October 6, 2016

North Carolina Department of Environmental Quality
Division of Waste Management – Inactive Hazardous Sites Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Mr. Thomas Slusser, LG Email: thomas.slusser@ncdenr.gov

Reference: **Remedial Investigation – Geotechnical Investigation, Jurisdictional Determination and Surveying Report**
Davidson River Dump
Pisgah Forest, Transylvania County, North Carolina
Task Order 591RA-A2
ID No. NONCD0000591

Dear Mr. Slusser:

S&ME, Inc. (S&ME) is submitting this report to the North Carolina Department of Environmental Quality (NCDEQ), Pre-Regulatory Landfill Unit (Unit) summarizing the Geotechnical Investigation, Jurisdictional Determination and Surveying activities conducted at the above-referenced site in Greensboro, North Carolina. S&ME completed these activities in general conformance with our approved proposals dated March 18 and May 13, 2016 for Task Orders 591RA-A and 591RA-A1, respectively, under state contract N10003S and approved proposal dated July 15, 2016 for Task Order 591RA-A2, under state contract N15002i.

Geotechnical Investigation and Sampling for Asbestos

During April 25 through May 4, 2016, S&ME conducted a geotechnical investigation to explore and characterize subsurface conditions at the site and evaluate the stability of the embankment slope located at the northern extent of the site. The attached report, *Geotechnical Investigation & Embankment Evaluation*, presents a summary of our field exploration, a description of the site and subsurface conditions, and discussion of our slope stability evaluation.

During the geotechnical investigation field activities, S&ME collected a total of 50 waste samples for asbestos analysis. The sampling locations (ASB-1 through ASB-8, and B-3) are shown on **Figure 1**. Samples were submitted to EMSL Analytical, Inc., which is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP Lab Code 200671-0). Following guidance from the Unit, S&ME requested that EMSL hold six samples (collected from the lowest depths, which may be outside of the volume of waste likely to be disturbed by remedial activities) for possible future analysis. No asbestos was detected in the samples analyzed by EMSL. The EMSL laboratory reports and boring logs are attached.

Topographic Surveying

S&ME sub-contracted WNC-PE&S, PLLC to perform topographic surveying of the northern slope of the waste disposal area. The completed 1-foot contour topographic survey was used in the geotechnical investigation and is shown on **Figure 1**.

Waters of the U.S. Delineation

S&ME conducted a waters of the United States field delineation on May 3, 2016. Our services included identifying and delineating jurisdictional waters of the U.S., marking the boundaries of those features in the field using flagging, collecting GPS coordinates of the flags, collecting USACE data points (site data including soil, vegetative and hydrological indicators inside and outside of the delineated jurisdictional features), meeting USACE onsite to verify the flagged wetland boundaries, submitting documentation for the Approved Jurisdictional Determination to USACE. During the delineation, S&ME flagged a wetland north of the waste disposal area that extends from near the northern toe of slope toward the French Broad River (**Figure 2**). A low-lying area located on the southern portion of the site (downgradient of the offsite spring shown on **Figure 3**) did not meet all of the indicators of a wetland and was not flagged.

The onsite field-verification meeting with USACE was conducted on June 28, 2016. The USACE field agent, Mr. David Brown concurred with S&ME's delineation and agreed the low-lying area located on the southern portion of the waste disposal area is not jurisdictional. A map of the approved jurisdictional delineation is included in, and reference by, the attached USACE issued Notification of Jurisdictional Determination (JD) letter dated July 14, 2016. Documentation submitted to USACE for the requested JD is also attached.

Mr. Brown stated during the field meeting that the wetland boundary depicted on **Figure 2** could be used for planning purposes and the limits of disturbance deemed necessary for the proposed remedial activities should be shown on a figure submitted with the Pre-Construction Notification (PCN) for approval prior to land disturbing activities. He stated that the applicable permit is Nationwide Permit No. 38 (NWP-38, Cleanup of Hazardous and Toxic Waste), which does not place limits on the allowable extents of impacts to waters of the U.S.

CERTIFICATION STATEMENT

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

Thomas P. Raymond, P.E. / S&ME, Inc.
Name of Environmental Consultant / Company

Signature of Environmental Consultant

Oct. 6, 2016
Date

I, Diane Belotti, a Notary Public of said County and State, do hereby certify that Thomas P. Raymond did personally appear and sign before me this day, produced proper identification in the form of driver's license, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 6th day of Oct., 2016.

(OFFICIAL SEAL)

Diane Belotti
Notary Public (signature)

DIANE BELOTTI
NOTARY PUBLIC
GRANVILLE COUNTY, NC
My Commission Expires 10-9-2017

My commission expires: 10-9-2017.

Please feel free to contact Jason Volker at 919-872-2660 if you have questions.

Sincerely,

S&ME, Inc.

Jason Volker, LSS
Project Scientist

Tom Raymond, PE, RSM
Program Manager

Attachments: Geotechnical Investigation & Embankment Evaluation
1 – Boring Location Plan
2 – Jurisdictional Waters of the U.S. Map
3 – Site Map
Laboratory Reports and Chains of Custody (Asbestos Analysis)
Notification of Jurisdictional Determination, July 14, 2016
Jurisdictional Determination Request Documentation

GEOTECHNICAL INVESTIGATION & EMBANKMENT EVALUATION
DAVIDSON RIVER DUMP
PISGAH FOREST, TRANSYLVANIA COUNTY
NORTH CAROLINA

ID No. NONCD0000591

State of North Carolina Contract No. N15002i

NCDEQ Task Order 591RA-A2

Prepared for:

North Carolina Department of Environmental Quality
Superfund Section, Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Prepared by:

S&ME, Inc.
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October 5, 2016

October 5, 2016

North Carolina Department of Environmental Quality
Division of Waste Management – Inactive Hazardous Sites Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Attention: Mr. Thomas Slusser, L.G., email: thomas.slusser@ncdenr.gov

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Davidson River Dump
Pisgah Forest, Transylvania County, North Carolina
Task Order 591RA-A2
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Dear Mr. Slusser:

S&ME, Inc. (S&ME) is submitting this report to the North Carolina Department of Environmental Quality (NCDEQ), Pre-Regulatory Landfill Unit (Unit) summarizing the results of the Remedial Investigation – Geotechnical Investigation and Embankment Evaluation activities conducted at the above-referenced site in Pisgah Forest, North Carolina. S&ME completed these activities in general conformance with our approved proposals dated March 18 and May 13, 2016 for Task Orders 591RA-A and 591RA-A1, respectively, under state contract N10003S and approved proposal dated July 15, 2016 for Task Order 591RA-A2, under state contract N15002i.

The purposes of our geotechnical engineering services were to explore and characterize subsurface conditions at the site and evaluate the stability of the embankment slope. This report presents a summary of our field exploration, a description of the site and subsurface conditions, and discussion of our slope stability evaluation. If you have any questions concerning information presented herein, please contact us.

Sincerely,
S&ME, Inc.

Sharon Y. Korleski
Oct 5 2016 3:36 PM

Sharon Y. Korleski, P.E.
Senior Engineer
N.C. Registration No. 25846

Stephen J. Loskota, P.E.
Senior Engineer
N.C. Registration No. 033606

Attachment: Remedial Investigation – Geotechnical Investigation & Embankment Evaluation Report

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Drawing

Drawing – Existing Conditions Site Map

1.0 SITE DESCRIPTION

The Davidson River Dump Site is located on the west end of Poplar Lane (SR-1574) in Pisgah Forest, North Carolina. The site is a former unlined municipal solid waste landfill that operated from the 1960s to 1974. The waste disposal area extends onto six parcels in a residential area of Transylvania County. It occupies a footprint area of about 3.9 acres, as shown on the Boring Location Plan, **Figure 1**.

S&ME conducted a visual site reconnaissance on October 22, 2015. The purpose of the site reconnaissance was to observe the general condition of the site. The surface of the site is currently grass and woodland covered. The site was a valley fill that slopes south to north. It has a steep slope face on its north side. The north face of the embankment is about 30 to 36 feet high with slopes ranging from 1.7 to 2 horizontal to 1 vertical along the north face. The north crest of the embankment ranges from about elevation 2161 mean sea level (msl) on the east to approximately elevation 2156 msl on the west. The slope toe is at roughly elevation 2,125 msl in the east and about elevation 2,126 feet in the west. The embankment is heavily vegetated with trees and underbrush on the crest and slope face.

The toe of the waste disposal area's north embankment is approximately 400 feet up gradient of the west side of the French Broad River. As shown on **Figure 2**, Preliminary Wetland Map, a jurisdictional wetland starts from the toe of slope and extends north to the French Broad River. A perennial stream is located within this area between the French Broad River and the toe of slope of the waste disposal area. The stream starts about 50 feet north of the waste disposal area's embankment toe of slope. The area north of the site is heavy wooded and covered with thick brush.

Several residences are located adjacent to the site. Residential gravel driveways extend westward across the middle of the site and across the northeast portion of the site. Overhead power lines, transmission lines, and buried electrical/phone lines cross the south half of the site (shown on the Boring Location Plan, **Figure 1**).

There is a spring adjacent to the south side of the waste disposal area. A low lying area down-gradient of the spring on the southern portion of the waste disposal area has been confirmed by the U.S. Army Corps of Engineers (ACOE) not to be a jurisdictional wetland.

2.0 FIELD EXPLORATION

S&ME performed three Standard Penetration Testing (SPT) borings (B-1 through B-3) and one (1) Hand Auger and Dynamic Cone Penetrometer (DCP) Test boring (B-4) at locations shown on the Boring Location Plan (**Figure 1**). These four locations were selected to obtain subsurface information along the existing embankment and driveways crossing the waste disposal area. In addition, S&ME performed eight Asbestos Sampling Borings (ASB-1 through ASB-8) at locations also shown on **Figure 1**.

Borings B-2 and B-3 were located in the northern portion of the site to evaluate the embankment with the highest and steepest slopes. Boring B-4 was located at the toe of this slope. It was located in an area that was heavily vegetated that did not permit drill rig access via the steep slope to the vicinity of the proposed location.

The soil test borings were advanced on April 25 through May 4, 2016 using a Diedrich D-50 drill rig mounted on a tracked all-terrain vehicle or hand auger (B-4). Soil test borings B-1 to B-3 were advanced using a 2¼-inch inside-diameter hollow stem auger to depths of about 5 ft. (at toe) to 45 ft. (in the dump site) below existing ground surface. Standard penetration testing (SPT) and split-spoon soil sampling was performed in general accordance with ASTM D1586 at 2½-ft intervals to a depth of 10 ft. and then at 5-ft intervals until auger refusal or maximum depth of 5 feet below the waste. Rock coring was not performed. Water levels, if any, were recorded within each borehole after completion of drilling.

Boring logs containing soil descriptions, SPT N-values, and drilling observations were prepared by a geotechnical professional, and are contained in **Appendix I**. Stratification lines shown on boring logs are intended to represent approximate depths of changes in soil types. Naturally, transitional changes in soil types are often gradual and cannot be defined at exact depths.

2.1 Laboratory Testing

Retrieved split spoon and bulk samples were submitted to AMEC Foster Wheeler's laboratory for soil testing to confirm field classification, determine soil index properties and measure shear strength. Index properties of residual soils, alluvial soil and waste material were correlated with shear strength parameters to select values for use in the stability evaluation. A reduction factor was applied to the remolded direct shear strength result for use in the analysis based on our experience.

Laboratory testing included the following:

- Natural Moisture Content (ASTM D2216)
- Grain Size Distribution [#200 wash] (ASTM D1140; D422)
- Atterberg Limits (ASTM D4318)
- Direct Shear Test (ASTM D3080)
- Standard Proctor (ASTM D698)

Laboratory test results are included in **Appendix II**. They are summarized in **Table 1**. The decomposed waste material and soil was typically classified as a silty sandy fill with waste identified as textiles, plastic, wood, glass, metal, rubber, bricks, and newspapers. Two samples of waste material tested had plasticity indices of 8 and 11 percent, and a liquid limit of 34 percent. Two other samples tested as non-plastic. Natural moisture contents ranged from 19.6 to 87.9 percent. The higher moisture contents may be indicative of high organic content and/or saturated soil/waste material. It should be noted that if the natural moisture content of soil exceeds its liquid limit, the soil is very sensitive, under consolidated, or is approaching a liquefied state.

Direct shear testing was conducted on a remolded bulk sample of silty gravelly sand obtained adjacent to the toe of slope of the dump site, Boring B-4. It yielded a friction angle of 46 degrees with zero cohesion.

Table 1
SUMMARY OF LABORATORY TEST RESULTS

				Mc	Atterberg Limits			Grain Size Distribution			Standard Proctor		Direct Shear	
Sample ID	Sample Type	Sample Depth	Soil Classi-fication[1]	In-Situ Moisture (%)	L.L.	P.L.	P.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm Sieve	Maximum Dry Density (lb/cu.ft)	Optimum Moisture Content (%)	Friction (phi)	Cohesion (psf)
B-4	SS	0-1.5	SM	-	-	-	-	48.8	22.9	-	-	-	-	-
B-4	BULK	0-4	SM	17.9	-	-	-	88.2	36.2	-	122.3	9.3	46.4	0.0
B-4	SS	1.5-2	SM	15.2	-	-	-	-	-	-	-	-	-	-
B-4A	SS	2.4-4	SM	-	-	-	-	86.8	43.0	-	-	-	-	-
B-2	SS	1-2.5	ML	-	-	-	-	99.0	62.3	-	-	-	-	-
B-3	SS	3.5-5	SM	-	-	-	-	84.2	39.3	-	-	-	-	-
B-2	SS	3.5-5	SM	21.4	-	-	-	-	-	-	-	-	-	-
B-1	SS	6-7.5	SC	-	34	23	11	-	-	-	-	-	-	-
B-2	SS	6-7.5	SM	-	34	26	8	-	-	-	-	-	-	-
B-3	SS	6-7.5	-	45.8	-	-	-	-	-	-	-	-	-	-
B-2	SS	8.5-10	SM	-	NP	NP	NP	-	-	-	-	-	-	-
B-3	SS	8.5-10	-	81.5	-	-	-	-	-	-	-	-	-	-
B-1	SS	18.5-20	-	87.9	-	-	-	-	-	-	-	-	-	-
B-3	SS	18.5-20	-	53.4	-	-	-	-	-	-	-	-	-	-
B-3	SS	33.5-35	SM	-	NP	NP	NP	-	-	-	-	-	-	-
B-1	SS	33.5-35	-	67.1	-	-	-	-	-	-	-	-	-	-
B-3	SS	38.5-40	SM	19.6	-	-	-	-	-	-	-	-	-	-

ABBREVIATIONS
LIQUID LIMIT (L.L.)
PLASTIC LIMIT (P.L.)
PLASTICITY INDEX (P.I.)
NON-PLASTIC (N/P)
MOISTURE CONTENT (Mc)

NOTES:
DS = DIRECT SHEAR TEST
SM = Silty Sand
SC = Clayey Sand
ML = Sandy Silt
[1] Based on field classification and laboratory testing

3.0 SUBSURFACE CONDITIONS

Within the landfill embankment, the general subsurface profile consisted of 0.3 to 2.25 feet of cover soil over 10 to 45 feet of waste material fill. Natural residual silty sands and partially weathered rock were encountered beneath this fill and beyond the toe of the slope. Generalized subsurface profiles based on the boring logs are reflected in the slope stability figures in **Appendix III**.

3.1 Landfill Embankment

The landfill materials were a predominately soil like matrix consisting of silty sand and some sandy silt or clayey sand fill with various refuse mixed within it. This refuse included textiles, plastic, wood, glass, metal, rubber, bricks, and newspapers, etc. Underlying the landfill materials, residual silty sand (SM) or partially weathered rock (PWR) was encountered.

SPT N-values within the landfill materials ranged from 3 blows/foot to 50 blows/1 inch of split spoon penetration [indicated as 50/1" on logs]. Typical N-values ranged between 5 to 18 blows/foot. The high blow counts are likely due to obstruction of the split spoon sampler by landfill debris within the soil matrix and are not representative of the consistency of these materials. The residual silty sands are considered very dense based on SPT N-values of 50+ blows/foot.

Borings drilled within the embankment were moist to very wet at completion of the exploration program. Groundwater was encountered in borings B-4, B-3, ASB-2 and ASB-5 at depths of 1.5, 9.8, 14.0, and 8.0 feet below ground surface, respectively at the time of boring. Other borings were dry at completion of drilling.

3.2 Toe of Slope – Alluvial Soils

Alluvial soils were encountered just beyond the toe of the slope. These included wet, gray brown, fine to medium grained, silty sand (SM) with small angular rocks. SPT N-values in these very loose to dense, alluvial soils ranged from 1 to 31. There was no recovery at 5 feet (Boring B-4) due to water flushing soil out of the auger, and this boring was terminated. A bulk sample of soil was obtained for testing.

3.3 Partially Weathered Rock

Partially weathered rock (PWR) is a transitional material between very hard or dense soil and competent rock and is defined as having SPT N-values in excess of 50 blows per 6 inches of split spoon penetration. PWR was encountered immediately below residual soil in boring B-3 at depth of 44 feet below existing grade. The PWR was sampled as red brown, silty sand (SM) and was observed as being dry.

4.0 STABILITY EVALUATION

A slope stability analysis was conducted using SLOPE/W software (GeoStudio 2012) Version 11.11.0.0 Build 106800 i86_n3 developed by Geo-Slope International Ltd. SLOPE/W uses the theory of limit equilibrium forces and moments to compute the factor of safety against failure. The factor of safety is defined as the ratio of the resistant shear strength of the soil over the driving force or moment of the failing body of material.

4.1 Method of Analysis

The SLOPE/W program allows the use of several different algorithms for determining slope stability of circular and non-circular failure surfaces. Static conditions were evaluated for rotational and non-circular stability. Grid and radius search method was used for circular failure surfaces and Optimized Entry-Exit search method was used for non-circular failure surfaces. Pseudo-static (seismic) analyses were not conducted for this site.

The rotational stability analysis was performed by investigating circular failure surfaces within the various strata. Morgenstern-Price Method was selected for the rotational stability analysis of circular failure surfaces. This method considers both interslice shear and normal forces and satisfies both moment and force equilibrium. A wide range of sections were evaluated to search for the potential failure surface with the minimum factor of safety. The geometry of the rotational analyses are shown on the graphical computer outputs shown in **Appendix III**. The minimum recommended factor of safety for static analysis is 1.5 (NC Dam Safety, 15A NCAC 02K).

4.2 Section Modeled-Subsurface Conditions

The embankment cross-section geometry was developed based on the available topographic survey drawing. The subsurface conditions modeled were based on the geotechnical explorations performed at this site. A composite piezometric surface was modeled based on the high groundwater elevations encountered within the borings or previously installed monitoring wells.

The north side was modeled as the critical cross section for the analyses. It has a side slope of 1.7 horizontal to 1 vertical, to a maximum height of 30 feet above the toe of slope. From the crest of the side slope it had an average slope of about 9 percent to the south side of the dump site. The section was based on boring logs from this investigation supplemented with boring logs from previous investigations to project the bottom of waste profile and piezometric surface. Borings from the previous investigations include MW-5 through MW-8 [*i.e.,* SB-32B, SB-33B, SB-34, and SB-35B] and SB-21 through SB-24. Copies of these logs are included in **Appendix I** for reference purposes.

4.3 Parameters Used in Analysis

The geotechnical parameters established for each layer included the unit weight and shear strength. Shear strength parameters include the effective angle of internal friction (Φ) and the cohesion intercept (C). Based on S&ME's evaluation of the boring logs, laboratory test results, and typical values for the region; shear strength values were established for the slope stability analysis. Some of the geotechnical parameters were established by correlating with material types, N-values, and index test results with shear strength data.

Shear strength values for the landfill materials used in our analysis were based on published data by Kavazanjian, Jr., E (2001). It is based on the lower bound direct shear testing results on large specimens of soil-like degraded waste with high liquid content. The shear strength values selected for the stability analyses are lower bound values for the stress levels of interest. A strength reduction factor of 0.70 was also applied to the shear strength values due to the limited field and laboratory data. These values were within the range of shear strength values published by Stark, et al (2009), which were obtained from back analysis of failed landfill slopes to determine the shear strength parameters of the municipal solid waste. The unit weight for wet soil-like waste material was about 100 pcf.

Based on S&ME's experience with similar types of soil and waste materials, the shear strength parameter values in **Table 2** were used in the slope stability analyses. They are considered reasonably conservative for this evaluation.

Table 2

SLOPE STABILITY PARAMETERS

Soil or Material	Unit Weight γ	Effective Stress	
		Friction Angle Ø'	Cohesion c'
Landfill Material	100 pcf	26°	200 psf
Alluvial Silty Sand (SM)	120 pcf	31°	0 psf
Residual Silty Sand (SM)	128 pcf	30°	0 psf
Partially Weathered Rock Silty Sand (SM)	135 pcf	32°	500 psf

pcf: pounds per cubic foot
psf: pounds per square foot

4.4 Stability Evaluation Results

Stability analyses were conducted at one select cross-section as shown on the Site Map, **Figure 3**. This section was selected because it has the steepest slope face at the greatest embankment height. It was modeled to intersect through B-4, B-3, ASB-2, B-1, SB-21 and MW-7. This section is also considered to have the maximum waste thickness and was thus considered the critical section. It was evaluated for long-term stability using the values for the effective stress parameters presented in **Table 2**.

The slope was modeled for both circular and non-circular analyses for its existing condition, a 1.7H:1V side slope, and a modified 3H:1V side slope (the waste was assumed to be cut back and relocated to fill in low areas in the center or south surface of the site). The modified 3H:1V side slope analysis was performed to demonstrate an increase in stability factors of safety due to flattening of slope face.

Table 3 below summarizes the factors of safety for the loading conditions evaluated. Results of the Slope/W modeling are contained in **Appendix III**.

Table 3

FACTOR OF SAFETY SUMMARY

Embankment Section	File Name	Inclination	Factor of Safety (FOS)	Min. Acceptable FOS
Existing Conditions - Rotational	Davidson Exist RG1	1.7:1	1.2	1.5
Existing Conditions- Entry Exit	Davidson ExistEE1	1.7:1	1.2	1.5
Modified Slope- Rotational	Davidson ModRG3	3:1	1.3	1.5
Modified Slope- Entry Exit	Davidson ModEE3	3:1	1.3	1.5
Modified Slope- Rotational with Toe Drain	Davidson ModTD-RG3	3:1	1.6	1.5
Modified Slope-Entry Exit with Toe Drain	Davidson ModTD-EE3	3:1	1.5	1.5

5.0 CONCLUSIONS

This analysis provided a Factor of Safety of 1.2 for the existing conditions circular and non-circular analysis, respectively. A Factor of Safety of 1.0 indicates failure or imminent failure. There is no evidence the existing slope face has experienced slope instability at this time. However, given the perched water conditions, high moisture content, and low SPT N-values within the site fill, a low factor of safety at this location was projected by the model for rotational analysis. Therefore, the values used for the slope stability parameters in this analysis are deemed reasonable.

The factors of safety for the modified slope achieves a 1.3 factor of safety. The factor of safety for the slope with the installation of a toe drain increases to 1.5 and 1.6, which is considered acceptable by the US Army Corp of Engineers for fill embankments. These factors of safety would also meet those required by the Land Quality-Dam Safety Section for earth embankment dams. As noted, the analyzed section is considered the most critical. Other portions of the embankment have flatter slopes; therefore, will have factors of safety greater than this section.

5.1 Modification of Embankment

The stability analysis indicates that the 1.7H:1V side slope is typically steeper than what would be considered stable for the long term. Long term slope stability will be considered during the engineering design.

6.0 QUALIFICATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty, express or implied, is made.

Conclusions submitted in this report are based, in part, upon the data obtained from the geotechnical exploration. The nature and extent of soil properties and shear strength parameters may vary between and outside of the soil test borings.

7.0 REFERENCES

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Kavazanjian, Jr., E, *Mechanical Properties of Municipal Solid Waste,* Proceedings Sardinia-8th International Waste Management and Landfill Symposium, Cagliari, Italy, October 2001, Vol. 111, pp. 415-424.

Kavazanjian, Jr., E., Athanasopoulos, G.A., Riemer, M.F. (2009). Journal of Geotechnical and Geoenvironmental Engineering, ASCE 135: 709-722.

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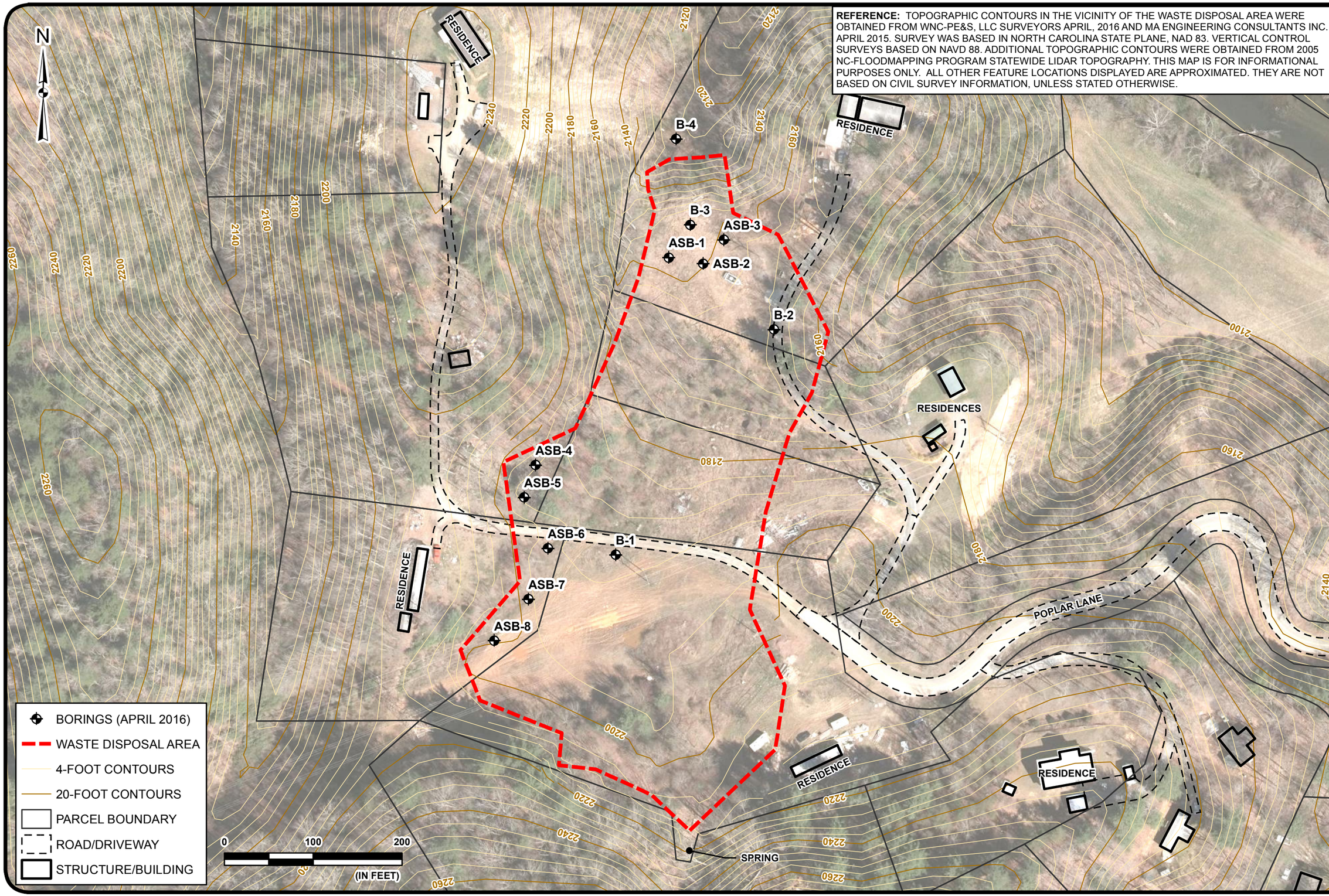


REFERENCE: TOPOGRAPHIC CONTOURS IN THE VICINITY OF THE WASTE DISPOSAL AREA WERE OBTAINED FROM WNC-PE&S, LLC SURVEYORS APRIL, 2016 AND MA ENGINEERING CONSULTANTS INC. APRIL 2015. SURVEY WAS BASED IN NORTH CAROLINA STATE PLANE, NAD 83. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ADDITIONAL TOPOGRAPHIC CONTOURS WERE OBTAINED FROM 2005 NC-FLOODMAPPING PROGRAM STATEWIDE LIDAR TOPOGRAPHY. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL OTHER FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

DATE: 8-3-2016

DRAWN BY: DDH

SCALE: 1 " = 100 '

PROJECT NO. 1054-12-1025

S&ME

BORING LOCATION MAP

DAVIDSON RIVER DUMP TASK ORDER 591RA-A2
PISGAH FOREST, TRANSYLVANIA COUNTY, NORTH CAROLINA

FIGURE NO.

