

Remedial Investigation First Phase Report – Revision 1

Mud Creek Dump - NONCD0000798 Hendersonville, North Carolina

September 3, 2015
H&H Job No. HVL-002



#C-1269 Engineering
#-245 Geology

**Remedial Investigation – First Phase Report
Mud Creek Dump – NONCD0000798
Hendersonville, North Carolina
H&H Job No. HVL-002**

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Remedial Investigation – First Phase Report
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1.0 Introduction

Hart & Hickman, PC (H&H) has completed Remedial Investigation - First Phase activities at the Mud Creek Dump (NONCD0000798). The site is located west of Mud Creek between William H. King Memorial Park and Lincoln Circle in Hendersonville, Henderson County, North Carolina. Recent geophysical survey results identify three discrete areas of buried debris associated with former Mud Creek Dump waste disposal activities. For the purposes of this report, the three areas of buried material defined by interpreted geophysical survey results are treated as one contiguous waste disposal area (subject site). A topographic review map depicting the waste disposal area is provided as Figure 1.

The scope of work for the First Phase investigation included tasks outlined in the North Carolina Department of Environment and Natural Resources (DENR) Inactive Hazardous Sites Branch (IHSB) Pre-Regulatory Landfill Unit (Unit) *Guidelines for Addressing Pre-Regulatory Landfills and Dumps* (Guidelines) updated December 2014. Marshall, Miller & Associates (MM&A) initially identified the Mud Creek Dump site in their *Site Summary Report* dated December 18, 2007 which addressed items 1 through 3 of the Guidelines. Therefore, this report documents the findings outlined under items 4 through 12 of the Guidelines.

2.0 Site and Surrounding Area Map

H&H conducted site reconnaissance activities on March 9 through 12, 2015, to identify structures, paved and landscaped areas, type and extent of ground cover, general surface conditions, sumps, septic systems, surface water bodies, storm water conduits present at the subject site and nearby area.

Four main access points into the waste disposal area were identified during site reconnaissance activities. The subject site is accessible from the Oklawaha Greenway at North Main Street located to the northwest (Access 1), a City of Hendersonville maintained utility right-of-way access road near Martin Circle located to the west (Access 2), William H. King Memorial Park to the southwest (Access 3), and Oklawaha Greenway at 7th Avenue East located to the southeast (Access 4). A Site and Surrounding Area map is provided as Figure 2. Photographs of features observed during the site reconnaissance are included as Appendix A.

The majority of the subject site is undeveloped and is predominantly covered by dense mixed deciduous and conifer wooded land. William H. King Park and an associated baseball diamond are located within the southwestern portion of subject site. Additionally, several residences located along the eastern side of Martin Circle appear to be located within the waste disposal area. H&H observed several buried and partially buried drums in the southern portion of the site during site reconnaissance activities and during excavation activities conducted in July 2014. Scattered debris such as refrigerators, tires, and other small appliances were observed in the northern portions of the subject site during recent assessment activities.

3.0 Vicinity Map

H&H conducted a vicinity land use survey to identify property boundaries, available utilities, and zoning designations for the subject site and properties located within 500 feet of the waste disposal area boundary. Additionally, H&H confirmed the locations of available utilities depicted on a map provided by the City of Hendersonville. Zoning designations, municipal utilities, and property boundaries located within 500 feet of the waste disposal boundary are depicted on Figure 3.

H&H reviewed available zoning data in the City of Hendersonville and Henderson County, NC, interactive GIS mapping databases. The parcels comprising the subject site are designated as High Density Residential (R-6). Properties located within 500 feet of the northeastern waste disposal boundary and across Mud Creek are designated Urban Village (UV). Properties located east of the subject site and across Mud Creek are zoned Highway Business (C-3). Properties located south of the subject site along 7th Avenue East are zoned Highway Business (C-3) and Secondary Business (C-2). Properties located to the west of the waste disposal boundary along Lincoln Circle, Martin Circle, and Robinson Terrace are zoned High Density Residential (R-6). Properties located along the railway corridor to the west of the subject site are designated as Industrial (I-1). Portions of the Hyman Heights Historical District (HHH) are present within 500 feet of the northwestern waste disposal boundary along Hyman Avenue.

The City of Hendersonville provided H&H with a map depicting available public utilities in the area surrounding the subject site. H&H conducted reconnaissance to locate surface features such as water meters, hydrants, manholes, CATV and telephone pedestals, stormwater pipes, and utility poles. H&H also talked to several local residents to confirm utilities in certain areas surrounding the Site. A recently installed sanitary sewer easement is located along the eastern boundary of waste disposal parallel to Oklawaha Greenway and Mud Creek (Photograph 1).

4.0 Water Source Survey

H&H conducted a water source survey to identify water supply wells, springs, and surface water features within 1,000 feet of the waste disposal area. Two water supply wells were identified approximately 1,500 feet north-northeast of the subject site at residences located in a rural neighborhood along Oklawaha Drive and Azalea Woods Drive (Photograph 2 and Photograph 3). The residences in this area are located outside of the Hendersonville city limits and municipal water and sanitary sewer services are currently not available; however, these services may become available as part of the Oklawaha Village development project. Although not observed during site reconnaissance activities, it is assumed that approximately four other residences within 1,000 feet of the waste disposal boundary located in this neighborhood have active water supply wells as there is no other source of potable water for the residents. Additionally, two residences located approximately 750 feet northwest of the northern boundary of waste disposal are likely serviced by water supply wells because municipal water is not provided to this property and the residences are occupied. Locations of observed and potential water supply wells are depicted on Figure 4. Property identification numbers, addresses, property owner names, phone numbers (if listed), and approximate distances to the closest boundary of buried material are summarized in Table 1.

The waste disposal area is bound to the east by Mud Creek, a Class C waterway that flows in a generally northwesterly direction towards the French Broad River (Photograph 4). Johnson Drainage Ditch is located in a predominantly undeveloped area east-northeast of Mud Creek and flows toward Mud Creek (Photograph 5). Several unnamed tributaries (Photograph 6) and stormwater drainages (Photograph 7) were observed within the boundaries of waste disposal. All nearby tributaries and unnamed surface water features observed during field activities flow toward Mud Creek. Locations of observed surface water features are provided on Figure 4 and a summary of surface water bodies is provided as Table 2.

H&H observed four inundated wetland areas located in the northern, central (two areas) and southern portions of the waste disposal area (Figure 4). The wetland area observed in the northern portion of the subject site is identified as a mixed freshwater emergent and freshwater forest/shrub wetland on the US Fishery and Wildlife Service National Wetland Inventory (NWI) database

(Photograph 8). Most of this wetland area was inundated and impassable on the day of field activities. The wetland areas observed in the central and southern portion of the subject site (Photograph 9) are not identified in the NWI database; however, Clearwater Environmental, a consultant company contracted by the City, recently performed wetland delineation activities at the subject site prior to installation of the new sanitary sewer pipeline. The Clearwater wetland delineations results were provided to H&H by the City and identify the areas in the central and southern portions of the sewer easement as wetlands. The areas identified by Clearwater correspond to the locations of wetland areas observed by H&H. In addition to the wetlands identified within the waste disposal area, a freshwater forest wetland is identified on the NWI database located northeast of Mud Creek near the Johnson Drainage Ditch.

5.0 Sensitive Environment Survey

H&H contacted the agencies listed in Appendix A of the Guidelines to request information regarding recognized environmentally sensitive areas within 500 feet of the waste disposal boundary. According to information provided by the DENR Natural Heritage Program (NHP), significant portions of Mud Creek Dump are located in a Registered Heritage Area (RHA) identified as the Mud Creek Bridge and Eubank Swamp Remnant natural area. Additionally, the Mud Creek Wetlands RHA, owned by the City of Hendersonville, is located within the waste disposal boundary and nearby area and provides suitable habitat for the endangered perennial vine American Bittersweet (*Celastrus scandens*) and trees associated with montane alluvial forest environments. The agreement between DENR and the City specifies that these RHA areas will be managed as natural areas and left undisturbed to protect the quantity and quality of water in Mud Creek and its associated wetlands, minimize invasion of weedy species in the wetlands or uplands, and keep habitats supporting rare species intact. Based on site reconnaissance observations, the sensitive areas located within 500 feet of waste disposal described above have been left intact and are predominantly undisturbed.

Additional information obtained from the NHP indicates that the occurrence of several other rare species have been documented within one mile of the subject site. Presence of the listed species at the subject site and nearby area cannot be determined without field specific observations; however, the occurrence of the species within close proximity to the site increases the probability that they are present if suitable habitats exist. Rare species identified within one mile of the Mud Creek Dump and listed in the NHP databases include (but are not limited to) the Trailing Wolfsbane, French Broad River Crayfish, Southern Blotched Chub, Swamp Pink, French Broad Heartleaf, *Macdunnoa brunnea* (a mayfly), Bunched Arrowhead, Sweet Indian-plantain, and the Appalachian Golden-banner. Sensitive environments supporting the identified rare species found within the waste disposal area and 500 ft of its boundaries are depicted on Figure 5 and a summary of the agencies contacted and responses (if received) are provided in Table 3. Communication logs with each agency contacted and written responses (if received) are included in Appendix B.

6.0 Geophysical Survey

H&H contracted with Geo Solutions Inc. (GSI) to conduct a surface geophysical survey at the subject site to delineate the horizontal extent of waste material associated with former Mud Creek Dump disposal activities. From March 9 to March 11, 2015, GSI completed a multi-frequency electromagnetic survey with a Model GEM-2 EM unit capable of collecting both in-phase (metallic debris) and apparent conductivity data. A GPS unit was integrated with the GEM-2 unit to provide site-wide latitude and longitude data at sub-meter accuracy. The unit was secured to a PVC sled and towed with a four wheeled ATV in a series of profiles in open areas of the subject site (Photograph 10). The EM and GPS instrumentation was pulled by hand through areas of the site with dense vegetation deemed impassible with the ATV (Photograph 11).

Results of the high-resolution electromagnetic survey indicate three discrete areas of waste disposal at the subject site identified as Areas A through Area C. The horizontal extents of the three areas of waste disposal are shown on Figure 6 and GPS locations of the perimeter of the waste disposal areas are summarized on Table 4. Geo Solution's *Geophysical Investigation of Mud Creek Landfill Area, Hendersonville, North Carolina* report dated April 29, 2015 is provided in Appendix C.

Area A is located in the northern portion of the site and is a relatively large area with elevated apparent conductivity values indicating buried and unburied debris. Geophysicists reported observing partially buried former building materials (concrete blocks and pipes), white goods (stoves, heaters, and metal containers), and miscellaneous debris (bottles, plastic toys, lawn chairs, tires, etc). An inundated wetland area located in this area was impassible and GSI was unable to collect EM data in this portion of the site. However, based on data collected up to the edges of the inundated area and observations made in the field, it does not appear that a significant amount of waste is present in the wetland.

Area B is located in the central portion of the subject site and demonstrates elevated in-phase values suggesting a significant amount of the buried waste consists of metallic debris. Area B extends from Mud Creek to the east beneath several parcels of the residential development along

Martin Circle to the west. In July 2014, H&H provided oversight during excavation activities associated with installation of the sanitary sewer pipeline through a portion of Area B. Significant amounts of metallic debris and car parts were observed from just below the surface to depths up to 8 feet below the ground surface during that excavation (Photograph 12). Results of the excavation activities are documented in our *Dump Area Excavation* report dated September 23, 2014.

Area C is located in the southern portion of the site. The majority of buried material in this area is located beneath the baseball diamond at William H. King Memorial park and extends beneath a security fence associated with an apartment complex at the corner of Robinson Terrace and 7th Avenue East. Additionally, an inundated and therefore impassable wetland area was observed near the southern portion of buried waste. GSI was unable to collect EM data in this portion of Area C, but based on observation made in the field and EM results from the edges of the inundated area, it is likely that buried material extends into this wetland. In July 2014, H&H provided oversight during excavation activities associated with installation of the sanitary sewer through this portion of buried debris. Excavated material included predominantly partially intact steel 55-gallon drums (Photograph 13). Additionally, during reconnaissance and excavation activities conducted at the time of the 2014 sanitary sewer installation, H&H observed partially buried drums outside of the proposed excavation alignment near the perimeter of a wooded area located northeast of the William H. King Memorial park baseball diamond (Photograph 14). The partially buried drums observed outside of the sanitary sewer right-of-way and excavation area during pipeline installation activities were left in place. Results of the excavation activities are documented in our *Drum Area Excavation* report dated August 18, 2014. Access for equipment needed for sewer line installation purposes was near the perimeter of the wooded area and in the general vicinity of the partially buried drums. Sewer installation subcontractor traffic through this area likely partially covered the exposed drums as they were not observed during recent assessment activities.

7.0 Local Geology and Hydrogeology

According to data obtained from the North Carolina Geologic Survey Geologic Map of North Carolina dated 1985, the Hendersonville area, including the subject site, is located in the Chauga Belt of the Blue Ridge Physiographic province of North Carolina. The Blue Ridge region is generally described as a deeply dissected mountainous area with numerous steep northeast to southwest trending ridges. The waste disposal area is underlain by Henderson Gneiss. This approximately 524 million year old (Cambrian) metamorphosed intrusive rock unit consists of monzonitic to granodioritic mineralogy with inequigranular texture.

The waste disposal area is located in a portion of a valley feature associated with Mud Creek. The shallow aquifer groundwater flow regime is expected to be influenced by Mud Creek which defines the eastern boundary of buried material. Some localized flow may be attributed to unnamed tributaries of Mud Creek located in the northern portion and central portion of the subject site. Depth to groundwater at the subject site ranged from 3.5 to 8.5 feet below the ground surface during groundwater assessment activities conducted by H&H in June 2014.

