Allen Steam Station Ash Basin

Plan for Identification of New Discharges

NPDES Permit NC0004979

September 30, 2014

Report Verification

PROJECT: GROUNDWATER MONITORING PROGRAM
ALLEN STEAM STATION
ASH BASIN
NPDES PERMIT NC0004979

TITLE: PLAN FOR IDENTIFICATION OF NEW DISCHARGES

This document has been reviewed for accuracy and quality commensurate with the intended application.

Prepared by:_____ Date:_____

Checked by:_____ Date:_____

Approved by:_____ Date:_____

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Section 1 - Introduction

The purpose of this document is to address the requirements of North Carolina General Statute (GS)130A-309.210 (d) *Identification and assessment of discharges; correction of unpermitted discharges*, as modified by North Carolina Senate Bill 729, for the Allen Steam Station (Allen) ash basin operated under National Pollutant Discharge Elimination System (NPDES) Permit NC0004979.

The following requirements are contained in General statue 130A-309.210:

d) Identification of New Discharges. – No later than October 1, 2014, the owner of a coal combustion residuals surface impoundment shall submit a proposed Plan for the Identification of New Discharges to the Department for its review and approval as provided in this subsection.

> *(1) The proposed Plan for the Identification of New Discharges shall include, at a minimum, all of the following:*
>
> > *a. A procedure for routine inspection of the coal combustion residuals surface impoundment to identify indicators of potential new discharges, including toe drain outfalls, seeps, and weeps.*
> >
> > *b. A procedure for determining whether a new discharge is actually present.*
> >
> > *c. A procedure for notifying the Department when a new discharge is confirmed.*
> >
> > *d. Any other information related to the identification of new discharges required by the Department.*
>
> *(2) The Department shall approve the Plan for the Identification of New Discharges if it determines that the Plan complies with the requirements of this subsection and will be sufficient to protect public health, safety, and welfare; the environment; and natural resources.*
>
> *(3) No later than 30 days from the approval of the Plan for the Identification of New Discharges, the owner shall begin implementation of the Plan in accordance with the Plan.*

The North Carolina Senate Bill 729 establishes the submittal date of this Plan for Identification of New Discharges no later than October 1, 2014.

This bill also modified GS 130A to establish the following submittals that are related to this Plan. GS130A-309.210(a) was modified to require:

(2) No later than December 31, 2014, the owner of a coal combustion residuals surface impoundment shall submit a topographic map that identifies the location of all (i) outfalls from engineered channels designed or improved for the purpose of collecting water from the

toe of the impoundment and (ii) seeps and weeps discharging from the impoundment that are not captured by engineered channels designed or improved for the purpose of collecting water from the toe of the impoundment to the Department. The topographic map shall comply with all of the following:

a. Be at a scale as required by the Department.

b. Specify the latitude and longitude of each toe drain outfall, seep, and weep.

c. Specify whether the discharge from each toe drain outfall, seep, and weep is continuous or intermittent.

d. Provide an average flow measurement of the discharge from each toe drain outfall, seep, and weep including a description of the method used to measure average flow.

e. Specify whether the discharge from each toe drain outfall, seep, and weep identified reaches the surface waters of the State. If the discharge from a toe drain outfall, seep, or weep reaches the surface waters of the State, the map shall specify the latitude and longitude of where the discharge reaches the surface waters of the State.

f. Include any other information related to the topographic map required by the Department.

The inspection procedures presented in this plan, developed to satisfy the requirements of GS130A-309.210(d), will be used as the basis for developing the topographic map required by GS130A-309.210(a)(2)

Section 2 - Site Description

2.1 Plant Description

Allen is a five-unit, coal-fired electric generating plant with a capacity of 1,140 megawatts located in Gaston County, North Carolina, near the town of Belmont. Allen is located on the west bank of the Catawba River on Lake Wylie, as shown on Figure 1. Commercial operations at Allen began in 1957.

2.2 Ash Basin Description

The coal ash residue from the coal combustion process has historically been disposed of in the Allen ash basin. The ash basin currently receives waste streams from the ash sluice lines (mostly bottom ash), water treatment system wastewater, stormwater, flue-gas desulfurization (FGD) wastewater, landfill leachate, and miscellaneous cleaning and maintenance wash waters. The discharge from the ash basin is permitted by the North Carolina Department of Environment and Natural Resources (NCDENR) Department of Water Resources (DWR) under NPDES Permit NC0004979.