1

\\charnc\CADData\1054\2012\1025 Davidson River Dump\591GEOTECH\1_BLP.mxd plotted by jvolker 09-14-2016

REFERENCE: TOPOGRAPHIC CONTOURS WERE OBTAINED FROM WNC-PE&S, LLC SURVEYORS APRIL, 2016 AND MA ENGINEERING CONSULTANTS INC. APRIL 2015. SURVEY WAS BASED IN NORTH CAROLINA STATE PLANE, NAD 83. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL OTHER FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

N

DRAINAGE FEATURE
80 LINEAR FEET

STREAM FORM COMPLETED

W-12
W-4
W-13
W-14
W-15
W-3
W-16
PIC 3
PIC 2
W-2
DP-2
FIRST FLOW- APRIL 26, 2016
W-17
DP-1
W-18
W-21
W-22
W-1
WETLAND
0.9 AC
W-20
W-19
W-23
PIC 1
W-28
W-25
W-24
W-27
W-26

2115
2120
2125
2130
2135
2140
2145
2150
2155
2160
2165
2170

STARNES PROPERTY
PIN: 8596-86-2418-000

AREA OF EVALUATION

DAVIDSON RIVER DUMP
(IHSB PRE-REGULATORY LANDFILL)
WASTE DISPOSAL AREA

0 20 40
(IN FEET)

- WETLAND BOUNDARY/DATA PTS
- DRAINAGE FEATURE
- PRELIMINARY WETLAND BOUNDARY
- WASTE DISPOSAL AREA
- AREA OF EVALUATION
- ROAD/DRIVEWAY
- STRUCTURE/BUILDING
- PARCEL BOUNDARY
- 5' GROUND ELEVATION CONTOUR
- 1' GROUND ELEVATION CONTOUR

DATE: 8-5-2016
DRAWN BY: DDH
SCALE: 1 " = 20 '
PROJECT NO. 1054-12-1025

S&ME

JURISDICTIONAL WATERS OF THE U.S. MAP

DAVIDSON RIVER DUMP TASK ORDER 591RA-A2
PISGAH FOREST, TRANSYLVANIA COUNTY, NORTH CAROLINA

FIGURE NO.
2

Q:\1054\2012\1025 Davidson River Dump\591GEOTECH\2_wetlands.mxd plotted by DHomans 08-05-2016

REFERENCE: TOPOGRAPHIC CONTOURS WERE OBTAINED FROM WNC-PE&S, LLC SURVEYORS APRIL, 2016 AND MA ENGINEERING CONSULTANTS INC. APRIL 2015. SURVEY WAS BASED IN NORTH CAROLINA STATE PLANE, NAD 83. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL OTHER FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

N

MW-6
SB-33B (0')
MW-5
SB-32B (0')
B-2
MW-8
SB-35B (29')
ASB-3
SB-24 (12')
ASB-2 (44')
B-3 (44')
B-4 (0')
ASB-1
SB-23 (17')
SB-22 (22')
B-1 (45')
SB-21 (10')
SPRING
MW-7
SB-34 (0')
ASB-4
ASB-5
ASB-6
ASB-7
ASB-8

2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220

SLOPE STABILITY CROSS SECTION
(44') WASTE THICKNESS
BORINGS (APRIL 2016)
WASTE DISPOSAL AREA
WASTE THICKNESS BORING (2013)
MONITORING WELL LOCATIONS (2014)
B BURIED ELECTRIC/PHONE
E OVERHEAD POWER
T POWER TRANSMISSION
5' GROUND ELEVATION CONTOUR
1' GROUND ELEVATION CONTOUR
PARCEL BOUNDARY
ROAD/DRIVEWAY
STRUCTURE/BUILDING

0 60 120
(IN FEET)

DATE: 8-3-2016
DRAWN BY: DDH
SCALE: 1 " = 60 '
PROJECT NO. 1054-12-1025

S&ME

SITE MAP

DAVIDSON RIVER DUMP TASK ORDER 591RA-A2
PISGAH FOREST, TRANSYLVANIA COUNTY, NORTH CAROLINA

FIGURE NO.
3

\\charnc\CADData\1054\2012\1025 Davidson River Dump\591GEOTECH\3_SITE MAP.mxd plotted by jvolker 09-14-2016

Appendices

Appendix I – Standard Penetration Test (SPT) Boring Logs

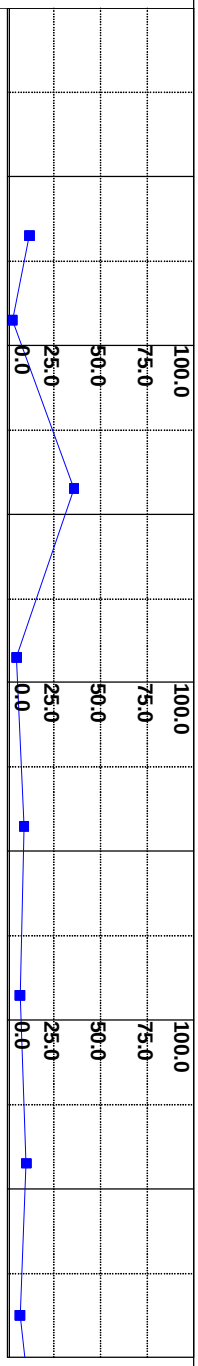
LOG OF SOIL BORING B-1

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	4/25/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	Geoprobe/HSA	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0 / 2190		FILL: Topsoil			
		FILL: Silty Sand; Brown Tan			
		FILL: Silty Sand; Green Gray			
5 / 2185		FILL: Silty Sand; Green Gray, waste (textiles)			
		FILL: Silty Sand; Brown Gray, waste		6 / 3 / 9	12
		FILL: Silty Sand; Gray Brown, waste, moist		4 / 2 / 1	3
10 / 2180					
		FILL: Silty Sand; Brown Gray, waste, moist			
				2 / 2 / 34	36
15 / 2175					
		FILL: Silty Sand; Brown Gray, waste, wet			
				7 / 2 / 3	5
20 / 2170					
		FILL: Silty Sand; Black Brown Gray, waste, very wet			
				5 / 4 / 5	9
25 / 2165					
				3 / 4 / 3	7
30 / 2160					
		FILL: Silty Sand; Gray Brown, wood fragments, very wet			
				4 / 4 / 6	10
35 / 2155					
		FILL: Silty Sand; Gray Brown, very wet			
				6 / 3 / 4	7
40					



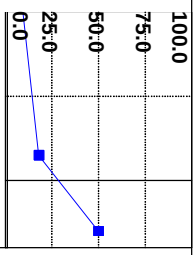
NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 47 feet below ground surface.

LOG OF SOIL BORING B-1

S&ME
3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	4/25/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	Geoprobe/HSA	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
40 / 2150		FILL: Silty Sand; Gray Brown, waste (plastic, wood debris), very wet			
45		FILL: Silty Sand; very wet		8 / 8 / 10	18
2145		No Recovery; Auger refusal at 47 feet		45 / 50/1 / -	50



NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 47 feet below ground surface.

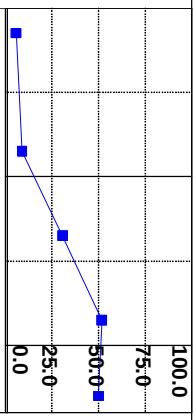
LOG OF SOIL BORING B-2

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	5/4/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	HSA	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0		**FILL: Silty Sand; Brown, with waste (glass)**		**4 / 2 / 4**	6
2165		**FILL: Silty SAND; Gray Brown, with waste (glass, plastic), moist**		**5 / 4 / 5**	9
5		**FILL: Silty Sand; Gray Brown, with waste (plastic), moist**		**7 / 16 / 15**	31
2160		**RESIDUAL: Silty Sand (SM); Brown Gray**			
		RESIDUAL: Silty Sand (SM); Red Brown Gray, moist		**14 / 19 / 33**	52
10		**PARTIALLY WEATHERED ROCK: Silty Sand (SM); Red Brown Gray**		**30 / 50/5 / -**	50



NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 12 feet below ground surface. Water level not encountered.

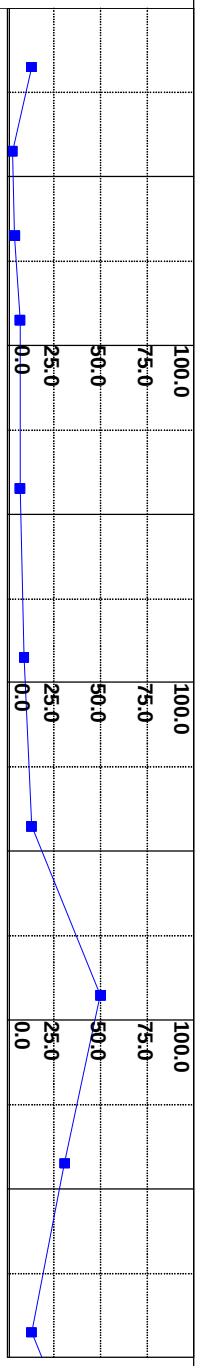
LOG OF SOIL BORING B-3

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME: Davidson River Dump
DATE DRILLED: 5/3/16
DRILLING METHOD: HSA
TASK ORDER: 591RA
LOGGED BY: B. Keyse
DRILLER: S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0		FILL: Silty Sand; Brown		2 / 7 / 6	13
2155		FILL: Silty Sand; Gray Brown, with waste (textiles)		3 / 2 / 1	3
5		FILL: Silty Sand; Brown, with waste (metal), moist		4 / 2 / 2	4
2150		FILL: Silty Sand; Brown Gray, with waste (textiles), wet	▽	4 / 4 / 3	7
10					
2145		No Recovery		4 / 4 / 3	7
15					
2140		FILL: Silty Sand; Gray Brown, with waste (textiles, plastic), very wet		5 / 5 / 4	9
20					
2135		FILL: Silty Sand; Gray Brown, with waste (textiles, glass), very wet		7 / 6 / 7	13
25					
2130		FILL: Silty Sand; Gray Black, with waste (rubber, bricks), very wet		17 / 50/5 / -	50
30					
2125		FILL: Silty Sand; Gray Black, with waste (wires, plastic), very wet		12 / 14 / 17	31
35					
2120		FILL: Silty Sand; Gray Brown, with waste (plastic, wood, textiles), very wet		18 / 9 / 4	13
40					



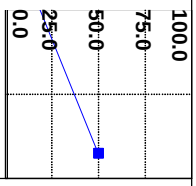
NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 45 feet below ground surface. Water level at 9.8 feet at temination of boring.

LOG OF SOIL BORING B-3

S&ME
3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	5/3/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	HSA	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
40					
2115		**FILL: Sand; Gray Brown, fine to medium grained sand, with waste (textiles), wet**			
45		**PARTIALLY WEATHERED ROCK: Silty Sand (SM); Red Brown, refusal at 45 feet**		**38 / 50/4 / -**	50



NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 45 feet below ground surface. Water level at 9.8 feet at temination of boring.

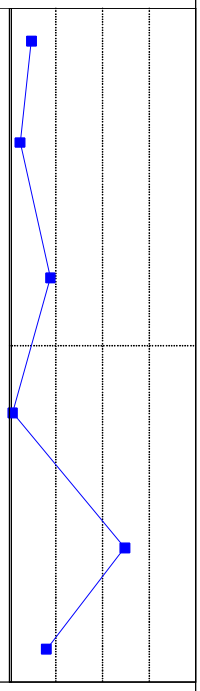
LOG OF SOIL BORING B-4

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	4/25/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	Hand Auger	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0		**FILL: Silty Sand; Brown, with angular rocks**		**2 / 3 / 3**	6
2120				**1 / 1 / 2**	3
		ALLUVIAL: Silty Sand; Brown Gray, fine to medium grained sand, with rocks, very wet		**2 / 8 / 3**	11
		ALLUVIAL: Silty Sand; Gray Brown, fine to medium grained sand, very wet, small angular rocks			
		ALLUVIAL: Silty Sand; Gray Brown, fine grained sand, small angular rocks		**1 / 1 / WH**	1
				2 / 6 / 25+	31
		No Recovery due to water flushing out of the auger, Refusal at 4.75 feet		**6 / 7 / 3**	10
5					



NOTES: WH-Weight of Hammer. Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 4.75 feet below ground surface. Water level at 1.5 feet at termination of boring.

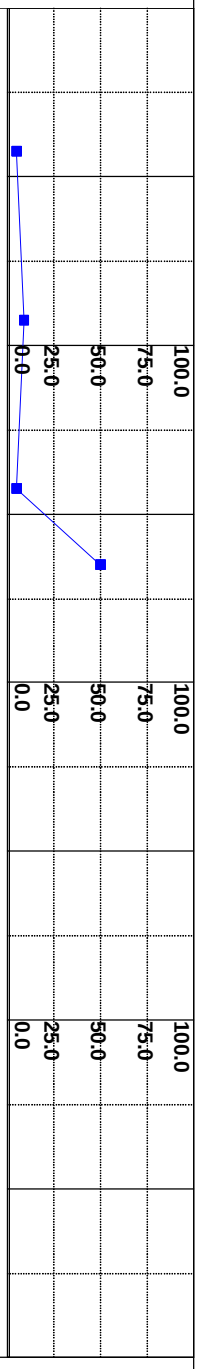
LOG OF SOIL BORING ASB-1

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	5/4/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	HSA	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0		**FILL: Silty Sand; Gray Brown, with waste (plastic), moist**			
2155				**4 / 2 / 3**	5
5		**FILL: Silty Sand; Gray Brown, with waste (glass, plastic), very moist**			
2150				**6 / 6 / 3**	9
10		**FILL: Silty Sand; Gray Brown, with waste (plastic), very moist**			
2145				**4 / 2 / 3**	5
15		**Auger refusal at 17' below ground surface on waste**		**50/1 / - / -**	50
2140					
20					
2135					
25					
2130					
30					
2125					
35					
2120					
40					



NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 17 feet below ground surface.

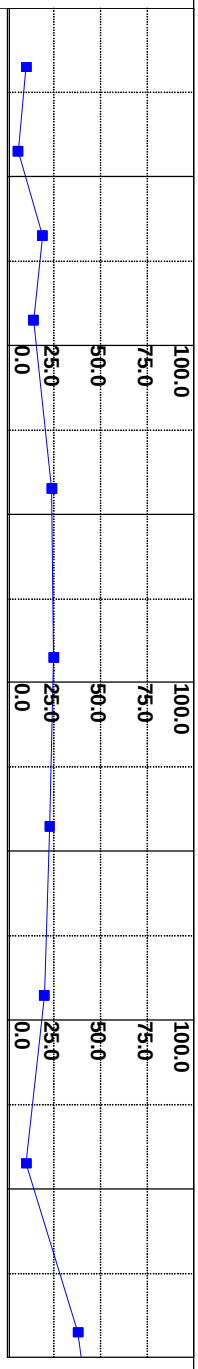
LOG OF SOIL BORING ASB-2

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME: Davidson River Dump
DATE DRILLED: 5/3/16
DRILLING METHOD: HSA
TASK ORDER: 591RA
LOGGED BY: B. Keyse
DRILLER: S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0 / 2120		FILL: Silty Sand; Red Brown		2 / 2 / 8	10
		FILL: Silty Sand; Gray Brown, with waste (textiles, plastic), moist		3 / 2 / 4	6
5 / 2115		FILL: Silty Sand; Gray Brown, with waste (textiles, wood, plastic), moist		10 / 11 / 8	19
				11 / 9 / 5	14
10 / 2110		FILL: Silty Sand; Brown Gray, with waste, wet		22 / 11 / 13	24
15 / 2105		FILL: Silty Sand; Brown, with waste (wood), wet		22 / 17 / 8	25
20 / 2100		FILL: Silty Sand; Brown Gray, with waste (newspaper, wood, plastic), wet		11 / 10 / 13	23
25 / 2095		FILL: Silty Sand; Gray Brown, with waste (textiles, wood debris), wet		8 / 9 / 11	20
30 / 2090		FILL: Silty Sand; Dark Gray Brown, with waste (wood, textiles), wet		7 / 6 / 4	10
35 / 2085		FILL: Silty Sand; Dark Gray Brown, with waste (wood, metal), wet		11 / 7 / 31	38
40 / 2080					



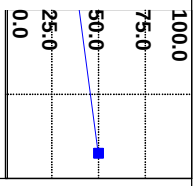
NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 45 feet below ground surface.

LOG OF SOIL BORING ASB-2

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	5/3/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	HSA	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
40 / 2080		**FILL: Sand; Gray Brown, fine to medium grained sand, with waste (metal, wood, textiles), wet**			
45 / 2075		**PARTIALLY WEATHERED ROCK: Silty Sand(SM); Red Brown; auger refusal at 45' below ground surface**		**7 / 50/5 / -**	50



NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 45 feet below ground surface.

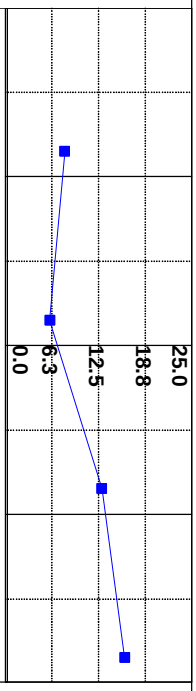
LOG OF SOIL BORING ASB-3

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	5/4/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	HSA	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0 / 2160		**FILL: Silty Sand; Gray Brown, with waste (textiles), moist**			
				6 / 4 / 4	8
5 / 2155		**FILL: Silty Sand; Gray Brown, with waste (textiles), very moist**			
				5 / 3 / 3	6
10 / 2150					
				11 / 9 / 4	13
15 / 2145					
				25 / 7 / 9	16
20					



NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 20 feet below ground surface.

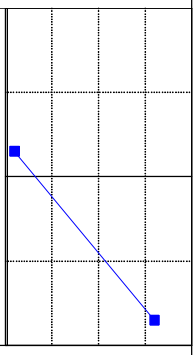
LOG OF SOIL BORING ASB-4

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	5/2/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	HSA	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0		**FILL: Silty Sand; Red Brown; moist, waste (plastics)**			
2190				**2 / 3 / 2**	5
5		**FILL: Silty Sand; Gray Brown, with waste, moist**			
2185		**RESIDUAL: Silty Sand; Red Brown**		**14 / 35 / 45**	80
10					



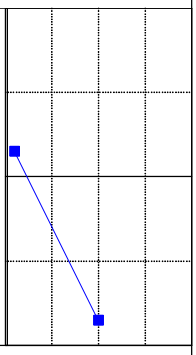
NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 10 feet below ground surface.

LOG OF SOIL BORING ASB-5

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME: Davidson River Dump
DATE DRILLED: 5/2/16
DRILLING METHOD: HSA
TASK ORDER: 591RA
LOGGED BY: B. Keyse
DRILLER: S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0 / 2190		FILL: Silty Sand; Red Brown, with waste (rubber, glass), moist		7 / 3 / 2	5
5 / 2185		FILL: Silty Sand; Gray Brown, with waste, moist			
10		PARTIALLY WEATHERED ROCK: Silty Sand (SM); Red Brown, Auger refusal at 10 feet.		33 / 50/2 / -	50



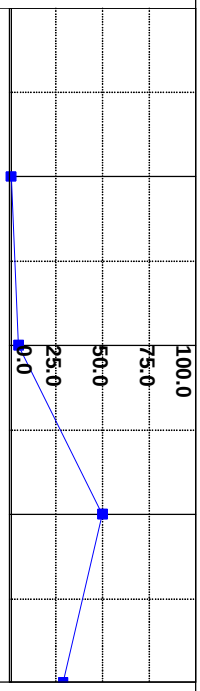
NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 10 feet below ground surface. Water level at 8 feet at termination of boring.

LOG OF SOIL BORING ASB-6

S&ME
3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	4/25/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	Geoprobe	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0		FILL: Sandy Silt; Red			
2190 / 5				2 / 1 / WH	1
		FILL: Silty Sand; Gray Brown, waste (wood, plastic), moist			
2185 / 10				1 / 1 / 4	5
		FILL: Silty Sand; Red Brown, with waste (plastic, rubber), moist			
2180 / 15		PARTIALLY WEATHERED ROCK: Silty Sand (SM); Gray Tan		11 / 50/3 / -	50
		RESIDUAL: Silty Sand (SM); Gray Tan			
2175 / 20		RESIDUAL: Silty Sand (SM); Red Tan		31 / 17 / 12	29



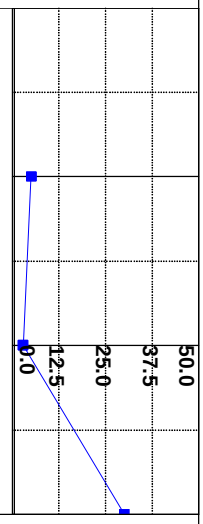
NOTES: WH - Weight of Hammer. Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 20 feet below ground surface.

LOG OF SOIL BORING ASB-7

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME: Davidson River Dump
DATE DRILLED: 4/25/16
DRILLING METHOD: Geoprobe
TASK ORDER: 591RA
LOGGED BY: B. Keyse
DRILLER: S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0 / 2195		FILL: Sandy Silt; Red			
5				2 / 2 / 3	5
2190		FILL: Silty Sand; Brown Gray, waste, moist			
10				8 / 2 / 1	3
2185		PARTIALLY WEATHERED ROCK: Silty SAND (SM); Gray Brown, no refusal		24 / 50/2 / -	30
15					



NOTES: Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 15 feet below ground surface.

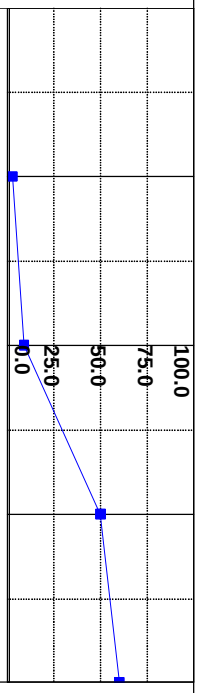
LOG OF SOIL BORING ASB-8

S&ME

3201 Spring Forest Rd.
Raleigh, North Carolina

PROJECT NAME:	Davidson River Dump	**TASK ORDER:**	591RA
DATE DRILLED:	4/25/16	**LOGGED BY:**	B. Keyse
DRILLING METHOD:	Geoprobe	**DRILLER:**	S&ME

ELEVATION / DEPTH	LITHOLOGY	Soil Description	Water Level	Blow Counts	N Values
0 / 2200		FILL: Sandy Silt; Red Brown			
5 / 2195		FILL: Silty Sand; Gray Brown		1 / 1 / 2	3
		FILL: Silty Sand; Black Gray, moist, waste			
10 / 2190				1 / 9 / WH	9
		FILL: Silty Sand; Gray Brown, moist, waste			
15 / 2185		RESIDUAL: Silty Sand (SM); Tan Brown		10 / 14 / 36	50
		RESIDUAL: Silty Sand (SM); Tannish Red No refusal			
20 / 2180				10 / 17 / 50/5	60



NOTES: WH-Weight Hammer. Elevations are approximate. Boring locations have not been surveyed. Boring terminated at 20 feet below ground surface.

Appendix II – Geotechnical Laboratory Test Results

Table 1
SUMMARY OF LABORATORY TEST RESULTS

Sample ID	Sample Type	Sample Depth	Soil Classi-fication[1]	Mc	Atterberg Limits			Grain Size Distribution			Standard Proctor		Direct Shear	
				In-Situ Moisture (%)	L.L.	P.L.	P.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm Sieve	Maximum Dry Density (lb/cu.ft)	Optimum Moisture Content (%)	Friction (phi)	Cohesion (psf)
B-4	SS	0-1.5	SM	-	-	-	-	48.8	22.9	-	-	-	-	-
B-4	BULK	0-4	SM	17.9	-	-	-	88.2	36.2	-	122.3	9.3	46.4	0.0
B-4	SS	1.5-2	SM	15.2	-	-	-	-	-	-	-	-	-	-
B-4A	SS	2.4-4	SM	-	-	-	-	86.8	43.0	-	-	-	-	-
B-2	SS	1-2.5	ML	-	-	-	-	99.0	62.3	-	-	-	-	-
B-3	SS	3.5-5	SM	-	-	-	-	84.2	39.3	-	-	-	-	-
B-2	SS	3.5-5	SM	21.4	-	-	-	-	-	-	-	-	-	-
B-1	SS	6-7.5	SC	-	34	23	11	-	-	-	-	-	-	-
B-2	SS	6-7.5	SM	-	34	26	8	-	-	-	-	-	-	-
B-3	SS	6-7.5	-	45.8	-	-	-	-	-	-	-	-	-	-
B-2	SS	8.5-10	SM	-	NP	NP	NP	-	-	-	-	-	-	-
B-3	SS	8.5-10	-	81.5	-	-	-	-	-	-	-	-	-	-
B-1	SS	18.5-20	-	87.9	-	-	-	-	-	-	-	-	-	-
B-3	SS	18.5-20	-	53.4	-	-	-	-	-	-	-	-	-	-
B-3	SS	33.5-35	SM	-	NP	NP	NP	-	-	-	-	-	-	-
B-1	SS	33.5-35	-	67.1	-	-	-	-	-	-	-	-	-	-
B-3	SS	38.5-40	SM	19.6	-	-	-	-	-	-	-	-	-	-

ABBREVIATIONS
LIQUID LIMIT (L.L.)
PLASTIC LIMIT (P.L.)
PLASTICITY INDEX (P.I.)
NON-PLASTIC (N/P)
MOISTURE CONTENT (Mc)

NOTES:
DS = DIRECT SHEAR TEST
SM = Silty Sand
SC = Clayey Sand
ML = Sandy Silt
[1] Based on field classification and laboratory testing

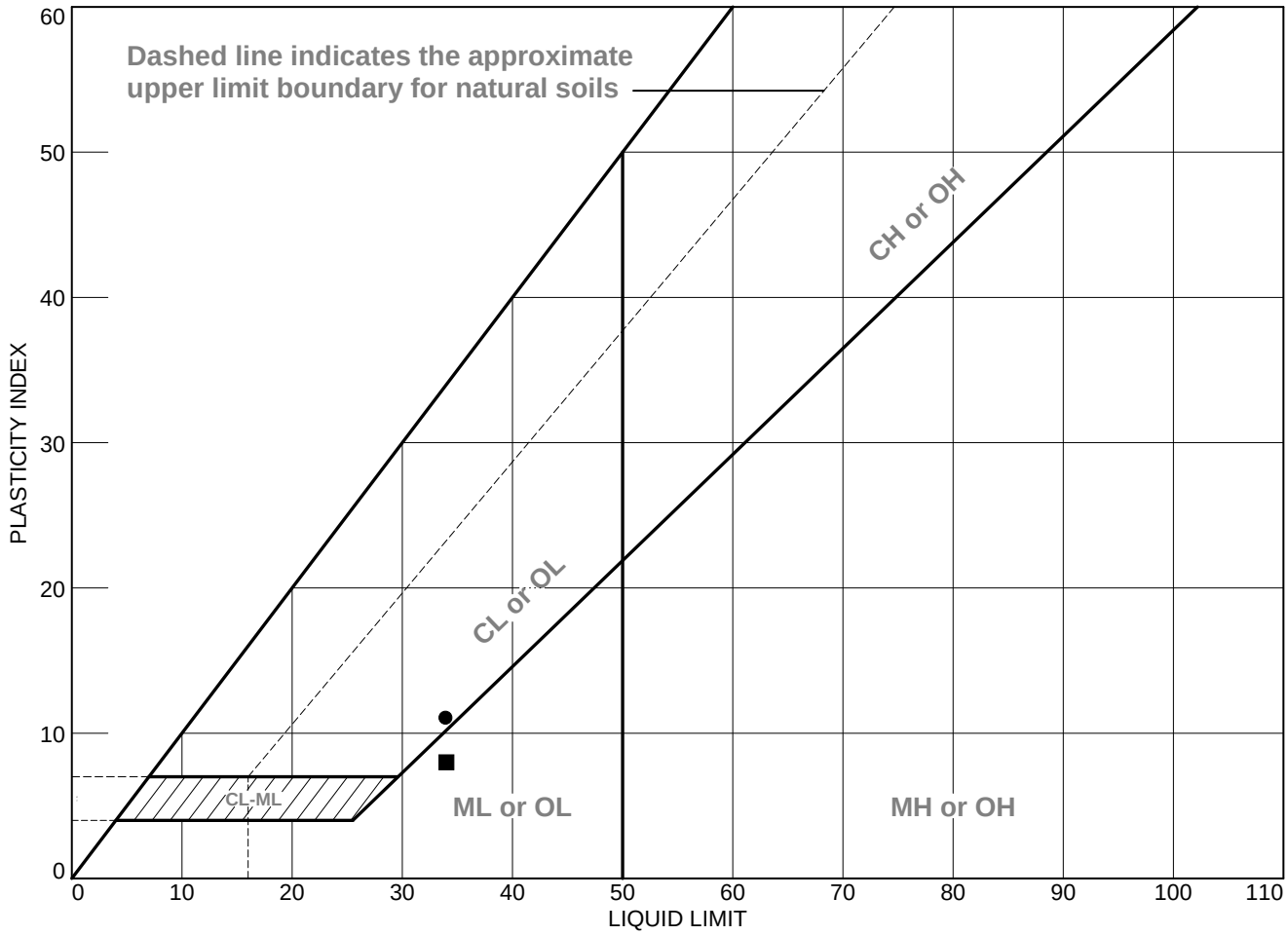
Data Testing Sheet For The Standard Test Methods For Laboratory Determination of Moisture Content of Soil and Rock by Mass
ASTM D2216-10

