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DRAFT

MEMORANDUM

To: John Richardson, Community Resilience Officer, Town of Chapel Hill

From: David Duncklee, President / Senior Hydrogeologist
Dr. Kenneth Rudo, Toxicologist

CC: Vence Harris, Department of Public Safety, Town of Chapel Hill
Laura Selmer, Program Coordinator, Town of Chapel Hill
Steve Hart Principal Hydrogeologist, Hart & Hickman, PC

Date: May 24, 2019

Re: Preliminary Risk Evaluation Findings for Interim Measures Along Bolin Creek Greenway,
Chapel Hill Police Department Property, 828 Martin Luther King Jr. Boulevard, Chapel Hill,
North Carolina.

As requested by the Town of Chapel Hill (the Town), Duncklee & Dunham, P.C. (Duncklee & Dunham) is providing human health and ecological risk assessment services for the above referenced site. Dr. Kenneth Rudo of Rudo Toxicological Consultants is providing toxicological services to Duncklee & Dunham for this work scope. Hart & Hickman, P.C. (Hart & Hickman) is also under contract with the Town to provide supporting environmental engineering services.

The requested work scope includes an evaluation of to what extent the use of potential interim remedial measures can better control the risk profile of the site. The potential use of interim measures is designed to enable the Town to ensure protectiveness of the nearby community, including users of the adjacent Bolin Creek Greenway Trail, while the development, feasibility, and selection of a final remedial plan is completed. A new connecting segment of the greenway trail is also under construction in the area. The Town determined the performance of the interim measures risk evaluation should be supported by the collection of additional environmental samples for analytical testing.

In order to collect more current site data for the risk evaluations, Duncklee & Dunham prepared a Sampling and Analysis Plan (SAP), dated March 29, 2019, that recommended the collection of samples for soil, groundwater, sediment, and surface water. The SAP also recommended the collection of additional samples from the coal combustion products (CCP) exposed along the southern-facing bluff located south on the Chapel Hill Police Department property.

Hart & Hickman performed these additional sampling activities during the week of April 1, 2019. A *Results of Data Gap Sampling Report* dated May 23, 2019 is in Attachment 1, including analytical testing data from these sampling activities. The SAP recommended that Hart & Hickman collect several grab samples from surface water run off in swales / rivulets in the floodplain within 2 hours of a rain event. Hart & Hickman visited the site several times in early April 2019 to collect samples during rain events; however, surface water run-off was not present in the swales / rivulets except at one location. On April 5, 2019, Hart & Hickman collected a surface water run-off sample, identified as SW-21, located in the southeastern portion of the site where they observed flowing water. Approximately 0.75 inch of rain fell on that day.

Next, Dr. Rudo utilized the most current version of North Carolina Department of Environmental Quality (NCDEQ) Risk Calculator Tool (<https://deq.nc.gov/permits-rules/risk-based-remediation/risk-evaluation-resources>) to perform two preliminary Human Health Risk Assessments for the site. He used the worst case scenario for data inputs into the Risk Calculator Tool to ensure conservativeness in the calculations. The maximum detected analyte concentration for each media was used as the Exposure Point Concentration. Human health risk estimates were evaluated using soil toxicity values and exposure parameters as specified by the United States Environmental Protection Agency (USEPA) and the NCDEQ.

Next, he used the data sets collected from 2014 and 2016 to establish a baseline condition for the site. The April 2019 dataset was used separately, along with worst case scenarios and default values, to help identify the exposure scenarios that would most benefit from risk minimization steps, and to help lead to the most effective and protective interim measures. The default parameter table used in these calculations is in Attachment 2. The output tables from the Risk Calculator Tool is in Attachment 3. A brief summary of the findings from this work is as follows:

- A slight increase in the potential for risk was suggested for the 2019 dataset, as compared to the 2014/2016 dataset.
- Elevated risk exists for two exposure pathways at the site:
 - Future Construction Worker – Arsenic and Manganese non-cancer risks from soil
 - Recreational User – Arsenic non-cancer risks from soil exposure
- No cancer risks exceeded NCDEQ or USEPA criteria
- No increased risk exists for adolescent exposures along or in Bolin Creek

Other receptors and pathways are present, by default, in the Risk Calculator Tool output in Attachment 3 (e.g., Resident and Non-Residential Worker). Neither of those pathways are applicable to the site conditions due to the different exposure frequencies and durations for those scenarios.



The potential risk to the Future Construction Worker scenario can be managed with proper training of workers. Also, exposures due to the Recreational User scenario can be controlled through implementation of interim measures that include the following components:

- Removal of visible surficial exposed CCP that has migrated in some areas from the embankment to locations near and adjacent to the trail, then provide clean backfill to the excavated areas;
- Place additional signage along the small trail segment immediately adjacent to the embankment where CCP is present to inform users of the risk and to stay on the paved trail;
- Polling of users of the greenway in this area to increase the accuracy of trail use frequency and duration data used in the risk evaluation;
- Repair of existing silt fence and installation of additional silt fencing in the wooded area along the embankment where exposed CCP is present;
- Limit disturbances to the embankment and perform a hydroseed pilot test in areas where exposed CCP is present along the embankment;
- Periodic inspections to identify the potential for migration of CCP;
- Post CCP removal sampling and analytical testing along the greenway trail; and
- Update the Risk Assessment to confirm the interim measures have accomplished the protectiveness goals.

Hart & Hickman collected six samples for radon analysis from indoor air within the Police Station at 828 Martin Luther King, Jr. Blvd. The results of these samples are in Table 8 of Attachment 1. Four of the samples contained no radon above the laboratory reporting limit of less than 0.4 picoCuries per liter (pCi/L). Two samples from a corner office and an administrative office on the first floor of the Police Station exhibited radon at 0.4 pCi/L, as compared to the Environmental Protection Agency recommended action level of 4 pCi/L. Therefore, radon is not a constituent of concern for the site.

Based on these data, Duncklee & Dunham recommends the Town implement these interim measures and complete the greenway underpass and new sidewalk connector. This work is expected to be completed in a 4-6 month period. After that time, Hart & Hickman will collect additional soil and sediment samples from the study area to evaluate the improvement to the risk profile for the site. The toxicological work by Dr. Rudo contributed to a risk management decision that the trail may remain open to uses of the greenway. The interim measures are expected to significantly reduce the risk profile for the site for a 3-5 year period until final remedial options can be designed and a final remedy selected.



Attachment 1

DRAFT

May 23, 2019

Town of Chapel Hill
405 Martin Luther King Jr. Blvd.
Chapel Hill, North Carolina

Attn: Mr. John Richardson

Re: Results of Data Gap Sampling
828 Martin Luther King Jr. Blvd. Property
Chapel Hill, North Carolina
H&H Job No. TCH-007

Dear John:

1.0 Introduction

As requested, Hart & Hickman, PC (H&H) has prepared this letter report to document the methods and results of additional environmental sampling conducted at the property located at 828 Martin Luther King Jr. Blvd. in Chapel Hill (Site or subject Site). The Site is comprised of one land parcel that is approximately 10.24 acres in size and contains a two-story approximately 35,000 sq. ft building located in the north-central portion of the Site that is currently used for police department operations. The Site topography consists of an elevated area where the police building and associated parking lots are located which slopes along an embankment to the south to a lower area along Bolin Creek where the Bolin Creek Trail are located. Site topography is indicated in Figure 1.

Previous assessment activities indicate that the Site was initially used as a borrow pit from the late 1950s to early 1960s, and then was used as a fill site from the mid-1960s to the mid-1970s. It appears that the fill initially consisted of construction debris, and then coal combustion products (CCPs) were placed above the construction debris for structural fill. Previous environmental assessment activities were conducted from 2013 to 2017 which culminated in the

completion of a Phase II Remedial Investigation (RI) Report for the Site dated August 14, 2017. Additional background information and the results of previous assessment activities are provided in the Phase II RI Report. The results of previous assessment activities are also summarized in the attached summary tables.

The Town of Chapel Hill recently contracted Duncklee & Dunham (D&D) and Dr. Ken Rudo of Rudo Toxicological Consultants (Rudo) to complete a Human Health and Ecological Risk Assessment for the subject Site. Prior to performing the Human Health and Ecological Risk Assessment, D&D and Rudo identified certain data gaps and requested that additional assessment be completed to support the risk assessment activities. H&H performed the assessment activities in April 2019 which included 1) collection and analysis of an updated round of groundwater samples from the existing monitor well network, 2) soil and CCP sampling consisting of the collection and analysis of samples from previous sample locations as well as additional sample locations, 3) collection and analysis of sediment and surface water samples from previous and additional sample locations in Bolin Creek, and 4) collection of indoor air samples from the police department building to screen the Site for potential radiological concerns. A brief description of the methods and results of the data gap assessment activities are provided below.

2.0 Scope of Work

H&H performed the additional assessment activities on April 3 through 8, 2019. The assessment activities were performed in general accordance with the North Carolina Department of Environmental Quality's (DEQ's) Inactive Hazardous Sites Branch (IHSB) *Guidelines for Assessment and Cleanup* (Guidelines) and most recent versions of the U.S. Environmental Protection Agency (EPA) Region IV Science and Ecosystem Support Division (SESD) *Field Branches Quality System and Technical Procedures*.

Prior to conducting the assessment activities, H&H contacted North Carolina 811 One-Call, the public utility locator service, to mark subsurface utilities at the site. After collection, sample locations (other than the existing surveyed monitor wells) were estimated using a sub-meter global positioning system (GPS) unit.

The locations of the previous and recent samples are provided in Figure 1 (groundwater, soil, sediment, and surface water), and the locations of the indoor air samples are indicated in Figure 2. In Figure 1, the locations where H&H collected samples in April 2019 are highlighted in yellow for ease of reference.

2.1 Monitoring Well Sampling Activities

H&H collected groundwater samples from existing monitoring wells MW-1, MW-3A, MW-4A, MW-6, and MW-7 on April 4, 2019. Before sampling, the monitoring wells were gauged for depth to water. The wells were then be purged to ensure that water samples obtained from the wells were representative of the aquifer. Purging and sampling of the monitoring wells were completed using low flow/low stress method in general accordance with EPA Region IV SESD protocol. Monitor wells MW-3A, MW-4A, and MW-6 were purged and sampled using a peristaltic pump with new polyethylene tubing. Due to depths to water greater than 25 ft, monitor wells MW-1 and MW-7 were purged and sampled using decontaminated bladder pumps connected to new polyethylene tubing.

