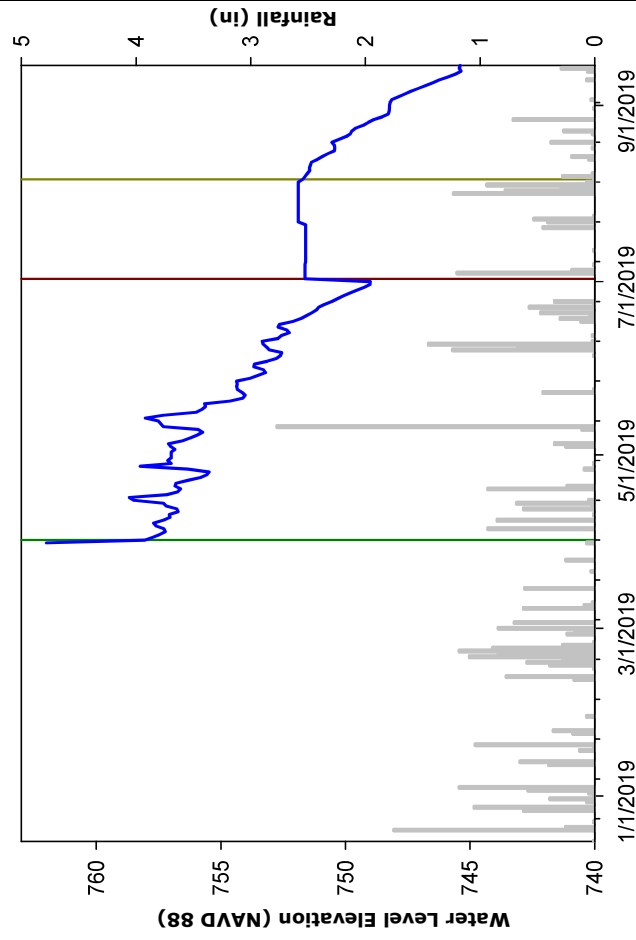


Ash Basin Pond



Date

— Ash Basin Pond Level Elevation (NAVD 88)

LEGEND

- Decanting Start (03/31/2019)
- Decanting Suspended (06/02/2019)
- Decanting Resumed (08/06/2019)
- Daily Total Rainfall (inches)

Notes:

Water level elevations are measured in feet
NAVD 88 – North American Vertical Datum 1988
in – inches

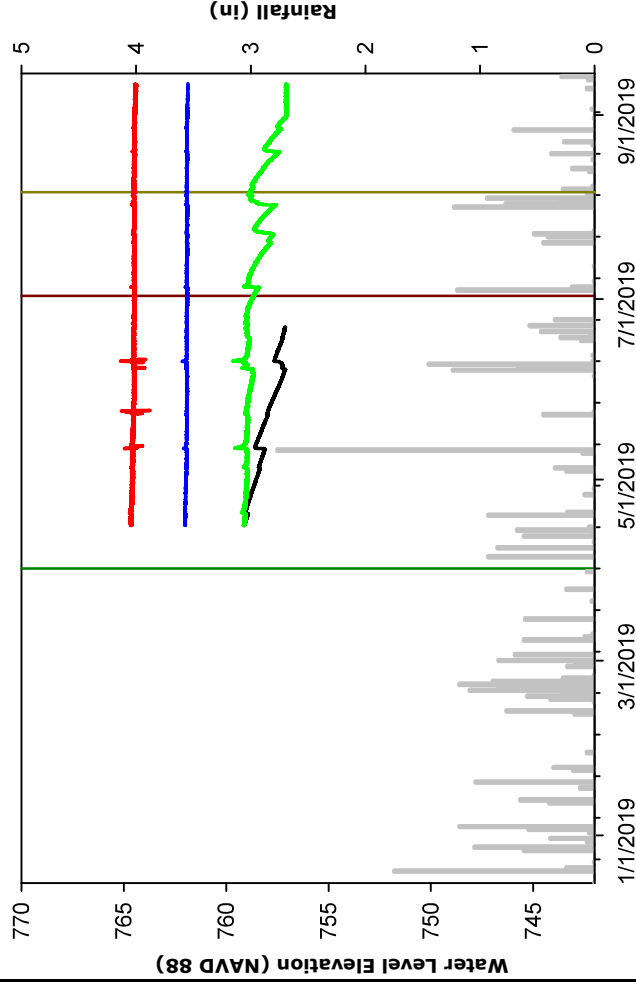


DRAWN BY: D. AVARD
REVISED BY: M. ROZIER
CHECKED BY: T. GRANT
APPROVED BY: T. GRANT
PROJECT MANAGER: S. SPINNER

DATE: 10/31/2019

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Ash Basin Fingers Monitoring



Date

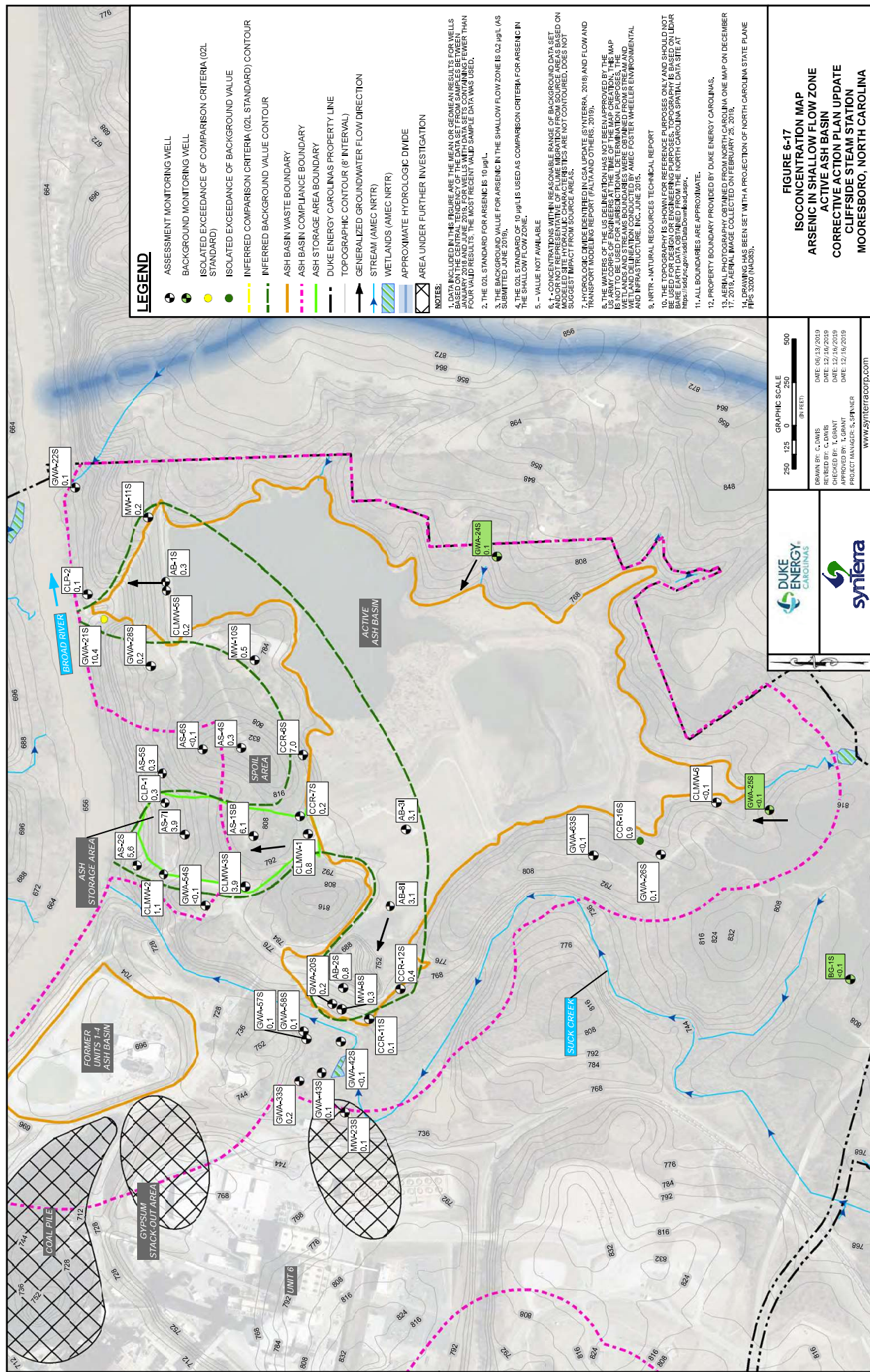
- South Finger Water Elevation (NAVD 88)
- SE Finger Water Elevation (NAVD 88)
- SW Finger Water Elevation (NAVD 88)
- Active South Water Elevation (NAVD 88)

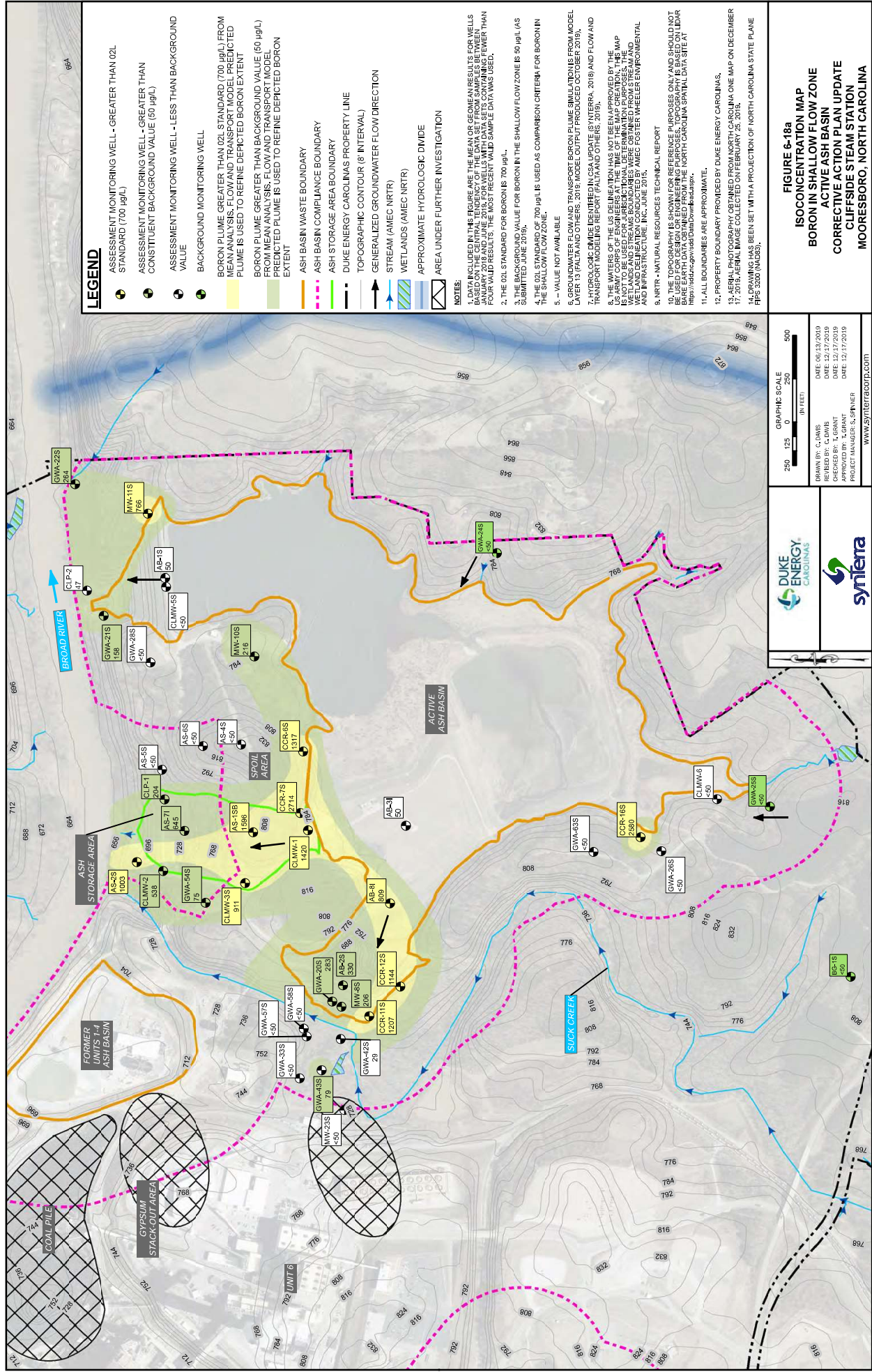
FIGURE 6-16

HYDROGRAPHS – WATER IN BASIN
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NC

Nov 05 2020

OFFICIAL COPY





LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (700 µg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- BORON PLUME GREATER THAN 02L STANDARD (700 µg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN FOUR VALID RESULTS. THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE SHALLOW FLOW ZONE IS 50 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 700 µg/L IS USED AS COMPARISON CRITERIA FOR BORON IN THE SHALLOW FLOW ZONE.
5. - VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT BORON PLUME SIMULATIONS FROM MODEL LAYER 13 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. IT IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE DELINEATION IS FOR INFORMATIONAL PURPOSES ONLY. THE DELINEATION WAS CONDUCTED BY AMEC POTTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA COLLECTED ON FEBRUARY 25, 2018. NORTH CAROLINA SPATIAL DATA SITE AT <https://data.openstreetmap.org/data/nc/>
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. THE ACTIVE ASH BASIN BOUNDARY IS SHOWN ON THE ONE MAP ON DECEMBER 17, 2018. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2018.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE NAD83, 3200 (NAD83).



GRAPHIC SCALE

250 0 250 500

(IN FEET)

FIGURE 6-18a

ISOCONCENTRATION MAP

BORON IN SHALLOW FLOW ZONE

ACTIVE ASH BASIN

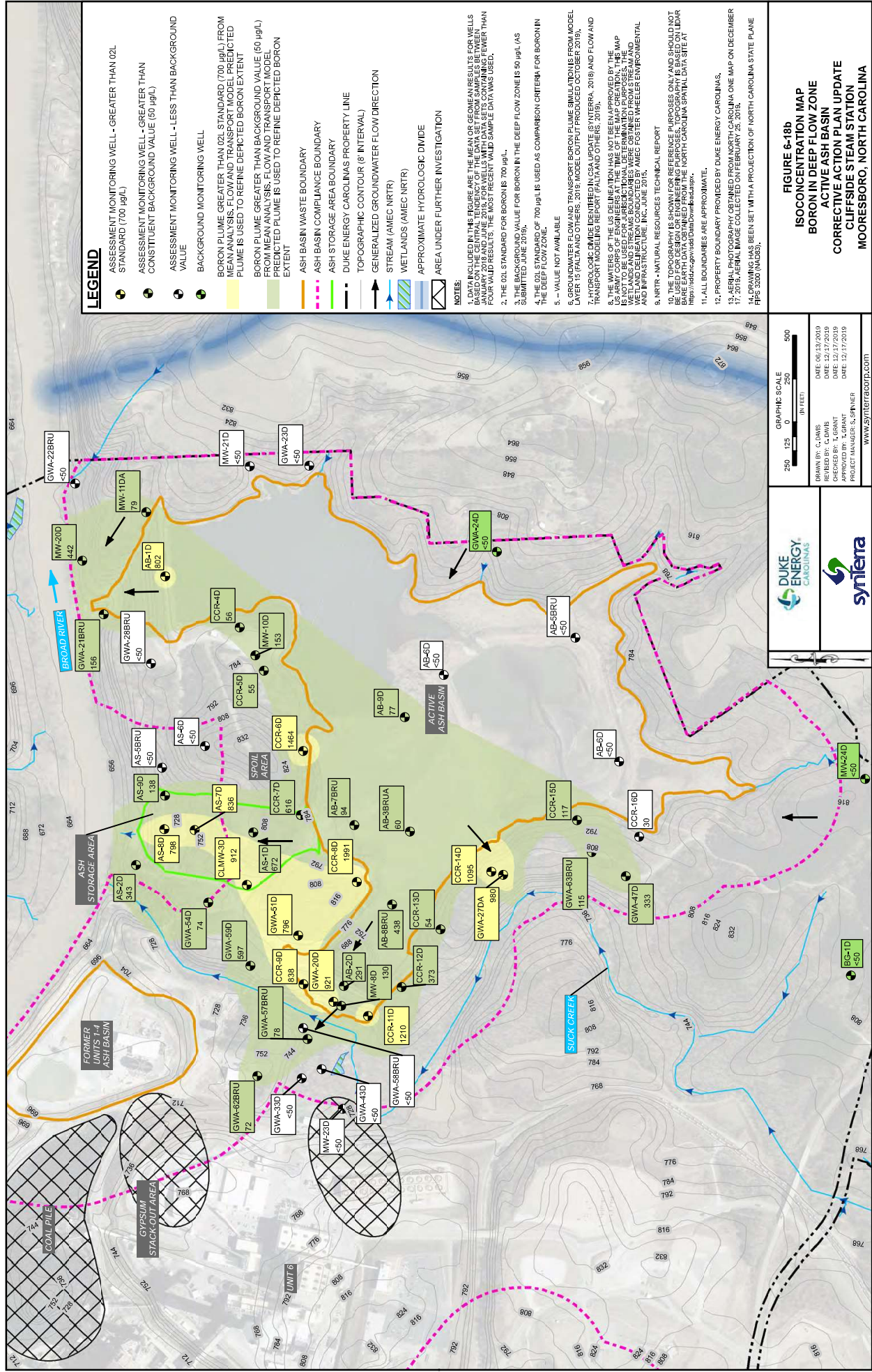
CORRECTIVE ACTION PLAN UPDATE

CLIFFSIDE STEAM STATION

MOORESBORO, NORTH CAROLINA

DRAWN BY: C. DAVIS
DATE: 06/12/2019
CHECKED BY: C. DAVIS
DATE: 12/17/2019
APPROVED BY: T. GRANT
DATE: 12/17/2019
PROJECT MANAGER: S. SPRINGER

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LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (700 µg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- BORON PLUME GREATER THAN 02L STANDARD (700 µg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEFICIT BORON EXTENT
- BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEFICIT BORON EXTENT
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN FOUR VALID RESULTS. THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE DEEP FLOW ZONE IS 50 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 700 µg/L IS USED AS COMPARISON CRITERIA FOR BORON IN THE DEEP FLOW ZONE.
5. - VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT BORON PLUME SIMULATIONS FROM MODEL LAYER 15 FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. IT IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. IT IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. IT IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES.
9. NRTR - NATURAL RESOURCES TECHNICAL REFERENCE
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA PROVIDED BY DUKE ENERGY CAROLINAS. NORTH CAROLINA SPATIAL DATA SITE AT <https://data.duke-energy.com/DataDownload.aspx>.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY PROVIDED BY DUKE ENERGY CAROLINAS ONE MAP ON DECEMBER 17, 2018. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2018.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE NAD83 3200 (NAD83).

FIGURE 6-18b

**ISOCONCENTRATION MAP
BORON IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA**

GRAPHIC SCALE
250 0 250 500
(IN FEET)

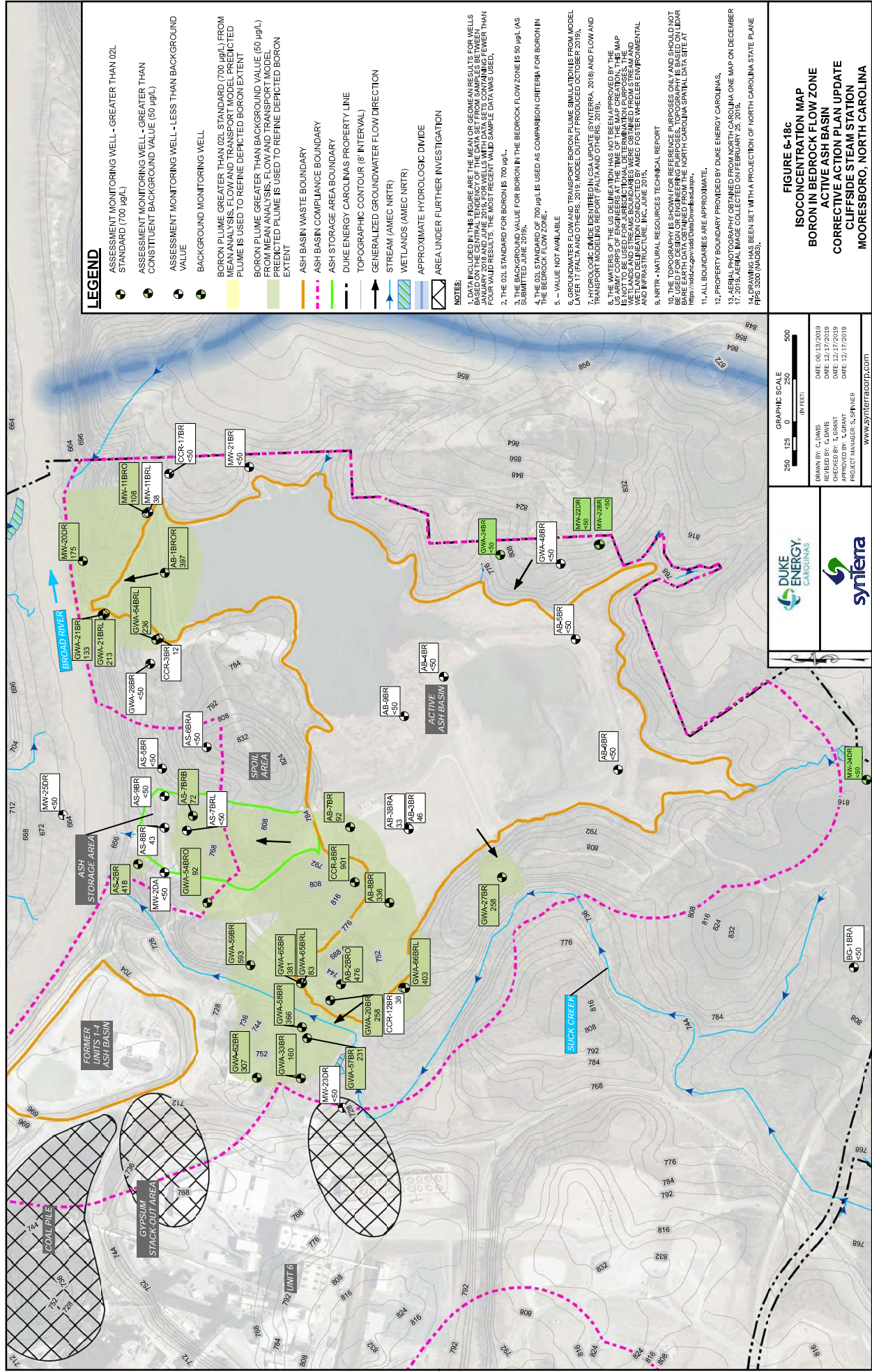
DRAWN BY: C. DAVIS
CHECKED BY: C. DAVIS
APPROVED BY: T. GRANT
PROJECT MANAGER: S. SPINER

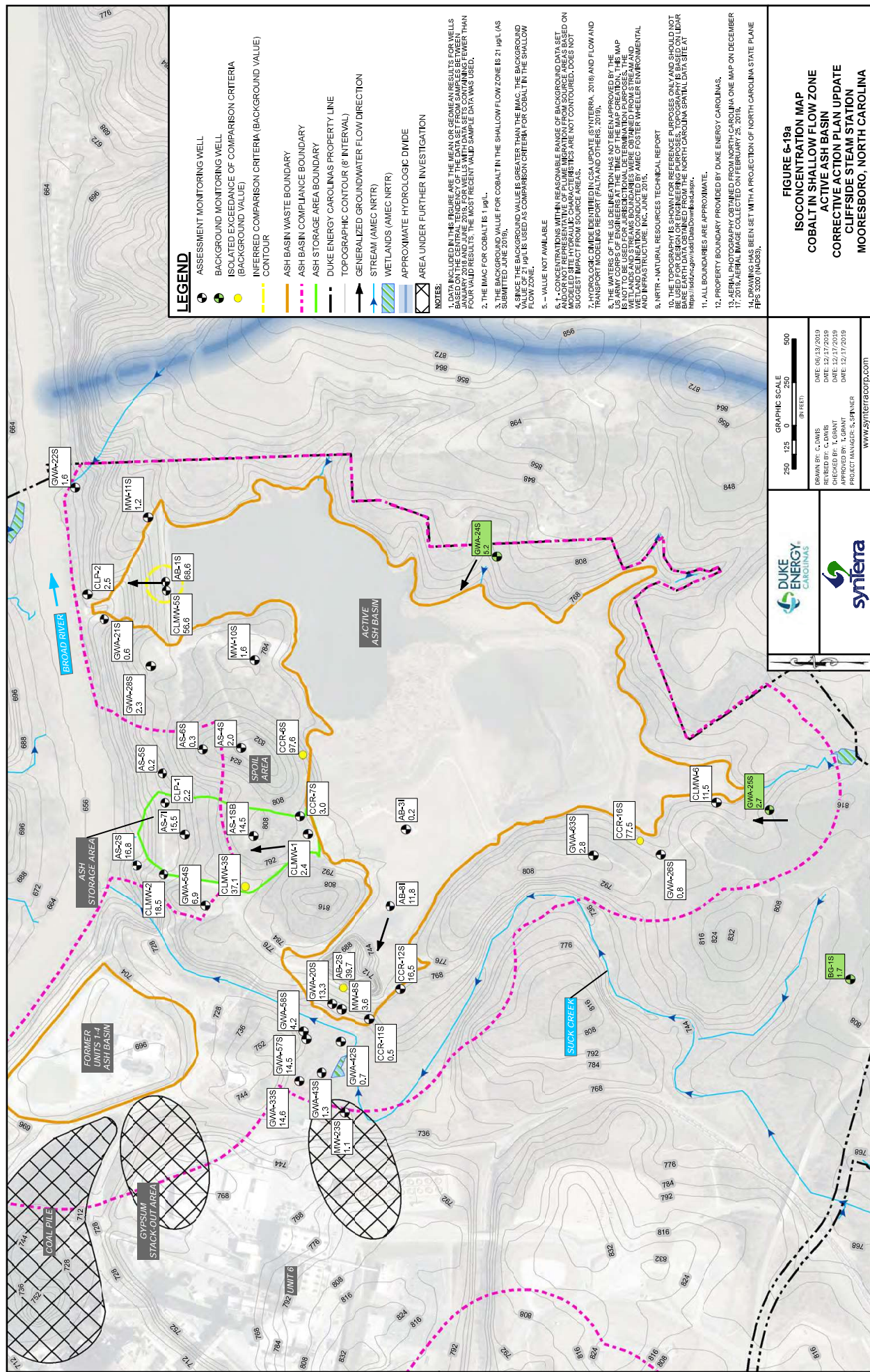
DATE: 06/12/2019
DATE: 12/17/2019
DATE: 12/17/2019
DATE: 12/17/2019

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DUKE ENERGY
CAROLINAS

synterra





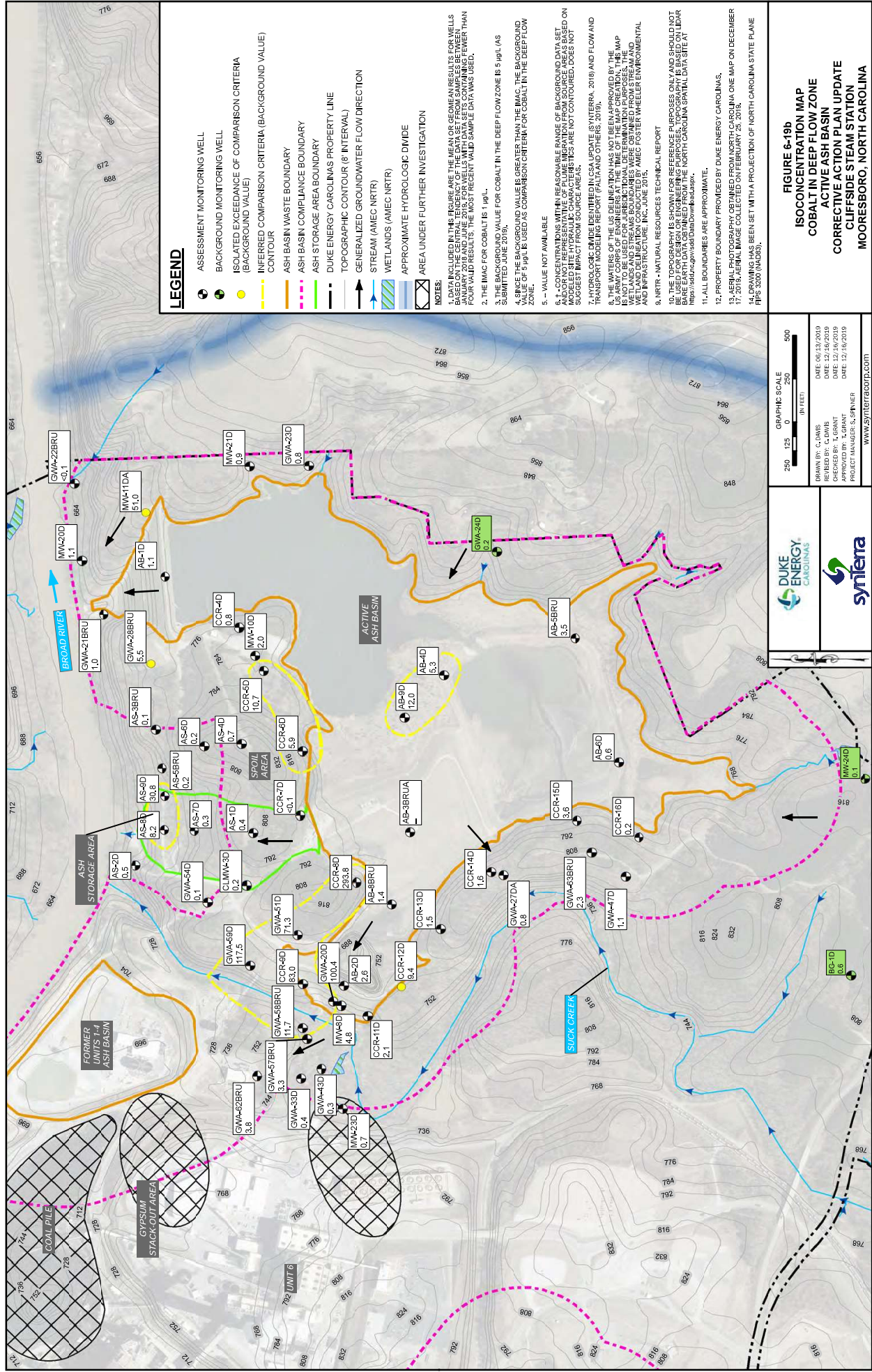


FIGURE 6-19b
ISOCONCENTRATION MAP
COBALT IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

GRAPHIC SCALE
250 0 250
(IN FEET)

DRAWN BY: C. DAVIS
DATE: 06/12/2019
REVIEWED BY: T. GRANT
DATE: 12/16/2019
APPROVED BY: T. GRANT
DATE: 12/16/2019
PROJECT MANAGER: S. SPINER
WWW.SYNTERRACORP.COM