TABLES

Table 1
Water Supply Well Survey Summary
Mud Creek Dump - NONCD0000798
Hendersonville, North Carolina
H&H Job No. HVL-002

Water Supply Well Survey						
Map ID	Parcel #	Physical Address	Listed Owner of Parcel	Phone Number	Approximate Distance from Subject Site (feet)	Well Observed
1	9926626	1500 & 1502 North Main St.	Jere E. & Mary Helen Hyder	(828) 693-9040	720	No
2	9932387	1590 North Main St.	Ted C. Barnett	No Listing	1,000	No
3	0114280	157 Ochlawaha Dr.	Robert Ricky Ruff	(828) 692-0865	975	No
4	0115753	202 Azalea Woods Dr.	Shawn Thomas Gilson	No Listing	1,000	No
5	0114263	209 Ochlawaha Dr	Robert Ricky Ruff	(828) 692-0865	950	No
6	1014817	No Address Assigned	Hickory Realty Fund, LLC	No Listing	985	No
7	9905688	No Address Assigned	Billy Ray and Cora Genelle Sargent	No Listing	1,500	Yes
8	9905687	200 Azalea Woods Dr.	Billy Ray and Cora Genelle Sargent	No Listing	1,550	Yes

Table 2
Remedial Investigation - First Phase Report
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Surface Water Body Survey						
Water Body Type	Name	Flow Direction	Surface Water Intakes	Approximate Distance from Waste	Water Resource Owners	Address of Owners
Stream	Mud Creek	generally northwest	None Observed	eastern boundary	--	--
Stream	Johnson Drainage Ditch	generally northwest	None Observed	50-800ft	--	--
Stream	unnamed tributary (southwest)	east to northeast toward Mud Creek	None Observed	transects central portion of subject site	--	--
Stream	unnamed tributary (northeast)	generally northwest toward Mud Creek	None Observed	headwaters located northern portion of the subject site	--	--
Stream	unnamed tributary (east)	generally southwest toward Mud Creek	None Observed	50 ft east (across Mud Creek)	--	--
Wetlands	Mud Creek Wetlands	Little to no flow	None Observed	northern, central, and southern portions of the subject site	--	--

Table 3 (Page 1 of 2)
Remedial Investigation - First Phase Report
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Agency	Contact Information	Sensitive Environment	Present	If yes, explanation
NC Division of Parks and Recreation	environmental.review@ncdenr.gov	State Parks	No	--
		Areas Important to Maintenance of Unique Natural Communities	Yes	See Environmental Review
		Sensitive Areas Identified Under the National Estuary Program	No	--
		Designated State Natural Areas	Yes	See Environmental Review
		State Seashore, Lakeshore, and River Recreational Areas	No	--
		Rare Species (state and federal Threatened and Endangered)	Yes	See Environmental Review
		Sensitive Aquatic Habitat	Yes	See Environmental Review
US Fish and Wildlife Service	On Website	State Wild and Scenic Rivers	No	--
National Park Service	Bambi Teague Bambi_Teague@nps.gov 828-348-3439	National Seashore, Lakeshore, and River Recreational Areas	No	--
		National Parks or Monuments	No	--
		Federal Designated Wild & Scenic Rivers	No	--
US Forest Service	pisgahrd@fs.fed.us 1600 Pisgah Hwy Pisgah Forest, NC 28768 828-877-3265	Designated and Proposed Federal Wilderness and Natural Areas	No	--
		National Preserves and Forests	No	--
		Federal Land Designated for the Protection of Natural Ecosystems	No	--
NC Division of Water Quality	Andrew Moore andrew.w.moore@ncdenr.gov 828-296-4684	State-Designated Areas for Protection or Maintenance of Aquatic Life	No	Mud Creek Classified as a Class C (least restricted) water use, no special restrictions for water use, all waterways are given a class, C has the least restrictions
NC Division of Forest Resources	Lee Wicker Henderson County Ranger lee.wicker@ncagr.gov 828-891-3957	State Preserved and Forests	No	--
NC Department of Cultural Resources	Annie McDonald annie.mcdonald@ncdcr.gov 828-296-7230 ext 223	National and State Historical Sites	No	--

Table 3 (Page 2 of 2)
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Agency	Contact Information	Sensitive Environment	Present	If yes, explanation
NC Division of Coastal Management	Michele Walker Michele.Walker@ncdenr.gov 919-707-8604	Areas Identified Under Coastal Protection Legislation, Coastal Barriers or Units of a Coastal Barrier	No	--
NC Wildlife Resources Commission	Ann May ann.may@ncwildlife.org 919-707-0050	National or State Wildlife Refuges	No	--
		State Lands Designated for Wildlife or Game Management	No	--
		Spawning Areas Critical for the Maintenance of Fish/Shellfish Species with River, Lake or Coastal Tidal Waters	No	--
	Division of Marine Fisheries Website: http://portal.ncdenr.org/web/mf/afsa-maps	Migratory Pathways and Feeding Area Critical for Maintenance of Anadromous Fish Species within River Reaches or Areas in Lakes or Coastal Tidal Waters in which such Fish Spend Extended Periods of Time	No	--
US Fish and Wildlife Service	Website: http://www.fws.gov/wetlands/Data/Mapper.html	Wetlands	Yes	Freshwater Emergent and Freshwater Forested/Shrub Wetlands
National Oceanic & Atmospheric Administration	http://sanctuaries.noaa.gov/about/southeast.html	Marine Sanctuaries	No	--
National Heritage Registry	Allen Ratzlaff allen_ratzlaff@fws.gov (828) 258-3939 ext 229	Areas likely to Serve as a Natural Area Attractive to Terrestrial Ecological Receptors	Yes	See Environmental Review
		Areas of Stressed Vegetation or Wildlife	No	--
		Endangered Species	Yes	See Environmental Review
		Terrestrial Areas Utilized for Breeding by Large or Dense Aggregations of Animals	No	--

**Table 4 (Page 1 of 4)
 Summary of GPS Coordinates
 Mud Creek Dump NONCD0000798
 Hendersonville, North Carolina
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Waypoint	GPS Waypoint Description	*State Plane (meters)		**Decimal Degrees	
		State Plane X	State Plane Y	Latitude	Longitude
1	Waste Disposal Area A	295072.713	180912.242	35.3314418	-82.4605923
2	Waste Disposal Area A	295129.667	180890.230	35.3312614	-82.4599578
3	Waste Disposal Area A	295161.113	180855.638	35.3309597	-82.4595988
4	Waste Disposal Area A	295183.825	180831.529	35.3307496	-82.4593399
5	Waste Disposal Area A	295224.356	180819.999	35.3306584	-82.4588899
6	Waste Disposal Area A	295243.923	180776.323	35.3302711	-82.4586580
7	Waste Disposal Area A	295272.574	180760.599	35.3301384	-82.4583370
8	Waste Disposal Area A	295264.538	180725.659	35.3298211	-82.4584120
9	Waste Disposal Area A	295258.948	180706.791	35.3296494	-82.4584662
10	Waste Disposal Area A	295268.731	180700.152	35.3295927	-82.4583561
11	Waste Disposal Area A	295306.118	180705.393	35.3296516	-82.4579471
12	Waste Disposal Area A	295344.552	180721.815	35.3298116	-82.4575309
13	Waste Disposal Area A	295384.035	180671.151	35.3293676	-82.4570775
14	Waste Disposal Area A	295374.252	180665.910	35.3293173	-82.4571830
15	Waste Disposal Area A	295362.023	180671.850	35.3293670	-82.4573197
16	Waste Disposal Area A	295349.444	180659.970	35.3292560	-82.4574534
17	Waste Disposal Area A	295319.046	180669.055	35.3293283	-82.4577911
18	Waste Disposal Area A	295289.346	180666.958	35.3293001	-82.4581168
19	Waste Disposal Area A	295232.043	180661.368	35.3292317	-82.4587446
20	Waste Disposal Area A	295184.524	180698.055	35.3295473	-82.4592810
21	Waste Disposal Area A	295203.042	180718.321	35.3297357	-82.4590852
22	Waste Disposal Area A	295192.560	180738.936	35.3299182	-82.4592084
23	Waste Disposal Area A	295169.849	180755.009	35.3300558	-82.4594642
24	Waste Disposal Area A	295159.366	180731.948	35.3298448	-82.4595706
25	Waste Disposal Area A	295141.547	180751.864	35.3300186	-82.4597741

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Waypoint	GPS Waypoint Description	*State Plane (meters)		**Decimal Degrees	
		State Plane X	State Plane Y	Latitude	Longitude
26	Waste Disposal Area A	295087.389	180795.890	35.3303982	-82.4603864
27	Waste Disposal Area A	295031.483	180846.554	35.3308371	-82.4610204
28	Waste Disposal Area A	294996.892	180857.036	35.3309207	-82.4614047
29	Waste Disposal Area A	295004.579	180875.205	35.3310868	-82.4613272
30	Waste Disposal Area A	295040.917	180901.411	35.3313343	-82.4609377
31	Waste Disposal Area B	295410.280	180649.837	35.3291838	-82.4567808
32	Waste Disposal Area B	295430.468	180628.096	35.3289943	-82.4565505
33	Waste Disposal Area B	295454.150	180603.638	35.3287814	-82.4562808
34	Waste Disposal Area B	295475.503	180577.238	35.3285502	-82.4560360
35	Waste Disposal Area B	295531.408	180520.557	35.3280571	-82.4553997
36	Waste Disposal Area B	295529.467	180501.145	35.3278816	-82.4554136
37	Waste Disposal Area B	295474.338	180543.074	35.3282421	-82.4560357
38	Waste Disposal Area B	295446.385	180491.827	35.3277716	-82.4563234
39	Waste Disposal Area B	295427.750	180433.593	35.3272412	-82.4565059
40	Waste Disposal Area B	295395.915	180432.816	35.3272242	-82.4568556
41	Waste Disposal Area B	295381.939	180466.204	35.3275206	-82.4570220
42	Waste Disposal Area B	295420.762	180480.957	35.3276657	-82.4566009
43	Waste Disposal Area B	295376.504	180572.968	35.3284807	-82.4571226
44	Waste Disposal Area B	295374.174	180584.226	35.3285814	-82.4571526
45	Waste Disposal Area B	295358.645	180601.308	35.3287304	-82.4573298
46	Waste Disposal Area B	295369.904	180609.461	35.3288074	82.4572092
47	Waste Disposal Area B	295390.868	180596.261	35.3286951	-82.4569737
48	Waste Disposal Area B	295393.586	180612.955	35.3288463	-82.4569502
49	Waste Disposal Area B	295390.092	180642.849	35.3291145	-82.4570000

**Table 4 (Page 3 of 4)
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Waypoint	GPS Waypoint Description	*State Plane (meters)		**Decimal Degrees	
		State Plane X	State Plane Y	Latitude	Longitude
50	Waste Disposal Area C	295642.830	180345.853	35.3265182	-82.4541080
51	Waste Disposal Area C	295670.006	180316.736	35.3262644	-82.4537981
52	Waste Disposal Area C	295704.559	180291.501	35.3260479	-82.4534086
53	Waste Disposal Area C	295737.170	180256.560	35.3257433	-82.4530367
54	Waste Disposal Area C	295741.440	180201.043	35.3252445	-82.4529686
55	Waste Disposal Area C	295741.440	180147.079	35.3247583	-82.4529479
56	Waste Disposal Area C	295731.346	180111.750	35.3244369	-82.4530454
57	Waste Disposal Area C	295698.347	180100.491	35.3243251	-82.4534038
58	Waste Disposal Area C	295657.194	180094.668	35.3242597	-82.4538539
59	Waste Disposal Area C	295647.100	180126.114	35.3245399	-82.4539769
60	Waste Disposal Area C	295623.418	180123.008	35.3245045	-82.4542361
61	Waste Disposal Area C	295618.371	180100.103	35.3242965	-82.4542828
62	Waste Disposal Area C	295585.760	180120.291	35.3244682	-82.4546490
63	Waste Disposal Area C	295571.395	180140.479	35.3246455	-82.4548146
64	Waste Disposal Area C	295546.937	180143.973	35.3246694	-82.4550848
65	Waste Disposal Area C	295540.725	180177.749	35.3249717	-82.4551660
66	Waste Disposal Area C	295553.149	180197.549	35.3251540	-82.4550371
67	Waste Disposal Area C	295565.572	180261.219	35.3257315	-82.4549249
68	Waste Disposal Area C	295560.525	180276.748	35.3258698	-82.4549863
69	Waste Disposal Area C	295568.290	180334.594	35.3263934	-82.4549231
70	Waste Disposal Area C	295600.901	180327.994	35.3263441	-82.4545620
71	Access 1	295132.561	180945.137	35.3317570	-82.4599470
72	Access 2	295419.344	180437.974	35.3272780	-82.4566000
73	Access 3	295555.778	180255.346	35.3256755	-82.4550303
74	Access 4	295795.914	180135.966	35.3246753	-82.4523448

Table 4 (Page 4 of 4)
Summary of GPS Coordinates
Mud Creek Dump NONCD0000798
Hendersonville, North Carolina
H&H Job No. HVL-002