During purging, field measurements of pH, temperature, dissolved oxygen, oxidation reduction potential, turbidity, and conductivity were collected at 3 to 5-minute intervals. Purging was considered complete when water quality parameters stabilized (i.e., pH \pm 0.1 SU, conductivity varies no more than 5%, and turbidity is less than 10 Nephelometric Turbidity Units [NTUs]). H&H was able to obtain samples with turbidity less than 10 NTU at each monitor well. The low flow groundwater sampling records are provided in Appendix A.

2.2 Soil/CCP Sampling Activities

H&H conducted the soil sampling activities on April 3 and 5, 2019. H&H advanced eight soil borings in the following locations using a decontaminated stainless-steel hand auger:

- H&H collected additional background samples at borings BG-6, BG-7, and BG-8 in an area located west of Martin Luther King, Jr. Blvd. At each location, samples were collected for laboratory analysis at depths of 0-1 ft and 2-3 ft below ground surface (bgs).
- H&H collected samples of CCP at previous sample locations GP-5 and GP-6. Samples were collected for laboratory analysis at the same approximate depths as samples collected from the borings in 2014 (4-6 ft bgs at GP-5 and 10-12 ft bgs at GP-6).
- H&H collected sample HH-9 at a depth of 0-1 ft bgs from the western portion of the embankment where CCP is under 2 ft of cover.
- H&H collected samples HH-10 and HH-11 at a depth of 0-1 ft bgs from the eastern portion of the embankment where exposed CCP is present at the surface.

In addition, H&H collected soil samples from identified potential wet weather drainage pathways in the lower portion of the Site between the embankment and Bolin Creek. The locations of these samples, labeled SED-8, SED-9, and SED-11 through SED-21, are indicated in Figure 1. Samples at these locations were collected at depths of 2 to 6 inches bgs. Sample SED-10 was collected from a location on the south stream embankment of Bolin Creek (other side of Bolin Creek from Site) at a depth of 2-6 inches. In addition, samples SED-3A and SED-5A were collected at a depth of 0-1 ft bgs from the northern embankment of Bolin Creek just north of in-stream sediment samples SED-3 and SED-5 for comparison between embankment and adjacent in-stream sample concentrations.

At the desired sampling interval, soil and CCP samples for laboratory analysis were collected from the center of the decontaminated hand auger bucket at each boring and then placed into laboratory containers for analysis.

2.3 Surface Water and Sediment Sampling Activities

H&H collected seven co-located in-stream sediment and surface water samples from Bolin Creek on April 4 and 5, 2019. Samples SW-1/SED-1 through SW-5/SED-5 were collected in the same locations as samples with the same identifications collected in November 2016 as part of the Phase II RI. Samples SW-6/SED-6 and SW-7/SED-7 were collected downstream of the Site and downstream of sample location SW-5/SED-5. Samples SW-1/SED-1 and SW-2/SED-2 served as background samples and were collected west of Martin Luther King, Jr. Blvd.

Samples were collected from downstream locations moving to upstream locations. Surface water and sediment samples SW-5/SED-5, SW-6/SED-6, and SW-7/SED-6 were collected on April 4, and the remainder of the samples were collected on April 5. The samples were collected under baseflow conditions prior to rain which occurred on April 5. On April 5, rain began to fall mid-morning after the collection of the surface water and sediment samples. During the rain event (which total approximately 0.75 inch of rain according to National Weather Service records), H&H observed the Site for stormwater runoff in the potential drainage channels in the lower portion of the Site. Stormwater runoff was only identified in the far southeastern portion of the Site at location SW-21 just downgradient of a culvert that extends below the Bolin Creek Trail (see Figure 1). Therefore, a water sample was collected at this location for analysis. Because of the presence of elevated turbidity in the sample, a filtered and unfiltered sample were collected for analysis at SW-21.

H&H collected the surface water samples by placing the sample bottles directly into the flowing stream and allowing the bottles to fill with water. During sampling at each location, H&H

utilized water quality meters to collect measurements of pH, temperature, dissolved oxygen, turbidity, and specific conductivity. H&H collected the sediment samples with a decontaminated stainless-steel scoop from areas of observed sediment accumulation. Please note that the bottom of the Bolin Creek near the Site is primarily comprised of large gravel and boulders with small pockets of sand-sized and finer sediment. The sediment samples were collected from these small pockets of accumulated smaller-sized sediment; no gravel or boulders were included in the samples for laboratory analysis.

2.4 Groundwater, Soil Surface Water, and Sediment Laboratory Analyses

Based upon previous analytical data, the groundwater, soil, surface water, and sediment samples were analyzed for the metals arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, manganese, nickel, and selenium by EPA Methods 6020/7470/7471 and strontium by EPA Method 6010. In addition, the soil and sediment samples were analyzed for hexavalent chromium by EPA Method 7199. Surface water samples were also analyzed for hardness by Standard Method 2340B to calculate North Carolina surface water standards for metals which are hardness dependent.

Upon collection, samples were placed directly into laboratory-supplied sample containers. After sample collection, sample containers were sealed, labeled, placed into a laboratory-supplied sample cooler, and covered with ice. The coolers were then delivered under standard chain-of-custody protocols to Pace Analytical Services.

2.5 Indoor Air Radon Sampling Activities

To screen the Site for potential radionuclides, H&H deployed five indoor air radon sampling canisters in representative sample locations in the first floor of the Police Department building. H&H collected the radon samples using a charcoal-type radon test kits which were deployed on

April 5, 2019 and collected on April 8, 2019 (approximate sample period of 73.5 hours at each location). Following the sampling period, the test kits were sealed and sent to AccuStar laboratory for analysis of radon by EPA Method #402-R-92-004. The locations of the samples are indicated in Figure 2.

2.6 Quality Assurance/Quality Control (QA/QC)

In addition to standard analytical method QA/QC procedures performed by the laboratory, H&H conducted the following activities for QA/QC evaluation purposes:

- Non-dedicated equipment and tools were decontaminated prior to use at each boring or sampling location, or following exposure to soil, sediment, groundwater, or surface water.
- A duplicate indoor air sample was collected for radon analysis to evaluate data reproducibility. The duplicate sample was collected in the First Floor Administrative Office.
- Duplicate soil, groundwater, surface water, and sediment samples were collected to evaluate data reproducibility. The duplicate sample were collected at GP-6 (CCP), MW-6 (groundwater), SW-4 (surface water), and SED-2 (sediment).
- Equipment/field blanks were collected by passing laboratory supplied deionized water through decontaminated equipment prior to use and then collecting the water for analysis of metals. The groundwater sample rinse blank was collected by pouring the water through the peristaltic pump tubing (sample labeled RB-MW), the soil and sediment rinse blanks were collected by pouring water over a decontaminated hand auger or scoop (samples labeled RB-Soil and RB-SED), and the surface water rinse sample was collected by pouring water in a laboratory supplied unpreserved container (sample labeled RB-SW).

3.0 Results Summary

The results of analysis of the data gap samples are summarized in Tables 1 through 8 along with the historical analytical data. In the tables, the April 2019 sample dates are highlighted in yellow for ease in referencing the additional data. The laboratory analytical data is provided in Appendix B. Some brief observations concerning the data and are provided in the following sections.

3.1 Groundwater Analytical Data

A summary of the monitor well construction and groundwater elevation data are provided in Table 1, a summary of the groundwater analytical data is provided in Table 3, and a summary of groundwater field geochemical parameters is provided in Table 4. In Table 3, groundwater analytical data are compared to background (MW-5) and the North Carolina 2L groundwater standards.

Some brief observations concerning the data are provided below:

- Groundwater elevations were approximately 2 to 5 ft higher than in November 2016. This is expected considering the large amount of rainfall that occurred in 2018 and early 2019 prior to the April 2019 monitoring event.
- Groundwater flow direction is to the southeast consistent with previous data.
- Groundwater metals concentrations for the downgradient and cross-gradient wells (MW-3A, MW-4A, MW-6, and MW-7) were generally similar to the previous sampling event in November 2016. Overall concentration decreases were observed in the furthest downgradient well MW-4A. In MW-1, arsenic, barium and strontium increased in concentration, but manganese and cobalt decreased. Of the metals analyzed in the April 2019 sampling event, arsenic, barium, cobalt, and manganese in MW-1, selenium in MW-3A, and manganese in MW-6 exceeded background and 2L standards.

3.2 Soil/CCP Analytical Data

The soil and CCP analytical data are summarized in Table 2. The data in Table 2 are compared to Site-specific background sample concentrations and DEQ's Preliminary Soil Remediation Goals (PSRGs). Note that the range of soil background concentrations and the 95% Upper Confidence Level (UCL) of the mean of the background data are provided in Table 2 and have been updated from the values included in the Phase II RI Report based upon the results of analysis of the additional background samples collected in April 2019.

Some brief observations concerning the data are provided below:

- The additional background samples (BG-6, BG-7, and BG-8) indicated similar concentrations to the previous background samples, although a relatively higher concentration of hexavalent chromium (5.34 mg/kg) was detected in background sample BG-6 (0-1 ft) as compared to previous samples.
- Metals concentrations in CCP samples (GP-5, GP-6, HH-10, and HH-11) were similar to previous samples, with arsenic being the primary metal detected. At GP-5 and GP-6 where samples were collected previously in 2014 at similar depths, metals concentrations were generally similar in GP-5 and lower in GP-6 as compared to the previous sample analyses.
- Consistent with previous data from the erosional CCP areas, the drainage pathway samples collected from the areas near where erosional CCP is present indicated elevated levels of arsenic and barium (SED-11, SED-13, SED-15, SED-16, and SED-17) although at lower concentrations than the samples of CCP. Drainage pathway samples located away from the erosional CCP areas generally did not indicate significantly elevated metals or only slightly elevated metals (SED-3A, SED-5A, SED-8, SED-9, SED-12, SED-14, SED-18, SED-19, SED-20, SED-21). Consistent with most samples located away from areas of erosional CCP, sample SED-10, located on the south side of Bolin Creek, did not indicate elevated concentrations of metals.

3.3 Surface Water Analytical Data

The surface water analytical data are summarized in Table 5, and the surface water geochemical parameter data are summarized in Table 6. The data in Table 5 are compared to Site-specific background sample concentrations from SW-1 and SW-2, the DEQ 2B surface water standards, and the EPA Region 4 surface water screening criteria (chronic). Note that for some metals, the 2B surface water standard is hardness dependent. For metals which the surface water standard is hardness dependent, the 2B surface water standards were calculated using the mean hardness value of samples SW-1 through SW-7 of approximately 54.5 mg/l.

Some brief observations concerning the data are provided below:

- Similar to the previous sampling event, the downstream sample concentrations were generally consistent with background levels. As before, there was a potentially slightly elevated level of manganese at the SW-3 location, although the concentration was less than the surface water standard. Copper was also potentially elevated in SW-3 but was also less than the surface water standard.
- During rainfall, the only location where we identified water flowing in the low area near Bolin Creek Trail was at SW-21 which is in the far southeastern portion of site where a culvert crosses under Bolin Creek Trail. Metals concentrations at SW-21 were similar to those in SW-3 with potentially slightly elevated levels of manganese and copper below the 2B surface water standard.