Project No.	6234-16-0304	Tested By	D. Kopitsky
Project Name	Davidson Dumpsite	Test Date	6-9-16
Boring No.	-----	Reviewed By	A. Kottenstette
Sample Depth	-----	Review Date	6-16-16
Sample No.	-----	Lab Location	Charlotte
Assignment Sheet Date	-----		

Boring No.	Sample No.	Depth (ft)	Tare No.	Tare Wt. (grams)	Wet Soil + Tare (grams)	Dry Soil + Tare (grams)	Water Wt (grams)	Dry Soil Wt (grams)	Moisture Content (%)
B-1	Jar	18.5-20	L-05	50.60	160.14	108.90	51.24	58.30	87.9
B-1	Jar	33.5-35	pam	92.17	264.71	195.45	69.26	103.28	67.1
B-2	Jar	3.5-5	L-76	50.66	183.15	159.79	23.36	109.13	21.4
B-3	Jar	6-7.5	L-44	50.06	180.01	139.16	40.85	89.10	45.8
B-3	Jar	8.5-10	4011	109.76	188.13	152.95	35.18	43.19	81.5
B-3	Jar	18.5-20	L-12	50.80	125.40	99.42	25.98	48.62	53.4
B-3	Jar	38.5-40	L-06	50.53	193.54	170.11	23.43	119.58	19.6
B-4	Jar	1.5-2	L-77	50.64	323.28	287.23	36.05	236.59	15.2
B-4	Bulk	2.0	100	136.3	474.80	423.40	51.40	287.10	17.9

Equipment Used	Equipment ID #
Scale	CLT-0370
Oven	CLT-0990

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-1	Jar	6-7.5'	NR	23	34	11	
■	B-2	Jar	6-7.5'	NR	26	34	8	
▲	B-2	Jar	8.5-10'	NR	NP	NV	NP	
◆	B-3	Jar	33.5-35'	NR	NP	NV	NP	

amec foster wheeler

Client: S&ME
Project: Davidson Dumpsite
Project No.: 6234160304 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

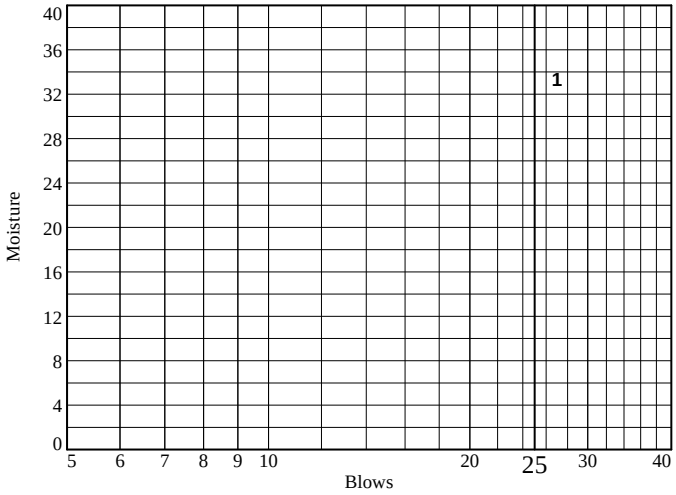
LIQUID AND PLASTIC LIMIT TEST DATA

6/17/2016

Client: S&ME
Project: Davidson Dumpsite
Project Number: 6234160304
Location: B-1
Depth: 6-7.5'
Sample Number: Jar
Tested by: A Kottenstette
Checked by: D Kopitsky

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.24					
Dry+Tare	24.46					
Tare	16.13					
# Blows	27					
Moisture	33.4					

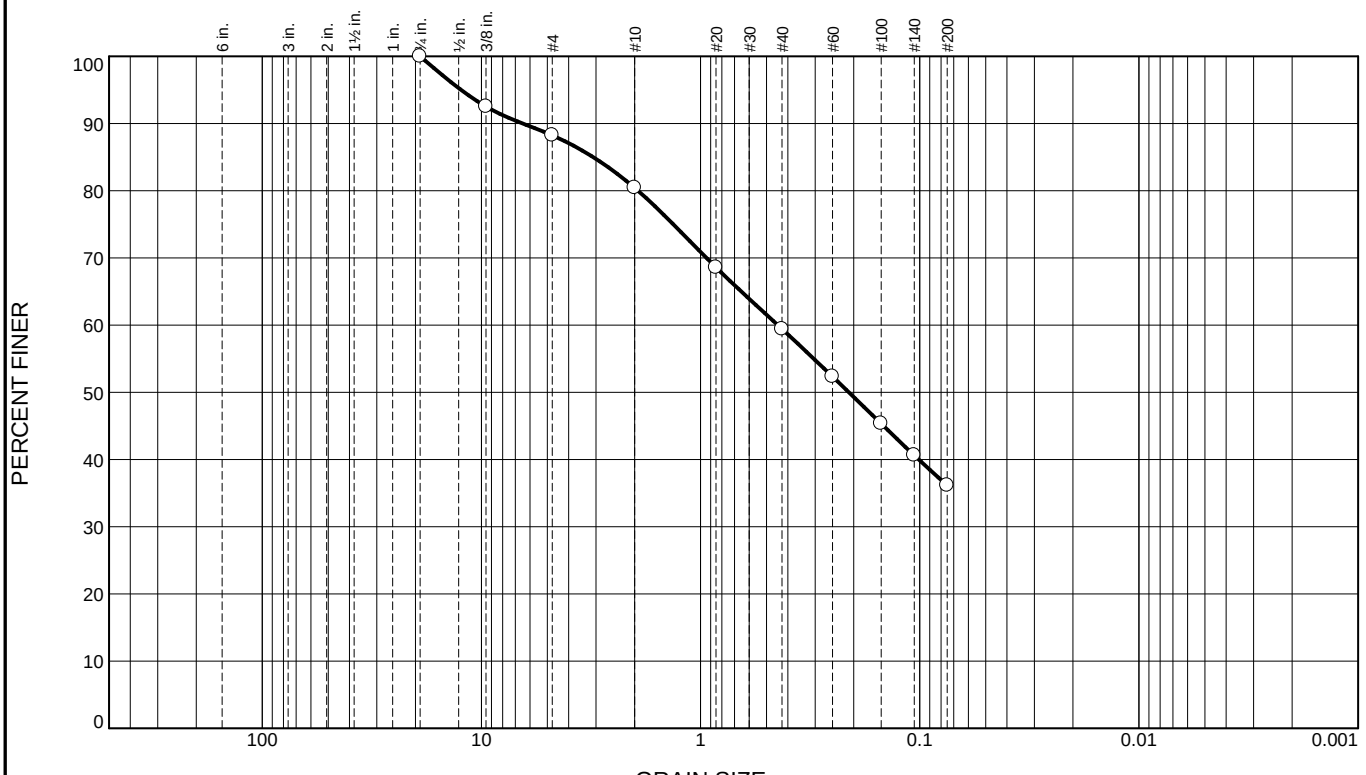


Liquid Limit= 34
Plastic Limit= 23
Plasticity Index= 11
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.05				
Dry+Tare	17.54				
Tare	10.86				
Moisture	22.6				

Particle Size Analysis ASTM C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.8	7.8	21.0	23.2	36.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	92.5		
#4	88.2		
#10	80.4		
#20	68.6		
#40	59.4		
#60	52.3		
#100	45.3		
#140	40.6		
#200	36.2		

* (no specification provided)

Material Description

Atterberg Limits

PL= NR LL= NR PI= NR

Coefficients

D_{90}= 6.4866 D_{85}= 3.0913 D_{60}= 0.4446
D_{50}= 0.2106 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= NR AASHTO=

Remarks

F.M.=2.00

Source of Sample: B-1 **Depth:** 3.5-5'
Sample Number: Jar **Date:** 6-16-16

amec foster wheeler

Client: S&ME
Project: Davidson Dumpsite
Project No: 6234160304 **Figure**

Tested By: D Kopitsky **Checked By:** G Williams

GRAIN SIZE DISTRIBUTION TEST DATA

6/17/2016

Client: S&ME
Project: Davidson Dumpsite
Project Number: 6234160304
Location: B-1
Depth: 3.5-5'
Sample Number: Jar
Date: 6-16-16
PL: NR
LL: NR
PI: NR
USCS Classification: NR
Tested by: D Kopitsky
Checked by: G Williams

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
244.61	90.20	0.00	3/4"	0.00	100.0
			3/8"	11.56	92.5
			#4	18.17	88.2
			#10	30.22	80.4
			#20	48.52	68.6
			#40	62.67	59.4
			#60	73.60	52.3
			#100	84.40	45.3
			#140	91.68	40.6
			#200	98.59	36.2

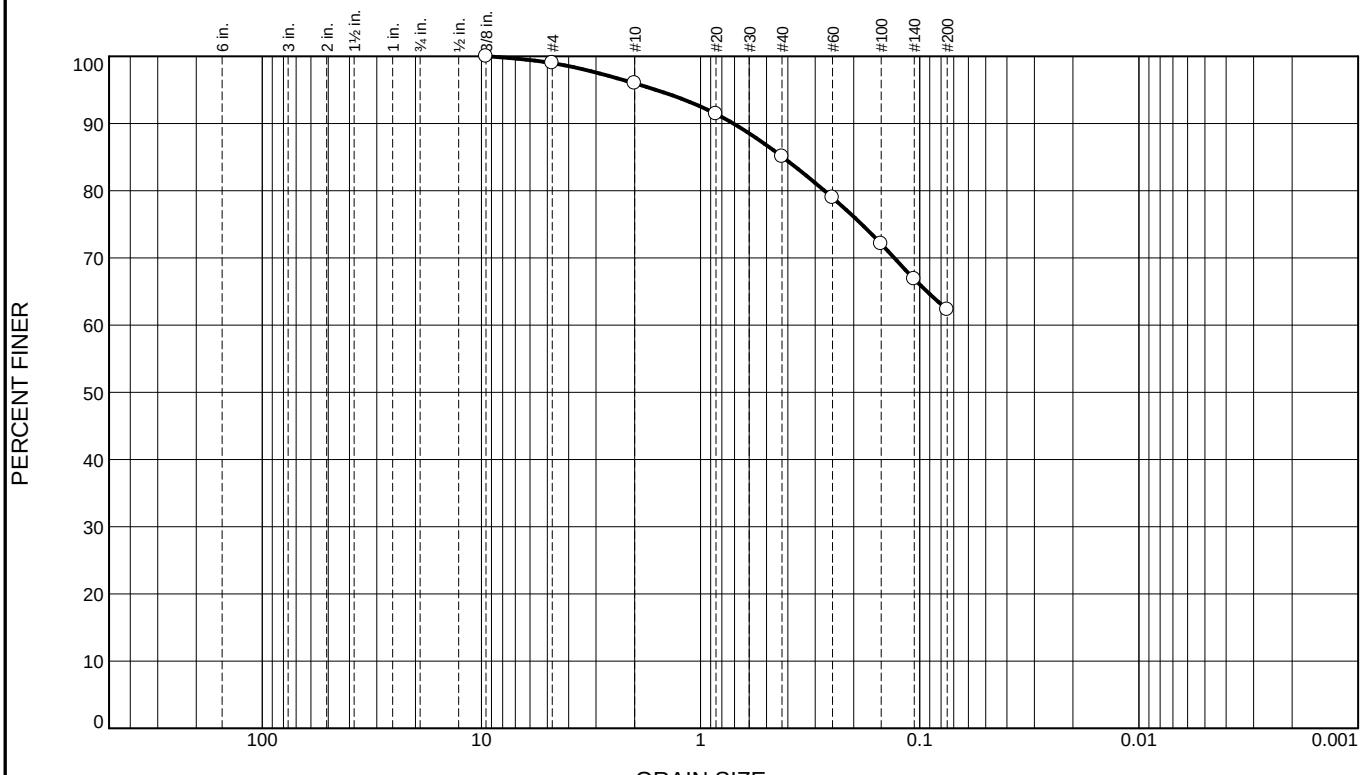
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	11.8	11.8	7.8	21.0	23.2	52.0			36.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.1011	0.2106	0.4446	1.9313	3.0913	6.4866	12.3880

Fineness Modulus
2.00

Particle Size Analysis ASTM C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	3.0	10.9	22.8	62.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.0		
#10	96.0		
#20	91.4		
#40	85.1		
#60	79.0		
#100	72.1		
#140	66.8		
#200	62.3		

* (no specification provided)

Material Description

Atterberg Limits

PL= NR LL= NR PI= NR

Coefficients

D_{90}= 0.7092 D_{85}= 0.4221 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= NR AASHTO= NR

Remarks

F.M.=0.69

Source of Sample: B-2 **Depth:** 1-2.5'
Sample Number: Jar **Date:** 6-16-16

amec foster wheeler

Client: S&ME
Project: Davidson Dumpsite
Project No: 6234160304 **Figure**

Tested By: D Kopitsky **Checked By:** G Williams

GRAIN SIZE DISTRIBUTION TEST DATA

6/17/2016

Client: S&ME
Project: Davidson Dumpsite
Project Number: 6234160304
Location: B-2
Depth: 1-2.5'
Sample Number: Jar
Date: 6-16-16
PL: NR
LL: NR
PI: NR
USCS Classification: NR
AASHTO Classification: NR
Tested by: D Kopitsky
Checked by: G Williams

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
180.87	106.64	0.00	3/4"		
			3/8"	0.00	100.0
			#4	0.75	99.0
			#10	2.99	96.0
			#20	6.37	91.4
			#40	11.08	85.1
			#60	15.62	79.0
			#100	20.72	72.1
			#140	24.61	66.8
			#200	27.99	62.3

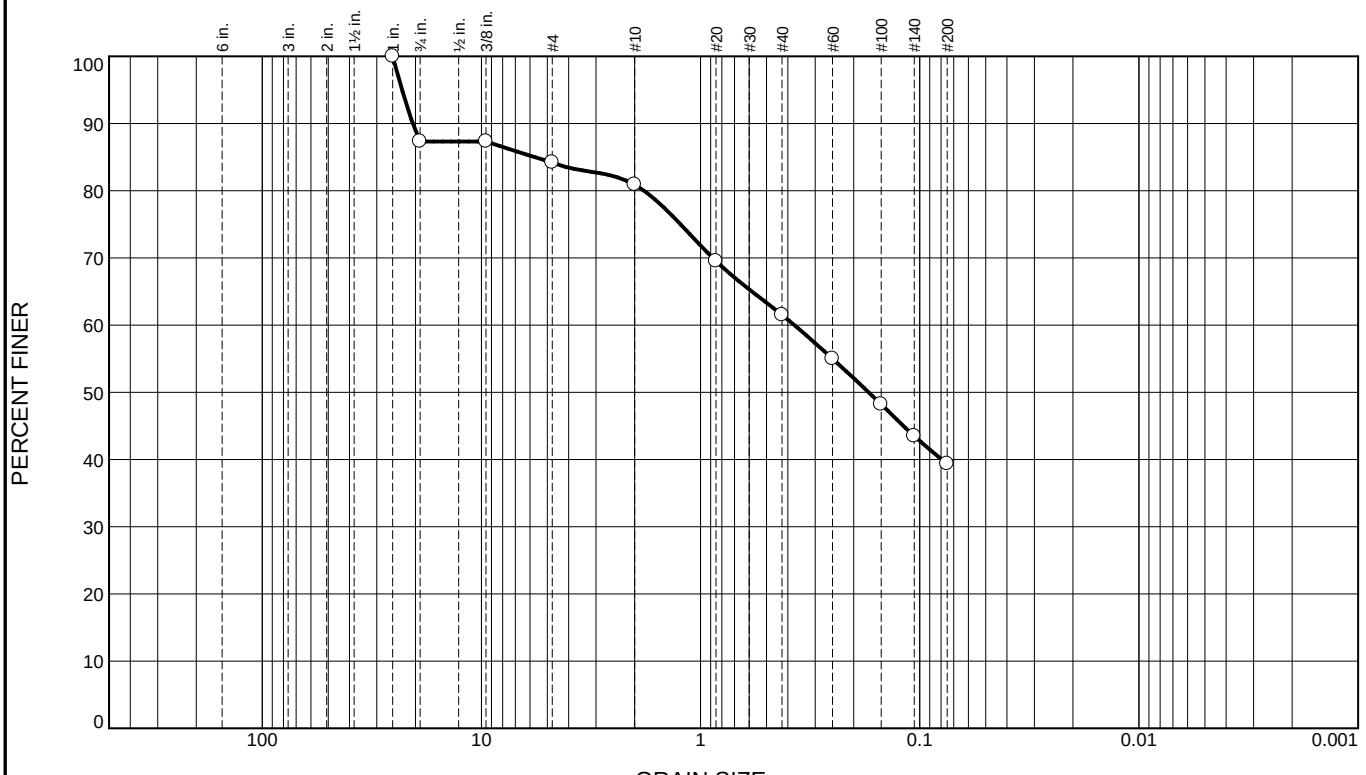
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.0	1.0	3.0	10.9	22.8	36.7			62.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.2723	0.4221	0.7092	1.5987

Fineness Modulus
0.69

Particle Size Analysis ASTM C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.7	3.1	3.3	19.4	22.2	39.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	87.3		
3/8"	87.3		
#4	84.2		
#10	80.9		
#20	69.5		
#40	61.5		
#60	55.0		
#100	48.2		
#140	43.5		
#200	39.3		

* (no specification provided)

Material Description

Atterberg Limits

PL= NR LL= NR PI= NR

Coefficients

D_{90}= 20.5757 D_{85}= 5.7091 D_{60}= 0.3733
D_{50}= 0.1710 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= NR AASHTO= NR

Remarks

F.M.=2.14

Source of Sample: B-3 **Depth:** 3.5-5'
Sample Number: Jar **Date:** 6-16-16

amec foster wheeler

Client: S&ME
Project: Davidson Dumpsite
Project No: 6234160304 **Figure**

Tested By: D Kopitsky **Checked By:** G Williams

GRAIN SIZE DISTRIBUTION TEST DATA

6/17/2016

Client: S&ME
Project: Davidson Dumpsite
Project Number: 6234160304
Location: B-3
Depth: 3.5-5'
Sample Number: Jar
Date: 6-16-16 **PL:** NR **LL:** NR **PI:** NR
USCS Classification: NR
AASHTO Classification: NR
Tested by: D Kopitsky
Checked by: G Williams

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
230.47	115.29	0.00	1"	0.00	100.0
			3/4"	14.60	87.3
			3/8"	14.60	87.3
			#4	18.18	84.2
			#10	22.01	80.9
			#20	35.11	69.5
			#40	44.33	61.5
			#60	51.85	55.0
			#100	59.64	48.2
			#140	65.08	43.5
			#200	69.86	39.3

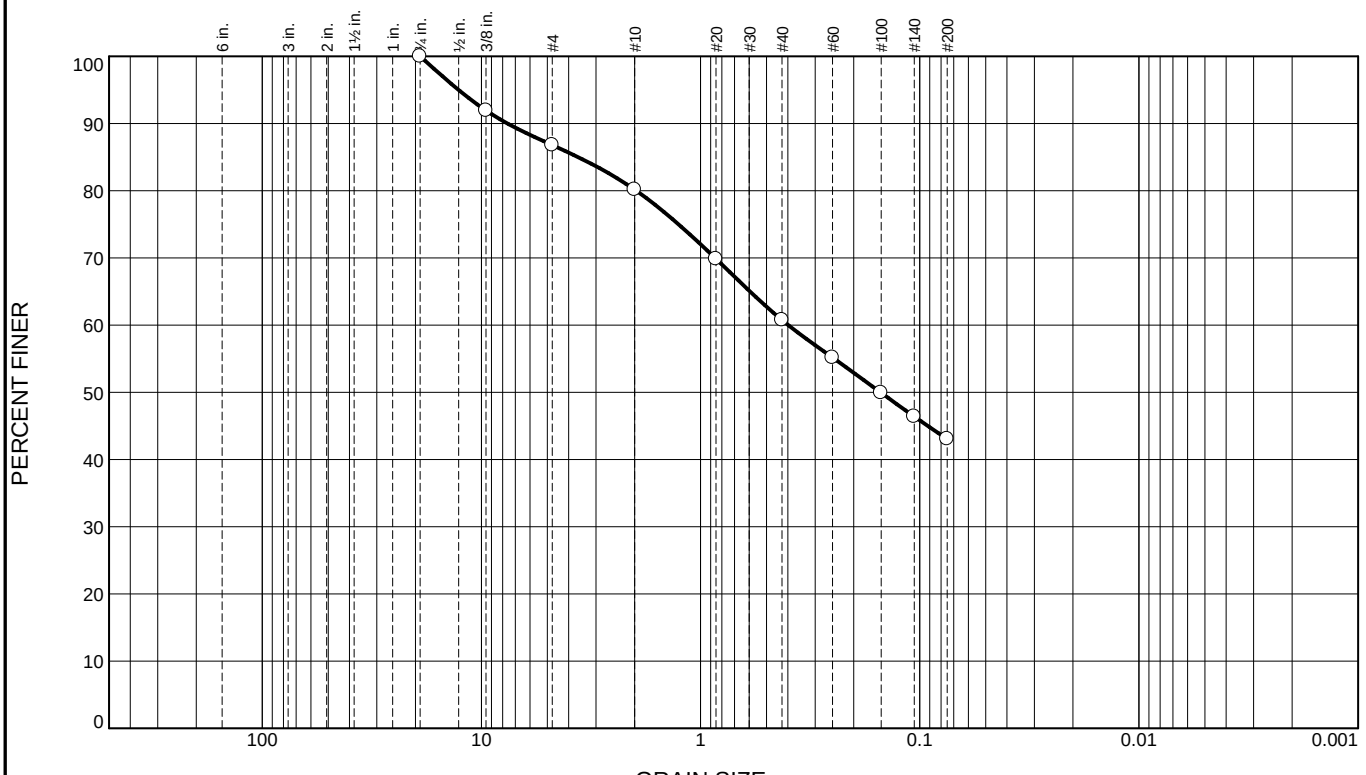
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	12.7	3.1	15.8	3.3	19.4	22.2	44.9			39.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.0794	0.1710	0.3733	1.8135	5.7091	20.5757	23.0079

Fineness Modulus
2.14

Particle Size Analysis ASTM C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.2	6.6	19.5	17.7	43.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	91.9		
#4	86.8		
#10	80.2		
#20	69.8		
#40	60.7		
#60	55.2		
#100	49.9		
#140	46.4		
#200	43.0		

* (no specification provided)

Material Description

Atterberg Limits

PL= NR LL= NR PI= NR

Coefficients

D_{90}= 7.6072 D_{85}= 3.6245 D_{60}= 0.3982
D_{50}= 0.1510 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= NR AASHTO= NR

Remarks

F.M.=1.93

Source of Sample: B-4A **Depth:** 3'
Sample Number: Jar **Date:** 6-16-16

amec foster wheeler

Client: S&ME
Project: Davidson Dumpsite
Project No: 6234160304 **Figure**

Tested By: D Kopitsky **Checked By:** G Williams

GRAIN SIZE DISTRIBUTION TEST DATA

6/17/2016

Client: S&ME
Project: Davidson Dumpsite
Project Number: 6234160304
Location: B-4A
Depth: 3'
Sample Number: Jar
Date: 6-16-16 **PL:** NR **LL:** NR **PI:** NR
USCS Classification: NR
AASHTO Classification: NR
Tested by: D Kopitsky
Checked by: G Williams

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
303.40	114.05	0.00	3/4"	0.00	100.0
			3/8"	15.30	91.9
			#4	25.01	86.8
			#10	37.56	80.2
			#20	57.10	69.8
			#40	74.33	60.7
			#60	84.89	55.2
			#100	94.81	49.9
			#140	101.51	46.4
			#200	107.85	43.0

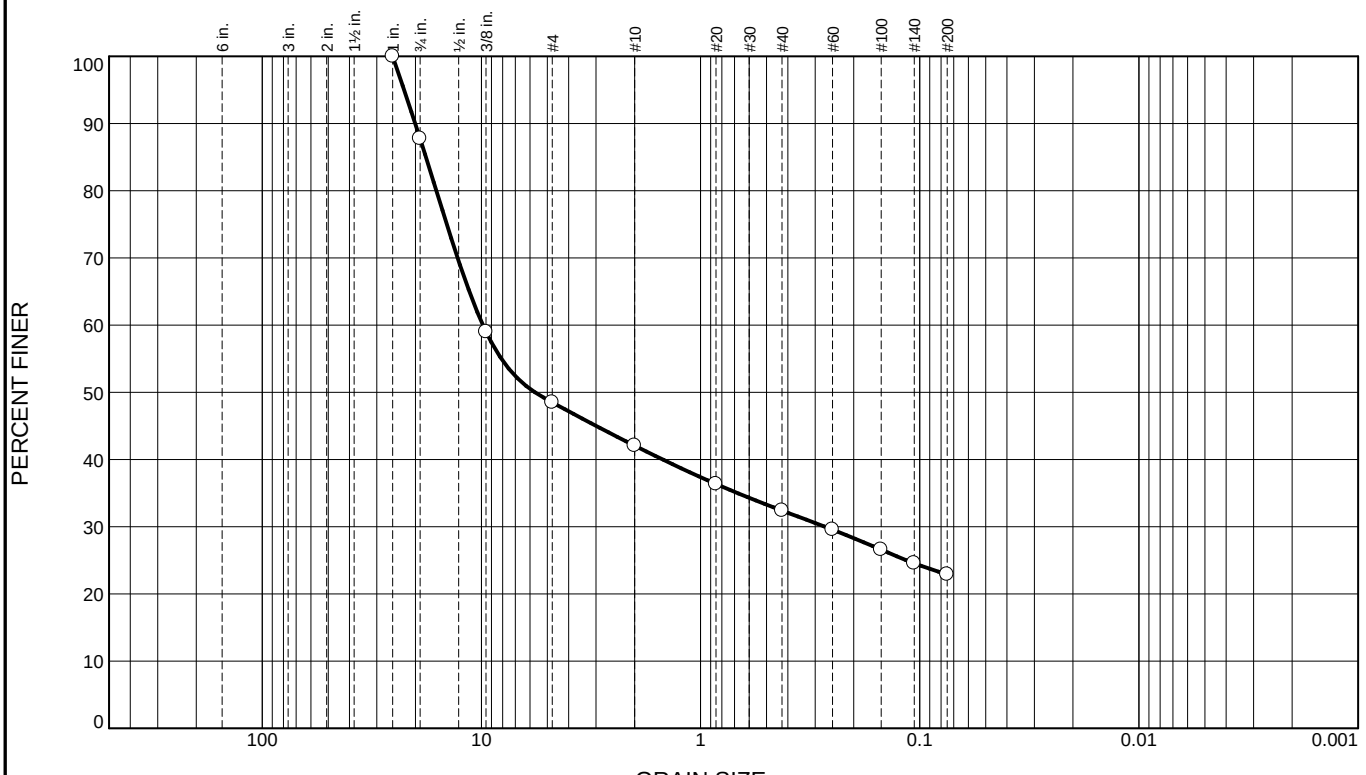
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	13.2	13.2	6.6	19.5	17.7	43.8			43.0