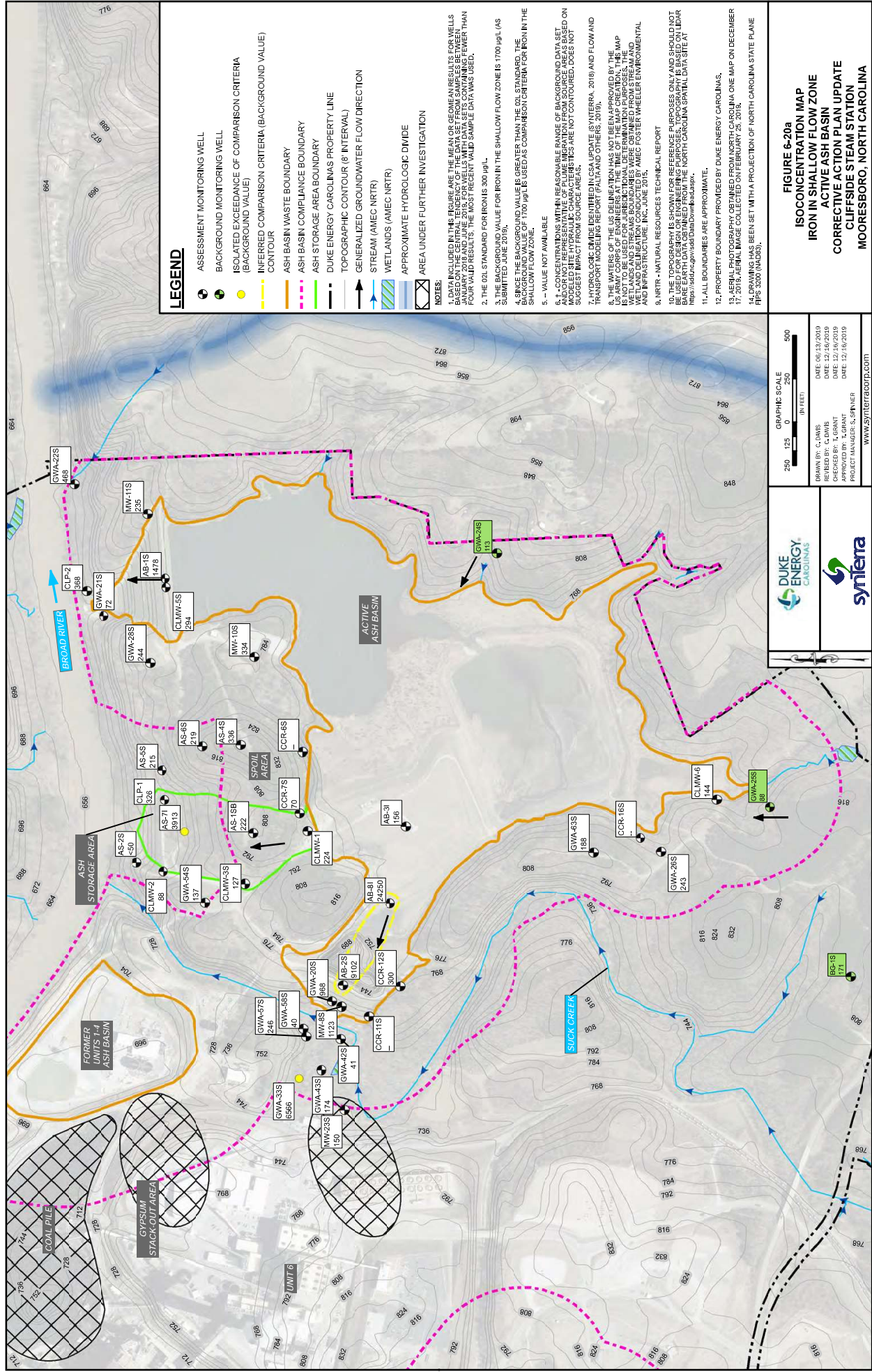


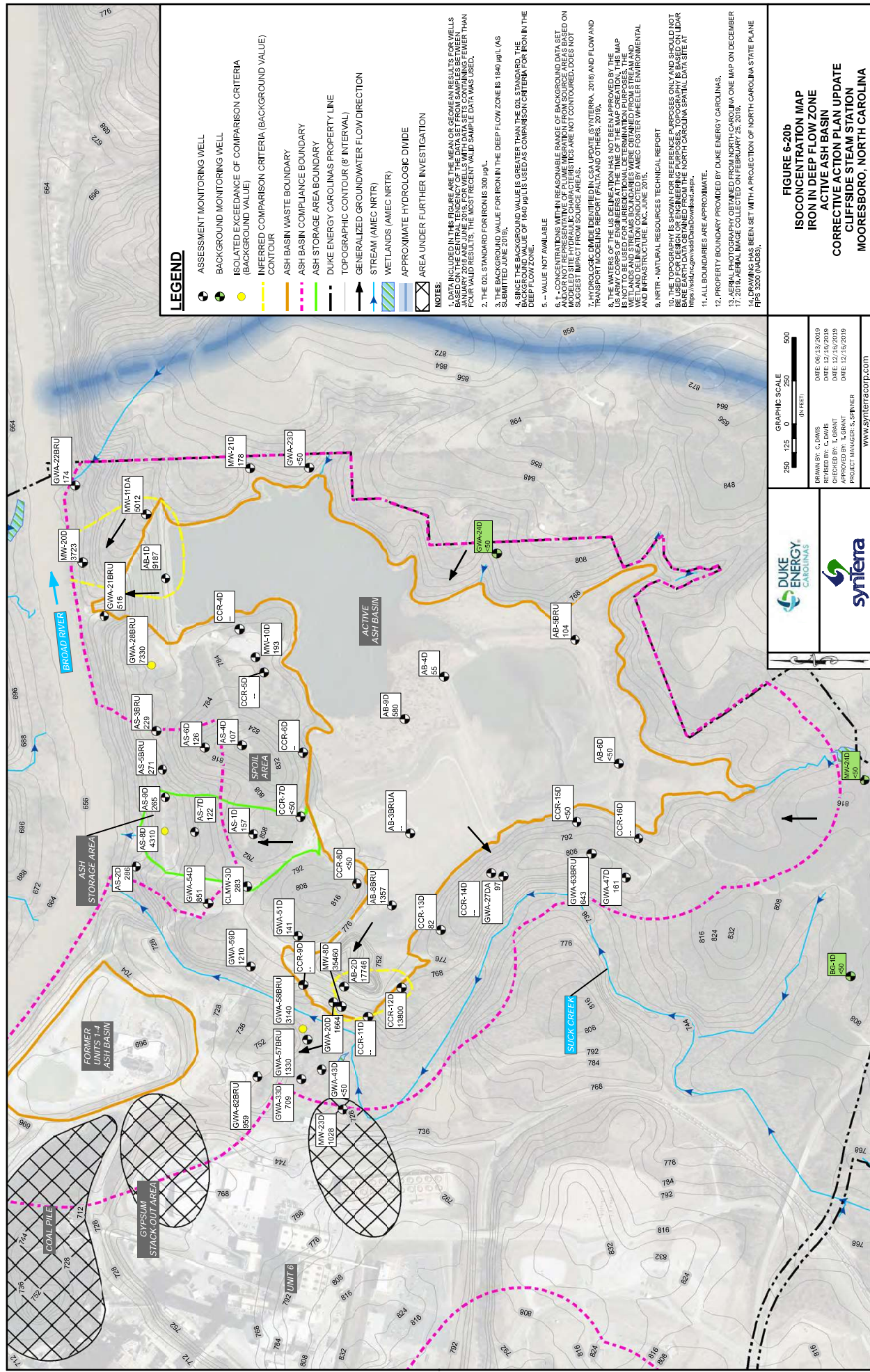
LEGEND

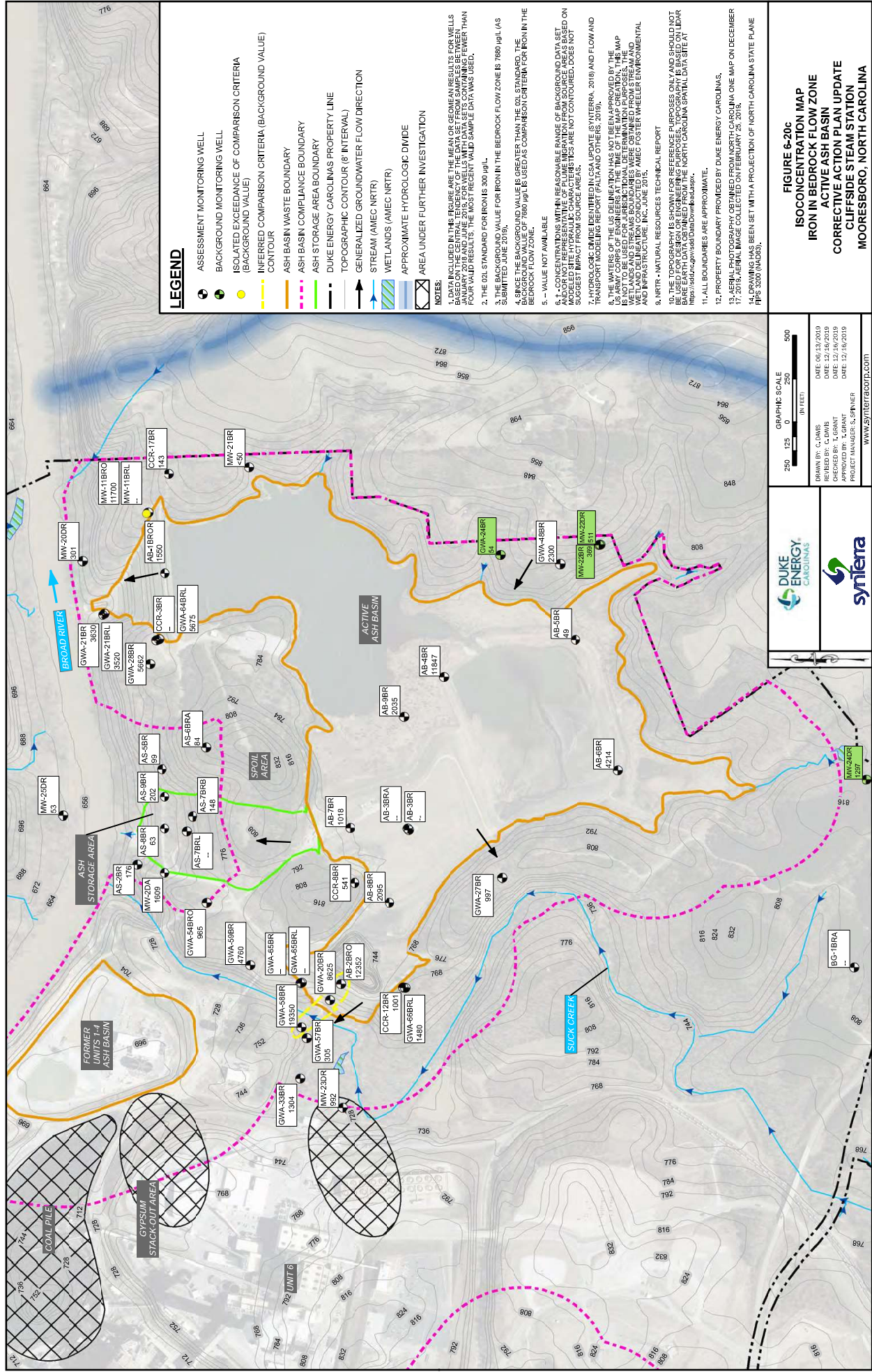
- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE)
- CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES

- DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMETRIC RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALUES, THE RESULTS ARE PRESENT AND SHOWN AS DATA NOT USED.
- THE IMAC FOR COBALT IS 1 µg/L.
- THE BACKGROUND VALUE FOR COBALT IN THE DEEP FLOW ZONE IS 5 µg/L (AS 5 µg/L).
- SINCE THE BACKGROUND VALUE IS GREATER THAN THE IMAC, THE BACKGROUND VALUE OF 5 µg/L IS USED AS COMPARISON CRITERIA FOR COBALT IN THE DEEP FLOW ZONE.
- VALUE NOT AVAILABLE
- CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET ADDED TO THE DATA SET FOR THE IMAC. IMPACT FROM SOURCE AREAS BASED ON ADDED SITE WELLS. IMPACT FROM SOURCE AREAS ARE NOT CONSIDERED IN THIS SUGGEST IMPACT FROM SOURCE AREAS.
- HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
- THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. IT IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WATERS OF THE US DELINEATION WAS OBTAINED FROM THE U.S. ARMY CORPS OF ENGINEERS AND WAS OBTAINED FROM THE U.S. ARMY CORPS OF ENGINEERS AND INFRASTRUCTURE, INC. JUNE 2015.
- NRTR - NATURAL RESOURCES TECHNICAL REPORT
- THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA FROM 2015 AND IS NOT TO BE USED FOR DESIGN OR ENGINEERING PURPOSES. https://data.duke-energy.com/DataDownload.aspx
- ALL BOUNDARIES ARE APPROXIMATE.
- PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
- SYNTERRA HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).







LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE)
- CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

- NOTES:**
1. DATA INCLUDED IN THIS REPORT ARE THE MEAN OR GEOMETRIC RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY AND JUNE 2019. WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID TESTS AND WELLS WITH DATA SETS CONTAINING FEWER THAN TWO VALID TESTS ARE NOT INCLUDED IN THIS REPORT.
 2. THE OSL STANDARD FOR IRON IS 300 µg/L.
 3. THE BACKGROUND VALUE FOR IRON IN THE BEDROCK FLOW ZONE IS 7800 µg/L (AS DETERMINED BY DUE ENERGY CAROLINAS).
 4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE OSL STANDARD, THE BACKGROUND VALUE OF 7800 µg/L IS USED AS A COMPARISON CRITERIA FOR IRON IN THE BEDROCK FLOW ZONE.
 5. - VALUE NOT AVAILABLE
 6. 1. CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET ARE NOT INCLUDED IN THIS REPORT. 2. DATA SETS WITH CONCENTRATIONS GREATER THAN THE BACKGROUND VALUE ARE NOT INCLUDED IN THIS REPORT. 3. DATA SETS WITH CONCENTRATIONS GREATER THAN THE BACKGROUND VALUE ARE NOT INCLUDED IN THIS REPORT.
 7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
 8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WATERS OF THE US DELINEATION WAS OBTAINED FROM THE U.S. ARMY CORPS OF ENGINEERS AND WAS OBTAINED FROM THE U.S. ARMY CORPS OF ENGINEERS AND WAS OBTAINED FROM THE U.S. ARMY CORPS OF ENGINEERS.
 9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
 10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA PROVIDED BY DUE ENERGY CAROLINAS. NORTH CAROLINA SPATIAL DATA SITE AT <https://data.opendatasoft.com/dataset/north-carolina-spatial-data-site>.
 11. ALL BOUNDARIES ARE APPROXIMATE.
 12. PROPERTY BOUNDARY PROVIDED BY DUE ENERGY CAROLINAS.
 13. THE PROPERTY BOUNDARY WAS OBTAINED FROM A ONE MAP ON DECEMBER 12, 2018. THE PROPERTY BOUNDARY WAS OBTAINED FROM A ONE MAP ON DECEMBER 12, 2018.
 14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).



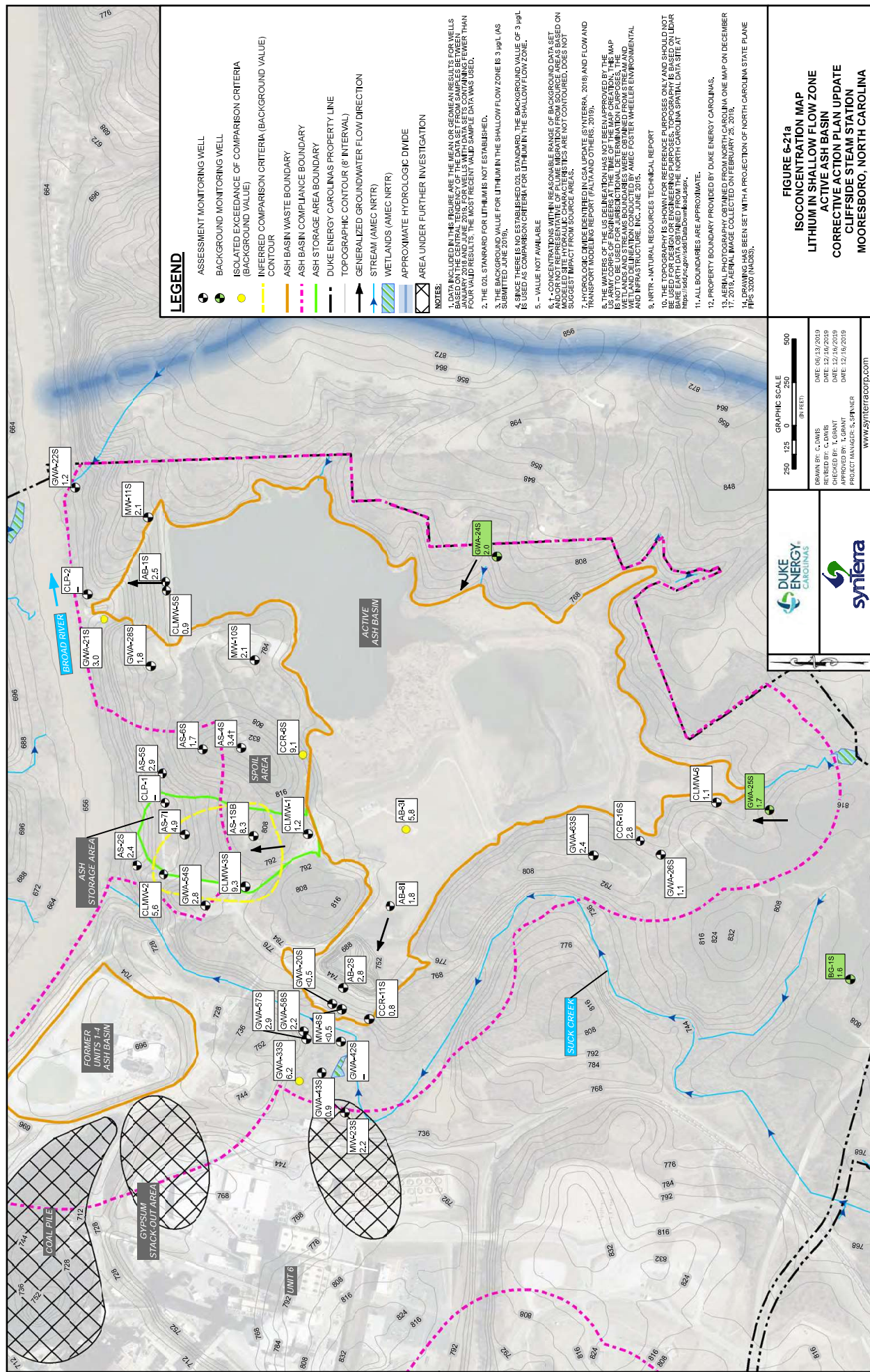
GRAPHIC SCALE
250 0 250
(IN FEET)

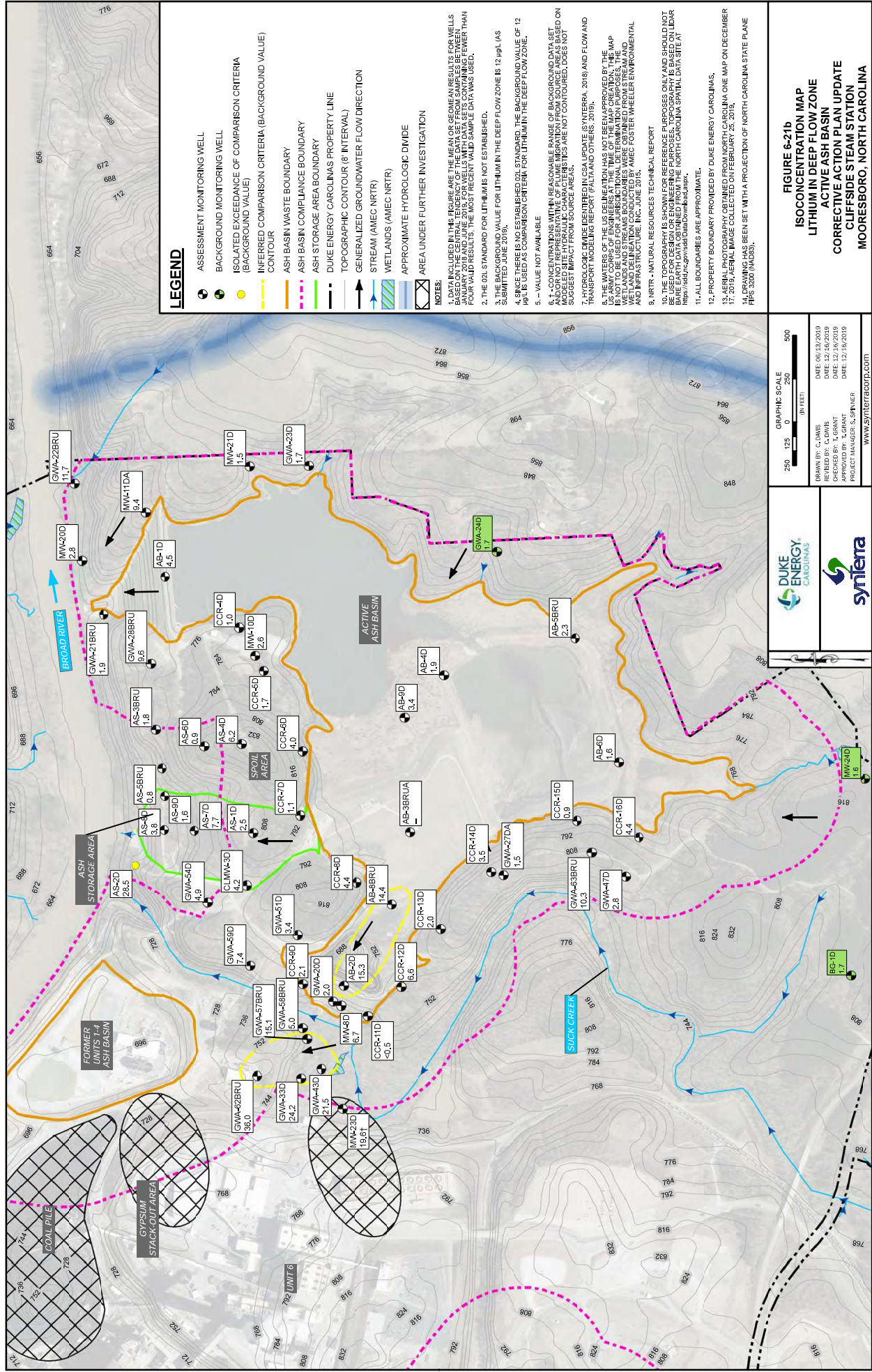
DRAWN BY: C. DAVIS
DATE: 06/12/2019
CHECKED BY: T. GRANT
APPROVED BY: T. GRANT
PROJECT MANAGER: S. SPINER

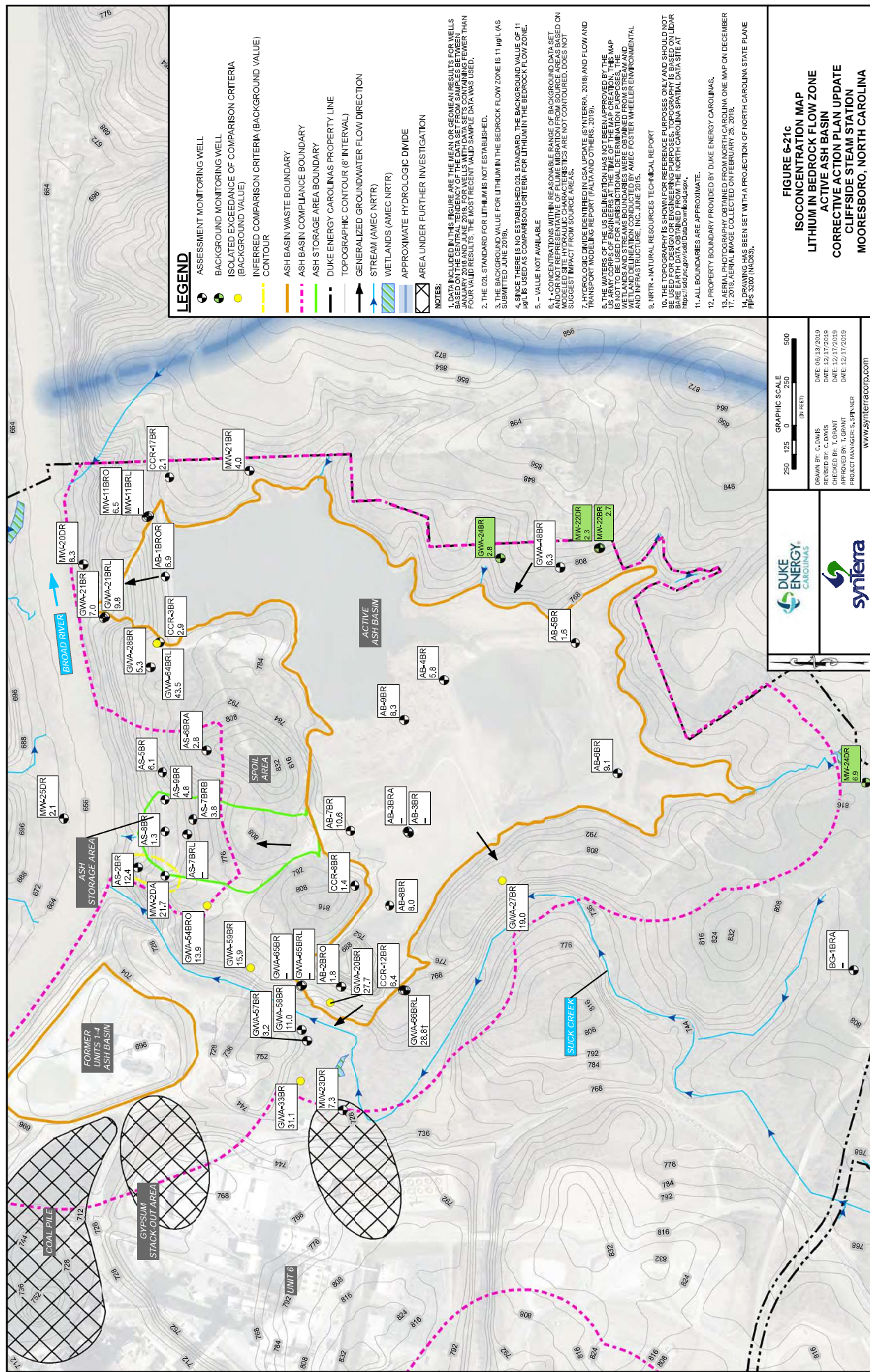
DATE: 06/12/2019
DATE: 12/16/2019
DATE: 12/16/2019

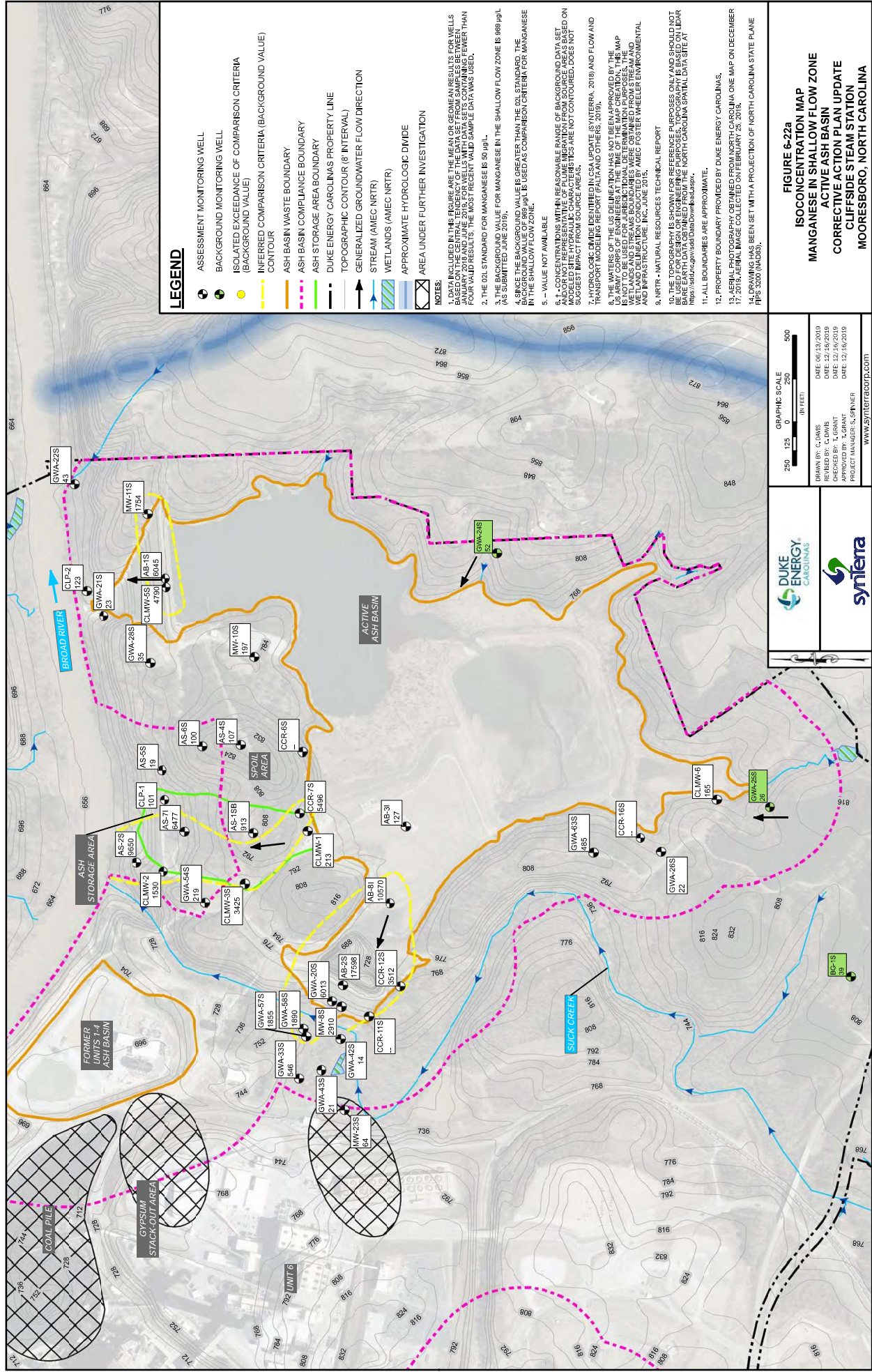
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FIGURE 6-20C
ISOCONCENTRATION MAP
IRON IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA









LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE)
- CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES

- DATA INCLUDED IN THIS REPORT ARE THE MEAN OR GEOMETRIC RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID TESTS OR WELLS WITH DATA SETS CONTAINING FEWER THAN TWO VALID TESTS ARE NOT INCLUDED IN THIS DATA SET.
- THE OIL STANDARD FOR MANGANESE IS 50 µg/L.
- THE BACKGROUND VALUE FOR MANGANESE IN THE SHALLOW FLOW ZONE IS 989 µg/L.
- SINCE THE BACKGROUND VALUE IS GREATER THAN THE OIL STANDARD, THE BACKGROUND VALUE OF 989 µg/L IS USED AS COMPARISON CRITERIA FOR MANGANESE IN THE SHALLOW FLOW ZONE.
- VALUE NOT AVAILABLE
- CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET ADDED TO THE DATA SET FOR COMPARISON. THESE DATA ARE NOT CONSIDERED AS SUGGEST IMPACT FROM SOURCE AREAS.
- HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
- THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. THE MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WATERS OF THE US DELINEATION WAS OBTAINED FROM SYNTERA AND WETLAND DETERMINATION REPORTS WERE OBTAINED FROM SYNTERA AND INFRASTRUCTURE, INC. JUNE 2015.
- NRTR - NATURAL RESOURCES TECHNICAL REPORT
- THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA PROVIDED BY SYNTERA AND THE NORTH CAROLINA SPATIAL DATA SITE AT <https://lidar.openviewdata.com/download>.
- ALL BOUNDARIES ARE APPROXIMATE.
- PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
- THE LIDAR DATA USED FOR THIS MAP WAS OBTAINED FROM SYNTERA ON DECEMBER 13, 2017. THE LIDAR DATA COORDINATE SYSTEM IS NAD83.
- THE LIDAR DATA COORDINATE SYSTEM IS NAD83.
- THE LIDAR DATA COORDINATE SYSTEM IS NAD83.
- THE LIDAR DATA COORDINATE SYSTEM IS NAD83.