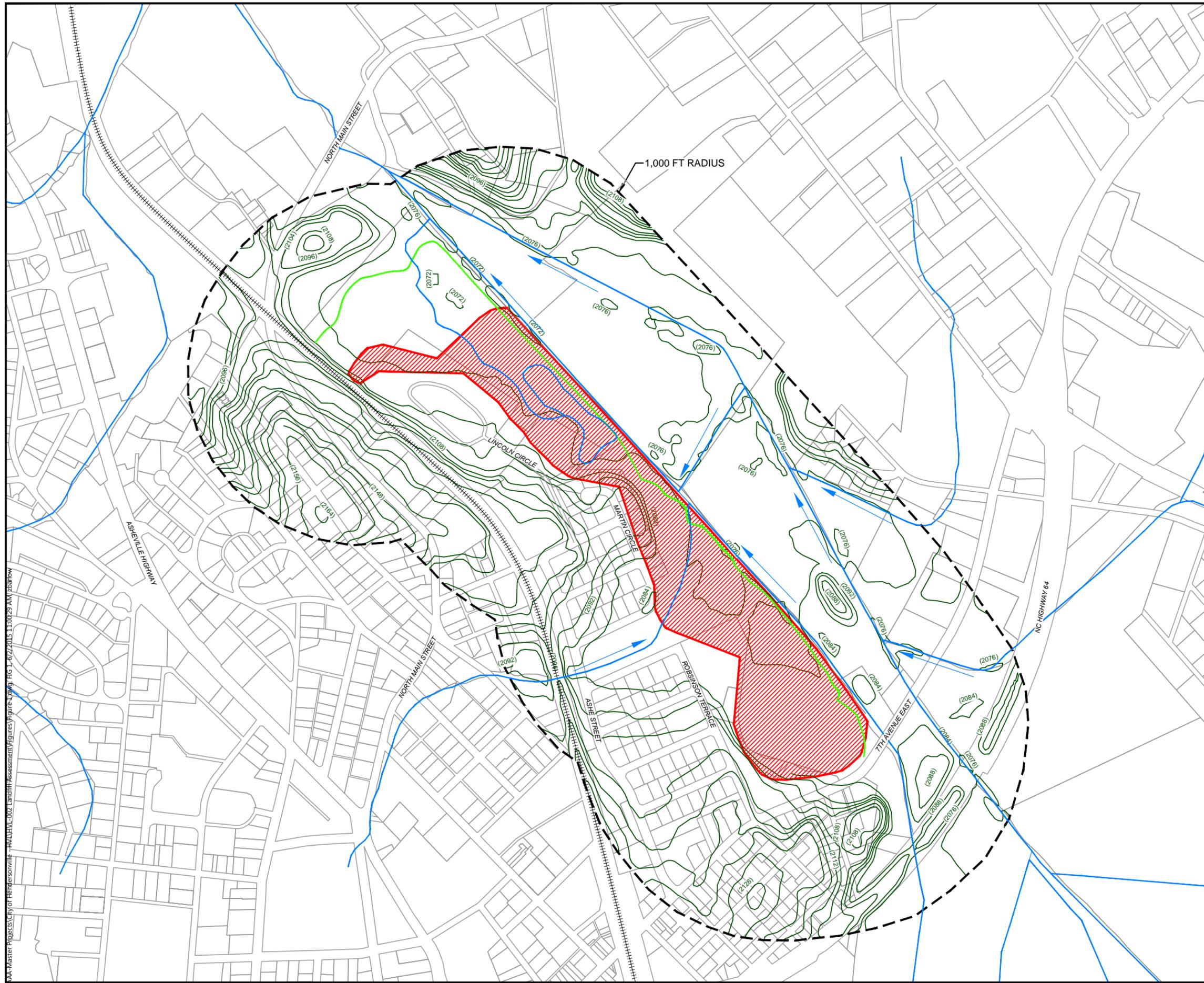
Waypoint	GPS Waypoint Description	*State Plane (meters)		**Decimal Degrees	
		State Plane X	State Plane Y	Latitude	Longitude
75	Photograph 1	294976.310	181099.823	35.3331015	-82.4617241
76	Photograph 2	295021.996	181348.766	35.3353585	-82.4613173
77	Photograph 3	295025.245	181328.924	35.3351808	-82.4612740
78	Photograph 4	295434.109	180634.755	35.3290554	-82.4565130
79	Photograph 5	295409.005	180259.243	35.3256645	-82.4566452
80	Photograph 6	295468.431	180577.356	35.3285491	-82.4561138
81	Photograph 7	294987.478	181075.243	35.3328835	-82.4615919
82	Photograph 8	294920.364	181054.003	35.3326711	-82.4623216
83	Photograph 9	295747.075	180162.501	35.3248990	-82.4528919
84	Photograph 10	295545.642	180230.877	35.3254519	-82.4551323
85	Photograph 11	295595.309	180451.335	35.3274536	-82.4546707
86	Photograph 12	295402.170	180632.561	35.3290256	-82.4568633
87	Photograph 13	295733.490	180247.764	35.3256629	-82.4530738
88	Photograph 14	295714.216	180276.281	35.3259138	-82.4532966

Notes:

* State plane coordinates are recorded using the North American Datum of 1983 (NAD83).

** Decimal degrees are recorded using the World Geodetic System of 1984 (WGS84).

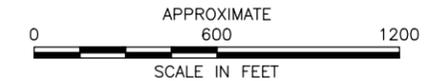
FIGURES



LEGEND

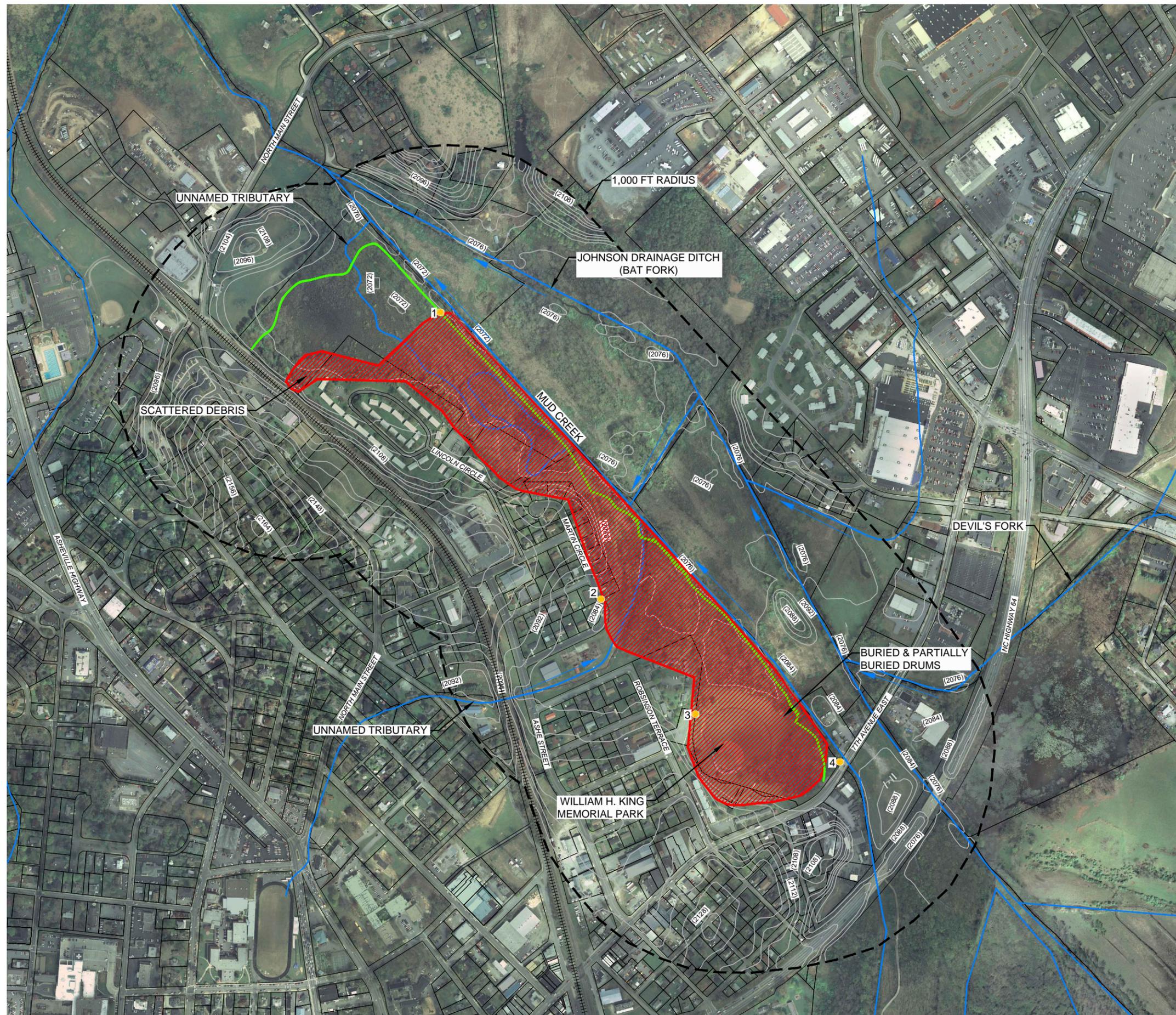
- WASTE DISPOSAL AREA
- SURFACE WATER BODY
- PROPERTY BOUNDARY
- ++++ RAILROAD TRACKS
- (2076) INDEX CONTOUR (FT ABOVE MSL)
- 4 FOOT CONTOUR INTERVAL
- OKLAWAHA GREENWAY
- - - 1,000 FOOT RADIUS FROM WASTE DISPOSAL BOUNDARY
- SURFACE WATER FLOW DIRECTION

NOTE:
 ELEVATION DATA PROVIDED BY
 USGS 2007 LIDAR SURVEY.



TOPOGRAPHIC REVIEW MAP	
MUD CREEK DUMP - NONCD0000798 HENDERSONVILLE, NORTH CAROLINA	
 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: 05-27-15	REVISION NO. 0
JOB NO. HVL-002	FIGURE NO. 1

S:\AA\Master Projects\City of Hendersonville - HVA\HVL-002 Landfill Assessment\Figures\Figure 1.dwg, FIG 1.dwg, 2015.11.09.29 AM, zdbartow



LEGEND

- WASTE DISPOSAL AREA
- SURFACE WATER BODY
- PROPERTY BOUNDARY
- ++++ RAILROAD TRACKS
- (2076) INDEX CONTOUR (FT ABOVE MSL)
- 4 FOOT CONTOUR INTERVAL
- OKLAWAHA GREENWAY
- ACCESS POINT
- - - 1,000 FOOT RADIUS FROM WASTE DISPOSAL BOUNDARY
- SURFACE WATER FLOW DIRECTION

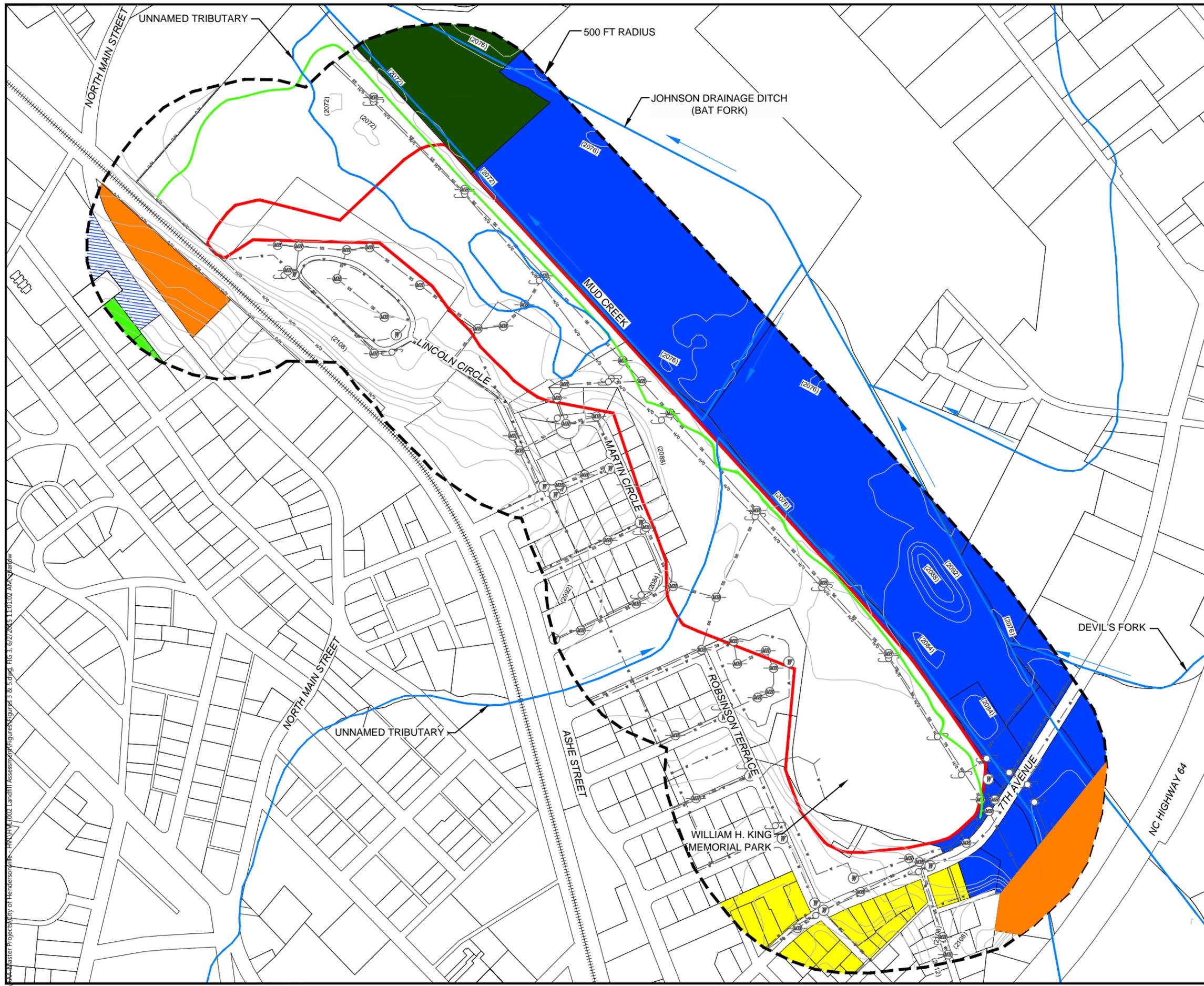
NOTE:

1. 2010 AERIAL IMAGERY OBTAINED FROM NC ONEMAP.
2. ELEVATION DATA PROVIDED BY USGS 2007 LIDAR SURVEY.
3. ACCESS POINT NUMBERS CORRESPOND TO GPS POINTS LISTED ON TABLE 4.



