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2725 East Millbrook Road, Ste. 121 / Raleigh, NC 27604 / Tel (919) 786-1414 / Fax (919) 786-1418

July 24, 2015

Mr. Zi-Qiang Chen, PhD
Environmental Engineer
NCDENR- Superfund Section
Inactive Hazardous Sites Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, North Carolina 27699

Re:*Work Plan and Cost Proposal for Task Orders 712DP-11 and DP-12*
City of Lumberton LDFL (NONCD0000712)
Lumberton, Robeson County, North Carolina
State Contract: N11001S
MM&A Project No.: NCUL233P8

Dear Chen:

Marshall Miller & Associates, Inc. (MM&A) is pleased to provide the **North Carolina Department of Environment and Natural Resources (NCDENR), Division of Waste Management, Superfund Section, Inactive Hazardous Sites Branch, Pre-Regulatory Landfill Unit (the Unit)** with this *Work Plan and Cost Proposal* for performance of the remedial investigation phase activities at the City of Lumberton LDFL (NONCD0000712), hereinafter referred to as the Site, located in Lumberton, Robeson County, North Carolina. The *Work Plan* reflects the activities specified in the Work Plan and Cost Proposal Request dated July 17, 2015.

SCOPE OF WORK

The following discussion outlines the proposed scope of work for the project and includes all activities associated with preparing the work plan and completing the field investigation. All field investigation activities will be conducted in accordance with MM&A's Standard Operating Procedures and Quality Assurance Manual (SOPQAM) dated January 10, 2011, and the Unit's most recent Guidelines for Addressing Pre-regulatory Landfills and Dumps. All field personnel, including subcontractors, will have obtained appropriate training and certification as specified in 29 CFR 1910.120.

Subtask 712DP-11A: Work Plan and Cost Proposal

MM&A will prepare a work plan outlining the scope of field assessment activities to be completed during the contaminant delineation phase as outlined in the Work Plan and Cost Proposal Request. This submittal is intended to satisfy the scope of work for this Subtask.

Subtask 712DP-11B: Sampling and Analysis of Potable Well Water and Surface Water

MM&A will conduct sampling at the three water supply wells (2133 Odum Road, 2411 Odum Road, and 194 Old Sawmill Road). MM&A will also collect one surface water sample and one sediment sample from the pond located at 2186 Odum Road. During purging and sampling of the wells, as well as sampling the surface water in the pond, field measurements will be obtained including pH, turbidity, temperature, and conductivity. All meters will be field calibrated and, as necessary, recalibrated in the field as recommended by the manufacturer. For the purpose of the cost estimate, it is assumed that 4 well water samples (3 wells plus a duplicate) and 2 samples of surface water (1 duplicate) will be collected and analyzed.

Subtask 712DP-11C: Permanent Groundwater Monitoring Wells

Prior to initiating the drilling, MM&A will contact NC One Call (811) to identify and mark local utilities. Since the Site is undeveloped, it will not be necessary to contract with a utility location service to locate any other underground utilities.

MM&A will subcontract with a drilling firm to advance six borings using hollow stem auger drilling methods to install permanent monitoring wells at the locations shown on **Figure 1**. Cuttings will be observed at each location for the purpose of visual inspection to log waste and/or soil characteristics (using the Unified Soil Classification System) and identify overt evidence of contamination (odor, staining). Cuttings will be screened for volatile organic vapors with a photoionization device (PID). Cuttings will be spread in the vicinity of the boring unless contamination is suspected. If the latter conditions exist, the cuttings will be drummed.

The monitoring wells will be constructed with 2-inch PVC well casing with 10-foot screen intervals, located to intersect the water table. For cost estimating purposes, the average depth of each well is estimated to be 18 feet. A sand pack will be placed around the screen interval to a depth of 1 to 2 feet above the top of the screen and a 2-foot bentonite seal will be placed on top

of the sand pack. The remainder of the borehole annulus will be filled with grout. The monitoring wells will be completed with an above-grade locking cover and a 2x2 foot concrete pad.