GRAPHIC SCALE

250 0 250 500

(IN FEET)

FIGURE 6-22a

ISOCONCENTRATION MAP

MANGANESE IN SHALLOW FLOW ZONE

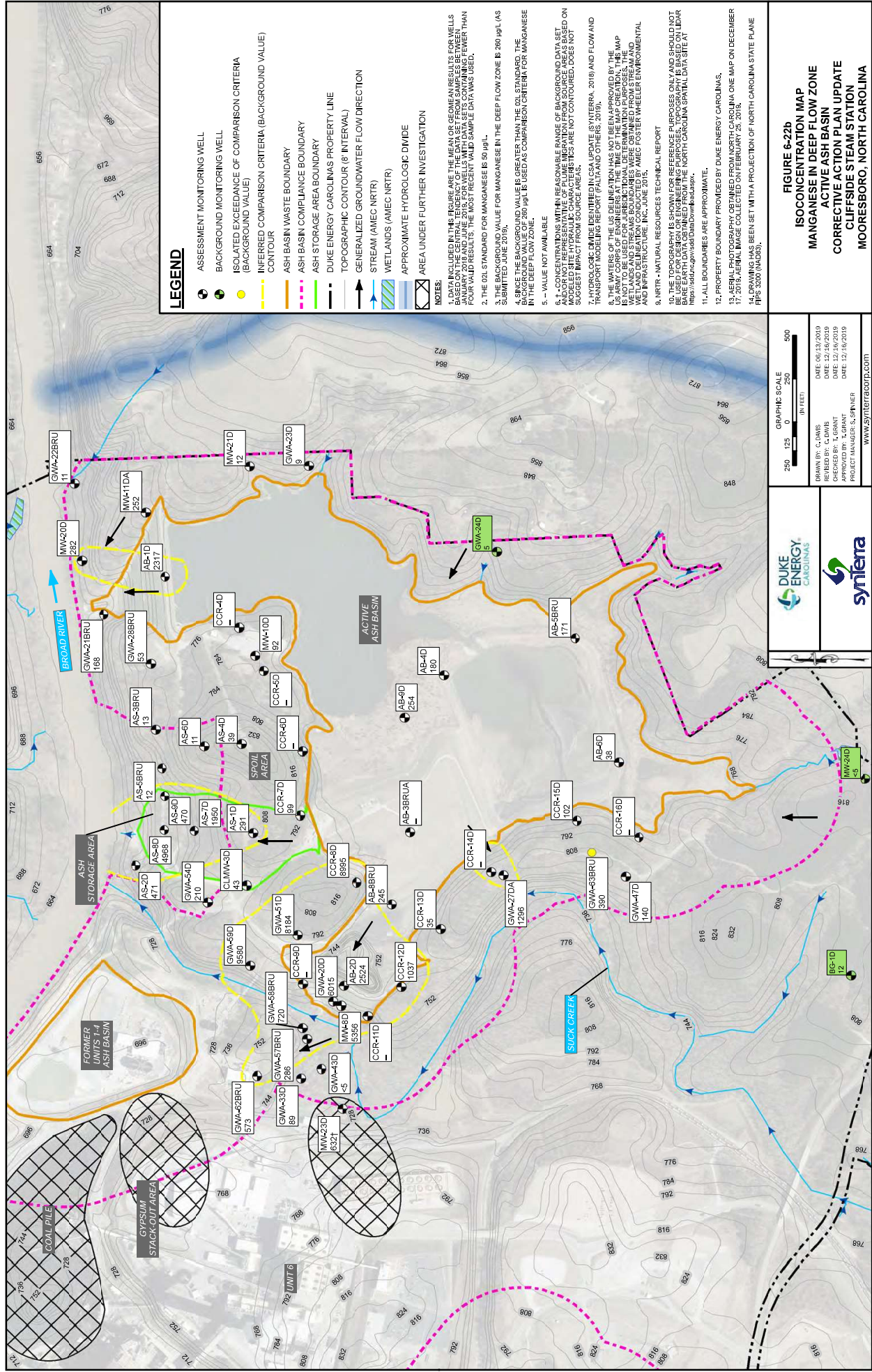
ACTIVE ASH BASIN

CORRECTIVE ACTION PLAN UPDATE

CLIFFSIDE STEAM STATION

MOORESBORO, NORTH CAROLINA

DRAWN BY: C. DAVIS
DATE: 06/12/2019
REVIEWED BY: C. DAVIS
DATE: 12/16/2019
APPROVED BY: T. GRANT
DATE: 12/16/2019
PROJECT MANAGER: S. SPINER
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LEGEND

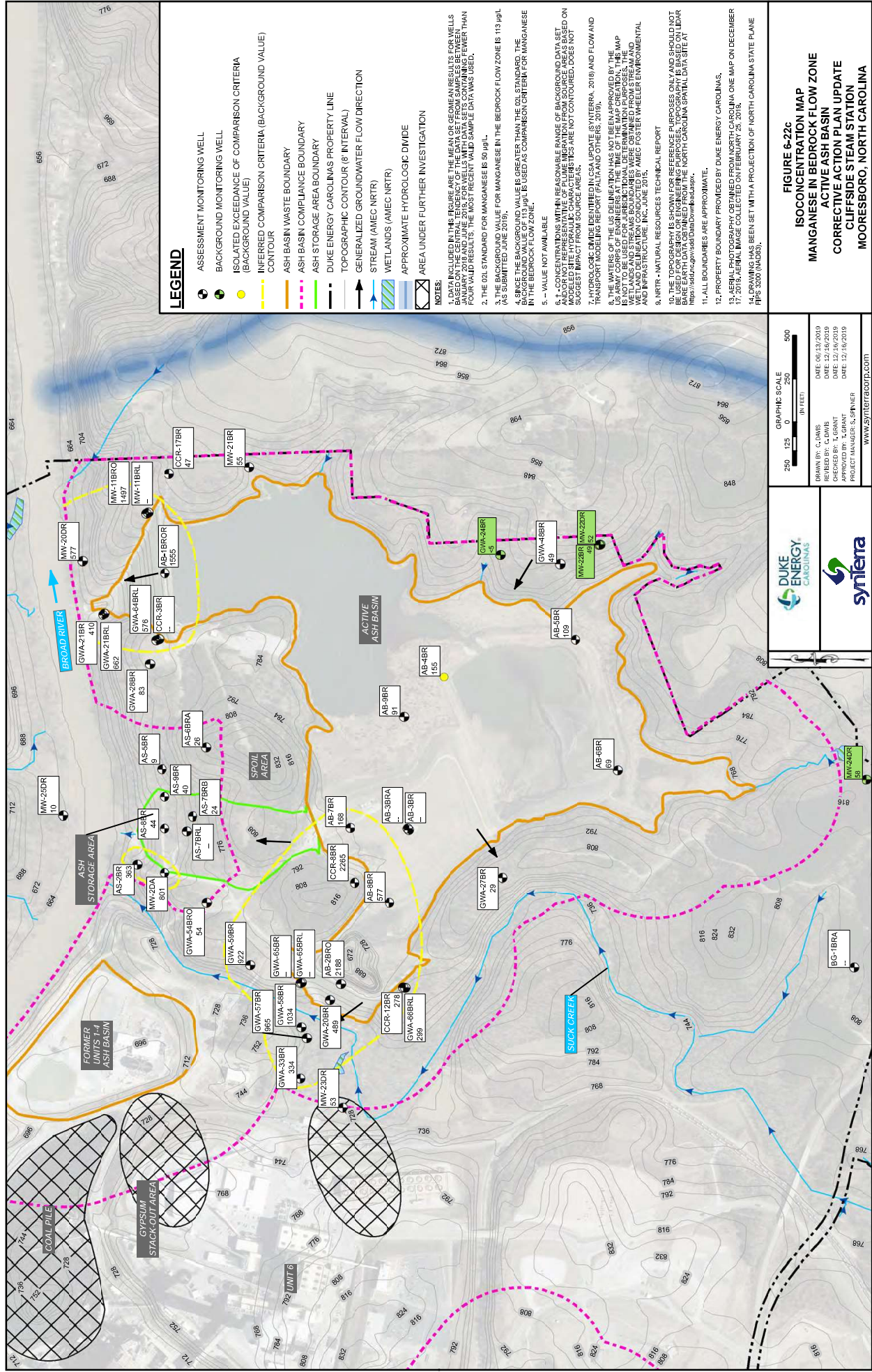
- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE)
- CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

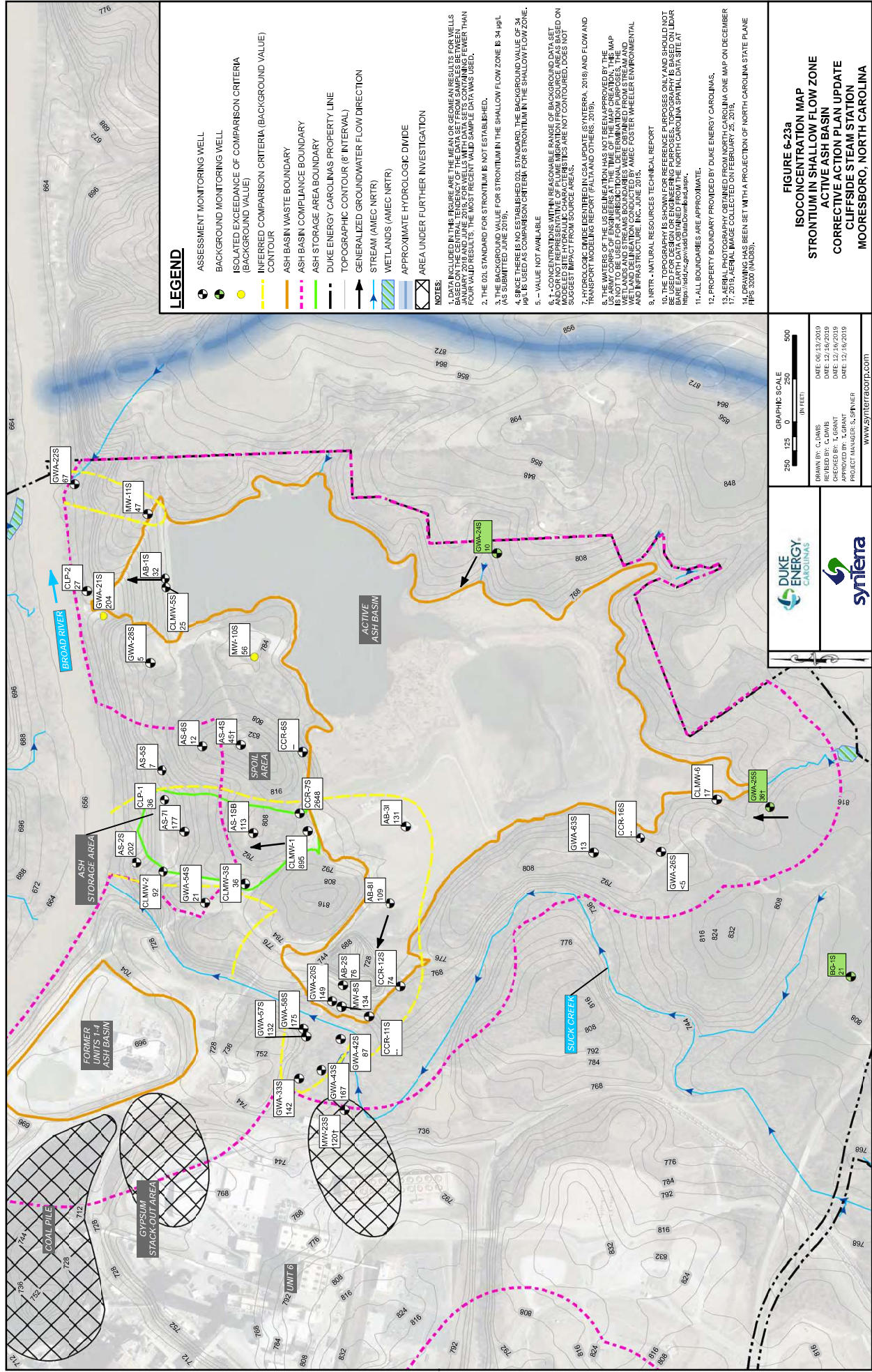
- NOTES:**
- DATA INCLUDED IN THIS REPORT ARE THE MEAN OR GEOMETRIC RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY AND JUNE 2019. WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALUES AND WELLS WITH DATA SETS CONTAINING FEWER THAN TWO VALUES WERE EXCLUDED FROM THIS ANALYSIS.
 - THE OIL STANDARD FOR MANGANESE IS 50 µg/L.
 - THE BACKGROUND VALUE FOR MANGANESE IN THE DEEP FLOW ZONE IS 200 µg/L (AS DETERMINED BY THE US GEOLOGICAL SURVEY).
 - SINCE THE BACKGROUND VALUE IS GREATER THAN THE OIL STANDARD, THE BACKGROUND VALUE OF 200 µg/L IS USED AS COMPARISON CRITERIA FOR MANGANESE IN THE DEEP FLOW ZONE.
 - VALUE NOT AVAILABLE
 - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET WERE EXCLUDED FROM THE ANALYSIS. MONITORING DATA FROM SOURCE AREAS BASED ON ADDED SITE HYDROLOGIC DATA CRITERIA WERE NOT CONSIDERED IN THIS ANALYSIS.
 - HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
 - THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WATERS OF THE US DELINEATION WAS OBTAINED FROM THE NATIONAL WETLANDS DATA BASE (NWD85) WHICH WAS OBTAINED FROM THE ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
 - NRTR - NATURAL RESOURCES TECHNICAL REPORT
 - THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA PROVIDED BY THE NORTH CAROLINA SPATIAL DATA SITE AT <https://data.ncspatial.com/DataDownload.aspx>.
 - ALL BOUNDARIES ARE APPROXIMATE.
 - PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
 - SYNTERRA HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

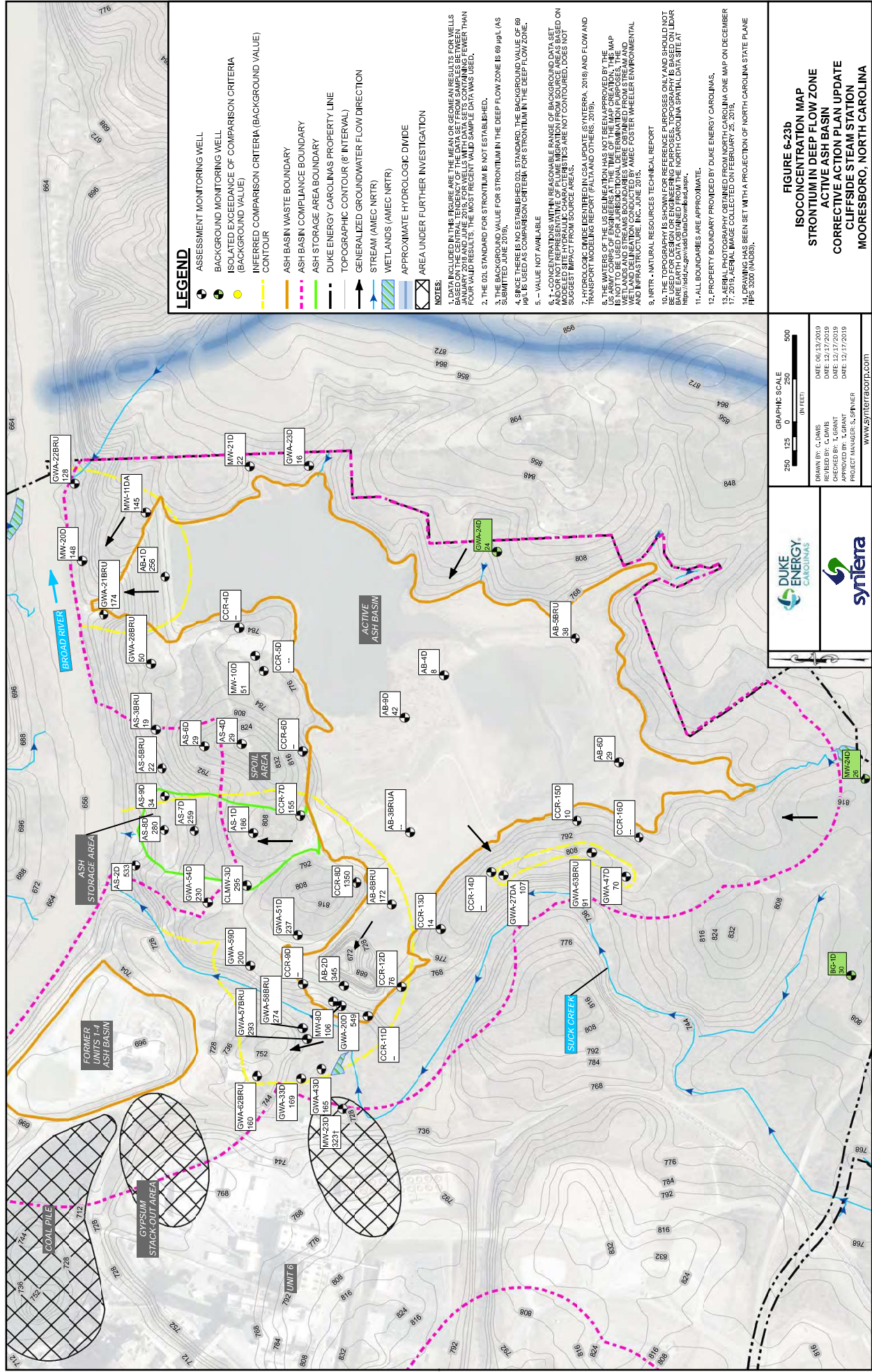
FIGURE 6-22b
ISOCONCENTRATION MAP
MANGANESE IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

GRAPHIC SCALE	250 500
(IN FEET)	
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APPROVED BY: T. GRANT	DATE: 12/16/2019
PROJECT MANAGER: S. SPINER	
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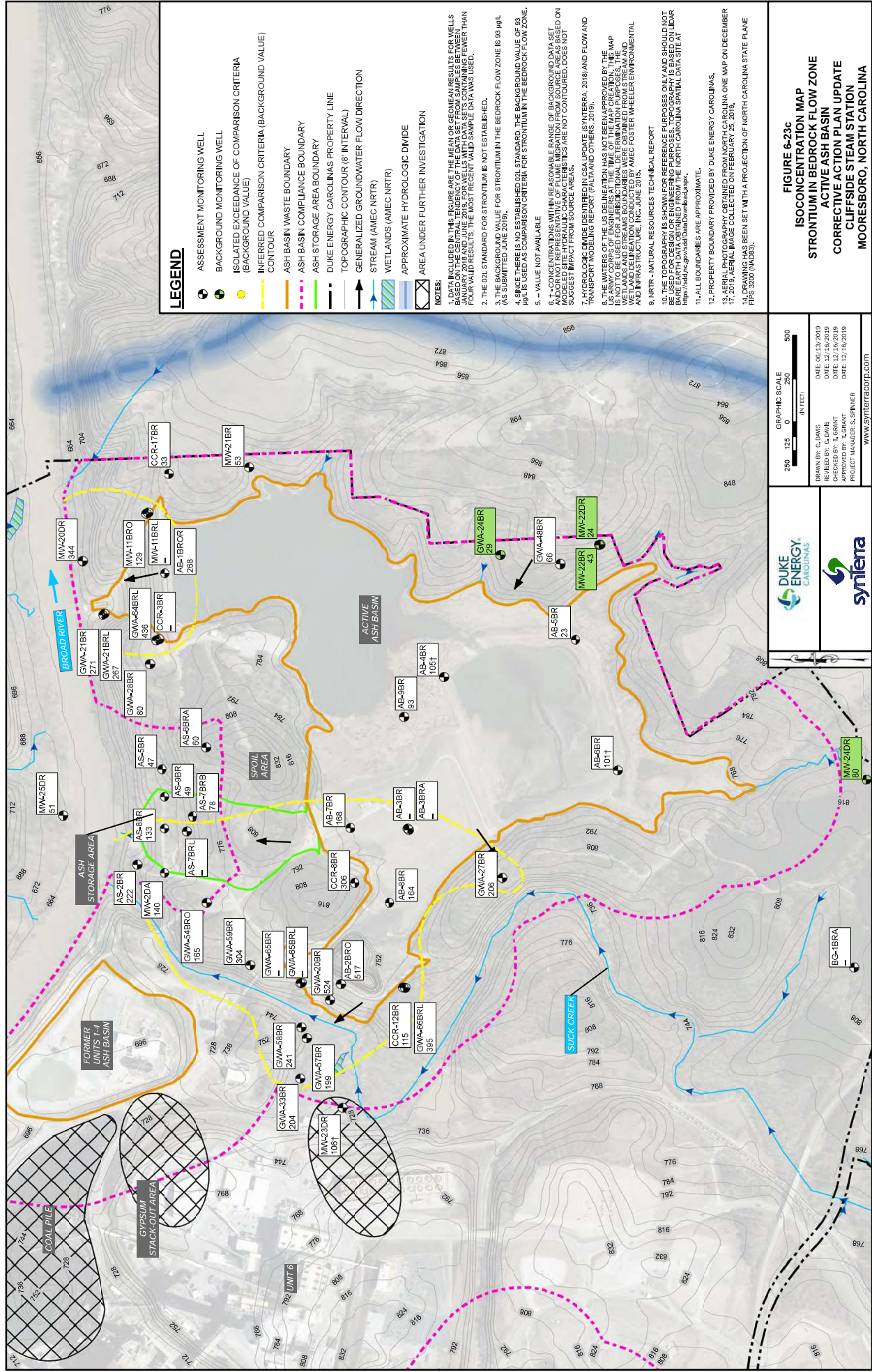
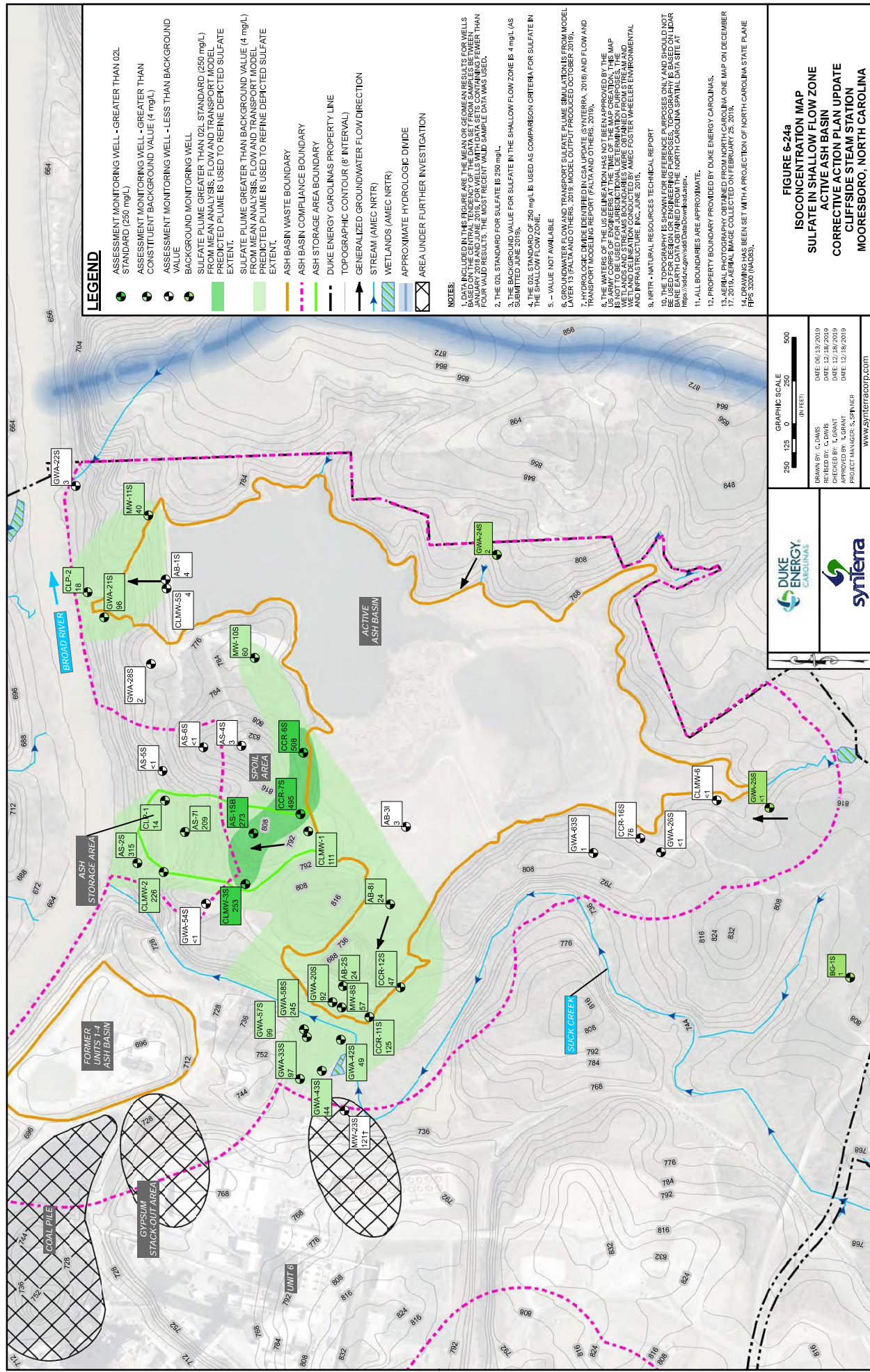
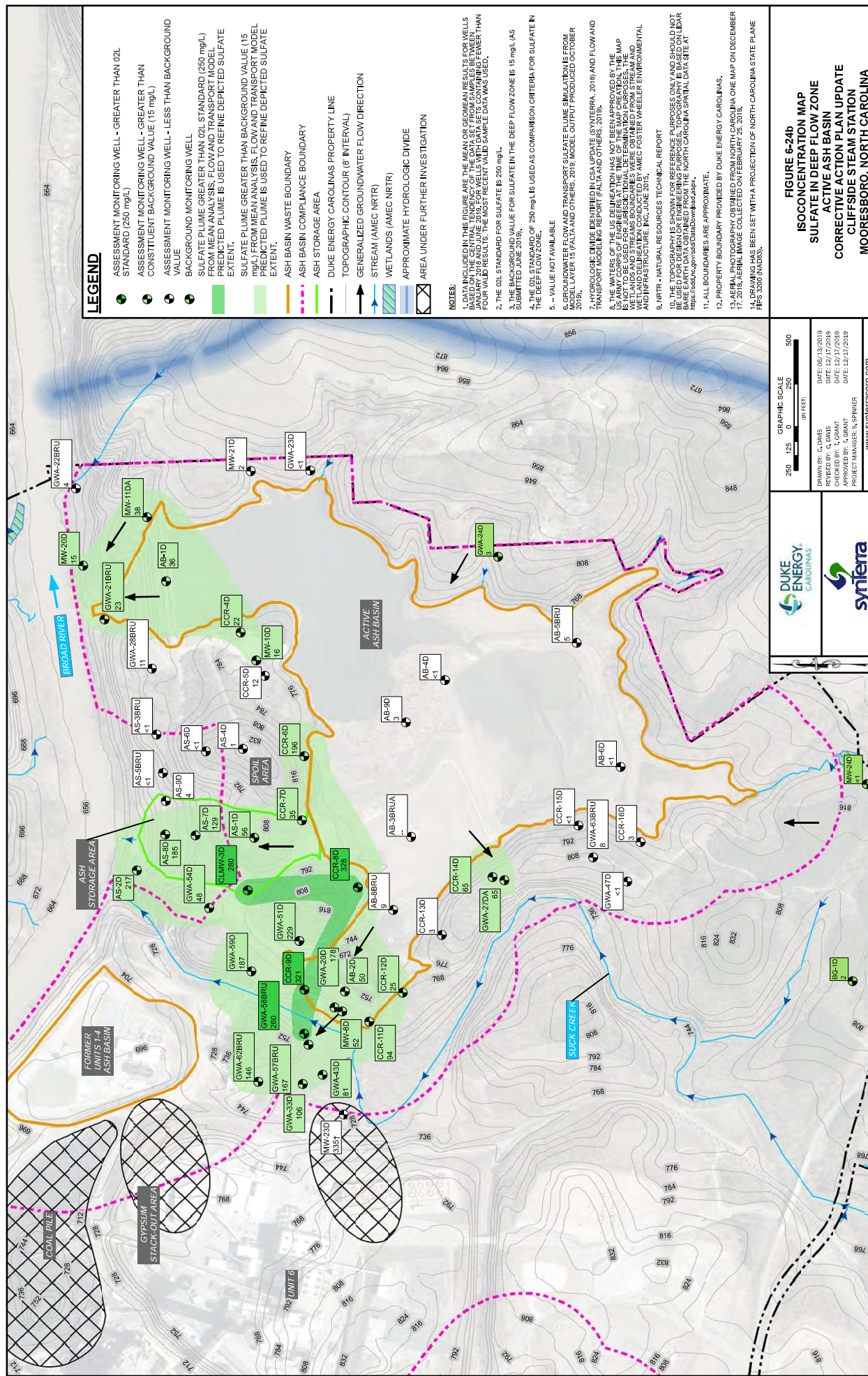
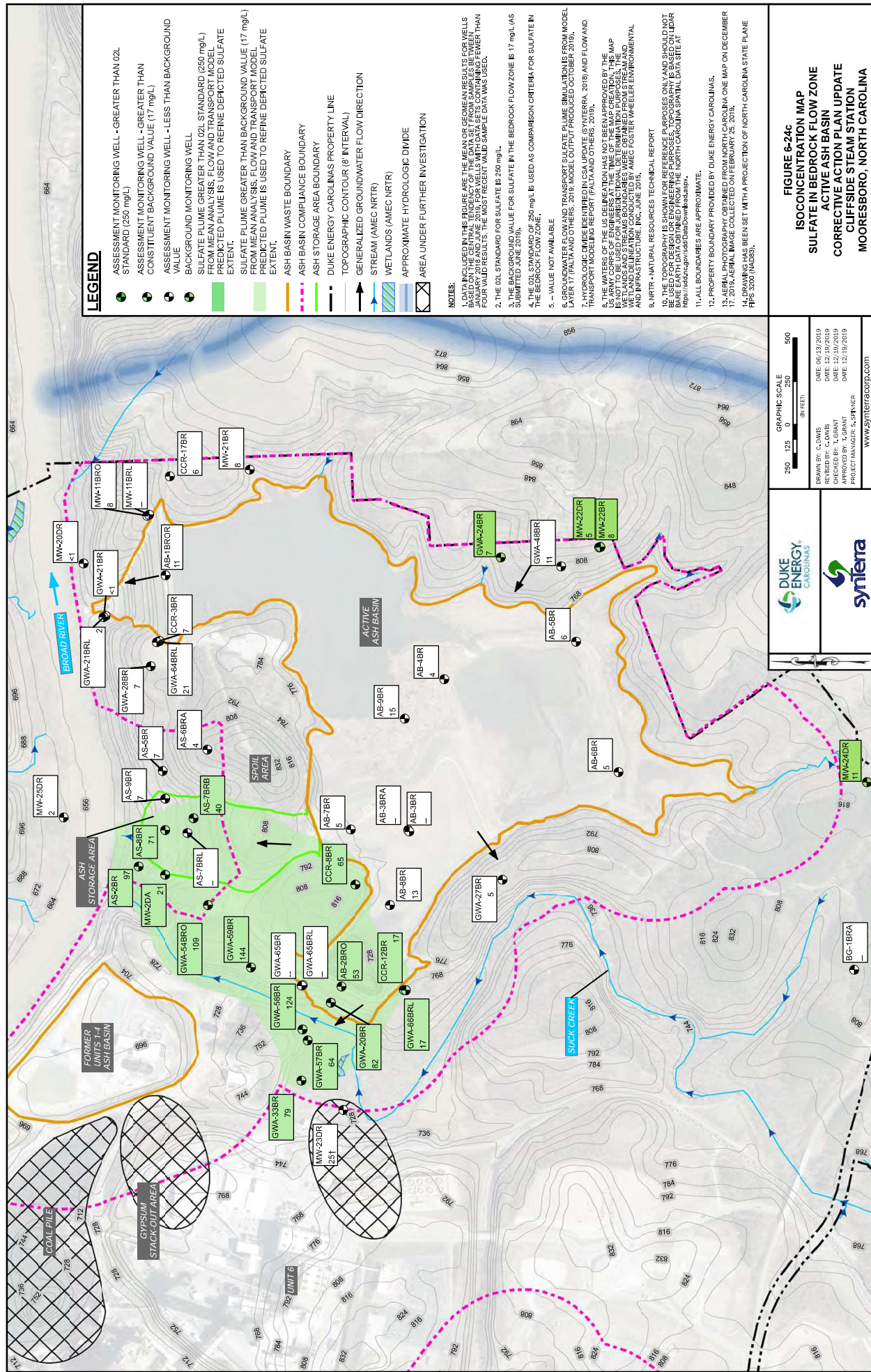
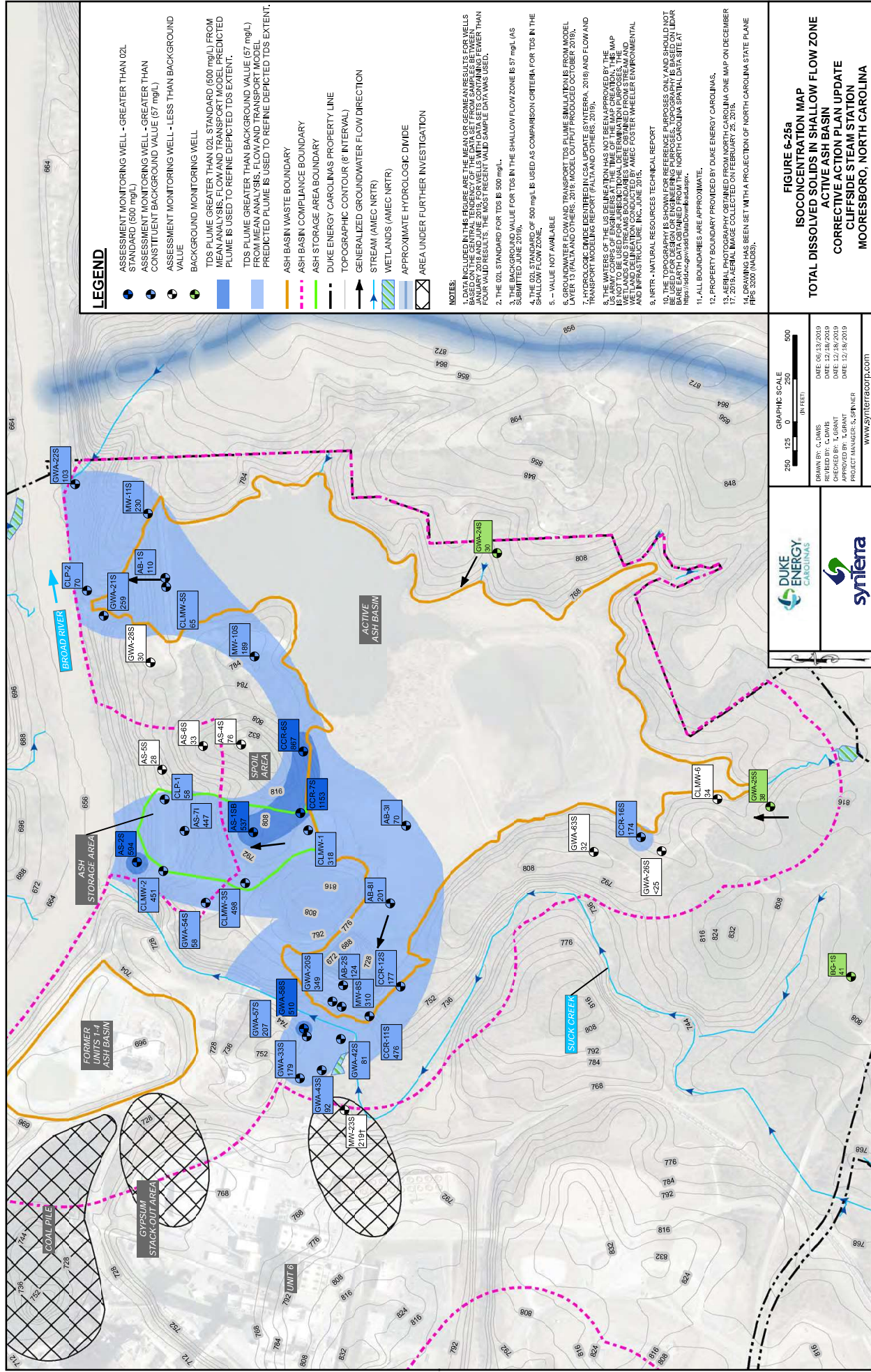