Allen has an active ash basin and an inactive ash basin. The active ash basin was commissioned in 1973 and is currently in operation. The inactive ash basin is located to the north of the active ash basin and is not in operation. A large portion of the inactive ash basin is permitted as an industrial landfill by the NCDENR Division of Waste Management (DWM) (Permit No. 3612). See Figure 2.

The active ash basin is located approximately 2,500 feet to the south of the power plant on the western side of Lake Wylie. There are two earthen dikes impounding the active ash basin; the East Dike, located along the west bank of Lake Wylie and the North Dike, separating the active and inactive ash basins. The surface area of the active ash basin is approximately 169 acres (Duke Energy 2009) with an approximate operating pond elevation of 633.5 feet. The full pond elevation of Lake Wylie is approximately 568.7 feet.

Due to the nature of Allen operations and weather, inflows to the ash basin are highly variable. The inflows from the ash removal system and other plant discharges are discharged through sluice lines into the ash basin. Since 2009, fly ash has been dry-handled and is infrequently sluiced to the ash basin. Prior to 2009, all of the fly ash produced was sluiced to the ash basin. All of the bottom ash produced by the station is sluiced to the ash basin. The water level (pond elevation) of the ash basin is maintained at approximately 633.5 feet by the use of concrete stop logs. A 42-inch-diameter reinforced concrete pipe serves as the outlet conduit for the discharge tower into Lake Wylie.

Section 3 - Site Geology and Hydrogeology

3.1 Site Geologic/Soil Framework

Allen and its associated ash basin system are located in the Charlotte terrane of the Carolina Zone (Pippin et al. 2008), or as described in the older belt terminology, the Charlotte Belt of the Piedmont physiographic province (Piedmont) (North Carolina Geological Survey 1985). The Charlotte terrane is characterized by mostly felsic to mafic plutonic rocks which intrude a suite of mainly metaigneous rocks and minor metasedimentary rocks (Pippin et al. 2008).

The soils that overlie the bedrock in the area have generally formed from the in-place weathering of the parent bedrock. The fractured bedrock is overlain by a mantle of unconsolidated material known as regolith. The regolith, where present, includes the soil zone, a zone of weathered, decomposed bedrock known as saprolite, and alluvium. Saprolite, the product of chemical and mechanical weathering of the underlying bedrock, is typically composed of silt and coarser granular material up to boulder size and may reflect the texture of the rock from which it was formed. The weathering products of felsic rocks may be sandy-textured and rich in quartz content while mafic rocks form a more clayey saprolite (LeGrand 2004).

3.2 Site Hydrogeologic Framework

Piedmont topography is characterized by gently rounded sloped hills and valleys. Recharge typically occurs on upland areas and slopes while groundwater discharge is concentrated in surface water bodies and lowland areas. LeGrand's (1988, 2004) conceptual model of the groundwater setting in the Piedmont incorporates the above two medium systems into an entity that is useful for the description of groundwater conditions. That entity is the surface drainage basin that contains a perennial stream or river (LeGrand 1988). Each basin is similar to adjacent basins and the conditions are generally repetitive from basin to basin. Within a basin, movement of groundwater is generally restricted to the area extending from the drainage divides to a perennial stream or river (Slope-Aquifer System; LeGrand 1988, 2004). Rarely does groundwater move beneath a perennial stream or river to another more distant stream (LeGrand 2004).

Therefore, in most cases in the Piedmont, the groundwater system is a two-medium system (LeGrand 1988) restricted to the local drainage basin. The groundwater occurs in a system composed of two interconnected layers: residuum/saprolite and weathered rock overlying fractured crystalline rock separated by the transition zone. Typically, the residuum/saprolite is partly saturated and the water table fluctuates within it. Water movement is generally through the fractured bedrock. The near-surface fractured crystalline rocks can form extensive aquifers. The character of such aquifers results from the combined effects of the rock type, fracture system, topography, and weathering. Topography exerts an influence on both weathering and the opening of fractures while the weathering of the crystalline rock modifies both transmissive and storage characteristics.

The aquifer system in the Piedmont typically exists in an unconfined or semi-confined condition in the bedrock zone. Under natural conditions, the general direction of groundwater flow can be

approximated from the surface topography. Groundwater moves both vertically down through the regolith and parallel to the bedrock surface to areas where groundwater discharges as seepage into streams, lakes, or other surface water bodies.