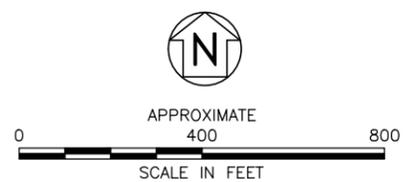
APPROXIMATE
0 600 1200
SCALE IN FEET

TITLE SITE & SURROUNDING AREA MAP	
PROJECT MUD CREEK DUMP - NONCD0000798 HENDERSONVILLE, NORTH CAROLINA	
 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: 09-03-15	REVISION NO. 0
JOB NO. HVL-002	FIGURE NO. 2



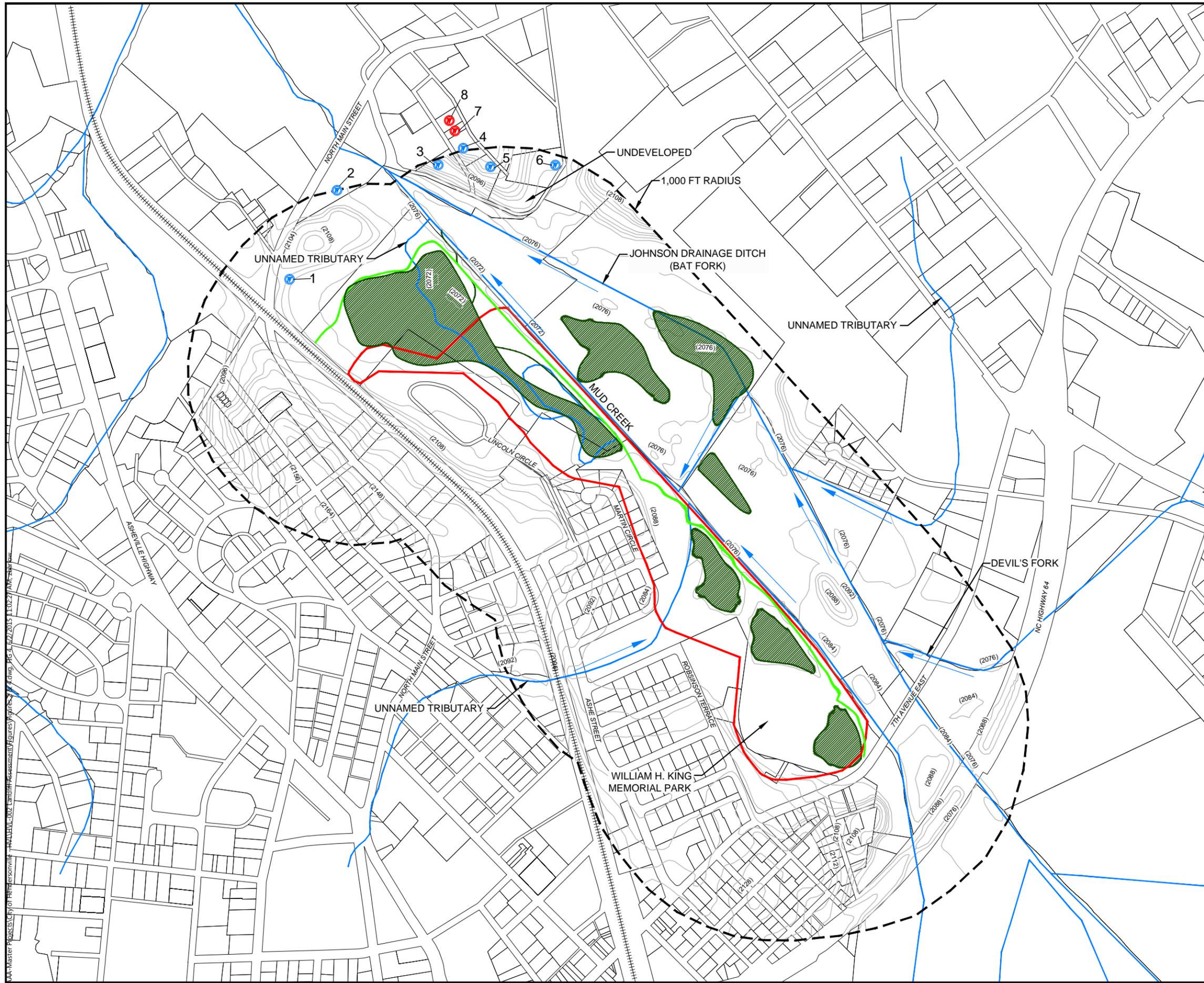
- LEGEND**
- WASTE DISPOSAL AREA
 - SURFACE WATER BODY
 - PROPERTY BOUNDARY
 - ++++ RAILROAD TRACKS
 - (2076) INDEX CONTOUR (FT ABOVE MSL)
 - 4 FOOT CONTOUR INTERVAL
 - OKLAWAHA GREENWAY
 - UTILITY POLE
 - ⊙ MANHOLE
 - ⊙ WATER METER
 - WATER LINE
 - SEWER LINE
 - ELECTRIC LINE
 - URBAN VILLAGE
 - HIGHWAY BUSINESS
 - INDUSTRIAL
 - SECONDARY BUSINESS
 - ▨ LOW DENSITY RESIDENTIAL
 - HYMAN HEIGHTS HISTORIC DISTRICT
 - HIGH DENSITY RESIDENTIAL
 - - - 500 FOOT RADIUS FROM WASTE DISPOSAL BOUNDARY
 - ➔ SURFACE WATER FLOW DIRECTION

NOTE:
ELEVATION DATA PROVIDED BY USGS 2007 LIDAR SURVEY.



TITLE SITE VICINITY MAP	
PROJECT MUD CREEK DUMP - NONCD0000798 HENDERSONVILLE, NORTH CAROLINA	
 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: 05-27-15	REVISION NO. 0
JOB NO. HVL-002	FIGURE NO. 3

S:\Master Projects\City of Hendersonville - HVA\HVA_002 Landfill Assessment\Figures\Figures 3 & 5.dwg, FIG 3, 07/27/2015 11:03:02 AM, JAW

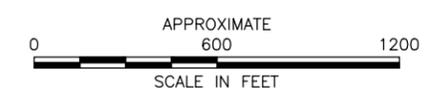


LEGEND

- WASTE DISPOSAL AREA
- SURFACE WATER BODY
- WETLANDS
- PROPERTY BOUNDARY
- ⋯ RAILROAD TRACKS
- (2076) INDEX CONTOUR (FT ABOVE MSL)
- 4 FOOT CONTOUR INTERVAL
- OKLAWAHA GREENWAY
- WATER SUPPLY WELL (OBSERVED)
- WATER SUPPLY WELL (POTENTIAL)
- SURFACE WATER FLOW DIRECTION
- - - 1,000 FOOT RADIUS FROM WASTE DISPOSAL BOUNDARY

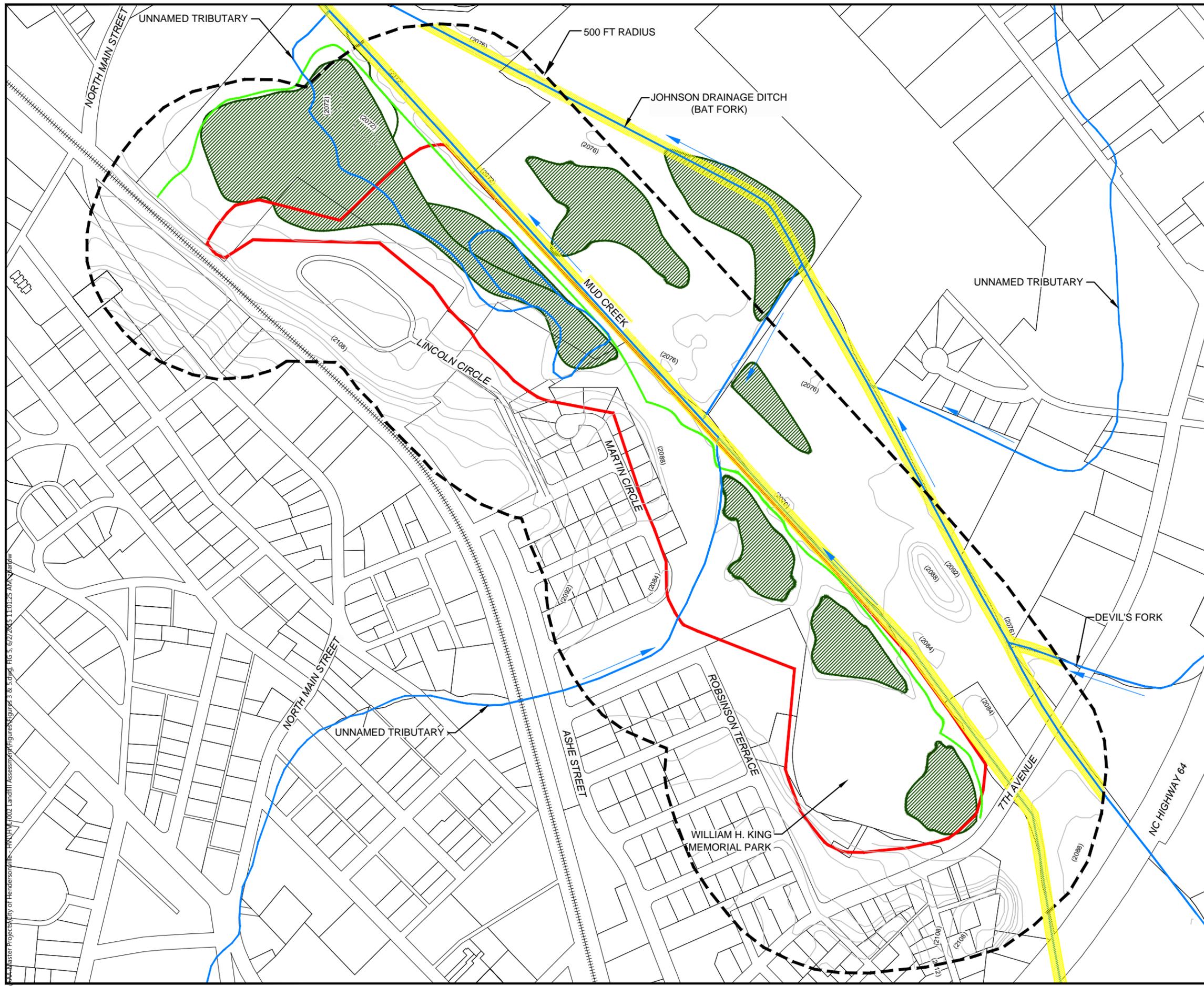
NOTE:

1. MAP ID NUMBERS CORRESPOND TO PROPERTY INFORMATION SUMMARIZED ON TABLE 1.
2. ELEVATION DATA PROVIDED BY USGS 2007 LIDAR SURVEY.



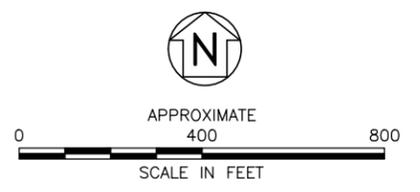
TITLE	
WATER SOURCE SURVEY	
PROJECT	
MUD CREEK DUMP - NONCD0000798 HENDERSONVILLE, NORTH CAROLINA	
SMARTER ENVIRONMENTAL SOLUTIONS	
2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 704-586-0007(p) 704-586-0373(f) License # C-1269 / #C-245 Geology	
DATE: 05-27-15	REVISION NO. 0
JOB NO. HVL-002	FIGURE NO. 4

S:\AA\Master Projects\CITY OF HENDERSONVILLE - HAVAHM\02 Landfill Assessment\Figures\Figures_4.dwg, FIG 4, 07/27/2015 11:02:27 AM, 487



- LEGEND**
- WASTE DISPOSAL AREA
 - SURFACE WATER BODY
 - PROPERTY BOUNDARY
 - ++++ RAILROAD TRACKS
 - WETLANDS
 - (2076) INDEX CONTOUR (FT ABOVE MSL)
 - 4 FOOT CONTOUR INTERVAL
 - OKLAWAHA GREENWAY
 - WETLANDS ASSOCIATED WITH MUD CREEK BRIDGE AND EUBANK SWAMP REMNANT NATURAL AREA RHA (REGISTERED HERITAGE AREA)
 - POTENTIAL ESTUARY FOR SELECT SENSITIVE ECOLOGICAL RECEPTORS IDENTIFIED BY THE DENR NATURAL HERITAGE PROGRAM
 - - - 500 FOOT RADIUS FROM WASTE DISPOSAL BOUNDARY
 - SURFACE WATER FLOW DIRECTION

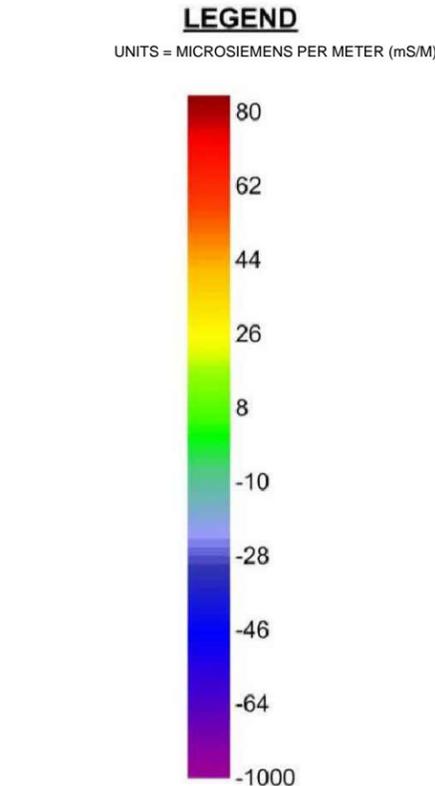
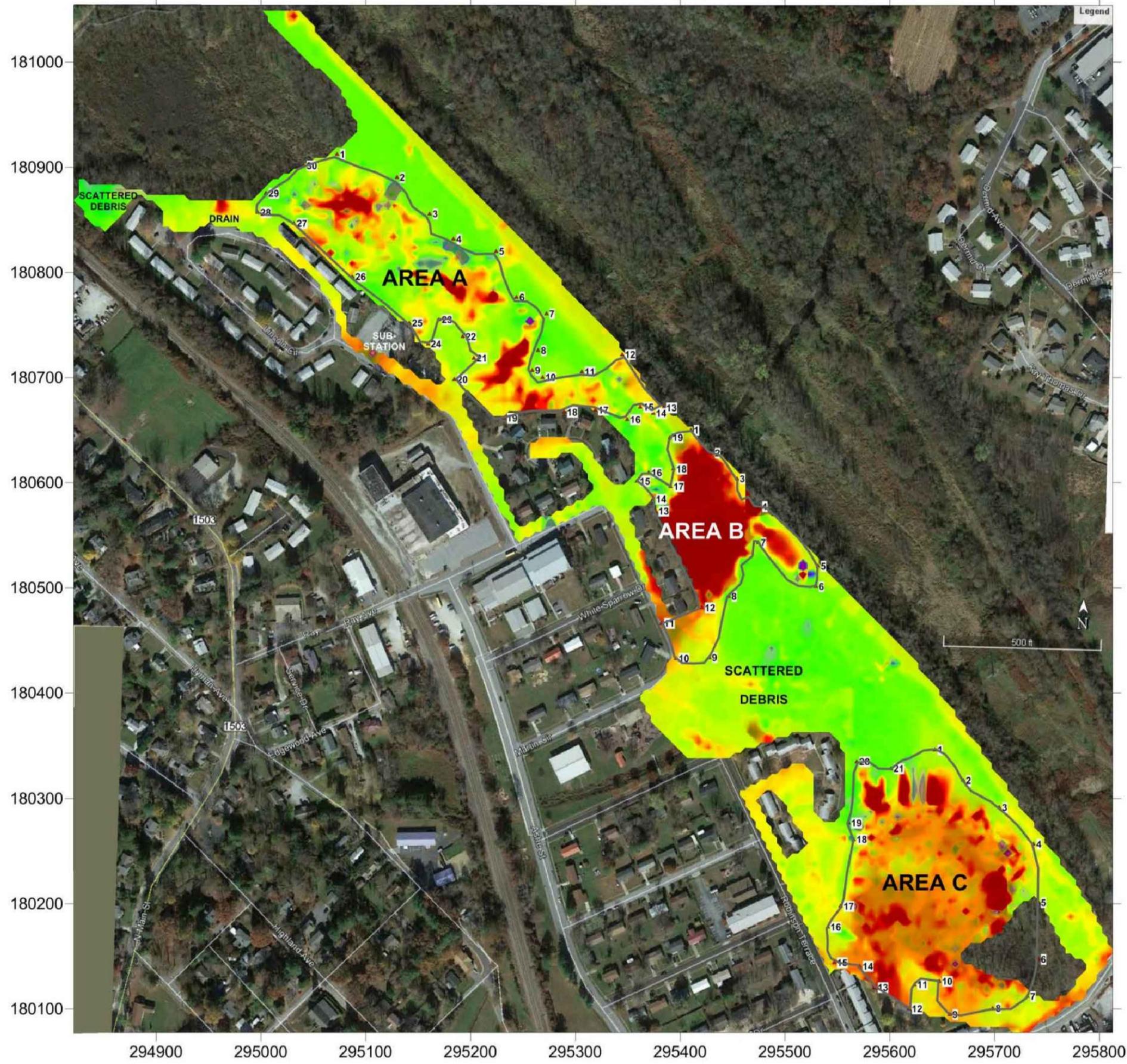
NOTE:
ELEVATION DATA PROVIDED BY USGS 2007 LIDAR SURVEY.



