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MEMORANDUM

To: Project File, Town of Chapel Hill, HH/ECO Risk Assessment (201959)

From: Don Malone *Donald Malone*

CC: Dave Duncklee, Ken Rudo

Date: March 29, 2019

Re: Notes from Site Walk on March 20, 2019 and Proposed Sampling and Analysis Plan, Human Health and Ecological Risk Assessment Services (Q19-77), 828 Martin Luther King, Jr. Boulevard Property, Chapel Hill, North Carolina

The purpose of this work is to review existing data to identify and close potential data gaps prior to performing a Human Health and Ecological Risk Assessment for the site. Don Malone and Dave Duncklee of Duncklee & Dunham, P.C. (Duncklee & Dunham) and Ken Rudo of Rudo Toxicological Consultants (Rudo) visited the site on March 20, 2019 from 10:00 AM until approximately 11:30 AM. During this visit, we walked along the Bolin Creek greenway approximately 800 feet east and 100 feet west of Martin Luther King Jr. Boulevard. . The objectives for this site visit were to identify and observe:

- Coal Combustion Products (CCP) exposed along the southern-facing bluff located south of the Chapel Hill Police Department property at 828 M.L.K. Jr Blvd.
- Prior sample locations for soil, groundwater, sediment, and surface water.
- Drainage features extending from the bluff and along the Bolin Creek greenway.
- Potential exposure pathways for human health and ecological receptors.

Based on our observations during the site walk, Duncklee & Dunham's evaluation is that additional samples should be collected from the following areas to close preliminary data gaps. Figure 1 includes a site map with historical sample locations. Figure 2 includes the new sample locations proposed by Duncklee & Dunham. Based on this information, we recommend the Town of Chapel Hill's consultant (Hart & Hickman) collect the samples specified in the preliminary Sampling and Analysis Plan (Tables 1 and 2), and as discussed in more detail below. Hart & Hickman should utilize sampling procedures based on normal industry practices and their internal standard operating procedures for similar work.

The proposed Sampling and Analysis Plan for water samples (Table 1) includes:

- Collect groundwater samples from five existing monitor wells (MW-1, MW-3a, MW-4A, MW-6, and MW-7) using low-flow sample techniques. Hart & Hickman's field staff should attempt to reduce sample turbidity to less than 10 Nephelometric Turbidity Units (NTPs) prior to collecting the samples, and attempt to redevelop any well that produces low quality (i.e., high turbidity) groundwater.
- Collect surface water samples from Bolin Creek (SW-1 through SW-5), including two new sample locations (i.e., SW-6 and SW-7) located approximately 150 and 300 feet downgradient of location SW-5. Hart & Hickman should collect each surface water sample from the approximate center line of Bolin Creek, and in order from downstream locations to upstream locations during apparent base flow conditions.
- Collect grab samples from several storm water drainage features / rivulets within 2 hours of a rain event. Sample locations SW-8, SW-12, SW-16, SW-18, and SW-21 don't normally contain water during dry periods. The surface water samples should be co-located with sediment samples of the same numeric suffix (i.e., SW-8 co-located with SED-8). However, additional sample locations may be collected and/or substituted for the specified locations, depending on whether Hart & Hickman's field staff identify drainage features that contain surface water runoff.

The proposed Sampling and Analysis Plan for soil and sediment samples (Table 2) includes:

- Collect discrete soil samples from the following locations by advancing borings with freshly decontaminated stainless steel hand augers to the target depths specified in Table 1:
 - background soil samples from locations BG-6, BG-7 and BG-8 on the similar southern-facing bluff as the CCP residues.
 - replicate soil samples near to prior soil boring locations GP-5 and GP-6, and
 - new soil sample locations HH-9, HH-10, and HH-11 along the southern face of the bluff from locations with exposed CCP residues.
- Collect sediment samples from Bolin Creek (SED-1 through SED-5), including two new sample locations (i.e., SED-6 and SED-7). Consistent with Hart & Hickman's prior sampling events, the sediment and surface water samples should be co-located. Each sediment sample should be collected from the approximate center line of Bolin Creek and in order from downstream locations to upstream locations during apparent base flow conditions.
- Collect two sediment samples within 1-3 foot of the bank of Bolin Creek (SED-3a and SED-5a) from areas with low surface water flow where sediment might deposit (e.g., eddies).
- Collect sediment samples (SED-8 through SED-21) from several storm water drainage features / rivulets that extend from the bluff toward Bolin Creek. Hart & Hickman should collect each sediment sample from the approximate center line of the drainage feature from areas of observed sediment accumulation in the run-off channels.



