526 South Church St.
Charlotte, NC 28202

P.O. Box 1006
Mail Code EC13K
Charlotte, NC 28201-1006
336-215-4576
704-382-6240 fax

March 17, 2015

Ms. Elizabeth Werner
Permitting Hydrogeologist
North Carolina Department of Environment and Natural Resources
Division of Waste Management - Solid Waste Section
1646 Mail Service Center – *Letter submitted electronically*
Raleigh, North Carolina 27699-1646

Subject: Well Installation Request
Duke Energy Carolinas - Marshall Steam Station
Permit Number 1804 and Photovoltaic Structural Fill
Catawba County North Carolina

Dear Ms. Werner:

Duke Energy Carolinas, LLC ("Duke Energy") hereby submits for review and approval proposed geotechnical exploration at the facilities noted above which will involve installation of instrumentation (monitoring wells). These monitoring wells must be installed to measure water levels and to collect water and solid phase (soil and rock) samples for use in the Groundwater Assessment required by the Coal Ash Management Act of 2014. The well locations outlined in the attached packages have been proposed to and approval has been received from the NCDENR Division of Water Resources as part of the Groundwater Assessment Plans for Marshall Steam Station. Information regarding the proposed exploration, including a figure showing the approximate proposed well locations and well details, are provided in the attached reports and plans prepared by HDR. We look forward to receiving your approval/concurrence to install these instruments associated with the enclosed plans.

Duke Energy is committed to excellent environmental stewardship and to cooperation with the Division regarding the operation, maintenance, safety, and integrity of all of its landfills, structural fills, ash basins, dams, and associated pipe systems in North Carolina. We look forward to continuing to work with you regarding such issues and to ensure that Duke Energy's facilities are maintained in good condition.

If you have any questions or need clarification regarding the information provided, feel free to contact me at kim.hutchinson@duke-energy.com or (336) 215-4576 at your convenience.

Sincerely,

Kimberlee Hutchinson

Kimberlee Hutchinson, PE
Environmental Services

Attachment: 2015-03-17 Permit No. 1804 Well Installation Plan
2015-03-17 Photovoltaic Structural Fill Well Installation Request

Cc: Ed Mussler – NCDENR Permitting Branch Head
Ed Sullivan - Duke Energy Environmental Services
Don Scruggs - Duke Energy Marshall Steam Station
Tim Russell - Duke Energy Marshall Steam Station

March 17, 2015

Ms. Kimberlee Hutchinson
Duke Energy Carolinas, LLC
3195 Pine Hall Road
Belews Creek, North Carolina 27009

Via email Kim.Hutchinson@duke-energy.com

Subject: Installation of Groundwater Monitoring Wells
Marshall Structural Fill
Duke Energy Marshall Steam Station
Catawba County, North Carolina

Dear Ms. Hutchinson,

HDR has prepared this notification letter for the installation of groundwater monitoring wells and soil borings located within the facility boundary at the Marshall Structural Fill. The proposed monitoring wells and soil borings are a part of the station's *Groundwater Assessment Work Plan* as required by the Coal Ash Management Act of 2014 and reviewed by the North Carolina Department of Environment and Natural Resources (NCDENR).

On August 13, 2014, the North Carolina Department of Environment and Natural Resources (NCDENR) issued a Notice of Regulatory Requirements (NORR) letter to Duke Energy requiring submittal of a work plan to complete a comprehensive site assessment (CSA) at the Marshall Steam Station Ash Basin site (Figure 1). The Coal Ash Management Act, which became law on September 20, 2014, also required a Groundwater Assessment Plan as outlined in the Act. Duke Energy submitted a *Groundwater Assessment Work Plan* to the NCDENR on September 25, 2014. Subsequently, NCDENR issued a comment letter dated November 4, 2014. In response to the comments, Duke Energy submitted a revised *Groundwater Assessment Work Plan* to NCDENR on December 30, 2014, which in part, proposed the installation of two groundwater monitoring wells and eight soil borings located within the facility boundary of the Marshall Structural Fill. The locations of the proposed monitoring wells and soil borings are shown on Figure 2. Note the proposed locations are approximate and may be revised based on final locations approved by NCDENR Division of Water Resources (DWR) and conditions encountered in the field.