TITLE	
SENSITIVE ENVIRONMENT SURVEY	
PROJECT	
MUD CREEK DUMP - NONCD0000798 HENDERSONVILLE, 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: 05-27-15	REVISION NO. 0
JOB NO. HVL-002	FIGURE NO. 5

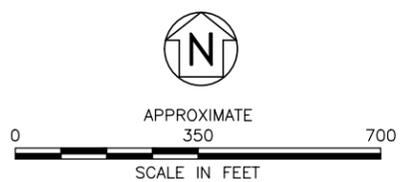
S:\AA\Master Projects\City of Hendersonville - HVA\HVA_002 Landfill Assessment\Figures\Figures 3 & 5.dwg, FIG 5, 07/27/2015 11:01:25 AM, SHARAW

S:\AAA-Master Projects\City of Hendersonville - HVL\HVL-002 Landfill Assessment\Figures\Geophysical Survey.dwg, FIG 6, 9/3/2015 10:26:18 AM, zbarlow



- NOTES**
1. NUMBERS OUTLINING AREA A THROUGH AREA C CORRESPOND TO GPS COORDINATES LISTED ON TABLE 4.
 2. IMAGE TAKEN FROM GEO SOLUTIONS, LTD. *GEOPHYSICAL INVESTIGATION OF MUD CREEK LANDFILL AREA, HENDERSONVILLE, NORTH CAROLINA* REPORT DATED APRIL 19, 2015.
 3. ELEVATED IN-PHASE AND APPARENT CONDUCTIVITY VALUES INDICATE HIGHER PROBABILITY OF BURIED WASTE MATERIAL.

**RESULTS OF MFEM EVALUATION
COMPOSITE OF IN-PHASE AND
APPARENT CONDUCTIVITY**



TITLE GEOPHYSICAL SURVEY MAP	
PROJECT MUD CREEK DUMP - NONCD0000798 HENDERSONVILLE, NORTH CAROLINA	
 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: 09-02-15	REVISION NO. 0
JOB NO. HVL-002	FIGURE NO. 6

NORTH CAROLINA STATE GRID COORDINATES (METRIC)

APPENDIX A
SITE RECONNAISSANCE PHOTOGRAPHIC LOG



Photograph 1: Sanitary sewer easement located near the eastern boundary of waste disposal (view from the north).



Photograph 2: Water supply well located approximately 1,500 feet northeast of northern waste disposal boundary.



Photograph 3: Water supply well located approximately 1,500 feet northeast of northern waste disposal boundary.



Photograph 4: Mud Creek located near the eastern waste disposal boundary (view from the south).



Photograph 5: Johnson Drainage Ditch located east of Mud Creek (view from west side of bridge at 7th Avenue East).



Photograph 6: Unnamed tributary of Mud Creek (view from the west).



Photograph 7: Stormwater drainage ditch located west of Mud Creek (view from the east).



Photograph 8: Wetland located in the northern portion of the subject site (view from the east).



Photograph 9: Wetland located in the southern portion of the subject site (view from the east).



Photograph 10: Geo Solutions conducting EM survey with instruments pulled by ATV.



Photograph 11: Geo Solutions conducting EM survey in wetland area located in the central portion of the subject site.



Photograph 12: Metallic debris being excavated for sewer installment (July 2014) through waste disposal Area B.



Photograph 13: Excavation of drums during sewer installment (July 2014) through waste disposal Area C.



Photograph 14: Partially buried 55-gallon steel drums observed in waste disposal Area C.

APPENDIX B
SENSITIVE ENVIRONMENT SURVEY COMMUNICATION LOG

Appendix B (Page 1 of 2)
Remedial Investigation - First Phase Report
Mud Creek Dump - NONCD0000798
Hendersonville, North Carolina
H&H Job No. HVL-002

Sensitive Environment Communication Log		
Landfill Name: Mud Creek Dump		ID: NONCD0000798
Date	Time	Notes
3/11/2015	14:45	Called Henderson County Parks and Recreation Department (828-697-4884), requesting information regarding sensitive environments within 500 feet of the Mud Creek Dump landfill. Was given phone numbers for Park Director, Tim Hopkins and City of Hendersonville Public Works -KJW
	15:00	Left voicemail with Tim Hopkins, Park Director of Henderson County, requesting information regarding sensitive environments within 500 feet of the site - KJW
3/12/2015	11:03	Tim Hopkins returned call and was able to answer a few questions within his jurisdiction. He said there were no state parks, sensitive areas identified under the national estuary program, or state seashore, lakeshore or river recreational areas within 500 feet of the site. -KJW
3/11/2015	15:05	Called and spoke with Sue Anderson, Planning Director with City of Public Works. Ms. Anderson informed me that Tim Hopkins would be able to provide available information. - KJW
	15:45	Left voice message for Allen Ratzlaff of US Fish and Wildlife (828-258-3939) requesting information regarding sensitive environments within 500 feet of the site. -KJW
	15:55	Spoke with Lee Wicker, Henderson County Ranger for NC Division of Forest Resources (828-891-3957). Mr. Wicker informed me that there were no State Preserves or State Forests within 500 feet of the site. - KJW
	16:00	Spoke with Michele Walker of NC Division of Coastal Management (919-707-8604). Ms. Walker informed me that there are no areas identified under coastal protection legislation, coastal barriers or units of coastal barrier within 500 feet of the site. -KJW
3/12/2015	9:05	Spoke with Bambi Teague, a biologist for the National Park Service (828-348-3439). Ms. Teague informed me that there are no listed national seashores, lakeshores, river recreational areas, national parks or monuments, or federal lands designated as wild and scenic rivers within 500 ft of the site. Ms. Teague also mentioned that there is a website that may be able to answer other questions regarding the sensitive environments survey. - KJW
	9:23	Left voicemail for US Forest Service (828-877-3265), requesting information regarding sensitive environments within 500 feet of the site. - KJW

Appendix B (Page 2 of 2)
Remedial Investigation - First Phase Report
Mud Creek Dump - NONCD0000798
Hendersonville, North Carolina
H&H Job No. HVL-002

Sensitive Environment Communication Log		
Landfill Name: Mud Creek Dump		ID: NONCD0000798
Date	Time	Notes
3/12/2015	9:35	Talked with Andrew Moore of NC Division of Water Quality (828-296-4684). Mr. Moore said he would give me a call back after doing some research on sensitive environments located near the site. - KJW
	10:12	Mr. Moore called back informing me that Mud Creek is identified as a Class C surface water body indicating that the creek has the least amount of restrictions regarding its use. No other specific restrictions have been identified for Mud Creek by the Division of Water Quality. - KJW
	9:41	Left voicemail for Annie McDonald with the NC Department of Cultural Resources (828-296-7230) requesting information regarding sensitive environments within 500 feet of the site. - KJW
	9:50	Left voicemail for Ann May an outreach biologist for the NC Wildlife Resources Commission (919-707-0050), requesting information regarding sensitive environments within 500 feet of the site. - KJW
3/13/2015	12:02	Ann May returned my call informing me that there are no national or state wildlife refuges or state lands designated for wildlife or game management. Ms. May plans to talk with others about other environments that fall under the Wildlife Resources Commission's jurisdiction. She also mentioned that their website may have additional information. - KJW
	11:13	Sent (via email) a information request form to Allison Weakley of the NC National Heritage Program (allison.weakley@ncdenr.gov) requesting an environmental review for sensitive environments within 500 feet of the site. - KJW
4/1/2015	13:07	Received completed information request from Allison Weakley for the environmental review for sensitive environments within 500 feet of the site. - KJW
4/7/2015	10:00	Left second voice message for Allen Ratzlaff of the US Fish and Wildlife (828-258-3939) requesting information regarding sensitive environments within 500 feet of the site. - KJW
4/7/2015	10:00	Allen Ratzlaff of US Fish and Wildlife (828-258-3939) returned my phone call and informed me that there are no natural areas attractive to terrestrial ecological receptors or terrestrial areas utilized for breeding by large or dense aggregations of animals identified within 500 feet of the site. - KJW

Ken Windsand

From: Weakley, Allison <allison.weakley@ncdenr.gov>
Sent: Wednesday, April 01, 2015 11:26 AM
To: Ken Windsand
Subject: RE: Information Request
Attachments: H&H#HVL-002_MudCreekDump_Hendersonville_20150401_AEW.pdf

Dear Mr. Windsand:

Attached is a response to your request for the Mud Creek Dump site in Hendersonville. Please feel free to contact me if you have questions or need additional information.

Thank you,
~Allison

Allison Schwarz Weakley, Conservation Planner
[North Carolina Natural Heritage Program](#)
Office of Land and Water Stewardship
NC Department of Environment and Natural Resources
1601 Mail Service Center, Raleigh, NC 27699-1601
(919) 707.8629 / allison.weakley@ncdenr.gov

Visit our new webpages that allow you to view NCNHP data and explore the state's conservation priorities!

NC Natural Heritage Data Explorer (NHDE) - <https://ncnhde.natureserve.org>
NC Conservation Planning Tool (CPT) - www.conservationtool.nc.gov

E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Ken Windsand [<mailto:KWindsand@harthickman.com>]
Sent: Friday, March 13, 2015 11:46 AM
To: Weakley, Allison
Subject: Information Request

Dear Allison,

Attached is our request for information regarding a site in Hendersonville, North Carolina.

Please let me know if you have any questions regarding this request.

Kindest Regards,

Kenneth Windsand, Staff Engineer
Hart & Hickman, PC | 2923 South Tryon Street, Suite 100 | Charlotte, NC 28203
Direct 704-887-4632 | Mobile 704-579-8117 | Main 704-586-0007
www.harthickman.com



North Carolina Department of Environment and Natural Resources
Office of Land and Water Stewardship

Pat McCrory
Governor

Bryan Gossage
Director

Donald R. van der Vaart
Secretary

April 1, 2015

Mr. Kenneth Windsand
Hart and Hickman, P.C.
2923 South Tryon Street, Suite 100
Charlotte, North Carolina 28203
kwindsand@harthickman.com

RE: Mud Creek Dump (NONCD0000798) – Environmentally Sensitive Areas Survey
North Main Street and 7th Avenue East, Hendersonville, Henderson County, North Carolina
H&H Project No. HVL.002

Dear Mr. Windsand:

Thank you for the opportunity to provide information from the North Carolina Natural Heritage Program (NCNHP) database for the proposed project referenced above. The NCNHP database shows that a portion of the project area is within the Mud Creek Bridge and Eubank Swamp Remnant natural area, and a large portion of the project area is a Registered Heritage Area (Mud Creek Wetlands RHA), owned by the City of Hendersonville and considered to be Henderson County open space. The Registry agreement between the North Carolina Department of Environment and Natural Resources and the City of Hendersonville states that “the owner agrees to leave wetland and upland vegetation undisturbed to: 1) protect the quality and quantity of water in Mud Creek and its associated wetlands, 2) minimize invasion of weedy species in the wetlands or uplands, and 3) keep habitats supporting rare species intact.” The NCNHP database also shows an element occurrence record for American Bittersweet (*Celastrus scandens*) and a record for a high-quality Montane Floodplain Slough Forest natural community within the proposed project area.

Within one mile of the proposed project area, the NCNHP database shows element occurrence records for the following rare species:

SCIENTIFIC NAME	COMMON NAME	ELEMENT OCCURRENCE STATUS	ACCURACY	STATE STATUS	FEDERAL STATUS
<i>Aconitum reclinatum</i>	Trailing Wolfsbane	Current	Low	SR-T	---
<i>Calopteryx amata</i>	Superb Jewelwing	Historical	Very Low	SR	---
<i>Cambarus reburus</i>	French Broad River Crayfish	Current	Medium	SR	FSC
<i>Celastrus scandens</i>	American Bittersweet	Current	Medium	E	---
<i>Crotalus horridus</i>	Timber Rattlesnake	Historical	Low	SC	---
<i>Dendrolycopodium dendroideum</i>	Prickly Ground-pine	Historical	Very Low	SR-P	---
<i>Erimystax insignis eristigma</i>	Southern Blotched Chub	Current	Medium	SR	FSC
<i>Helonias bullata</i>	Swamp Pink	Current	High	T	T

SCIENTIFIC NAME	COMMON NAME	ELEMENT OCCURRENCE STATUS	ACCURACY	STATE STATUS	FEDERAL STATUS
<i>Hexastylis rhombiformis</i>	French Broad Heartleaf	Current	Medium	SR-L	FSC
<i>Macdunnoa brunnea</i>	a mayfly	Current	Medium	SR	---
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Historical	Medium	SC-H	C
<i>Sagittaria fasciculata</i>	Bunched Arrowhead	Current	High	E	E
<i>Sarracenia jonesii</i>	Mountain Sweet Pitcher Plant	Historical (2 records)	Low (2 records)	E	E
<i>Senecio suaveolens</i>	Sweet Indian-plantain	Current	High	SC-H	---
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Historical	Very Low	SR-G	---
<i>Thermopsis mollis</i>	Appalachian Golden-banner	Current	Low	SC-V	---

*For status and accuracy definitions, please see the Rare Species Status Definitions and Element Occurrences documents at <https://ncnhde.natureserve.org/content/help>.

The occurrences of Trailing Wolfsbane, Timber Rattlesnake, and Appalachian Golden-banner are all documented within the vicinity of Hendersonville. The occurrence records for Superb Jewelwing, Prickly Ground-pine, and Eastern Spotted Skunk all have very low accuracy due to the lack of site-specific locational information associated with these records, but all three species have been documented in Henderson County.

The occurrence of French Broad River Crayfish is from Bat Fork Creek (Johnson Drainage Ditch), just east of the project area. As noted above, the occurrence of American Bittersweet is located within the proposed project area and the Mud Creek Wetlands RHA. The occurrence of Southern Blotched Chub is from Clear Creek, northeast of the project area, and also from Mud Creek and Bat Fork Creek (Johnson Drainage Ditch).

