTRODUCTION

Air monitoring to protect worker safety and safeguard the health of nearby residents will be conducted during any task that involves excavation to a depth of 4 feet or greater as required by the EPA. The air monitoring program will be supervised by a California-registered Industrial Hygienist. Air monitoring may also be required if unexpected conditions are encountered during construction activities including visual or olfactory indications of contamination and the presence of underground storage tanks or other unexpected subsurface features or structures. Air monitoring action levels are described in the **Section 5** of the site-specific **SMP**.

Ambient air monitoring for trichloroethene (TCE) will be conducted using an SRI 8610C field portable Gas Chromatograph (GC) equipped with an Electron Capture Detector (ECD) for low level detection of chlorinated volatile organic compounds (VOCs). Setup and calibration of the GC are described in **Section 2**. Air sampling procedures are described in **Section 3**. Ambient air monitoring results will be recorded in a daily air monitoring log. An example air monitoring log form is provided in Attachment A-1.

2 ELECTRON CAPTURE DETECTOR (ECD) EQUIPPED GC SETUP

Several steps are involved in setting up normal operation of the GC with an ECD as follows:

1. Cap off carrier inlet to the ECD cell in the column oven and connect the makeup gas (nitrogen). Let makeup gas flow through and purge the ECD cell. Makeup flow is 40-100 ml/min, but typical 60 ml/min.
2. Heat the ECD detector to 150 °C to verify that baseline noise and offset are normal. 150 °C is hot enough to evaporate off water but low enough to avoid oxidation of the nickel foil which can occur at high temperatures in the presence of oxygen. Once the ECD's operation has been verified at his temperature, the temperature can be increased as needed.
3. Turn on the ECD standing current (The ECD current switch is located on the front control panel of the GC, under "DETECTOR PARAMETERS") As a rule of thumb the ECD detector requires enough nitrogen makeup flow (40-100 ml/min) to significantly dilute the carrier gas in order to keep noise in the detector down. The ECD can have up to a ratio of 6:1 nitrogen (makeup gas) to helium (carrier gas).
4. With the carrier and makeup gas connected and flowing, check the signal offset from zero. The millivolt reading should be between 100 and 500 mV. If the signal offset is less than 100 mV, the standing current needs to be increased. If the signal offset is more than 500 mV, the standing current needs to be decreased. Once the signal is quiet and

stable, set the temperature of the ECD by using the flatbed screwdriver to adjust the trimpot setpoint.

5. After the ECD reached the desired temperature, let the system stand until there is a stable millivolt reading. Reconnect the column and observe the signal in the presence of carrier flow. If it is significantly higher, it indicated contamination introduced by the carrier flow. If the millivolt reading is still relatively stable in the presence of the carrier flow, then sample may be injected to the column. Avoid samples with high concentrations of electronegative compounds as the may affect the ECD operation for a period after since the can take a long time to dissipate.
6. The ECD standing current may be adjusted using the trimpot stand point. The trimpot standpoints are located on the top edge of the front control panel, directly above the display above the push-buttons for each controlled zone. Increasing the standing current will also increase the ECD's sensitivity and raises the baseline offset.

3 SAMPLING PROCEDURES

Procedures for collecting samples using a: a) syringe or b) vacuum pump, are described below.

3.1 Air Sampling using Syringe

1. While ECD is heating and stabilizing, load or create event table to control the Purge and trap concentrator system. The valve must be in the LOAD position while analytes are being adsorbed onto the traps. The valve is rotated to INJECT position during desorption.
2. Inject the sample into the 5030 septum nut or the 5030/5035 syringe port. Another method is to remove the 5030 purge head by unscrewing the nut next to the purge head, which allows the sample to be injected directly into the bulkhead fitting on the front of the valve oven duct.
3. Load or create temperature program for the column oven. Once the ECD is activated and stabilized, begin the analysis.

3.2 Air Sampling using Vacuum Pump

1. Connect vacuum pump to the trap on the backside of the valve oven.
2. Plug the vacuum pump into the power socket on the left pane; of the GC chassis. Enter events into event table to turn the vacuum pump on and off as desired during the analysis.
3. Once the ECD is activated and stabilized, connect a Tedlar bag to the purge head septum nut or remove the purge head and secure the Tedlar bag directly to the bulkhead fitting in the front of the vale oven duct. Load or create a temperature program. Begin the analysis.