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.1510	0.3982	1.9671	3.6245	7.6072	12.7191

Fineness Modulus
1.93

Particle Size Analysis ASTM C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.2	39.3	6.4	9.7	9.5	22.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	87.8		
3/8"	59.0		
#4	48.5		
#10	42.1		
#20	36.4		
#40	32.4		
#60	29.6		
#100	26.6		
#140	24.6		
#200	22.9		

* (no specification provided)

Material Description

Atterberg Limits

PL= NR LL= NR PI= NR

Coefficients

D_{90}= 20.0517 D_{85}= 17.9168 D_{60}= 9.8490
D_{50}= 5.6935 D_{30}= 0.2709 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= NR AASHTO= NR

Remarks

F.M.=4.32

Source of Sample: B-4 **Depth:** 1'
Sample Number: Jar **Date:** 6-16-16

amec foster wheeler

Client: S&ME
Project: Davidson Dumpsite
Project No: 6234160304 **Figure**

Tested By: D Kopitsky **Checked By:** G Williams

GRAIN SIZE DISTRIBUTION TEST DATA

6/17/2016

Client: S&ME
Project: Davidson Dumpsite
Project Number: 6234160304
Location: B-4
Depth: 1'
Sample Number: Jar
Date: 6-16-16 **PL:** NR **LL:** NR **PI:** NR
USCS Classification: NR
AASHTO Classification: NR
Tested by: D Kopitsky
Checked by: G Williams

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
323.59	114.12	0.00	1"	0.00	100.0
			3/4"	25.66	87.8
			3/8"	85.92	59.0
			#4	107.89	48.5
			#10	121.36	42.1
			#20	133.32	36.4
			#40	141.61	32.4
			#60	147.55	29.6
			#100	153.79	26.6
			#140	158.04	24.6
			#200	161.50	22.9

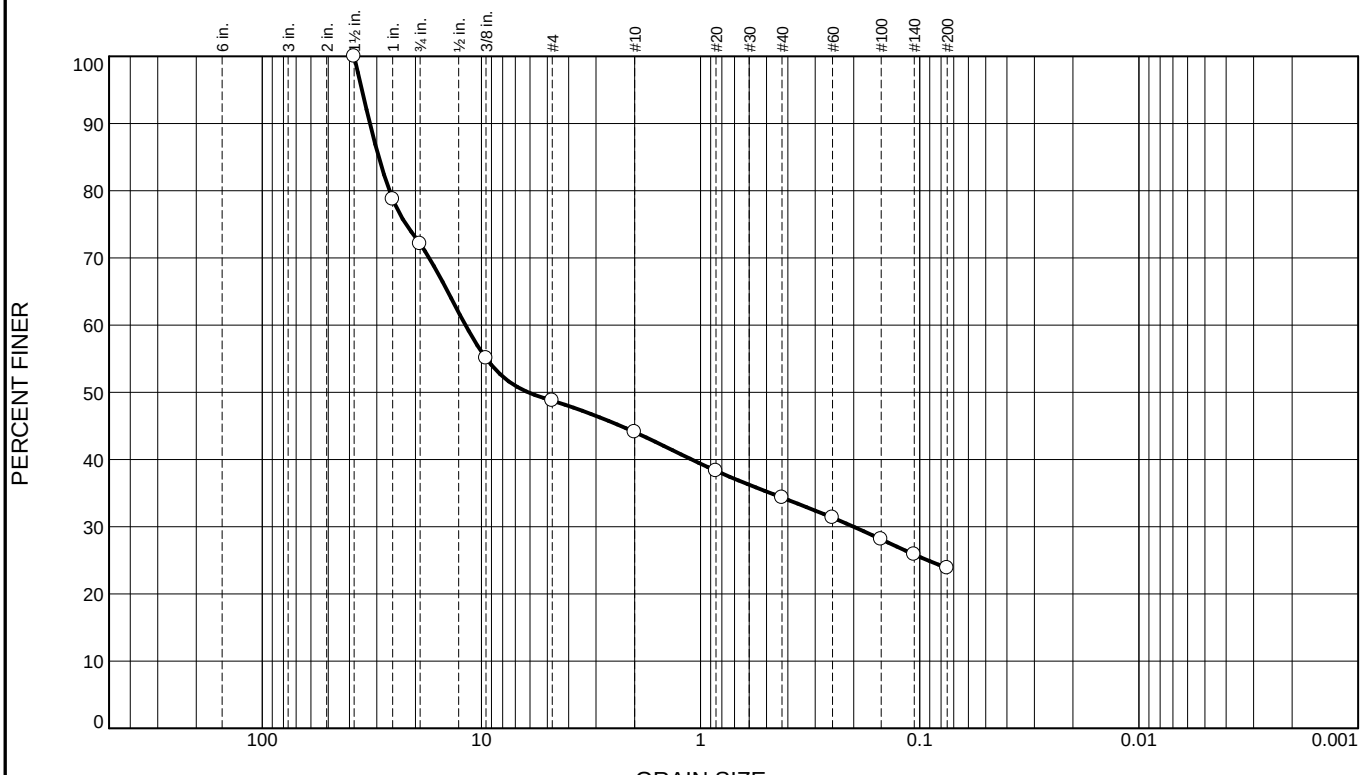
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	12.2	39.3	51.5	6.4	9.7	9.5	25.6			22.9

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.2709	1.4880	5.6935	9.8490	16.0582	17.9168	20.0517	22.5396

Fineness Modulus
4.32

Particle Size Analysis ASTM C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	27.9	23.3	4.7	9.8	10.5	23.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	78.7		
3/4"	72.1		
3/8"	55.1		
#4	48.8		
#10	44.1		
#20	38.3		
#40	34.3		
#60	31.3		
#100	28.1		
#140	25.9		
#200	23.8		

* (no specification provided)

Material Description

Light Brown SAND with Gravel

Atterberg Limits

PL= NR LL= NR PI= NR

Coefficients

D_{90}= 32.2550 D_{85}= 29.3972 D_{60}= 11.8234
D_{50}= 6.1265 D_{30}= 0.2008 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= NR AASHTO=

Remarks

F.M.=4.42

Location: B-4
Sample Number: BULK **Depth:** 2.0' **Date:** 6-16-16

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Client: S&ME
Project: Davidson Dumpsite
Project No: 6234160304 **Figure**

Tested By: D Kopitsky **Checked By:** G Williams

GRAIN SIZE DISTRIBUTION TEST DATA

6/17/2016

Client: S&ME
Project: Davidson Dumpsite
Project Number: 6234160304
Location: B-4
Depth: 2.0' **Sample Number:** BULK
Material Description: Light Brown SAND with Gravel
Date: 6-16-16 **PL:** NR **LL:** NR **PI:** NR
USCS Classification: NR
Tested by: D Kopitsky **Checked by:** G Williams

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
546.46	258.45	0.00	1 1/2"	0.00	100.0
			1"	61.23	78.7
			3/4"	80.33	72.1
			3/8"	129.44	55.1
			#4	147.58	48.8
			#10	161.06	44.1
			#20	177.67	38.3
			#40	189.14	34.3
			#60	197.75	31.3
			#100	207.02	28.1
			#140	213.54	25.9
			#200	219.33	23.8

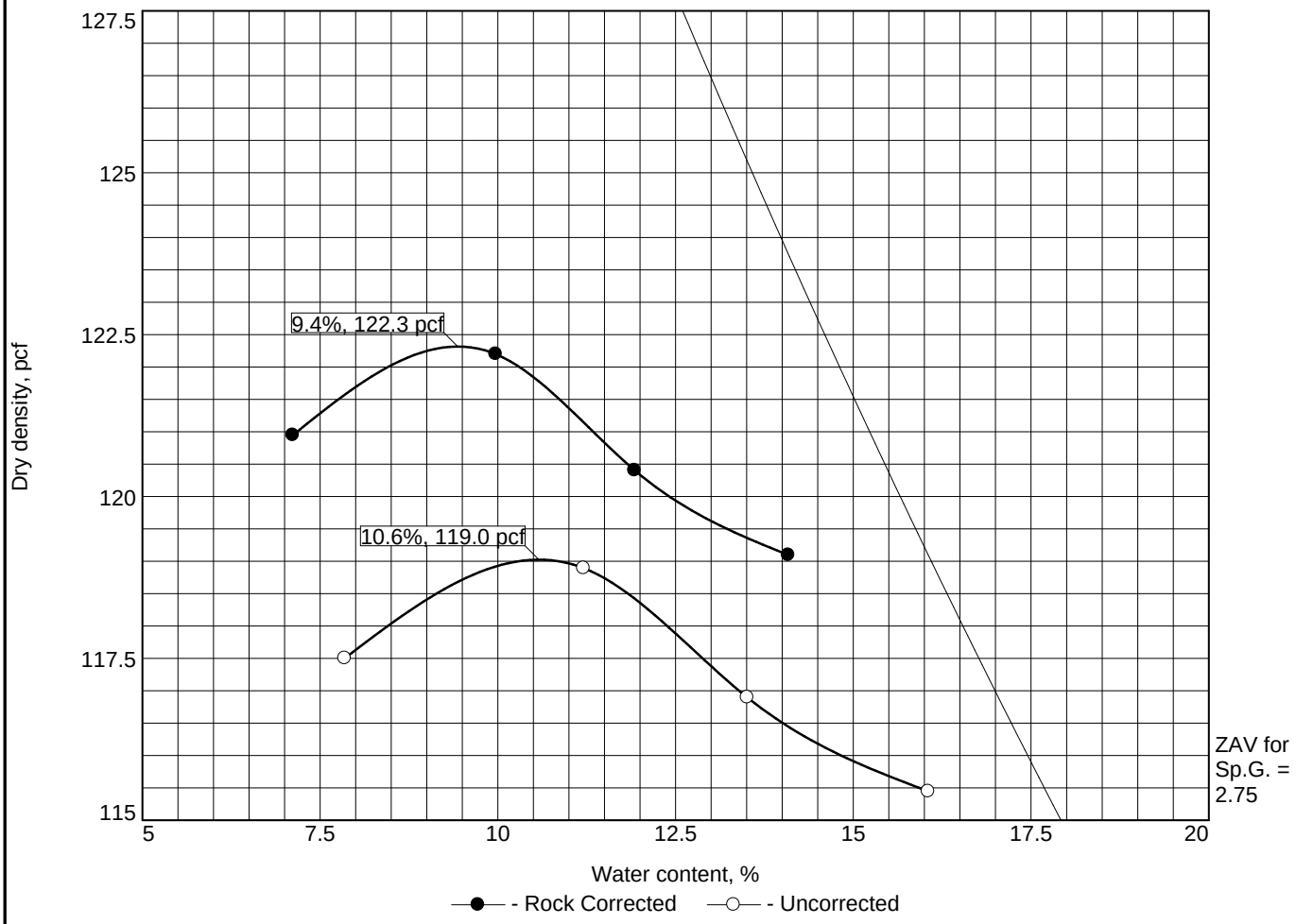
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	27.9	23.3	51.2	4.7	9.8	10.5	25.0			23.8

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.2008	1.0975	6.1265	11.8234	26.2945	29.3972	32.2550	35.1119

Fineness Modulus
4.42

COMPACTION TEST REPORT



Test specification: ASTM D 698-07 Method C Standard
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
2.0'	NR				NR	NR	15.1	23.8

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 122.3 pcf	119.0 pcf	Light Brown SAND with Gravel
Optimum moisture = 9.4 %	10.6 %	

Project No. 6234160304 **Client:** S&ME
Project: Davidson Dumpsite

○**Location:** B-4 **Sample Number:** BULK

Remarks:
Oversize SG: 2.32

amec foster wheeler

Figure

Tested By: A. Kottenstette **Checked By:** M. Hamilton

MOISTURE DENSITY TEST DATA

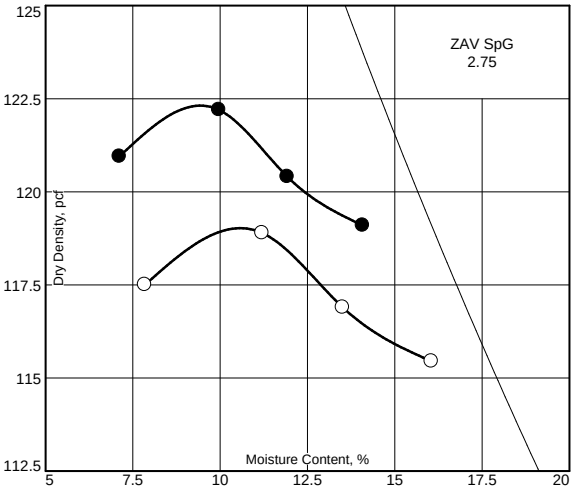
6/17/2016

Client: S&ME
Project: Davidson Dumpsite
Project Number: 6234160304
Location: B-4
Depth: 2.0' **Sample Number:** BULK
Description: Light Brown SAND with Gravel
USCS Classification: NR
Liquid Limit: NR **Plasticity Index:** NR
Testing Remarks: Oversize SG: 2.32
Tested by: A. Kottenstette **Checked by:** M. Hamilton

Test Data and Results

Test Specification:

Type of Test: ASTM D 698-07 Method C Standard
Mold Dia: 6.00 **Hammer Wt.:** 5.5 lb. **Drop:** 12 in. **Layers:** three **Blows per Layer:** 56



Point No.	1	2	3	4
Wt. M+S	11107.0	11123.0	11167.0	10920.0
Wt. M	6609.0	6609.0	6609.0	6609.0
Wt. W+T	901.3	907.4	1352.4	785.5
Wt. D+T	848.1	823.0	1216.5	747.0
Tare	373.4	198.3	370.0	256.3
Moist.	11.2	13.5	16.1	7.8
Moist.*	10.0	11.9	14.1	7.1
Dry Den.*	122.2	120.4	119.1	120.9

Rock Corrected Results: **Max. Dry Den.=** 122.3 pcf **Opt. Moist.=** 9.4%
Uncorrected Results: **Max. Dry Den.=** 119.0 pcf **Opt. Moist.=** 10.6%

Rock Correction Data:

Correction Method: ASTM D 4718-87
Percentage of Oversize Material (%> 3/4 in.): 15.1 **Bulk Specific Gravity of Oversize Material:** 2.32
Oversize Material Moisture Content: 3.02
***Note: the rock correction was applied to every test point's density and moisture value.**

ASTM D4718 CORRECTION FACTOR WORKSHEET

PROJECT NAME: Davidson Dumpsite

PROJECT NO.: 6234-16-0304 PHASE

PERFORMED BY: A. Kottenstette CHECKED BY: M. Hamilton

PROCTOR NO.: 1 DATE: 6/14/2016

Maximum Dry Density (pcf): **MDD=** 119 Optimum Moisture: **OM=** 10.6 %

A. 3/4 Sieve Retainged Weight (lbs): 7.4

B. Moisture Content Retained:
Pan Name: 911
Pan Tare (g): 406
Wet Wt. (grams): 1503
Dry Wt. (grams): 1470.8
% Moisture (decimal): 0.030 (= B)

C. 3/4 Sieve Passing Weight (lbs): 41.5

D. Moisture Content Passing:
Pan Name: 100
Pan Tare (g): 136.3
Wet Wt. (grams): 474.8
Dry Wt. (grams): 423.4
% Moisture (decimal): 0.179 (= D)

E. Dry Weight Retained (lbs): 7.18 = $\frac{A}{1+B}$

F. Dry Weight Passing (lbs): 35.20 = $\frac{C}{1+D}$

G. Total Dry Weight (lbs): 42.38 = E+F

H. Percent Oversize by Weight (%): 16.9 = $\frac{E * 100}{G}$ ***% larger than 3/4 sieve in proctor program***

J. Percent Fine by Weight (%): 83.1 = $\frac{F * 100}{G}$

SPECIFIC GRAVITY OF COARSE AGGREGATE

K. Weight of Sample Submerged (grams): 1295.7

L. Weight of Sample SSD in Air (grams): 2517.4

Pan Name: P#1
Pan Tare (grams): 317

M. Dry Weight of Sample (grams): 2413.7

N. Specific Gravity: 2.32 = $\frac{M}{L - K}$

O. Absorption (%): 4.95 = $\frac{(L - M)}{M}$

Typical Values for Specific Gravity:
Soil: 2.55 - 2.75
Sand: 2.60 - 2.75
Stone: 2.65 - 3.00

MOISTURE CONTENT CORRECTION

P. Corrected Moisture Content (%): 9.6 = $\frac{OM*J + O*H}{100}$

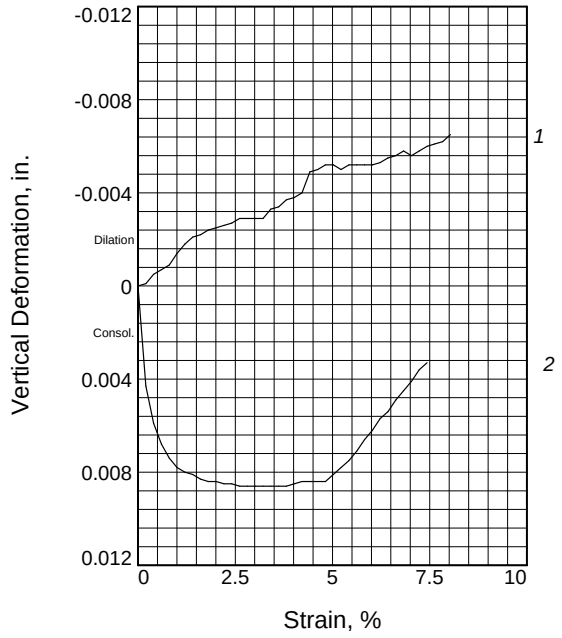
MAXIMUM DRY DENSITY CORRECTION

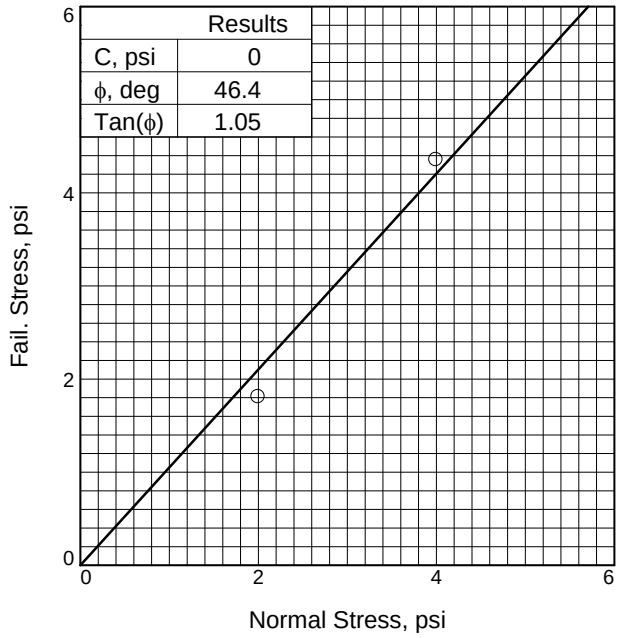
Q. Corrected Max. Dry Density (pcf): 122.7 = $\frac{100*(MDD)*N*62.4}{(MDD)*H + N*62.4*J}$

CORRECTED MAXIMUM DRY DENSITY (ASTM D4718)

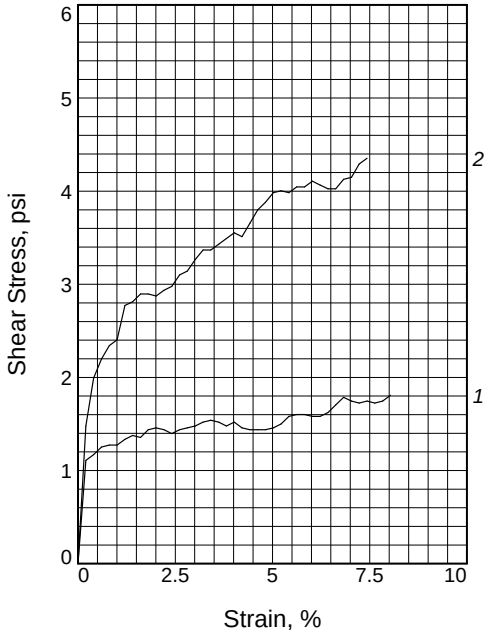
Project Name:
Project #:
Proctor #:
Source: (optional)

PERCENT RETAINED	PERCENT PASSING	UNCORRECTED MAXIMUM DRY DENSITY	SPECIFIC GRAVITY	ADJUSTED MAXIMUM DRY DENSITY	ADJUSTED MOISTURE CONTENT
0	100	119.0	2.32	119.0	10.6
1	99	119.0	2.32	119.2	10.5
2	98	119.0	2.32	119.4	10.5
3	97	119.0	2.32	119.6	10.4
4	96	119.0	2.32	119.8	10.4
5	95	119.0	2.32	120.1	10.3
6	94	119.0	2.32	120.3	10.3
7	93	119.0	2.32	120.5	10.2
8	92	119.0	2.32	120.7	10.1
9	91	119.0	2.32	120.9	10.1
10	90	119.0	2.32	121.1	10.0
11	89	119.0	2.32	121.4	10.0
12	88	119.0	2.32	121.6	9.9
13	87	119.0	2.32	121.8	9.9
14	86	119.0	2.32	122.0	9.8
15	85	119.0	2.32	122.2	9.8
16	84	119.0	2.32	122.5	9.7
17	83	119.0	2.32	122.7	9.6
18	82	119.0	2.32	122.9	9.6
19	81	119.0	2.32	123.1	9.5
20	80	119.0	2.32	123.4	9.5
21	79	119.0	2.32	123.6	9.4
22	78	119.0	2.32	123.8	9.4
23	77	119.0	2.32	124.1	9.3
24	76	119.0	2.32	124.3	9.2
25	75	119.0	2.32	124.5	9.2
26	74	119.0	2.32	124.7	9.1
27	73	119.0	2.32	125.0	9.1
28	72	119.0	2.32	125.2	9.0
29	71	119.0	2.32	125.4	9.0
30	70	119.0	2.32	125.7	8.9
31	69	119.0	2.32	125.9	8.8
32	68	119.0	2.32	126.2	8.8
33	67	119.0	2.32	126.4	8.7
34	66	119.0	2.32	126.6	8.7
35	65	119.0	2.32	126.9	8.6
36	64	119.0	2.32	127.1	8.6
37	63	119.0	2.32	127.3	8.5
38	62	119.0	2.32	127.6	8.5
39	61	119.0	2.32	127.8	8.4





Results	
C, psi	0
ϕ, deg	46.4
Tan(ϕ)	1.05



	Sample No.	1	2
Initial	Water Content, %	9.8	9.8
	Dry Density, pcf	114.0	114.0
	Saturation, %	57.8	57.8
	Void Ratio	0.4518	0.4518
	Diameter, in.	2.49	2.49
	Height, in.	1.00	1.00
At Test	Water Content, %	22.1	21.1
	Dry Density, pcf	115.0	114.7
	Saturation, %	133.3	126.8
	Void Ratio	0.4392	0.4418
	Diameter, in.	2.49	2.49
	Height, in.	0.99	0.99
Normal Stress, psi		2.00	4.00
Fail. Stress, psi		1.81	4.35
Strain, %		8.0	7.4
Ult. Stress, psi			
Strain, %			
Strain rate, in./min.		0.02	0.02

Sample Type:

Description: Light Brown SAND with Gravel

LL= NR **PI=** NR

Assumed Specific Gravity= 2.65

Remarks: Removed material retained on the 3/8" sieve to ensure a ratio of 6 between the testing ring diameter to maximum aggregate size was met.

Figure _____

Client: S&ME

Project: Davidson Dumpsite

Location: B-4

Sample Number: BULK **Depth:** 2.0'

Proj. No.: 6234160304 **Date Sampled:** 6-16-16

amec foster wheeler

Tested By: M. Hamilton **Checked By:** T. Landis

DIRECT SHEAR TEST

6/20/2016

Date: 6-16-16
Client: S&ME
Project: Davidson Dumpsite
Project No.: 6234160304
Location: B-4
Depth: 2.0' **Sample Number:** BULK
Description: Light Brown SAND with Gravel
Remarks: Removed material retained on the 3/8" sieve to ensure a ratio of 6 between the testing ring diameter to maximum aggregate size was met.
Type of Sample:
Assumed Specific Gravity=2.65 **LL=**NR **PL=** **PI=**NR

Parameters for Specimen No. 1

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	35.620		304.930
Moisture content: Dry soil+tare, gms.	33.880		273.710
Moisture content: Tare, gms.	16.210		132.350
Moisture, %	9.8	22.1	22.1
Moist specimen weight, gms.	160.0		
Diameter, in.	2.49	2.49	
Area, in.²	4.87	4.87	
Height, in.	1.00	0.99	
Net decrease in height, in.		0.01	
Wet density, pcf	125.2	140.3	
Dry density, pcf	114.0	115.0	
Void ratio	0.4518	0.4392	
Saturation, %	57.8	133.3	

Test Readings for Specimen No. 1

Normal stress = 2 psi
Strain rate, in./min. = 0.02
Fail. Stress = 1.81 psi **at reading no.** 40

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress psi	Vertical Def. Dial in.
0	0.0000	0.000	0.0	0.0	0.00	0.0000
1	0.0050	5.400	5.4	0.2	1.11	0.0001
2	0.0100	5.700	5.7	0.4	1.17	0.0005
3	0.0150	6.100	6.1	0.6	1.25	0.0007
4	0.0200	6.200	6.2	0.8	1.27	0.0009
5	0.0250	6.200	6.2	1.0	1.27	0.0014
6	0.0300	6.500	6.5	1.2	1.33	0.0018
7	0.0350	6.700	6.7	1.4	1.38	0.0021
8	0.0400	6.600	6.6	1.6	1.36	0.0022
9	0.0450	7.000	7.0	1.8	1.44	0.0024
10	0.0500	7.100	7.1	2.0	1.46	0.0025
11	0.0550	7.000	7.0	2.2	1.44	0.0026
12	0.0600	6.800	6.8	2.4	1.40	0.0027
13	0.0650	7.000	7.0	2.6	1.44	0.0029

Test Readings for Specimen No. 1

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress psi	Vertical Def. Dial in.
14	0.0700	7.100	7.1	2.8	1.46	0.0029
15	0.0750	7.200	7.2	3.0	1.48	0.0029
16	0.0800	7.400	7.4	3.2	1.52	0.0029
17	0.0850	7.500	7.5	3.4	1.54	0.0033
18	0.0900	7.400	7.4	3.6	1.52	0.0034
19	0.0950	7.200	7.2	3.8	1.48	0.0037
20	0.1000	7.400	7.4	4.0	1.52	0.0038
21	0.1050	7.100	7.1	4.2	1.46	0.0040
22	0.1100	7.000	7.0	4.4	1.44	0.0049
23	0.1150	7.000	7.0	4.6	1.44	0.0050
24	0.1200	7.000	7.0	4.8	1.44	0.0052
25	0.1250	7.100	7.1	5.0	1.46	0.0052
26	0.1300	7.300	7.3	5.2	1.50	0.0050
27	0.1350	7.700	7.7	5.4	1.58	0.0052
28	0.1400	7.800	7.8	5.6	1.60	0.0052
29	0.1450	7.800	7.8	5.8	1.60	0.0052
30	0.1500	7.700	7.7	6.0	1.58	0.0052
31	0.1550	7.700	7.7	6.2	1.58	0.0053
32	0.1600	7.900	7.9	6.4	1.62	0.0055
33	0.1650	8.300	8.3	6.6	1.70	0.0056
34	0.1700	8.700	8.7	6.8	1.79	0.0058
35	0.1750	8.500	8.5	7.0	1.75	0.0056
36	0.1800	8.400	8.4	7.2	1.73	0.0058
37	0.1850	8.500	8.5	7.4	1.75	0.0060
38	0.1900	8.400	8.4	7.6	1.73	0.0061
39	0.1950	8.500	8.5	7.8	1.75	0.0062
40	0.2000	8.800	8.8	8.0	1.81	0.0065

Parameters for Specimen No. 2

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	35.620		308.920
Moisture content: Dry soil+tare, gms.	33.880		279.330
Moisture content: Tare, gms.	16.210		139.400
Moisture, %	9.8	21.1	21.1
Moist specimen weight, gms.	160.0		
Diameter, in.	2.49	2.49	
Area, in.²	4.87	4.87	
Height, in.	1.00	0.99	
Net decrease in height, in.		0.01	
Wet density, pcf	125.2	139.0	
Dry density, pcf	114.0	114.7	
Void ratio	0.4518	0.4418	
Saturation, %	57.8	126.8	