3.4 Sediment Analytical Data

The in-stream sediment analytical data are summarized in Table 7. The data in Table 7 are compared to Site-specific background sample concentrations from samples SED-1 and SED-2, the range and 95% UCL of the mean of background soil sample concentrations, the PSRGs, and the EPA Region 4 sediment screening criteria.

Some brief observations concerning the data are provided below:

- Sediment concentrations were generally consistent with background.
- The manganese concentration at SW-5, which appeared elevated in the November 2016 sampling, was consistent with background levels in the April 2019 sampling event.
- Strontium appears slightly elevated at SED-4 as compared to the previous sampling event and background sediment, although the concentration is consistent with background soil data. The strontium concentration is significantly below the PSRGs.

3.5 Radon Analytical Data

The results of analysis of the radon samples collected from the first floor of the police station are summarized in Table 8. In Table 8, the data are compared to the EPA radon action level of 4 pCi/L.

The results of the radon sample analyses indicate that radon was not detected in three of the five samples, and was detected at the detection limit of 0.4 pCi/L in two of the samples. The detected concentrations are well below the EPA action level.

3.6 QA/QC Sample Summary

A brief summary of the QA/QC sample analyses is provided below:

- The results of analysis of the duplicate samples indicated generally good correlation with the parent sample, except for the duplicate sediment sample collected at SED-2 where there were some differences in metals concentrations between the two samples. This is likely the result of sample heterogeneity.
- The results of analysis of the rinse blank samples indicated the presence of trace levels (less than 1 µg/l) of the metals arsenic, barium, chromium, copper, manganese, nickel, and or strontium in one or more samples. Given the trace levels detected of these metals in comparison to the sample concentrations detected and/or screening levels/standards,

the concentrations of the metals in the rinse blanks are not expected to have a significant effect on interpretation of the data.

If you have any questions or comments concerning this submittal, please let us know.

Sincerely,
Hart & Hickman, PC

A handwritten signature in black ink, appearing to read "Steve Hart", with a stylized flourish at the end.

Steve Hart, PG
Principal

Attachments

Table 1 (page 1 of 1)
Monitoring Well Construction Details and Groundwater Elevation Data
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Well ID	Permanent or Temporary	Date Installed	Date Abandoned	Drilling Method	Well Description	Screen Slot Size (in)	Total Depth (ft bls)	Screened Interval	TOC Elevation (ft)	November 9, 2016		April 3, 2019	
										Depth to Water (ft bls)	Groundwater Elevation (ft)	Depth to Water (ft bls)	Groundwater Elevation (ft)
MW-1	Permanent	4/29/2013		DPT	2" PVC	0.01	40	30-40	346.12	35.48	310.64	30.90	315.22
MW-2	Temporary	6/20/2013	6/20/2013	HA	Unknown	Unknown	8	Unknown	--	--	--	--	--
MW-3	Permanent	1/27/2014	1/7/2015	Auger	2" PVC	0.01	11	6-11	--	--	--	--	--
MW-4	Permanent	1/27/2014	1/6/2015	Auger	2" PVC	0.01	9.2	4.2-9.2	--	--	--	--	--
MW-3A	Permanent	5/12/2015		Air Rotary	2" PVC	0.01	16	1-16	298.10	5.91	292.19	2.79	295.31
MW-4A	Permanent	5/14/2015		Air Rotary	2" PVC	0.01	19	4-19	298.00	6.72	291.28	3.20	294.80
MW-5	Permanent	11/2/2016		Air Rotary	2" PVC	0.01	27.5	27.5 - 17.5	369.33	9.27	360.06	7.03	362.30
MW-6	Permanent	11/2/2016		HSA	2" PVC	0.01	17.5	17.5 - 7.5	315.39	9.92	305.47	7.42	307.97
MW-7	Permanent	11/2/2016		Air Rotary	2" PVC	0.01	69.5	69.5 - 59.5	339.54	46.97	292.57	43.58	295.96

Notes:
 MW-1, MW-3A, MW-4A, MW-5, MW-6, and MW-7 were surveyed by CE Group on December 8, 2016
 ft = feet
 bls = below land surface
 DPT = Direct Push Technology
 HA = Hand Auger
 HSA = Hollow Stem Auger
 TOC = Top of Casing
 -- = Not Specified