Potential items that may be addressed in later project phases include:

- Construct and sample two new monitor wells MW-8 and MW-9 to be located downgradient (south) of existing monitor wells MW-6 and MW-3A, respectively. Monitor wells MW-8 and MW-9 shall be constructed with screened intervals in the partially-weather rock (PWR) or bedrock zones of the surficial aquifer, as identified in Hart & Hickman's *Phase II Remedial Investigation Report* dated August 25, 2017. These additional wells will possibly be constructed and sampled during Spring or Summer 2019; and therefore, the data will not be available for a meeting tentatively planned with the Chapel Hill Town Council on May 15, 2019.
- Abandon all monitor wells screened in the CCP, and consider installation of additional monitor wells beneath the CCP-containing interval.
- Consider performing a macroinvertebrate study in Bolin Creek upgradient, within, and downgradient of the CCP study area to evaluate aquatic life in the stream as an indicator of health of Bolin Creek due to potential impacts from the CCO. The Town of Chapel Hill should also obtain and review NCDEQ's Water Quality Report for Bolin Creek (<https://townofcarrboro.org/DocumentCenter/View/2979/Benthic-Report-2015>), and other potential water quality reports for Bolin Creek.
- NCDEQ guidance does not include recommendations for sampling and analysis of naturally occurring radionuclides in CCP. USEPA's website provides information pertaining to Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) in CCP (<https://www.epa.gov/radiation/tenorm-coal-combustion-residuals>), including the analysis of radionuclides for uranium, thorium, potassium, and radium. The Town of Chapel Hill should consider in later project phases the evaluation of these compounds in CCP and a few intermittent soil samples downgradient of the fill area.
- Review relevant documents and assess the potential for impacts to assess Bolin Creek from incidents at the following properties:
 - Holton Rentals Property, 607 Hillsborough St, Chapel Hill, North Carolina (UST Incident No. 33564) and
 - Run-in-Jims, 800 Martin Luther King Jr Blvd, Chapel Hill (UST Incident Nos. 22628 and 46020).

Attachments:

Figure 1 – Site Map with Existing Sample Locations

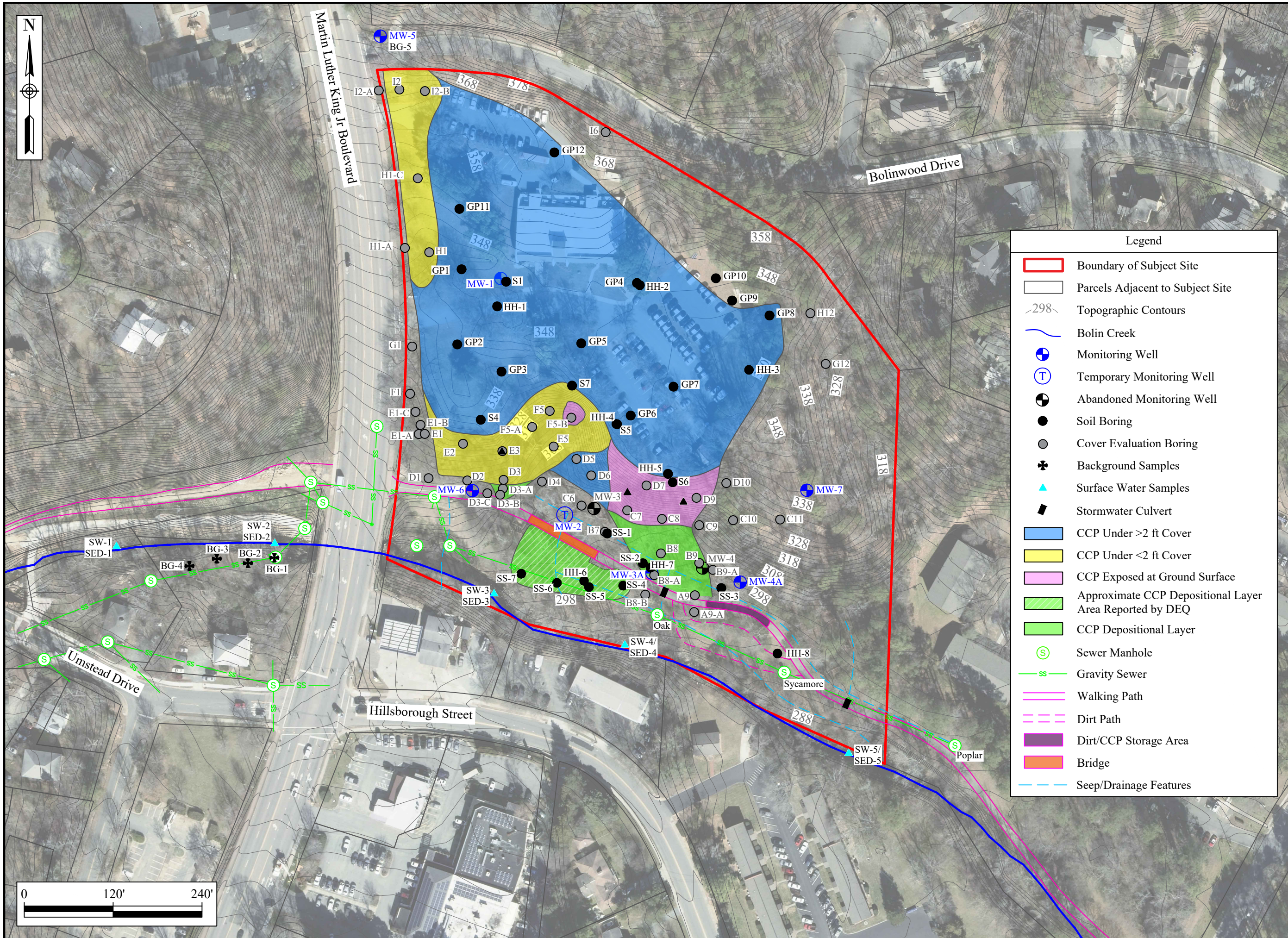
Figure 2 – Site Map with Proposed Sample Locations