Test Readings for Specimen No. 2

Normal stress = 4 psi

Strain rate, in./min. = 0.02

Fail. Stress = 4.35 psi **at reading no.** 37

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress psi	Vertical Def. Dial in.
0	0.0000	0.000	0.0	0.0	0.00	0.0000
1	0.0050	7.200	7.2	0.2	1.48	-0.0043
2	0.0100	9.700	9.7	0.4	1.99	-0.0059
3	0.0150	10.700	10.7	0.6	2.20	-0.0068
4	0.0200	11.400	11.4	0.8	2.34	-0.0074
5	0.0250	11.700	11.7	1.0	2.40	-0.0078
6	0.0300	13.500	13.5	1.2	2.77	-0.0080
7	0.0350	13.700	13.7	1.4	2.81	-0.0081
8	0.0400	14.100	14.1	1.6	2.90	-0.0083
9	0.0450	14.100	14.1	1.8	2.90	-0.0084
10	0.0500	14.000	14.0	2.0	2.88	-0.0084
11	0.0550	14.300	14.3	2.2	2.94	-0.0085
12	0.0600	14.500	14.5	2.4	2.98	-0.0085
13	0.0650	15.100	15.1	2.6	3.10	-0.0086
14	0.0700	15.300	15.3	2.8	3.14	-0.0086
15	0.0750	15.900	15.9	3.0	3.27	-0.0086
16	0.0800	16.400	16.4	3.2	3.37	-0.0086
17	0.0850	16.400	16.4	3.4	3.37	-0.0086
18	0.0900	16.700	16.7	3.6	3.43	-0.0086
19	0.0950	17.000	17.0	3.8	3.49	-0.0086
20	0.1000	17.300	17.3	4.0	3.55	-0.0085
21	0.1050	17.100	17.1	4.2	3.51	-0.0084
22	0.1100	17.800	17.8	4.4	3.66	-0.0084
23	0.1150	18.500	18.5	4.6	3.80	-0.0084
24	0.1200	18.900	18.9	4.8	3.88	-0.0084
25	0.1250	19.400	19.4	5.0	3.98	-0.0081
26	0.1300	19.500	19.5	5.2	4.00	-0.0078
27	0.1350	19.400	19.4	5.4	3.98	-0.0075
28	0.1400	19.700	19.7	5.6	4.05	-0.0071

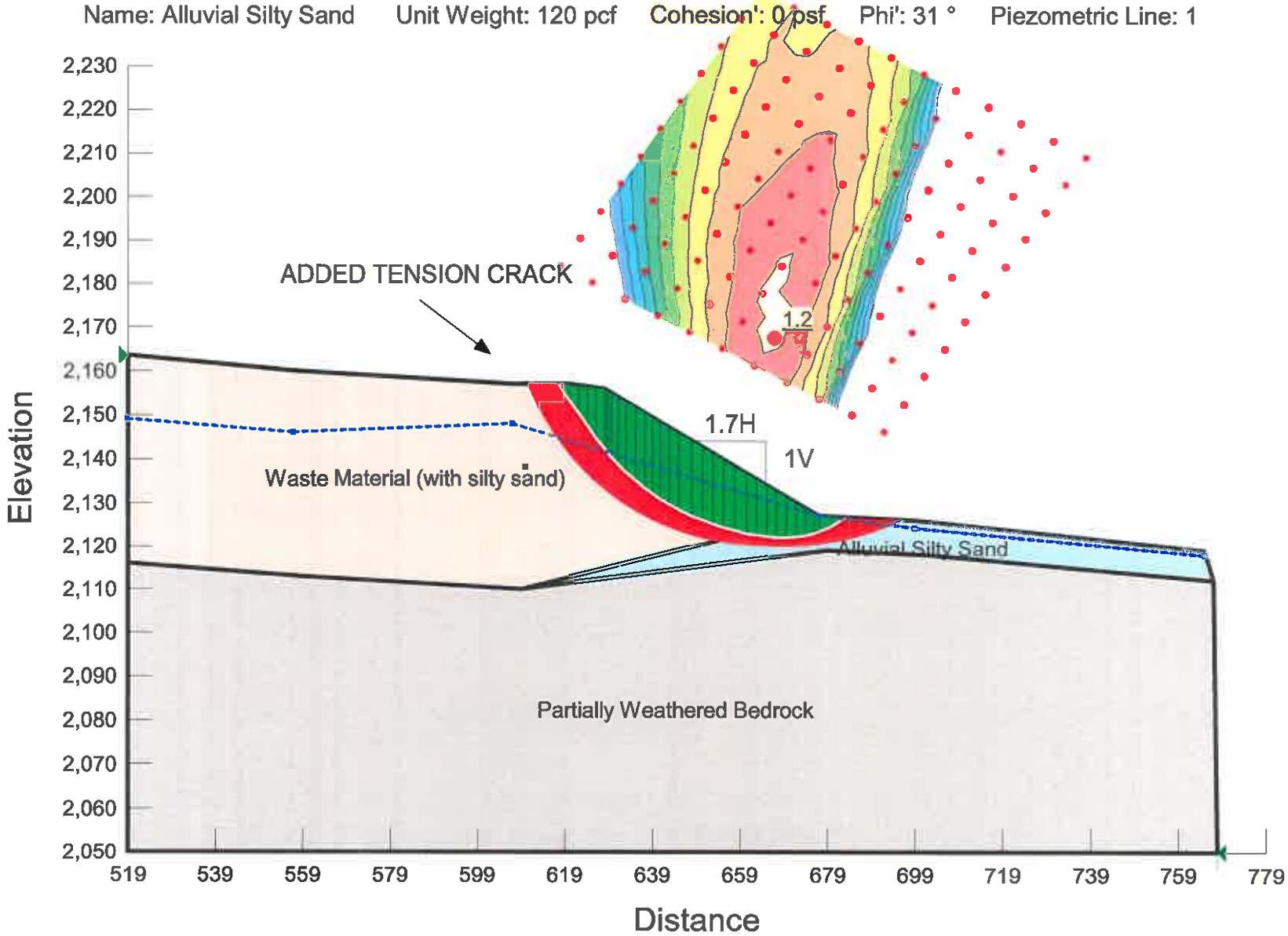
Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress psi	Vertical Def. Dial in.
29	0.1450	19.700	19.7	5.8	4.05	-0.0066
30	0.1500	20.000	20.0	6.0	4.11	-0.0062
31	0.1550	19.800	19.8	6.2	4.07	-0.0057
32	0.1600	19.600	19.6	6.4	4.03	-0.0054
33	0.1650	19.600	19.6	6.6	4.03	-0.0049
34	0.1700	20.100	20.1	6.8	4.13	-0.0045
35	0.1750	20.200	20.2	7.0	4.15	-0.0041
36	0.1800	20.900	20.9	7.2	4.29	-0.0036
37	0.1850	21.200	21.2	7.4	4.35	-0.0033

Appendix III – Slope Stability Evaluation Results

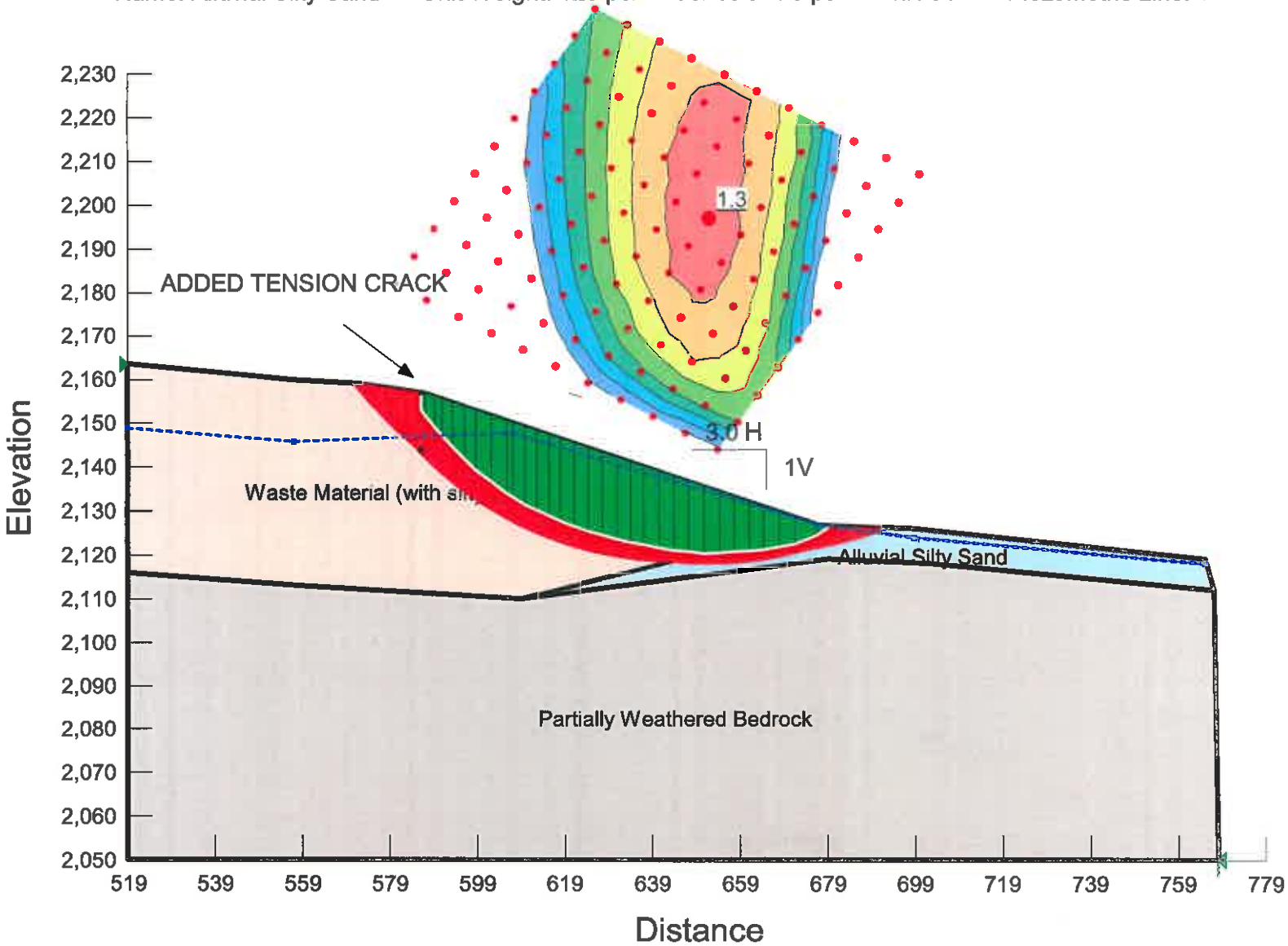
Davidson Dump Site
Existing Conditions-Radius & Grid [1.7H:1V maximum slope]
8/5/2016
Davidson ExistRG1.gsz
Morgenstern-Price

Name: Waste Material (with silty sand) Unit Weight: 100 pcf Cohesion': 200 psf Phi': 26 ° Piezometric Line: 1
Name: Partially Weathered Bedrock Unit Weight: 135 pcf Cohesion': 500 psf Phi': 32 ° Piezometric Line: 1
Name: Alluvial Silty Sand Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Piezometric Line: 1



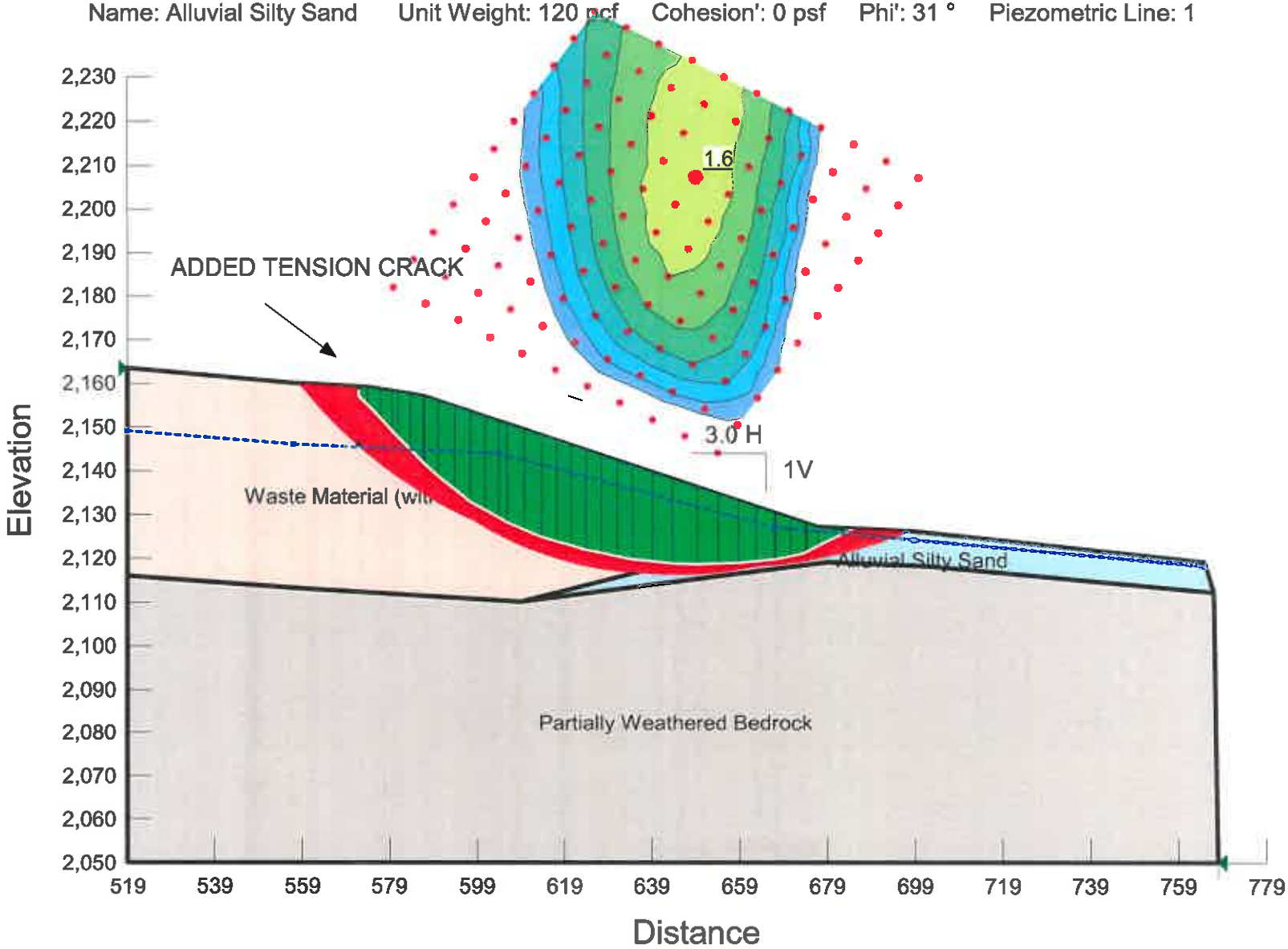
Davidson Dump Site
Modified Slope Conditions-Radius & Grid [3.0H:1V maximum slope]
8/5/2016
DavidsonModRG3.gsz
Morgenstern-Price

Name: Waste Material (with silty sand) Unit Weight: 100 pcf Cohesion': 200 psf Phi': 26 ° Piezometric Line: 1
Name: Partially Weathered Bedrock Unit Weight: 135 pcf Cohesion': 500 psf Phi': 32 ° Piezometric Line: 1
Name: Alluvial Silty Sand Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Piezometric Line: 1



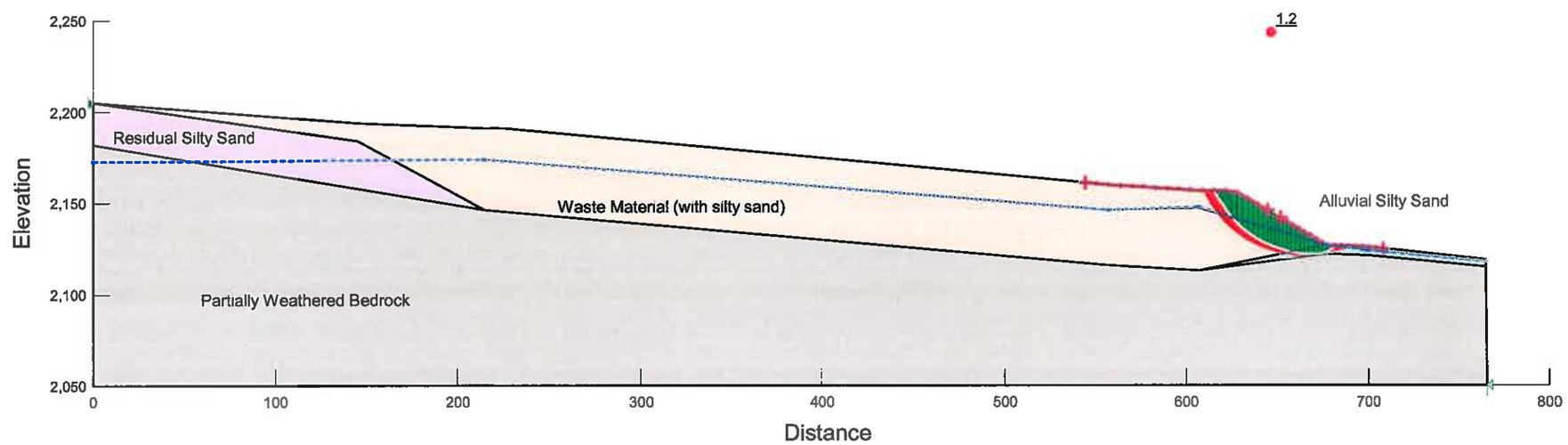
Davidson Dump Site
Modified Slope Conditions-Radius & Grid [3.0H:1V maximum slope and Toe Drai
8/5/2016
Davidson ModTD-G3.gsz
Morgenstern-Price

Name: Waste Material (with silty sand) Unit Weight: 100 pcf Cohesion': 200 psf Phi': 26 ° Piezometric Line: 1
Name: Partially Weathered Bedrock Unit Weight: 135 pcf Cohesion': 500 psf Phi': 32 ° Piezometric Line: 1
Name: Alluvial Silty Sand Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Piezometric Line: 1



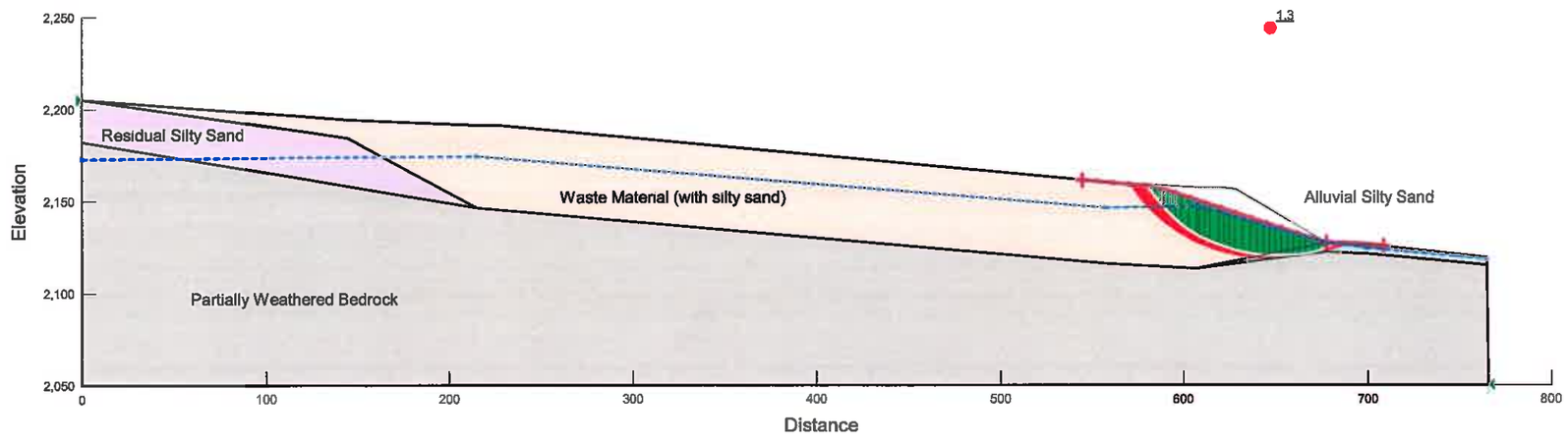
Davidson Dump Site
Existing Conditions-Entry Exit [1.7H:1V maximum slope]
8/5/2016
Davidson ExistEE1.gsz
Morgenstern-Price

Name: Waste Material (with silty sand) Unit Weight: 100 pcf Cohesion': 200 psf Phi': 26 ° Piezometric Line: 1
Name: Residual Silty Sand Unit Weight: 128 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Partially Weathered Bedrock Unit Weight: 135 pcf Cohesion': 500 psf Phi': 32 ° Piezometric Line: 1
Name: Alluvial Silty Sand Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Piezometric Line: 1



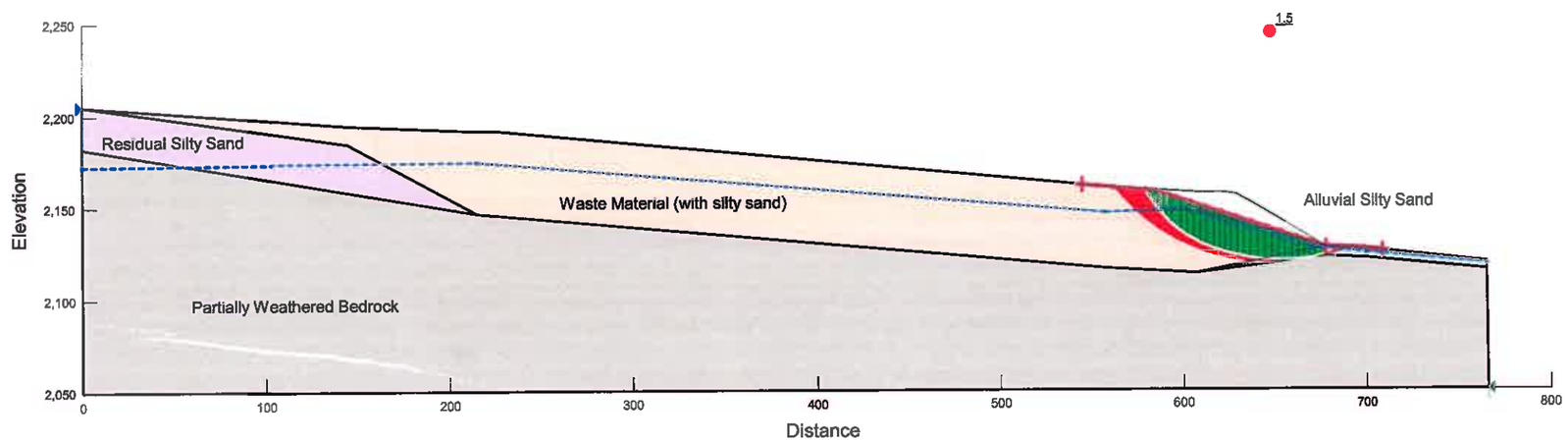
Davidson Dump Site
Modified Conditions-Entry Exit [Flatten to 3H:1V maximum slope]
8/5/2016
Davidson ModEE3.gsz
Morgenstern-Price

Name: Waste Material (with silty sand) Unit Weight: 100 pcf Cohesion': 200 psf Phi': 26 ° Piezometric Line: 1
Name: Residual Silty Sand Unit Weight: 128 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Partially Weathered Bedrock Unit Weight: 135 pcf Cohesion': 500 psf Phi': 32 ° Piezometric Line: 1
Name: Alluvial Silty Sand Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Piezometric Line: 1



Davidson Dump Site
Modified Conditions-Entry Exit [Flatten to 3H:1V maximum slope]
8/5/2016
Davidson ModEE3.gsz
Morgenstern-Price

Name: Waste Material (with silty sand) Unit Weight: 100 pcf Cohesion': 200 psf Phi': 26 ° Piezometric Line: 1
Name: Residual Silty Sand Unit Weight: 128 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Partially Weathered Bedrock Unit Weight: 135 pcf Cohesion': 500 psf Phi': 32 ° Piezometric Line: 1
Name: Alluvial Silty Sand Unit Weight: 120 pcf Cohesion': 0 psf Phi': 31 ° Piezometric Line: 1



Drawing

REFERENCE: TOPOGRAPHIC CONTOURS WERE OBTAINED FROM WNC-PE&S, LLC SURVEYORS APRIL, 2016 AND MA ENGINEERING CONSULTANTS INC. APRIL 2015. SURVEY WAS BASED IN NORTH CAROLINA STATE PLANE, NAD 83. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL OTHER FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION.