The location and estimated depths for the proposed monitoring wells and soil borings are included below in Table 1. Construction diagrams for typical shallow and deep monitoring wells are shown on Figure 3.

Table 1. Monitoring Well Construction Summary

Exploration Location	Proposed Well/ Soil Boring ID	Latitude	Longitude	Estimated Depth (ft bgs)	Estimated Well Screen Interval (ft bgs)
On Top of Structural Fill	AB-20S	35.615188	-80.980223	60	50-60
	AB-20D	35.615188	-80.980223	100	95-100
	SB-2	35.611068	-80.977962	80	--
	SB-3	35.612577	-80.978728	80	--
	SB-4	35.616105	-80.981785	80	--
	SB-5	35.616977	-80.979545	80	--
	SB-6	35.616563	-80.980472	80	--
	SB-7	35.614475	-80.981937	80	--
	SB-8	35.613017	-80.981143	80	--
	SB-9	35.614145	-80.978733	80	--

The proposed monitoring wells and soil borings will be installed following the NCDENR DWR approval of the Work Plan. The shallow monitoring well will be installed using hollow stem augers. The deep monitoring well will be installed using hollow stem augers until reaching refusal (assumed to be beneath the structural fill). Rotary cone and rock coring drilling techniques will then be used to advance the boring beneath auger refusal. The soil borings will be advanced using a direct push technology (DPT) drill rig or hollow stem augers. Sonic drilling techniques may be used.

The monitoring wells will be completed as specified on Figure 3 such that the integrity of the existing landfill cap system is not impaired by installation of the wells. All voids from the borehole will be filled with grout, sand, and/or bentonite as specified on Figure 3. Following completion of the soil borings, the borings will be backfilled with portland cement and bentonite grout mix to the existing ground surface. The NCDENR Solid Waste Section shall be contacted for approval prior to future abandonment of the proposed monitoring wells.

Note that preventive measures (such as use of rubber mats under the drill rig contact points and potentially on existing ground surface when mobilizing drilling equipment) will be taken to maintain integrity of vegetation and soil cover during monitoring well and soil boring installation activities on the structural fill. Repairs will be made as soon as practical should damages occur to vegetation and/or soil cover during installation activities.

Following completion of the installation activities, record documentation including boring logs and well completion records will be provided to Duke Energy for submittal to the NCDENR Solid Waste Section.