Table 2 (page 1 of 2)
Summary of Soil Analytical Data
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Sample ID	Sample Date	Material Sampled (Soil or CCP)	Sample Depth	aluminum	antimony	arsenic	barium	beryllium	boron	cadmium	calcium	hexavalent chromium	trivalent chromium	total chromium	cobalt	copper	iron	lead	magnesium	manganese	mercury	molybdenum	nickel	potassium	selenium	silver	sodium	strontium	thallium	vanadium	zinc	
S-4	4/29/2013	CCP	1 ft	23,000	ND	14	24	ND	NA	1.5	9,900	NA	NA	22	30	65	58,000	20	9,000	1,500	0.011	NA	43	680	ND	ND	150	NA	ND	21	120	
S-5	1/31/2014	CCP	0-4 ft	NA	NA	37	2,800	NA	NA	ND	NA	1.3	19.7	21	NA	NA	NA	10	NA	NA	0.30	NA	NA	NA	3.2	ND	NA	NA	NA	NA		
S-6	1/31/2014	CCP	0-4 ft	NA	NA	43	3,200	NA	NA	ND	NA	2.7	19.3	22	NA	NA	NA	12	NA	NA	0.42	NA	NA	NA	6.1	ND	NA	NA	NA	NA		
S-7	1/31/2014	CCP	0-4 ft	NA	NA	44	2,500	NA	NA	ND	NA	1.4	27.6	29	NA	NA	NA	11	NA	NA	0.44	NA	NA	NA	4.5	ND	NA	NA	NA	NA		
GP-1	2/3/2014	CCP	8-12 ft	NA	NA	3.5	86	NA	NA	ND	NA	ND	8.8	8.8	NA	NA	NA	26	NA	NA	0.083	NA	NA	NA	ND	ND	NA	NA	NA	NA		
GP-2	2/3/2014	CCP	26-28 ft	NA	NA	41	1,100	NA	NA	ND	NA	ND	19	19	NA	NA	NA	11	NA	NA	0.24	NA	NA	NA	4.0	ND	NA	NA	NA	NA		
GP-3	2/3/2014	CCP	10-12 ft	NA	NA	48	1,200	NA	NA	ND	NA	0.53	22.47	23	NA	NA	NA	39	NA	NA	0.42	NA	NA	NA	ND	ND	NA	NA	NA	NA		
GP-4	2/4/2014	CCP	10-12 ft	NA	NA	59	2,900	NA	NA	ND	NA	ND	20	20	NA	NA	NA	11	NA	NA	0.51	NA	NA	NA	5.8	ND	NA	NA	NA	NA		
GP-5	2/4/2014	CCP	4-6 ft	NA	NA	77	2,800	NA	NA	ND	NA	ND	19	19	NA	NA	NA	9.5	NA	NA	0.33	NA	NA	NA	2.5	ND	NA	NA	NA	NA		
	4/3/2019	CCP	4-6 ft	NA	NA	95.9	2,350	5.46	NA	<0.395	NA	0.836 J	12.3	13.1	7.05	50.9	NA	NA	NA	34.7	1.2	NA	11.1	NA	12.0	NA	NA	325	NA	NA	NA	
GP-6	2/4/2014	CCP	4-6 ft	NA	NA	95.9	2,630	6.99	NA	<0.931	NA	0.712 J	16.2	16.9	10.3	62.5	NA	NA	NA	53.4	0.39	NA	17.1	NA	13.0	NA	NA	308	NA	NA	NA	
	4/4/2019	CCP	9-11 ft	NA	NA	65	850	NA	NA	ND	NA	ND	19	19	NA	NA	NA	27	NA	NA	11	NA	NA	NA	4.1	ND	NA	NA	NA	NA		
GP-7	2/4/2014	CCP	9-10 ft	NA	NA	6.73	178	0.758	NA	0.118 J	NA	<1.11	10.0	10.0	5.18	11.0	NA	NA	687	0.050	NA	NA	6.24	NA	0.880	NA	NA	21.7	NA	NA	NA	
GP-8	2/4/2014	CCP	10-12 ft	NA	NA	55	1,700	NA	NA	ND	NA	ND	19	19	NA	NA	NA	11	NA	NA	0.26	NA	NA	NA	4.3	ND	NA	NA	NA	NA		
GP-9	2/4/2014	CCP	11-15 ft	NA	NA	54	4,100	NA	NA	ND	NA	ND	20	20	NA	NA	NA	9.2	NA	NA	0.29	NA	NA	NA	4.5	ND	NA	NA	NA	NA		
GP-11	2/4/2014	CCP	4-6 ft	NA	NA	16	450	NA	NA	ND	NA	ND	16	16	NA	NA	NA	23	NA	NA	0.35	NA	NA	NA	ND	ND	NA	NA	NA	NA		
GP-12	2/4/2014	CCP	2-4 ft	NA	NA	52	2,000	NA	NA	ND	NA	ND	19	19	NA	NA	NA	14	NA	NA	0.28	NA	NA	NA	2.1	ND	NA	NA	NA	NA		
SS1	2/18/2016	Soil/CCP	2-12 in	NA	ND	9.7	210	1.2	ND	ND	NA	NA	NA	28	25	47	NA	22	NA	2,400	0.052	ND	15	NA	ND	ND	NA	120	1.3	88	100	
SS1-Dup1	2/18/2016	Soil/CCP	2-12 in	NA	ND	9.5	260	1.4	ND	ND	NA	NA	NA	31	28	55	NA	28	NA	3,300	0.059	ND	18	NA	ND	ND	NA	150	1.7	95	110	
SS2	2/18/2016	Soil/CCP	2-12 in	NA	ND	24	830	3.5	ND	ND	NA	NA	NA	27	20	57	NA	39	NA	1,700	0.21	1.7	19	NA	2.4	ND	NA	190	1.2	81	110	
SS3	2/18/2016	Soil	2-12 in	NA	ND	4.5	100	0.80	ND	ND	NA	NA	NA	13	6.8	22	NA	14	NA	240	0.048	ND	5.3	NA	ND	ND	NA	36	ND	41	28	
SS4	2/18/2016	Soil	2-12 in	NA	ND	8.5	380	1.2	ND	ND	NA	NA	NA	22	12	29	NA	25	NA	910	0.061	ND	12	NA	ND	ND	NA	51	ND	54	51	
SS5	2/18/2016	Soil	2-12 in	NA	ND	4.8	130	0.89	ND	ND	NA	NA	NA	17	9.4	25	NA	27	NA	460	0.091	ND	7.9	NA	ND	ND	NA	43	ND	47	48	
SS6	2/18/2016	Soil	2-12 in	NA	ND	3.1	82	0.70	ND	ND	NA	NA	NA	35	7.6	23	NA	17	NA	410	0.038	ND	6.5	NA	ND	ND	NA	25	ND	45	43	
SS7	2/18/2016	Soil	2-12 in	NA	ND	3.1	84	0.60	ND	ND	NA	NA	NA	14	6.9	15	NA	13	NA	500	0.038	ND	5.9	NA	ND	ND	NA	31	ND	37	37	
HH-1	11/3/2016	Soil	0-1 ft	NA	<0.29	5.9	120	1.00	NA	<0.29	NA	0.45	20.55	21	7.9	25	NA	27	NA	350	0.052	NA	8.8	NA	0.69	NA	NA	31	<0.58	48	50	
HH-2	11/3/2016	Soil	0-1 ft	NA	<0.35	3.4	110	0.79	NA	<0.35	NA	0.54	19.46	20	8.4	17	NA	18	NA	360 BH	0.067	NA	12	NA	<0.71	NA	NA	30	<0.71	41	35	
	11/3/2016	Soil	0-1 ft	NA	<0.29	4.9	140	0.93	NA	<0.29	NA	2.43	13.57	14	12	21	NA	30	NA	260	0.085	NA	5.9	NA	1.0	NA	NA	25	<0.58	48	45	
HH-3	11/3/2016	Soil	0-1 ft	NA	<0.33	9.8	200	1.30	NA	<0.33	NA	0.46 J	17.54	18	7.8	31	NA	24	NA	350	0.076	NA	8.9	NA	2.4	NA	NA	36	<0.65	53	100	
HH-4	11/3/2016	Soil	0-1 ft	NA	<0.28	2.4	72	1.00	NA	<0.28	NA	0.50	44.5	45	16	37	NA	2.3	NA	630	<0.025	NA	33	NA	<0.56	NA	NA	42	0.60	73	70	
HH-5	11/3/2016	Soil	0-1 ft	NA	<0.30	2.4	73	0.75	NA	<0.30	NA	<0.14	23	23	8.4	19	NA	9.3	NA	410	<0.025	NA	14	NA	1.2	NA	NA	23	<0.60	39	51	
HH-6	10/27/2016	Soil	0-1 ft	NA	NA	NA	NA	NA	NA	NA	NA	<0.33	20	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
HH-7	10/27/2016	Soil	0-1 ft	NA	NA	NA	NA	NA	NA	NA	NA	<0.61	22	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
HH-8	10/27/2016	Soil	0-1 ft	NA	<0.30	3.6	100	1.00	NA	<0.30	NA	<0.35	19	19	12	29	NA	18	NA	570	0.036	NA	9.0	NA	<0.60	NA	NA	28	<0.60	52	54	
HH-9	4/3/2019	CCP	0-1 ft	NA	NA	3.37	131	0.398 J	NA	0.178 J	NA	<1.29	12.7	12.7	5.97	14.5	NA	NA	NA	260	0.31	NA	3.59	NA	0.722	NA	NA	33.2	NA	NA	NA	
HH-10	4/3/2019	CCP	0-1 ft	NA	NA	60.3	2,970	5.14	NA	0.162 J	NA	<1.60	13.8	13.8	9.84	51.3	NA	NA	NA	73.3	0.22	NA	17.1	NA	5.04	NA	NA	269	NA	NA	NA	
HH-11	4/3/2019	CCP	0-1 ft	NA	NA	42.5	3,260	5.90	NA	0.220 J	NA	0.467 J	18.7	19.2	13.4	55.3	NA	NA	NA	113	0.43	NA	23.5	NA	9.05	NA	NA	234	NA	NA	NA	
MW-6	11/2/2016	Soil	0-1 ft	NA	<0.26	2.9	38	0.81	NA	<0.26	NA	0.21 J	8.79	10	9.5	23	NA	12	NA	570	0.082	NA	8.2	NA	1.0	NA	NA	22	0.81	31	77	
MW-7	11/2/2016	Soil	0-1 ft	NA	<0.30	9.11	180	0.87	NA	<0.30	NA	0.89	9.11	10	3.9	180	NA	7.6	NA	100	0.090	NA	2.9	NA	<0.65	NA	NA	6.7	<0.58	61	46	
SED-3A	4/5/2019	Soil	0-1 ft	NA	NA	3.45	33.9	0.418 J	NA	<0.395	NA	<1.16	17.4	17.4	16.5	6.97	NA	NA	560	<0.025	NA	NA	5.82	NA	0.237 J	NA	NA	9.6	NA	NA	NA	
SED-5A	4/4/2019	Soil	0-1 ft	NA	NA	1.25	13.5	0.156 J	NA	<0.571	NA	0.352 J	13.2	13.6	5.95	39.1	NA	NA	NA	243	0.0071	NA	4.38	NA	<0.571	NA	NA	10.9	NA	NA	NA	
SED-8	4/5/2019	Drainage Pathway Soil	2-6 in	NA	NA	2.41	49.1	0.313 J	NA	0.122 J	NA	<1.25	12.0	12.0	7.01	14.3	NA	NA	NA	423	0.063	NA	4.66	NA	1.01	NA	NA	NA	15.2	NA	NA	NA
SED-9	4/5/2019	Drainage Pathway Soil	2-6 in	NA	NA	1.16	33.8	0.199 J	NA	<0.660	NA	0.461 J	21.6	22.1	9.11	10.1	NA	NA	NA	431	0.013	NA	6.68	NA	<0.660	NA	NA	16.7	NA	NA	NA	
SED-10	4/5/2019	Drainage Pathway Soil	2-6 in	NA	NA	1.29	24.4	0.118 J	NA	0.221 J	NA	0.416 J	12.0	12.4	4.43	10.8	NA	NA	NA	195	0.037	NA	4.03	NA	0.273 J	NA	NA	8.1	NA	NA	NA	
SED-11	4/5/2019	Drainage Pathway Soil/CCP	2-6 in	NA	NA	5.98	285	0.768	NA	<0.753	NA	<1.51	9.72	9.72 B	6.61	15.1	NA	NA	NA	288	0.14	NA	7.03	NA	2.03	NA	NA	65.0	NA	NA	NA	
SED-12	4/5/2019	Drainage Pathway Soil	2-6 in	NA	NA	3.97	122	0.499 J	NA	0.204 J	NA	<1.74	9.45	9.45 B	6.04	19.7	NA	NA	NA	319	0.077	NA	4.95	NA	1.36	NA	NA	32.8	NA	NA	NA	
SED-13	4/5/2019	Drainage Pathway Soil	2-6 in	NA	NA	14.5	724	1.10	NA	0.171 J	NA	<1.58	14.0	14.0	7.58	27.1	NA	NA	NA	563	0.075	NA	8.73	NA	1.69	NA	NA	70.5	NA	NA	NA	
SED-14	4/5/2019	Drainage Pathway Soil	2-6 in	NA	NA	1.86	18.9	0.152 J	NA	<0.811	NA	0.506 J	17.2	17.7	5.07	8.00	NA	NA	NA	231	0.012	NA	3.18	NA	<0.811	NA	NA	17.3	NA	NA	NA	
SED-15	4/5/2019	Drainage Pathway Soil	2-6 in	NA	NA	5.33	98.1	0.641 J	NA	<0.745	NA	<1.49	15.2	15.2	8.84	19.4	NA	NA	NA	550	0.030	NA	8.24	NA	2.36	NA	NA	39.5	NA	NA	NA	
SED-16	4/5/2019	Drainage Pathway Soil/CCP	2-6 in	NA	NA	28.3	758	2.86	NA	0.238 J	NA	<2.0																				

Table 2 (page 2 of 2)
Summary of Soil Analytical Data
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Notes:

Yellow highlighting indicates samples collected as part of April 2019 data gap sampling

Soil concentrations are reported in milligrams per kilogram (mg/kg).

PSRG = North Carolina Department of Environmental Quality (DEQ) Preliminary Soil Remediation Goals (PSRGs) (February 2018); UCL = Upper Confidence Limit

95% UCL of site specific background ranges were calculated using EPA ProUCL 5.1

North Carolina Soil Background Range taken from *Elements in North American Soils, 2nd Edition* by James Dragun and Khaled Chekiri

*Not available for North Carolina. Used Eastern US Background Range

Bold denotes concentration above protection of groundwater PSRG and significantly above background.

Shading indicates concentration above residential PSRG and significantly above background.

Underlining indicates concentration above industrial PSRG and significantly above background.

ND = Not Detected; NA = Not Analyzed; NS = Not Specified; -- = statistical test not applicable to data set

J = Detected above method detection limit but below laboratory reporting limit; therefore, result is an estimated concentration

O1 = Analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

J6 = The sample matrix interfered with the ability to make any accurate determination; spike value is low.

BH = Method blank greater than one-half laboratory reporting limit, but sample concentration greater than 10x the method blank.

A = Continuing Calibration Verification standard recovery (82%) is less than the lower control limit (90%). Result has possible low bias.