The Allen ash basin is generally bounded to the north by the inactive ash basin (Figure 2). Lake Wylie is located to the east of the ash basin and lies along the toe of the East Dike. To the south, the ash basin is generally bounded by a surface water divide located north of Reese Wilson Road. This divide drops in elevation to the east toward Lake Wylie. The ash basin is generally bounded to the west by a surface water divide that runs approximately along the alignment of South Point Road (NC 273) and upland areas east of South Point Road. The geological/groundwater conditions at the site are expected to be generally consistent with the characteristics of the conceptual groundwater model developed by LeGrand for the Piedmont region. The surface water divide along South Point Road likely functions as a groundwater divide. The predominant direction of groundwater flow from the ash basin is likely in an easterly direction, generally from South Point Road towards Lake Wylie.

Section 4 - Identification of New Discharges

4.1 Purpose of Inspection

The purpose of the inspection is to identify new discharges and indicators of potential new discharges, including toe drain outfalls, seeps, and weeps associated with the coal combustion residuals surface impoundments (ash basins).

4.2 Seepage

Seepage is considered to be the movement of wastewater from the ash basin through the ash basin embankment, the embankment foundation, the embankment abutments, or through residual material in areas adjacent to the ash basin. A seep is defined in this document as an expression of seepage at the ground surface. A weep is understood to have the same meaning as a seep.

Indicators of seepage include areas where water is observed on the ground surface and/or where vegetation suggests the presence of seepage. Seepage can emerge anywhere on the downstream face, beyond the toe, or on the downstream abutments at elevations below normal pool. Seepage may vary in appearance from a "soft," wet area to a flowing "spring." Seepage may show up first as only an area where the vegetation is lusher and darker green than surrounding vegetation. Cattails, reeds, mosses, and other marsh vegetation often become established in a seepage area.[1] However, in many instances, indicators of seeps do not necessarily indicate the presence of seeps.

4.3 Area To Be Inspected for New Discharges

The areas to be inspected for new discharges and indicators of potential new discharges are the areas of the site where water contained in the ash basin might infiltrate into the underlying residual material and be expressed as seepage. This would include the earthen embankment which impounds the ash basin and certain adjacent areas.

The extent of the areas to be inspected was determined based on the generalized LeGrand conceptual model and the concept of the slope-aquifer system and the site topography. In this generalization, flow of water from the ash basin would be expected to be located within the slope-aquifer compartment and to be below the full pond elevation of the ash basin. The area to be inspected for new discharges is shown on Figure 2.

4.4 Inspection Procedure

The inspection procedure for identification of new discharges and indicators of potential new discharges associated with the Allen ash basin system is provided in Appendix A. In addition to the specific requirements for the inspection, Appendix A also provides the general requirements, the frequency of inspections, documentation requirements, and provides a decision flow chart for determining if the potential new discharge is associated with the ash basin.

[1] Dam Operation, Maintenance, and Inspection Manual, North Carolina Department of Environment and Natural Resources, Division of Land Resources, Land Quality Division, 1985 (Revised 2007).