Immediately after installation, the monitoring wells will be developed using either a disposable polyethylene bailer or a pump. After development, the wells will be allowed to stabilize for at least 24 hours. The depth to groundwater will then be measured in each well using a decontaminated electronic water level indicator. After collecting the groundwater level measurements, each well will be purged and sampled using either a Teflon[®] bailer or by low-flow methods using a peristaltic pump. Field parameters (pH, temperature, conductivity, and turbidity) will be measured after each well volume. If turbidity readings are greater than 10 NTUs, then groundwater collected for metals analysis will initially be placed in an unpreserved container and allowed to settle. The sample will then be collected by decanting from the container into the sample bottle. Turbidity readings will be collected after decanting. The groundwater samples will be analyzed by the same methods and target constituents as described below. For the purpose of this cost estimate, six groundwater samples and one duplicate sample are assumed (7 samples total). An equipment blank is not included as either a new bailer or new tubing will be used for each sample collection.

Subtask 712DP-11D – Soil Cover Investigation

MM&A will advance borings at the 12 locations shown on **Figure 1** for the purpose of determining soil cover thickness and collecting samples at appropriate depths. The borings will be advanced using decontaminated hand augers or power auger to a maximum depth of 3 feet. Soil samples will be collected at 6 inches below ground surface (bgs) (if soil cover is equal to or greater than 6 inches) and at 18 inches bgs if soil cover is 2 feet or greater. The samples will be submitted for analysis by the same methods and target constituents described below. For cost estimating purposes, it is assumed that up to 28 samples (24 samples, 2 duplicates, and 2 equipment blanks) will be submitted for analysis.

Drill cuttings will be collected at each location for the purpose of visual inspection to log waste and/or soil characteristics and identify overt evidence of contamination (odor, staining). Soil will be screened for VOCs with a photoionization device (PID) only if contamination is

suspected. Drilling cuttings will be placed back in the boring once the appropriate samples are collect. The locations of the borings will be recorded with a GPS as described below.

Project Management

MM&A will perform management activities throughout the project including:

- Planning and preparation for field activities;
- Scheduling internal personnel and subcontractors;
- General project management tasks including tracking progress of various subtasks and assuring compliance with requirements set forth in the scope of work; and
- Coordination with the Unit personnel and field staff throughout the project on sample collection and analysis.

Surveying

The locations of the monitoring wells, water supply wells, soil borings, and the surface water sample location will be recorded in decimal degrees to the seventh order (NAD 83 datum) using a Trimble GeoXT 3000 GPS meter that will provide sub-meter accuracy with differential correction. Ground and top of casing elevations at each of the monitoring wells will be surveyed with the elevation tied into an arbitrary onsite benchmark.

Investigative Derived Waste Management Plan

Investigative Derived Waste (IDW) will be managed in accordance with the Unit guidelines. Any IDW that cannot be disposed on-site (used to backfill borings or spread on the ground surface) will be contained in 55-gallon drums and stored on-site within a secured temporary fenced area. It is assumed that the analytical data collected in Subtasks 712DP-11B and 11C will be sufficient for characterization for disposal. Cost for disposal is not included.

Analytical Methods for Groundwater and Soil Samples

MM&A will subcontract with North Carolina certified laboratory for the analyses specified in above Subtasks. All samples, along with trip blanks (VOC analysis only); will be transported to the selected laboratory for the following analyses:

- Volatile organic compounds (VOCs) using EPA Method 8260

- 1,4-dioxane by EPA Method 8260SIM
- Semi-volatile organic compounds (SVOCs) using EPA Method 8270
- The 15 hazardous substance list metals (Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Thallium and Zinc) using appropriate EPA Methods (6020 or 7471/7470A)
- Ammonia by EPA Standard Method 350.1
- Nitrate and Sulfate by EPA Method 300

After receipt of all laboratory reports, the data will be reviewed to assure there were no QA/QC exceptions during analysis that would render the data unacceptable for its intended use. After the review is completed, an electronic copy of the laboratory reports will be provided to the Unit along with a letter to outline the findings of the completeness review.