The occurrences of Swamp Pink, White Fringeless Orchid, and Bunched Arrowhead are from the Bat Fork Bog natural area, southeast of the project area. There is also a record of a high-quality Swamp Forest-Bog Complex (Typic Subtype) natural community within this natural area. A portion of the Bat Fork Bog natural area is owned and managed by the North Carolina Plant Conservation Program as a Dedicated Nature Preserve.

The occurrence of French Broad Heartleaf is from Tom Hill in Hendersonville, southwest of the project area, and the occurrence of *Macdunnoa brunnea* (a mayfly) is from Mud Creek in the vicinity of SR-1508, north of the project area.

There are two occurrences of Mountain Sweet Pitcher plant within one mile of the project area; one is located at Bat Fork Bog natural area, southeast of the project area, and the other is northwest of the project area in the vicinity of Stoney Mountain.

The occurrence of Sweet Indian-plantain is located in the Jackson Park Wetlands natural area, just south of the project area. There is also a record for a high-quality Piedmont Swamp Forest within this natural area. A portion of the Jackson Park Wetlands is also a RHA owned and managed by the City of Hendersonville.

In addition, there are several conservation/managed areas within one mile of the project area considered to be Henderson County open space, and a property considered to be City of Hendersonville open space. There is also a record for a high-quality Piedmont/Montane Semi-permanent Impoundment natural community located in the portion of the Mud Creek Bridge and Eubank Swamp Remnant natural area located southwest of the project area

The locations of natural areas and conservation/managed areas near the project area may be viewed by accessing the Natural Heritage Data Explorer online map viewer, or by downloading and using Geographic Information System (GIS) data; both options are available from the NCNHP Data Services webpage (see www.ncnhp.org).

Please note that occurrences of rare species documented within one mile of the proposed project area increase the likelihood that these species may be present within the project area if suitable habitat exists. The use of Natural Heritage Program data should not be substituted for actual field surveys if needed, particularly if the project area contains suitable habitat for rare species. If rare species are found during field surveys, the NCNHP would appreciate receiving this information so that we may update our database.

Thank you for your inquiry, and please feel free to contact me at Allison.Weakley@ncdenr.gov or 919-707-8629 if you have questions or need additional information.

Ken Windsand

From: Weakley, Allison <allison.weakley@ncdenr.gov>
Sent: Wednesday, April 01, 2015 12:58 PM
To: Ken Windsand
Cc: Finnegan, John
Subject: RE: Information Request

Hi, Ken ~

Our data manager, John Finnegan (copied on this email), responded to a request for this information yesterday, and advised that the datasets that we maintain can potentially be used to fulfill the following NCDWM sensitive environments requirements for information:

Managed Areas shapefile (MAREA)

- State Parks
- Designated State Natural Areas (these are unit types in the State Park system)
- State Seashore, Lakeshore and River Recreational Areas
- State Wild & Scenic Rivers
- National Seashore, Lakeshore and River Recreational Areas
- National Parks or Monuments
- Federal Designated Wild & Scenic Rivers
- Designated ~~and Proposed~~ Federal Wilderness and Natural Areas
- National Preserves and Forests
- State Preserves and Forests
- National and State Historical Sites (coverage may be incomplete)
- Coastal Barriers or Units of a Coastal Barrier Resources System
- National or State Wildlife Refuges
- State lands designated for wildlife or game management (aka, Wildlife Resources Commission game lands)

Natural Heritage Natural Areas shapefile (NHNA)

- Areas Important to Maintenance of Unique Natural Communities
- Sensitive Aquatic Habitat
- Sensitive Areas Identified under the National Estuary Program (along with submerged aquatic vegetation [SAV] shapefiles?)

Natural Heritage Element Occurrences shapefile (NHEO)

- Rare species (state and federal Threatened and Endangered)
- Endangered Species (how is this different from above?)

Unknown

- Federal Land Designated for the Protection of Natural Ecosystems
- State-Designated Areas for Protection or Maintenance of Aquatic Life
- Areas Identified Under Coastal Protection Legislation
- Migratory Pathways and Feeding Areas Critical for Maintenance of Anadromous Fish Species within River Reaches or Areas in Lakes or Coastal Tidal Waters in which such Fish Spend Extended Periods of Time
- Spawning Areas Critical for the Maintenance of Fish/Shellfish Species within River, Lake or Coastal Tidal Waters
- Wetlands (NWI and NC-CREWS data?)

Our GIS data on Managed Areas, Natural Areas, and Element Occurrences are updated quarterly and are available via our website (www.ncnhp.org) under Data Services – GIS Download.

We will work with NC Division of Waste Management to incorporate more details about the information we can provide into their guidance documents. In the meantime, it's likely the following agencies can provide more information for the Unknown category listed above: NC Division of Coastal Management - Areas Identified Under Coastal Protection Legislation; NC Division of Water Resources - State-Designated Areas for Protection or Maintenance of Aquatic Life; and NC Division of Marine Fisheries - Anadromous Fish Species and Spawning Areas. Data on Wetlands are available via the National Wetlands Inventory (maintained by US Fish and Wildlife Service – see <http://www.fws.gov/wetlands/>) and NC-CREWS data for coastal counties (maintained by NC Division of Coastal Management – see <http://portal.ncdenr.org/web/cm/download-coastal-wetlands-spatial-data>).

Hope that helps,
~Allison

Allison Schwarz Weakley, Conservation Planner
[North Carolina Natural Heritage Program](#)
Office of Land and Water Stewardship
NC Department of Environment and Natural Resources
1601 Mail Service Center, Raleigh, NC 27699-1601
(919) 707.8629 / allison.weakley@ncdenr.gov

Visit our new webpages that allow you to view NCNHP data and explore the state's conservation priorities!

NC Natural Heritage Data Explorer (NHDE) - <https://ncnhde.natureserve.org>
NC Conservation Planning Tool (CPT) - www.conservationtool.nc.gov

E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Ken Windsand [mailto:KWindsand@harthickman.com]
Sent: Wednesday, April 01, 2015 11:47 AM
To: Weakley, Allison
Subject: RE: Information Request

Thank you Allison,

I have just one follow up question.

Does this reflect all potential sensitive environments based on the large list I gave you? If nothing else is mentioned is it safe to assume no other sensitive environments based on the list I gave you are not in the area?

Thanks again.

Regards,

Kenneth Windsand, Staff Engineer
Hart & Hickman, PC | 2923 South Tryon Street, Suite 100 | Charlotte, NC 28203
Direct 704-887-4632 | Mobile 704-579-8117 | Main 704-586-0007
www.harthickman.com



From: Weakley, Allison [<mailto:allison.weakley@ncdenr.gov>]
Sent: Wednesday, April 01, 2015 11:26 AM
To: Ken Windsand
Subject: RE: Information Request

Dear Mr. Windsand:

Attached is a response to your request for the Mud Creek Dump site in Hendersonville. Please feel free to contact me if you have questions or need additional information.

Thank you,
~Allison

Allison Schwarz Weakley, Conservation Planner
[North Carolina Natural Heritage Program](#)
Office of Land and Water Stewardship
NC Department of Environment and Natural Resources
1601 Mail Service Center, Raleigh, NC 27699-1601
(919) 707.8629 / allison.weakley@ncdenr.gov

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E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Ken Windsand [<mailto:KWindsand@harthickman.com>]
Sent: Friday, March 13, 2015 11:46 AM
To: Weakley, Allison
Subject: Information Request

Dear Allison,

Attached is our request for information regarding a site in Hendersonville, North Carolina.

Please let me know if you have any questions regarding this request.

Kindest Regards,

Kenneth Windsand, Staff Engineer
Hart & Hickman, PC | 2923 South Tryon Street, Suite 100 | Charlotte, NC 28203
Direct 704-887-4632 | Mobile 704-579-8117 | Main 704-586-0007
www.harthickman.com



Ken Windsand

From: McDonald, Annie <Annie.McDonald@ncdcr.gov>
Sent: Friday, March 13, 2015 11:32 AM
To: Ken Windsand
Cc: Gledhill-earley, Renee
Subject: RE: Site Map
Attachments: 500&1000FT RADIUS.PDF

Ken,

In response to your inquiry, I've copied below my signature a screen shot of our GIS-based online mapping system that shows the previously documented National Register-listed properties that overlap with the APE. For future reference for any other environmental review projects you work on in North Carolina, you can find a external-user version of this map (with basically the exact same documentation) here: <http://gis.ncdcr.gov/hpoweb/>

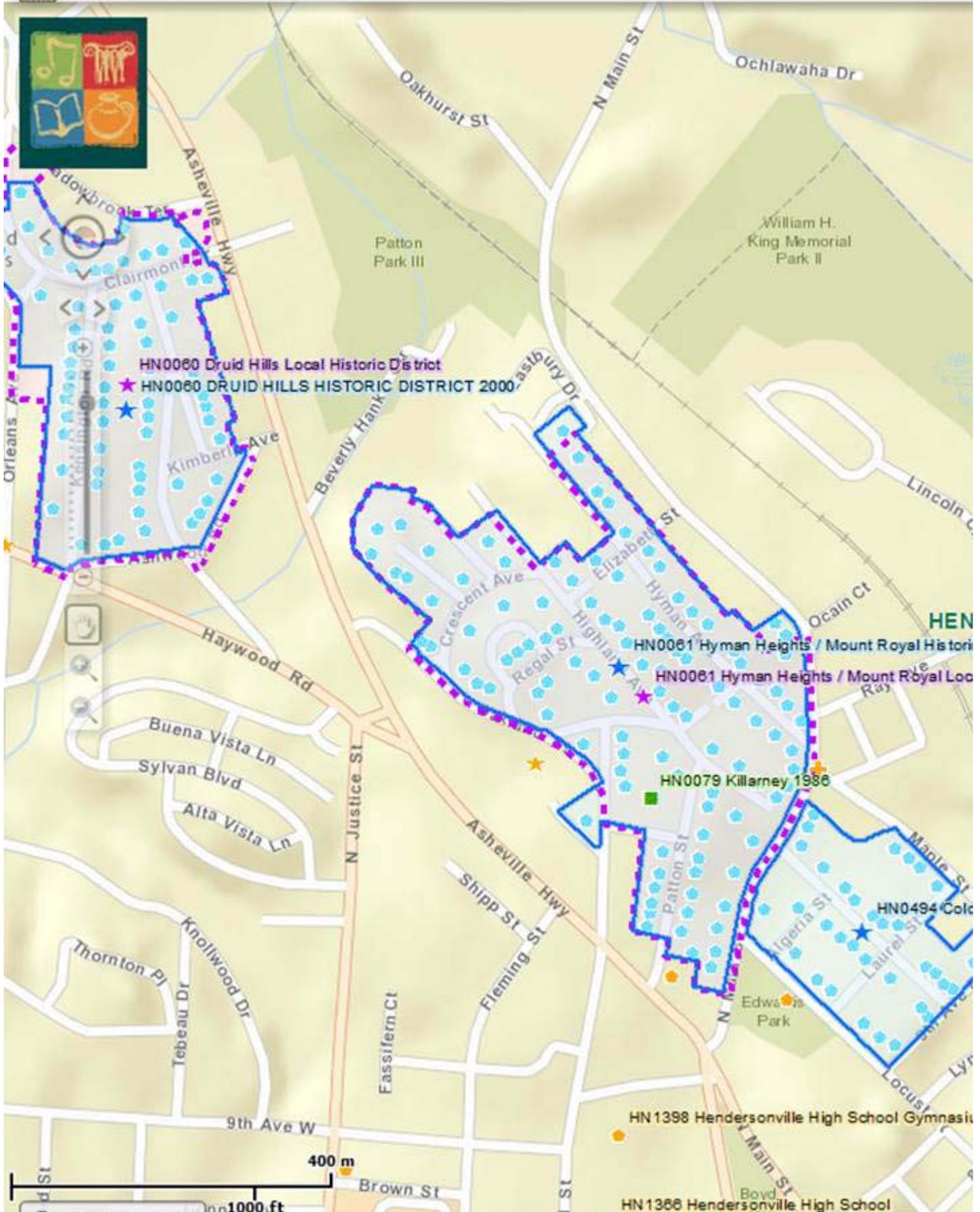
I highly recommend that you discuss the project with Renee Gledhill-Earley to find out whether or not you will need to do additional survey work to determine whether or not there are any previously unrecorded resources in the APE that might be considered eligible for listing in the National Register of Historic Places. I've copied Renee on this e-mail to facilitate communication. You may also reach her at 919.807.6579.

Regards,
Annie.

Annie Laurie McDonald
Preservation Specialist
State Historic Preservation Office - Asheville
NC Department of Cultural Resources
176 Riceville Road
Asheville, North Carolina 28805

828.296.7230 extension 223
www.hpo.ncdcr.gov

***My opinions may not be those of my agency.
***E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law "NCGS.Ch.132" and may be disclosed to third parties by an authorized state official.



From: Ken Windsand [<mailto:KWindsand@harthickman.com>]

Sent: Friday, March 13, 2015 11:20 AM

To: McDonald, Annie

Subject: Site Map

Hi Annie,

I just spoke with you on the phone to determine if there are any National and State Historic sites within a 1,000 ft Area of the Mud Creek Dump. I have attached an aerial outlining the approximate area of the landfill, and the yellow outline is our 1,000 ft perimeter. I look forward to hearing the results.

I appreciate you doing this.

Regards,

Kenneth Windsand, Staff Engineer

Hart & Hickman, PC | 2923 South Tryon Street, Suite 100 | Charlotte, NC 28203

Direct 704-887-4632 | Mobile 704-579-8117 | Main 704-586-0007

www.harthickman.com



APPENDIX C
GEOPHYSICAL SURVEY REPORT
Geo Solutions, Ltd.

April 29, 2015

Leonard Moretz
Hart & Hickman, PC
3334 Hillsborough St.
Raleigh, NC 27607

Re: Geophysical Investigation of Mud Creek Landfill Area, Hendersonville, North Carolina.

Dear Mr. Moretz:

Geo Solutions Limited, Inc. (Geo Solutions) is pleased to submit this report for a geophysical survey at the site of a dump site located south and west of Mud Creek between North Main Street and 7th Ave East. The purpose of this investigation was to evaluate the potential presence of buried and dumped debris within the area outlined in Figure 1 (the original area of evaluation “yellow” was expanded to include area outlined in red).



Figure 1. Geophysical Survey area within yellow dashed area (original area) and red outline (expanded area of evaluation).