Section 5 - References

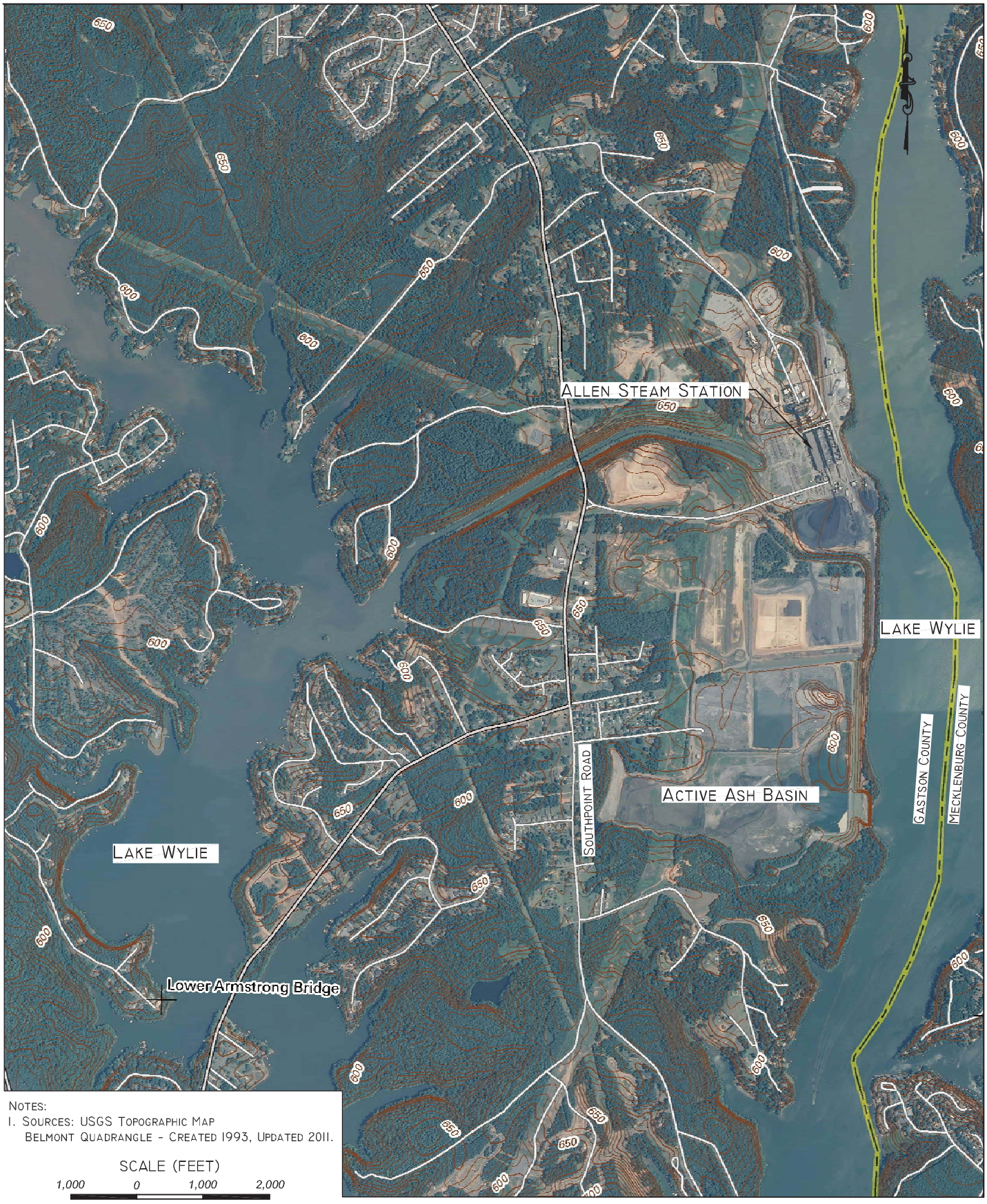
North Carolina Geological Survey, 1985, Geologic map of North Carolina: North Carolina Geological Survey, General Geologic Map, scale 1:500000.

LeGrand, H.E. 1988. Region 21, Piedmont and Blue Ridge, p.201-208, in Black, W., Rosenhein, J.S., and Seaber, P.R., eds., Hydrogeology: Geological Society of America, The Geology of North America, v. O-2, Boulder, Colorado, 524p.

LeGrand, Harry, Sr. 2004. A Master Conceptual Model for Hydrogeological Site Characterization in the Piedmont and Mountain Region of North Carolina, North Carolina Department of Environment and Natural Resources.

Pippin, Charles G., Chapman, Melinda J., Huffman, Brad A., Heller, Matthew J., and Schelgel, Melissa E. 2008. Hydrogeologic Setting, Ground-Water Flow, and Ground-Water Quality at the Langtree Peninsula Research Station, Iredell County, North Carolina, 2000-2005, United States Geological Survey, Prepared in cooperation with the North Carolina Department of Environment and Natural Resources, Division of Water Quality.

Figures



NOTES:
1. SOURCES: USGS TOPOGRAPHIC MAP
BELMONT QUADRANGLE - CREATED 1993, UPDATED 2011.