N

MW-6
SB-33B
(0')

MW-5
SB-32B
(0')

B-2

MW-8
SB-35B
(29')

ASB-3

SB-24
(12')

ASB-2

B-3

B-4

ASB-1

SB-23
(17')

SB-22
(22')

B-1

SB-21
(10')

ASB-6

ASB-7

ASB-8

ASB-4

ASB-5

MW-7
SB-34
(0')

SPRING

WASTE THICKNESS BORING (2013)
BORINGS (APRIL 2016)
MONITORING WELL LOCATIONS (2014)
BURRIED ELECTRIC/PHONE
OVERHEAD POWER
ELECTRIC
POWER TRANSMISSION
WASTE DISPOSAL AREA
5' GROUND ELEVATION CONTOUR
1' GROUND ELEVATION CONTOUR
PARCEL BOUNDARY
ROAD/DRIVEWAY
STRUCTURE/BUILDING

OFF-SITE CONTOURS:

4-FOOT CONTOURS
20-FOOT CONTOURS

0 30 60 90
(IN FEET)

S&ME
WWW.SMEINC.COM
9751 SOUTHERN PINE BLVD.
CHARLOTTE, NC 28273
(704) 523-4726
ENGINEERING FIRM LICENSE NUMBER F-0176

NO.	DATE	DESCRIPTION	BY	CHK	APV
A	8/3/2016	ISSUED FOR CONCEPTUAL DESIGN	DDH	SK	

EXISTING CONDITIONS / SITE MAP

DAVIDSON RIVER DUMP TASK ORDER 591RA-A2
PISGAH FOREST, TRANSYLVANIA COUNTY, NORTH CAROLINA

PROJECT NUMBER: 1054-12-1025

DRAWING: 1 OF: 1

Q:\1054-12-1025 Davidson River Dump\591GEOTECH\FULLSIZE.mxd plotted by Dhommans 08-03-2016

S&ME, Inc.
Davidson River Dump/1054-12-1025
5/18/2016 10:0 TAT: 2 Week
PLM Qualitative Soils

Order ID: 291603198
No Samples: 37
Due: 06/01 10:00 AM
Fax: 919-790-9827

EMS LABOR

ONE:
FAX:

Company Name: S&ME, INC		EMSL Customer ID:	
Street: 3201 SPRING FOREST RD		City: RALEIGH	State/Province: NC
Zip/Postal Code: 27616	Country: US	Telephone #:	Fax #:
Report To (Name): JASON VOLKER		Please Provide Results: ☐ Fax ☑ Email	
Email Address: JVOLKER@SMEINC.COM		Purchase Order: 1054-12-1025	
Project Name/Number: DAVIDSON RIVER DUMP/1054-12-1025		EMSL Project ID (*Internal Use Only*):	
U.S. State Samples Taken:		CT Samples: ☐ Commercial/Taxable ☐ Residential/Tax Exempt	

EMSL-Bill to: ☒ Same ☐ Different - If Bill to is Different note instructions in Comments**
Third Party Billing requires written authorization from third party

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☒ 2 Week

**For TEM Air 3 hr through 6 hr, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air ☐ Check if samples are from NY
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☑ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NYS 198.8 SOF-V
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ 4-4.5hr TAT (AHERA only)
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
Fibers >10µm ☐ Waste ☐ Drinking
All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite*
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ TEM Qual. via Filtration Technique
- ☐ TEM Qual. via Drop-Mount Technique

*Can not accept New York State Loose Fill Vermiculite Samples

Other:
☑ PLM 600 - QUALITATIVE - SOIL

☐ **Check For Positive Stop – Clearly Identify Homogenous Group** | **Filter Pore Size (Air Samples):** ☐ 0.8µm ☐ 0.45µm

Samplers Name: | **Samplers Signature:**

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
B-3-5'	SOIL		5-3-16
B-3-10'	SOIL		5-3-16
B-3-20'	SOIL		5-3-16
B-3-30'	SOIL		5-3-16
B-3-35'	SOIL		5-3-16
B-3-40'	SOIL		5-3-16
B-3-45'	SOIL		5-3-16

Client Sample # (s): B-3-5' - ASB-8-14' **Total # of Samples:** 39
Relinquished (Client): [signature] **Date:** 5/16/16 **Time:** 1530
Received (Lab): [signature] **Date:** 5/18/16 **Time:** 10a
Comments/Special Instructions:

Controlled Document – Asbestos COC – R9 – 10/30/2014

Asbestos Chain of Custody

EMSL ANALYTICAL LABORATORY

S&ME, Inc.
Davidson River Dump/1054-12-1025
5/18/2016 10:0
PLM Qualitative

TAT: 2 Week
Soils

Order ID: 291603198
No Samples: 37
Due: 06/01 10:00 AM
Fax: 919-790-9827

Additional pages of the Chain of Custody are only necessary if needed for additional sample information

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
ASB-1-5'	SOIL		5-4-16
ASB-1-10'	SOIL		5-4-16
ASB-1-15'	SOIL		5-4-16
ASB-1-17'	SOIL		5-4-16
ASB-2-5'	SOIL		5-3-16
ASB-2-10'	SOIL		5-3-16
ASB-2-15'	SOIL		5-3-16
ASB-2-20'	SOIL		5-3-16
ASB-2-25'	SOIL		5-3-16
ASB-2-30'	SOIL		5-3-16
ASB-2-35'	SOIL		5-3-16
ASB-2-40'	SOIL		5-3-16
ASB-2-45'	SOIL		5-3-16
ASB-3-5'	SOIL		5-4-16
ASB-3-10'	SOIL		5-4-16
ASB-3-15'	SOIL		5-4-16
ASB-3-20'	SOIL		5-4-16
ASB-4-5'	SOIL		5-2-16
ASB-4-8.5'	SOIL		5-2-16
ASB-5-5'	SOIL		5-2-16
ASB-5-8.5'	SOIL		5-2-16
ASB-6-5'	SOIL		4-25-16
ASB-6-10'	SOIL		4-25-16
ASB-6-14'	SOIL		4-25-16

***Comments/Special Instructions:**

Page 2 of 3 pages

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

S&ME, Inc.
Davidson River Dump/1054-12-1025
5/18/2016 10:0
PLM Qualitative

TAT: 2 Week
Soils

Order ID: 291603198
No Samples: 37
Due: 06/01 10:00 AM
Fax: 919-790-9827

HONE:
FAX:

Additional Pages of the Chain of Custody are only necessary ... nation

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
ASB-7-5'	SOIL		4-25-16
ASB-7-10'	SOIL		4-25-16
ASB-7-14'	SOIL		4-25-16
ASB-8-5'	SOIL		4-25-16
ASB-8-10'	SOIL		4-25-16
ASB-8-14'	SOIL		4-25-16

***Comments/Special Instructions:**

Page 3 of 3 pages

EMSL Analytical, Inc.
2500 Gateway Centre Blvd., Suite 600, Morrisville, NC 27560
Phone/Fax: (919) 465-3900 / (919) 465-3950
http://www.EMSL.com raleighlab@emsl.com

EMSL Order:	291603198
CustomerID:	SMEI60
CustomerPO:	1054-12-1025
ProjectID:	

Attn: **Jason Volker**
S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

Phone:	(919) 872-2660
Fax:	(919) 790-9827
Received:	05/18/16 10:00 AM
Analysis Date:	6/1/2016
Collected:	

Project: **Davidson River Dump/1054-12-1025**

Test Report: Qualitative asbestos analysis of soils using the EPA 600/R-93/116 method

Sample	Description	Appearance	Result	Notes
B-3-5' *291603198-0001*	Soil	Brown/Tan Fibrous Heterogeneous	**None Detected**	
B-3-10' *291603198-0002*	Soil	Brown/Tan Fibrous Heterogeneous	**None Detected**	
B-3-20' *291603198-0003*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
B-3-30' *291603198-0004*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
B-3-35' *291603198-0005*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
B-3-40' *291603198-0006*	Soil *HOLD*		**Not Analyzed**	
B-3-45' *291603198-0007*	Soil *HOLD*		**Not Analyzed**	
ASB-1-5' *291603198-0008*	Soil	Brown/Gray Fibrous Heterogeneous	**None Detected**	
ASB-1-10' *291603198-0009*	Soil	Brown/Tan Fibrous Heterogeneous	**None Detected**	

Analyst(s)

Joshua Moorman (1) *Roxsee Stover (14)*
Kelly Gallisdorfer (16)

Essie Spencer, Laboratory Manager
or other approved signatory

Soil is a problem matrix due to its inherent heterogeneity and there is a likelihood for false negatives with this analysis. EMSL recommends more specialized methodologies such as the EPA 600/R-93/116 with milling preparation. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Morrisville, NC

Initial report from 06/02/2016 08:50:34

EMSL Analytical, Inc.
2500 Gateway Centre Blvd., Suite 600, Morrisville, NC 27560
Phone/Fax: (919) 465-3900 / (919) 465-3950
http://www.EMSL.com raleighlab@emsl.com

EMSL Order:	291603198
CustomerID:	SMEI60
CustomerPO:	1054-12-1025
ProjectID:	

Attn: **Jason Volker**
S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

Phone:	(919) 872-2660
Fax:	(919) 790-9827
Received:	05/18/16 10:00 AM
Analysis Date:	6/1/2016
Collected:	

Project: **Davidson River Dump/1054-12-1025**

Test Report: Qualitative asbestos analysis of soils using the EPA 600/R-93/116 method

Sample	Description	Appearance	Result	Notes
ASB-1-15' *291603198-0010*	Soil	Brown/Tan Fibrous Heterogeneous	**None Detected**	
ASB-1-17' *291603198-0011*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-2-5' *291603198-0012*	Soil	Tan Fibrous Heterogeneous	**None Detected**	
ASB-2-10' *291603198-0013*	Soil	Tan Fibrous Heterogeneous	**None Detected**	
ASB-2-15' *291603198-0014*	Soil	Tan Fibrous Heterogeneous	**None Detected**	
ASB-2-20' *291603198-0015*	Soil	Tan Fibrous Heterogeneous	**None Detected**	
ASB-2-25' *291603198-0016*	Soil	Tan Fibrous Heterogeneous	**None Detected**	
ASB-2-30' *291603198-0017*	Soil *HOLD*		**Not Analyzed**	
ASB-2-35' *291603198-0018*	Soil *HOLD*		**Not Analyzed**	

Analyst(s)

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Kelly Gallisdorfer (16)

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http://www.EMSL.com raleighlab@emsl.com

EMSL Order:	291603198
CustomerID:	SMEI60
CustomerPO:	1054-12-1025
ProjectID:	

Attn: **Jason Volker**
S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

Phone:	(919) 872-2660
Fax:	(919) 790-9827
Received:	05/18/16 10:00 AM
Analysis Date:	6/1/2016
Collected:	

Project: **Davidson River Dump/1054-12-1025**

Test Report: Qualitative asbestos analysis of soils using the EPA 600/R-93/116 method

Sample	Description	Appearance	Result	Notes
ASB-2-40' *291603198-0019*	Soil *HOLD*		**Not Analyzed**	
ASB-2-45' *291603198-0020*	Soil *HOLD*		**Not Analyzed**	
ASB-3-5' *291603198-0021*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-3-10' *291603198-0022*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-3-15' *291603198-0023*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-3-20' *291603198-0024*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-4-5' *291603198-0025*	Soil	Brown/Red Fibrous Heterogeneous	**None Detected**	
ASB-4-8.5' *291603198-0026*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-5-5' *291603198-0027*	Soil	Brown/Red Fibrous Heterogeneous	**None Detected**	

Analyst(s)

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Samples analyzed by EMSL Analytical, Inc. Morrisville, NC

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EMSL Order:	291603198
CustomerID:	SMEI60
CustomerPO:	1054-12-1025
ProjectID:	

Attn: **Jason Volker**
S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

Phone:	(919) 872-2660
Fax:	(919) 790-9827
Received:	05/18/16 10:00 AM
Analysis Date:	6/1/2016
Collected:	

Project: **Davidson River Dump/1054-12-1025**

Test Report: Qualitative asbestos analysis of soils using the EPA 600/R-93/116 method

Sample	Description	Appearance	Result	Notes
ASB-5-8.5' *291603198-0028*	Soil	Gray/Tan Fibrous Heterogeneous	**None Detected**	
ASB-6-5' *291603198-0029*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-6-10' *291603198-0030*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-6-14' *291603198-0031*	Soil	Gray/Tan Fibrous Heterogeneous	**None Detected**	
ASB-7-5' *291603198-0032*	Soil	Tan Fibrous Heterogeneous	**None Detected**	
ASB-7-10' *291603198-0033*	Soil	Brown Fibrous Heterogeneous	**None Detected**	
ASB-7-14' *291603198-0034*	Soil	Brown/Red Fibrous Heterogeneous	**None Detected**	
ASB-8-5' *291603198-0035*	Soil	Brown/Tan Fibrous Heterogeneous	**None Detected**	
ASB-8-10' *291603198-0036*	Soil	Tan Fibrous Heterogeneous	**None Detected**	

Analyst(s)

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http://www.EMSL.com raleighlab@emsl.com

EMSL Order:	291603198
CustomerID:	SMEI60
CustomerPO:	1054-12-1025
ProjectID:	

Attn: **Jason Volker**
S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

Phone:	(919) 872-2660
Fax:	(919) 790-9827
Received:	05/18/16 10:00 AM
Analysis Date:	6/1/2016
Collected:	

Project: **Davidson River Dump/1054-12-1025**

Test Report: Qualitative asbestos analysis of soils using the EPA 600/R-93/116 method

Sample	Description	Appearance	Result	Notes
ASB-8-14' *291603198-0037*	Soil	Tan Fibrous Heterogeneous	**None Detected**	

Analyst(s)

Joshua Moorman (1) *Roxsee Stover (14)*
Kelly Gallisdorfer (16)

Essie Spencer, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc. Morrisville, NC

Initial report from 06/02/2016 08:50:34

OrderID: 291603199

Asbestos Chain of Custody

S&ME, Inc.
Davidson River Dump, 1054-12-1025
5/18/2016 10:0
PLM Qualitative

TAT: 2 Week
Soils

Order ID: 291603199
No Samples: 13
Due: 06/01 10:00 AM
Fax: 919-790-9827

PHONE:
FAX:

Company Name: S&ME, INC		EMSL Customer ID:	
Street: 3201 SPRING FOREST RD		City: RALEIGH	State/Province: NC
Zip/Postal Code: 27616	Country: US	Telephone #:	Fax #:
Report To (Name): JASON VOLKER		Please Provide Results: ☐ Fax ☒ Email	
Email Address: JVOLKER@SMEINC.COM		Purchase Order: 1054-12-1025	
Project Name/Number: DAVIDSON RIVER DUMP		EMSL Project ID (*Internal Use Only*):	
U.S. State Samples Taken: 1054-12-1025		CT Samples: ☐ Commercial/Taxable ☐ Residential/Tax Exempt	

EMSL-Bill to: ☒ Same ☐ Different - If Bill to is Different note instructions in Comments**
Third Party Billing requires written authorization from third party

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☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☒ 2 Week

**For TEM Air 3 hr through 6 hr, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air ☐ Check if samples are from NY
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☒ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NYS 198.8 SOF-V
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ 4-4.5hr TAT (AHERA only)
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite*
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ TEM Qual. via Filtration Technique
- ☐ TEM Qual. via Drop-Mount Technique

*Can not accept New York State Loose Fill Vermiculite Samples

Other:
- ☐

☐ **Check For Positive Stop – Clearly Identify Homogenous Group** | **Filter Pore Size (Air Samples):** ☐ 0.8µm ☐ 0.45µm

Samplers Name: | **Samplers Signature:**

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
B-3-10'	SOIL / TEXTILES		5-3-2016
B-3-20'	SOIL / TEXTILES		5-3-2016
B-3-25'	SOIL / TEXTILES		5-3-2016
B-3-30'	SOIL / TEXTILES		5-3-2016
B-3-40'	SOIL / TEXTILES		5-3-2016
ASB-2-5'	SOIL / TEXTILES		5-3-2016
ASB-2-25'	SOIL / TEXTILES		5-3-2016

Client Sample # (s): B-3-10' - ASB-8-14' **Total # of Samples:** 13

Relinquished (Client): [signature] **Date:** 5/16/16 **Time:** 1530

Received (Lab): [signature] **Date:** 5/18/16 **Time:** [illegible]

Comments/Special Instructions:

Controlled Document – Asbestos COC – R9 – 10/30/2014

Asbestos Chain of Custody

EMSL Order Number *(Lab Use Only)*:

EMSL ANALYTI
LABORATORY•PRODU

Additional P

S&ME, Inc.
Davidson River Dump, 1054-12-1025
5/18/2016 10:0
PLM Qualitative

TAT: 2 Week
Soils

Order ID: 291603199
No Samples: 13
Due: 06/01 10.00 AM
Fax: 919-790-9827

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
ASB-2-30'	SOIL / TEXTILES		5-3-16
ASB-3-5'	SOIL / TEXTILES		5-4-16
ASB-4-8.5'	SOIL / TEXTILES		4-25-16
ASB-7-10'	SOIL / TEXTILES		4-25-16
ASB-7-14'	SOIL / TEXTILES		4-25-16
ASB-8-14'	SOIL / TEXTILES		4-25-16

***Comments/Special Instructions:**

Page 2 of 2 pages

EMSL Analytical, Inc.

2500 Gateway Centre Blvd., Suite 600 Morrisville, NC 27560
Tel/Fax: (919) 465-3900 / (919) 465-3950
http://www.EMSL.com / raleighlab@emsl.com

EMSL Order: 291603199
Customer ID: SMEI60
Customer PO: 1054-12-1025
Project ID:

Attention: Jason Volker
S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

Project: Davidson River Dump, 1054-12-1025

Phone: (919) 872-2660
Fax: (919) 790-9827
Received Date: 05/18/2016 10:00 AM
Analysis Date: 06/01/2016
Collected Date:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
B-3-10' *291603199-0001*	Soil/Textiles	Brown Fibrous Homogeneous	15% Cellulose <1% Synthetic 5% Glass	80% Non-fibrous (Other)	None Detected
B-3-20' *291603199-0002*	Soil/Textiles	Brown Fibrous Homogeneous	2% Cellulose 15% Synthetic	83% Non-fibrous (Other)	None Detected
B-3-25' *291603199-0003*	Soil/Textiles	Brown Fibrous Homogeneous	3% Cellulose 10% Synthetic	87% Non-fibrous (Other)	None Detected
B-3-30' *291603199-0004*	Soil/Textiles	Brown Fibrous Homogeneous	8% Cellulose 15% Synthetic <1% Glass	77% Non-fibrous (Other)	None Detected
B-3-40' *291603199-0005*	Soil/Textiles	Brown Fibrous Homogeneous	5% Cellulose 15% Synthetic 2% Min. Wool 2% Glass	76% Non-fibrous (Other)	None Detected
ASB-2-5' *291603199-0006*	Soil/Textiles	Brown Fibrous Homogeneous	3% Cellulose 8% Synthetic	89% Non-fibrous (Other)	None Detected
ASB-2-25' *291603199-0007*	Soil/Textiles	Various Fibrous Homogeneous	5% Cellulose 5% Synthetic	90% Non-fibrous (Other)	None Detected
ASB-2-30' *291603199-0008*	Soil/Textiles	Brown Fibrous Homogeneous	5% Cellulose 5% Synthetic	90% Non-fibrous (Other)	None Detected
ASB-3-5' *291603199-0009*	Soil/Textiles	Green Fibrous Homogeneous	80% Synthetic	20% Non-fibrous (Other)	None Detected
ASB-4-8.5' *291603199-0010*	Soil/Textiles				Not Submitted
ASB-7-10' *291603199-0011*	Soil/Textiles	Brown/Blue Fibrous Homogeneous	5% Cellulose 70% Synthetic 8% Glass	17% Non-fibrous (Other)	None Detected
ASB-7-14' *291603199-0012*	Soil/Textiles	Brown/Blue Fibrous Homogeneous	5% Cellulose 45% Synthetic	50% Non-fibrous (Other)	None Detected
ASB-8-14' *291603199-0013*	Soil/Textiles	Brown/White Fibrous Homogeneous	2% Cellulose 3% Glass	95% Non-fibrous (Other)	None Detected

Initial Report From: 06/01/2016 12:58:33

EMSL Analytical, Inc.
2500 Gateway Centre Blvd., Suite 600 Morrisville, NC 27560
Tel/Fax: (919) 465-3900 / (919) 465-3950
http://www.EMSL.com / raleighlab@emsl.com

EMSL Order:	291603199
Customer ID:	SMEI60
Customer PO:	1054-12-1025
Project ID:	

Analyst(s)

Kelly Gallisdorfer (3)
Olivia Bradley (9)

Essie Spencer, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Analytical, Inc. Morrisville, NC NVLAP Lab Code 200671-0, VA 3333 000278, WVA LT000296

Initial Report From: 06/01/2016 12:58:33

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID: **2016-01171** County: **Transylvania** U.S.G.S. Quad: **Pisgah Forest**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: **Phillip and Lianne Starnes**
Address: **3475 Reasonover Road**
Cedar Mountain, NC 28718

Size (acres): **4.36** Nearest Town: **Pisgah Forest**
Nearest Waterway: **UT French Broad River** Coordinates: **35.25019 N, 82.69184 W**
River Basin/ HUC: **Upper French Broad (06010105)**

Location description: **The site is located on a tract of land (PIN 8596-86-2418-000) at 954 Poplar Lane in Pisgah Forest, Transylvania County, North Carolina.**

Indicate Which of the Following Apply:

A. Preliminary Determination

_ Based on preliminary information, there may be wetlands on the above describedproperty. We strongly suggest you have this property inspected to determine the extent of Department of the Army (DA) jurisdiction. To be considered final, a jurisdictional determination must be verified by the Corps. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also, you may provide new information for further consideration by the Corps to reevaluate the JD.

B. Approved Determination

_ There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

X There are waters of the U.S. including wetlands on the above described property subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ We strongly suggest you have the wetlands on your property delineated. Due to the size of your property and/or our present workload, the Corps may not be able to accomplish this wetland delineation in a timely manner. For a more timely delineation, you may wish to obtain a consultant. To be considered final, any delineation must be verified by the Corps.

X The waters of the U.S. including wetlands on your project area have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

_ The waters of the U.S. including wetlands have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on_____. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ There are no waters of the U.S., to include wetlands, present on the above described project area which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **David Brown** at **828-271-7980, ext. 232** or **david.w.brown@usace.army.mil**.

C. Basis for Determination:

The site contains wetlands as determined by the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Eastern Mountain and Piedmont Region (Version 2.0). These wetlands are abutting to a stream channel located on the site which exhibit indicators of ordinary high water marks and has perennial flow. The stream channel on the site is an unnamed tributary (UT) of the French Broad River, a relatively permanent water (RPW), which flows into the French Broad River, traditional navigable waters (TNW) and designated Section 10 water downstream of Wilson Road Bridge in Brevard, North Carolina. The French Broad River merges with the Holston River to form the Tennessee River which flows into the Ohio River then to the Mississippi River before entering the Gulf of Mexico. This jurisdictional determination is valid for the review area only.

D. Remarks:

The waters of the U.S., at this site, were verified on-site by the Corps on June 28, 2016 and are as approximately depicted on the attached Figure 2, Preliminary Wetland Map (dated May 2016), submitted by S&ME, Inc.

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Jason Steele, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by September 12, 2016.

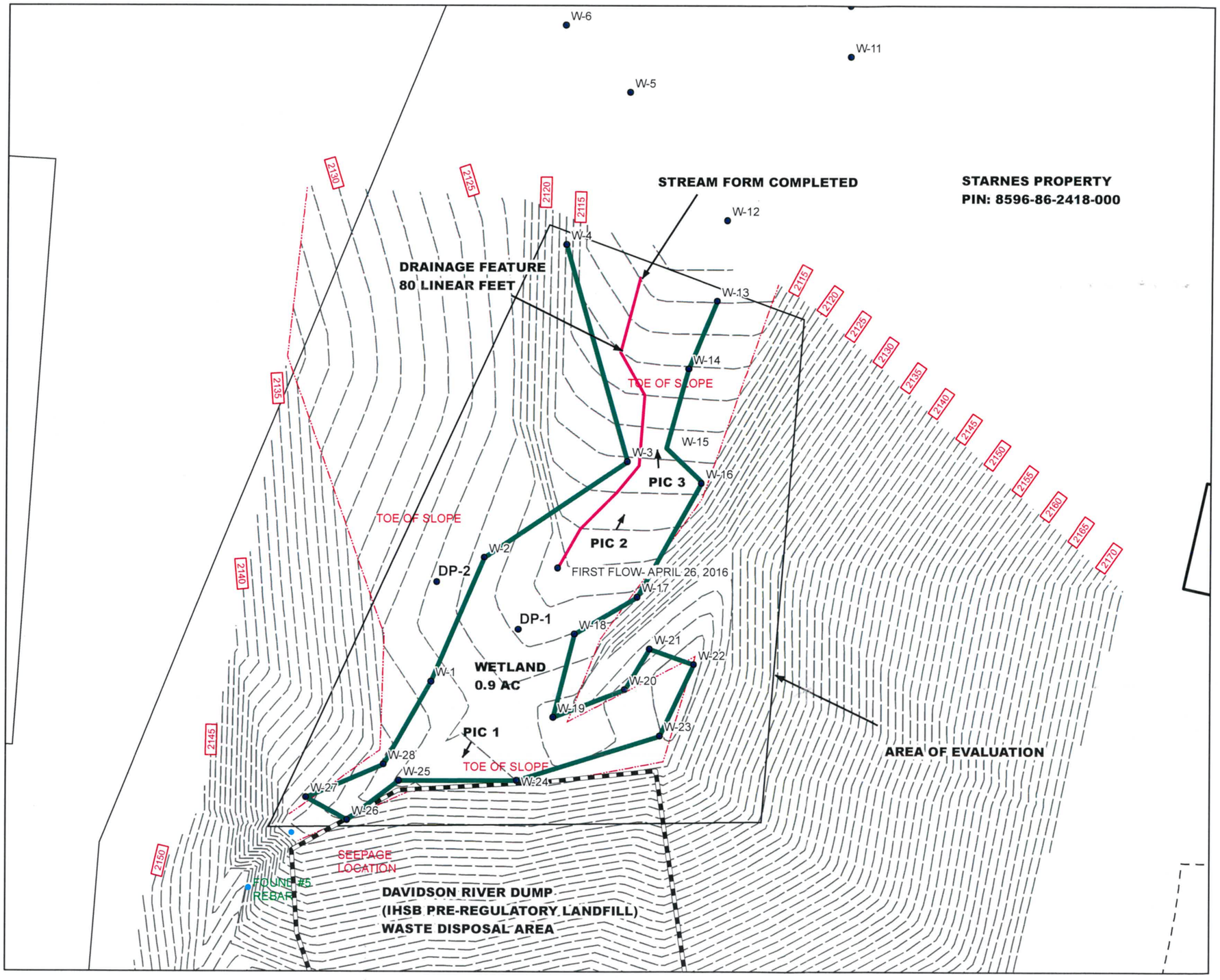
It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: _____
David Brown

Issue Date of JD: **July 14, 2016** Expiration Date: Five years from *Issue Date*

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete our Customer Satisfaction Survey, located online at http://regulatory.usacesurvey.com/.

Copy furnished:
S&ME, Inc., Attn.: Jason Volker, 3201 Spring Forest Road, Raleigh, NC 27616



N

PARCELS BASED ON TRANSYLVANIA CO. GIS ACCESSED MAY 2012.

TOPOGRAPHIC COUNTOURS OBTAINED FROM WNC-PE&S, PLLC LIDAR DATA, APRIL 2007.

0 12.5 25 50 Feet

LEGEND

- WETLAND BOUNDARY/DATA PTS
- DRAINAGE FEATURE
- PRELIMINARY WETLAND BOUNDARY
- WASTE DISPOSAL AREA
- AREA OF EVALUATION
- ROAD/DRIVEWAY
- STRUCTURE/BUILDING
- PARCEL BOUNDARY

SCALE: 1" = 25'	PROJECT NO: 1054-12-1025	DATE: MAY 2016
	DRAWING NUMBER:	DRAWN BY: JLV
		CHECKED BY:

S&ME
WWW.SMEINC.COM
NC ENG. LICENSE #F-0176
3201 SPRING FOREST RD, RALEIGH, NC 27616

PRELIMINARY WETLAND MAP

DAVIDSON RIVER DUMP - TASK ORDER 591RA-A
PISGAH FOREST, NORTH CAROLINA

FIGURE NO.
2

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Phillip and Lianne Starnes**	File Number: **SAW-2016-01171**	Date: **July 14, 2016**

Attached is:	See Section below
☐ INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
☐ PROFFERED PERMIT (Standard Permit or Letter of permission)	B
☐ PERMIT DENIAL	C
☒ APPROVED JURISDICTIONAL DETERMINATION	D
☐ PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: **District Engineer, Wilmington Regulatory Division,** **Attn: David Brown** **828-271-7980**	If you only have questions regarding the appeal process you may also contact: Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn.: David Brown, 69 Darlington Avenue, Wilmington, North Carolina 28403

For Permit denials, Proffered Permits and approved Jurisdictional Determinations send this form to:

Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Jason Steele, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

Jurisdictional Determination Request

US Army Corps of Engineers
Wilmington District

This form is intended for use by anyone requesting a jurisdictional determination (JD) from the U.S. Army Corps of Engineers, Wilmington District (Corps). Please include all supporting information, as described within each category, with your request. You may submit your request to the appropriate Corps Field Office (or project manager, if known) via mail, electronic mail, or facsimile. A current list of county assignments by Field Office and project manager can be found on-line at: http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram.aspx , by telephoning: 910-251-4633, or by contacting any of the field offices listed below:

ASHEVILLE REGULATORY FIELD OFFICE

US Army Corps of Engineers
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006
General Number: (828) 271-7980
Fax Number: (828) 281-8120

WASHINGTON REGULATORY FIELD OFFICE

US Army Corps of Engineers
2407 West Fifth Street
Washington, North Carolina 27889
General Number: (910) 251-4610
Fax Number: (252) 975-1399

RALEIGH REGULATORY FIELD OFFICE

US Army Corps of Engineers
3331 Heritage Trade Drive, Suite 105
Wake Forest, North Carolina 27587
General Number: (919) 554-4884
Fax Number: (919) 562-0421

WILMINGTON REGULATORY FIELD OFFICE

US Army Corps of Engineers
69 Darlington Avenue
Wilmington, North Carolina 28403
General Number: 910-251-4633
Fax Number: (910) 251-4025

INSTRUCTIONS:

All requestors must complete Parts A, B, C, D, E and F.

NOTE TO CONSULTANTS AND AGENCIES: If you are requesting a JD on behalf of a paying client or your agency, please note the specific submittal requirements in **Part G**.

NOTE ON PART D – PROPERTY OWNER AUTHORIZATION: Please be aware that all JD requests must include the current property owner authorization for the Corps to proceed with the determination, which may include inspection of the property when necessary. This form must be signed by the current property owner to be considered a complete request.

NOTE ON PART D - NCDOT REQUESTS: Property owner authorization/notification for JD requests associated with North Carolina Department of Transportation (NCDOT) projects will be conducted according to the current NCDOT/USACE protocols.

NOTE TO USDA PROGRAM PARTICIPANTS: A Corps approved or preliminary JD may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should also request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

A. PARCEL INFORMATION

Street Address: 954 Poplar Lane
City, State: Pisgah Forest
County: Transylvania
Directions: From Old 64/Hendersonville HWY, south on Everette Rd across French Broad River, right onto Poplar Ln, before end of asphalt turn right onto driveway.

Parcel Index Number(s) (PIN): 8596-86-2418-000

B. REQUESTOR INFORMATION

Name: Jason Volker
Mailing Address: 3201 Spring Forest Road
Telephone Number: 919-880-3137
Electronic Mail Address[1]: jvolker@smeinc.com

Select one:

- [ ] I am the current property owner.
- [x] I am an Authorized Agent or Environmental Consultant[2]
- [ ] Interested Buyer or Under Contract to Purchase
- [ ] Other, please explain.