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GEOLOGICA INC.

Real-Time Air Monitoring Documentation Form

Project Number:	Date:
Project Name:	Weather:
Site Location:	Operator:

Instrument: Serial #: Detector:

Settings:

Calibration Standard:

Blank Calibration Value, ug/m^3:	Time	Comment	Standard Calibration Value, ug/m^3	Comment	Time

Time	Ambient Air Monitoring Location	Current Work Activity	TCE Concentration ug/m^3

GEOLOGICA INC.

Real-Time Air Monitoring Documentation Form

Date:

Site:

Time	Ambient Air Monitoring Location	Current Work Activity	TCE Concentration ug/m^3

ATTACHMENT B

Passive Air Sampler Procedures

Attachment B
Passive Air Sampler Procedures

1 INTRODUCTION

As discussed in the site-specific SMP, air samples will be collected for analysis by a California-certified analytical laboratory using Radiello 130 Solvent Sorbent Cartridges or equivalent passive vapor samplers.

2 PASSIVE SAMPLER SETUP

Passive vapor samples will be collected using Radiello Solvent Sorbent Cartridges. There are three parts to the Radiello system: the adsorbing cartridge, the diffusive body, and the supporting plate. To set up the sampler, open the protective plastic tube containing the adsorbent cartridge, and draw the cartridge out from the tube and place it in the diffusive body. The lower part of the diffusive body holds a seat for the central positioning of the cartridge. The cartridge must be inserted fully into the diffusive body. The diffusive body should be kept in a vertical position as it is threaded into the supporting plate. Once the diffusive body with absorbing cartridge is attached to the supporting plate, sampling will begin. Place the sampling assembly on the location to be monitored. The start time and date should be recorded on the barcode label. When sampling is considered complete, record end time and date on the barcode label. Remove the cartridge from the diffusive body and return it to the plastic shipping tube. Peel off the label and stick it onto the tube such that the barcode is parallel to the axis of the tube. The diffusive body and supporting plate may be reused after washing with soapy solution (2% alkaline detergent in deionized water) to remove dust particles.

3 REPORTING LIMITS AND SAMPLE COLLECTION DURATION

Reporting limits for the Radiello passive vapor samplers depend on the absorbent cartridge utilized and the sample collection period. An approximate listing of reporting limits for the seven MEW Superfund Site Constituents of Concern is summarized below.

	Radiello 130 Reporting Limit		
Sample Collection Duration	1 day	2 day	5 day
Compound	(ug/m^3)	(ug/m^3)	(ug/m^3)
Trichloroethene (TCE)	1	0.5	0.2
Tetrachloroethene (PCE)	1.18	0.59	0.24
Vinyl Chloride (VC)*	0.77	0.39	0.15
cis-1,2-Dichloroethene (cis-DCE)*	1.12	0.56	0.22
trans-1,2-Dichloroethene (trans-DCE)*	1.16	0.58	0.23
1,1-Dichloroethane (1,1-DCA)*	1.1	0.55	0.22
1,1-Dichloroethene (1,1-DCE)*	0.91	0.46	0.18

4 QA/QC SAMPLES AND PROCEDURES

The passive samplers will be assembled and disassembled with minimal handling to preserve sample integrity. The absorbent cartridges will only be removed from their shipping container at the time they are to be inserted in the diffusive body and on retrieval will immediately be placed back in the shipping container. QA/QC samples will be collected as follows:

- Field duplicate samples will be collected at the rate of one duplicate sample per ten samples submitted for analysis for the project (10%). The analytical laboratory cleans and tests the absorbent media after each use; consequently, equipment blank samples are unnecessary.

5 LABORATORY ANALYSIS

Passive vapor samples will the shipped to Eurofins / Air Toxics in Sacramento, CA. following standard EPA chain-of-custody (COC) procedures. Preservation with ice is NOT necessary for shipment. The absorbent cartridges will be analyzed for VOCs using EPA Method TO-17. Sample extraction and handling by the laboratory will be in accordance with Eurofins Air Toxics SOP#100, Revision 3, December 26, 2012.