¹ denotes duplicate sample taken

² 95% UCL of Site Specific Background Values were calculated using values from samples collected through the Phase II RI

Analytical Methods

Metals by EPA Method 6010C or 6020B

Hexavalent Chromium by EPA Method 7196 or 7199 (Phase II RI and April 2019 Data Gap Samples)

Mercury by EPA Method 7471B

Table 3 (page 1 of 1)
Summary of Groundwater Analytical Data
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Monitoring Well ID	Sample Date	turbidity	aluminum	antimony*	arsenic	barium	beryllium	boron	cadmium	calcium	hexavalent chromium	trivalent chromium	Total chromium	cobalt*	copper	iron	lead	magnesium	manganese	mercury	molybdenum	nickel	potassium	selenium	silver	sodium	strontium	thallium*	vanadium*	zinc
2L Standard or IMAC		NS	NS	1	10	700	4	700	2	NS	NS	NS	10	1	1,000	300	15	NS	50	1	NS	100	NS	20	20	NS	NS	0.2	0.3	1,000
MW-5 (Background)	11/9/2016	3.8	NA	<0.5	<10	51	<2.0	NA	<1.0	NA	NA	NA	<5.0	0.27 J	<10	NA	<5.0	NA	580	<0.2	NA	<10	NA	23	NA	NA	190	<2.5	0.39 J	<30
	4/3/2017	8.2	NA	NA	NA	NA	NA	NA	NA	NA	<4.8	NA	<10.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-1	5/3/2013	NA	5,600	5.4	85	1,100	1.6	NA	0.17	110,000	NA	NA	15	15	25	6,500	5.8	25,000	7,600	ND	NA	12	7,600	2.5	ND	34,000	NA	1.0	38	52
	2/18/2016	NS	NA	ND	67	1,300	11.0	ND	ND	NA	NA	NA	100	78	170	NA	36	NA	9,600	0.26	ND	58	NA	ND	ND	NA	2,900	ND	260	330
	2/18/2016 ⁴	NS	NA	ND	52	1,100	8.8	ND	ND	NA	NA	NA	86	61	130	NA	29	NA	9,000	0.21	ND	46	NA	ND	ND	NA	2,700	ND	200	260
	11/10/2016	475.0	NA	<0.5	19	470	4.1	NA	0.15 J	NA	NA	NA	31	32	57	NA	10	NA	8,600	<0.2	NA	21	NA	23	NA	NA	2,200	<2.5	92	99
	11/10/2016 ⁴	NA	NA	<0.5	<10	160	0.53 J	NA	<1.0	NA	NA	NA	<5.0	6.0	<10	NA	<5.0	NA	8,000	<0.2	NA	2.3 J	NA	<20	NA	NA	2,100	<2.5	1.2 J	<30
	4/3/2019	7.76	NA	NA	22.9	1,730	<0.10	NA	<0.080	NA	NA	NA	<0.50	1.8	0.33 J	NA	NA	NA	3,090	<0.20	NA	0.60	NA	<0.50	NA	NA	4,710	NA	NA	NA
MW-2	6/20/2013 ¹	NA	16,000	0.6	8.3	1,100	5.5	NA	0.93	260,000	NA	NA	8.4	23	1,200	13,000	27	47,000	1,200	0.18	NA	70	42,000	18	0.27	52,000	NA	0.48	71	2,200
MW-3	2/5/2014	NA	NA	NA	ND	160	NA	NA	ND	NA	ND	NA	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
	2/5/2014 ²	NA	NA	NA	ND	250	NA	NA	ND	NA	ND	NA	24	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
	8/15/2014 ³	1,500	NA	NA	51	830	NA	NA	ND	NA	30	NA	78	NA	NA	NA	30	NA	NA	ND	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
	8/20/2014 ⁴	13.0	NA	NA	NA	220	NA	NA	ND	NA	23	NA	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
MW-3A	7/21/2015	5.7	NA	NA	ND	67	NA	520	ND	NA	ND	NA	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
	2/17/2016	1.3	NA	ND	ND	89	ND	ND	ND	NA	NA	NA	ND	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	23	ND	NA	2,400	ND	ND	ND
	2/17/2016 ²	1.3	NA	ND	ND	80	ND	ND	ND	NA	NA	NA	ND	ND	ND	NA	ND	NA	23	ND	ND	ND	NA	26	ND	NA	2,100	ND	ND	ND
	11/9/2016	1.2	NA	<0.5	<10	53	<2.0	NA	<1.0	NA	NA	NA	<5.0	<0.11	<10	NA	<5.0	NA	14	<0.2	NA	<10	NA	50	NA	NA	2,400	5.4 J	0.94 J	12 J
	11/9/2016 ²	1.2	NA	<0.5	<10	53	<2.0	NA	<1.0	NA	NA	NA	<5.0	<0.11	<10	NA	<5.0	NA	15	<0.2	NA	<10	NA	52	NA	NA	2,400	5.3 J	0.95 J	<30
	4/4/2019	0.00	NA	NA	0.15	68.2	<0.10	NA	<0.080	NA	NA	NA	<0.50	0.21	0.55	NA	NA	NA	5.8	<0.20	NA	0.50 J	NA	34.2	NA	NA	2,950	NA	NA	NA
MW-4	2/5/2014	NA	NA	NA	140	6,500	NA	NA	1.7	NA	ND	NA	930	NA	NA	NA	250	NA	NA	1.4	NA	NA	NA	99	ND	NA	NA	NA	NA	NA
	8/20/2014 ^{4,5}	<10	NA	NA	ND	75	NA	NA	ND	NA	ND	NA	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
MW-4A	7/21/2015	24.7	NA	NA	ND	64	NA	ND	ND	NA	ND	NA	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
	7/21/2015 ⁴	24.7	NA	NA	ND	61	NA	ND	ND	NA	ND	NA	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
	2/18/2016	189.0	NA	ND	ND	26	ND	ND	ND	NA	NA	NA	ND	ND	ND	NA	7.8	NA	49	ND	ND	ND	NA	ND	ND	NA	110	ND	ND	34
	2/18/2016 ⁴	189.0	NA	ND	ND	33	ND	ND	ND	NA	NA	NA	ND	ND	ND	NA	8.4	NA	41	ND	ND	ND	NA	ND	ND	NA	78	ND	ND	48
	11/9/2016	4.8	NA	<0.5	<10	36	<2.0	NA	<1.0	NA	NA	NA	1.2 J	<0.11	<10	NA	<5.0	NA	140	<0.2	NA	<10	NA	7.2 J	NA	NA	170	<2.5	<0.15	17 J
	4/4/2019	9.43	NA	NA	<0.10	22.5	0.070 J	NA	<0.080	NA	NA	NA	<0.50	0.063 J	0.63	NA	NA	NA	6.0	<0.20	NA	1.5	NA	0.82	NA	NA	73.0	NA	NA	NA
MW-6	11/9/2016	2.5	NA	<0.5	<10	340	<2.0	NA	<1.0	NA	NA	NA	29	<0.11	1.9 J	NA	<5.0	NA	2,500	<0.2	NA	22	NA	20	NA	NA	690	<2.5	1.2 J	<30
	4/3/2017	7.6	NA	NA	NA	NA	NA	NA	NA	NA	<4.8	NA	<10.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/4/2019	4.48	NA	NA	0.14	283	<0.10	NA	<0.080	NA	NA	NA	<0.50	0.33	<0.50	NA	NA	NA	2,210	<0.20	NA	0.20 J	NA	0.12 J	NA	NA	752	NA	NA	NA
	4/4/2019 ²	4.48	NA	NA	0.14	279	<0.10	NA	<0.080	NA	NA	NA	<0.50	0.32	0.50 J	NA	NA	NA	2,160	<0.20	NA	0.19 J	NA	0.11 J	NA	NA	736	NA	NA	NA
MW-7	11/14/2016	8.9	NA	<0.5	<10	10	<2.0	NA	<1.0	NA	NA	NA	1.3 J	0.17 J	1.6 J	NA	<5.0	NA	140	<0.2	NA	1.6 J	NA	<20	NA	NA	42	<2.5	1.1 J	26 J
	4/3/2019	8.95	NA	NA	0.13	4.5	<0.10	NA	<0.080	NA	NA	NA	<0.50	<0.050	0.72	NA	NA	NA	20.5	<0.20	NA	0.43 J	NA	0.10 J	NA	NA	44.9	NA	NA	NA

Notes:
Yellow highlighting indicates samples collected as part of April 2019 data gap sampling
All results in ug/l, except turbidity which is NTUs
2L Standard = North Carolina Department of Environmental Quality (DEQ) 15A NCAC 02L.0202 Groundwater Standards (April 2013).
IMAC = Interim Maximum Allowable Concentration
Bold denotes above the 2L standard or IMAC and background levels
ND = Not Detected; NA = Not Analyzed; NS = Not Specified
J = Detected above method detection limit but below laboratory reporting limit; therefore, result is an estimated concentration
U = Below method detection limit
*reported to the method detection limit instead of laboratory reporting limit
¹ Denotes sample labeled as "Well #1" in the lab report associated with the Limited Phase II ESA prepared by Falcon
² Denotes duplicate sample taken.
³ Denotes sample labeled as "Well 1" in the lab report associated with the October 3, 2014 letter prepared by Falcon
⁴ Denotes filtered samples
⁵ An unfiltered sample was also collected from MW-4 on August 20, 2014 and the results were reported in mg/kg-wet, presumably because of the high sediment load. These data are not included in this table.
Analytical Methods:
Metals by EPA Method 6010C, 6020A, or 6020B
Hexavalent Chromium by EPA Method 7196A / SM3500
Mercury by 7470A/245.1

Table 4 (page 1 of 1)
Summary of Groundwater Geochemical Parameters
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Monitoring Well ID	Sample Date	DO (mg/L)	Temperature (°C)	Conductivity (µS/cm)	pH (SU)	ORP (mV)	Turbidity (NTU)
MW-5 (background)	11/9/2016	0.27	20.30	569	6.96	39.2	3.76
	4/3/2017	0.21	17.80	750	6.98	-280.4	8.19
MW-1	5/3/2013	NS	NS	NS	NS	NS	NA
	2/18/2016	NS	NS	NS	NS	NS	NS
	11/10/2016	6.87	17.13	767	6.89	79.0	475
	4/3/2019	1.35	17.90	1,269	6.03	-36.0	7.76
MW-2	6/20/2013	NS	NS	NS	NS	NS	NA
MW-3	2/5/2014	NS	NS	NS	NS	NS	NA
	8/15/2014	NS	NS	NS	NS	NS	1,500
	8/20/2014	NS	NS	NS	NS	NS	13
MW-3A	7/21/2015	NA	15.80	2,321	6.50	NA	5.7
	2/17/2016	NS	NS	NS	NS	NS	1.3
	11/9/2016	2.51	18.14	1,231	6.63	288.7	1.24
	4/4/2019	0.14	12.80	1,536	6.40	273.5	0.00
MW-4	2/5/2014	NS	NS	NS	NS	NS	NA
	8/20/2014	NS	NS	NS	NS	NS	<10
MW-4A	7/21/2015	NA	15.64	831	6.25	NA	24.7
	2/18/2016	NS	NS	NS	NS	NS	189
	11/9/2016	1.41	16.91	241	5.43	300.5	4.83
	4/4/2019	2.15	13.30	134	5.11	277.7	9.43
MW-6	11/9/2016	0.61	20.51	607	6.19	12.2	2.54
	4/3/2017	0.23	16.00	452	6.10	-270.0	7.64
	4/4/2019	0.10	13.80	786	6.30	-23.3	4.48
MW-7	11/14/2016	1.79	15.66	112	5.28	61.2	8.92
	4/3/2019	1.35	15.10	107	5.40	214.9	8.95

Notes

Yellow highlighting indicates samples collected as part of April 2019 data gap sampling

