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By Alameda County Environmental Health 12:30 pm, Apr 26, 2017

20 April 2017

Mr. Karel Detterman, P.G.
Hazardous Materials Specialist
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502
San Francisco, CA 94102

**Re: Work Plan for Microbial Groundwater Analyses dated 20 April 2017
3093 Broadway, Oakland, CA
Site Cleanup Program Case No. Ro0000199**

Dear Ms. Detterman,

Please find attached *Work Plan for Microbial Groundwater Analyses*, dated 20 April 2017 for the Former Connell Oldsmobile site, located at 3093 Broadway in Oakland, California. The Work Plan was prepared by Langan.


I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge.

OWNER:

3093 BROADWAY HOLDINGS, L.L.C

**By: 3093 BROADWAY VENTURE, L.L.C.,
as its sole member**

**By: CV 3093 Broadway, LLC,
as its Administrative Member**

By:  _____

Name: Stephen Siri
VP

Title: _____

20 April 2017

Ms. Karel Detterman, P.G.
Hazardous Materials Specialist
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502

**Re: Work Plan for Microbial Groundwater Analyses
3093 Broadway
Oakland, California
ACEH Case No.: RO0000199
Langan Project No.: 730637001**

Dear Ms. Detterman,

On behalf of 3093 Broadway Holdings, L.L.C. ("Broadway Holdings"), Langan Engineering and Environmental Services, Inc. (Langan) has prepared this *Work Plan for Microbial Groundwater Analyses* at the Former Connell Oldsmobile Site, located at 3093 Broadway in Oakland, California (the site; Figure 1). Microbial testing is proposed to provide an additional line of evidence demonstrating the reduction of groundwater impacts following implementation of the bioremediation remedy at the site. The microbial testing will quantify the presence and activity of sulfate reducing bacteria and confirmation of benzene biodegradation. Background information, proposed microbial testing methods, and the schedule for implementing the testing are described below.

BACKGROUND INFORMATION

The site is located in a mixed-use area, near commercial, medical, and residential properties. The approximately 3.4-acre site is bounded by Hawthorne Street to the north, Broadway to the east, Webster Street to the west, and a grocery store to the south. Three underground storage tanks (USTs) that previously contained gasoline, diesel, and waste oil were removed from beneath the sidewalk adjacent to Hawthorne Street, near the northwest corner of the property in December 1989.

Previous Environmental Investigations and Remediation

Site investigation in response to a fuel release from the former USTs was performed between 1990 and 2015. Onsite groundwater beneath and downgradient of the USTs was impacted by petroleum hydrocarbons. The enhanced bioremediation groundwater cleanup plan and groundwater monitoring program implemented to address the impacted groundwater at the site are described in the 21 May 2015 *Feasibility Study and Corrective Action Plan (FS/CAP)* and in the 30 July 2015 *Enhanced Bioremediation Pilot Study Report and Full Scale Implementation Plan*, approved by Alameda County Department of Environmental Health (ACEH) on 17 April and 31 July 2015, respectively.

ACEH requires quarterly groundwater monitoring following implementation of the enhanced bioremediation groundwater cleanup plan. Langan has completed three quarterly post-remediation groundwater sampling events and we anticipate that a fourth and final sampling event will be conducted in May 2017.

MICROBIAL TESTING

Microbial testing will be conducted as described below.

Sample Collection and Analysis

Microbial Insights CENSUS analysis will be conducted using groundwater samples collected at all onsite wells (MW-20, MW-21, MW-23, and MW-24). CENSUS testing was conducted at multiple onsite wells as part of the July 2015 *Enhanced Bioremediation Pilot Study*. The CENSUS testing will detect and quantify targeted members of the microbial community deemed critical for bioremediation, in this case sulfate reducing bacteria and benzene carboxylase, for comparison to previous microbial testing results.

Microbial Insights Stable Isotope Probing (SIP) will also be conducted at one onsite well (MW-20) to evaluate the presence and rate of benzene biodegradation at the site. A Microbial Insights Bio-Trap Sampler will be installed at MW-20 for the SIP on approximately 26 April 2017. The typical SIP study incubation period for the Bio-Trap sampler is 30 days. The Bio-Trap Sampler will be removed just prior to the May 2017 groundwater monitoring event tentatively scheduled for the week of 22 May 2017.