ATTACHMENT C

PID Calibration Procedures

Attachment C

PID Calibration Procedures

1 INTRODUCTION

Any activities that will disturb the soil, other than post-construction final landscaping installation and maintenance activities, shall be conducted in accordance with the Contractor-prepared HASP, as specified in Section 4 of the site-specific SMP. Soil VOC screening will be conducted whenever trenching or excavations are advanced to depths of 4 feet or greater. VOC screening samples will be collected from every 5 cy of soil excavated or from every 10 linear feet (LF) of trench excavated to 4 ft bgs or greater. VOC screening will also be conducted in the event that visual or olfactory indications of contamination in soil or if groundwater is encountered. VOC screening will be conducted by placing an approximately 1 ounce, representative sample of soil in a sealed zip-lock plastic bag. After equilibrating for approximately 10 minutes at room temperature, a handheld Photoionization Detector (PID) will be used to screen the sample for the presence of volatile organic compounds (VOCs). Screening will be conducted using a properly calibrated PID (e.g., ppbRAE Plus, ppbRAE 3000, or equivalent) containing a 10.6eV lamp and capable of reading parts per billion (ppb). Organic vapor concentrations in ppb will be recorded on a daily log as shown in Attachment A.

2 CALIBRATION OF PID (PPB RAE 3000, PPBRAE PLUS, OR EQUIVALENT)

At a minimum of once daily before first use, a two-point calibration (zero and span) will be performed on the PID. The zero (fresh air) calibration procedure determines the zero point of the sensor calibration curve. To perform a fresh air calibration, use the calibration adapter to connect the instrument to a "fresh" air source such as from a cylinder. The "fresh" air is clean, dry air without organic impurities and an oxygen value of 20.9%. If such an air cylinder is not available, any clean ambient air without detectable contaminants can be used with a charcoal filter. Single-use VOC zeroing tube (RAE Systems P/N 025-2000-010) are preferred to multiple-use organic vapor zeroing filter (RAE Systems P/N 490-0006-000). Once the fresh air cylinder is attached or a charcoal filter has been fitted to the PID, the calibration should be completed by following the prompts of the Zero Calibration menu.

Once the zero calibration has been completed, a span calibration should be performed. This procedure determines the second point of the sensor calibration curve for the sensor. A cylinder of standard reference gas (span gas) fitted with a flow-matching (demand-flow) regulator is the simplest way to perform this procedure. A flow-limiting regulator set to 500 cc/min can also be used. Using a regulator with flow much greater than 500 cc/min may damage the pump of the PID. Calibration gas is typically 10 ppm Isobutylene. Once the cylinder of calibration gas is attached to the PID, the calibration should be completed by following the prompts of the Span Calibration menu. Daily field screening logs will be maintained while soil excavation activities are underway. An example field screening log is provided in Attachment C-1.

APPENDIX B

Quality Assurance Project Plan

Quality Assurance Project Plan
Fairchild Drive Rowhouse Project
(MV Viewpoint 2013 Inc. Phase II)

APN # 160-07-003 and 160-07-004
Mountain View, California

Prepared for:

MV Viewpoint 2013, Inc.

By:

GEOLOGICA

May 3, 2016

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1.0 INTRODUCTION & PURPOSE

GEOLOGICA prepared this Quality Assurance Project Plan (QAPP) to provide Quality Assurance (QA) and Quality Control (QC) procedures for the data collected in association with the Soil manage Plan (SMP). This QAPP, along with the SMP, provide the sampling and analysis protocols consistent with U.S. Environmental Protection Agency (USEPA) guidance. The QAPP outlines the project organization and responsibilities with respect to the SMP and provides procedures and methodologies to ensure that the proposed field and laboratory activities generate reliable data.

2.0 PROJECT TEAM AND RESPONSIBILITIES

The organizational structure and responsibilities for individual positions for this project are outlined in the following sections.

2.1 Environmental Consulting Company— GEOLOGICA, INC.

GEOLOGICA is the consulting firm for MV Viewpoint 2013, Inc. and is responsible for implementing the SMP. The project tem is composed of the Project Manager (PM), Project Field Manager, QA manager, and Site Safety Manager.