Background

Hart and Hickman is presently conducting an environmental review at this site known to contain previously dumped and buried debris of unknown origin. Geo Solutions has been asked to evaluate the potential occurrence of these features at this site using electromagnetic (EM) geophysical equipment. This investigation is a follow-up to a previous investigation conducted along a pipeline right-of-way in June of 2014.

Field Activities

Geo Solutions conducted the approved geophysical investigations during March 8 through March 13, 2015 and included the following work:

1. A multifrequency electromagnetic survey of the site using a multiple frequency EM profiler attached to a continuous recording global positioning survey system (GPS). A Geophex Model Gem-2 profiler equipped with a Hemisphere Model 324 global Positioning Survey system (sub meter accuracy) was used to collect the EM data and provide accurate locations of the profile line. The survey was completed with an EM profile line spacing of no more than 100 feet. The location of the MFEM profile lines is presented in Figure 2.
2. Approximately 2/3rds of the site was not accessible using an AWD Polaris Ranger. As such Geo Solutions had to complete the survey by clearing brush to make paths though the very thick underbrush. A two person crew collected the data.
3. Several portions of the site were deemed unsafe for foot or vehicle traffic (usually where creeks and floor plain bottoms were very soft and could not support the weight of the geophysicist). Two portions of the site were determined to be unsafe for foot passage including some areas covered with vines and dense vegetation.

EM Evaluation Results

The results of the EM evaluation are presented in Figures 3 and 4. EM data was collected using a Geophex GEM-2 multifrequency electromagnetic profiler setup to operate in EM-31 mode (9810 Hz). The survey was completed using a sled mounted unit along the open land areas and then carried by hand in the densely wooded areas. Site coordinates were collected using a GPS data collection system that was integrated with the GEM-2 unit to provide sub-meter site wide accuracy. The data was collected at 7 frequencies, and later downloaded and processed using software provided by Geophex (WinGEM Version 2) to create in-phase and apparent conductivity data. The in-phase and apparent conductivity data was combined onto one map to produce a composite figure showing the extent of fill material (Figure 5). Here, red and orange hues indicate areas of elevated in-phase and apparent conductivity values. These hues generally correspond to the presence of buried or surface debris/garbage. There appears to be two general types of EM patterns that likely indicate differences in the composition of buried material. For purpose of discussion we have divided the site into three dump areas:

Area A Dump – is located on the northern one-half of the site. It is represented by a large area of dump and unburied debris consisting of former building material (concrete blocks, pipes) white goods (stoves, heaters, and metal containers, and miscellaneous material (bottles, plastic toys, lawn chairs, etc.). The material appears to have been dumped in an accretionary fashion displacing a drainage to the north and east.

Area B Dump – is located in the central one fourth of the site and is represented by buried and partially buried material. The bulk of the material is not visible at the site but presents a very strong in-phase response indicating a bulk of the buried material likely contains metal. Where visible metal debris is present.

Area C Dump – is all buried material and occupies the southern one fourth of the site (the bulk of this area is the local high school baseball field and an open grassy field with paved pathway. A portion of the Area C Dump was excavated during the placement of a gravity pipeline completed in the previous year. Geo Solutions has projected a small portion of the Area C Dump to be located in an inaccessible swampy area on the extreme southern end of the site. Geo Solutions also identified a small portion of this dump site to extend beneath the security fence of an apartment complex on the south eastern corner of the site.

The outline of the three dump areas was determined by the results of the EM evaluation and visual records made during the collection of data. The outline of the three dump areas are mapped in Figure 5 where map stations were estimated based on our interpretation of the dump boundaries. The coordinates for these stations are presented in the following tables and are marked on the map in Figure 5. All coordinates are listed in North Carolina State Grid Metric units.

AREA A DUMP

STATION	X	Y
1	295072.713	180912.242
2	295129.667	180890.230
3	295161.113	180855.638
4	295183.825	180831.529
5	295224.356	180819.999
6	295243.923	180776.323
7	295272.574	180760.599
8	295264.538	180725.659
9	295258.948	180706.791
10	295268.731	180700.152
11	295306.118	180705.393
12	295344.552	180721.815
13	295384.035	180671.151
14	295374.252	180665.910
15	295362.023	180671.850
16	295349.444	180659.970
17	295319.046	180669.055

18	295289.346	180666.958
19	295232.043	180661.368
20	295184.524	180698.055
21	295203.042	180718.321
22	295192.560	180738.936
23	295169.849	180755.009
24	295159.366	180731.948
25	295141.547	180751.864
26	295087.389	180795.890
27	295031.483	180846.554
28	294996.892	180857.036
29	295004.579	180875.205
30	295040.917	180901.411

AREA B DUMP

STATION	X	Y
1	295410.280	180649.837
2	295430.468	180628.096
3	295454.150	180603.638
4	295475.503	180577.238
5	295531.408	180520.557
6	295529.467	180501.145
7	295474.338	180543.074
8	295446.385	180491.827
9	295427.750	180433.593
10	295395.915	180432.816
11	295381.939	180466.204
12	295420.762	180480.957
13	295376.504	180572.968
14	295374.174	180584.226
15	295358.645	180601.308
16	295369.904	180609.461
17	295390.868	180596.261
18	295393.586	180612.955
19	295390.092	180642.849

AREA C DUMP

STATION	X	Y
1	295642.830	180345.853
2	295670.006	180316.736
3	295704.559	180291.501

4	295737.170	180256.560
5	295741.440	180201.043
6	295741.440	180147.079
7	295731.346	180111.750
8	295698.347	180100.491
9	295657.194	180094.668
10	295647.100	180126.114
11	295623.418	180123.008
12	295618.371	180100.103
13	295585.760	180120.291
14	295571.395	180140.479
15	295546.937	180143.973
16	295540.725	180177.749
17	295553.149	180197.549
18	295565.572	180261.219
19	295560.525	180276.748
20	295568.290	180334.594
21	295600.901	180327.994

Conclusions

Geo Solutions has completed a multifrequency electromagnetic evaluation of the site. During the completion of the initial site work it became obvious that the area extended beyond the original planned survey outline. As such, Geo Solutions expanded the survey area at no additional expense to include the expanded area containing dumped material.

Geo Solutions has identified three concentrated areas of dumping (A, B and C) along with some areas containing minor surface dumped material as shown in Figure 5 of this report.

Geo Solutions is pleased to have been provided this opportunity, please give me a call should you have any questions concerning the above report.

Very truly yours,

GEO SOLUTIONS LIMITED, INC.



Ronald A. Crowson
Geophysicist

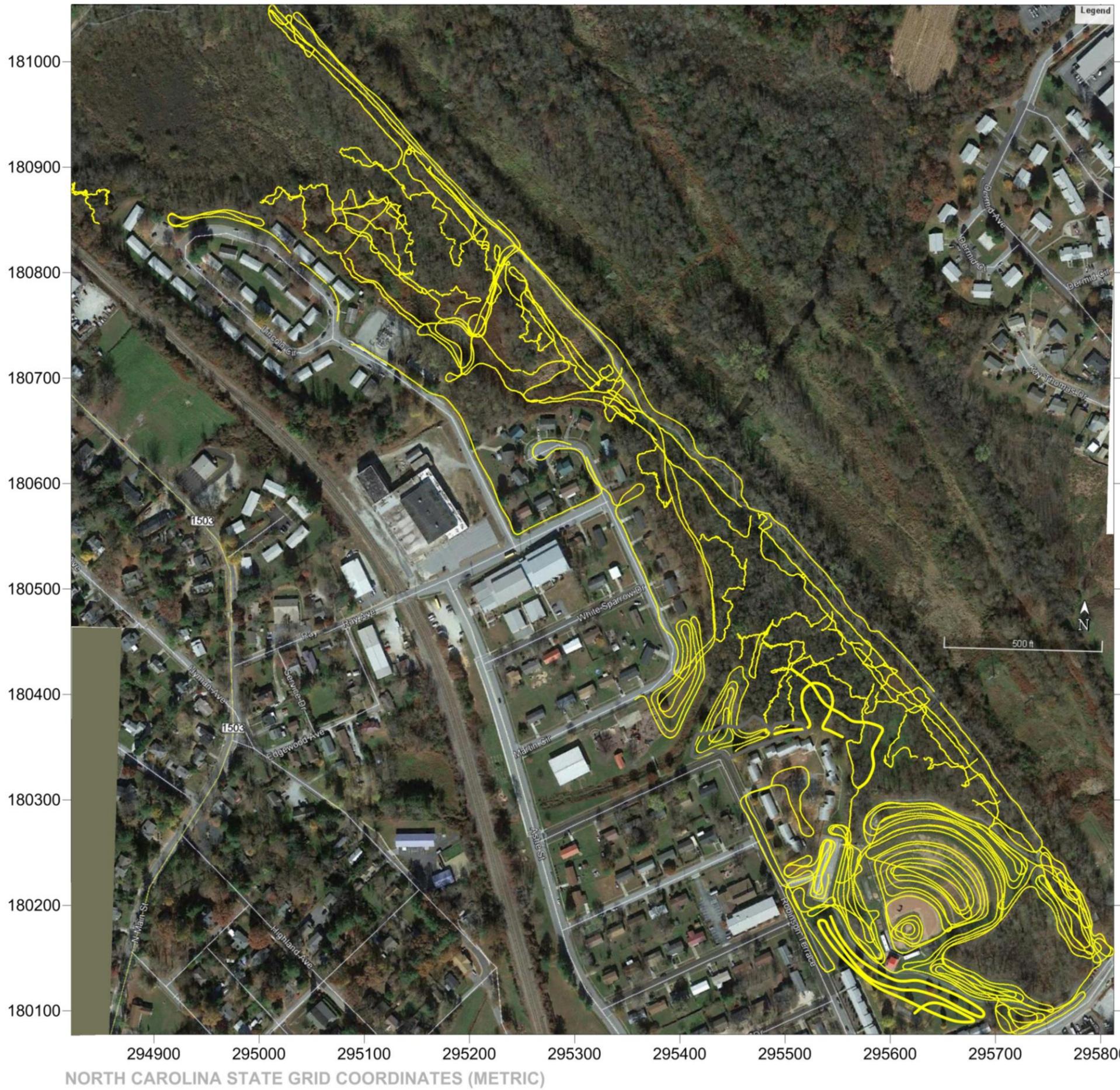


FIGURE 2

INDICATES LOCATION OF MFEM DATA POINT (EM-31 MODE)

LOCATION OF MFEM DATA POINTS AND SURVEY AREA

**MULTIFREQUENCY EM GEOPHYSICAL SURVEY
MUD CREEK
HENDERSONVILLE, NC**

MARCH 2015



NORTH CAROLINA STATE GRID COORDINATES (METRIC)

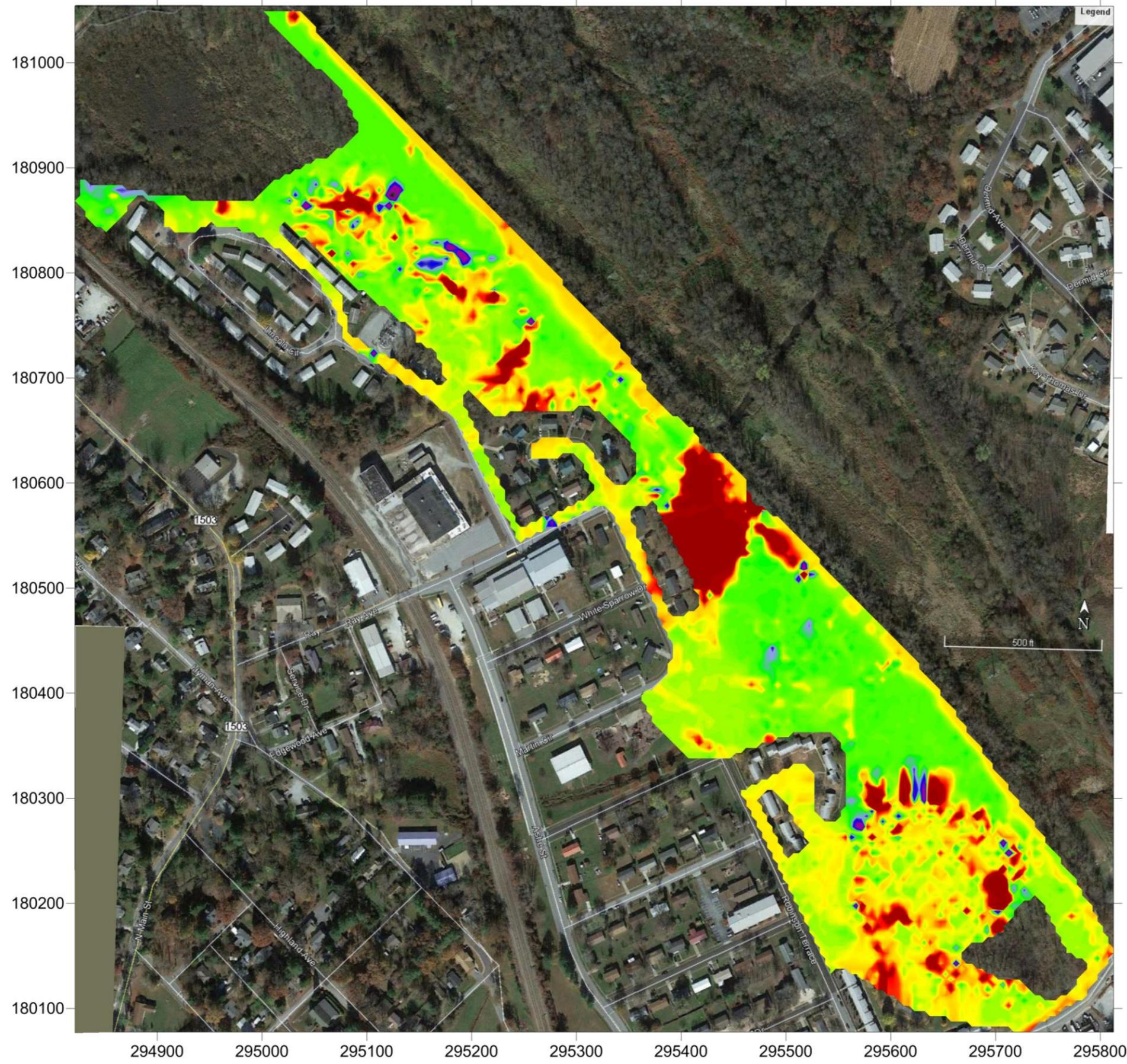
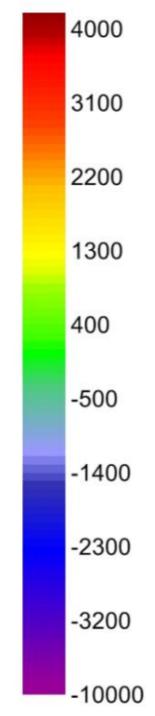