Subtask 712DP-12 – Report Compilation

After completion of the above Task Orders will compile the report components into a comprehensive report that will be titled “*Remedial Investigation: Re-sampling and Analysis of Surface Water and Potable Water, Confirmation Groundwater Monitoring, and Additional Soil Cover Studies*”. The report will include the following for each Subtask:

- Soil boring logs
- Tables providing GPS waypoints, field screening results, and analytical results compared to appropriate standards
- Figures with boring locations and contaminant concentrations
- Photologs of any significant clearing or land disturbance
- Text describing the activities, observations and results
- Field notes and instrument calibration information

SCHEDULE

MM&A will begin coordination of all work within 5 working days of the approval of this proposal. It is estimated that field work will be initiated by the third week after the work plan is approved contingent upon subcontractor and equipment availability. MM&A estimates that the field investigation can be completed within five working days inclusive of mobilization/demobilization. The following table summarizes the schedule and staffing for

completion of the field work. Invoices for work performed under this Task Order will be issued upon completion of the work.

Field Schedule	Subtask	Staff Level		
		Project	Staff	Technician
Week 1 Day 1	712DP-11C	1	1	
Week 1 Days 2	712DP-11C		1	
Week 1 Day 3 & 4	712DP-11B & C		1	1
Week 1 Days 4 & 5	712DP-11D		1	1

A cost estimate for the proposed work is attached. Proposals from two qualified drilling firms were obtained and are attached for reference.

STAFFING

This project will be staffed by the following personnel from MM&A's Raleigh office.

Senior	Larry George
Project	Tim Grant
Staff	Chris Hanley

MM&A appreciates the opportunity to provide this proposal. Should you have any questions or require additional information, please do not hesitate to call.

Sincerely,

MARSHALL MILLER & ASSOCIATES, INC.