2.1.1 Project Manager—Brian Aubry, PG, CEG, CHG

The Project Manager will hold overall responsibility for technical and quality-related project matters. The Project Manager will be responsible for committing the necessary resources of GEOLOGICA for the timely completion of the project tasks. Final decisions on recommendations, personnel assignments, and the submittal of final reports to the City of Mountain View and the USEPA will be made by the Project Manager. All of the documents prepared by GEOLOGICA will be reviewed and signed by the Project Manager.

2.1.2 Project Field Manager— Erin Male, GIT

The Project Field Manager will be responsible for managing the field personnel and ensuring that field activities are completed pursuant to the workplan. The Project Field Manager will be responsible for day-to-day coordination of field activities, including the coordination of subcontractors, as necessary. The Project Field Manager will schedule pick up or delivery of samples to the appropriate analytical laboratory.

2.1.3 Quality Assurance Manager— Dan Matthews, PG

The Quality Assurance Manager will work with the Project Field Manager to ensure that field activities are carried out in compliance with the QAPP. The Quality Assurance Manager shall approve QA and technical procedures and deliverables from the field and the laboratory.

2.1.4 Site Health and Safety Manager— Dan Matthews, PG

The Site Health and Safety Manager will ensure that requirements specified in the Health and Safety Plan are being met.

2.2 Laboratory Subcontractors

An offsite laboratory will be utilized for chemical analysis of media and waste materials. The laboratory will be responsible for providing data subject to their own QAPP as well as this QAPP and will designate a Laboratory Quality Assurance Manager. The Laboratory Quality Assurance Manager will review laboratory QA/QC reports, identify problems, and ensure the proper use maintenance, and storage of analytical equipment. Pursuant to California Health and Safety Code Section 25198, all subcontractor laboratories will be certified by the State of California Department of Health Services under the Environmental Laboratory Accreditation Program (NELAP) for the requested analyses. The Laboratory Quality Assurance Manager will report to the Project Field Manager.

2.3 Training

All personnel will be trained and qualified to perform the assigned tasks and will have completed the necessary safety training pursuant to the Health and Safety Plan.

3.0 DATA GENERATION AND ACQUISTION

A description of the sampling scope, including types and numbers of samples required, locations of samples, rationale for design, and sampling methods, is detailed in the SMP and associated Sampling and Analysis Plan (SAP). This section presents the activities associated with data generation and acquisition to ensure that appropriate methods for sampling, measurement and analysis, and QC activities are employed throughout the project.

3.1 Sample Handling and Documentation

As outlined in the SMP, the types of samples to be collected include soil and air samples.

3.1.1 Sample Containers

All containers used to hold collected samples will be new containers supplied by the laboratory or environmental equipment supply company. Samples will be stored at the appropriate temperatures while they are held onsite, during transport to the laboratory, and during storage the laboratory.

3.1.2 Sample Labeling

Each sample collected will be labeled appropriates prior to submission to the laboratory. All samples subject to analysis will require a sample ID that indicated where the sample was taken and the matrix associated with the sample (i.e., soil, air). The sample label will include the following information:

- Sample Identification,
- Sampling date and time,
- Name of person who collected the sample,
- Type of analysis to be performed on the sample,
- Site name,
- Type of preservative, if needed.

3.1.3 Chain-of-Custody Record

All samples will be collected, transported, and received under chain-of-custody (COC) protocols. The COC forms will contain the following information:

- Project name,
- Sample identification,
- Date and time of sample collection,
- Analyses to be performed,
- Signatures of personnel relinquishing and receiving the samples.

The COC forms shall accompany the samples at all time. When transferring possession of samples, the transformer shall sign the form and enter the date and time the samples were relinquished. The receiver shall also sign and date the COC form when the samples are received.

3.1.4 Hold Time Compliance

For each sample collected, the time is held prior to analysis will be verified with the laboratory prior to submittal as indicated by the COC forms. It is the responsibility of the laboratory to analyze the submitted sample within the appropriate hold time.