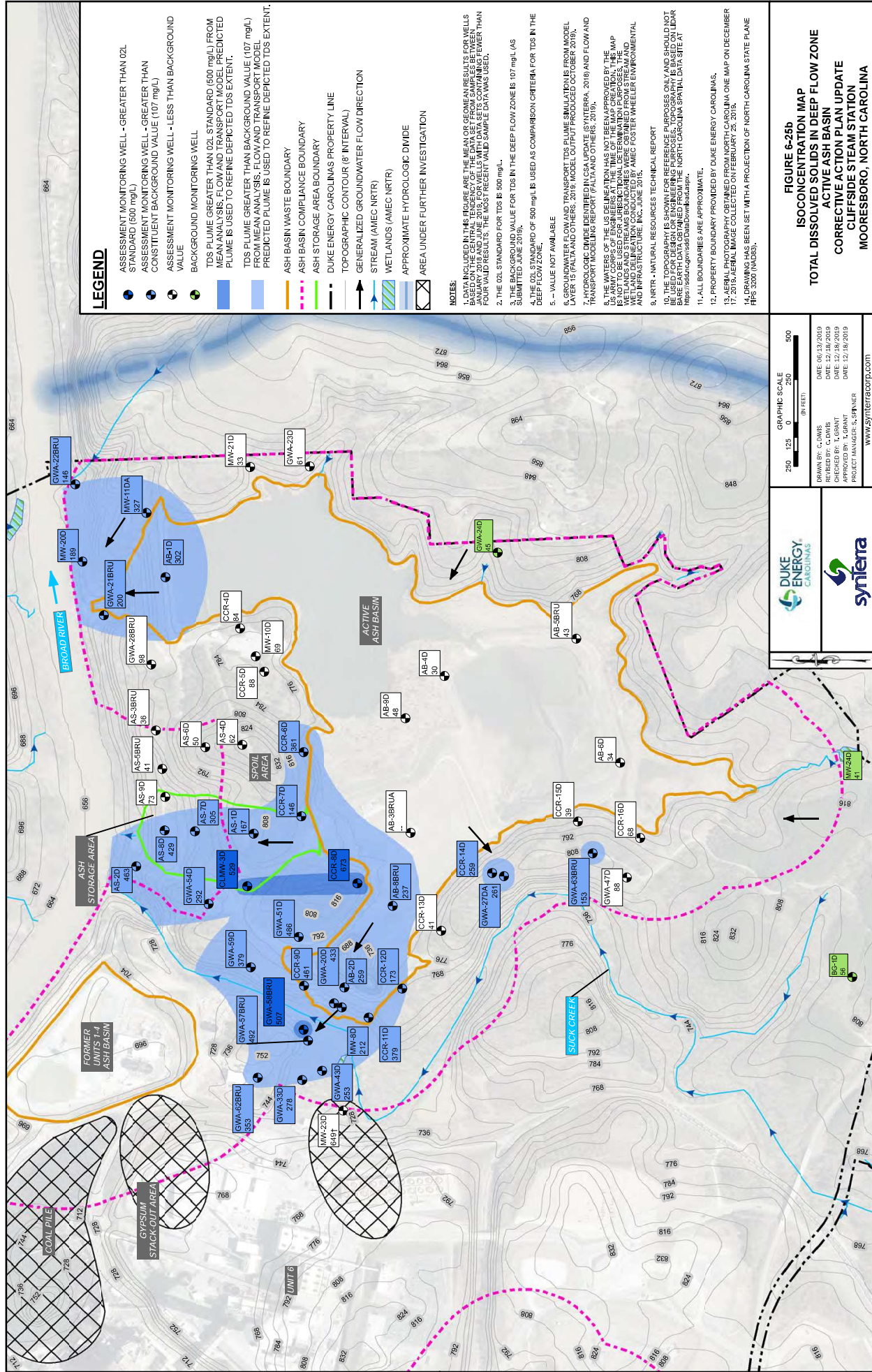
FIGURE 6-23C
ISOCONCENTRATION MAP
STROMTUM IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

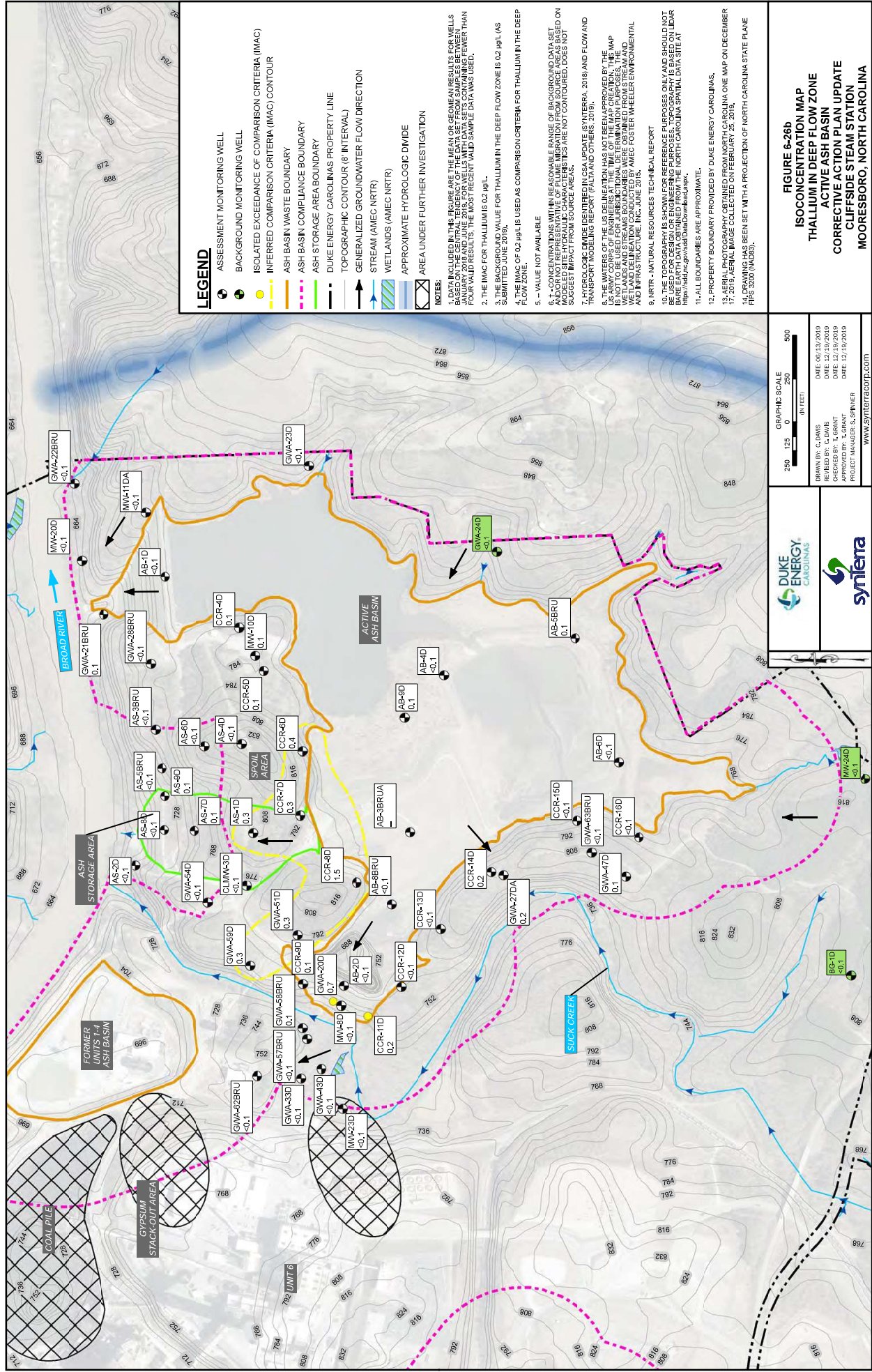












LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (IMAC)
- INFERRED COMPARISON CRITERIA (IMAC) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:
1. DATA INCLUDED IN THIS REPORT ARE THE MEAN OR GEOMETRIC MEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID DATA POINTS ARE NOT REPRESENTED IN THIS REPORT.
2. THE IMAC FOR THALLIUM IS 0.2 µg/L.
3. THE BACKGROUND VALUE FOR THALLIUM IN THE DEEP FLOW ZONE IS 0.2 µg/L (AS DETERMINED BY DUE ENERGY CAROLINAS).
4. THE IMAC OF 0.2 µg/L IS USED AS A COMPARISON CRITERIA FOR THALLIUM IN THE DEEP FLOW ZONE.
5. - VALUE NOT AVAILABLE

1. CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON SOURCE AREA DATA SETS. THESE ARE NOT CONTOURED.
2. HYDROLOGIC DIVIDE DETERMINED IN CSA UPDATE (SYNTERRA, 2019) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
3. THE WATERS OF THE US DESIGNATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS AT THE TIME OF THIS MAP CREATION. THE MAP DOES NOT REPRESENT A DESIGNATION OF WATERS OF THE US. WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLANDS DATA PROVIDED BY DUE ENERGY CAROLINAS AND AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE CONSULTING INC.
4. WITH NATURAL RESOURCES TECHNICAL REPORT
5. THE DATA FOR THIS MAP WERE OBTAINED FROM THE FOLLOWING SOURCES:
a. DUE ENERGY CAROLINAS
b. USED FOR DESIGN OF FLOW AND TRANSPORT MODELING. TOPOGRAPHY IS BASED ON U.S. GEOLOGICAL SURVEY 7.5-MINUTE QUAD MAPS.
c. BASE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT <https://spatial.nc.gov/data/DownloadData.do>.
6. PROPERTY BOUNDARY PROVIDED BY DUE ENERGY CAROLINAS.
7. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
8. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE NAD 83 3200 (NAD83).

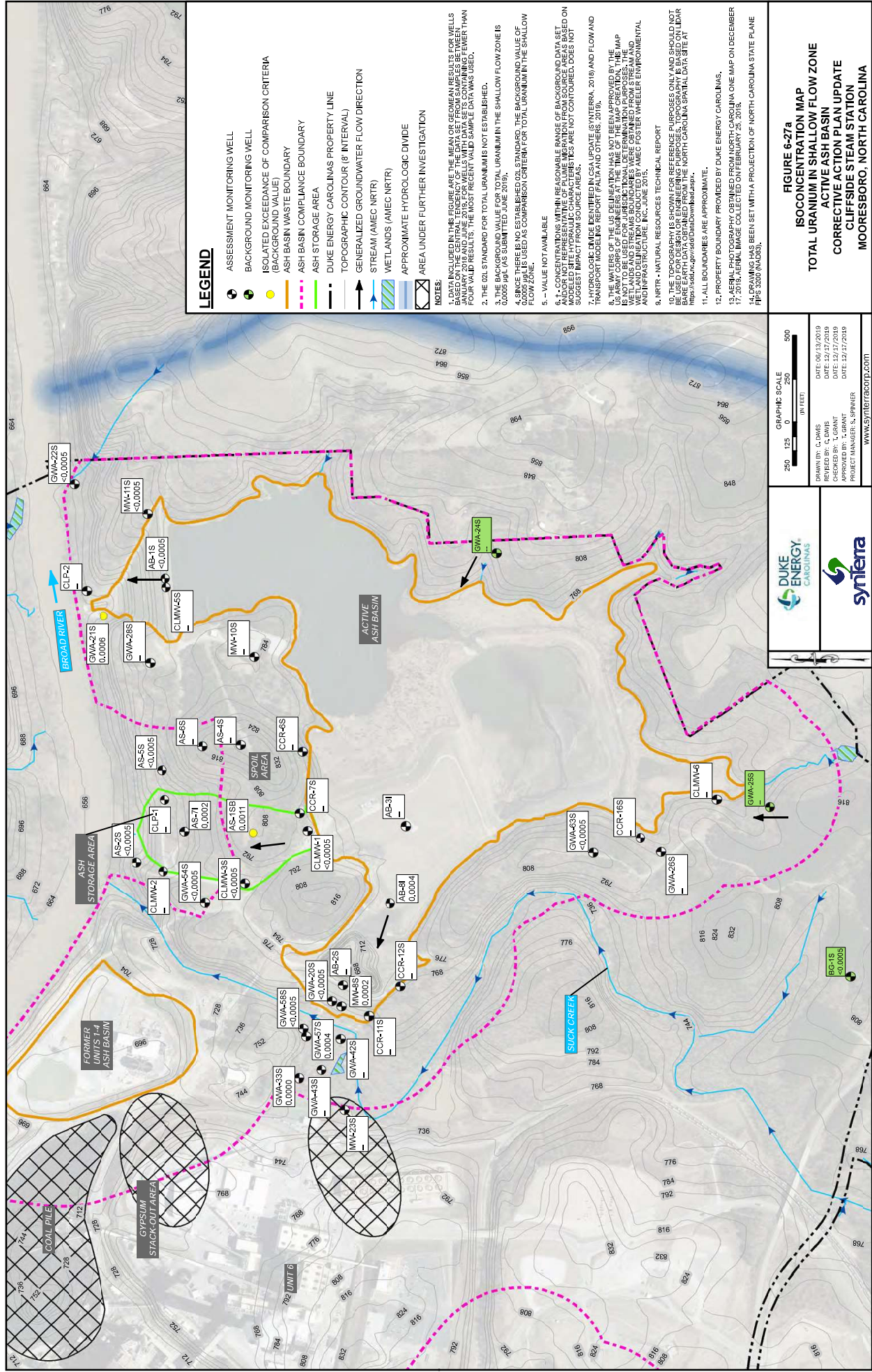
FIGURE 6-26B

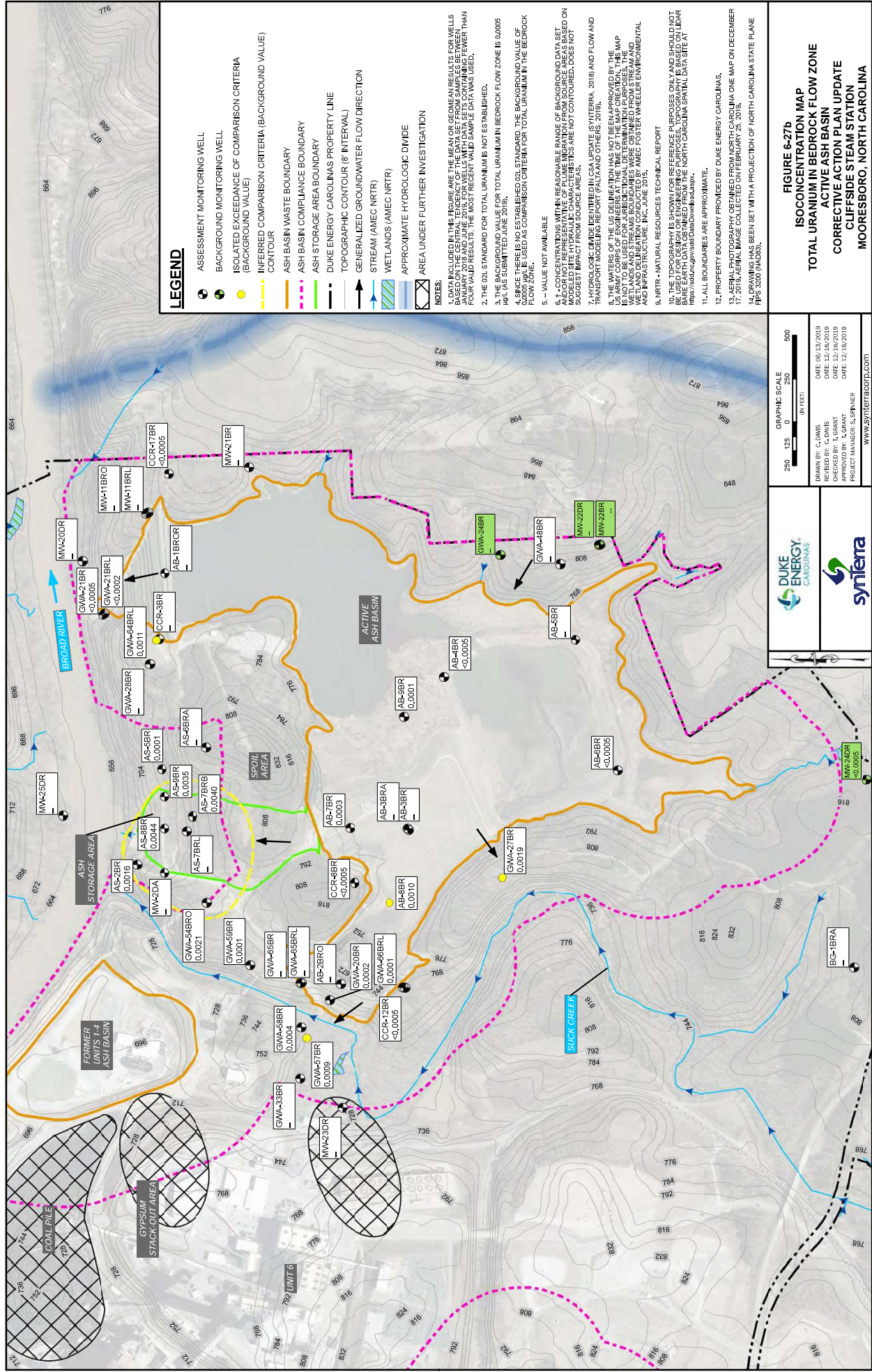
ISOCONCENTRATION MAP
THALLIUM IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

GRAPHIC SCALE
250 0 250 500
(IN FEET)

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DATE: 06/12/2019
REVIEWED BY: C. DAVIS
DATE: 12/19/2019
CHECKED BY: T. GRANT
DATE: 12/19/2019
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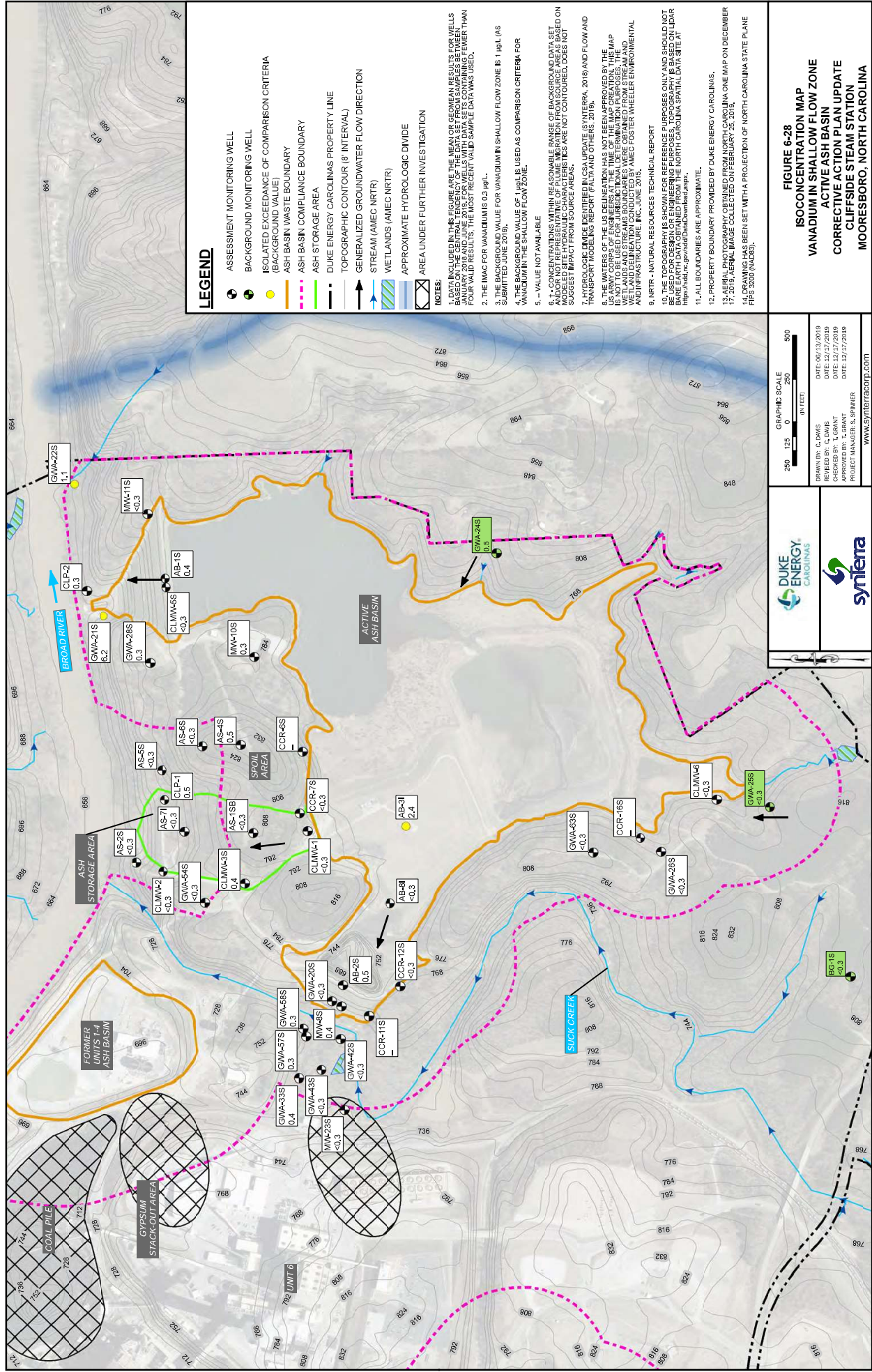


FIGURE 6-28
ISOCONCENTRATION MAP
VANADIUM IN SHALLOW FLOW ZONE

ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

GRAPHIC SCALE	0 250 500 FEET
DRAWN BY: C. DAVIS	DATE: 06/12/2019
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APPROVED BY: T. GRANT	DATE: 12/17/2019
PROJECT MANAGER: S. SPRINGER	
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- LEGEND**
- ASSESSMENT MONITORING WELL
 - BACKGROUND MONITORING WELL
 - ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
 - ASH BASIN WASTE BOUNDARY
 - ASH BASIN COMPLIANCE BOUNDARY
 - ASH STORAGE AREA
 - DUKE ENERGY CAROLINAS PROPERTY LINE
 - TOPOGRAPHIC CONTOUR (8' INTERVAL)
 - GENERALIZED GROUNDWATER FLOW DIRECTION
 - STREAM (AMEC NRTR)
 - WETLANDS (AMEC NRTR)
 - APPROXIMATE HYDROLOGIC DIVIDE
 - AREA UNDER FURTHER INVESTIGATION
- NOTES:**
- DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMETRIC RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY AND JUNE 2019. WELLS WITH DATA SETS CONTAINING FEWER THAN FIVE DATA POINTS ARE NOT REPRESENTED AND SAMPLE DATA WAS NOT USED.
 - THE IMAC FOR VANADIUM IS 0.2 µg/L.
 - THE BACKGROUND VALUE OF VANADIUM IN SHALLOW FLOW ZONE IS 1 µg/L AS DETERMINED FROM THE 2016 AERIAL PHOTOGRAPHY.
 - THE BACKGROUND VALUE OF VANADIUM IS USED AS A COMPARISON CRITERION FOR VANADIUM IN THE SHALLOW FLOW ZONE.
 - VALUE NOT AVAILABLE
 - CONCENTRATIONS WITHIN THE COMPARABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON SOURCE IMPACT FROM SOURCE AREAS.
 - HYDROLOGIC DIVIDE DETERMINED IN CSA UPDATE, SYNTERRA, 2019, AND FLOW AND TRANSPORT MODELING REPORT (ALTA AND OTHERS, 2019).
 - THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT A GUARANTEE OF THE ACCURACY OF THE DELINEATION. THE DELINEATION OF WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT <https://data.nc.gov/ncspatialdata/ncspatialdata>.
 - NRTR - NATURAL RESOURCES TECHNICAL REPORT
 - USE OF DATA FROM OTHER SOURCES FOR THIS FIGURE IS BASED ON THE BEST AVAILABLE DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT <https://data.nc.gov/ncspatialdata/ncspatialdata>.
 - ALL BOUNDARIES ARE APPROXIMATE.
 - PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
 - AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2016. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2018.
 - DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE, NAD 83, 3200 INCHES.

Note:
* - Sampling events prior to 1/1/2018

Source Water Legend

- SW-7*
- Active Ash Pond*

Surface Water Legend

- SW-SC-1*
- SW-SC-2*
- SW-SC-3*
- SW-SC-4*
- SW-SC-5*
- SW-SC-6*
- SW-SC-6A
- SW-2
- SW-3

Seeps Legend

- S-14*
- S-21*
- S-15*
- S-16*
- S-27*
- S-31*
- S-8

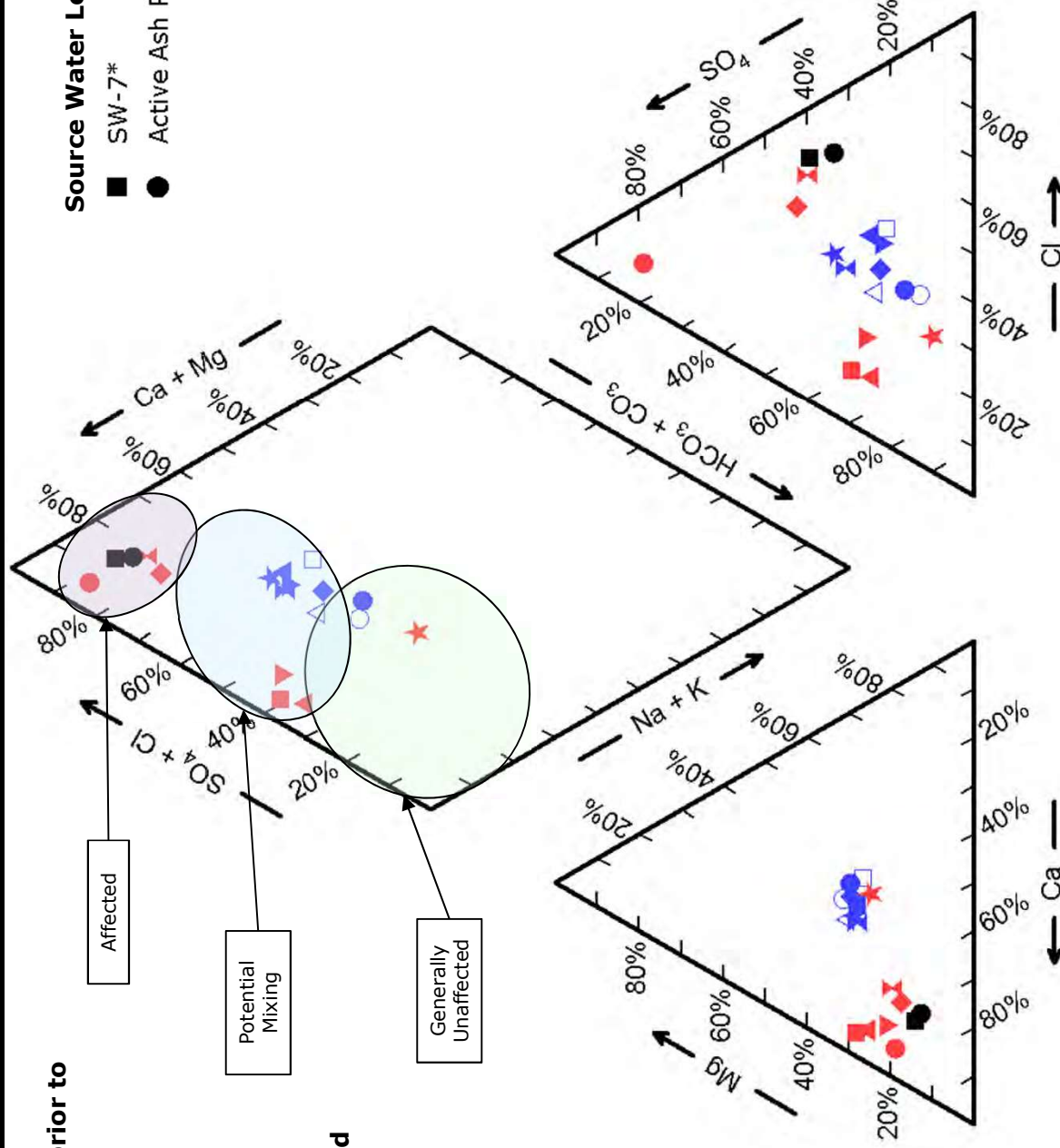


FIGURE 6-29a
SEEP AND SURFACE WATER QUALITY
PIPER DIAGRAMS – SUCK CREEK
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

DATE: 10/18/2019
DRAWN BY: R. Badum
REVISED BY: R. Badum
CHECKED BY: T. Grant
APPROVED BY: T. Grant
PROJECT MANAGER: S. Spinner
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Note:
 * - Sampling events prior to
 1/1/2018

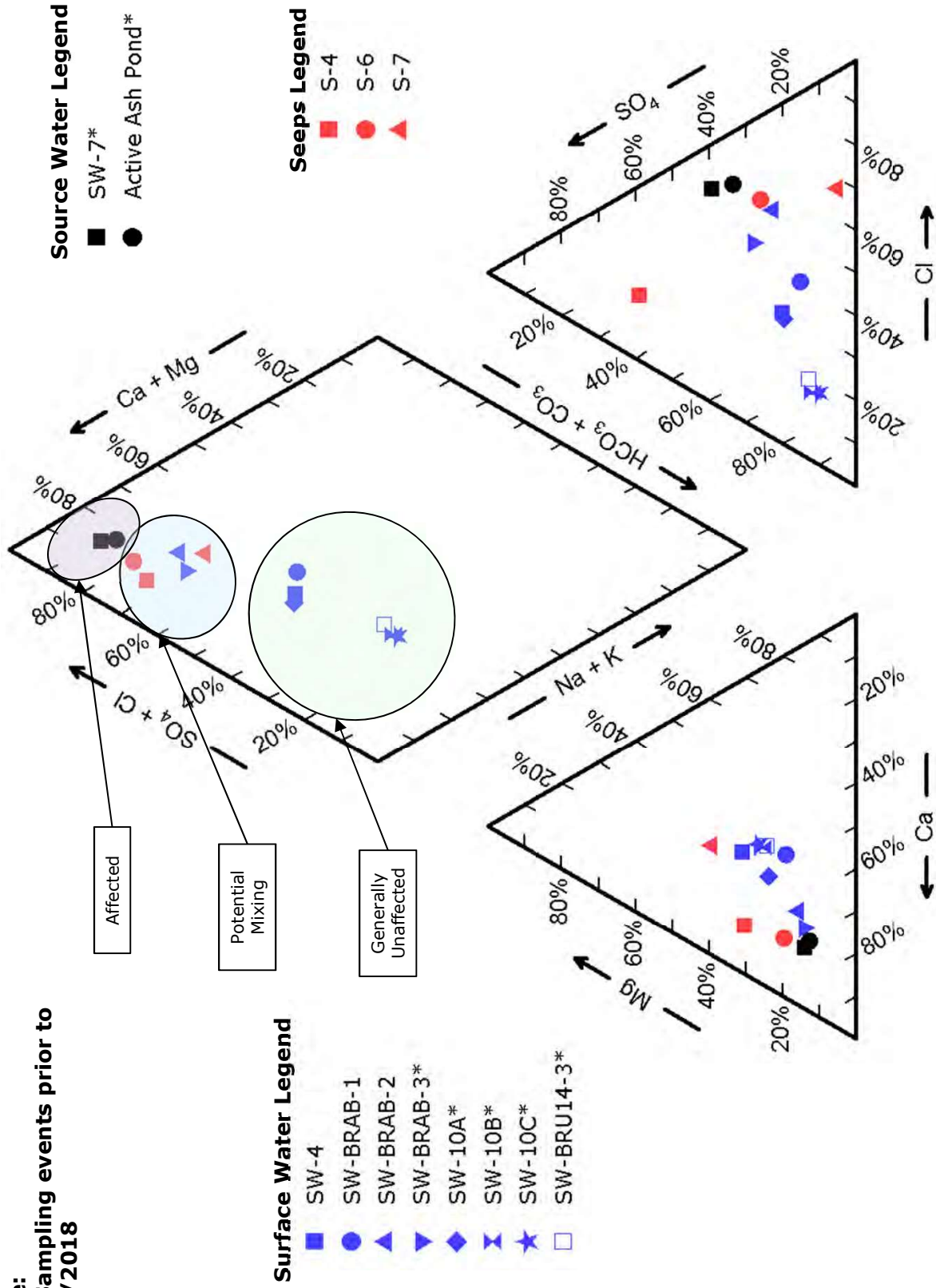


FIGURE 6-29b
SEEP AND SURFACE WATER QUALITY
PIPER DIAGRAMS – BROAD RIVER
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