Microbial Insights sampling protocol information for the proposed testing is included as Attachments 1 through 3.

Data Evaluation and Reporting

A description of the sampling activities, tabulated analytical results, and a copy of the analytical laboratory report will be reported to ACEH in the Case Closure Report, tentatively scheduled for September 2017. This Case Closure Report will also present the remainder of groundwater monitoring results with an evaluation of the site for regulatory case closure, provided that upcoming monitoring data continue to support the case for closure.

SCHEDULE

Microbial testing will be conducted as part of the anticipated quarterly groundwater monitoring event tentatively scheduled for the week of 22 May 2017.

CLOSING

This report was prepared by Langan under the supervision of the Professional Engineer whose seal and signature appear hereon. The findings, recommendations, specifications, or professional opinions are presented within the limits described by the client, after being prepared in accordance with generally accepted professional engineering practice. No warranty is expressed or implied. If you have any questions, please do not hesitate to call us at 415-955-5200.

Sincerely yours,

Langan Engineering and Environmental Services, Inc.



Hayley Farr
Staff Engineer



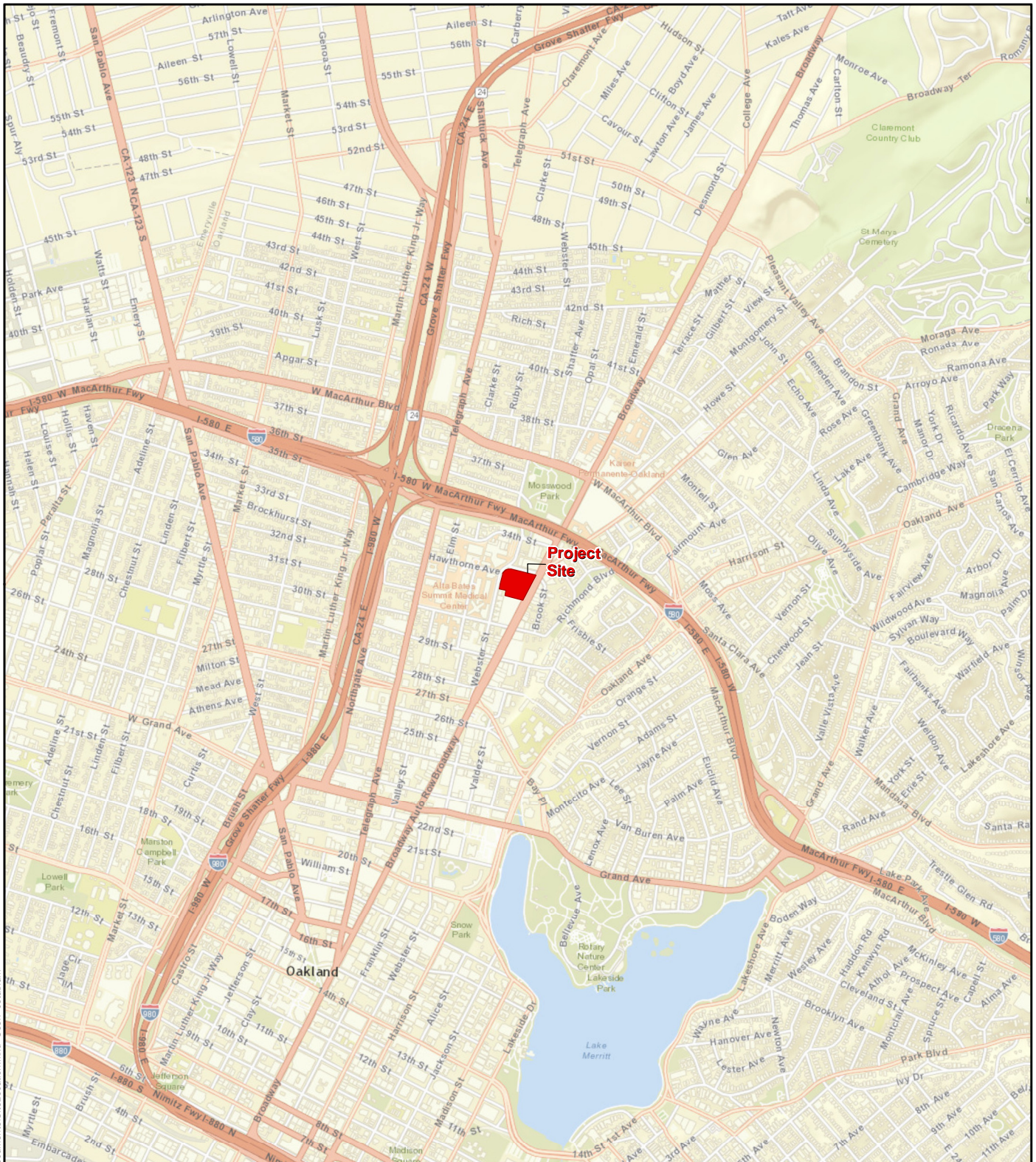
Christopher Glenn, PE, LEED GA
Senior Project Manager