Table 1 - Proposed Sampling and Analysis Plan for Water Samples

Table 2 - Proposed Sampling and Analysis Plan for Soil and Sediment Samples

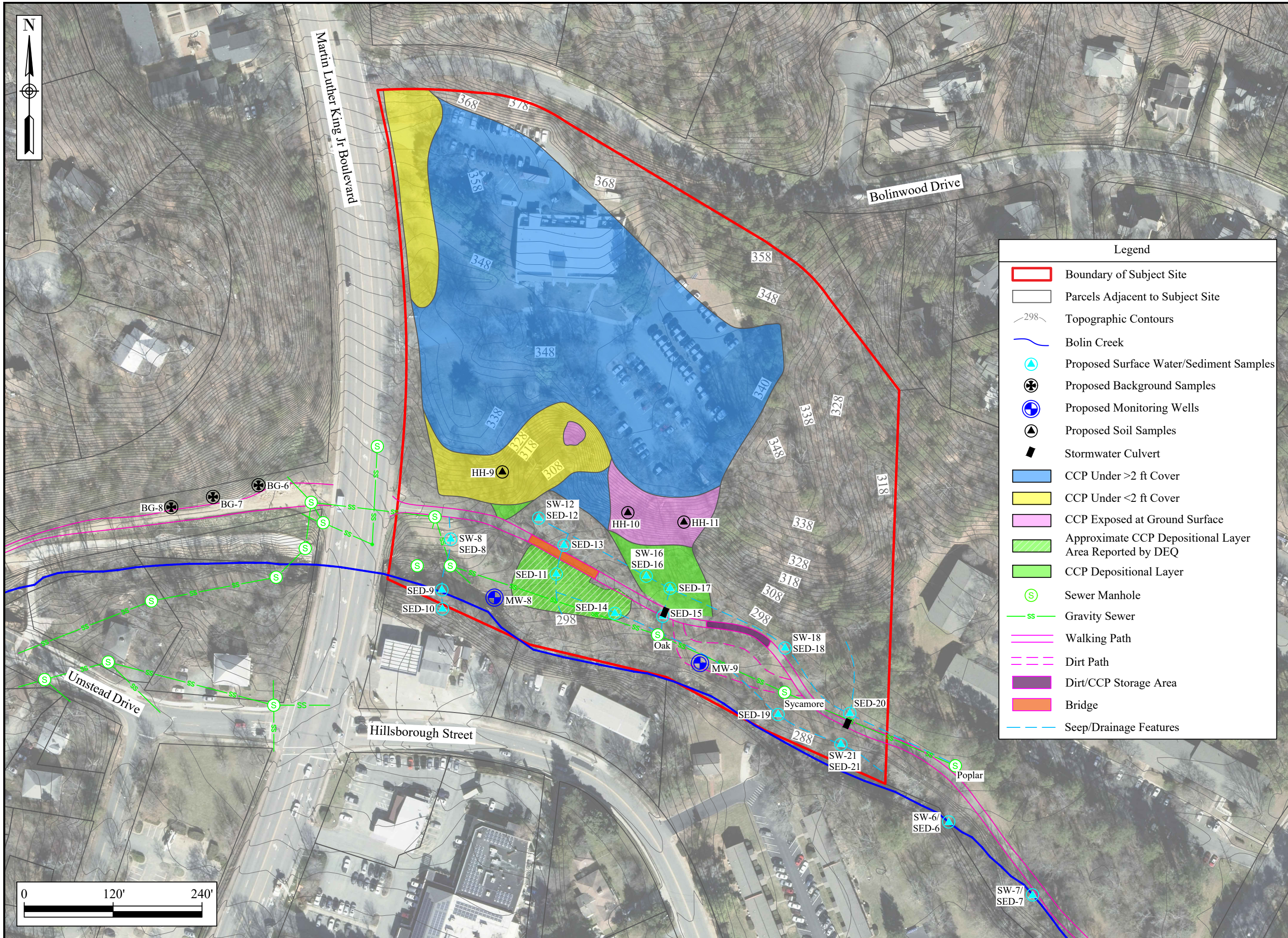


Figures



Site Map with Existing Sample Locations			
828 Martin Luther King, Jr. Boulevard Property Chapel Hill, North Carolina			
Drawn By:	Checked By:	Project Number:	References:
pjs	pjs	201959	Phase II Remedial Investigation Report (Harr & Hickman, 2017), NCOneMap, Orange County GIS
Scale:	Date:	Layers:	Filename:
1" = 120'	March 2019	0-13, 15-18, 20, 22-24	P:\Chapel Hill_Town of 201959\Bolin Creek HHCCO RACAD_Drawing\site map.dwg

Figure
1



Site Map with Proposed Sample Locations
 828 Martin Luther King, Jr. Boulevard Property
 Chapel Hill, North Carolina

Drawn By:	pjs	Checked By:		Project Number:	201959	Date:	March 2019	References:	Phase II Remedial Investigation Report (Hart & Hickman, 2017), NCOneMap, Orange County GIS
Scale:	1" = 120'	Size:	11" x 17"	Layers:	0-9, 14, 16, 17, 19, 21, 25	Filename:	P:\Chapel Hill, Town of\201959\Bolin Creek\HHECO BA\CAD_Drawing\site map.dwg		

Figure

Tables

**Table 1. Proposed Sampling and Analysis Plan for Water Samples
Human Health and Ecological Risk Assessment Monitoring
828 Martin Luther King, Jr. Boulevard Property, Chapel Hill, North Carolina**