NA = Not Analyzed; NS = Not Specified

Table 5 (page 1 of 1)
Summary of Surface Water Analytical Data
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Surface Water Sampling Point ID	Sample Date	aluminum	antimony	arsenic	barium	beryllium	cadmium ²	calcium	hexavalent chromium	trivalent chromium ²	total chromium	cobalt	copper ²	iron	lead ²	magnesium	manganese	mercury	nickel ²	potassium	selenium	strontium	silver ²	sodium	thallium	vanadium	zinc ²	Hardness
NC 2B Standard ¹		NS	NS	10(t)	1000(t)	6.5	0.27	NS	11	45.09	NS	NS	5.33	NS	1.29	NS	NS	0.012(t)	31.13	NS	5(t)	NS	1.13	NS	NS	NS	70.08	NS
EPA Region 4 Surface Water Screening Value (Chronic) ³		87	190	150	220	11	0.25	116,000	11	74	NS	19	9	1,000	2.5	82,000	93	0.77	52	53,000	5	5,300	0.06	680,000	6	27	120	NS
BC-1 (Upstream)	2/5/2014	NA	NA	ND	24	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA
SW-1 (Upstream)	11/3/2016	NA	<5.0	<10	27	<2.0	<1.0	NA	<0.74	NA	<5.0	<5.0	<10	<0.2	<5.0	NA	<10	<0.2	<10	NA	<20	100	NA	NA	<10	<5.0	<30	NA
	4/5/2019	NA	NA	0.44	23.1	<0.10	<0.080	NA	NA	NA	0.53	0.16	1.2	NA	NA	NA	22.2	<0.20	0.29 J	NA	0.096 J	85.3	NA	NA	NA	NA	NA	54,000
SW-2 (Upstream)	11/3/2016	NA	<5.0	<10	27	<2.0	<1.0	NA	<0.74	NA	<5.0	<5.0	<10	<0.2	<5.0	NA	11	<0.2	<10	NA	<20	100	NA	NA	<10	<5.0	<30	NA
	4/5/2019	NA	NA	0.42	23.2	<0.10	<0.080	NA	NA	NA	0.45 J	0.16	1.1	NA	NA	NA	21.2	<0.20	0.33 J	NA	0.11 J	85.5	NA	NA	NA	NA	NA	53,600
BC-2 (Bolin Creek at Site)	6/20/2013	290	ND	0.9	27	ND	ND	16,000	NA	ND	ND	0.37	2.6	860	0.50	5,300	100	ND	1.2	2,300	ND	NA	ND	7,800	ND	ND	45	NA
	2/5/2014	NA	NA	ND	24	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA
SW-3 (Adjacent)	11/3/2016	NA	<5.0	<10	27	<2.0	<1.0	NA	<0.74	NA	<5.0	<5.0	<10	<0.2	<5.0	NA	34	<0.2	<10	NA	<20	100	NA	NA	<10	<5.0	<30	NA
	11/3/2016 ⁴	NA	<5.0	<10	27	<2.0	<1.0	NA	<0.74	NA	<5.0	<5.0	<10	<0.2	<5.0	NA	33	<0.2	<10	NA	<20	110	NA	NA	<10	<5.0	<30	NA
	4/5/2019	NA	NA	0.45	25.7	<0.10	<0.080	NA	NA	NA	0.62	0.26	2.8	NA	NA	NA	37.4	<0.20	0.50	NA	0.11 J	88.8	NA	NA	NA	NA	NA	55,900
SW-4 (Adjacent)	11/3/2016	NA	<5.0	<10	27	<2.0	<1.0	NA	<0.74	NA	<5.0	<5.0	<10	<0.2	<5.0	NA	25	<0.2	<10	NA	<20	110	NA	NA	<10	<5.0	<30	NA
	4/5/2019	NA	NA	0.42	23.6	<0.10	<0.080	NA	NA	NA	<0.50	0.14	1.0	NA	NA	NA	24.6	<0.20	0.26 J	NA	0.10 J	89.1	NA	NA	NA	NA	NA	57,100
	4/5/2019 ⁴	NA	NA	0.41	23.7	<0.10	<0.080	NA	NA	NA	<0.50	0.14	0.98	NA	NA	NA	24.8	<0.20	0.26 J	NA	0.088 J	87.7	NA	NA	NA	NA	NA	54,300
SW-5 (Downstream)	11/3/2016	NA	<5.0	<10	26	<2.0	<1.0	NA	<0.74U	NA	<5.0	<5.0	<10	<0.2	<5.0	NA	24	<0.2	<10	NA	<20	100	NA	NA	<10	<5.0	<30	NA
	4/4/2019	NA	NA	0.40	16.9	<0.10	<0.080	NA	NA	NA	<0.50	0.14	0.88	NA	NA	NA	19.5	<0.20	0.21 J	NA	0.12 J	81.8	NA	NA	NA	NA	NA	53,400
SW-6 (Downstream)	4/4/2019	NA	NA	0.40	16.9	<0.10	<0.080	NA	NA	NA	<0.50	0.14	0.84	NA	NA	NA	18.7	<0.20	0.21 J	NA	0.11 J	81.3	NA	NA	NA	NA	NA	53,400
SW-7 (Downstream)	4/4/2019	NA	NA	0.42	18.4	<0.10	<0.080	NA	NA	NA	<0.50	0.16	1.1	NA	NA	NA	23.1	<0.20	0.23 J	NA	0.10 J	86.7	NA	NA	NA	NA	NA	54,400
SW-21 (Drainage Pathway)	4/5/2019	NA	NA	0.40	32.1	<0.10	<0.080	NA	NA	NA	0.73	0.36	3.2	NA	NA	NA	29.5	<0.20	0.62	NA	0.11 J	69.9	NA	NA	NA	NA	NA	31,400
	4/5/2019 ⁵	NA	NA	0.15	18.3	<0.10	<0.080	NA	NA	NA	<0.50	0.094 J	3.1	NA	NA	NA	9.3	<0.20	0.43 J	NA	<0.50	43.5	NA	NA	NA	NA	NA	22,200

Notes:

Yellow highlighting indicates samples collected as part of April 2019 data gap sampling

All results in ug/l

¹ NC 2B Standard = North Carolina Surface Water Quality Standard adopted per 15A NCAC 2B Section .0100. Unless otherwise noted, values are the lowest of the Freshwater, Water Supply, and Human Health values because Bolin Creek is a WS V classification surface water.

² 2B Standards are derived using Site specific hardness data for surface water samples SW-1 through SW-7 and the DEQ Hardness-Dependent Metal Calculator dated September 22, 2017. Mean hardness for these samples was 54.513 mg/L.

³ EPA Region 4 Surface Water Screening Values from EPA (2018)

⁴ denotes duplicate sample taken

⁵ Denotes filtered samples

ND = Not Detected; NA = Not Analyzed; NS = Not Specified

J = Detected above method detection limit but below laboratory reporting limit; therefore, result is an estimated concentration

(t) = based upon measurement of total recoverable metal. See 15A NCAC 02B .0211 for more information.

Analytical Methods:

Metals by 6010C, 6020A, or 6020B

Mercury by 7470A

Hexavalent chromium by 7199A

Total hardness by Standard Method 2340B

Table 6 (page 1 of 1)
Summary of Surface Water Geochemical Parameters
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Sample ID	Sample Date	DO (mg/L)	Temperature (°C)	Conductivity (µS/cm)	pH (SU)	Turbidity (NTU)
SW-1 (Upstream)	11/3/2016	6.54	17.7	168.4	7.12	0.76
	4/5/2019	10.42	13.7	146.2	7.22	6.47
SW-2 (Upstream)	11/3/2016	7.63	17.3	182.5	7.58	1.04
	4/5/2019	9.31	13.7	148.0	7.13	3.37
SW-3 (Adjacent)	11/3/2016	7.19	17.9	178.7	7.50	0.48
	4/5/2019	10.48	13.7	50.6	7.46	8.76
SW-4 (Adjacent)	11/3/2016	6.89	17.4	178.0	7.64	0.54
	4/5/2019	10.25	13.7	155.1	7.39	5.24
SW-5 (Downstream)	11/3/2016	6.56	17.7	182.4	7.68	0.39
	4/4/2019	11.63	16.3	149.4	7.86	2.71
SW-6 (Downstream)	4/4/2019	11.08	15.8	148.2	7.61	1.98
SW-7 (Downstream)	4/4/2019	10.60	15.5	148.9	7.63	2.87
SW-21 (Downstream)	4/5/2019	7.78	14.6	71.0	6.39	22.10

Notes

Yellow highlighting indicates samples collected as part of April 2019 data gap sampling