FIGURE 3



LEGEND



**RESULTS OF MFEM EVALUATION
9810 Hz IN-PHASE DATA
RESULTS IN PPM**

**MULTIFREQUENCY EM
GEOPHYSICAL SURVEY
MUD CREEK
HENDERSONVILLE, NC**

MARCH 2015



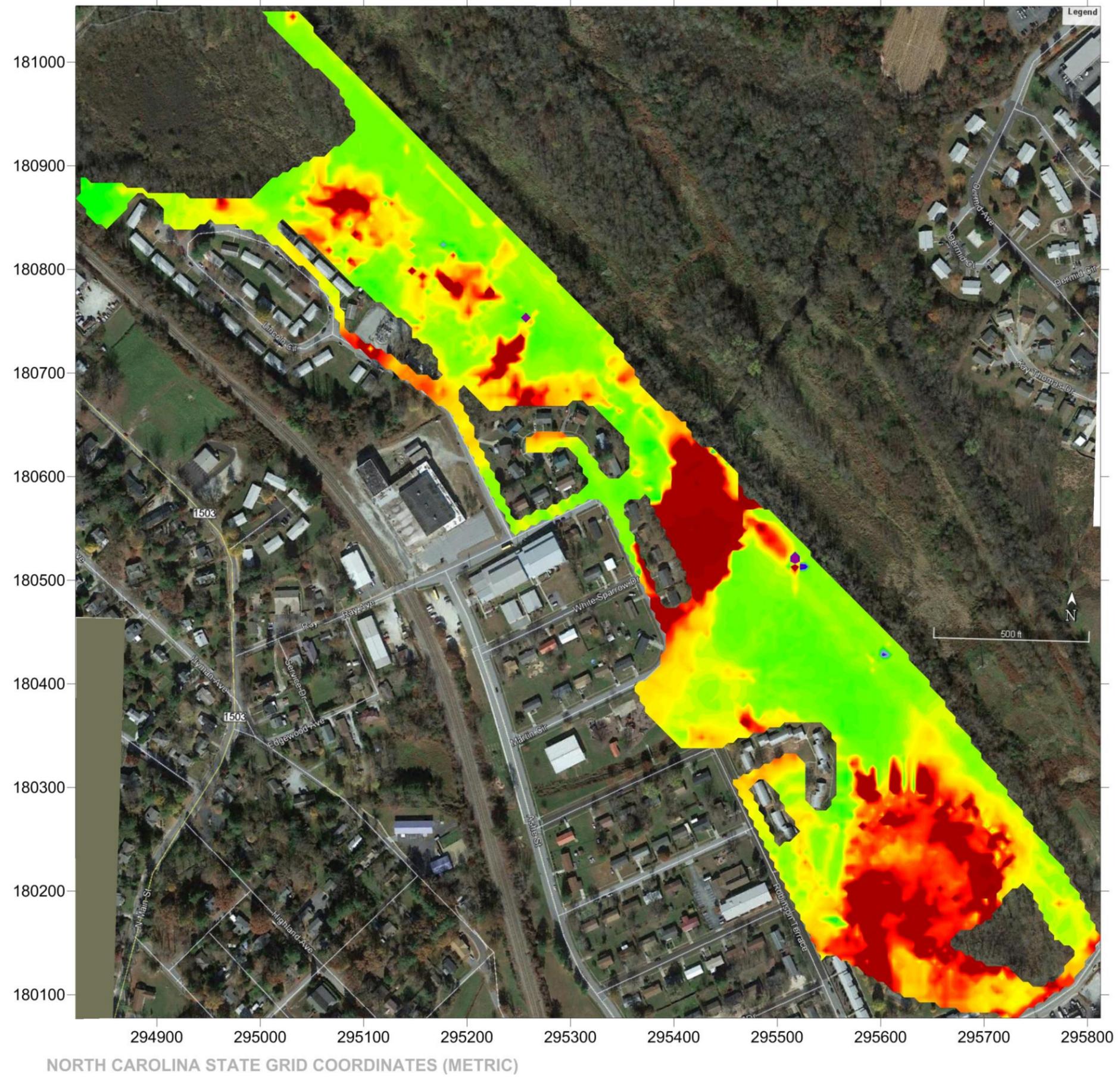
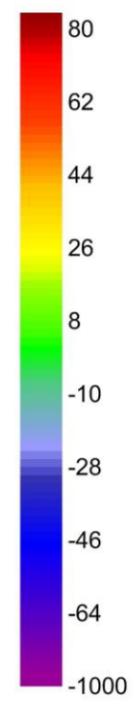


FIGURE 4



LEGEND



**RESULTS OF MFEM EVALUATION
9810 Hz APPARENT CONDUCTIVITY
RESULTS IN mS/M**

**MULTIFREQUENCY EM
GEOPHYSICAL SURVEY
MUD CREEK
HENDERSONVILLE, NC**

MARCH 2015



NORTH CAROLINA STATE GRID COORDINATES (METRIC)

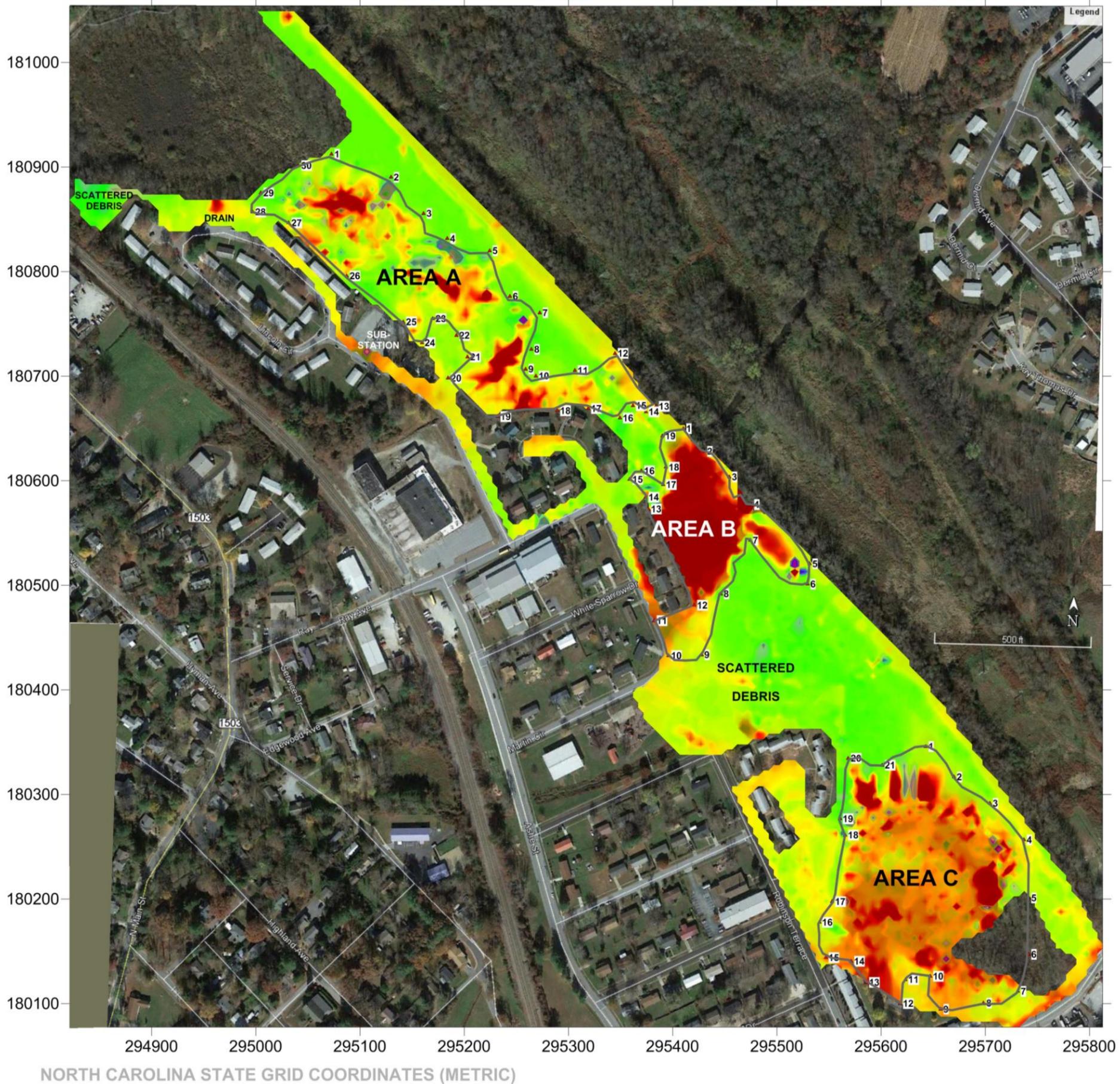
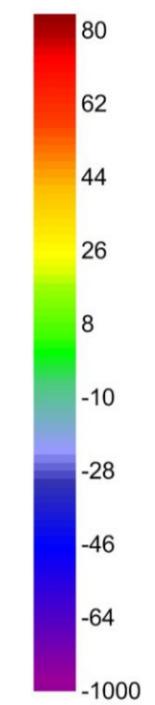


FIGURE 5



LEGEND



**RESULTS OF MFEM EVALUATION
COMPOSITE OF IN-PHASE AND
APPARENT CONDUCTIVITY**

**MULTIFREQUENCY EM
GEOPHYSICAL SURVEY
MUD CREEK
HENDERSONVILLE, NC**

MARCH 2015



NORTH CAROLINA STATE GRID COORDINATES (METRIC)

APPENDIX D
FIELD DOCUMENTS

3/9/15

KJW

0945 KJW onsite with GeoPhysical Co.
 0950 Talked w/ Ron & Karen of GSC
 to plan on working where wetland
 remediation planting will take place
 to place sure it is done. Ron says
 they plan to work till dark due to
 rain potential, want to get as much
 done as possible before heavy rain.

1010 Have H&S tailgate meeting, let them
 know ~~the~~ plan to work east side
 perimeter first then check in w/ them.
 Ron plans to check equipment first
 then take off down trail.

1040 KJW starts to drive around and
 check for water supply walls in East part
 of perimeter, Give RLM a call to ask
 for a key to gain access to ~~baseball~~^{baseball}
 field.

1710 KJW returns to check on GSC
 KJW rides with Ron, show him areas

3/2/15

KJW³³

where wetlands will be put
 in.

12~~45~~ GCS on lunch

1250 KJW heard to trails to work on
 water way flows.

1600 KJW Finish work on determining
 flow direction of wells, Observed
 GCS working in wetlands area.
 Meet with GCS see plan
 for rest of day. Group! 1500
 GCS had to download info
 onto computer ~~before~~^{after}
 continuing. Plan to walk system

~~1630~~ KJW goes to find potential /
 1630 WSDUS.

1715 Meet w/ GCS, said done for day, due
 to wanting to use larger GPS, having
 trouble in forested areas w/ smaller unit
 clean up, park vehicles

1725 KJW & GCS offsite

Rite in the Rain

3/10/15

KTW

Weather 40's cloudy - 60's

0800 KTW onsite

0815 Call RON, says they are at Lowe's picking up equipment for GPS unit, to be onsite in 5-10 minutes.

0820 GCS onsite, H&S tailgate meeting

0830 Ron heads back to Lowe's for electrical tape

0835 Returns, continues set up of equipment.

0835- Talked to RLM, let him know GCS believe trash area goes into property south of baseball diamond, wondering if there is way to gain access to property, if can get onsite, plan to walk instead of drive on property.

0915 GCS begins work on North-West End

0920 H&S continues search for WSW's

1030 GCS finished west side of the wetlands on northern end.

KTW

3/10/15 35

1300 KTW finishes WSW survey, will try to reach owners off Azalea Woods Dr.

1330 No one home off Azalea Woods will try again later.

1400 GCS. Finishes work on East side of wetlands in northern part. Move to south end where wetlands are on right of way.

1500 Finish main wetlands area, work heavy wooded area north of area ~~near~~ behind properties along Martin Creek

1540 Ron of GCS leaves site to get a blade for heavy dense wooded areas North of baseball diamond on higher grounds

1610 Ron of GCS Returns, begins

Rite in the Rain

3/10/15

cont... Geo physical survey East of Goldfinch,
and Parkview. Area is very thick,
machete needed for job to create
path.

1335 Finish work for day

1340 KJW called Ed Frisbee of
Hendersonville Housing Authority,
said they will unlock gates around
8 am, so GCS can gain access
onto properties. GCS packs
equipment onto trailer and
into vehicle.

1750 KJW and GCS offsite

3/10/15

Weather: '50's - '60's cloudy

0750 KJW onsite

0800 GCS onsite

0810 H&S tailgate Meeting

0815 Ed of Hendersonville Housing drops
off key to gain access to
south property of baseball diamond,

0845 Head back to Martin Circle to check
out NW corner. Ron says he
thinks there could be a pocket
of land fill in area but couldn't
gain access due to conditions. He
suggested buying a ladder to go over
fence. KJW says as long as you
are comfortable and safe we can
do that.

0850 Ron takes together a ladder

~~0900~~ KJW observes edge of fence line, suggests
to Ron to walk around fence instead

0920 GCS back onsite, they will try
walking behind fence to reach NW corner

Rite in the Rain.

31/1/15

KJW

39

- 1000 Finished NW area to the best of GCS capabilities.
- 1010 Move to Areas where creek cuts across wood line, and finish remaining areas
- 1200 GCS finished with Geophysical ~~Survey~~. Start download to computer to display areas walked
- 1220 GCS packs up vehicular equipment
- 210 GCS offsite, KJW called RUM about today progress and talks about plans for rest of day.
- 1250 KJW offsite.

Rite in the Rain

APPENDIX E
REPORT CERTIFICATION

CERTIFICATION

Document Name: Remedial Investigation – First Phase Report

Site Name: Mud Creek Dump

Site ID: NCD0000798

I certify to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete.

Leonard C. Moretz, PG, RSM

Leonard Moretz
Signature

8-26-15
Date

Before me personally appeared Leonard C. Moretz, PG, RSM to me known and known to me to be the person described in and who executed the foregoing instrument, and acknowledge to and before me that Leonard C. Moretz, PG, RSM executed said instrument for the purposes therein expressed.

Witness my hand and official seal on this 26 day of August, 2015.

Kimberly P. Pietrolungo
Notary Public

3/28/2019
My Commission Expires On

NC
State of

Wake
County of