3.1.5 Equipment Decontamination

As detailed in **Section 5.3** of the SAP, non-dedicated equipment use in the field will be decontaminated prior to collection of each sample. The equipment will be washed with a non-phosphate detergent, rinsed with potable water, and rinsed again with de-ionized water.

3.2 Analytical Methods

As discussed in the SAP, analytical methods, required equipment, and laboratory procedures shall meet the standards for the associated USEPA methodology.

3.3 Quality Control

QC procedures will be carried out during field sampling and laboratory analysis activities. QC procedures in the field will consist of strict protocols for field sampling and decontamination procedures (described in the SAP) and the collection of field duplicates and equipment rinsate samples for laboratory analysis. Laboratory QC procedures will include the analysis of matrix spike and matrix spike duplicates. A description of the QC procedures is presented in the following sections.

3.3.1 Field QC Samples

QC samples ensure that the sampling and field measurements activities are in control and generate quality data. QC samples for this project will consist of equipment blanks and duplicates/split samples.

- As necessary, equipment blanks will be collected at a frequency of one per day per matrix, or a minimum of 10 percent of the samples collected. An equipment blank will collected by pouring ASTM Type II reagent grade water through or over the purging or sampling device, transferring the water to a sample bottle, and transporting it to the laboratory for analysis.

- As necessary, one field duplicates/splits will be collected for every 10 samples collected. Field duplicates will be collected from one sampling location during a single act of sampling. The precision goal for field duplicate analyses will be plus or minus 30 relative percent difference (RPD).

3.3.2 Laboratory QC Samples

Laboratory QC samples will consist of method blanks, laboratory control samples, matrix spikes, matrix spike duplicates, and surrogate spikes.

- Method blanks will be analyzed at a minimum frequency of one per batch, and the concentration of target compounds in the blank must be less than the practical quantitation limit (PQL).

- Laboratory control samples (LCSs) will be analyzed at a minimum frequency of one per batch. Laboratory control samples consist of blank spikes, which are used to determine the accuracy of the analytical procedure by measuring a known concentration of an analyte of interest.

- Surrogate spikes will be performed for all organic standards, samples, and blanks. Each organic standard sample matrix spike, matrix spike duplicate, LCS, and blank is spiked with surrogate compounds prior to purging or extraction. Surrogate spike recoveries must fall within the limits established by the analytical method and if a surrogate spike recovery is outside of acceptable ranges, then a corrective action will be taken.

- Matrix spike/matrix spike duplicates (MS/MSD) are conducted to evaluate the matrix effect of the sample on the analytical method. The MS/MSD analyses will be performed at a minimum frequency of one per each group of 10 samples of the sample matrix. As a result, it is necessary to collect triplicate sample volumes in the field for one sample out of every 10. The RPD goal will be 20 percent.

3.4 Precision, Accuracy, and Completeness

The procedures used to assess data are precision, accuracy, and completeness. In the absence of laboratory-specific precision and accuracy limits, the QC limits presented in this section must be met.

3.4.1 Precision

Precision refers to the reproducibility of data under a specified set of conditions. Precision will be evaluated in conjunction with accuracy for the LCS samples. Precision will be determined using the MS/MSD samples and will be expressed as **RPD. RPD** is defined as:

$$RPD = X — X' \_\_\_\_\_ 2 \times 100$$

$$(Xi + X2)I2$$

Here, X, and X2 refer to the larger and smaller of the two observed values, respectively.

Acceptable levels of precision vary with the sample matrix, analytical method, and sample concentration. EPA precision data will be used as a basis for developing acceptance criteria for assessing precision.

3.4.2 Accuracy

Accuracy refers to the degree of agreement between a measurement or set of measurements to an accepted reference value. Accuracy is assessed by means of reference samples and percent recoveries. The calculation of percent recovery (AR) or accuracy is given by the equation:

$$\%R\ 100x_x$$

$$ILs — LI$$

Here, Ls refers to the measured value of the spiked sample, L refers to the measured value of the unspiked sample, and X refers to the known value of the spike solution. Acceptable levels of accuracy vary with the sample matrix, analytical method, and sample concentration. EPA accuracy data will be used as a basis for developing acceptance criteria for assessing precision.

Field accuracy will be assessed through the analysis of field equipment blanks. The goal for field equipment blanks is that all values are less than the reporting limit for each target constituent.