Water Sample Location	Sample Depth(s)	Media	Existing or New Location	Analytes	
				Metals ¹ 6020B	Mercury 7470A (Water)
MW-1	Center of Screen	Groundwater	Existing	X	X
MW-3a	Center of Screen	Groundwater	Existing	X	X
MW-4A	Center of Screen	Groundwater	Existing	X	X
MW-6	Center of Screen	Groundwater	Existing	X	X
MW-7	Center of Screen	Groundwater	Existing	X	X
MW-8	Center of Screen	Groundwater	Proposed	X ²	X ²
MW-9	Center of Screen	Groundwater	Proposed	X ²	X ²
SW-1 (in Bolin Creek)	Water Surface	Surface Water	Existing	X	X
SW-2 (in Bolin Creek)	Water Surface	Surface Water	Existing	X	X
SW-3 (in Bolin Creek)	Water Surface	Surface Water	Existing	X	X
SW-4 (in Bolin Creek)	Water Surface	Surface Water	Existing	X	X
SW-5 (in Bolin Creek)	Water Surface	Surface Water	Existing	X	X
SW-6 (in Bolin Creek)	Water Surface	Surface Water	Proposed	X	X
SW-7 (in Bolin Creek)	Water Surface	Surface Water	Proposed	X	X
SW-8 (Runoff in swale) ^{3,4}	Water Surface	Sediment	Proposed	X	X
SW-12 (Runoff in swale) ^{3,4}	Water Surface	Sediment	Proposed	X	X
SW-16 (Runoff in swale) ^{3,4}	Water Surface	Sediment	Proposed	X	X
SW-18 (Runoff in swale) ^{3,4}	Water Surface	Sediment	Proposed	X	X
SW-21 (Runoff in swale) ^{3,4}	Water Surface	Sediment	Proposed	X	X