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 APPROVED BY: T. Grant
 PROJECT MANAGER: S. Spinner

DATE: 10/18/2019

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Note:

*sampling events prior to 1/1/2018

Beneath Source Legend

- AB-01BROR
- AB-02BRO
- AB-04BR
- AB-05BR
- AB-06BR
- AB-07BR
- AB-08BR
- AB-09BR

Water Supply Well Legend

- C1 Well 2*
- C1 Well 3*
- C10*
- C-1001: C2801 Riverfront*
- C-1003*
- C-1005 S1*
- C-1005 S2*
- C-1005 S5*
- C-1005 W1*
- C-1005 W2*
- C-1005 W3*
- C-1006: 2910 Fox Place*
- C-1007: 433 Dysart Place*
- C11*
- C15*
- C23*
- C24-1*
- C25*
- C3*
- C26*

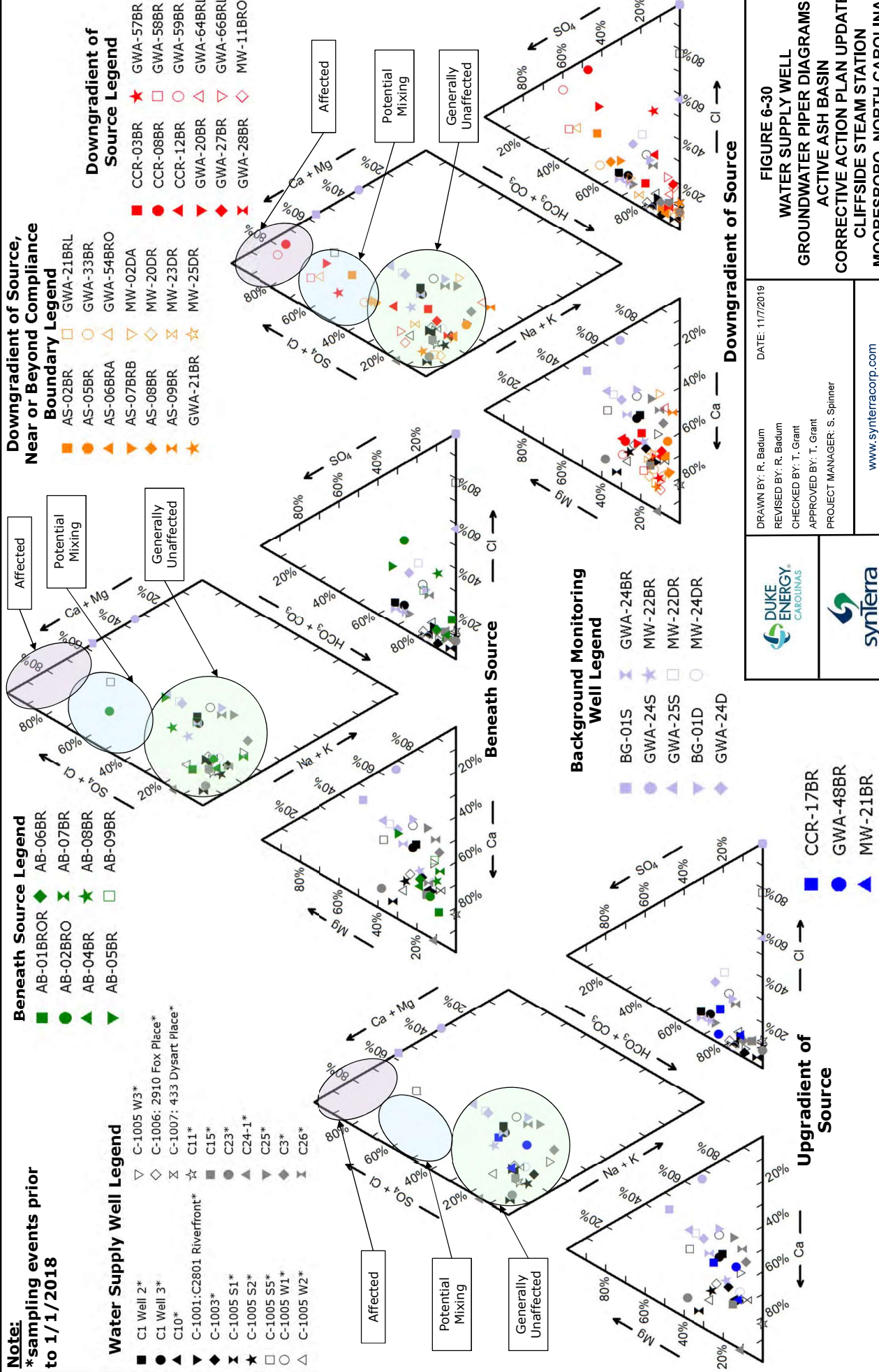
Downgradient of Source, Near or Beyond Compliance

Boundary Legend

- AS-02BR
- AS-05BR
- AS-06BRA
- AS-07BRB
- AS-08BR
- AS-09BR
- GWA-21BR
- GWA-21BRL
- GWA-33BR
- GWA-54BRO
- MW-02DA
- MW-20DR
- MW-23DR
- MW-25DR

Downgradient of Source Legend

- CCR-03BR
- CCR-08BR
- CCR-12BR
- GWA-20BR
- GWA-27BR
- GWA-28BR
- GWA-57BR
- GWA-58BR
- GWA-59BR
- GWA-64BRL
- GWA-66BRL
- MW-11BRO



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PROJECT MANAGER: S. Spinner
DATE: 11/7/2019



FIGURE 6-30
WATER SUPPLY WELL
GROUNDWATER PIPER DIAGRAMS
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

Figure 6-31

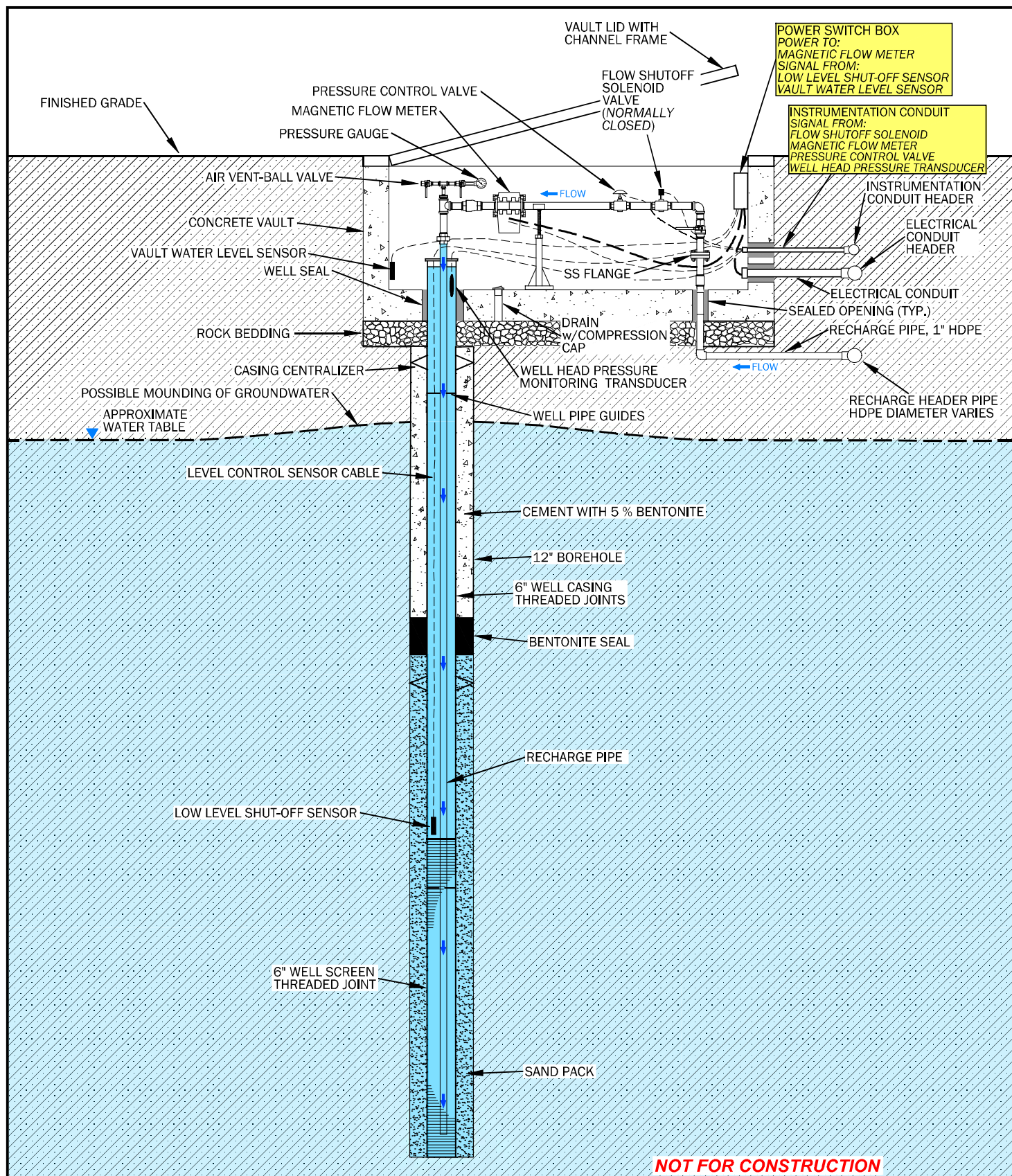
Pourbaix Diagram for Iron-Water System

Included in Section 6 text

Figure 6-32a

Remedial Alternative 2 – System Layout – Groundwater Remediation by Extraction combined with Clean Water Infiltration and Treatment

Provided in separate electronic figure file as a
large sheet size

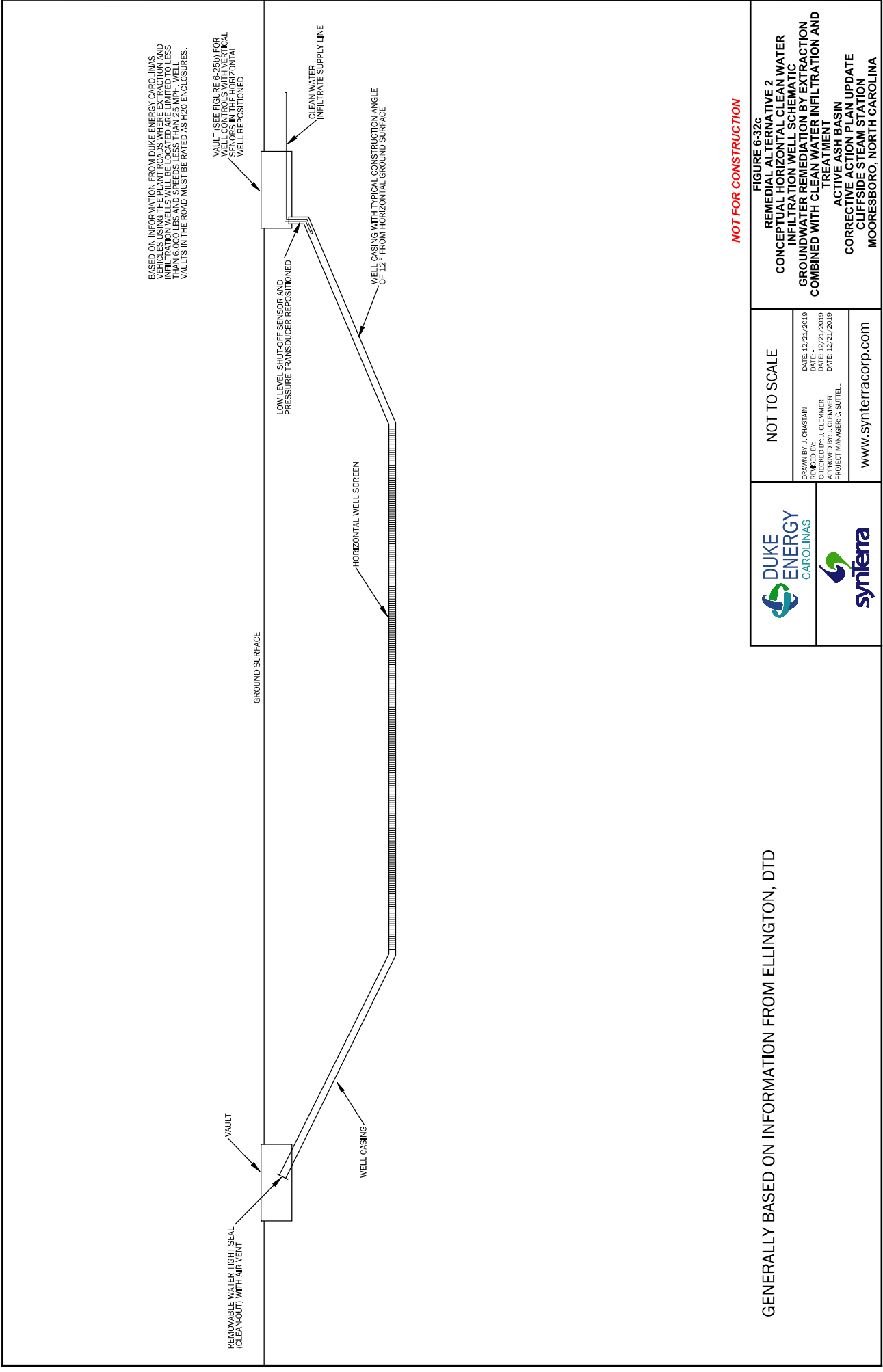


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FIGURE 6-32b
REMEDIAL ALTERNATIVE 2
CONCEPTUAL VERTICAL CLEAN WATER INFILTRATION
WELL SCHEMATIC
GROUNDWATER REMEDIATION BY EXTRACTION
COMBINED WITH CLEAN WATER INFILTRATION AND
TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

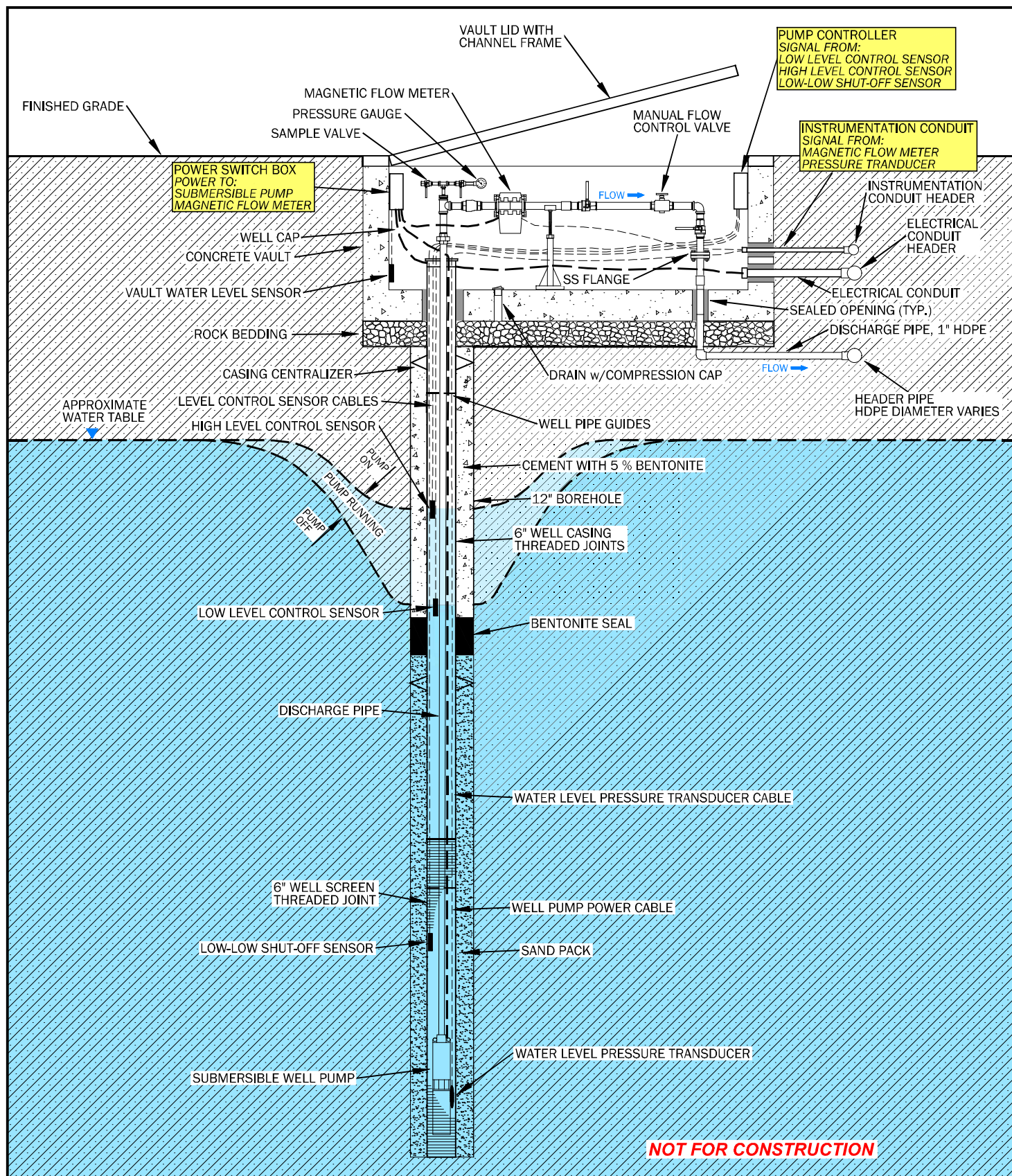


GENERALLY BASED ON INFORMATION FROM ELLINGTON, DTD

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FIGURE 6-32C
REMEDIAL ALTERNATIVE 2
CONCEPTUAL HORIZONTAL CLEAN WATER
INFILTRATION WELL SCHEMATIC
GROUNDWATER REMEDIATION BY EXTRACTION
COMBINED WITH CLEAN WATER INFILTRATION AND
TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

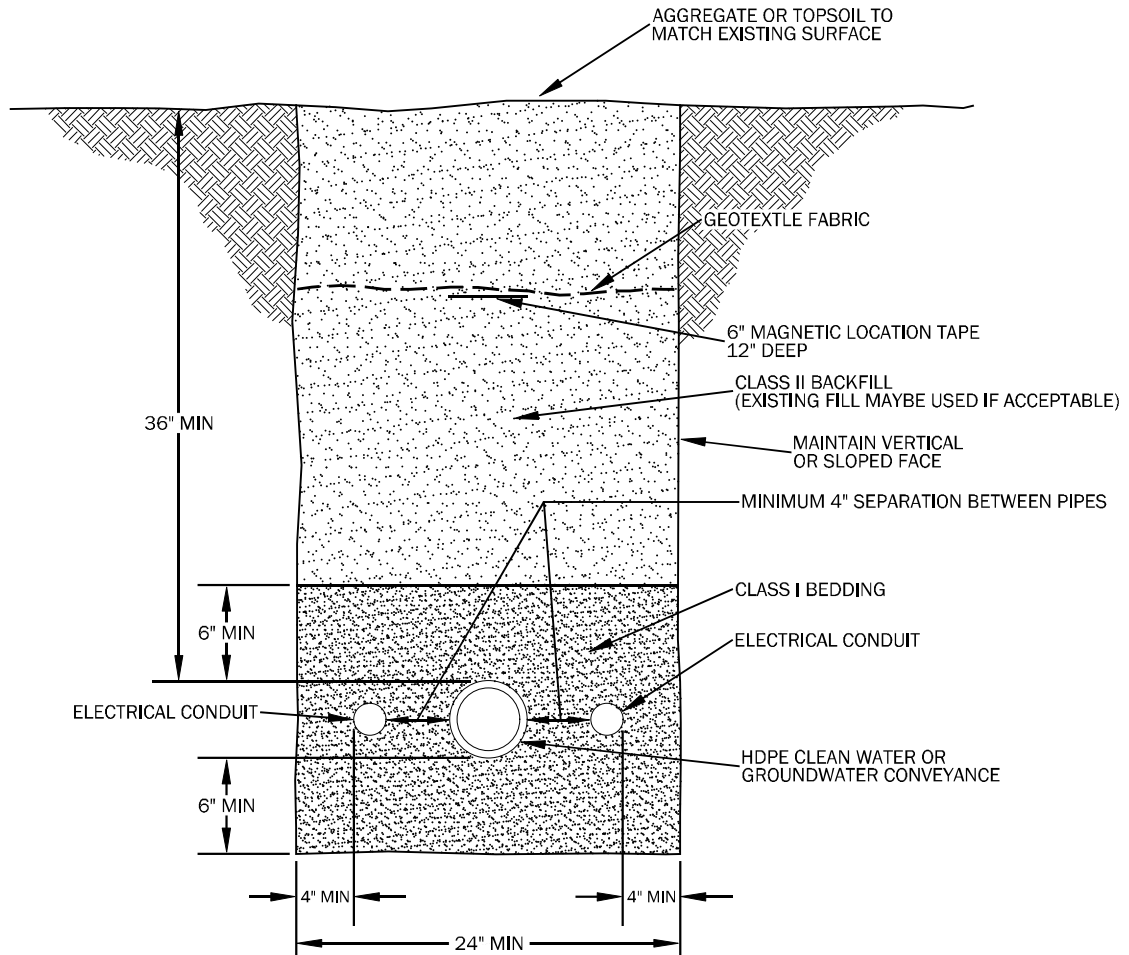


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FIGURE 6-32d
REMEDIAL ALTERNATIVE 2
CONCEPTUAL VERTICAL EXTRACTION WELL
SCHEMATIC
GROUNDWATER REMEDIATION BY EXTRACTION
COMBINED WITH CLEAN WATER INFILTRATION AND
TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



NOTES:

1. 4" MINIMAL HORIZONTAL SEPARATION BETWEEN ALL PIPE AND CONDUIT.
2. 6" VERTICAL SEPARATION WHEN CROSSING OVER ALL PIPE AND CONDUIT.
3. 36" MINIMUM COVER FOR ALL PIPE AND CONDUIT.
4. PLACE BACKFILL AND FILL SOIL MATERIALS IN LAYERS NOT MORE THAN 8" IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HEAVY COMPACTION EQUIPMENT AND NOT MORE THAN 4 INCHES LOOSE DEPTH FOR MATERIAL COMPACTED BY HAND OPERATED TAMPERS.
5. PLACE BACKFILL AND FILL MATERIALS EVENLY ON ALL SIDES OF STRUCTURES TO REQUIRED ELEVATIONS AND UNIFORMLY ALONG THE FULL LENGTH OF EACH STRUCTURE.
6. COMPACT SOIL MATERIALS TO NOT LESS THAN 95 PERCENT OF MAXIMUM DRY UNIT WEIGHT ACCORDING TO ASTM D 698.

NOT FOR CONSTRUCTION



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FIGURE 6-32e
REMEDIAL ALTERNATIVE 2
CONCEPTUAL PIPELINE TRENCH DETAIL
REMEDICATION BY EXTRACTION COMBINED WITH
CLEAN WATER INFILTRATION AND TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

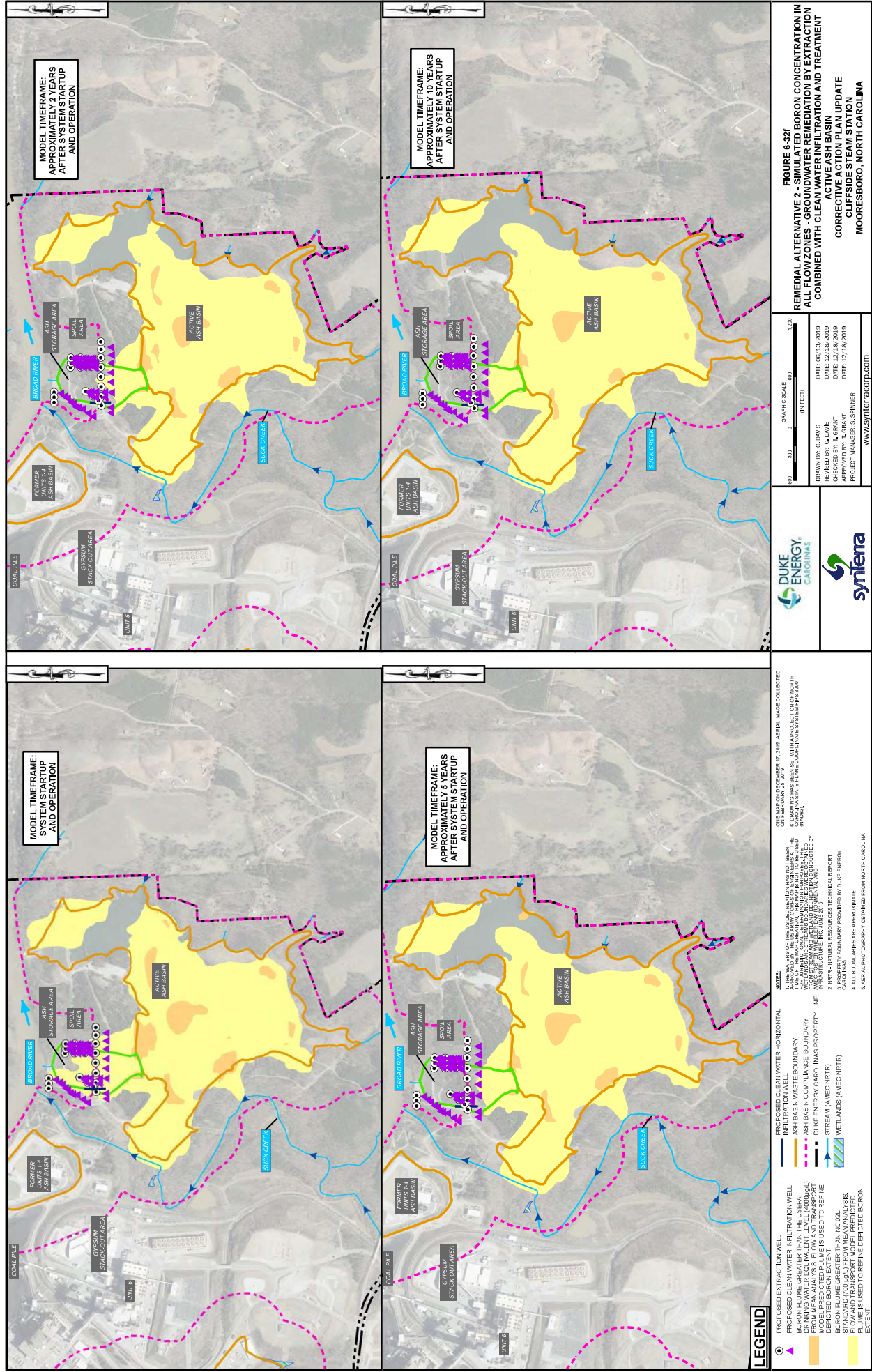


FIGURE 6-321
REMEDIAL ALTERNATIVE 2 - SIMULATED BORON CONCENTRATION IN THE ACTIVE ASH BASIN AT THE CLIFFS STEAM STATION, NORTH CAROLINA
CORRECTIVE ACTION PLAN UPDATE
MOORESBORO, NORTH CAROLINA

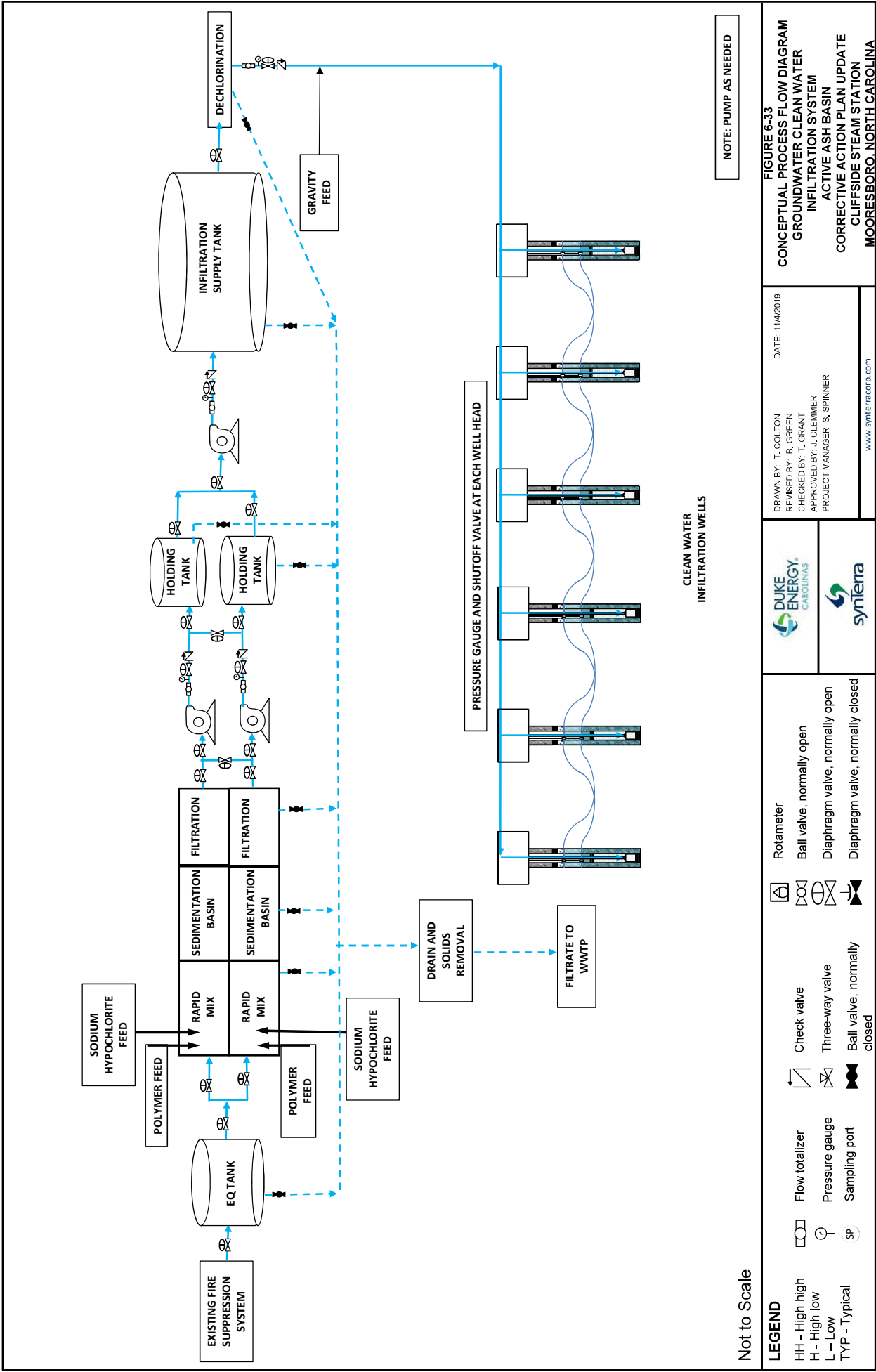
DATE: 06/13/2019
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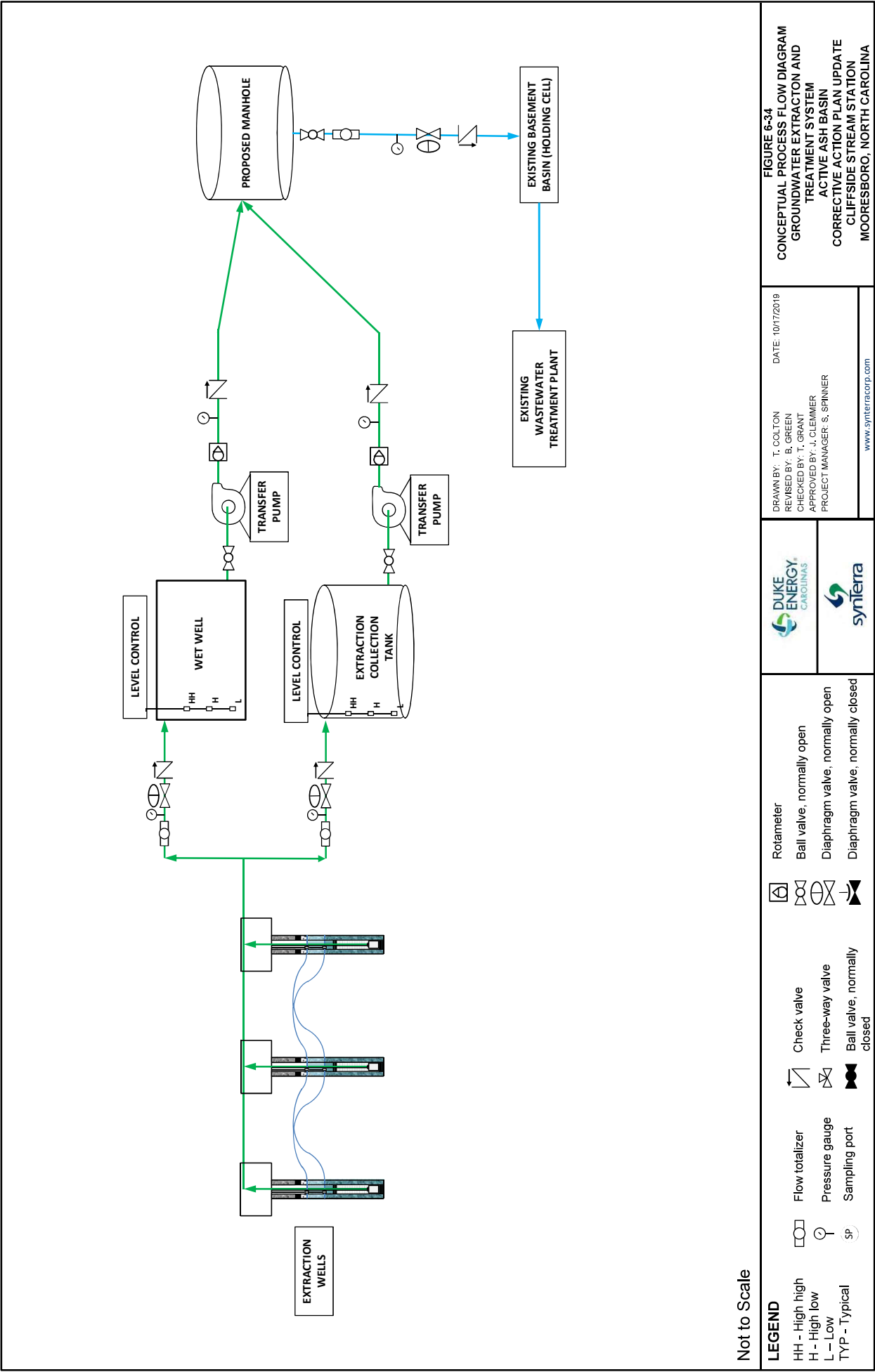
LEGEND