3.4.3 Completeness

Completeness is the amount of valid data collected as compared to the amount of data that was expected to be collected under normal operating conditions. Two completeness values will be calculated: total number of samples collected, and total number of samples reaching the laboratory intact. The objective for completeness is to recover at least 90 percent of the planned data. The formula for completeness is:

$$\% \bullet completeness = 100\ x \frac{(number\ of\ valid\ \_results)}{(number\ \_\ of\ \_\ expected\ \_\ results)}$$

4.0 INSTRUMENT CALIBRATION AND MAINTENANCE PROCEDURES

Laboratory analytical instruments will be calibrated in accordance with the procedures specified in the applicable method. All analytes that are reported shall be present in the initial and continuing calibrations, and these calibrations must meet the acceptance criteria specified in the reference method. Records of standard preparation and instrument calibration will be maintained. Records shall unambiguously trace the preparation of standards and their use in calibration and quantitation of sample results. Calibration records will be traceable to standard materials.

At the onset of analysis, instrument calibrations will be checked using all of the analytes of interest. At a minimum, calibration criteria will satisfy method requirements. Analyte concentrations can be determined with either calibration curves or response factors, as defined in the method. Guidance provided in USEPA SW-846, or applicable method, should be considered to determine appropriate evaluation procedures.

All equipment and instruments used in the field will be maintained and calibrated to operate within the manufacturer's specifications to ensure the required sensitivity and QA/QC parameters. **Attachment A** of the SAP details the calibrations procedures and standards of practice for the photo-ionization detectors, passive air samplers, and gas chromatograph.

Use of all field instruments will be documented by maintaining a log for each individual instrument. Calibration and maintenance requirements of the field instruments follow the manufacturer's specifications. Any required modifications, adjustments, repairs, or replacement of parts for any piece of equipment are recorded in the instrument's logbook. The effects of the modifications will be tested with appropriate standards and the related procedures recalibrated, if required, prior to continued use of the equipment.

5.0 DATA MANAGEMENT

Data measured by field instruments will be recorded in field notebooks or logsheets. The field data will be reviewed by the Project Field Manager to evaluate completeness of the records, problems encountered in the field, and compliance with field methods specified in the SAP. All field records will be retained with the project files.

Laboratory reports will be consistent with Level II documentation and include the following data:

- Narrative, chain-of-custody, and methods references,
- Analytical results,
- Laboratory QC results including surrogate recoveries and LCs recoveries,
- Sample spike recoveries,
- Acceptance criteria for applicable QC samples.

The laboratory QA/QC manager will determine if the data quality objectives (DQOs) for the analytical data have been met. Results will be documented and summarized in a data validation memorandum, which is reported along with the associated data.

All data generated will be assessable to downloading into the USEPA's system if necessary.

5.1 Data Validation

Data validation is the process of screening and accepting or rejecting data to use for project evaluation and decision-making. Whether or not data is acceptable is based on compliance with specified criteria, including meeting holding times, verifying calibration results, and meeting goals for laboratory QC sample results (i.e., blank and duplicate sample results).

Data validation activities include the following:

- Examination of the raw data to verify adequacy of documentation and check the accuracy of spreadsheet calculations and the data entered into tables and figures.
- Confirmation that the calibration standards are within the expected values.
- Review of all associated blank, duplicate, spike, standard, and QC data to ensure that results meet analytical objectives.
- Flagging laboratory results that may be suspect. Suspect data will be assessed to determine whether the information is usable or not.

5.2 Corrective Action

Corrective action will be initiated when deficiencies are encountered during the project or when QA/QC guideline or objectives are not met. Corrective Action will be performed prior to the analysis of the next batch of data to prevent recurrent erroneous data. Corrective actions may include one of the following:

- Datum is annotated,
- Documentation is reviewed for adherence to QA/QC,
- Measurement is repeated to check the error,
- Duplicate sample is reanalyzed,
- Calibrations are checked and/or repeated,
- Measuring device is replaced or repaired,
- Sample is re-collected.

The Quality Assurance Manager will be responsible for initiating and approving corrective actions. All corrective actions will be handled individually.

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