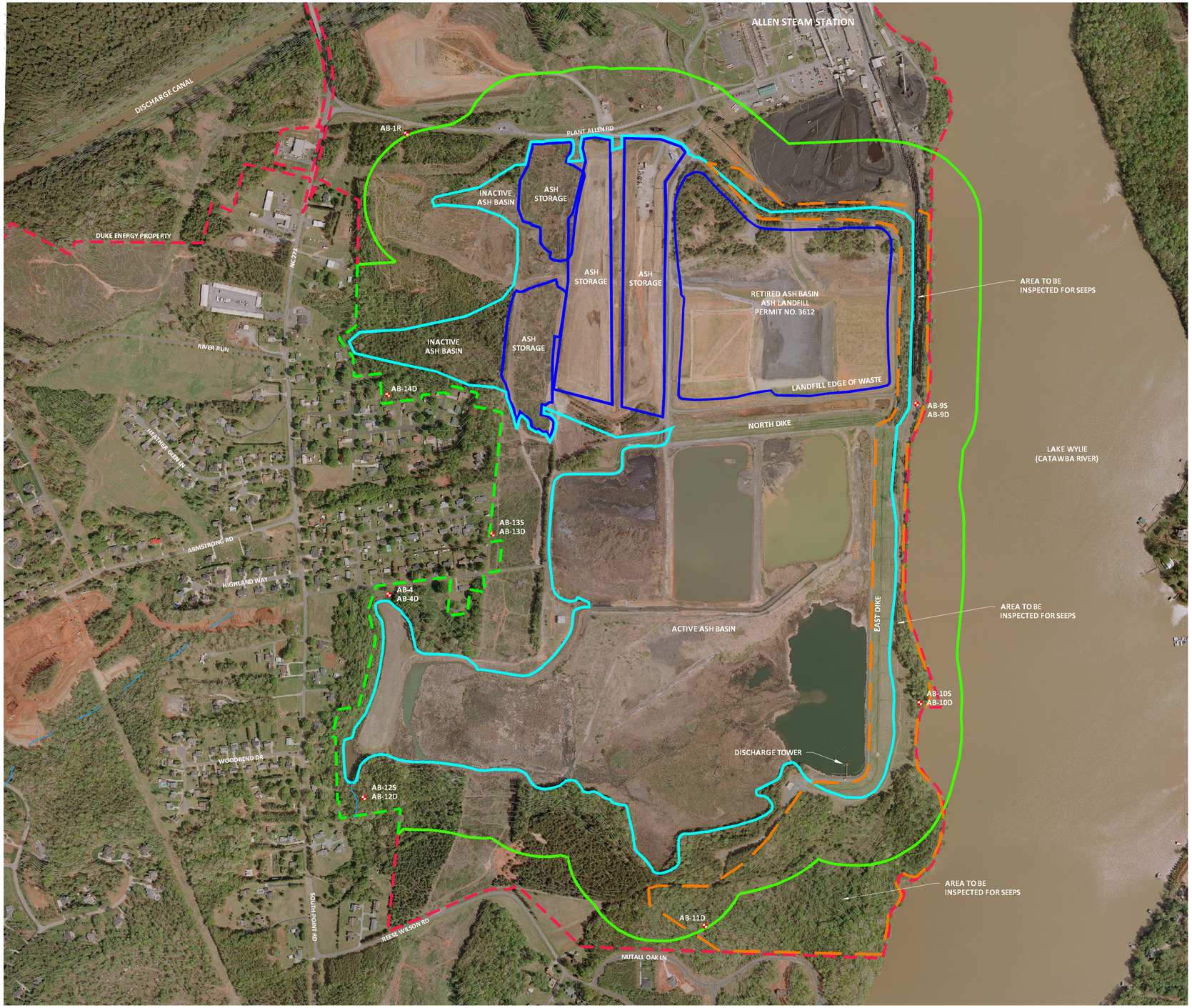
SCALE (FEET)
1,000 0 1,000 2,000

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

SITE LOCATION MAP
ALLEN STEAM STATION
DUKE ENERGY CAROLINAS, LLC
GASTON COUNTY, NORTH CAROLINA

September 30, 2014

FIGURE
1



LEGEND:

- DUKE ENERGY PROPERTY BOUNDARY
- ASH BASIN WASTE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY COINCIDENT WITH DUKE PROPERTY BOUNDARY
- STREAM
- TOPOGRAPHIC CONTOUR (4-FT INTERVAL)*
- AREA TO BE INSPECTED FOR SEEPS
- ASH BASIN COMPLIANCE GROUNDWATER MONITORING WELL

NOTES:
1. PARCEL DATA FOR THE SITE WAS OBTAINED FROM DUKE ENERGY REAL ESTATE AND IS APPROXIMATE.
2. WASTE BOUNDARY IS 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 COMPLIANCE BOUNDARY IS ESTABLISHED ACCORDING TO THE DEFINITION FOUND IN 15A NCAC 02L .0107 (a).

SCALE (FEET)
200' 0 200' 400'
1" = 400'

AREAS TO BE INSEPCTED FOR SEEPS
DUKE ENERGY CAROLINAS, LLC
ALLEN STEAM STATION ASH BASIN
NPDES PERMIT NO. NC0004979

GASTON COUNTY, NORTH CAROLINA

DATE
9/30/2014

FIGURE
2

A

ALLEN STEAM STATION ASH BASIN INSPECTION FOR IDENTIFICATION OF NEW DISCHARGES

Allen Steam Station Ash Basin
INSPECTION FOR IDENTIFICATION OF NEW DISCHARGES

1. Purpose of Inspection

The purpose of the inspection is to identify new discharges and indicators of potential new discharges, including toe drain outfalls, seeps, and weeps that arise after the initial submittal of maps required by North Carolina General Statute 130A-309.210(a)(2)(ii). Seepage is considered to be the movement of wastewater from the ash basin through the ash basin embankment, the embankment foundation, the embankment abutments, or through residual material in areas adjacent to the ash basin. Therefore, a seep is defined in this document as an expression of seepage at the ground surface. A weep is understood to have the same meaning as a seep. If new discharges or indicators of potential new discharges are identified, the decision flow chart (see Figure A-1) will be used to determine if the potential new discharge is from the ash basin and if notification to the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Resources (DWR) is required.