C. PROPERTY OWNER INFORMATION

Name: Phillip and Lianne Starnes
Mailing Address: 3475 REASONOVER RD, CEDAR MOUNTAIN NC 28718

Telephone Number:
Electronic Mail Address[3]:

- [x] Proof of Ownership Attached (e.g. a copy of Deed, County GIS/Parcel/Tax Record data)

[1] If available
[2] Must attach completed Agent Authorization Form
[3] If available

D. PROPERTY OWNER CERTIFICATION[4]

I, the undersigned, a duly authorized owner of record of the property/properties identified herein, do authorize representatives of the Wilmington District, U.S. Army Corps of Engineers (Corps) to enter upon the property herein described for the purpose of conducting on-site investigations and issuing a determination associated with Waters of the U.S. subject to Federal jurisdiction under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899.

_____ _____
Property Owner (please print) Date

_____
Property Owner Signature

E. JURISDICTIONAL DETERMINATION TYPE

Select One:

☐ I am requesting that the Corps provide a preliminary JD for the property identified herein. This request does include a delineation.

☐ I am requesting that the Corps provide a preliminary JD for the property identified herein. This request does NOT include a delineation.

☐ I am requesting that the Corps investigate the property/project area for the presence or absence of WoUS[5] and provide an approved JD for the property identified herein. This request does NOT include a request for a verified delineation.

☐ I am requesting that the Corps delineate the boundaries of all WoUS on a property/project area and provide an approved JD (this may or may not include a survey plat).

☑ I am requesting that the Corps evaluate and approve a delineation of WoUS (conducted by others) on a property/project area and provide an approved JD (may or may not include a survey plat).

[4] For NCDOT requests following the current NCDOT/USACE protocols, skip to Part E.
[5] Waters of the United States

F. ALL REQUESTS

☑ Map of Property or Project Area (attached). This Map must clearly depict the boundaries of the area of evaluation.

☑ Size of Property or Project Area 4.37 acres

☑ I verify that the property (or project) boundaries have recently been surveyed and marked by a licensed land surveyor OR are otherwise clearly marked or distinguishable.

G. JD REQUESTS FROM CONSULTANTS OR AGENCIES

(1) Preliminary JD Requests:

☐ Completed and signed Preliminary Jurisdictional Determination Form[6].

☐ Project Coordinates: _____ Latitude _____ Longitude

Maps (no larger than 11x17) with Project Boundary Overlay:

☐ Large and small scale maps that depict, at minimum: streets, intersections, towns

☐ Aerial Photography of the project area

☐ USGS Topographic Map

☐ Soil Survey Map

☐ Other Maps, as appropriate (e.g. National Wetland Inventory Map, Proposed Site Plan, previous delineation maps, LIDAR maps, FEMA floodplain maps)

[6] See Appendix A of this Form. From Regulatory Guidance Letter No. 08-02, dated June 26, 2008

Delineation Information (when applicable)[7]:

Wetlands:

☐ Wetland Data Sheets[8]

☐ Upland Data Sheets

☐ Landscape Photos, if taken

Tributaries:

☐ USACE Assessment Forms

☐ Other Assessment Forms (when appropriate)

☐ Field Sketch overlain on legible Map that includes:

- All aquatic resources (for sites with multiple resources, label and identify)
- Locations of wetland data points and/or tributary assessment reaches
- Locations of photo stations
- Approximate acreage/linear footage of aquatic resources

(2) Approved JDs including Verification of a Delineation:

☑ Project Coordinates: 35°15'0.579 Latitude 82°41'30.719 Longitude

Maps (no larger than 11x17) with Project Boundary Overlay:

☑ Large and small scale maps that depict, at minimum: streets, intersections, towns

☑ Aerial Photography of the project area

☑ USGS Topographic Map

☑ Soil Survey Map

☑ Other Maps, as appropriate (e.g. National Wetland Inventory Map, Proposed Site Plan, previous delineation maps)

[7] 1987 Manual Regional Supplements and Data forms can be found at:
http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/reg_supp.aspx
Wetland and Stream Assessment Methodologies can be found at:
http://portal.ncdenr.org/c/document_library/get_file?uuid=76f3c58b-dab8-4960-ba43-45b7faf06f4c&groupId=38364 and,
http://www.saw.usace.army.mil/Portals/59/docs/regulatory/publicnotices/2013/NCSAM_Draft_User_Manual_130318.pdf

[8] Delineation information must include, at minimum, one wetland data sheet for each wetland/community type.

Delineation Information (when applicable):

Wetlands:

- [x] Wetland Data Sheets[9]
- [ ] Upland Data Sheets

Tributaries:

- [x] USACE Assessment Forms
- [ ] Other Assessment Forms (when appropriate)

- [x] Landscape Photos, if taken

- [x] Field Sketch overlain on legible Map that includes:
    - All aquatic resources (for sites with multiple resources, label and identify)
    - Locations of wetland data points and/or tributary assessment reaches
    - Locations of photo stations
    - Approximate acreage/linear footage of aquatic resources

Supporting Jurisdictional Information (for Approved JDs only)

- [x] Approved Jurisdictional Determination Form(s) (also known as "Rapanos Form(s)")

- [x] Map(s) depicting the potential (or lack of potential) hydrologic connection(s), adjacency, etc. to navigable waters.

[9] Delineation information must include, at minimum, one wetland data sheet for each wetland/community type.

I. REQUESTS FOR CORPS APPROVAL OF SURVEY PLAT

Prior to final production of a Plat, the Wilmington District recommends that the Land Surveyor electronically submit a draft of a Survey Plat to the Corps project manager for review.

Due to storage limitations of our administrative records, the Corps requires that all hard-copy submittals include at least one original Plat (to scale) that is no larger than 11"x17" (the use of match lines for larger tracts acceptable). Additional copies of a plat, including those larger than 11"x17", may also be submitted for Corps signature as needed. The Corps also accepts electronic submittals of plats, such as those transmitted as a Portable Document Format (PDF) file. Upon verification, the Corps can electronically sign these plats and return them via e-mail to the requestor.

(1) PLATS SUBMITTED FOR APPROVAL

☐ Must be sealed and signed by a licensed professional land surveyor

☐ Must be to scale (all maps must include both a graphic scale and a verbal scale)

☐ Must be legible

☐ Must include a North Arrow, Scale(s), Title, Property Information

☐ Must include a legible WoUS Delineation Table of distances and bearings/metes and bounds/GPS coordinates of all surveyed delineation points

☐ Must clearly depict surveyed property or project boundaries

☐ Must clearly identify the known surveyed point(s) used as reference (e.g. property corner, USGS monument)

☐ When wetlands are depicted:

- Must include acreage (or square footage) of wetland polygons
- Must identify each wetland polygon using an alphanumeric system

☐ When tributaries are depicted:

- Must include either a surveyed, approximate centerline of tributary with approximate width of tributary OR surveyed Ordinary High Water Marks (OHWM) of tributary
- Must identify each tributary using an alphanumeric system
- Must include linear footage of tributaries and calculated area (using approximate widths or surveyed OHWM)
- Must include name of tributary (based on the most recent USGS topographic map) or, when no USGS name exists, identify as "unnamed tributary"

☐ all depicted WoUS (wetland polygons and tributary lines) must intersect or tie-to surveyed project/property boundaries

☐ Must include the location of wetland data points and/or tributary assessment reaches

☐ Must include, label accordingly, and depict acreage of all waters not currently subject to the requirements of the CWA (e.g. "isolated wetlands", "non-jurisdictional waters"). NOTE: An approved JD must be conducted in order to make an official Corps determination that a particular waterbody or wetland is <u>not</u> jurisdictional.

☐ Must include and survey all existing conveyances (pipes, culverts, etc.) that transport WoUS

(2) CERTIFICATION LANGUAGE

☐ When the entire actual Jurisdictional Boundary is depicted:

include the following Corps Certification language:

"This certifies that this copy of this plat accurately depicts the boundary of the jurisdiction of Section 404 of the Clean Water Act as determined by the undersigned on this date. Unless there is a change in the law or our published regulations, the determination of Section 404 jurisdiction may be relied upon for a period not to exceed five (5) years from this date. The undersigned completed this determination utilizing the appropriate Regional Supplement to the 1987 U.S. Army Corps of Engineers Wetlands Delineation Manual."

Regulatory Official: _____

Title: _____

Date: _____

USACE Action ID No.: _____

☐ When uplands may be present within a depicted Jurisdictional Boundary:

include the following Corps Certification language:

"This certifies that this copy of this plat identifies all areas of waters of the United States regulated pursuant to Section 404 of the Clean Water Act as determined by the undersigned on this date. Unless there is change in the law or our published regulations, this determination of Section 404 jurisdiction may be relied upon for a period not to exceed five years from this date. The undersigned completed this determination utilizing the appropriate Regional Supplement to the 1987 U.S. Army Corps of Engineers Wetlands Delineation Manual."

Regulatory Official: _____

Title: _____

Date: _____

USACE Action ID No.: _____

(3) GPS SURVEYS

For Surveys prepared using a Global Positioning System (GPS), the Survey must include all of the above, as well as:

☐ be at sub-meter accuracy at each survey point.

☐ include an accuracy verification:
One or more known points (property corner, monument) shall be located with the GPS and cross-referenced with the existing traditional property survey (metes and bounds).

☐ include a brief description of the GPS equipment utilized.

North Carolina Department of Environmental Quality
Division of Waste Management
Superfund Section
Inactive Hazardous Sites Branch
Pre-Regulatory Landfill Unit

ACCESS AUTHORIZATION

Davidson River Dump
ID# NONCD0000591

Phillip and Lianne Starnes
Poplar Lane
Pisgah Forest, Transylvania County

This Site Access Authorization is to allow the U.S. Army Corps of Engineers to conduct a jurisdictional determination on a certain property located at 954 Poplar Lane, Pisgah Forest, North Carolina (PIN# 8596-86-2418-000) and;

Provide results of the study to the North Carolina Department of Environmental Quality, Division of Waste Management, Superfund Section, Inactive Hazardous Sites Branch, and the assigned firm under contract with the State of North Carolina.

Lianne B. Starnes
Phillip D. Starnes

Signature

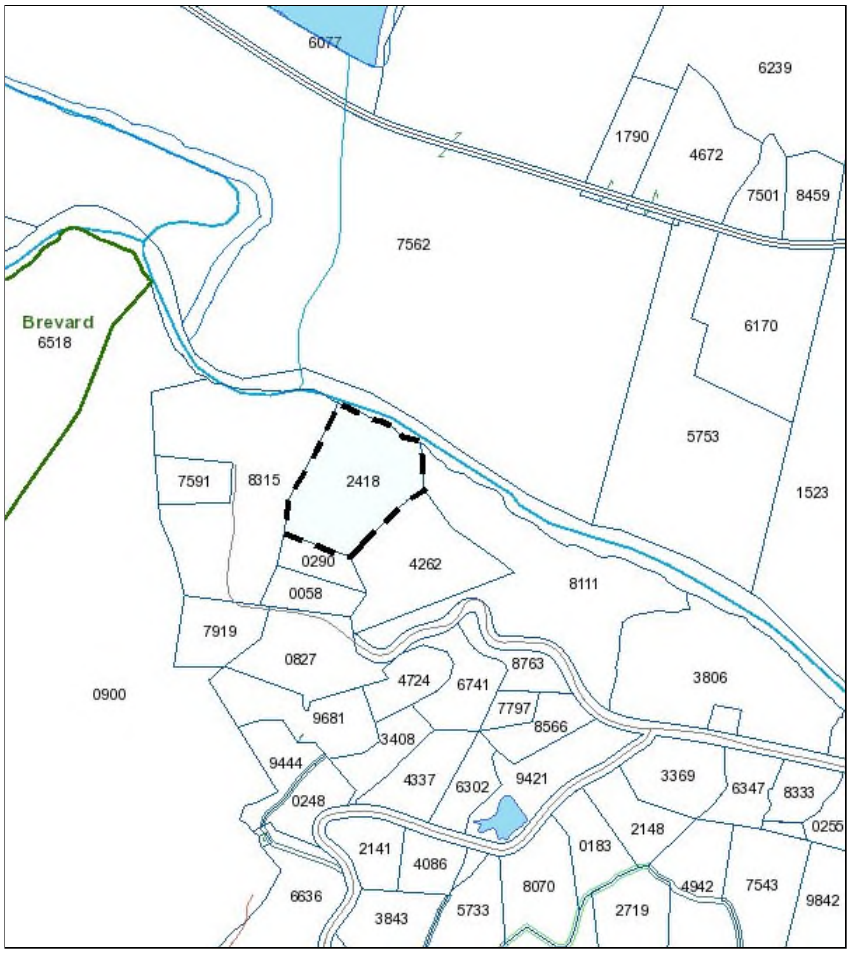
Lianne B. Starnes
Phillip D. Starnes

Name (Print) Title

Date 3/11/16

Return to: Thomas Slusser
Pre-Regulatory Landfill Unit
DWM Superfund Section
1646 Mail Service Center
Raleigh, NC 27699-1646

RECEIVED
MAR 18 2016
Superfund Section



Disclaimer: The information contained on this page is NOT to be construed or used as a survey or legal description. Map information is believed to be accurate but accuracy is not guaranteed.

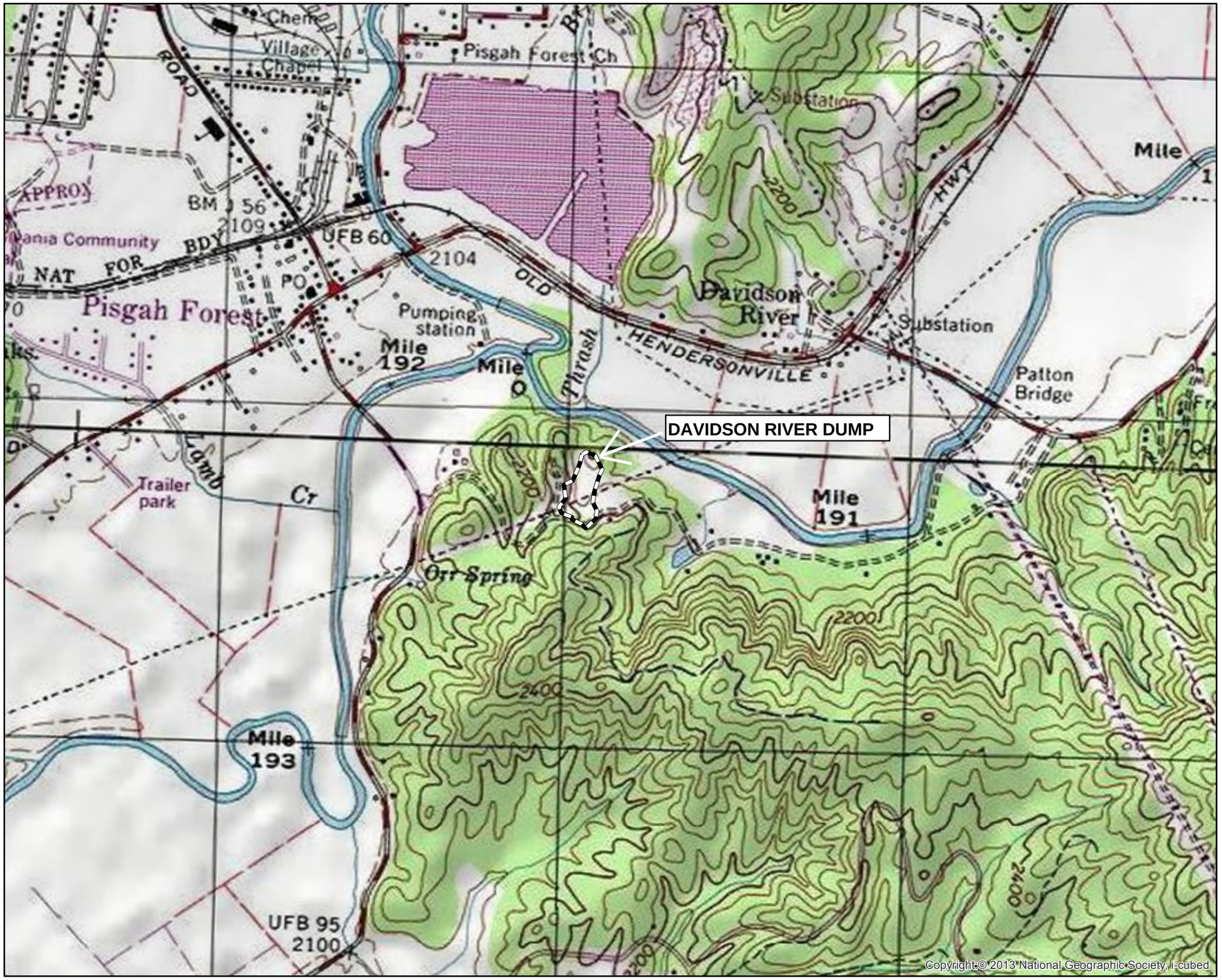
Approx. Scale 1:5874

0 489 ft 978 ft

Layer: Parcels

PIN:	8596-86-2418-000
Owner:	STARNES LIANNE B &
Owner2:	STARNES PHILLIP D
Address2:	3475 REASONOVER RD
City:	CEDAR MOUNTAIN
State:	NC
Zip:	28718
Acres:	4.36
Land Area:	4.37
Land Units:	AC
Township:	02
Land Value:	51570
Assessed Value:	109270
Bldg Value:	57700
XFOB Value:	0
Legal Address:	OFF POPLAR LN

Attributes at point: 898203, 566462
Layer: Fire Districts
Fire District: FR04
Layer: Voting Tabulation Districts (VTD)
Name: Pisgah Forest
Layer: Precincts
Description: PF_PISGAH FOREST



N

0 500 1,000 2,000 Feet

LEGEND

WASTE DISPOSAL AREA

DATE: AUG. 2015

SCALE: 1" = 1,000'

DRAWN BY: JLV

PROJECT NO: 1054-12-1025

CHECKED BY:

DRAWING NUMBER:

S&ME
WWW.SMEINC.COM
NC ENG. LICENSE #F-0176
3201 SPRING FOREST RD. RALEIGH, NC 27616

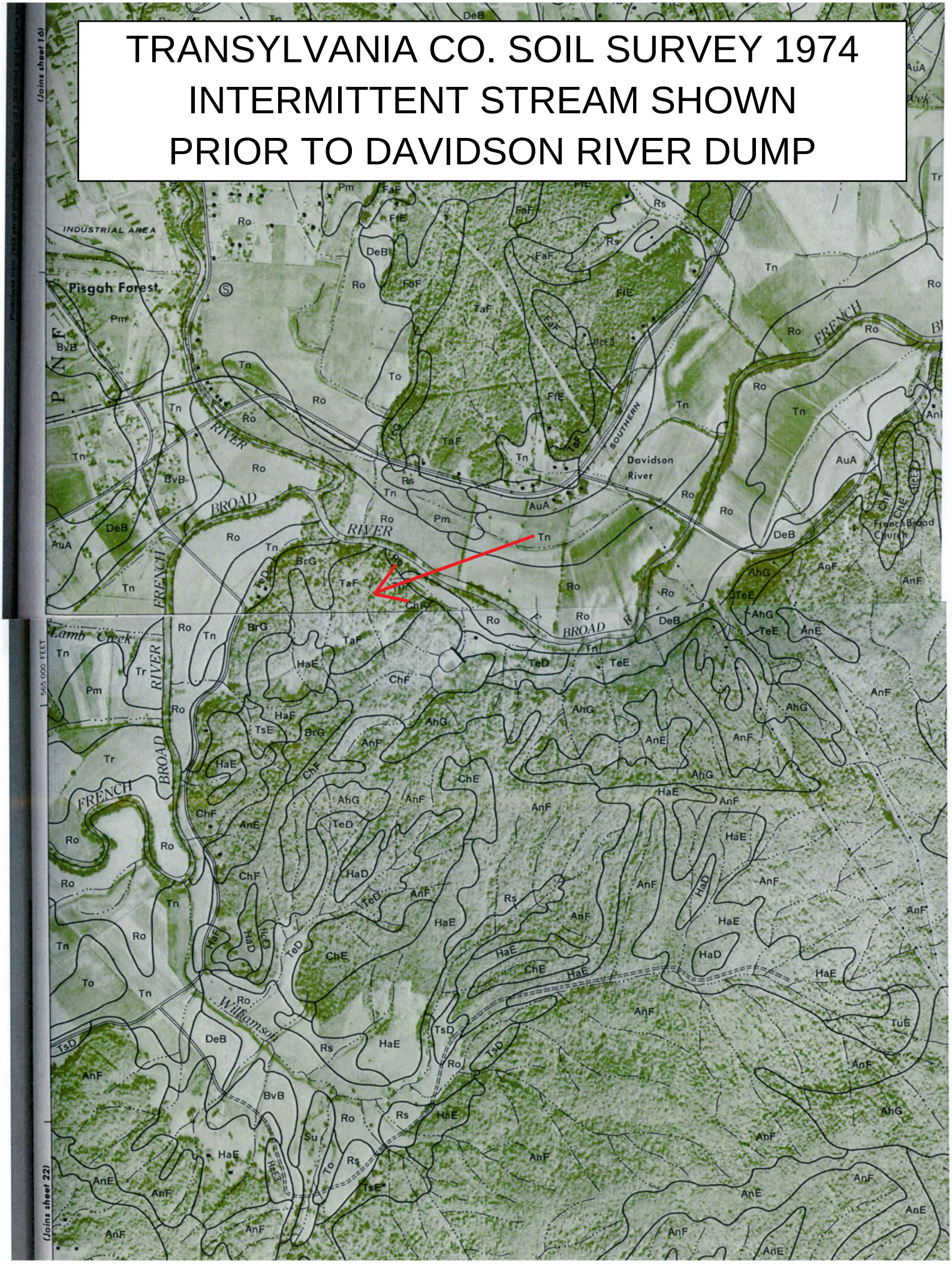
VICINITY MAP

DAVIDSON RIVER DUMP - TASK ORDER 591SUM
PISGAH FOREST, NORTH CAROLINA

FIGURE NO.

1

TRANSYLVANIA CO. SOIL SURVEY 1974
INTERMITTENT STREAM SHOWN
PRIOR TO DAVIDSON RIVER DUMP



N

PARCELS BASED ON TRANSYLVANIA CO. GIS ACCESSED MAY 2012.

SOME SITE FEATURES DIGITIZED FROM AERIAL PHOTOGRAPHY FROM NC ONEMAP DATED 2010.

0 50 100 200 Feet

LEGEND

- DRAINAGE FEATURE
- PRELIMINARY WETLAND BOUNDARY
- WASTE DISPOSAL AREA
- AREA OF EVALUATION
- ROAD/DRIVEWAY
- STRUCTURE/BUILDING
- PARCEL BOUNDARY

Imagery\Orthoimagery_2010

RGB

- Red: Band_1
- Green: Band_2
- Blue: Band_3

SCALE: 1" = 50'	PROJECT NO: 1054-12-1025	DRAWING NUMBER:
DATE: MAY 2016	DRAWN BY: JLV	CHECKED BY:

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NC ENG. LICENSE #F-0176
3201 SPRING FOREST RD, RALEIGH, NC 27616

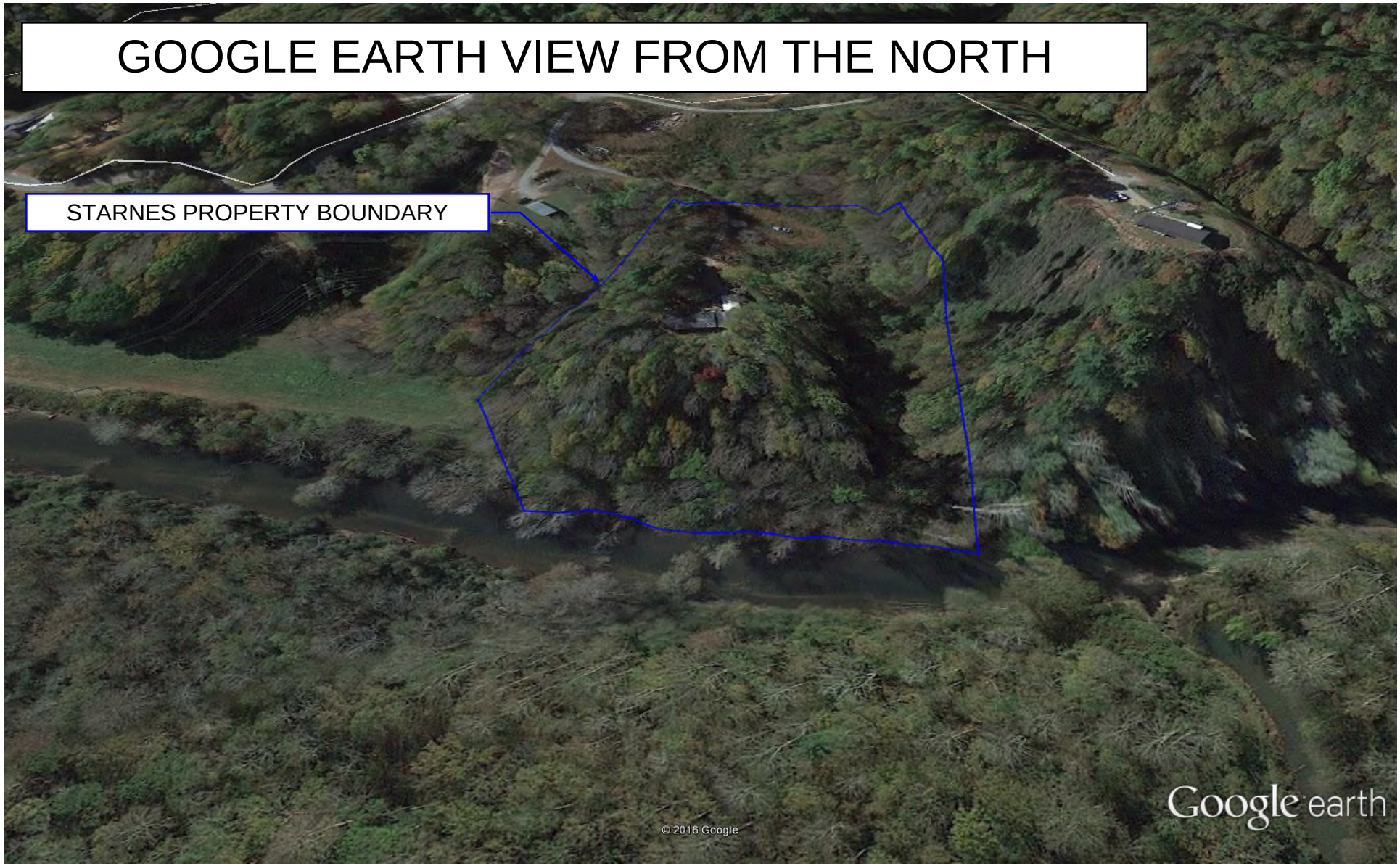
SITE MAP - AERIAL PHOTO

DAVIDSON RIVER DUMP - TASK ORDER 591RA-A
PISGAH FOREST, NORTH CAROLINA

FIGURE NO.