Table 7 (page 1 of 1)
Summary of Stream Sediment Analytical Data
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Surface Water Sampling Point ID	Sample Date	antimony	arsenic	barium	beryllium	cadmium	hexavalent chromium	trivalent chromium	total chromium	cobalt	copper	lead	manganese	mercury	nickel	selenium	strontium	thallium	vanadium	zinc
SED-1 (Upstream)	10/27/2016	<0.32	1.2	12	<0.32	<0.32	0.24 J	22.76	23	3.9	4.2	4.0	180	<0.026	3.8	<0.64	6.9	<0.64	19	19
	4/5/2019	NA	1.95 O1	38.4 J6	0.249 J	<0.636	0.428 J	65.0	65.4 J3, J6	7.63	8.42	NA	449 J6	0.0078	7.10	0.409 J	8.4	NA	NA	NA
SED-2 (Upstream)	10/27/2016	<0.33	2.1	20	0.48	<0.33	<0.40	36	36	7.8	8.0	7.1	330	<0.025	7.2	<0.65	11	<0.65	37	34
	10/27/2016 ¹	<0.32	2.5	17	0.45	<0.32	<0.40	49	49	6.5	9.1	6.7	290	<0.026	6.0	<0.63	12	<0.63	35	31
	4/5/2019	NA	2.74	29.6	0.305 J	<0.619	0.796 J	56.3	57.1	20.9	13.8	NA	811	0.0053 J	9.16	0.306 J	16.9	NA	NA	NA
	4/5/2019 ¹	NA	2.02	17.4	0.222 J	<0.617	0.546 J	69.5	70.0	7.29	6.79	NA	347	0.0051	9.92	0.237 J	8.8	NA	NA	NA
SED-3 (Adjacent)	10/27/2016	<0.32	1.6	21	0.37	<0.32	<0.39	30	30	6.2	7.4	6.9	220	<0.026	6.8	<0.64	12	<0.64	29	35
	4/5/2019	NA	1.36	16.4	0.111 J	<0.607	0.670 J	13.5	14.2	5.18	20.2	NA	225	0.0054 J	4.81	<0.607	9.2	NA	NA	NA
SED-4 (Adjacent)	10/27/2016	<0.33	1.2	8.4	<0.33	<0.33	<0.38	34	34	3.5	5.2	3.5	130	<0.027	5.0	<0.65	6.4	<0.65	16	20
	4/5/2019	NA	2.35	20.3	0.191 J	<0.586	0.456 J	63.8	64.3	7.26	8.39	NA	293	0.0080	10.5	0.344 J	30.7	NA	NA	NA
SED-5 (Downstream)	10/27/2016	<0.31	1.4	44	0.41	<0.31	<0.37	51	51	9.5	8.6	22	860	<0.025	5.3	<0.62	13	<0.62	35	32
	4/4/2019	NA	1.82	24.3	0.233 J	<0.617	0.595 J	16.8	17.4	5.90	8.86	NA	399	<0.0035	4.86	<0.617	6.2	NA	NA	NA
SED-6 (Downstream)	4/4/2019	NA	1.96	17.3	0.247 J	<0.643	0.517 J	24.9	25.4	6.57	9.25	NA	308	0.0058	7.15	<0.643	8.4	NA	NA	NA
SED-7 (Downstream)	4/4/2019	NA	1.35	16.4	0.179 J	<0.635	0.995 J	59.4	60.4	6.47	6.77	NA	262	0.0025 J	9.04	<0.635	8.1	NA	NA	NA
Site Specific Sediment Background Range		<0.32-<0.33	1.2-2.74	12-38.4	<0.32-0.48	<0.32-<0.636	0.24 J-0.796 J	22.76-69.5	23-70	3.9-20.9	4.2-13.8	4-7.1	180-811	<0.0051-<0.026	3.8-9.92	0.237 J- <0.65	6.9-16.9	<0.63-<0.65	19-37	19-34
Site Specific Soil Background Range		<0.27-<0.33	1.4-3.08	36-77.9	0.293 J-0.99	<0.27-0.38	<0.12-5.34	16.16-70.2	16-70.2	6.3-27	15-62.8	0.55-43	310-940	<0.0067-0.280	4.9-20	<0.59-1.7	14-46	<0.53-2.3	34-190	40-230
95% UCL of Site Specific Soil Background Range ³		--	2.1	58	0.58	0.18	2.19	28	25	15	27	30	591	0.114	10	1.2	29	--	84	147
PSRG - Protection of Groundwater		0.9	5.8	580	63	3.0	3.8	360,000	3.8	0.90	700	270	65	1.0	130	2.1	1,500	0.28	350	1,200
PSRG - Residential		6.3	0.68	3,100	31	14.2	0.30	23,000	0.31	4.7	630	400	2,200	2.3	310	78	9,400	0.16	78	4,700
PSRG - Industrial		93	3.0	47,000	470	196	6.5	350,000	6.5	70	9,300	800	32,000	9.7	4,700	1,160	140,000	2.3	1,200	70,000
EPA Region 4 Sediment Screening Value ²		3.0*	42	20	NS	1	NS	NS	43.4	50	31.6	36	460	0.18	22.7	0.72	NS	NS	NS	121

Notes
Yellow highlighting indicates samples collected as part of April 2019 data gap sampling
Sediment concentrations are reported in milligrams per kilogram (mg/kg).
¹ denotes duplicate sample taken
² EPA Region 4 Ecological Screening Value from EPA (2018)
³ 95% UCL of Site Specific Background Values were calculated using values from samples collected through the Phase II RI
PSRG = North Carolina Department of Environmental Quality (DEQ) Preliminary Soil Remediation Goals (PSRGs) (February 2018); UCL = Upper Confidence Limit
ND - Not Detected; NA - Not Analyzed; NS - Not Specified
J = Detected above method detection limit but below laboratory reporting limit; therefore, result is an estimated concentration.
B = Analyte is found in the associated blank.
O1 = Analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
J3 = The associated batch QC was outside the established quality control range for precision.
J6 = The sample matrix interfered with the ability to make any accurate determination; spike value is low.
Bold denotes concentration above protection of groundwater PSRG and significantly above background.
Underlining indicates concentration above industrial PSRG and significantly above background.
Analytical Methods:
Metals by EPA Method 6010C, 6020A, or 6020B
Mercury by EPA Method 7470A
Hexavalent Chromium by EPA Method 7199A

Table 8 (page 1 of 1)
Summary of Indoor Air Radon Analytical Data
828 Martin Luther King, Jr. Blvd.
Chapel Hill, North Carolina
H&H Job No. TCH-003

Sample ID / Canister ID	Sample Date	Radon (pCi/L)
EPA Action Level¹		4
First Floor Weight Room / 647501	4/5/2019-4/8/2019 (73.5 hours)	<0.4
First Floor Center Office / 647500	4/5/2019-4/8/2019 (73.4 hours)	<0.4
First Floor Breakroom / 647502	4/5/2019-4/8/2019 (73.6 hours)	<0.4
First Floor Corner Office / 647499	4/5/2019-4/8/2019 (73.6 hours)	0.4
First Floor Admin Office / 647503 & 647504²	4/5/2019-4/8/2019 (73.6 hours)	0.4
	4/5/2019-4/8/2019 (73.6 hours) ²	<0.4

Notes:

All results in picoCuries per liter (pCi/L)

¹ EPA Action Level - Environmental Protection Agency recommended radon action level

² denotes duplicate sample taken



LEGEND

- SITE PROPERTY BOUNDARY
- BOLIN CREEK
- 101 TOPOGRAPHIC CONTOUR ELEVATION (FT MSL)
- MONITORING WELL LOCATION (FALCON ENGINEERING)
- TEMPORARY MONITORING WELL LOCATION (FALCON ENGINEERING)
- SOIL BORING LOCATION (FALCON ENGINEERING)
- SURFACE WATER SAMPLE LOCATION (FALCON ENGINEERING)
- ABANDONED MONITORING WELL LOCATION
- MONITORING WELL LOCATION (H&H)
- SOIL BORING LOCATION (H&H)
- BACKGROUND SOIL BORING LOCATION (H&H)
- SURFACE WATER/SEDIMENT SAMPLE LOCATION (H&H)
- DRAINAGE PATHWAY SOIL SAMPLE LOCATION (H&H)
- DRAINAGE PATHWAY SURFACE WATER SAMPLE LOCATION (H&H)
- COVER EVALUATION BORING LOCATION
- CCP UNDER > 2 FT COVER
- CCP UNDER < 2 FT COVER
- CCP EXPOSED AT GROUND SURFACE
- CCP DEPOSITIONAL LAYER
- APPROXIMATE CCP DEPOSITIONAL LAYER AREA REPORTED BY DEQ
- STORMWATER CULVERT

NOTES:

- EXISTING MONITORING WELLS & OCTOBER/ NOVEMBER 2016 SAMPLING LOCATIONS SURVEYED BY CE GROUP ON DECEMBER 8, 9, & 20, 2016.
- HIGHLIGHTED SAMPLE IDs REFLECT SAMPLES COLLECTED AS PART OF APRIL 2019 DATA GAP SAMPLING ACTIVITIES.

0 115 230
SCALE IN FEET

N

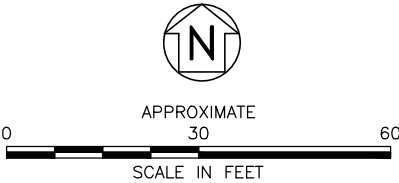
TITLE SAMPLE LOCATION MAP	
PROJECT TOWN OF CHAPEL HILL 828 MARTIN LUTHER KING JR. BOULEVARD CHAPEL HILL, NORTH CAROLINA	
<div><div>hart hickman SMARTER ENVIRONMENTAL SOLUTIONS</div><div>2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 704-586-0007(p) 704-586-0373(f) License # C-1269 / #C-245 Geology</div></div>	
DATE: 4-18-19	REVISION NO. 0
JOB NO. TCH-003	FIGURE NO. 1


S:\444-Master Projects\Town of Chapel Hill (TCH)\TCH-002 - Police Station\Ph II RI Work\Figures\Figures_4.18.19.dwg, FIG 1, 4/18/2019 3:29:01 PM, erichardson



LEGEND

- SITE PROPERTY BOUNDARY
- RADON SAMPLE LOCATION



TITLE		RADON SAMPLE LOCATION MAP	
PROJECT		TOWN OF CHAPEL HILL 828 MARTIN LUTHER KING JR. BOULEVARD CHAPEL HILL, NORTH CAROLINA	
 SMARTER ENVIRONMENTAL SOLUTIONS		2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 704-586-0007(p) 704-586-0373(f) License # C-1269 / #C-245 Geology	
DATE: 4-17-19		REVISION NO. 0	
JOB NO. TCH-003		FIGURE NO. 2	

Appendix A
Groundwater Sampling Logs

LOW-FLOW GROUNDWATER SAMPLING RECORD

Stabilization Criteria

Primary:
 pH +/- 0.1 unit
 S. Cond. +/- 5%
 Turb. +/- 10% (<10 NTUs for metals)
 Water Level: slight or stable
 drawdown during purging

Secondary:
 DO +/- 0.2 mg/L
 ORP +/- 10mV

Job No: TCH-002

Well ID: MW-1

Well Location: Chapel Hill, NC

Facility Name: Town of Chapel Hill Police Department Date: 4/3/19

Top of Casing Elevation (ft msl): Casing Material: PVC Volume of Water Per Well Volume:

Total Well Depth (ft): 40.00 Depth to Water (ft): 30.90 Well Diameter: 2 in

Sampling Personnel: H Randolph, Screen Interval (ft bgs): 30 - 40

Type of Pump: Bladder Tubing Material: 1/4" OD Pump/Tubing set at: 35 ft.

Weather Conditions: Sunny, 50s NOTES:

GROUNDWATER SAMPLING PARAMETERS

Time	Water Level	Volume Pumped	Pumping Rate	DO (mg/l)	Temp. (°C)	S. Cond. (µS/cm)	pH (SU)	ORP (mV)	Turbidity (NTU)
10:45				2.50	18.2	1,273.0	6.12	-38.4	146.70
10:50				1.52	18.2	1,272.0	6.12	-34.6	64.60
10:55				1.61	18.2	1,281.0	6.11	-33.0	80.92
11:00				1.43	18.2	1,291.0	6.09	-31.6	180.40
11:05				1.53	18.2	1,277.0	6.09	-32.2	90.32
11:10				1.42	18.1	1,281.0	6.04	-35.0	40.17
11:15				1.39	18.0	1,280.0	6.05	-36.1	21.73
11:20				1.35	17.9	1,269.0	6.03	-36.0	18.74
13:05		5 gal							7.76

Other Sample Parameters:

Sampled at: 13:05 Parameters taken with: Ysi ProPlus, MicroTPI turbidity meter

Sample Delivered to: Pace Analytical by Courier at

Field Filtration: ☐ Yes ☒ No If yes, which sample parameters were field filtered:

Sample Parameter Containers (Types, Number of Containers, Preservatives): See chain



LOW-FLOW GROUNDWATER SAMPLING RECORD

Stabilization Criteria

Primary:
pH +/- 0.1 unit
S. Cond. +/- 5%
Turb. +/- 10% (<10 NTUs for metals)
Water Level: slight or stable
drawdown during purging

Secondary:
DO +/- 0.2 mg/L
ORP +/- 10mV

Job No: TCH-002

Well ID: MW-4A

Well Location: Chapel Hill, NC

Facility Name: Town of Chapel Hill Police Department Date: 4/4/19

Top of Casing Elevation (ft msl): Casing Material: PVC Volume of Water Per Well Volume:

Total Well Depth (ft): 19.00 Depth to Water (ft): 3.20 Well Diameter: 2 in

Sampling Personnel: H Randolph, Screen Interval (ft bgs): 4 - 19

Type of Pump: Peristaltic Tubing Material: 1/4" OD poly Pump/Tubing set at: 11.5 ft.