2. General Inspection Requirements

2.1. Inspections are to be performed on areas that are below the ash basin full pond elevation and within the area shown on Figure A-2. The purpose of the inspection is to identify new discharges and indicators of potential new discharges, including toe drain outfalls, seeps, and weeps associated with the coal combustion residuals surface impoundment (ash basin).

2.2. If required, a larger scale figure showing the locations of outfalls from engineered channels will be developed. If a separate figure showing outfalls from engineered channels is not developed, Figure A-2 will be revised to show these features.

2.3. Inspections of areas on or adjacent to the ash basin embankments should be performed within two months after mowing, if possible.

2.4. Inspections should not be performed if the following precipitation amounts have occurred in the respective time period preceding the planned inspection:

2.4.1. Precipitation of 0.1 inches or greater within 72 hours or

2.4.2. Precipitation of 0.5 inches or greater within 96 hours

2.5. Record the most recent ash basin water surface elevation.

2.6. Review previous Inspection for Identification of New Discharge report(s) prior to performing inspection.

2.7. Review the most recent previous dam inspections.

2.8. Conduct an interview with the Site Environmental Coordinator prior to performing inspection to inquire about possible changes to site conditions, such as pond elevations, operations, additions or removal of wastewater discharges to the ash basin, changes to site surface water drainage, etc.

3. Frequency of Inspections

Inspections will be performed on a semi-annual basis during the following months: April to May and October to November.

4. Qualifications

The inspections shall be performed under the direction of a qualified Professional Engineer or Professional Geologist.

5. Documentation of Inspection

The inspection shall be documented by the individual performing the inspection. The report should contain observations and descriptions of the seeps observed, changes in observations compared to previous inspections, estimates of flows quantities, and photographs of seeps and outfalls of engineered channels designed or improved for collecting water from the impoundment. Photographs are to be numbered and captioned.

6. Initial Inspection

An initial inspection should be performed to identify features and document baseline conditions including location, extent (i.e., dimensions of affected area), and flow. Seep locations should be recorded using a Global Positioning System (GPS) device. Photographs should be taken from vantage points that can be replicated during subsequent semi-annual inspections.

7. Inspection For New Seeps at Outfalls From Engineered Channels

Inspect the outfalls from engineered channels designed and/or improved (such as through the placement of rip-rap) associated with the ash basin dikes to identify new seeps or indicators of new seeps.

7.1. Inspect all outfalls from engineered channels designed and/or improved (such as through the placement of rip-rap)

7.2. Document the condition of the outfall of the engineered channel with photographs. Photographs are to be taken from similar direction and scale as photographs taken during the initial inspection.

7.3. Observe outfall for seepage and for indicators of seeps.

7.4. Compare current seepage location, extent, and flow to seepage photographs and descriptions from previous inspections.

7.5. Record flow rate if measureable.

9. Inspection For New Seeps Not Captured by Engineered Channels

Inspect areas below the ash basin full pond elevation and within the slope-aquifer system shown on Figure A-2 to identify new seeps or indicators of new seeps. Inspect topographic drainage features that potentially could contain new seeps that potentially discharge from the ash basin.

9.1. Previously Identified Seeps

a) Inspect previously identified seep locations. Document the condition of the seeps with a photograph. Photographs are to be taken from similar direction and at a similar scale as the photograph documenting original photograph of seep. Describe the approximate dimensions and flow conditions of the seep.

b) If flow measurement device is installed at the outfall, record flow.

c) Observe seep to determine if changes to location, extent, or flows are present. Document changes to location, extent, and/or flow amount or pattern.

9.2. New Seep or Indicators of Seep

a) Mark the location of new seep or indicators of seep using a GPS device.

b) Document the condition of the seeps or indicators of seeps with a photograph.

c) Describe the approximate dimensions and flow conditions of the seep.

d) Map the location of new seep or indicator of seep using GPS coordinate points collected during the site visit.

e) If seep or indicator of seep was not caused by changes in surface water drainage and if the location is below the ash basin pond elevation, utilize the decision flow chart to determine if the seep represents a discharge from the ash basin and if notification to DWR is required.