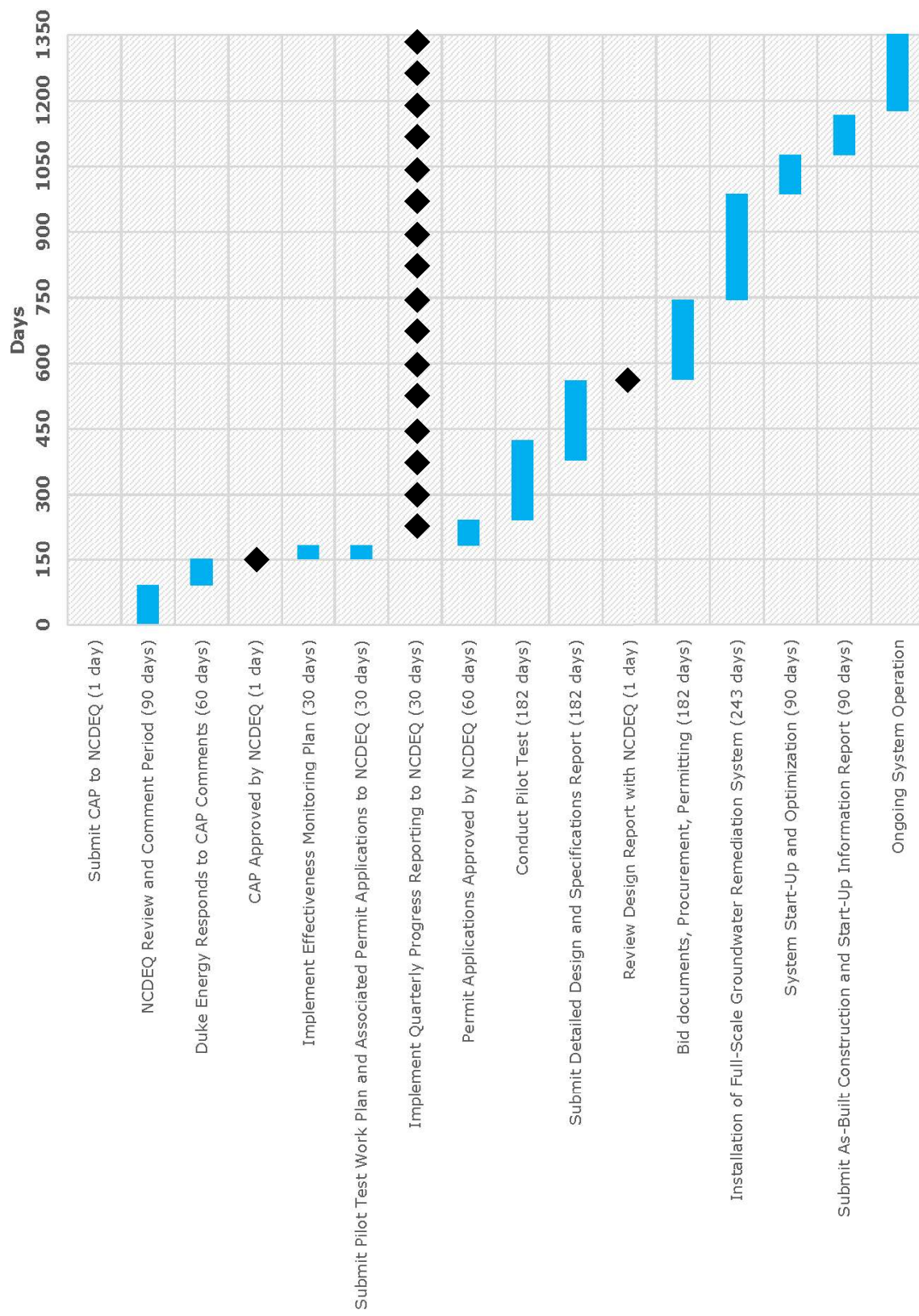
- PROPOSED CLEAN WATER HORIZONTAL
- PROPOSED CLEAN WATER INFILTRATION WELL
- BORON PLUME GREATER THAN 100 ug/l
- BORON PLUME GREATER THAN 10 ug/l
- MODEL PREDICTED PLUME IS USED TO REFIN
- BORON PLUME GREATER THAN 100 ug/l
- BORON PLUME GREATER THAN 10 ug/l
- STANDARD (700 ug/l) FROM MEAN ANALYSIS
- PLUME IS USED TO REFIN
- EXTENT

NOTE:

1. ALL BOUNDARIES ARE APPROXIMATE.
2. GENERAL PHOTOGRAPHY OF AREAS FROM NORTH CAROLINA.
3. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
4. ALL BOUNDARIES ARE APPROXIMATE.
5. DUKES ENERGY CAROLINAS HAS NOT BEEN ADVISED BY THE USE OF THIS DRAWING FOR THE PURPOSES OF THE DRAWING. THE DRAWING IS NOT TO BE USED FOR ANY OTHER PURPOSES WITHOUT THE WRITTEN PERMISSION OF DUKE ENERGY CAROLINAS.
6. DRAWING HAS BEEN PREPARED WITH A PROJECTION OF NORTH CAROLINA STATE PLANE COORDINATE SYSTEM (NAD83).







Notes:
 * - Either submittal of the Effectiveness Monitoring Plan or the pilot test work plan and permit applications (as applicable) will fulfill section G.S. 130A-309.209, (b)(3).

**** - Actual time may vary due to a variety of factors including agency review and approvals, weather delays, equipment availability, etc.**

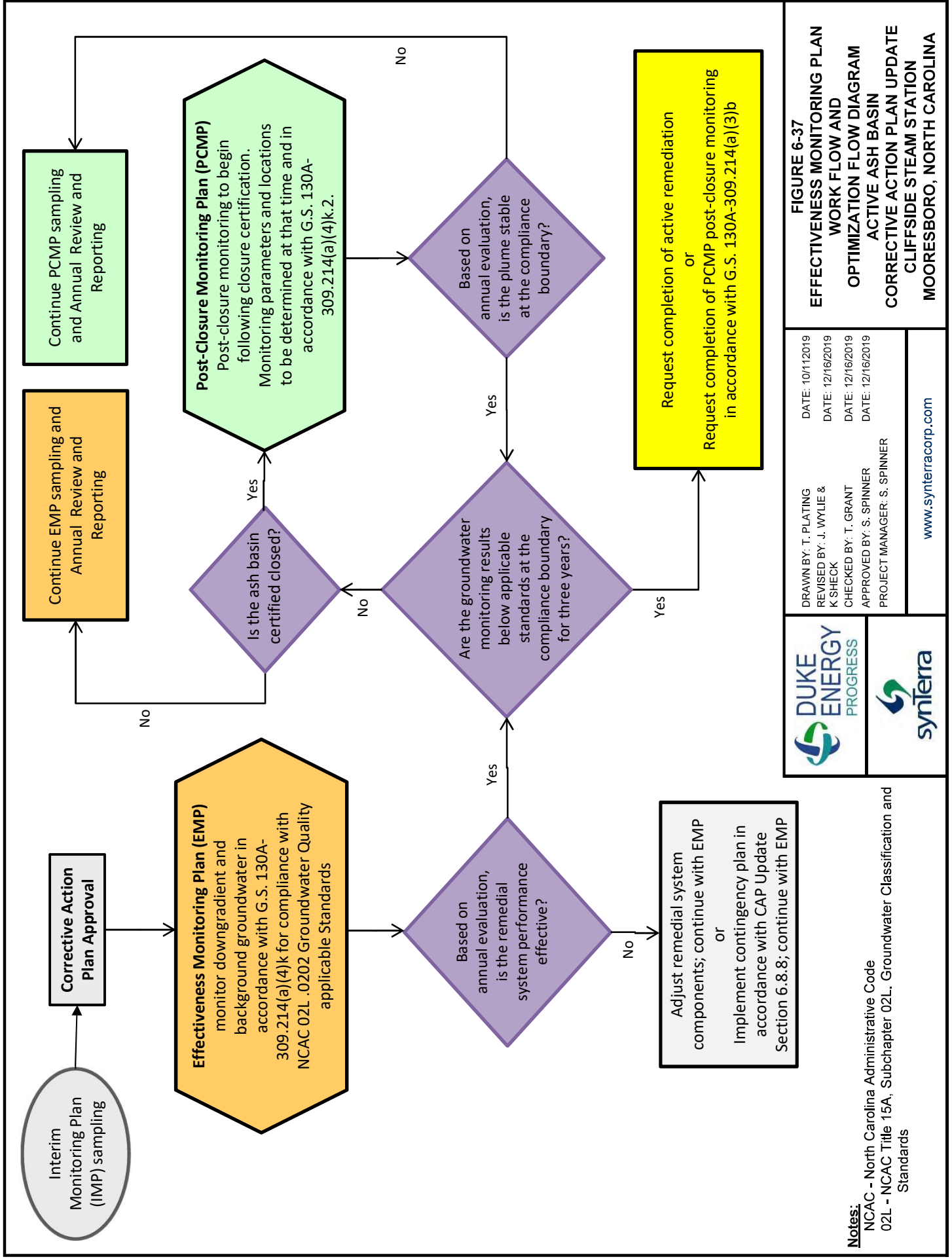


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APPROVED BY: T. GRANT
PROJECT MANAGER: S. SPINNER

DATE: 12/5/2019

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FIGURE 6-35
CAP IMPLEMENTATION GANTT CHART
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



Notes:
NCAC - North Carolina Administrative Code
02L - NCAC Title 15A, Subchapter 02L, Groundwater Classification and Standards

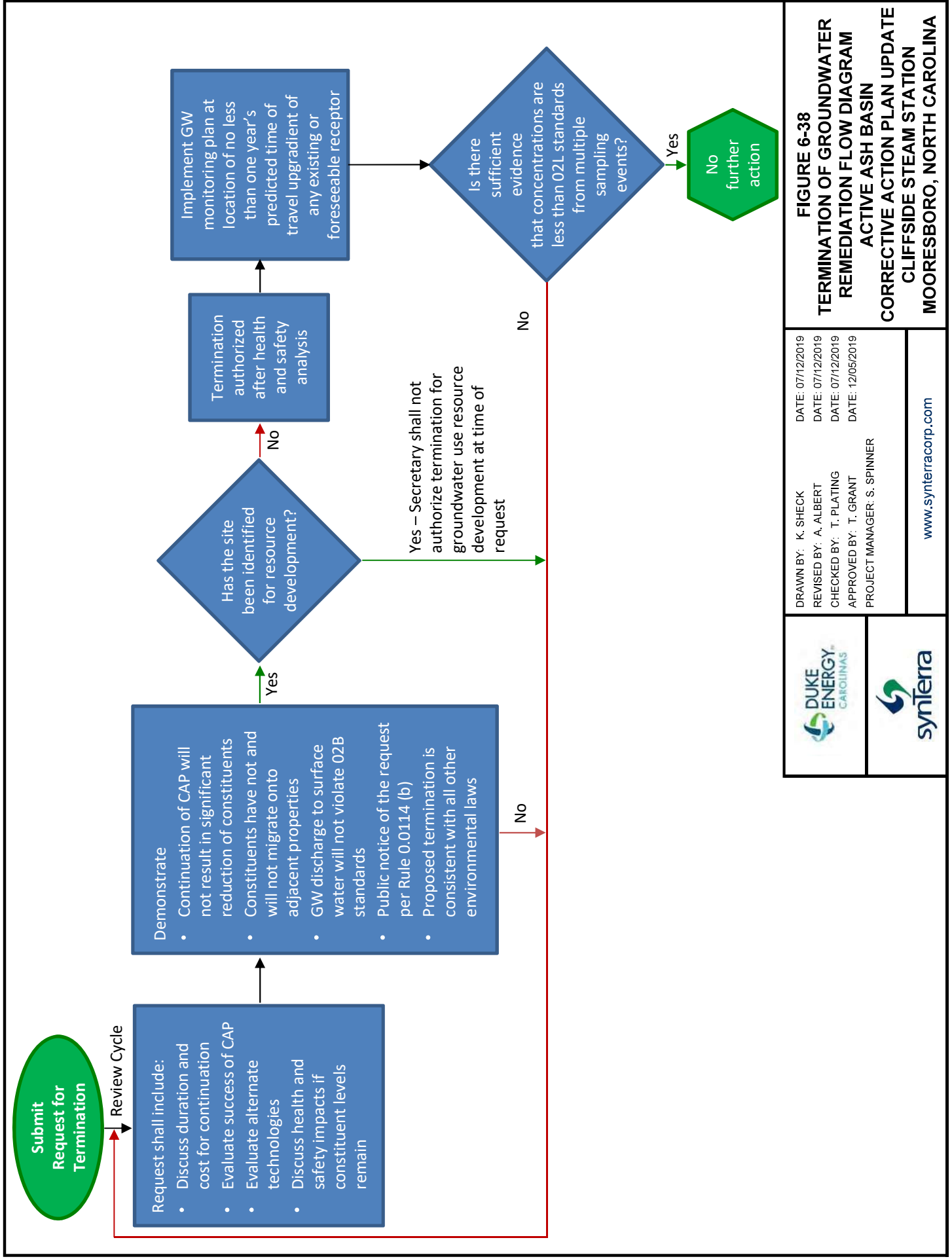


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REVISED BY: J. WYLIE & K. SHECK
CHECKED BY: T. GRANT
APPROVED BY: S. SPINNER
PROJECT MANAGER: S. SPINNER

DATE: 10/11/2019
DATE: 12/16/2019
DATE: 12/16/2019
DATE: 12/16/2019

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FIGURE 6-37
EFFECTIVENESS MONITORING PLAN
WORK FLOW AND
OPTIMIZATION FLOW DIAGRAM
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



			
DRAWN BY: K. SHECK REVISOR BY: A. ALBERT CHECKED BY: T. PLATING APPROVED BY: T. GRANT PROJECT MANAGER: S. SPINNER		DATE: 07/12/2019 DATE: 07/12/2019 DATE: 07/12/2019 DATE: 12/05/2019	
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FIGURE 6-38
TERMINATION OF GROUNDWATER REMEDIATION FLOW DIAGRAM
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

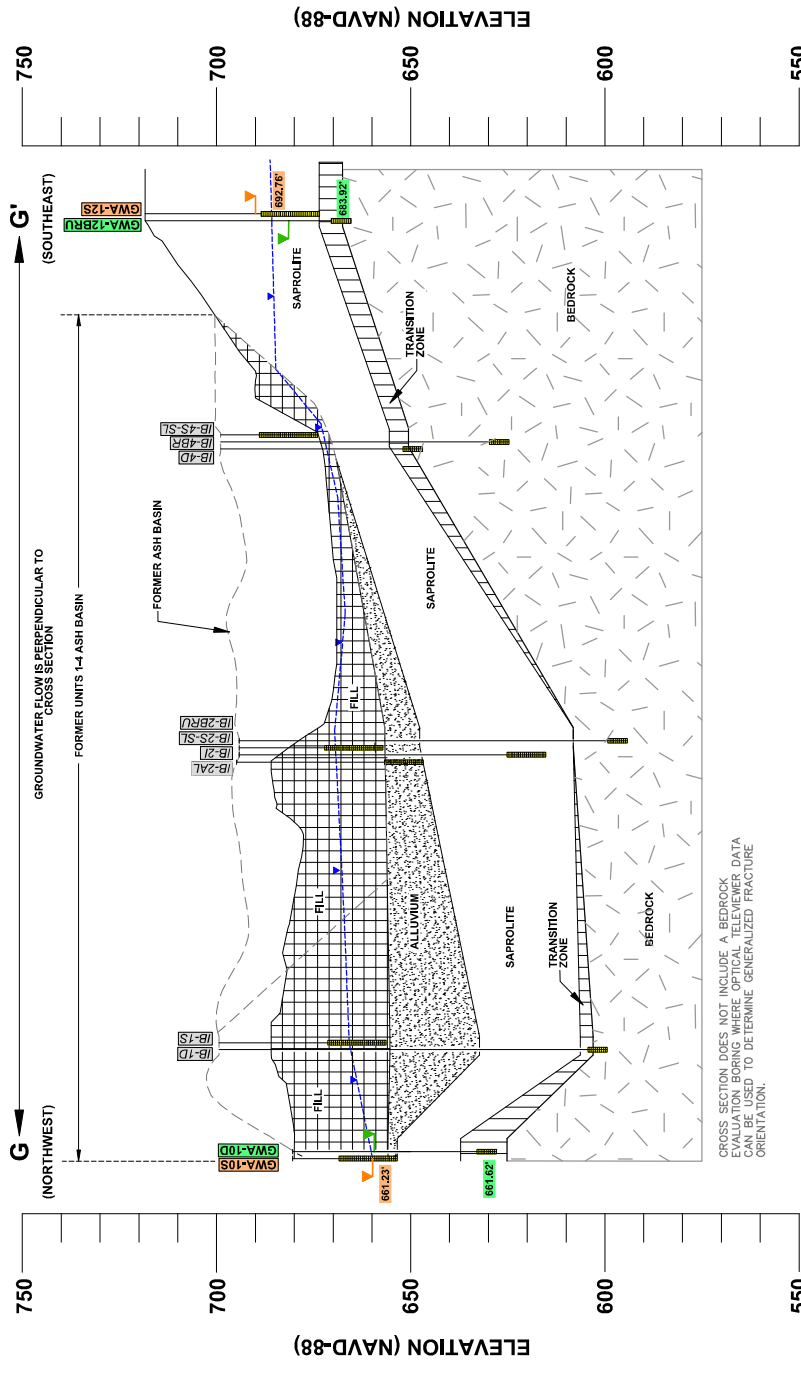
Source Area 2

(Former Units 1-4 Ash Basin)

Figure 6-39

**Fly Ash and Bottom Ash Interbedded
Depiction**

Included in Section 6 text

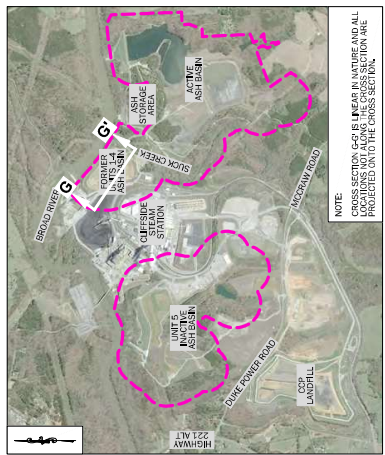


CROSS SECTION DOES NOT INCLUDE A BEDROCK EVALUATION BORING WHERE OPTICAL TELEVIEWER DATA WAS USED TO DETERMINE GENERALIZED FRACTURE ORIENTATION.

- LEGEND**
- GWA-10S: WELL IN SHALLOW FLOW LAYER
 - GWA-12BRU: WELL IN DEEP FLOW LAYER
 - IB-1S, IB-1D: ABANDONED WELL/ GEOTECHNICAL BORING
 - IB-2AL, IB-2S, IB-2BRU: GENERALIZED WATER TABLE
 - IB-4D, IB-4BR, IB-4S, IB-4SL: GENERALIZED GROUNDWATER FLOW DIRECTION
 - ASH: ASH
 - ASH PORE WATER: ASH PORE WATER
 - FILL: FILL
 - SAPROLITE: SAPROLITE
 - TRANSITION ZONE: TRANSITION ZONE
 - BEDROCK: BEDROCK
 - ALLUVIUM: ALLUVIUM

- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- WATER LEVEL ELEVATION (NAVD 88) (LABEL COLORING BY FLOW ZONE)
- WELL SCREEN
- COMPLIANCE BOUNDARY

- NOTES**
- DEPTH TO WATER GAUGED IN MONITORING WELLS ON APRIL 22, 2019.
 - NM - NOT MEASURED DURING 24-HOUR WATER LEVEL EVENT.
 - ALL VERTICAL ELEVATIONS ARE MEASURED IN FEET, NORTH AMERICA VERTICAL DATUM (NAVD) OF 1988.

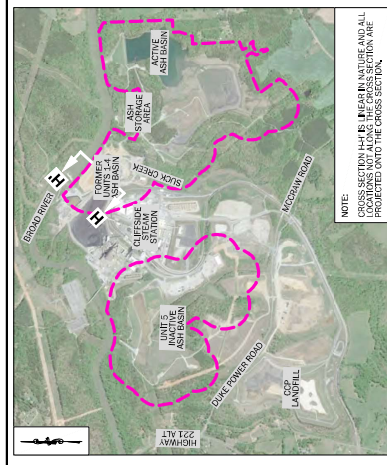


CROSS SECTION LOCATION

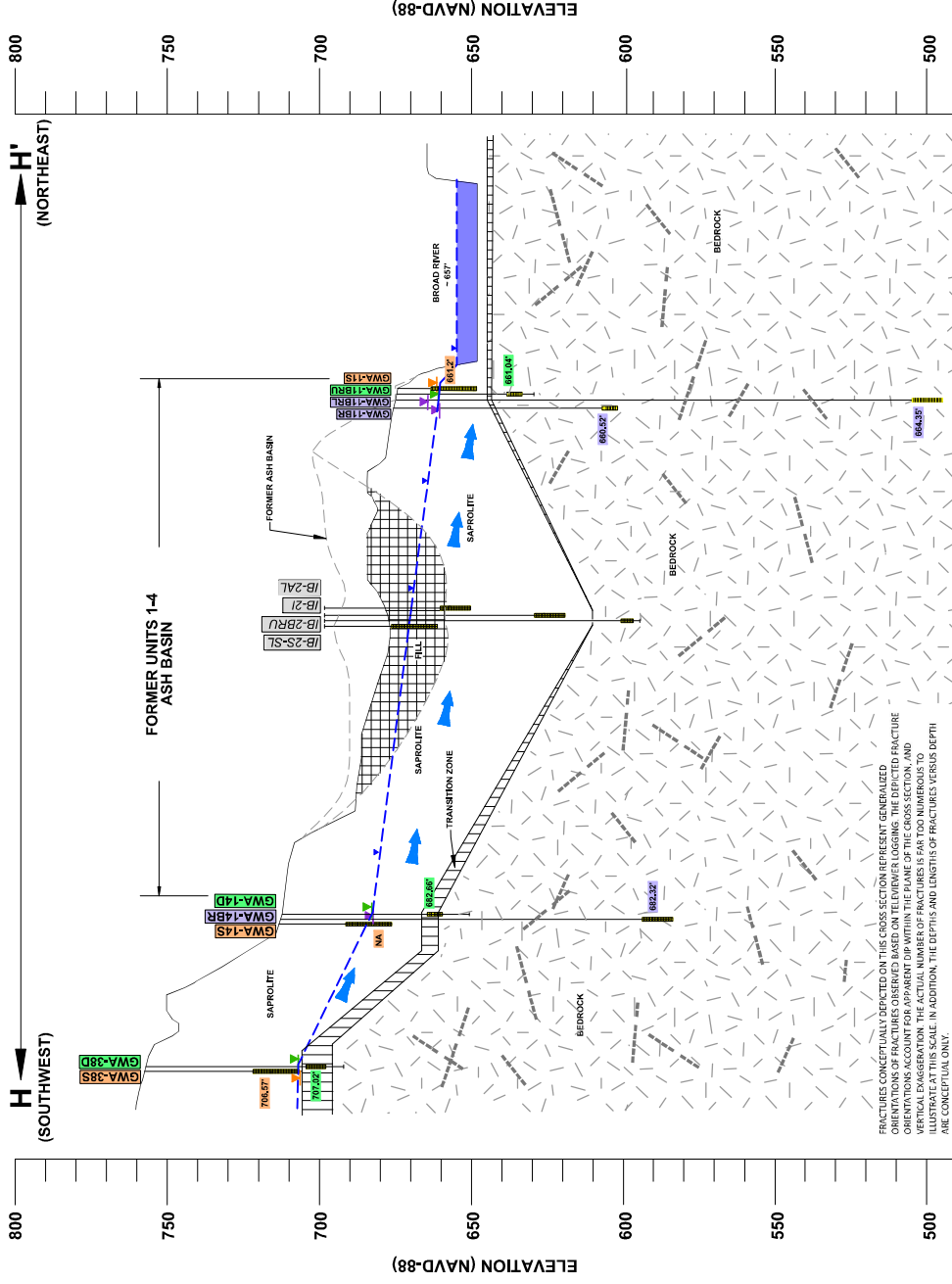
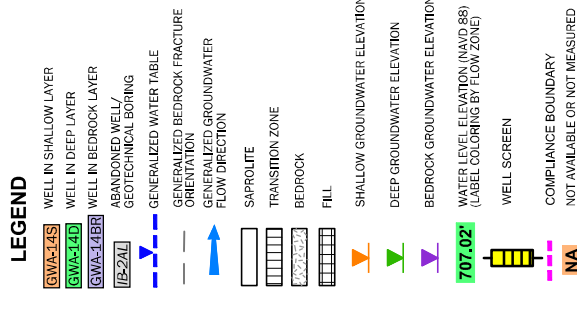


FIGURE 6-40
GENERAL CROSS SECTION G-G'
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

DATE: 10/30/2019
 DRAWN BY: L. GOSWAMI
 CHECKED BY: T. GRANT
 APPROVED BY: S. SPINER
 PROJECT MANAGER: S. SPINER
 www.synterracorp.com



CROSS SECTION LOCATION



FRACTURES ORIENTATIONS DERIVED FROM THE CROSS SECTION REPRESENT GENERALIZED ORIENTATIONS OF FRACTURES OBSERVED BASED ON TELEVISION LOGGING. THE DEPICTED FRACTURE ORIENTATIONS ACCOUNT FOR APPARENT DIP WITHIN THE PLANE OF THE CROSS SECTION, AND VERTICAL ENLARGEMENT. THE ACTUAL NUMBER OF FRACTURES IS FAR TOO NUMEROUS TO ILLUSTRATE AT THIS SCALE. IN ADDITION, THE DEPTHS AND LENGTHS OF FRACTURES VERSUS DEPTH ARE COMPLETED ONLY.

NOTES

1. DEPTH TO WATER GAUGED IN MONITORING WELLS ON APRIL 22, 2019.
2. NM - NOT MEASURED DURING 24-HOUR WATER LEVEL EVENT.
3. ALL VERTICAL ELEVATIONS ARE MEASURED IN FEET, NORTH AMERICA VERTICAL DATUM (NAVD) OF 1988.
4. DATA POSTED FROM IB-2 WELLS IS HISTORIC DATA COLLECTED BEFORE WELLS WERE ABANDONED DURING BASIN CLOSURE.



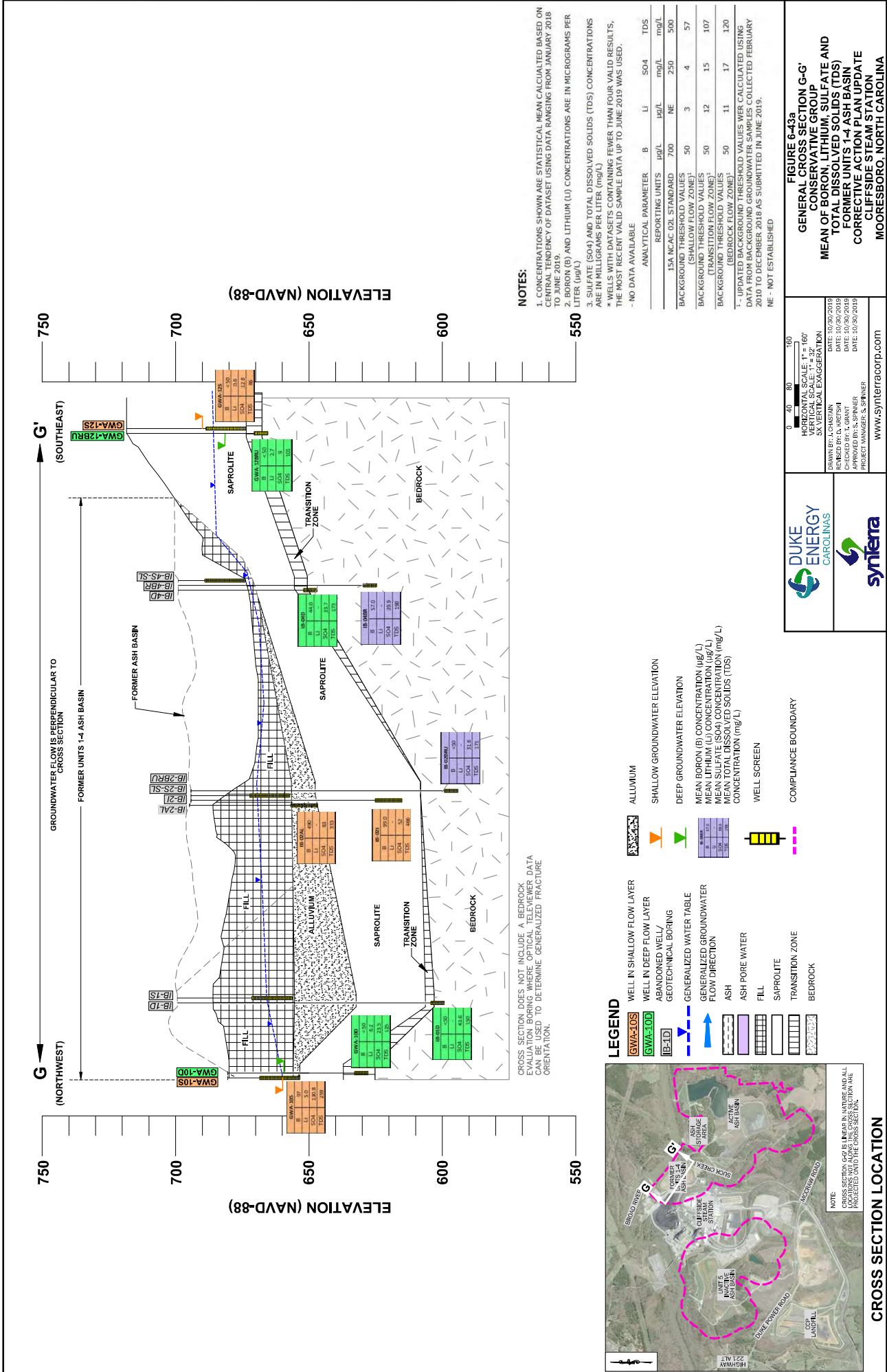
FIGURE 6-41
GENERAL CROSS SECTION H-H'
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

SYNTERA
 PROJECT MANAGER: S. SPINER
 DATE: 10/29/2019

DUKE ENERGY
 CAROLINAS
 PROJECT MANAGER: S. SPINER
 DATE: 10/29/2019

SYNTERA
 PROJECT MANAGER: S. SPINER
 DATE: 10/29/2019

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1. CONCENTRATIONS SHOWN ARE STATISTICAL MEAN CALCULATED BASED ON CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.

2. ARSENIC (As), STRONTIUM (Sr), AND VANADIUM (V) CONCENTRATIONS ARE IN MICROGRAMS PER LITER ($\mu\text{g/L}$).

* WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATE UP TO JUNE 2019 WAS USED.