Weather Conditions: Sunny, 60s NOTES:

GROUNDWATER SAMPLING PARAMETERS

Time	Water Level	Volume Pumped	Pumping Rate	DO (mg/l)	Temp. (°C)	S. Cond. (µS/cm)	pH (SU)	ORP (mV)	Turbidity (NTU)
08:15	3.29	0 mL	150 mL/min	3.27	13.2	135.9	6.04	254.9	19.71
08:20	3.30	750		2.63	13.4	133.0	5.49	260.8	18.73
08:25	3.30	1500		2.75	13.4	132.0	5.26	268.8	20.94
08:30	3.30	2250		2.33	13.4	133.7	5.14	274.9	21.32
08:35	3.30	3000		2.22	13.4	133.6	5.13	275.5	17.01
08:40	3.30	3750		2.15	13.3	133.8	5.11	277.7	16.86
11:45									9.43

Other Sample Parameters:

Sampled at: 11:45 Parameters taken with: YSI ProPlus, MicroTPI turbidity meter

Sample Delivered to: Pace Analytical by Courier at

Field Filtration: ☐ Yes ☒ No If yes, which sample parameters were field filtered:

Sample Parameter Containers (Types, Number of Containers, Preservatives): See chain

LOW-FLOW GROUNDWATER SAMPLING RECORD

Stabilization Criteria

Primary:
 pH +/- 0.1 unit
 S. Cond. +/- 5%
 Turb. +/- 10% (<10 NTUs for metals)
 Water Level: slight or stable
 drawdown during purging

Secondary:
 DO +/- 0.2 mg/L
 ORP +/- 10mV

Job No: TCH-002

Well ID: MW-7

Well Location: Chapel Hill, NC

Facility Name: Town of Chapel Hill Police Department Date: 4/3/19

Top of Casing Elevation (ft msl): Casing Material: PVC Volume of Water Per Well Volume:

Total Well Depth (ft): 69.50 Depth to Water (ft): 43.58 Well Diameter: 2 in

Sampling Personnel: H Randolph, Screen Interval (ft bgs): 59.5 - 69.5

Type of Pump: Bladder Tubing Material: 1/4" OD poly Pump/Tubing set at: 64.5 ft.

Weather Conditions: Sunny, 60s NOTES:

GROUNDWATER SAMPLING PARAMETERS

Time	Water Level	Volume Pumped	Pumping Rate	DO (mg/l)	Temp. (°C)	S. Cond. (µS/cm)	pH (SU)	ORP (mV)	Turbidity (NTU)
15:30				1.71	16.2	105.4	7.27	144.3	6.43
15:35				1.60	15.7	94.8	5.31	199.5	6.04
15:40				1.62	15.7	95.9	5.24	202.4	14.95
15:45				1.49	15.6	105.0	5.20	210.3	24.30
15:50				1.59	15.6	105.5	5.27	210.0	28.19
15:55				1.50	15.7	106.1	5.31	211.9	35.86
16:00				1.33	15.4	107.1	5.46	206.6	37.17
16:05				1.41	15.2	107.2	5.46	209.2	35.10
16:10				1.35	15.1	107.2	5.40	214.9	34.04
19:55									8.95

Other Sample Parameters:

Sampled at: 19:55 Parameters taken with: YSI ProPlus, MicroTPI turbidity meter

Sample Delivered to: Pace Analytical by Courier at

Field Filtration: ☐ Yes ☒ No If yes, which sample parameters were field filtered:

Sample Parameter Containers (Types, Number of Containers, Preservatives): See chain

Appendix B

Laboratory Analytical Data

Attachment 2

USEPA / DWM HHRA Default Receptors and Exposure Parameters

Default Receptor	Residential		Non-Residential Worker ("Occupational")	Construction Worker	Recreation		Trespasser
Contributing Age Groups	Child Component	Adult Component	Adult	Adult	Child Component	Adult Component	Adolescent (6-16 yrs of age)
Exposure Parameter	Value	Value	Value	Value	Value	Value	Value
Lifetime (LT) (years)	70	70	70	70	70	70	70
Body Weight (BW) (kg)	15	80	80	80	15	80	45
Exposure Duration (ED) (yr)	6	20	25	1			
Exposure Frequency (EF) (d/yr)	350	350	250	250	195	195	90
Exposure Time (ET) (hr)	24	24	8	8	2	2	2
Skin Surface Area - Soil Exposure (SA _s) (cm ²)	2373	6032	3527	3527	2373	6032	6032
Soil Adherence Factor (AF) (mg/cm ²)	0.2	0.07	0.12	0.3	0.2	0.07	0.2
Soil Ingestion Rate (IRS) (mg/day)	200	100	100	330	200	100	200
Skin Surface Area - Water Exposure (SA _w) (cm ²)	6365	19652	19652		6365	19652	19652
Water Ingestion Rate (IRW) (L/d)	0.78	2.5	0.83		0.12	0.071	0.071
Water Exposure Time (ET _{event}) (hr/event)	0.54	0.71	0.67		2	2	2
Water Event Frequency (EV) (events/day)	1	1	1		1	1	1
Working Weeks (EW) (wk/yr)				50			
Averaging Time (AT) (days/yr)					365	365	365
Exposure Duration 0-2 (ED) (yr)					2	0	
Exposure Duration 2-6 (ED) (yr)					4	0	
Exposure Duration 16-26 (ED) (yr)					0	10	10

(Source: February 2018 USEPA Superfund Program Regional Screening Levels)



Attachment 3

Summary of Risk Assessment Output				Output Form 1A
Version Date: February 2018				
Basis: November 2017 EPA RSL Table				
Site ID: 828 MLK April 2019 Sample data				
Exposure Unit ID: April 2019 sample data, with 6Cr				
PRIMARY CALCULATORS				
Receptor	Pathway	Carcinogenic Risk	Hazard Index	Risk exceeded?
Resident	Soil Combined Pathways	1.4E-04	3.9E+00	YES
	Groundwater Combined Pathways*	4.4E-04	6.7E+00	YES
Non-Residential Worker	Soil Combined Pathways	3.2E-05	2.9E-01	NO
	Groundwater Combined Pathways*	8.9E-05	1.0E+00	YES
Construction Worker	Soil Combined Pathways	6.0E-06	5.8E+00	YES
User Defined	Soil Combined Pathways	8.0E-05	2.1E+00	YES
	Surface Water Combined Pathways*	1.0E-05	3.0E-02	NO
VAPOR INTRUSION CALCULATORS				
Receptor	Pathway	Carcinogenic Risk	Hazard Index	Risk exceeded?
Resident	Groundwater to Indoor Air	0.0E+00	2.3E-01	NO
	Soil Gas to Indoor Air	0.0E+00	0.0E+00	NO
	Indoor Air	0.0E+00	0.0E+00	NO
Non-Residential Worker	Groundwater to Indoor Air	0.0E+00	5.4E-02	NO
	Soil Gas to Indoor Air	0.0E+00	0.0E+00	NO
	Indoor Air	0.0E+00	0.0E+00	NO
CONTAMINANT MIGRATION CALCULATORS				
Pathway	Source	Target POE Concentrations Exceeded?		
Protection of Groundwater Use	Source Soil	Exceedence of 2L at POE?		NM
	Source Groundwater	Exceedence of 2L at POE?		NM
Protection of Surface Water	Source Soil	Exceedence of 2B at POE?		NM
	Source Groundwater	Exceedence of 2B at POE?		NM
<p>Notes:</p> <p>1. If lead concentrations were entered in the exposure point concentration tables, see the individual calculator sheets for lead concentrations in comparison to screening levels. Note that lead is not included in cumulative risk calculations.</p> <p>2. * = If concentrations in groundwater exceed the NC 2L Standards or IMAC, or concentrations in surface water exceed the NC 2B Standards, appropriate remediation and/or institutional control measures will be necessary to be eligible for a risk-based closure.</p>				

Summary of Risk Assessment Output				Output Form 1A
Version Date: February 2018				
Basis: November 2017 EPA RSL Table				
Site ID: 828 MLK April 2019 Sample data				
Exposure Unit ID: April 2019 Sample data, Trespasser w/ 6Cr				
PRIMARY CALCULATORS				
Receptor	Pathway	Carcinogenic Risk	Hazard Index	Risk exceeded?
Resident	Soil Combined Pathways	NC	NC	NC
	Groundwater Combined Pathways*	NC	NC	NC
Non-Residential Worker	Soil Combined Pathways	NC	NC	NC
	Groundwater Combined Pathways*	NC	NC	NC
Construction Worker	Soil Combined Pathways	NC	NC	NC
User Defined	Soil Combined Pathways	1.8E-05	3.6E-01	NO
	Surface Water Combined Pathways*	2.4E-06	7.8E-03	NO
VAPOR INTRUSION CALCULATORS				
Receptor	Pathway	Carcinogenic Risk	Hazard Index	Risk exceeded?
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
CONTAMINANT MIGRATION CALCULATORS				
Pathway	Source	Target POE Concentrations Exceeded?		
Protection of Groundwater Use	Source Soil	Exceedence of 2L at POE?		NM
	Source Groundwater	Exceedence of 2L at POE?		NM
Protection of Surface Water	Source Soil	Exceedence of 2B at POE?		NM
	Source Groundwater	Exceedence of 2B at POE?		NM
<p>Notes:</p> <p>1. If lead concentrations were entered in the exposure point concentration tables, see the individual calculator sheets for lead concentrations in comparison to screening levels. Note that lead is not included in cumulative risk calculations.</p> <p>2. * = If concentrations in groundwater exceed the NC 2L Standards or IMAC, or concentrations in surface water exceed the NC 2B Standards, appropriate remediation and/or institutional control measures will be necessary to be eligible for a risk-based closure.</p>				