cc: Dilan Roe, ACEH
Stephen Siri, CityView

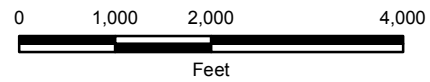
Enclosures: Figure 1 – Site Location Map
Figure 2 – Site Plan and Proposed Additional Soil Sampling Locations
Attachment 1 – Microbial Insights Groundwater DNA Sampling Protocol
Attachment 2 – Microbial Insights Groundwater Bio-Flo RNA Sampling Protocol
Attachment 3 – Microbial Insights Bio-Trap Stable Isotope Probing Protocol

FIGURES



Notes:

1. World street basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online. Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN.
2. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



3093 BROADWAY
Oakland, California

SITE LOCATION MAP

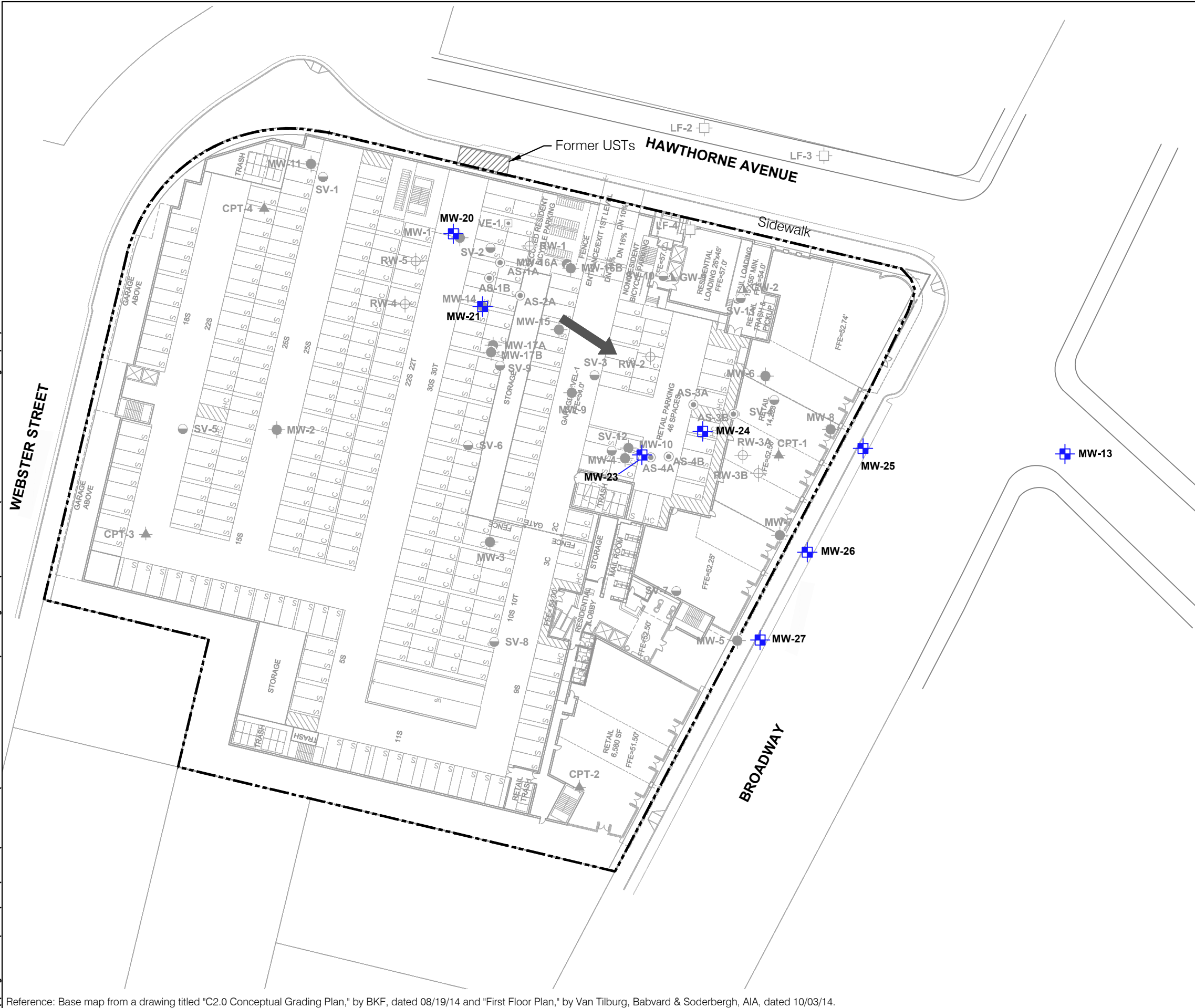
LANGAN TREADWELL ROLLO

Date 3/4/2015

Project 7316317001

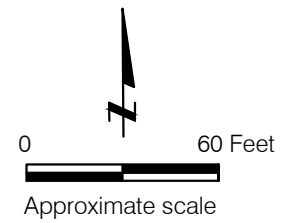
Figure 1

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EXPLANATION

- MW-20 Existing monitoring well
- SV-1 Former soil vapor well location
- MW-1 Former monitoring well location
- RW-4 Former remediation monitoring well location
- AS-1B Former air sparge well location
- VE-1 Former vapor extraction well location
- LF-2 Abandoned monitoring well location
- Site boundary
- Direction of groundwater flow



3093 BROADWAY Oakland, California		
MONITORING WELL LOCATIONS		
Date 04/18/17	Project No. 731637001	Figure 2
LANGAN		

Reference: Base map from a drawing titled "C2.0 Conceptual Grading Plan," by BKF, dated 08/19/14 and "First Floor Plan," by Van Tilburg, Babvard & Soderbergh, AIA, dated 10/03/14.

ATTACHMENT 1
MICROBIAL INSIGHTS GROUNDWATER DNA SAMPLING PROTOCOL

SAMPLING INSTRUCTIONS