- NO DATA AVAILABLE	ANALYTICAL PARAMETER	As	Sr	V
	REPORTING UNITS	µg/L	µg/L	µg/L
	15A NCAC 02L STANDARD	10	NE	3*
	BAC GROUND THRESHOLD VALUES (SHALLOW FLOW ZONE) ¹	0.2	34	1
	BAC GROUND THRESHOLD VALUES (TRANSITION FLOW ZONE) ²	2	69	11
	BAC GROUND THRESHOLD VALUES (DEEP FLOW ZONE) ³	1	93	1

* - UPDATED OF THE 15A NCAC 02L STANDARD, APPENDIX V, APRIL 1, 2015

1 - UPDATED BACKGROUND THRESHOLD VALUES WERE CALCULATED FROM DATA FROM BAC GROUNDING GROUNDWATER SAMPLES COLLECTED FEB 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2015



FIGURE 6-43b
GENERAL CROSS SECTION G-G'
NON - CONSERVATIVE GROUP
MEAN OF ARSENIC, STRONTIUM AND VANADIUM
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



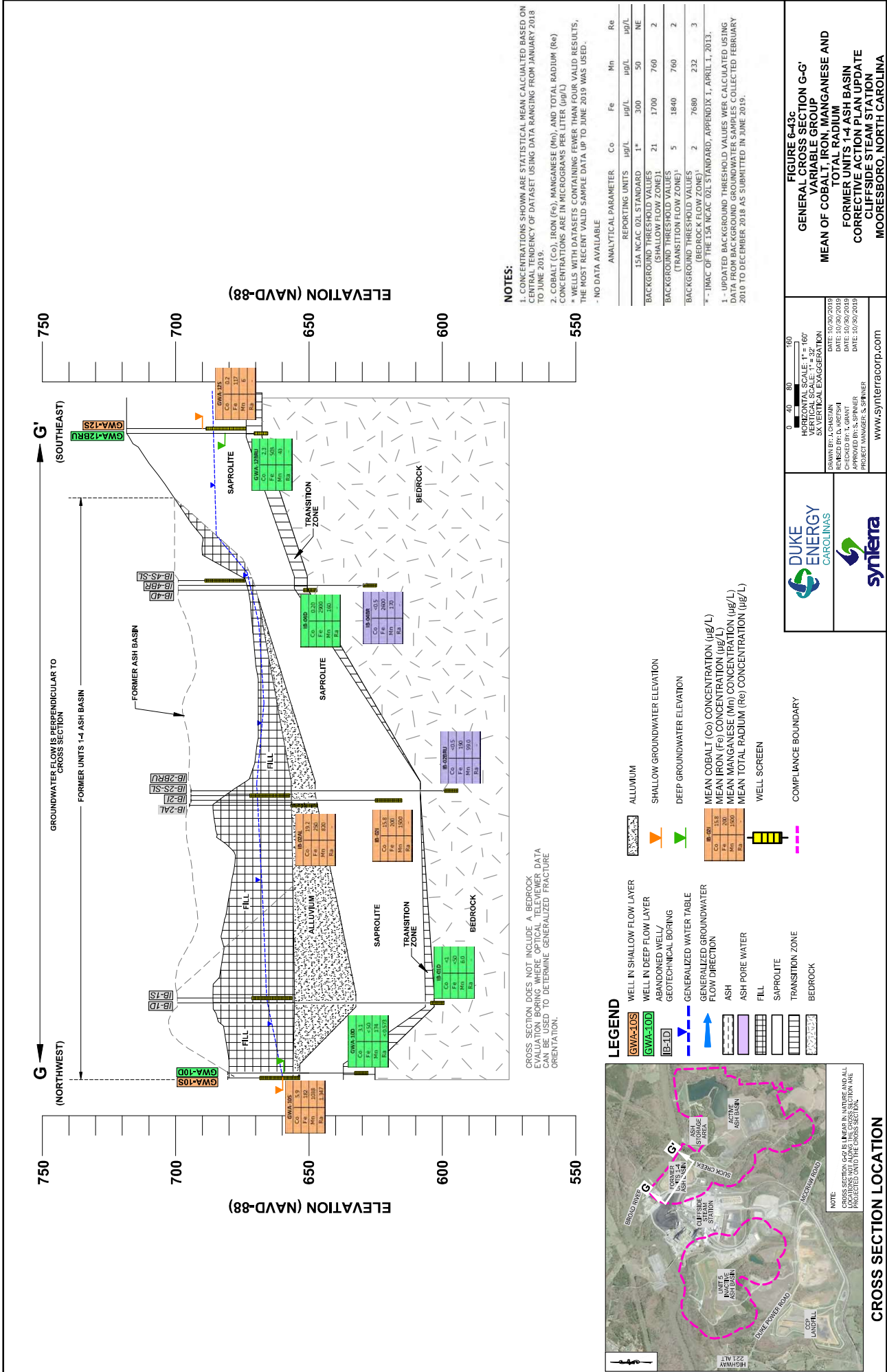
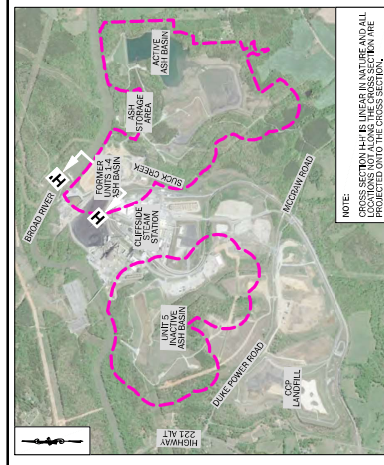




FIGURE 6-43C
GENERAL CROSS SECTION G-G'
VARIABLE GROUP
MEAN OF COBALT, IRON, MANGANESE AND TOTAL RADIUM
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

SCALE: 1" = 100'
VERTICAL SCALE: 1" = 32'
DATE: 10/30/2019
DRAWN BY: L. GRANT
CHECKED BY: T. GRANT
APPROVED BY: S. SPINER
PROJECT MANAGER: S. SPINER
www.synterracorp.com



CROSS SECTION LOCATION

NOTES:

1. CONCENTRATIONS SHOWN ARE STATISTICAL MEAN CALCULATED BASED ON CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.
 2. BORON (B) AND LITHIUM (LI) CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L)
 3. SULFATE (SO4) AND TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L)
- * WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA UP TO JUNE 2019 WAS USED.
- NO DATA AVAILABLE

ANALYTICAL PARAMETER	B	LI	SO4	TDS
REPORTING UNITS	µg/L	µg/L	mg/L	mg/L
15A NCAC 02L STANDARD	700	NE	250	500
BACKGROUND THRESHOLD VALUES (SHALLOW FLOW ZONE) ¹	50	3	4	57
BACKGROUND THRESHOLD VALUES (TRANSITION FLOW ZONE) ¹	50	12	15	107
BACKGROUND THRESHOLD VALUES (BEDROCK FLOW ZONE) ¹	50	11	17	120

¹ - UPDATED BACKGROUND THRESHOLD VALUES WERE CALCULATED USING DATA FROM BACKGROUND GROUNDWATER SAMPLES COLLECTED FEBRUARY 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2019.

NE - NOT ESTABLISHED

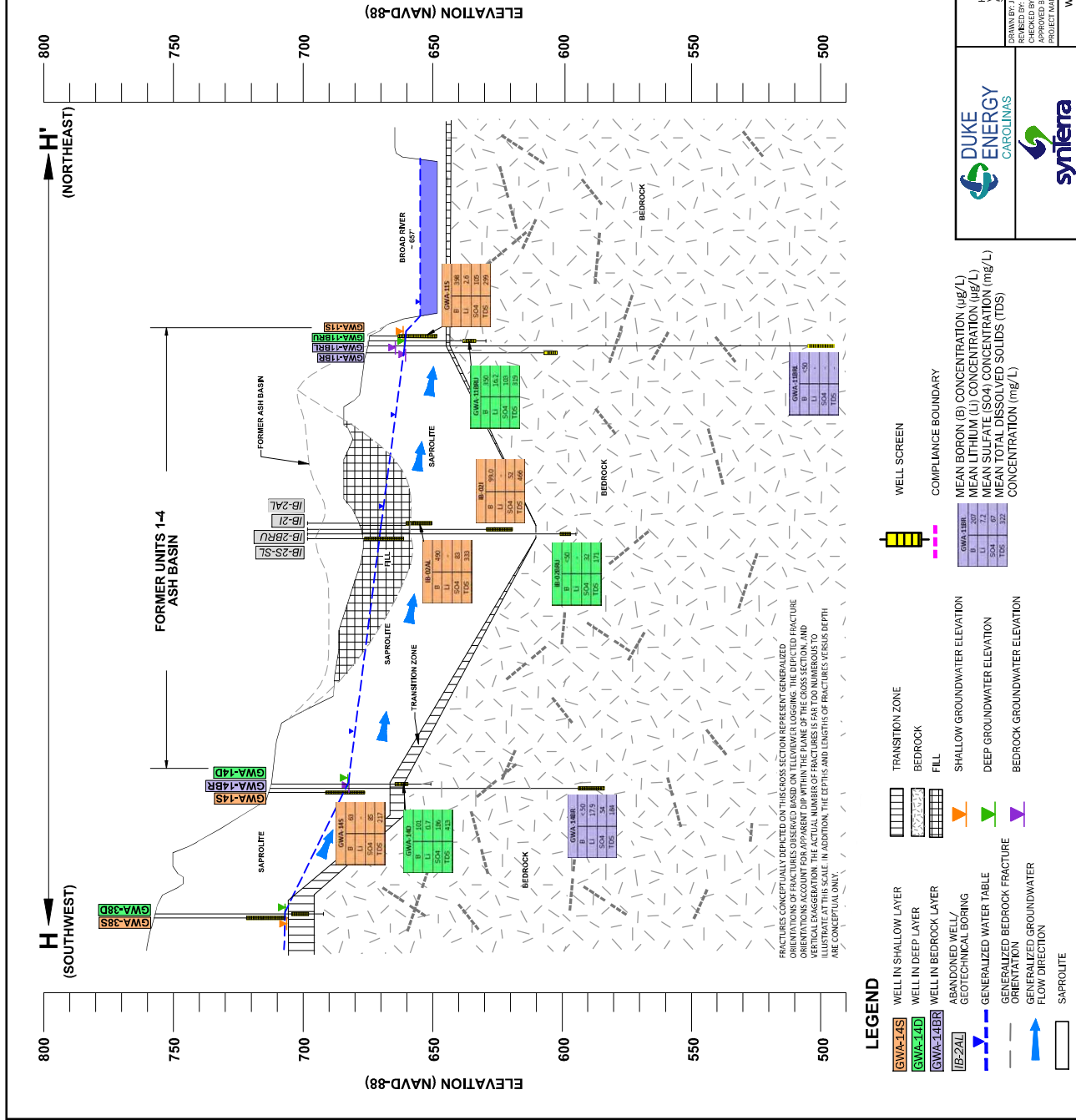
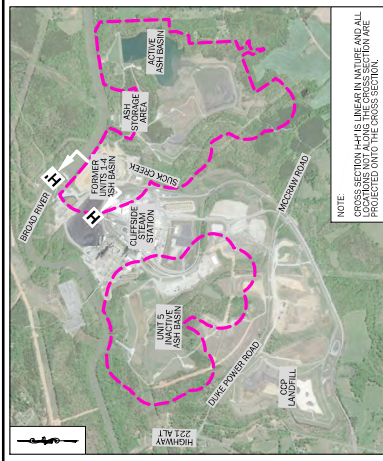


FIGURE 6-44a
GENERAL CROSS SECTION H-H'
CONSERVATIVE GROUP
MEAN OF BORON, LITHIUM, SULFATE AND TOTAL
DISSOLVED SOLIDS (TDS)
FORMER UNITS 1 - 4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

SYNTERA
www.synterracorp.com

DATE: 10/29/2019
CHECKED BY: T. GRANT
PROJECT MANAGER: S. SPINER



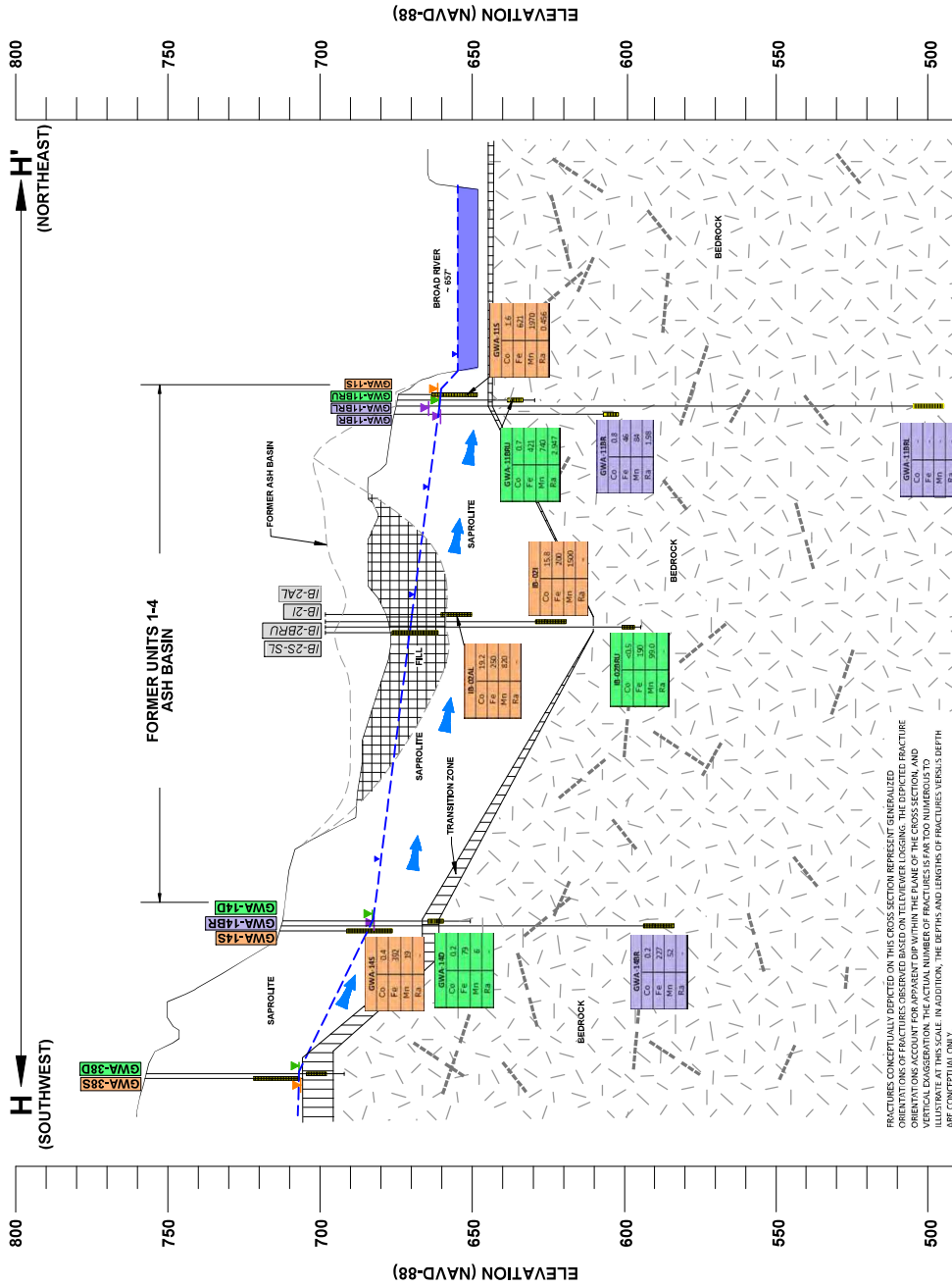
CROSS SECTION LOCATION

NOTES:

1. CONCENTRATIONS SHOWN ARE STATISTICAL MEAN CALCULATED BASED ON CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.
2. COBALT (Co), IRON (Fe), MANGANESE (Mn), AND TOTAL RADIUM (Re) CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L)
- * WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA UP TO JUNE 2019 WAS USED.
- NO DATA AVAILABLE

ANALYTICAL PARAMETER	Co	Fe	Mn	Re
REPORTING UNITS	µg/L	µg/L	µg/L	µg/L
15A NCAC 02L STANDARD	1*	300	50	5^
BACKGROUND THRESHOLD VALUES (SHALLOW FLOW ZONE)1	21	1700	760	2
BACKGROUND THRESHOLD VALUES (TRANSITION FLOW ZONE)2	5	1940	760	2
BACKGROUND THRESHOLD VALUES (BEDROCK FLOW ZONE)3	2	7680	232	3
* - IMAC OF THE 15A NCAC 02L STANDARD, APPENDIX 1, APRIL 1, 2013.				
^ - FEDERAL MAXIMUM CONTAMINANT LEVEL				

1 - UPDATED BACKGROUND THRESHOLD VALUES WERE CALCULATED USING DATA FROM BACKGROUND GROUNDWATER SAMPLES COLLECTED FEBRUARY 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2019.



LEGEND

- WELL IN SHALLOW LAYER
- WELL IN DEEP LAYER
- WELL IN BEDROCK LAYER
- ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE ORIENTATION
- GENERALIZED BEDROCK FRACTURE ORIENTATION
- GENERALIZED GROUNDWATER FLOW DIRECTION
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- FILL
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- BEDROCK GROUNDWATER ELEVATION
- WELL SCREEN
- COMPLIANCE BOUNDARY

MEAN ARSENIC (As) CONCENTRATION (µg/L)
MEAN STRONTIUM (Sr) CONCENTRATION (µg/L)
MEAN VANADIUM (V) CONCENTRATION (µg/L)

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe	Mn	Re
14D	1.5	250	100	1.5
14D	1.5	250	100	1.5

GWA-14BR	Co	Fe	Mn	Re
14BR	1.5	250	100	1.5
14BR	1.5	250	100	1.5

IB-2AL	Co	Fe	Mn	Re
2AL	1.5	250	100	1.5
2AL	1.5	250	100	1.5

IB-21	Co	Fe	Mn	Re
21	1.5	250	100	1.5
21	1.5	250	100	1.5

IB-2BRU	Co	Fe	Mn	Re
2BRU	1.5	250	100	1.5
2BRU	1.5	250	100	1.5

IB-2SL	Co	Fe	Mn	Re
2SL	1.5	250	100	1.5
2SL	1.5	250	100	1.5

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe	Mn	Re
14D	1.5	250	100	1.5
14D	1.5	250	100	1.5

GWA-14BR	Co	Fe	Mn	Re
14BR	1.5	250	100	1.5
14BR	1.5	250	100	1.5

IB-2AL	Co	Fe	Mn	Re
2AL	1.5	250	100	1.5
2AL	1.5	250	100	1.5

IB-21	Co	Fe	Mn	Re
21	1.5	250	100	1.5
21	1.5	250	100	1.5

IB-2BRU	Co	Fe	Mn	Re
2BRU	1.5	250	100	1.5
2BRU	1.5	250	100	1.5

IB-2SL	Co	Fe	Mn	Re
2SL	1.5	250	100	1.5
2SL	1.5	250	100	1.5

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe	Mn	Re
14D	1.5	250	100	1.5
14D	1.5	250	100	1.5

GWA-14BR	Co	Fe	Mn	Re
14BR	1.5	250	100	1.5
14BR	1.5	250	100	1.5

IB-2AL	Co	Fe	Mn	Re
2AL	1.5	250	100	1.5
2AL	1.5	250	100	1.5

IB-21	Co	Fe	Mn	Re
21	1.5	250	100	1.5
21	1.5	250	100	1.5

IB-2BRU	Co	Fe	Mn	Re
2BRU	1.5	250	100	1.5
2BRU	1.5	250	100	1.5

IB-2SL	Co	Fe	Mn	Re
2SL	1.5	250	100	1.5
2SL	1.5	250	100	1.5

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe	Mn	Re
14D	1.5	250	100	1.5
14D	1.5	250	100	1.5

GWA-14BR	Co	Fe	Mn	Re
14BR	1.5	250	100	1.5
14BR	1.5	250	100	1.5

IB-2AL	Co	Fe	Mn	Re
2AL	1.5	250	100	1.5
2AL	1.5	250	100	1.5

IB-21	Co	Fe	Mn	Re
21	1.5	250	100	1.5
21	1.5	250	100	1.5

IB-2BRU	Co	Fe	Mn	Re
2BRU	1.5	250	100	1.5
2BRU	1.5	250	100	1.5

IB-2SL	Co	Fe	Mn	Re
2SL	1.5	250	100	1.5
2SL	1.5	250	100	1.5

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe	Mn	Re
14D	1.5	250	100	1.5
14D	1.5	250	100	1.5

GWA-14BR	Co	Fe	Mn	Re
14BR	1.5	250	100	1.5
14BR	1.5	250	100	1.5

IB-2AL	Co	Fe	Mn	Re
2AL	1.5	250	100	1.5
2AL	1.5	250	100	1.5

IB-21	Co	Fe	Mn	Re
21	1.5	250	100	1.5
21	1.5	250	100	1.5

IB-2BRU	Co	Fe	Mn	Re
2BRU	1.5	250	100	1.5
2BRU	1.5	250	100	1.5

IB-2SL	Co	Fe	Mn	Re
2SL	1.5	250	100	1.5
2SL	1.5	250	100	1.5

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe	Mn	Re
14D	1.5	250	100	1.5
14D	1.5	250	100	1.5

GWA-14BR	Co	Fe	Mn	Re
14BR	1.5	250	100	1.5
14BR	1.5	250	100	1.5

IB-2AL	Co	Fe	Mn	Re
2AL	1.5	250	100	1.5
2AL	1.5	250	100	1.5

IB-21	Co	Fe	Mn	Re
21	1.5	250	100	1.5
21	1.5	250	100	1.5

IB-2BRU	Co	Fe	Mn	Re
2BRU	1.5	250	100	1.5
2BRU	1.5	250	100	1.5

IB-2SL	Co	Fe	Mn	Re
2SL	1.5	250	100	1.5
2SL	1.5	250	100	1.5

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe	Mn	Re
14D	1.5	250	100	1.5
14D	1.5	250	100	1.5

GWA-14BR	Co	Fe	Mn	Re
14BR	1.5	250	100	1.5
14BR	1.5	250	100	1.5

IB-2AL	Co	Fe	Mn	Re
2AL	1.5	250	100	1.5
2AL	1.5	250	100	1.5

IB-21	Co	Fe	Mn	Re
21	1.5	250	100	1.5
21	1.5	250	100	1.5

IB-2BRU	Co	Fe	Mn	Re
2BRU	1.5	250	100	1.5
2BRU	1.5	250	100	1.5

IB-2SL	Co	Fe	Mn	Re
2SL	1.5	250	100	1.5
2SL	1.5	250	100	1.5

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe	Mn	Re
14D	1.5	250	100	1.5
14D	1.5	250	100	1.5

GWA-14BR	Co	Fe	Mn	Re
14BR	1.5	250	100	1.5
14BR	1.5	250	100	1.5

IB-2AL	Co	Fe	Mn	Re
2AL	1.5	250	100	1.5
2AL	1.5	250	100	1.5

IB-21	Co	Fe	Mn	Re
21	1.5	250	100	1.5
21	1.5	250	100	1.5

IB-2BRU	Co	Fe	Mn	Re
2BRU	1.5	250	100	1.5
2BRU	1.5	250	100	1.5

IB-2SL	Co	Fe	Mn	Re
2SL	1.5	250	100	1.5
2SL	1.5	250	100	1.5

GWA-14S	Co	Fe	Mn	Re
14S	1.5	250	100	1.5
14S	1.5	250	100	1.5

GWA-14D	Co	Fe</
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Note:
*sampling events prior to 1/1/2018

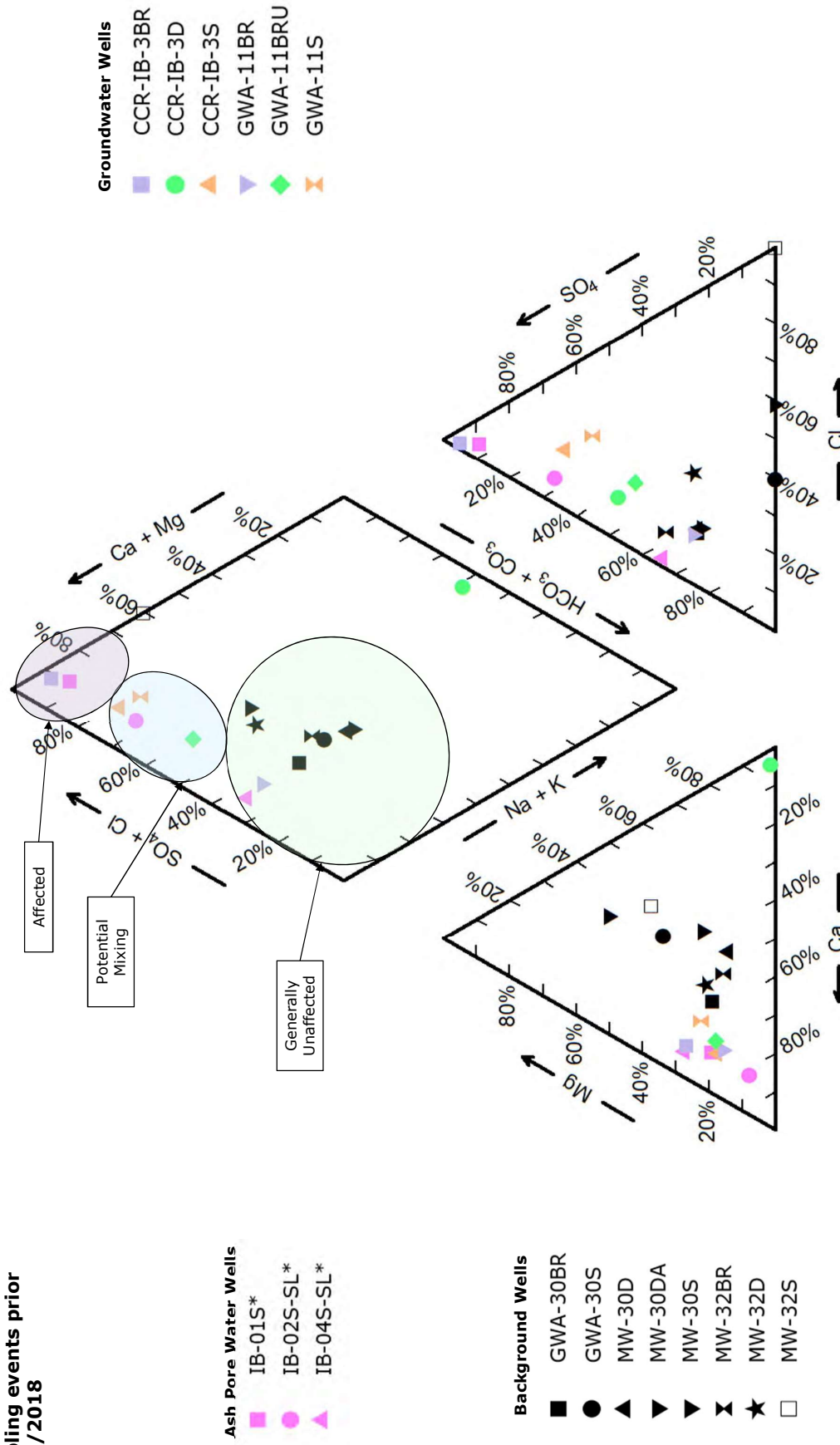
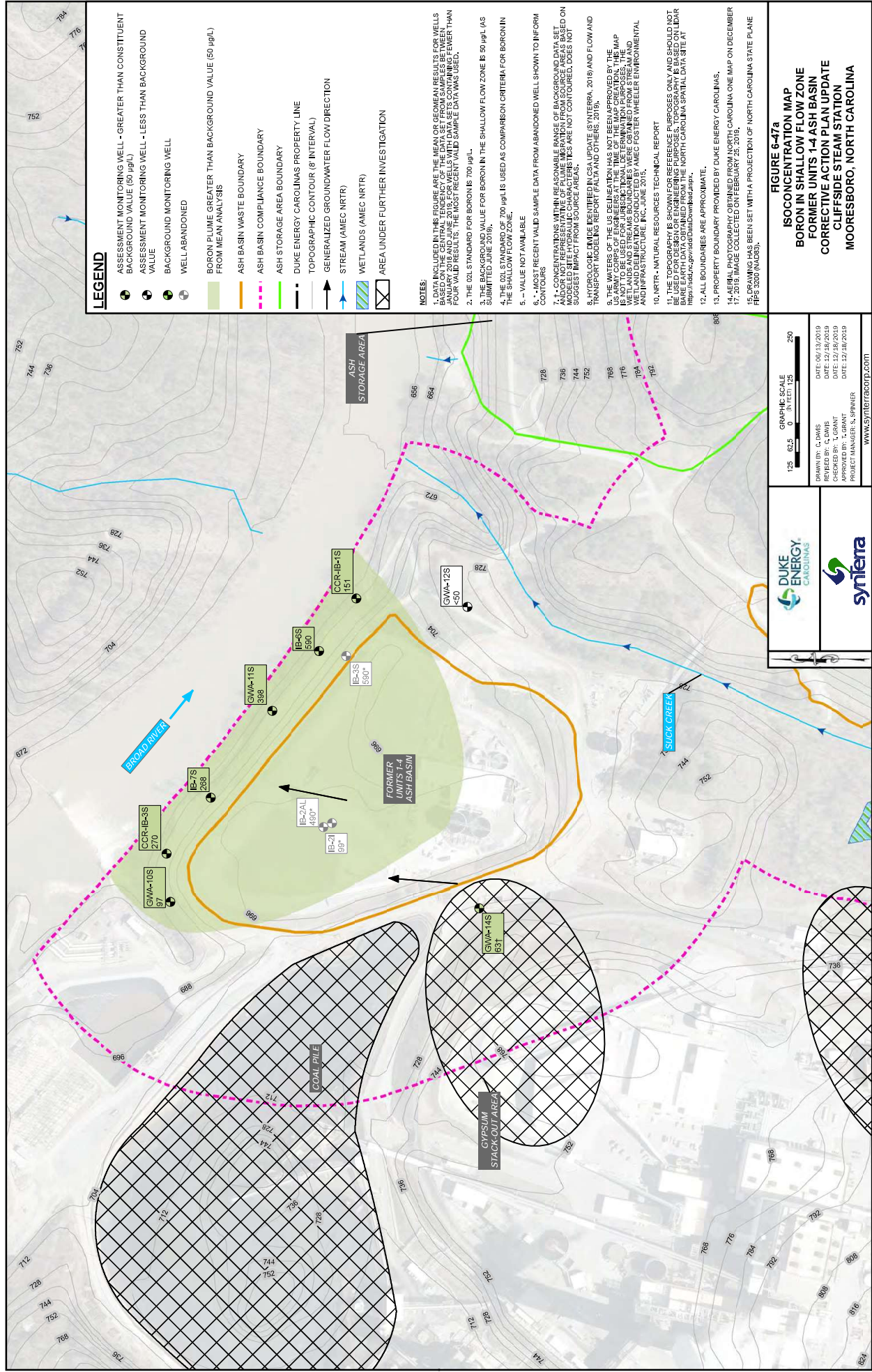


FIGURE 6-45
ASH PORE WATER AND
GROUNDWATER PIPER DIAGRAM
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

DRAWN BY: R. Badum
REVISED BY:
CHECKED BY: T. Grant
APPROVED BY: T. Grant
PROJECT MANAGER: S. Spinner

DATE: 12/4/2019

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LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NTR)
- WETLANDS (AMEC NTR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN FOUR VALID RESULTS. THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE QZL STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE SHALLOW FLOW ZONE IS 50 µg/L AS SUBMITTED JUNE 2019.
4. THE QZL STANDARD FOR BORON IN THE SHALLOW FLOW ZONE IS 50 µg/L AS SUBMITTED JUNE 2019.
5. - VALUE NOT AVAILABLE
6. - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. 1. - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET. MONITORING WELLS WITHIN THIS RANGE ARE NOT CONTOURED, DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC CONDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALIA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE DELINEATION IS FOR INFORMATIONAL PURPOSES ONLY. SYNTERRA AND DUKE ENERGY CAROLINAS ARE NOT RESPONSIBLE FOR ANY CONSEQUENCES OF ANY DELINEATION AND INFRASTRUCTURE INC. JUNE 2015.
10. NTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA FROM 2018. PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2018. IMAGE COLLECTED ON FEBRUARY 25, 2019.
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2018. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE, NAD83, 3200.