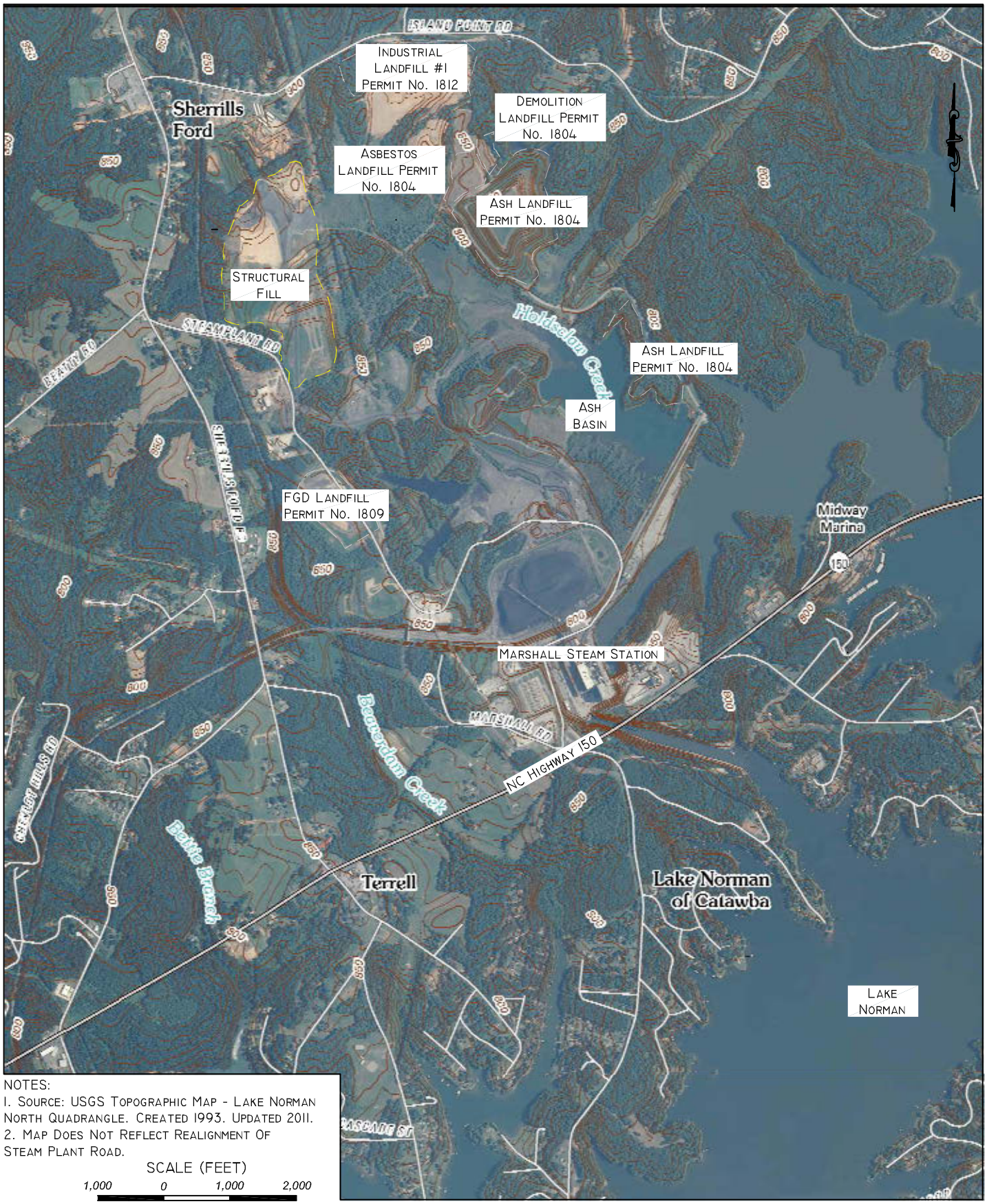
Should you have questions or need additional information, please contact Chad Hearn at (704) 248-3650 or Chad.Hearn@hdrinc.com.

Sincerely,
HDR Engineering, Inc. of the Carolinas

Jeffrey C. Hearn, P.E.
Environmental Engineer

Attachments: Figure 1 – Site Location Map
Figure 2 – Proposed Well and Sample Location Map
Figure 3 – Typical Well Construction Details

cc: Donn Scruggs
Tim Russell



NOTES:
1. SOURCE: USGS TOPOGRAPHIC MAP - LAKE NORMAN NORTH QUADRANGLE. CREATED 1993. UPDATED 2011.
2. MAP DOES NOT REFLECT REALIGNMENT OF STEAM PLANT ROAD.