The following sampling instructions are used for collecting water or groundwater samples for DNA analysis by DGGE and/or CENSUS. The recommended sampling container is a 1L Poly bottle with a screw cap. Amber glass bottles can be used but are not recommended due to the likelihood of breakage during shipment. Microbial Insights, Inc. can provide the proper sampling supplies upon request.

Once the proper sampling bottle is obtained be sure not to contaminate the inside of the sample bottle with skin, dirt or any form of debris (this helps to ensure the accuracy of the data results). Wearing latex gloves (or similar) is recommended when sampling.

The required volume of water to conduct DNA based analyses from groundwater samples is 1L.

* Note: It is important to collect as close to the required amounts as possible to ensure the ability to properly conduct the analysis requested.

Hold time is 24-48 hours for this analysis.

To Submit Sample:

1. Once the required amount of groundwater has been collected into the proper sampling container, seal the container tightly with a screw cap lid.
2. Properly affix a label with the sample name, date and analysis.
3. Be sure to fill out the Chain of Custody (COC) form correctly and accurately and ship it along with the samples. A COC form is required for QA/QC purposes.
4. Once the bottles have been correctly labeled, place them in the designated cooler. Be sure to fill the remaining space in the cooler with blue ice or regular ice that has been double bagged in Ziploc bags. Use sufficient ice to keep the entire shipment around 4°C, especially during the summer months.
5. All paperwork to be sent with the samples should be placed within a waterproof pouch or Ziploc bag and placed on top of the samples or affixed to the inside lid of the cooler.
6. Seal the cooler lid with a strong packaging tape.