1

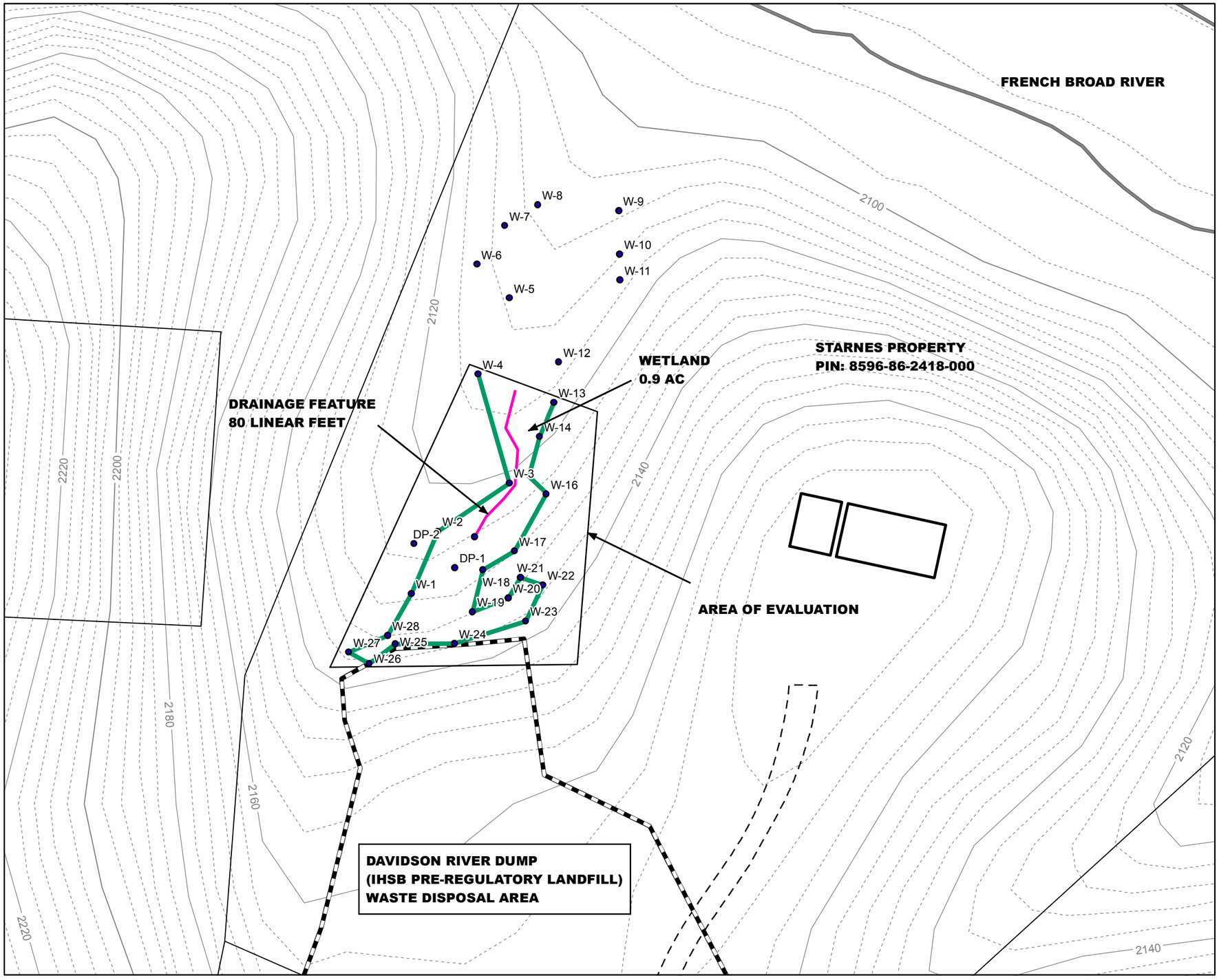
GOOGLE EARTH VIEW FROM THE NORTH



Google earth

feet 500

meters 100



N

PARCELS BASED ON TRANSYLVANIA CO. GIS ACCESSED MAY 2012.

SOME SITE FEATURES DIGITIZED FROM AERIAL PHOTOGRAPHY FROM NC ONEMAP DATED 2010.

TOPOGRAPHIC COUNTOURS OBTAINED FROM NC FLOOD MAPPING PROGRAM LIDAR DATA, APRIL 2007.

0 25 50 100 Feet

LEGEND

- WETLAND BOUNDARY/DATA PTS
- DRAINAGE FEATURE
- PRELIMINARY WETLAND BOUNDARY
- WASTE DISPOSAL AREA
- AREA OF EVALUATION
- ROAD/DRIVEWAY
- STRUCTURE/BUILDING
- PARCEL BOUNDARY
- 4' GROUND ELEVATION CONTOUR
- 20' GROUND ELEVATION CONTOUR
- 100' GROUND ELEVATION CONTOUR

SCALE: 1" = 50'	PROJECT NO: 1054-12-1025	DRAWING NUMBER:
DATE: MAY 2016	DRAWN BY: JLV	CHECKED BY:

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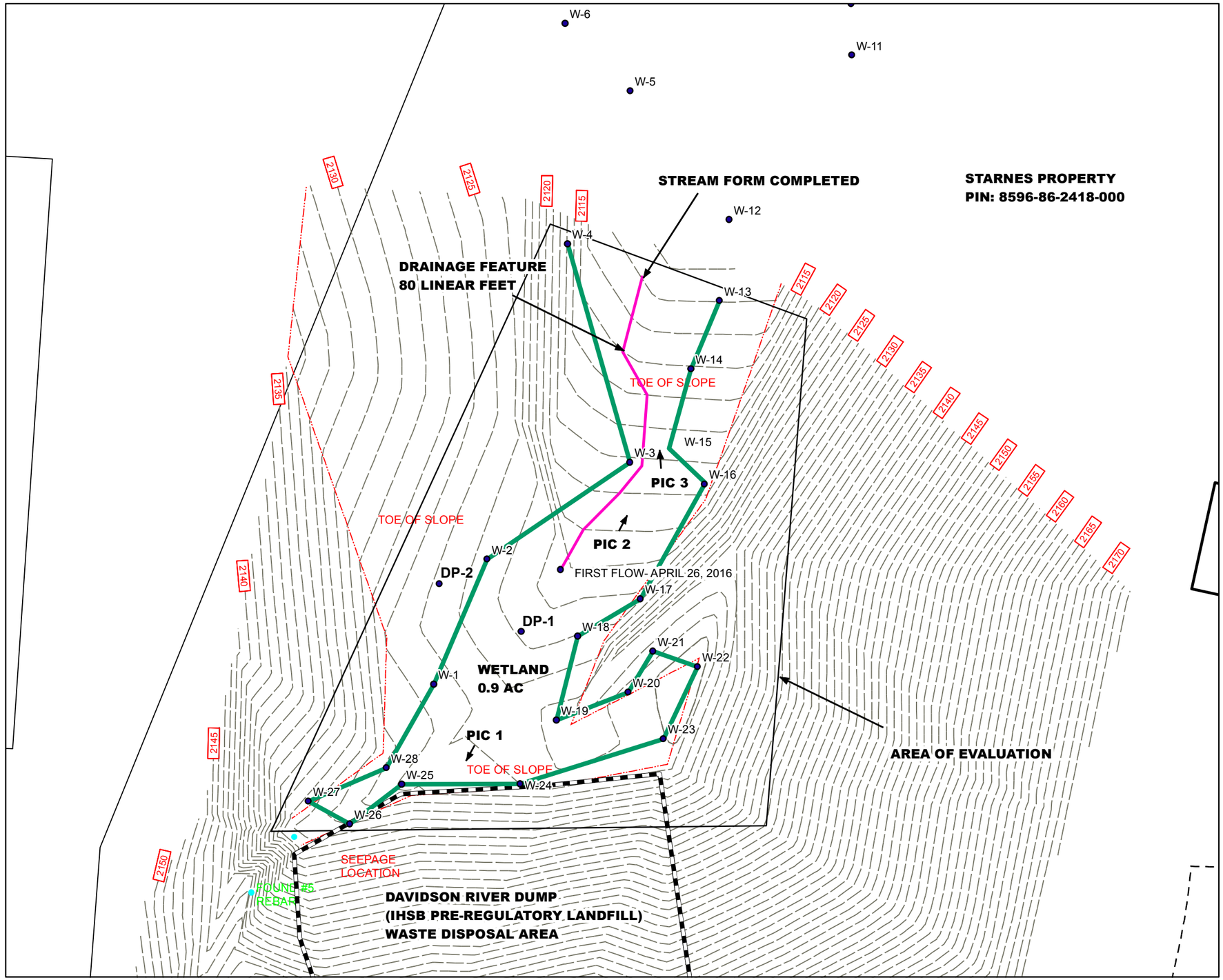
NC ENG. LICENSE #F-0176
3201 SPRING FOREST RD, RALEIGH, NC 27616

PRELIMINARY WETLAND MAP

DAVIDSON RIVER DUMP - TASK ORDER 591RA-A
PISGAH FOREST, NORTH CAROLINA

FIGURE NO.
1



N

PARCELS BASED ON TRANSYLVANIA CO. GIS ACCESSED MAY 2012.

TOPOGRAPHIC COUNTOURS OBTAINED FROM WNC-PE&S, PLLC LIDAR DATA, APRIL 2007.

0 12.5 25 50 Feet

LEGEND

- WETLAND BOUNDARY/DATA PTS
- DRAINAGE FEATURE
- PRELIMINARY WETLAND BOUNDARY
- WASTE DISPOSAL AREA
- AREA OF EVALUATION
- ROAD/DRIVEWAY
- STRUCTURE/BUILDING
- PARCEL BOUNDARY

SCALE: 1" = 25'	PROJECT NO: 1054-12-1025	DRAWING NUMBER:
DATE: MAY 2016	DRAWN BY: JLV	CHECKED BY:

S&ME
WWW.SMEINC.COM
NC ENG. LICENSE #F-0176
3201 SPRING FOREST RD, RALEIGH, NC 27616

PRELIMINARY WETLAND MAP

DAVIDSON RIVER DUMP - TASK ORDER 591RA-A
PISGAH FOREST, NORTH CAROLINA

FIGURE NO.
2

Pic 1

Pic 2

Pic 3

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State:North Carolina County/parish/borough: Transylvania City: Pisgah Forest
Center coordinates of site (lat/long in degree decimal format): Lat. 35.250201° **N**, Long. -82.691852 ° **W**.
Universal Transverse Mercator: 17S 346079 3902101
Name of nearest waterbody: French Broad River
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: French Broad River
Name of watershed or Hydrologic Unit Code (HUC): Lyday Creek-French Broad River (060101050206)

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☐ Office (Desk) Determination. Date:
- ☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 80 linear feet: 2 width (ft) and/or acres.
   Wetlands: 0.9 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
   Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: 11,009 **acres**
Drainage area: 12 **acres**
Average annual rainfall: 66 inches
Average annual snowfall: 8 inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☒ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: Channel flows northward about 500 feet to French Broad River (TNW).
Tributary stream order, if known: First.

---

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☒ Natural
☐ Artificial (man-made). Explain: .
☒ Manipulated (man-altered). Explain: Original upgradient stream reach was filled with a Pre-Regulatory Landfill that operated between early 1960's and 1974.

Tributary properties with respect to top of bank (estimate):
Average width: 2 feet
Average depth: 1 feet
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):

☒ Silts	☒ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: Stable with occasional high flows.
Presence of run/riffle/pool complexes. Explain: Weak riffle/pool complexes.
Tributary geometry: **Meandering**
Tributary gradient (approximate average slope): 8-10 %

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: Intermittent.
Other information on duration and volume: .

Surface flow is: **Discrete and confined**. Characteristics: .

Subsurface flow: **Yes**. Explain findings: Evidence of groundwater flow (reddish oxidation of reduced groundwater) from the banks.
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☒ OHWM[6] (check all indicators that apply):

☒ clear, natural line impressed on the bank	☐ the presence of litter and debris
☒ changes in the character of soil	☒ destruction of terrestrial vegetation
☒ shelving	☒ the presence of wrack line
☒ vegetation matted down, bent, or absent	☒ sediment sorting
☒ leaf litter disturbed or washed away	☐ scour
☒ sediment deposition	☐ multiple observed or predicted flow events
☒ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: Water is clear with a lot of orange/red oxidized iron accumulation. Overland flow comes from steep slopes and municipal waste areas.
Identify specific pollutants, if known: High levels of iron (Greater than 2B Standards), landfill leachate.

---

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☐ Riparian corridor. Characteristics (type, average width): hardwood, 40 Feet.
☒ Wetland fringe. Characteristics: Narrow wetland directly abuts the RPW.
☒ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☒ Aquatic/wildlife diversity. Explain findings: Little wildlife diversity observed except 2-3 frogs heard jumping in water .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:
Properties:
Wetland size:0.9 acres
Wetland type. Explain:Bottom hardwood.
Wetland quality. Explain: Created in part by woody debris placement. Trash also present. Serves function of slowing down discharge from steep areas and Landfill leachate.
Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:
Flow is: **Perennial flow**. Explain: Based on observations of surface topography and oxidized iron patterns.

Surface flow is**: Discrete and confined**
Characteristics: Surface topography drains to stream in much of the area.

Subsurface flow: **Yes**. Explain findings: Some evidence of subsurface flow based on observed groundwater discharge (iron oxidizing bacteria).
☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
☒ Directly abutting
☐ Not directly abutting
☐ Discrete wetland hydrologic connection. Explain: .
☐ Ecological connection. Explain: .
☐ Separated by berm/barrier. Explain: Separated by non-wetland area.

(d) Proximity (Relationship) to TNW
Project wetlands are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Flow is from: **Wetland to navigable waters.**
Estimate approximate location of wetland as within the **500-year or greater** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: Water color is clear, evidence of oxidized iron.
Identify specific pollutants, if known: landfill leachate and sediment discharges to wetland.

(iii) Biological Characteristics. Wetland supports (check all that apply):

☒ Riparian buffer. Characteristics (type, average width): Wooded buffer exists - confined by very steep side slopes (40' average width) wetland provides some surface water storage.
☒ Vegetation type/percent cover. Explain:100% hardwood.
☒ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☒ Aquatic/wildlife diversity. Explain findings: Observed evidence of some wildlife diversity.

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **1**
Approximately (1) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	1 Acre		

Summarize overall biological, chemical and physical functions being performed: Provides storage from discharge of upgradient old, pre-regulatory (unlined) landfill.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☒ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: Seasonal flow determination has been supported by visual observation and stream form assessment during site visits by consultant.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **80** linear feet **2** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **.**

☒ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **0.9** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:1:24:000, Davidson, NC.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Transylvania County, 1974.
☐ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date):Source: NC OneMap; 2012.
or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Davidson River Dump City/County: Pisgah Forest, Transylvania Sampling Date: 5/3/16
Applicant/Owner: NCDEQ, IHSB, Pre-Regulatory, Landfill Unit State: NC Sampling Point: Wetland
Investigator(s): Jason Volker Section, Township, Range: _____
Landform (hillslope, terrace, etc.): Draw Local relief (concave, convex, none): Concave Slope (%): _____
Subregion (LRR or MLRA): LRR N Lat: 35.250201 N Long: -82.691852 Datum: NAD83
Soil Map Unit Name: Similar to Toxaway Loam NWI classification: Hydric
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X / No _____ (If no, explain in Remarks.)
Are Vegetation X, Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- X Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes X	No _____	Depth (inches): 10
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: wetland

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liriodendron tulipifera	40	yes	FACU
2. Salix nigra	40	yes	OBL
3.			
4.			
5.			
6.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Sapling Stratum (Plot size: ____)			
1. Ligustrum sinense	20	yes	FACU
2.			
3.			
4.			
5.			
6.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Shrub Stratum (Plot size: ____)			
1. Liriodendron tulipifera	10	yes	FACU
2.			
3.			
4.			
5.			
6.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Herb Stratum (Plot size: ____)			
1. Impatiens capensis	20	yes	FACW
2. Senecio L.	1		FACU
3. Athyrium asplenioides	2		FAC
4. Polystichum acrostichoides	2		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Woody Vine Stratum (Plot size: ____)			
1. Lonicera japonica	30	yes	FAC
2.			
3.			
4.			
5.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: wetland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	7.5YR 3/4	100					SL	
6-8	10YR 5/3	100					SCL	
8-12	10YR 4/1	90	7.5YR 4/6	10			SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Davidson River Dump City/County: Pisgah Forest, Transylvania Sampling Date: 5/3/10
Applicant/Owner: NCDEQ, Pre-Regulatory Landfill Unit State: NC Sampling Point: Upland
Investigator(s): Jason Volkert Section, Township, Range: _____
Landform (hillslope, terrace, etc.): Draw Local relief (concave, convex, none): _____ Slope (%): _____
Subregion (LRR or MLRA): LRR N Lat: 35.250201 N Long: -82.691852 Datum: NAD 83
Soil Map Unit Name: Similar to Junaluska NWI classification: Non-Hydric
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X / No _____ (If no, explain in Remarks.)
Are Vegetation X, Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____
Hydric Soil Present?	Yes _____	No X
Wetland Hydrology Present?	Yes _____	No X

Is the Sampled Area within a Wetland? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): 12
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): 12

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: Upland

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula alleghaniensis	50	Y	FAC
2. Salix nigra	30	Y	OBL
3.			
4.			
5.			
6.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling Stratum (Plot size:)			
1. Betula alleghaniensis	10		FAC
2. Liriodendron tulipifera	10		FACU
3. Ligustrum sinense	15		FACU
4.			
5.			
6.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Shrub Stratum (Plot size:)			
1. Rosa multiflora	20	Y	FACU
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size:)			
1. Impatiens capensis	5		FACW
2. Senecio L.	2		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Woody Vine Stratum (Plot size:)			
1. Lonicera japonica	40	Y	FAC
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	_____	x 1 = _____
FACW species	_____	x 2 = _____
FAC species	_____	x 3 = _____
FACU species	_____	x 4 = _____
UPL species	_____	x 5 = _____
Column Totals:	_____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/3	100					SL	
6-12	10YR 5/3	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NCDEQ

2. Evaluator's name: Jason Volker

3. Date of evaluation: 5/3/16

4. Time of evaluation: 1500

5. Name of stream: UT

6. River basin: French Broad - Holston

7. Approximate drainage area:

8. Stream order: First

9. Length of reach evaluated:

10. County: Transylvania

11. Site coordinates (if known): prefer in decimal degrees.

12. Subdivision name (if any):

Latitude (ex. 34.872312): 35.250389 Longitude (ex. -77.556611): -82.691811

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): North of Davidson River Dump, Approx. 500' South of French Broad River.

14. Proposed channel work (if any): no work proposed.

15. Recent weather conditions: Wet

16. Site conditions at time of visit: Dry

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area:

19. Does channel appear on USGS quad map? YES NO

20. Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: ___% Residential ___% Commercial ___% Industrial ___% Agricultural ___% Forested ___% Cleared / Logged ___% Other (_____)

22. Bankfull width: 2'

23. Bank height (from bed to top of bank): 1'

24. Channel slope down center of stream: ___Flat (0 to 2%) ___Gentle (2 to 4%) X Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: ____Straight ___Occasional bends ___Frequent meander ___Very sinuous X Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 52 **Comments:**

Evaluator's Signature [signature] **Date** 5/3/16

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	0
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	4
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	5
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	5
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	5
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	0
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	4
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
		Total Points Possible	100	100	100	
		TOTAL SCORE (also enter on first page)				52

* These characteristics are not assessed in coastal streams.

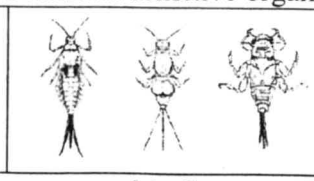
Notes on Characteristics Identified in Assessment Worksheet

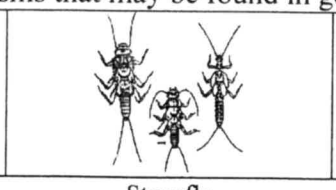
1. Consider channel flow with respect to channel cross-sectional area (expected flow), drainage area, recent precipitation, potential drought conditions, surrounding land use, possible water withdrawals, presence of impoundments upstream, vegetation growth in channel bottom (as indicator of intermittent flow), etc.
2. Human-caused alterations may include relocation, channelization, excavation, riprap, gabions, culverts, levees, berms, spoil piles adjacent to channel, etc.
3. The riparian zone is the area of vegetated land along each side of a stream or river that includes, but is not limited to, the floodplain. Evaluation should consider width of riparian area with respect to floodplain width, vegetation density, maturity of canopy and understory, species variety, presence of undesirable invasive species (exotics), breaks (utility corridors, roads, etc.), presence of drainage tiles, logging activities, other disturbances which negatively affect function of the riparian zone.
4. Evidence of nutrient or chemical discharges includes pipes, ditches, and direct draining from commercial and industrial sites, agricultural fields, pastures, golf courses, swimming pools, roads, parking lots, etc. Sewage, chlorine, or other foul odors, discolored water, suds, excessive algal growth may also provide evidence of discharge.
5. Groundwater discharge may be indicated by persistent pools and saturated soils during dry weather conditions, presence of adjacent wetlands, seeps, and springs feeding channel, reduced soils in channel bottom.
6. Presence of floodplains may be determined by topography and the slope of the land adjacent to the stream, terracing, the extent of development within the floodplain, FEMA designation if known, etc.
7. Indicators of floodplain access include sediment deposits, wrack lines, drainage patterns in floodplain, local stream gauge data, testimony of local residents, entrenchment ratio, etc. Note that indicators may relic and not a result of regular flooding.
8. Wetland areas should be evaluated according to their location, size, quality, and adjacency relative to the stream channel, and may be indicated by beaver activity, impounded or regularly saturated areas near the stream, previous delineations, National Wetland Inventory maps, etc. (Wetlands must meet criteria outlined in 1987 delineation manual and are subject to USACE approval.)
9. Channel sinuosity should be evaluated with respect to the channel size and drainage area, valley slope, topography, etc.
10. To evaluate sediment deposition within the channel consider water turbidity, depth of sediment deposits forming at point bars and in pools, evidence of eroding banks or other sediment sources within watershed (construction sites, ineffective erosion controls). In rare cases, typically downstream of culverts or dams, a sediment deficit may exist and should be considered in scoring.
11. When looking at channel substrate, factor in parent material (presence of larger particles in soil horizons adjacent to the stream), average size of substrate (bedrock, clay/silt, sand, gravel, cobble, boulder, etc.), and diversity of particle size (riprap is excluded).
12. Indications of channel incision and deepening may include a v-shaped channel bottom, collapsing banks, evidence of recent development and increased impervious surface area resulting in greater runoff in the watershed.
13. Evaluation should consider presence of major bank failures along the entire reach under evaluation, including uprooted trees on banks, banks falling into channel, formation of islands in channel as they widen, exposed soil, active zones of erosion, etc.
14. Increased root depth and density result in greater bank stability. Consider the depth and density that roots penetrate the bank relative to the amount of exposed soil on the bank and the normal water elevation.
15. Assessment of agriculture, livestock, and/or timber production impacts should address areas of stream bank destabilization, evidence of livestock in or crossing stream, loss of riparian zone to pasture or agricultural fields, evidence of sediment or high nutrient levels entering streams, drainage ditches entering streams, loss of riparian zone due to logging, etc.
16. Riffle-pool steps can be identified by a series of alternating pools and riffles. Abundance, frequency, and relative depth of riffles and pools should be considered with respect to topography (steepness of terrain) and local geology (type of substrate). Coastal plain streams should be evaluated for the presence of ripple-pool sequences. Ripples are bed forms found in sand bed streams with little or no gravel that form under low shear stress conditions, whereas, dunes and antidunes form under moderate and high shear stresses, respectively. Dunes are the most common bed forms found in sand bed streams.
17. Habitat complexity is an overall evaluation of the variety and extent of in-stream and riparian habitat. Types of habitat to look for include rocks/cobble, sticks and leafpacks, snags and logs in the stream, root mats, undercut banks, overhanging vegetation, pool and riffle complexes, wetland pockets adjacent to channel, etc.
18. Evaluation should consider the shading effect that riparian vegetation will provide to the stream during the growing season. Full sun should be considered worst case, while good canopy coverage with some light penetration is best case.
19. Stream embeddedness refers to the extent that sediment that has filled in gaps and openings around the rocks and cobble in the streambed. The overall size of the average particle in the streambed should be considered (smaller rocks will have smaller gaps).
20. Evaluation should be based on evidence of stream invertebrates gathered from multiple habitats. Scores should reflect abundance, taxa richness, and sensitivity of stream invertebrate types. (see attached examples of common stream invertebrates on page 4).
21. Evaluation should include evidence of amphibians in stream channel. Tadpoles and frogs should receive minimum value, while salamanders, newts, etc. may be assigned higher value.
22. Evaluation of fish should consider the frequency and, if possible, the variety of different fish taxa observed.
23. Evaluation of wildlife should include direct observation or evidence (tracks, shells, droppings, burrows or dens, hunting stands, evidence of fishing, etc.) of any animals using the streambed or riparian zone, to include small and large mammals, rodents, birds, reptiles, insects, etc.

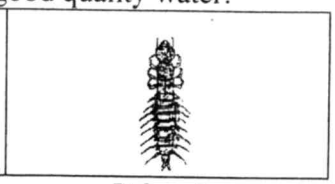
Common Stream Invertebrates

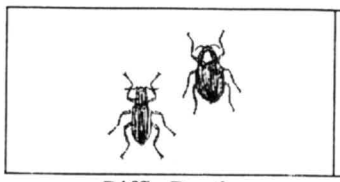
Sensitive Taxa – Pollution sensitive organisms that may be found in good quality water.

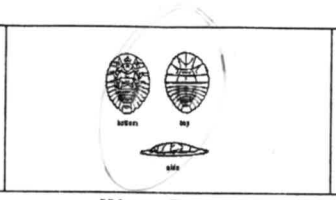
Caddisfly

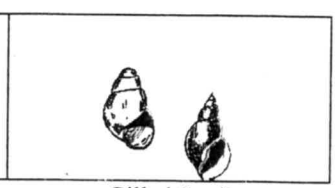

Mayfly


Stonefly

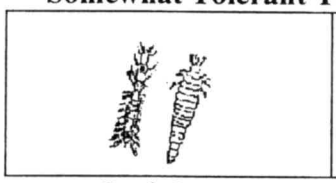

Dobsonfly

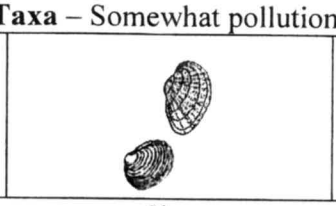

Riffle Beetle

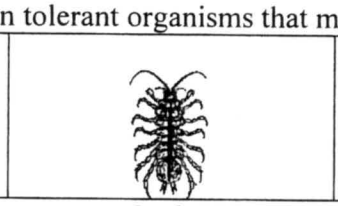

Water Penny

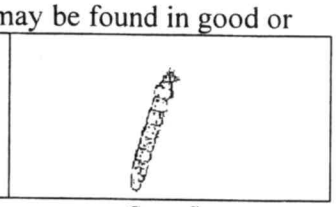

Gilled Snail

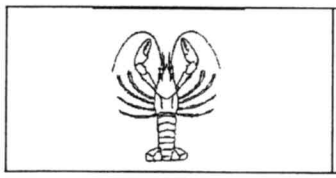
Somewhat Tolerant Taxa – Somewhat pollution tolerant organisms that may be found in good or

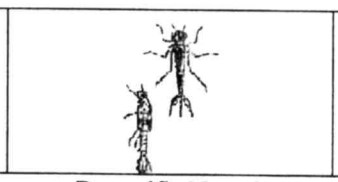

Beetle Larva

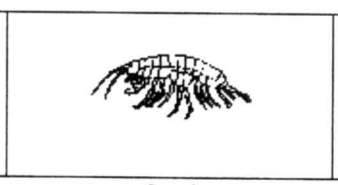

Clam

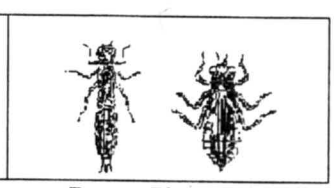

Sowbug


Cranefly

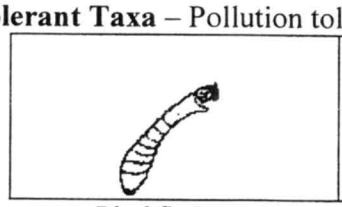

Crayfish

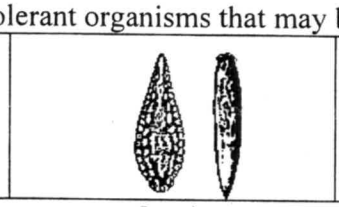

Damselfly Nymph

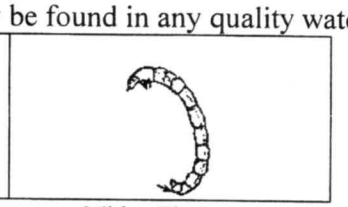

Scud

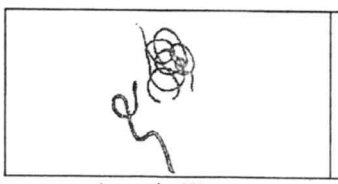

Dragon Fly Nymph

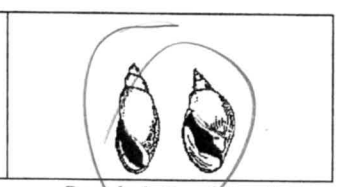
Tolerant Taxa – Pollution tolerant organisms that may be found in any quality water.


Blackfly Larva


Leech


Midge Fly Larva


Aquatic Worm


Pouch & Pond Snail