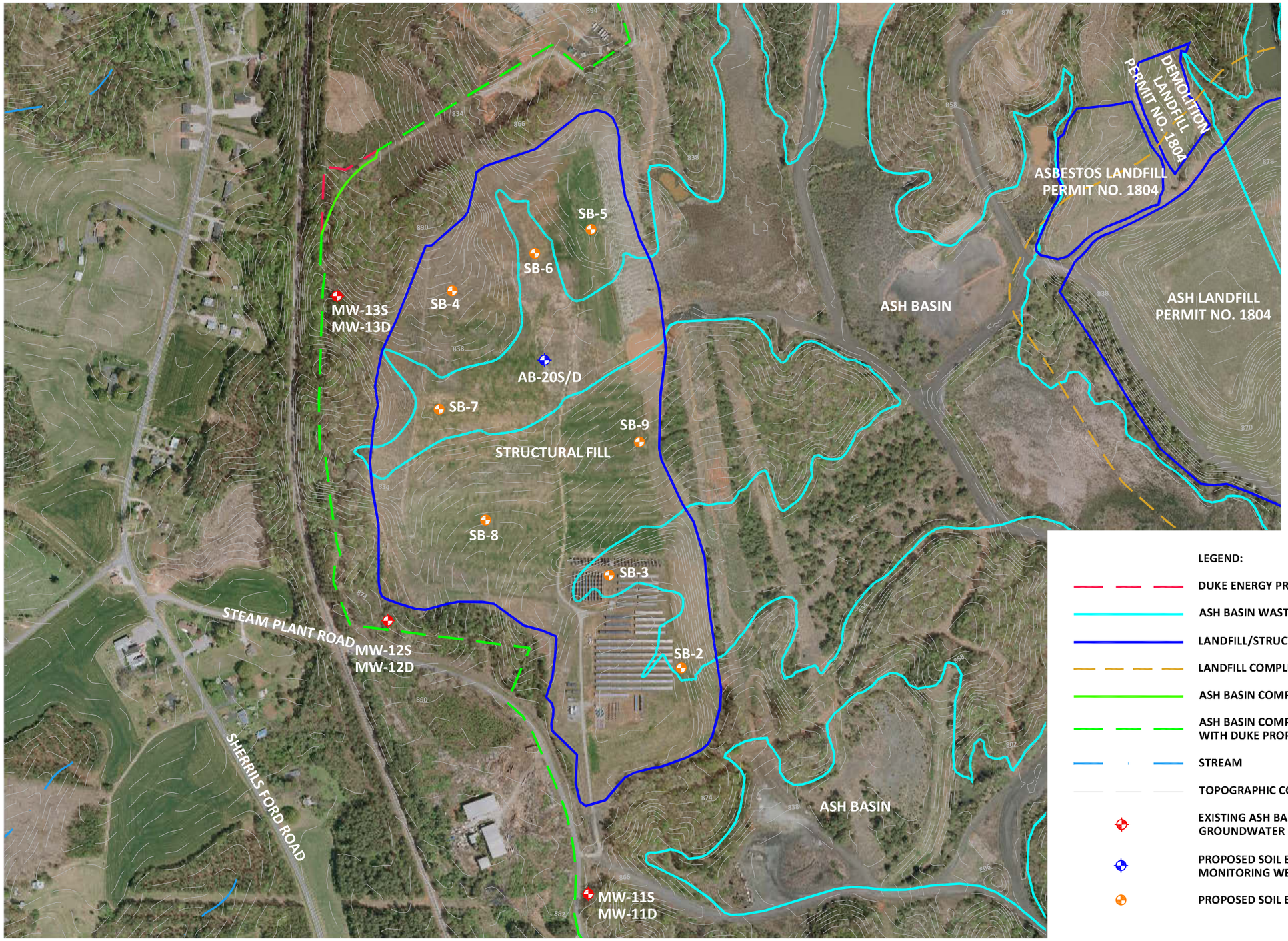
SCALE (FEET)
1,000 0 1,000 2,000

License Number: F-0116
440 South Church Street Charlotte, NC 28202

SITE LOCATION MAP
STRUCTURAL FILL
DUKE ENERGY CAROLINAS, LLC
MARSHALL STEAM STATION
CATAWBA COUNTY, NORTH CAROLINA

DATE
MARCH 17, 2015

FIGURE
1



LEGEND:

- DUKE ENERGY PROPERTY BOUNDARY
- ASH BASIN WASTE BOUNDARY
- LANDFILL/STRUCTURAL FILL BOUNDARY
- LANDFILL COMPLIANCE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY COINCIDENT WITH DUKE PROPERTY BOUNDARY
- STREAM
- TOPOGRAPHIC CONTOUR (4-FT INTERVAL)*
- EXISTING ASH BASIN COMPLIANCE GROUNDWATER MONITORING WELL
- PROPOSED SOIL BORING/GROUNDWATER MONITORING WELL LOCATION
- PROPOSED SOIL BORING LOCATION

NOTES:
1. PARCEL DATA FOR THE SITE WAS OBTAINED FROM DUKE ENERGY REAL ESTATE AND IS APPROXIMATE.
2. ASH BASIN WASTE BOUNDARY AND STRUCTURAL FILL BOUNDARY ARE APPROXIMATE.
3. AS-BUILT MONITORING WELL LOCATIONS PROVIDED BY DUKE ENERGY.
4. COMPLIANCE SHALLOW MONITORING WELLS (S) ARE SCREENED ACROSS THE SURFICIAL WATER TABLE.
5. COMPLIANCE DEEP MONITORING WELLS (D) ARE SCREENED IN THE TRANSITION ZONE BETWEEN COMPETENT BEDROCK AND THE REGOLITH.
6. TOPOGRAPHY DATA FOR THE SITE WAS OBTAINED FROM NC DOT GEOGRAPHIC INFORMATION SYSTEM (GIS) WEB SITE (DATED 2007).
7. AERIAL PHOTOGRAPHY WAS OBTAINED FROM WSP DATED APRIL 2014.
8. THE ASH BASIN COMPLIANCE BOUNDARY IS ESTABLISHED ACCORDING TO THE DEFINITION FOUND IN 15A NCAC 02L .0107 (a).