SHIPPING INSTRUCTIONS

Packaging Samples:

1. Samples should be shipped in a cooler with ice or blue ice for next day delivery. If regular ice is used, the ice should be double bagged.
2. A chain of custody form must be included with each shipment of samples. Access our chain of custody at www.microbe.com.

Shipment for Weekday Delivery:

Samples for weekday delivery should be shipped to:

Sample Custodian
Microbial Insights, Inc.
10515 Research Drive
Knoxville, TN 37932
(865) 573-8188

Shipment for Saturday Delivery:

Coolers to be delivered on Saturday must be sent to our **FedEx Drop Location**. To ensure proper handling the following steps must be taken:

1. FedEx shipping label should be marked under (6) Special Handling, check Hold Saturday,
2. The cooler must be taped with FedEx SATURDAY tape.
3. The shipping label must be filled out with the Drop Location address below. Our laboratory name must be on the address label.
4. You **MUST notify by email** customerservice@microbe.com with the **tracking number** of the package on Friday (prior to 4pm Eastern Time) to arrange for Saturday pickup. Please make sure you write "Saturday Delivery" in the subject line of the message. **Without proper labeling and the tracking number, there is no guarantee that the samples will be collected.**

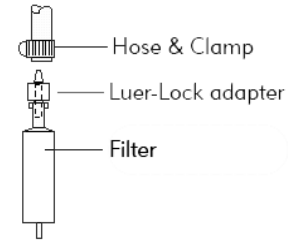
Samples for **Saturday delivery** should be shipped to:

Microbial Insights, Inc.
FedEx Drop Location
10601 Murdock Drive
Knoxville, TN 37932
(865) 300-8053

ATTACHMENT 2
MICROBIAL INSIGHTS GROUNDWATER BIO-FLO RNA SAMPLING PROTOCOL

SAMPLING INSTRUCTIONS

1. Purge the well.
2. Prepare the pump (Peristaltic preferred, Grundfos, or air bladder) as normal. Use the clamp provided to ensure a leak-proof connection.
3. Remove the filter from the Falcon tube.
4. Attach the inlet of the filter with a 1/4" - 5/16" inner diameter (I.D.) tubing using the clamp to secure.
5. Place the filter within a receiving container so that the amount of water filtered can be measured accurately.
6. The amount of water filtered will vary depending upon the turbidity of the water. We recommend filtering 1-2 L.
7. Record the volume of water that passed through the filter, and then submit the filter for analysis. The water may then be discarded.



Note: If the filter clogs before 1L has been filtered, record how much water was passed through the first filter, and then collect an additional filter, also recording the volume of water that went through the second filter. In this case, both filters are then submitted for testing. For each location there should be **no more than 2 filters** used and there is no need to filter more than 2L of water.

Hold time for this analysis is 24 hours.

8. **Immediately following collection, it is VITAL that each filter is preserved with 3mL of preservative.** Using the 3mL syringes (provided) load the syringe with 3mL of preservative, attach the filter onto the end of the syringe, and inject. Please cap the filter on both ends. The thinner end should be closed with the red rubber cap and the thicker end should be closed with the clear luer plug. Immediately place the filter back in a Falcon tube and store within a cooler.

To Submit Sample:

1. Place the filter in the Falcon tube provided.
2. Affix the label to the Falcon tube and note the amount of water that passed through the filter, the well location, sampling date, and the analyses requested.

SHIPPING INSTRUCTIONS

Packaging Samples:

1. Samples should be shipped in a cooler with ice or blue ice for next day delivery. If regular ice is used, the ice should be double bagged.
2. A chain of custody form must be included with each shipment of samples. Access our chain of custody at www.microbe.com

Shipment for Weekday Delivery:

Samples for weekday delivery should be shipped to:

Sample Custodian
Microbial Insights, Inc.
10515 Research Drive
Knoxville, TN 37932
(865) 573-8188

Shipment for Saturday Delivery:

Due to the short hold time associated with RNA it is not recommended to send samples for Q-Expression (RNA) for Saturday Delivery.