1. Metals shall include constituents that exceeded the background ranges in any of the prior soil sample locations (i.e., arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, manganese, nickel, selenium, and strontium).

2. Monitor wells MW-8 and MW-9 to be installed and sampled during Spring or Summer 2019. The data will not be available for the May 15, 2019 meeting with Chapel Hill Town Council.

3. Surface water run-off samples to be collected during the first 2 hours of a heavy rain event. The data may not be available for the May 15, 2019 meeting with Chapel Hill Town Council.

4. Surface water samples shall be co-located with sediment samples with the same numeric suffix (i.e., SW-8 co-located with SED-8). Other sample location may be selected depending on flow.

**Table 2. Proposed Sampling and Analysis Plan for Soil and Sediment Samples
Human Health and Ecological Risk Assessment Monitoring
828 Martin Luther King, Jr. Boulevard Property, Chapel Hill, North Carolina**

Soil/Sediment Sample Location	Sample Depth(s)	Media	Existing or New Location	Analytes		
				Metals ¹ 6020B	Mercury 7471B (Soil/Sediment)	Hexavalent Chromium ² 7199
BG-6	0-1 feet and 2-3 feet bls	Soil	Proposed	X	X	H
BG-7	0-1 feet and 2-3 feet bls	Soil	Proposed	X	X	H
BG-8	0-1 feet and 2-3 feet bls	Soil	Proposed	X	X	H
GP-5 (Replicate)	4-6 feet bls	Soil	Existing	X	X	H
GP-6 (Replicate)	9-11 feet bls	Soil	Existing	X	X	H
HH-9	0-1 feet bls	Soil	Proposed	X	X	H
HH-10	0-1 feet bls	Soil	Proposed	X	X	H
HH-11	0-1 feet bls	Soil	Proposed	X	X	H
SED-1 (in Bolin Creek, adjacent to SW-1)	Sediment Surface	Sediment	Existing	X	X	H
SED-2 (in Bolin Creek, adjacent to SW-2)	Sediment Surface	Sediment	Existing	X	X	H
SED-3 (in Bolin Creek, adjacent to SW-3)	Sediment Surface	Sediment	Existing	X	X	H
SED-3a (1 foot from bank in Bolin Creek, adjacent to SW-3)	Sediment Surface	Sediment	Proposed	X	X	H
SED-4 (in Bolin Creek, adjacent to SW-4)	Sediment Surface	Sediment	Existing	X	X	H
SED-5 (in Bolin Creek, adjacent to SW-5)	Sediment Surface	Sediment	Existing	X	X	H
SED-5a (1 foot from bank in Bolin Creek, adjacent to SW-5)	Sediment Surface	Sediment	Proposed	X	X	H
SED-6 (in Bolin Creek, adjacent to SW-6)	Sediment Surface	Sediment	Proposed	X	X	H
SED-7 (in Bolin Creek, adjacent to SW-7)	Sediment Surface	Sediment	Proposed	X	X	H
SED-8 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-9 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-10 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-11 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-12 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-13 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-14 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-15 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-16 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-17 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-18 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-19 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-20 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H
SED-21 (in swale)	2-6 inches bls	Sediment	Proposed	X	X	H

1. Metals shall include constituents that exceeded the background ranges in any of the prior soil sample locations (i.e., arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, manganese, nickel, selenium, and strontium).

2. Hexavalent chromium analyses are only required if total chromium concentrations in the soil samples exceed the IHSB Preliminary Soil Remediation Goal (PSRG) for total chromium of 0.31 mg/kg. Then the residential PSRG for chromium (III) of 23,000 mg/kg shall apply as the applicable remedial goal.

H = Hold samples in laboratory, depending on results of total chromium analyses.