10. Update Maps Identifying Seeps

If new seeps are identified during the inspection, Figure A-2 shall be updated to show the location of the new seeps. All seeps located below the ash basin full pond elevation and within the slope-aquifer system shown are to be shown on Figure A-2.

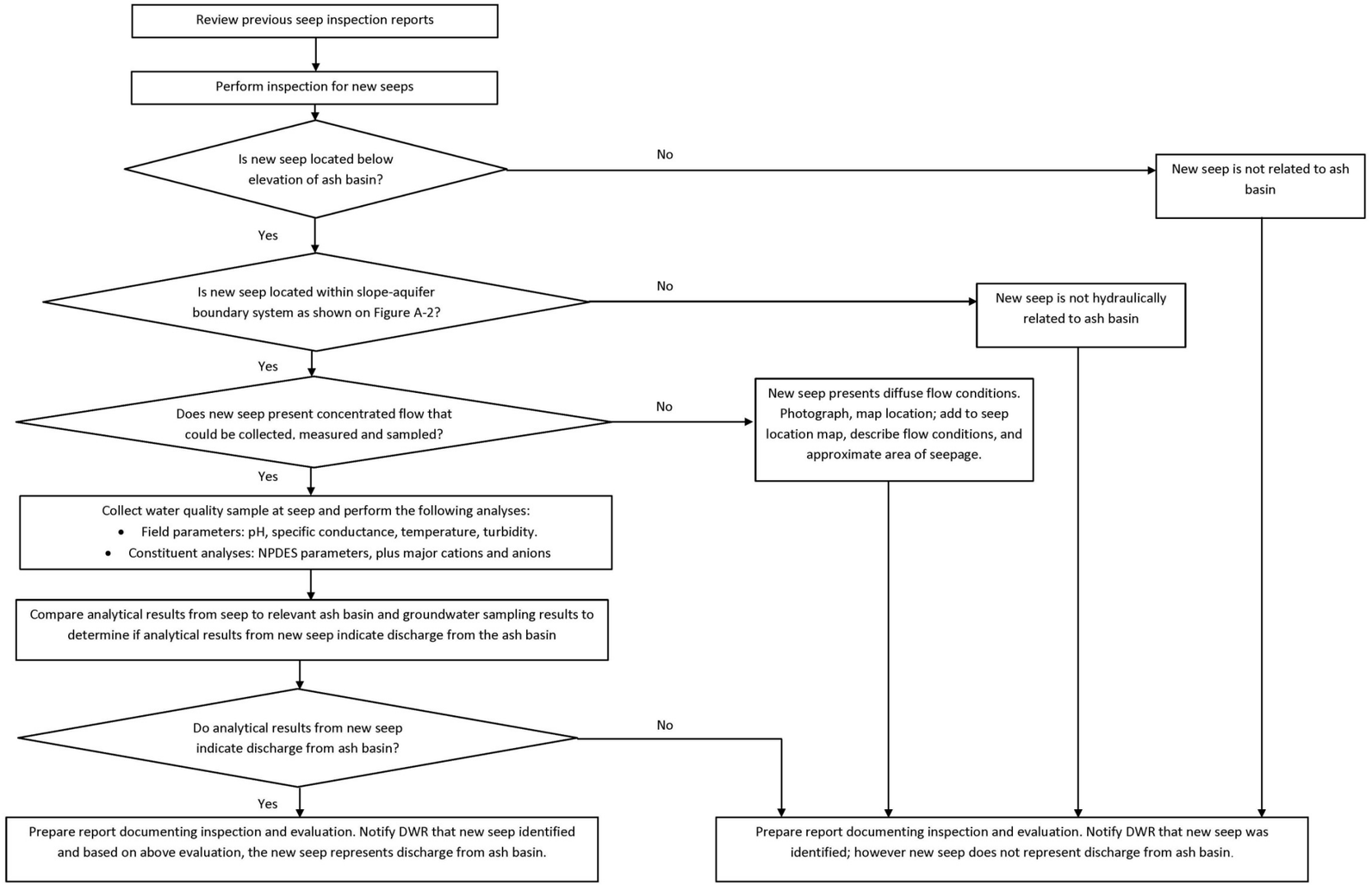
11. Decision Flow Chart

The decision flow chart developed to determine whether a new seep discharges from the ash basin is found on Figure A-1.