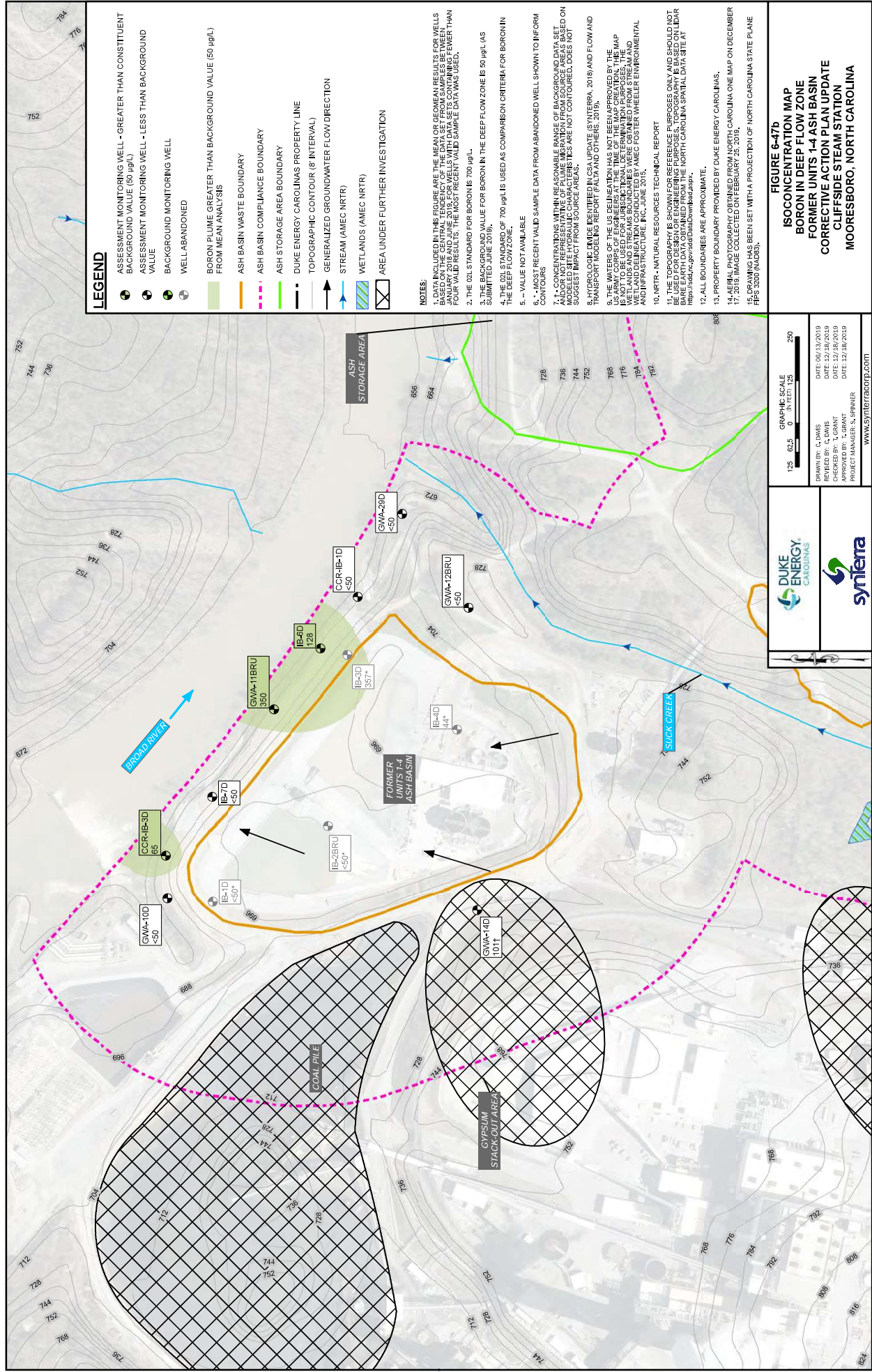


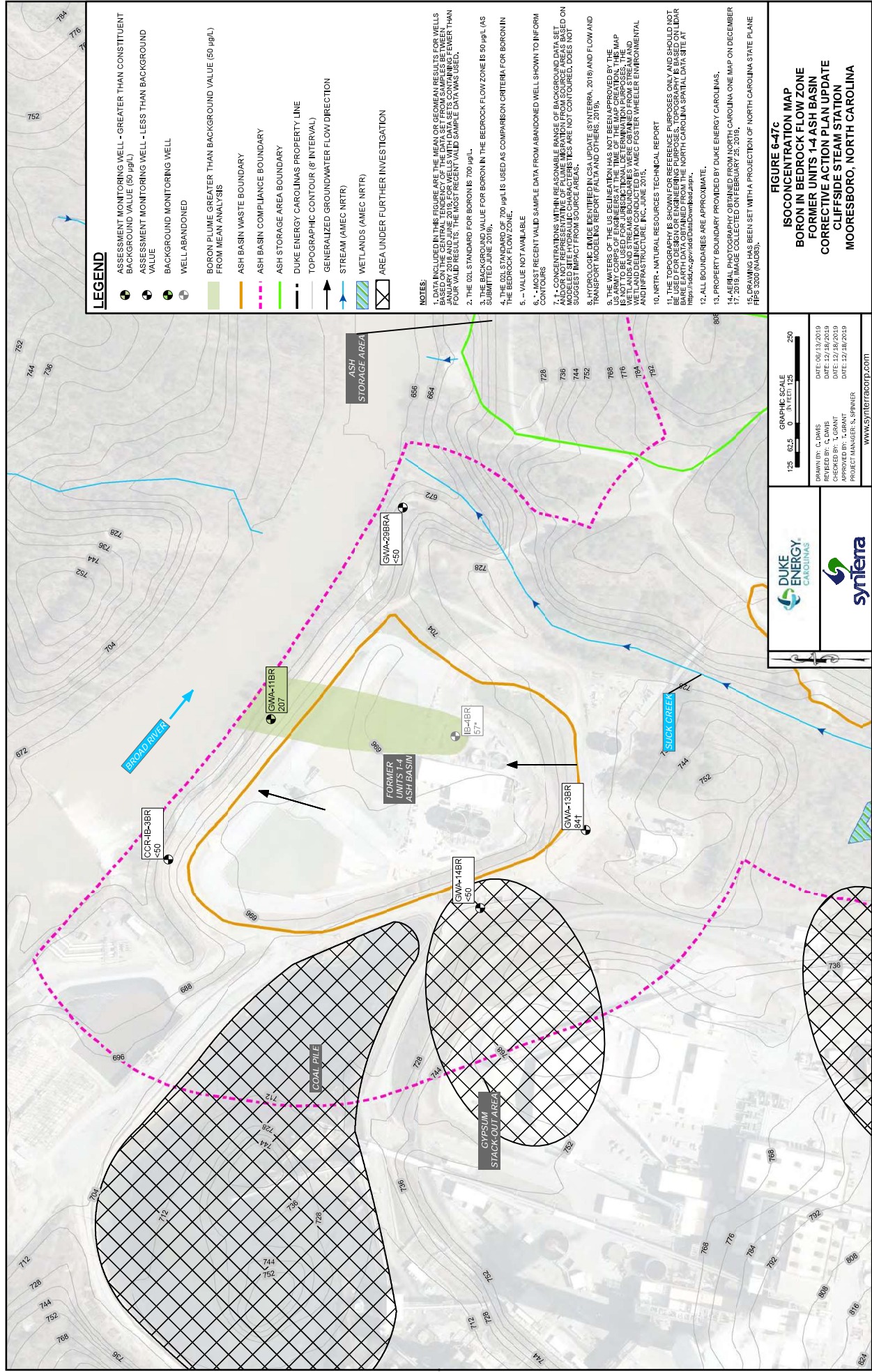
FIGURE 6-47a
ISOCONCENTRATION MAP
BORON IN SHALLOW FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

GRAPHIC SCALE: 1" = 60.5' (IN FEET) 1" = 250'

DATE: 06/12/2019
REVIEWED BY: C. DAVIS
CHECKED BY: T. GRANT
APPROVED BY: T. GRANT
PROJECT MANAGER: S. SPRINGER

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LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NTR)
- WETLANDS (AMEC NTR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN FOUR VALID RESULTS. THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE OEL STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE BEDROCK FLOW ZONE IS 50 µg/L AS SUBMITTED JUNE 2019.
4. THE OEL STANDARD OF 700 µg/L IS USED AS COMPARISON CRITERIA FOR BORON IN THE BEDROCK FLOW ZONE.
5. - VALUE NOT AVAILABLE
6. - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. 1. - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET. MONITORING WELLS WITHIN THIS RANGE ARE NOT CONTOURED, DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC UNITS IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALIA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE DELINEATION IS FOR INFORMATIONAL PURPOSES ONLY. SYNTERRA AND AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE INC. JUNE 2015.
10. NTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA PROVIDED BY DUKE ENERGY CAROLINAS.
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2018. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE NAD83 3200 (NAD83).

FIGURE 6-47C

ISOCONCENTRATION MAP

BORON IN BEDROCK FLOW ZONE

FORMER UNITS 1-4 ASH BASIN

CORRECTIVE ACTION PLAN UPDATE

CLIFFSIDE STEAM STATION

MOORESBORO, NORTH CAROLINA

GRAPHIC SCALE

125 62.5 0 62.5 125

IN FEET 125

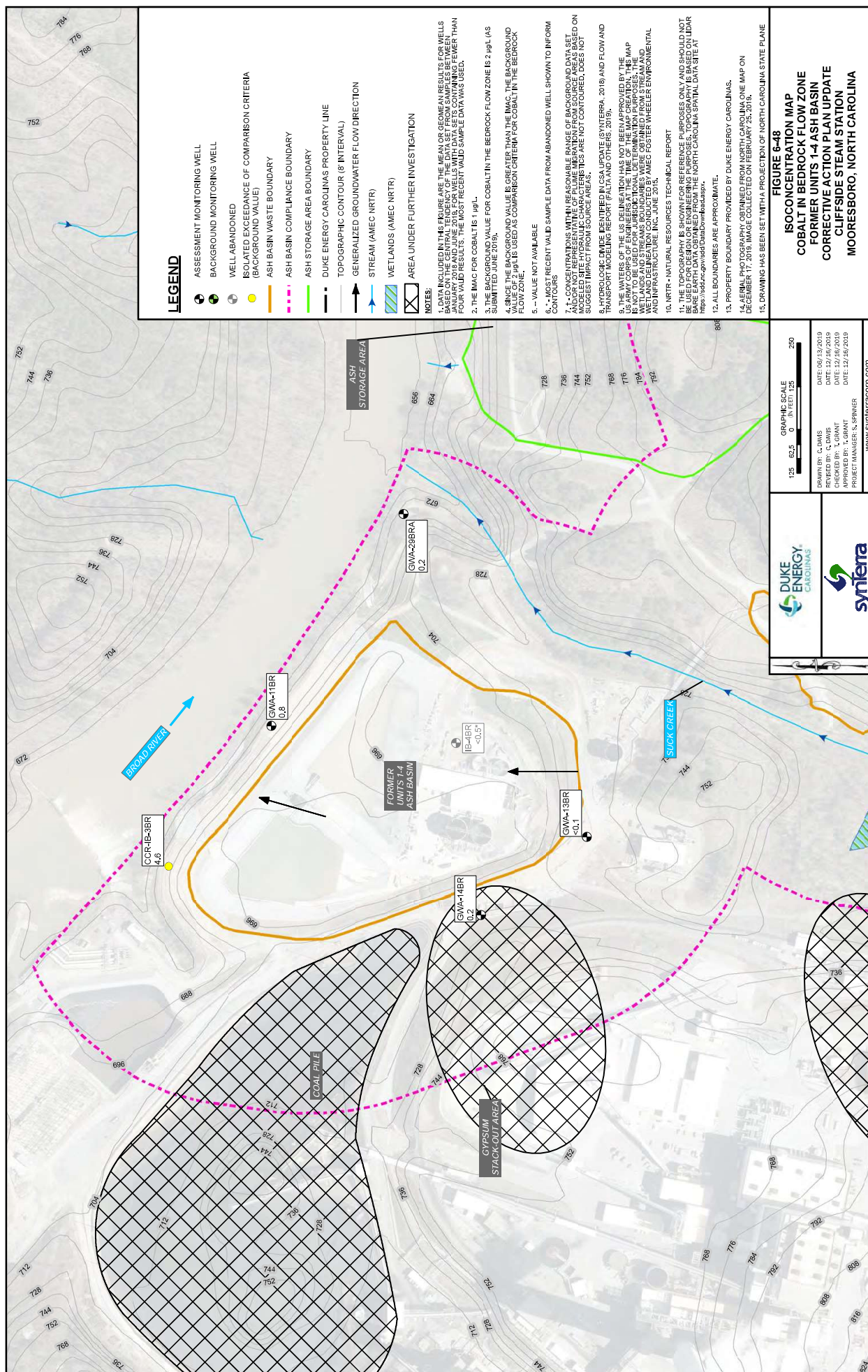
DUKE ENERGY CAROLINAS

synterra

DATE: 06/13/2019
REVIEWED BY: C. DAVIS
CHECKED BY: T. GRANT
APPROVED BY: T. GRANT
PROJECT NUMBER: S. SPRINGER

DATE: 12/18/2019
DATE: 12/18/2019
DATE: 12/18/2019

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LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NTRR)
- WETLANDS (AMEC NTRR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:
1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMETRIC MEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2018. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR SAMPLES, THE MOST RECENT VALID SAMPLE DATA WAS USED.

2. THE IMAC FOR COBALT IS 1.1 µg/L.

3. THE BACKGROUND VALUE FOR COBALT IN THE BEDROCK FLOW ZONE IS 2 µg/L (AS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2018).

4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE IMAC, THE BACKGROUND VALUE OF 2 µg/L IS USED AS COMPARISON CRITERIA FOR COBALT IN THE BEDROCK FLOW ZONE.

5. - VALUE NOT AVAILABLE

6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS

7. 1. CO-CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET WERE USED TO DETERMINE THE MOST RECENT VALID SAMPLE DATA WAS USED TO SUGGEST IMPACT FROM SOURCE AREAS.

8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALCA AND OTHERS, 2019).

9. THE WATERS OF THE US DELINEATION HAS NOT BEEN PROVIDED BY THE US ARMY CORPS OF ENGINEERS. THE DELINEATION IS BASED ON THE 1:250,000 SCALE MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE DELINEATION IS BASED ON THE 1:250,000 SCALE MAP AND IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES.

10. NTRR - NATURAL RESOURCES TECHNICAL REPORT

11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. THE TOPOGRAPHY IS BASED ON LIDAR DATA FROM 2018. THE TOPOGRAPHY IS BASED ON LIDAR DATA FROM 2018.

12. ALL BOUNDARIES ARE APPROXIMATE.

13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.

14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2018. IMAGE COLLECTED ON FEBRUARY 25, 2019.

15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE.

FIGURE 6-48

ISOCONCENTRATION MAP

COBALT IN BEDROCK FLOW ZONE

FORMER UNITS 1-4 ASH BASIN

CORRECTIVE ACTION PLAN UPDATE

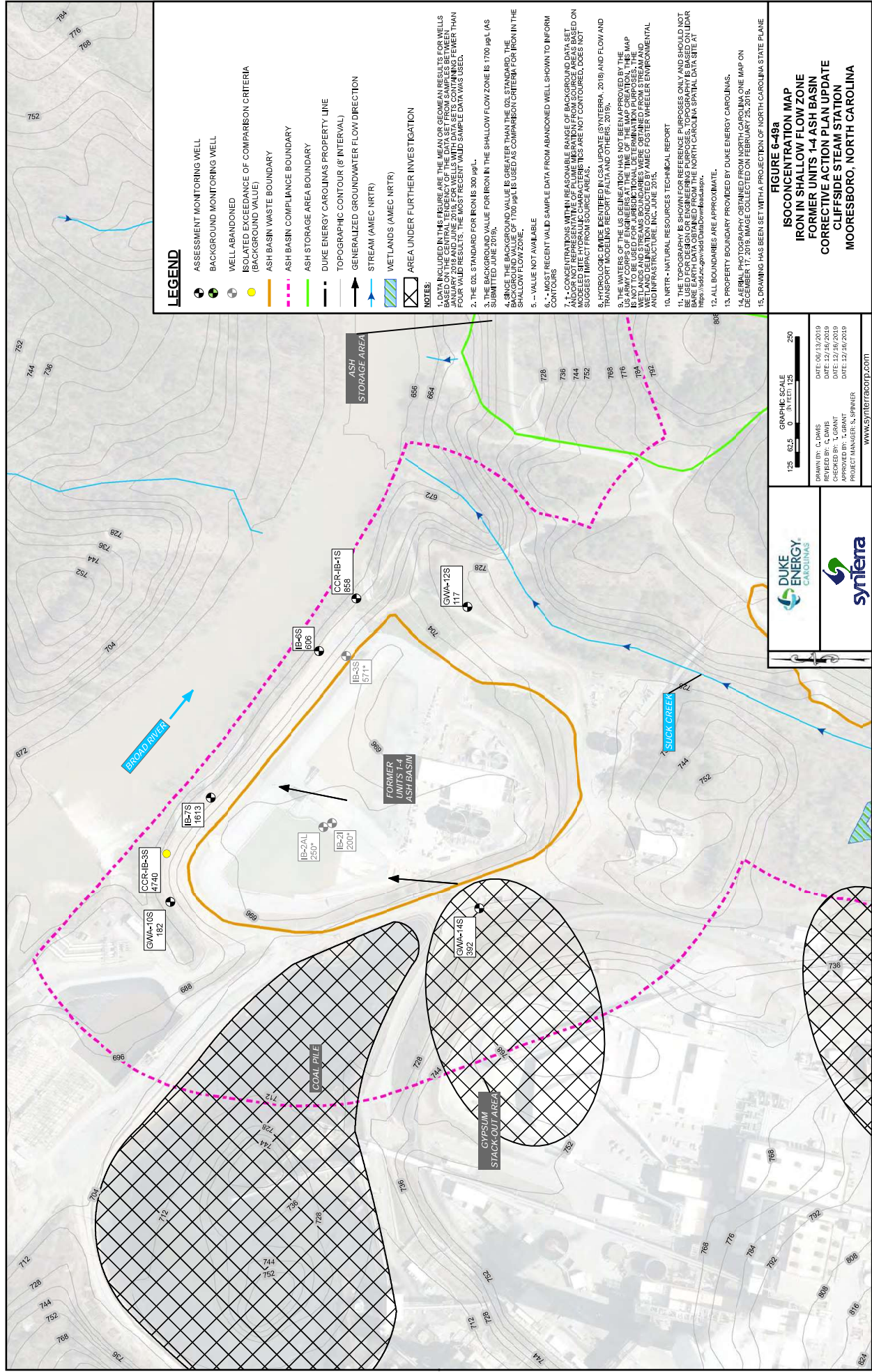
CLIFFSIDE STEAM STATION

MOORESBORO, NORTH CAROLINA

GRAPHIC SCALE
125 62.5 0 (IN FEET) 125 250

DRAWN BY: C. DAVIS
DATE: 06/12/2019
CHECKED BY: T. GRANT
DATE: 12/16/2019
APPROVED BY: T. GRANT
DATE: 12/16/2019
PROJECT NUMBER: S. SPRINGER
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LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NTR)
- WETLANDS (AMEC NTR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS REPORT ARE THE MEAN OR GEOMETRIC RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2018. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR ANALYSES, THE MEAN OR GEOMETRIC RESULTS FROM THE PRESENT VALID SAMPLE DATA WERE USED.
2. THE DCL STANDARD VALUE FOR IRON IS 300 µg/L.
3. THE BACKGROUND VALUE FOR IRON IN THE SHALLOW FLOW ZONE IS 1700 µg/L (AS DETERMINED BY THE US GEOLOGICAL SURVEY).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE GSI STANDARD, THE BACKGROUND VALUE OF 1700 µg/L IS USED AS A COMPARISON CRITERION FOR IRON IN THE SHALLOW FLOW ZONE.
5. - VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM AN ABANDONED WELL SHOWN TO INFORM CONTOURS
7. 1. CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET WERE NOT USED FOR CONTOURING PURPOSES. CONTOURING WAS BASED ON THE MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALCA AND OTHERS, 2019).
9. WATERS OF THE US DELINEATION HAS NOT BEEN PROVIDED BY THE US GEOLOGICAL SURVEY. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLAND DELINEATION CONDUCTED BY AMEC FORSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
10. NTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BACKGROUND DATA OBTAINED FROM NORTH CAROLINA STATE MAP ON DECEMBER 17, 2018. IMAGE COLLECTED ON FEBRUARY 25, 2019.
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA STATE MAP ON DECEMBER 17, 2018. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE.



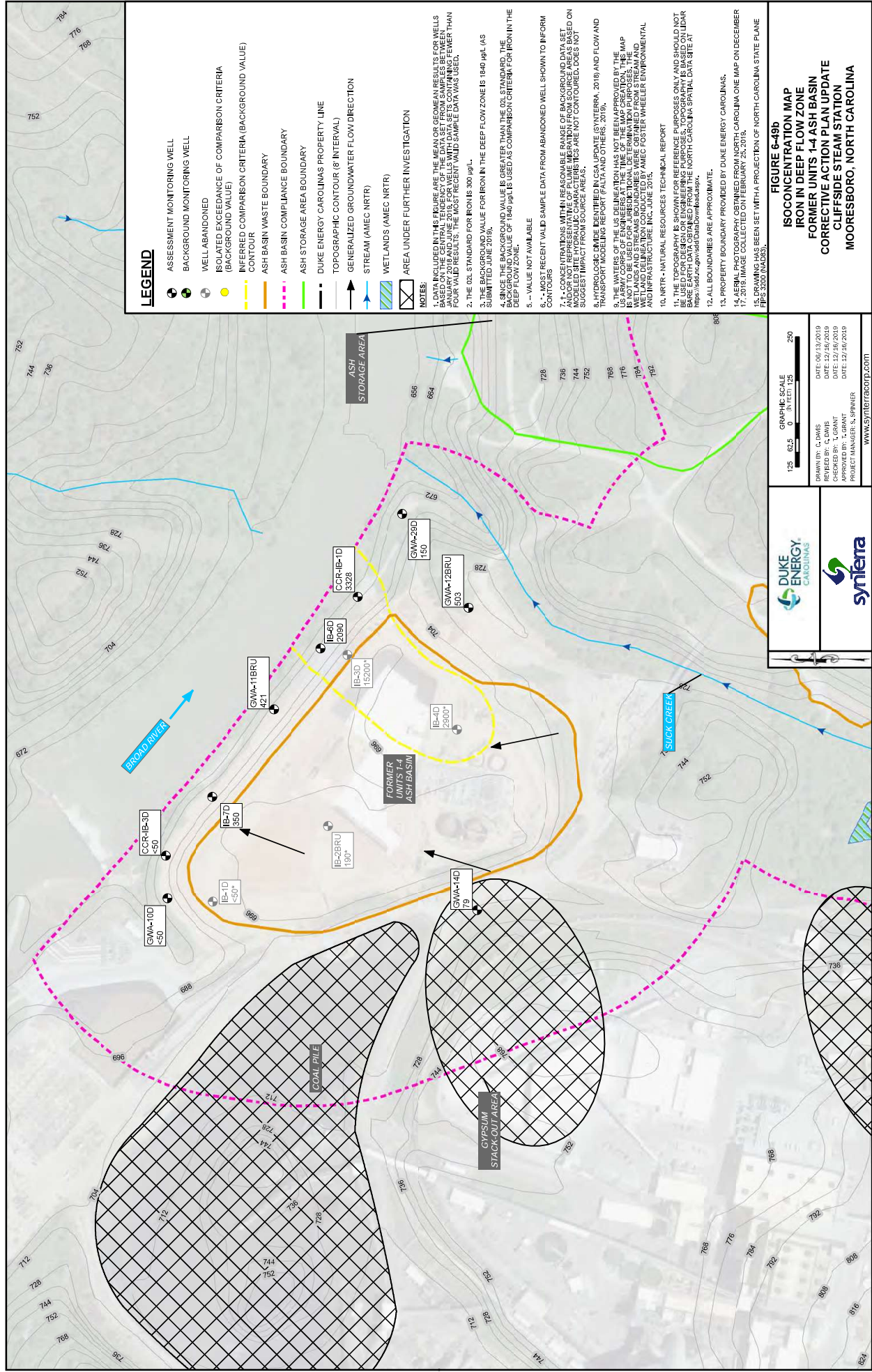
GRAPHIC SCALE: 1" = 60.5' (IN FEET) 1" = 250'

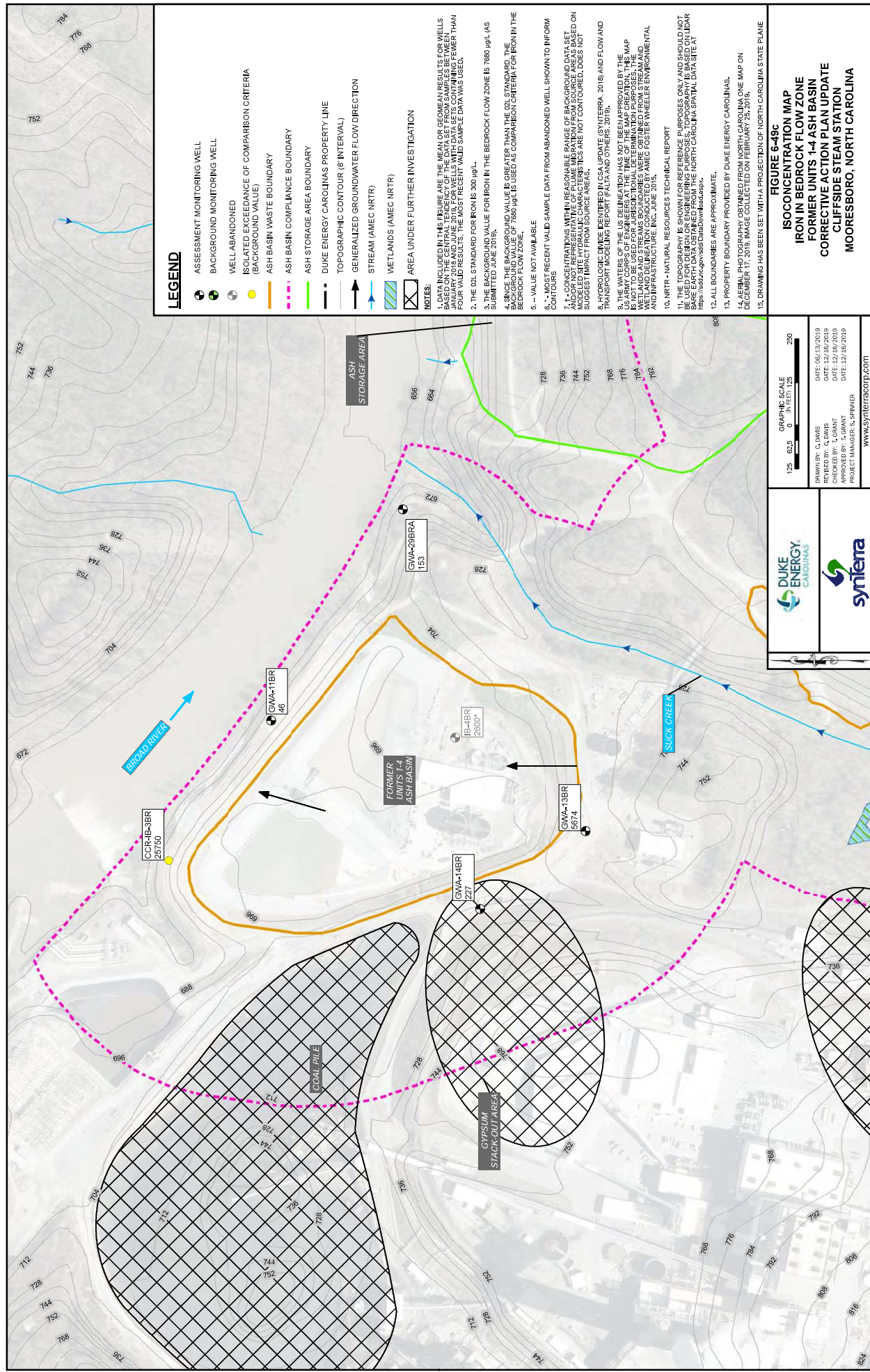
DRAWN BY: C. DAVIS
CHECKED BY: T. GRANT
APPROVED BY: T. GRANT
PROJECT NUMBER: S. SPRINGER

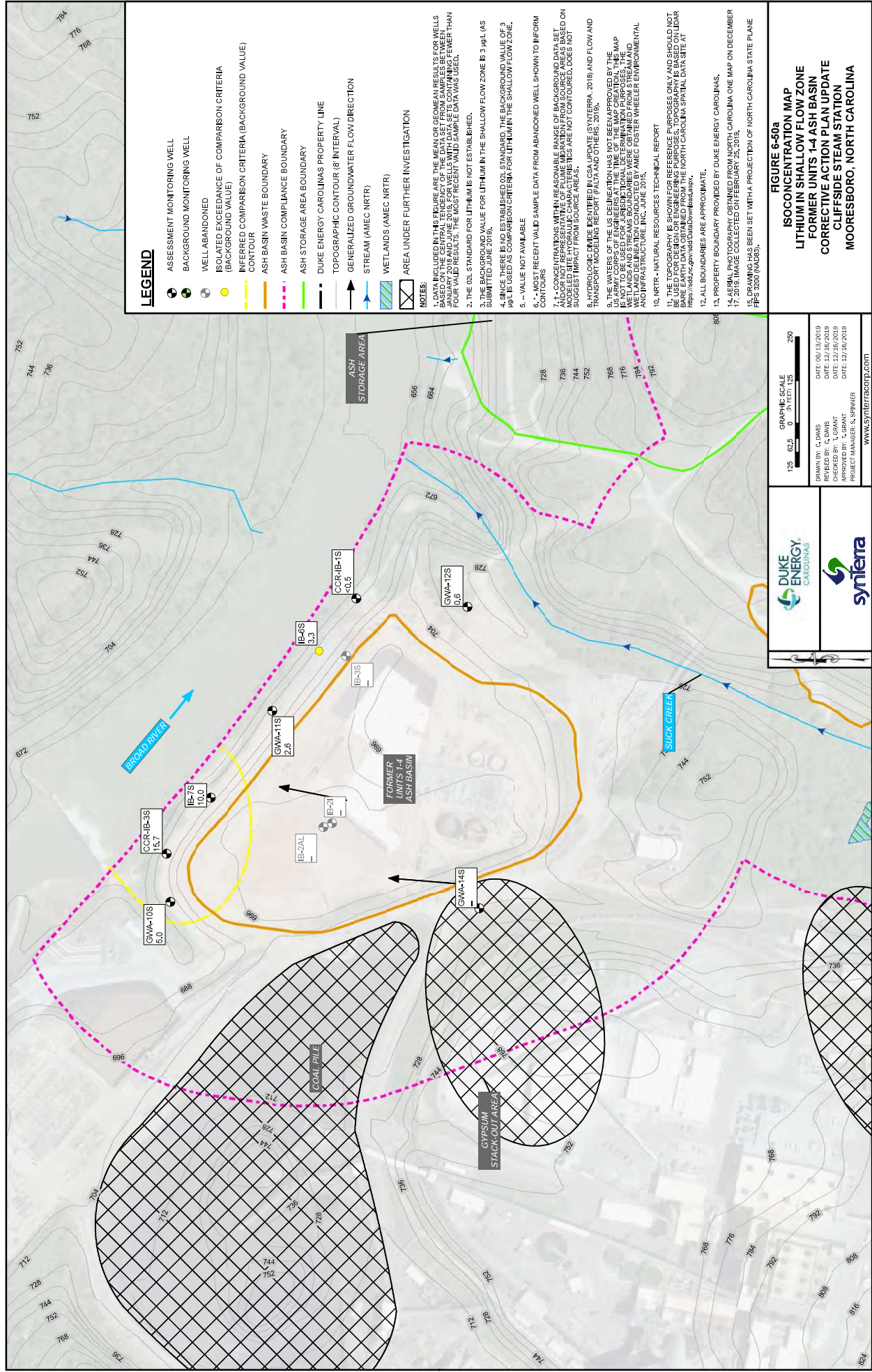
DATE: 06/13/2019
DATE: 12/16/2019
DATE: 12/16/2019

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FIGURE 6-49a
ISOCONCENTRATION MAP
IRON IN SHALLOW FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA







LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NTR)
- WETLANDS (AMEC NTR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN FOUR VALID RESULTS. THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE DOL STANDARD FOR LITHIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR LITHIUM IN THE SHALLOW FLOW ZONE IS 3 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED DOL STANDARD, THE BACKGROUND VALUE OF 3 µg/L IS USED AS COMPARISON CRITERIA FOR LITHIUM IN THE SHALLOW FLOW ZONE.
5. - VALUE NOT AVAILABLE
6. - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. 1. CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET. ADDITIONAL MONITORING WELLS WERE IDENTIFIED AND MONITORED TO DETERMINE MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIME IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALCA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE U.S. ARMY CORPS OF ENGINEERS. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WATERS OF THE US DELINEATION IS FOR INFORMATIONAL PURPOSES ONLY. WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
10. NTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR DATA FROM THE STATE OF NORTH CAROLINA. SPATIAL DATA URL: <https://sdata.nc.gov/sdata/DataDownload.aspx>.
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2018. IMAGE COLLECTED ON FEBRUARY 23, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

FIGURE 6-50a

ISOCONCENTRATION MAP
LITHIUM IN SHALLOW FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

GRAPHIC SCALE
125 62.5 0 (IN FEET) 125

DRAWN BY: C. DAVIS
DATE: 06/12/2019
REVIEWED BY: C. DAVIS
DATE: 12/16/2019
APPROVED BY: T. GRANT
DATE: 12/16/2019
PROJECT MANAGER: S. SPRINGER

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