ATTACHMENT 3
MICROBIAL INSIGHTS BIO-TRAP STABLE ISOTOPE PROBING PROTOCOL

SAMPLING INSTRUCTIONS

Handling:

- Bio-Trap Samplers used for Stable Isotope Probing (SIP) are baited with ¹³C-labeled contaminant of interest (e.g. benzene, MTBE, chlorobenzene) adsorbed onto the powder activated carbon (PAC). Controlled laboratory conditions show only minimal loss of contaminant due to volatilization. However, special considerations must be taken into account when handling SIP Bio-Trap Samplers in order to reduce the risk of volatilization.
- SIP Bio-Trap Samplers are shipped out chilled, on blue ice, and it is essential that they should be kept cool (not frozen) until deployment.
- When retrieving the Bio-Trap Samplers that have been deployed in the field, they should immediately be placed on ice and shipped on ice for next day delivery. These steps will ensure the most accurate results.
- Although the contaminant is absorbed onto the beads, caution should be used in handling these Bio-Trap Samplers because the contaminant compounds are associated with possible health and safety risks.

Note: Clean latex gloves (or similar) should be used at all times when handling the Bio-Trap Samplers.

Storage:

It is important to minimize the amount of time that Bio-Trap Samplers are stored prior to being installed in the field. The physical properties of the Bio-Trap Samplers that make them an ideal medium for collecting microbes also increase the chances of microbial or chemical contamination. Bio-Trap Samplers need to remain sealed and refrigerated (not frozen) until they can be installed in the field.

Installation:

- Prior to installing Bio-Trap Sampler, the monitoring well may need to be purged if it has not been sampled in a while. If purging is necessary, MI recommends that three well volumes be removed to ensure contact with formation water and reduce well bore effect.
- Attach the Bio-Trap Sampler's nylon loop (provided) to a nylon line (not provided) and suspend Bio-Trap Sampler at a depth where significant contaminant concentrations exist. If no data are available on the vertical distribution of contaminants, then suspend the Bio-Trap Sampler in the middle of the saturated screened interval.
- If large fluctuations in the water level are anticipated during the period of incubation, the Bio-Trap Sampler should be suspended from a float (contact MI for further details). Be sure not to suspend the bio-trap in the NAPL zone.
- Once installed, incubation times can vary depending upon the scope of the project. A typical Stable Isotope Probing (SIP) study incubation period is 30 days but is project dependant. Please contact us if you have questions regarding the optimum deployment period for your samples.

Retrieval:

- Open the monitoring well and pull up the Bio-Trap Sampler. Cut and remove the braided nylon line used to suspend the Bio-Trap Sampler.
- Transfer the recovered Bio-Trap Sampler to labeled (well number and date) zippered bags, seal and then double bag in a larger (one-gallon) zippered bag, immediately place on blue ice in a cooler.
- Repeat above for all the Bio-Trap Samplers from the site.
- A chain of custody (COC) form must be included with each shipment of samples.
- In order to minimize the potential effect of these samplers on the monitoring well, MI recommends purging three well volumes from the test well following the retrieval of the SIP Bio-Trap Samplers.

Hold time for this analysis is 24-48 hours.

SHIPPING INSTRUCTIONS

Packaging Samples:

1. Samples should be shipped in a cooler with ice or blue ice for next day delivery. If regular ice is used, the ice should be double bagged.
2. A chain of custody form must be included with each shipment of samples. Access our chain of custody at www.microbe.com.

Shipment for Weekday Delivery:

Samples for weekday delivery should be shipped to: Sample Custodian
Microbial Insights, Inc.
10515 Research Drive
Knoxville, TN 37932
(865) 573-8188

Shipment for Saturday Delivery:

Note: Microbial Insights, Inc is **closed** on Sunday, however we can receive samples on Saturday. Please contact us prior to shipping if the delivery of the samples is going to be on a Saturday.

Samples for **Saturday delivery** should be shipped to:

Microbial Insights, Inc.
FedEx Drop Location
10601 Murdock Drive
Knoxville, TN 37932
(865) 300-8053

Notes:

- **Stable Isotope Probing (SIP) may preclude subsequent Compound Specific Isotope Analysis (CSIA) in the study well for a period of time. CSIA can be performed prior to SIP or at another location.**