12. Procedure for Notifying NCDENR DWR If New Discharge Is Confirmed

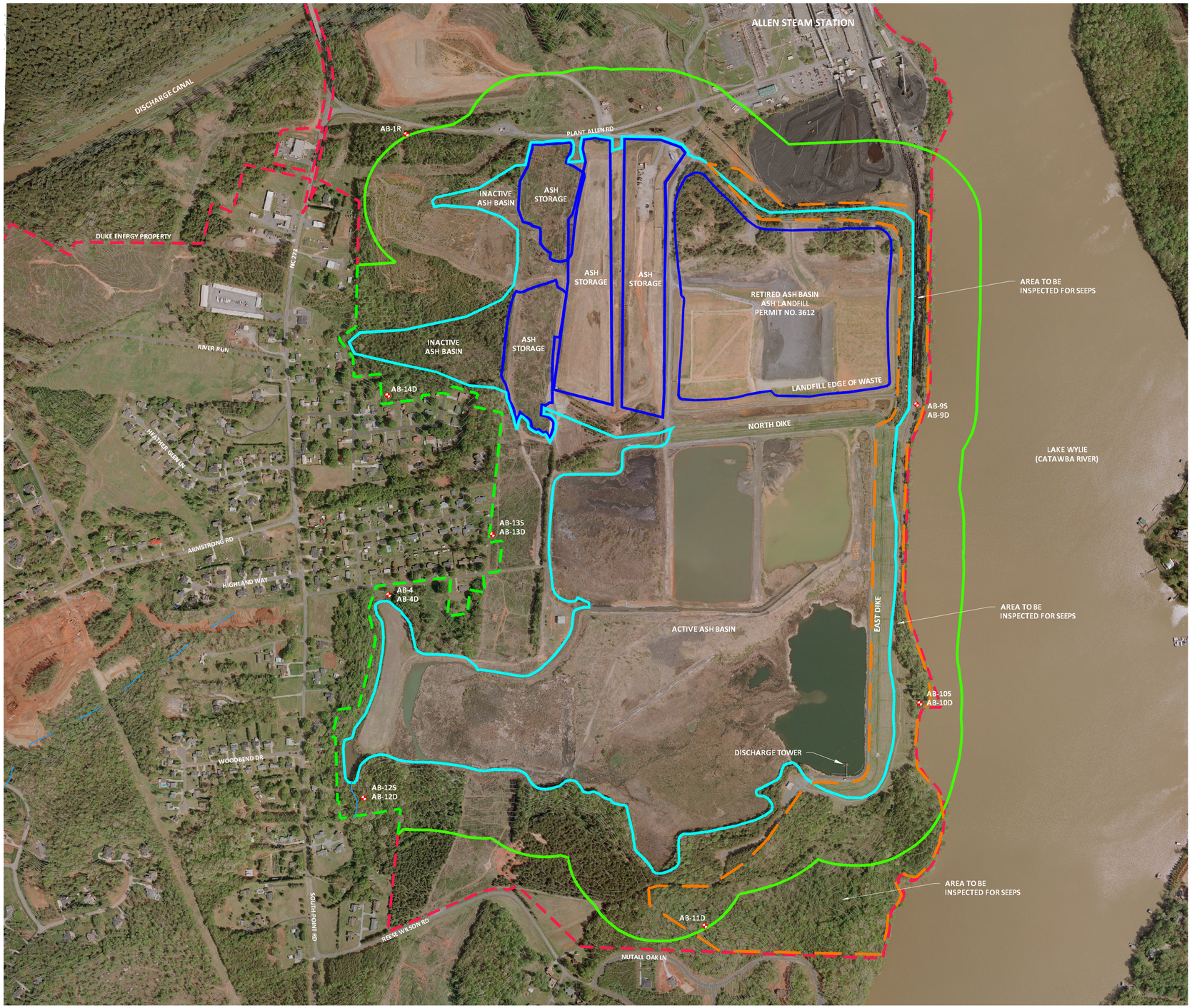
If it is determined that a newly identified seep is present, Duke Energy will notify the DWR Regional Office by mail within 14 days after the determination.

Figure A-1 - Decision Flow Chart for Determining If New Seep Represents Discharge From the Ash



Notes:

1. If no new seeps are identified, inspection will be documented however no notification to NCDENR DWR is required.
2. If new seeps are identified that do not represent discharge from the ash basin during the same inspection that identifies new seeps that do represent a discharge from the ash basin, a single report will be submitted to NCDENR DWR.



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DATE

9/30/2014

FIGURE

A-2