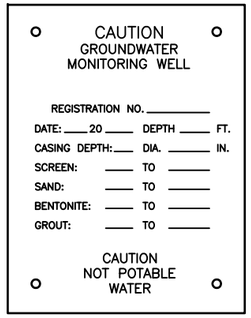
SCALE (FEET)
250' 0 250' 500'
1" = 500'

HDR

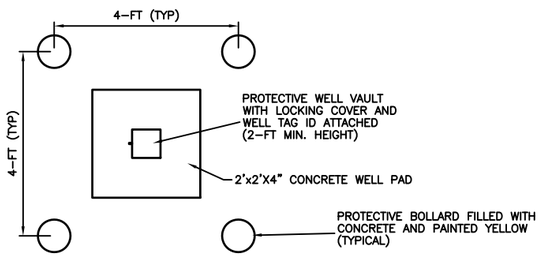
PROPOSED WELL AND SAMPLE LOCATION MAP
DUKE ENERGY CAROLINAS, LLC
MARSHALL STEAM STATION
MARSHALL STRUCTURAL FILL
CATAWBA COUNTY, NORTH CAROLINA

DATE
3/17/2015

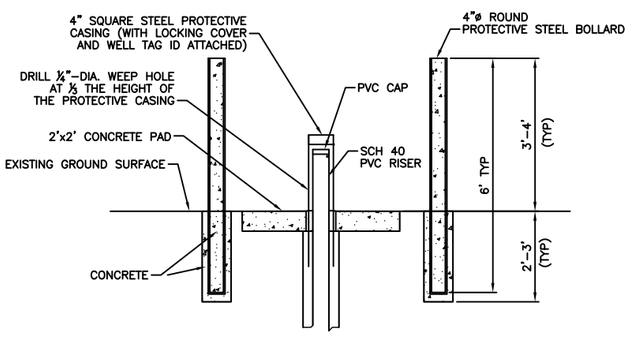
FIGURE
2



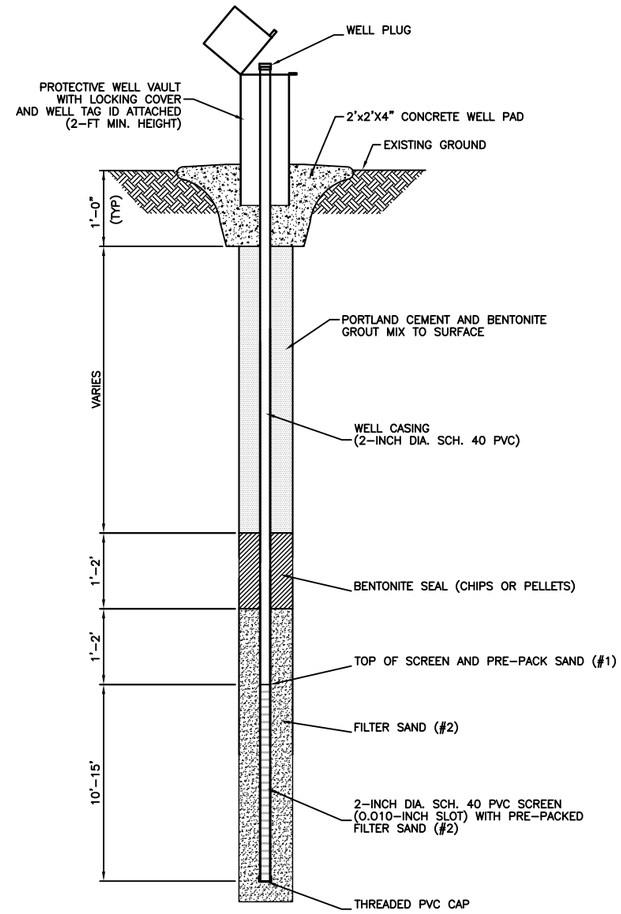
TYPICAL WELL TAG ID
SCALE: NTS



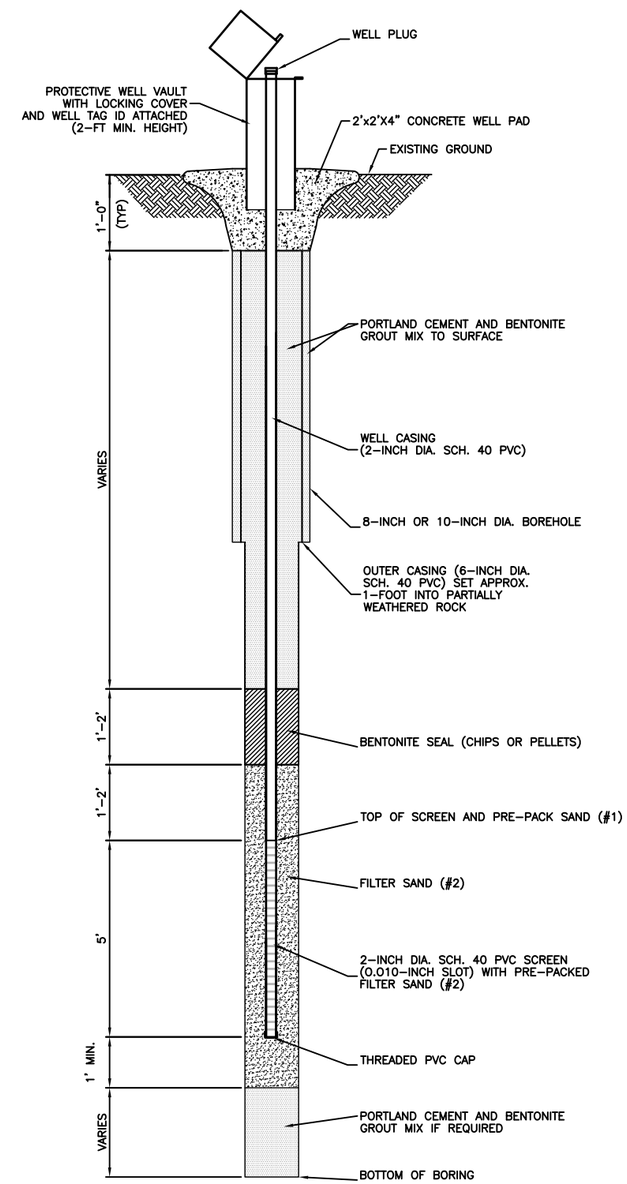
TYPICAL PROTECTIVE BOLLARDS (PLAN)
SCALE: NTS



TYPICAL PROTECTIVE BOLLARDS (PROFILE)
SCALE: NTS



TYPICAL SHALLOW MONITORING WELL (Single Cased)
SCALE: NTS



TYPICAL DEEP MONITORING WELL (Double Cased)
SCALE: NTS

NOTES:
1. MONITORING WELLS WILL BE CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 02C .0108 STANDARDS OF CONSTRUCTION: WELLS OTHER THAN WATER SUPPLY.
2. WELL TAG IDs TO BE ATTACHED TO WELL PROTECTIVE COVER WITH MECHANICAL RIVETS.
3. PROTECTIVE BOLLARDS (CONE-TAPERED, FILLED WITH CONCRETE, AND PAINTED YELLOW) ARE TO BE INSTALLED AS NECESSARY.
4. SLOPE 2' X 2' CONCRETE PAD SURFACE UPWARD TO PROTECTIVE COVER TO PREVENT PONDING WATER.
5. WELL ID TO BE ETCHED IN 2' X 2' CONCRETE PAD.
6. ALL CONSTRUCTION MEASUREMENTS ARE APPROXIMATE.

PROPOSED WELL CONSTRUCTION DETAILS
DUKE ENERGY CAROLINAS, LLC
MARSHALL STEAM STATION
MARSHALL STRUCTURAL FILL
CATAWBA COUNTY, NORTH CAROLINA

DATE
3/17/2015

FIGURE
3