Lawrence M. George, P.G.
Senior Geologist



Timothy D Grant, P.G.
Project Geologist

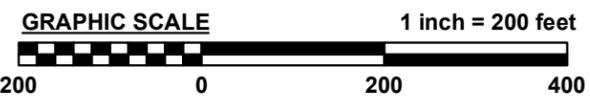
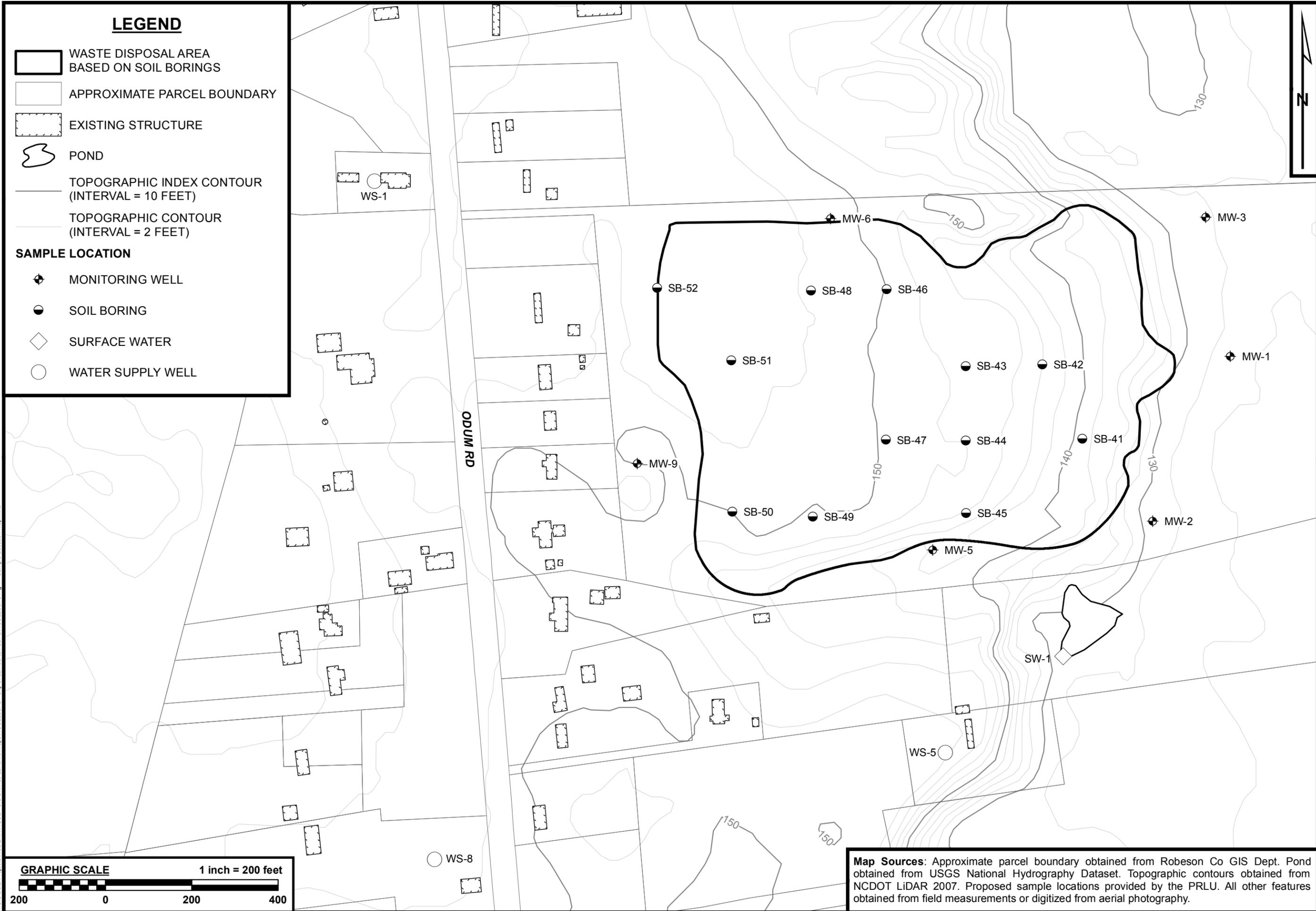
cc: File NCDENR/NCUL232P8

Attachments

LEGEND

-  WASTE DISPOSAL AREA BASED ON SOIL BORINGS
-  APPROXIMATE PARCEL BOUNDARY
-  EXISTING STRUCTURE
-  POND
-  TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 10 FEET)
-  TOPOGRAPHIC CONTOUR (INTERVAL = 2 FEET)
- SAMPLE LOCATION**
-  MONITORING WELL
-  SOIL BORING
-  SURFACE WATER
-  WATER SUPPLY WELL

T:\GIS Data\Projects\NCDENR\NCDL - Old Unlined Landfills\Maps\NCDL233P8 - City of Lumberton LDFL\NCDL233P8 Fig 1 - Sample Location Map.mxd



Map Sources: Approximate parcel boundary obtained from Robeson Co GIS Dept. Pond obtained from USGS National Hydrography Dataset. Topographic contours obtained from NCDOT LiDAR 2007. Proposed sample locations provided by the PRLU. All other features obtained from field measurements or digitized from aerial photography.

Prepared By: **Marshall Miller & Associates, Inc.**
 Geology, Environmental Sciences & Engineering, Geophysics

Ashland, VA Camp Hill, PA Lexington, KY
 Beckley, WV Charleston, WV Mason, KS
 Blacksburg, VA Kinston, TN Raleigh, NC
 Bluefield, VA Shreveport, LA

FILE NO.: NCDL233P8 Fig 1 - Sample Location Map.mxd

DESIGNED:	EMC
DRAWN:	EMC
CHECKED:	TG
DATE:	7/23/2015
SCALE:	1" = 200'
PROJECT NO.:	NCDL233P8

REMEDIAL INVESTIGATION - DELINEATION PHASE
 CITY OF LUMBERTON LDFL
 NONCD0000712
 ROBESON COUNTY, NC
 SAMPLE LOCATION MAP