Dan River Steam Station
Stormwater Diversion Project and Associated Projects
Section 404 Individual Permit Support

Prepared for:

Dan River Steam Station
Eden, North Carolina

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LIST OF ABBREVIATIONS AND ACRONYMS

amsl	above mean sea level
BMPs	best management practices
CAMA	Coal Ash Management Act of 2014
CC	Combined Cycle
CCR	Coal Combustion Residual
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DFIRM	Digital Flood Insurance Rate Map
DR 131	Dan River 131 Project
DR 134	Dan River 134 Project
ECOS	Environmental Conservation Online System
EO	Executive Order
ESA	Endangered Species Act
E&SC	Erosion & Sediment Control
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GIS	geographic information system
gpm	gallons per minute
HDPE	high-density polyethylene
HUC	Hydrologic Unit Code
IP	Individual Permit
IPaC	Information for Planning and Conservation
JD	Jurisdictional Determination
Ldn	Day/Night Levels
MBTA	Migratory Bird Treaty Act
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NCAC	North Carolina Administrative Code
NCDEQ	North Carolina Department of Environmental Quality
NCDMS	North Carolina Division of Mitigation Services
NCDWR	North Carolina Division of Water Resources
NCNHP	North Carolina Natural Heritage Program
NC SAM	North Carolina Stream Assessment Method
NCSHPO	North Carolina State Historic Preservation Office
NC WAM	North Carolina Wetlands Assessment Method
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NO2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System

NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
OHWM	ordinary high water mark
O3	ozone
PAB	Primary Ash Basin
%	percent
PM2.5	fine particulate matter
PM10	particulate matter
PRM	permittee-responsible mitigation
RCP	reinforced concrete pipe
SAB	Secondary Ash Basin
SO2	Sulfur dioxide
SOP	USACE Standard Operating Procedures for the Regulatory Program
UFA	upland flow area
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WSA-1	water storage area 1
WSA-2	water storage area 2
WSA-3	water storage area 3
WMP	Wetland Master Plan

EXECUTIVE SUMMARY

Stormwater Diversion Project

The Dan River Steam Station is a 620 megawatt (MW) combined cycle (CC) power generating facility. The station is located near the southeastern side of the City of Eden in northern Rockingham County. On August 20, 2014, the North Carolina General Assembly passed S 729, the Coal Ash Management Act of 2014 (CAMA), requiring Duke Energy to phase out wet ash handling. Under CAMA, all coal ash in the state will be covered by North Carolina's solid waste laws. At the Dan River Steam Station, Duke Energy has initiated the process to transport some of the coal ash from the Dan River Steam Station to an existing lined landfill in Jetersville, Virginia. Presently, the excavation and disposal of coal combustion residual (CCR) materials from areas of ash fill will entail the diversion of stormwater to facilitate these actions. Specifically, the implementation of stormwater diversion will require removal of ash from an existing dredge basin, construction of a soil divider berm, and construction of five pipelines. The proposed method for implementing stormwater diversion will incorporate a pump-around operation.

The purpose of the Stormwater Diversion Project is to divert stormwater to facilitate the excavation and disposal of CCR materials from areas of ash fill within the Dan River Steam Station. This purpose is based on the following needs:

1. Address North Carolina regulatory requirements related to diverting stormwater away from the Primary Ash Basin (PAB) and Secondary Ash Basin (SAB), and disposal of CCR materials
2. Provide separation between water that has contacted CCR material (contact water) and water that has not contacted CCR material (non-contact water)
3. Increase safety by improving site access

The Project components include the following: divider berm; upland flow area (UFA); three water storage areas (WSA), including WSA-1, WSA-2, and WSA-3; and five Pipe Lines, including Pipe Lines 1, 2, 3, 4 and 5. The Project must adhere to federal and state water quality standards during the diversion of stormwater. Therefore, the Project has been designed to provide separation between water that has contacted CCR material (contact water) and water that has not contacted

CCR material (non-contact water). Specifically, a divider berm will be created to provide separation of contact and non-contact water during CCR removal activities. The implementation of stormwater diversion will require removal of ash from an existing dredge basin (located between the current footprints of Ash Fill 1 and Ash Fill 2), construction of a soil divider berm, and construction of five pipelines. The diversion of stormwater is a significant element of the overall process to excavate and remove CCR materials from the Dan River Steam Station.

The impetus for the alternatives analysis for the Project is the need for the diversion of stormwater, as linked to the CAMA compliance requirement. The alternatives analysis comprises the set of three action alternatives for the diversion of stormwater: the pump-around alternative (400 gallons per minute [gpm]), the high-volumetric flow rate pump-around alternative (49,000 gpm), and the gravity alternative. These three alternatives were examined with respect to project practicability limits and the need to avoid and/or minimize impacts to waters of the U.S.

The wetland impacts associated with WSA-2 (0.11 acre) have previously been permitted by the USACE. This impact is common to all three action alternatives. The proposed wetland impact associated with WSA-3 (0.19 acre) would occur under all action alternatives. The proposed impact to the dredge basin (1.89 acres) associated with WSA-1 would also occur under all action alternatives. The remaining Project component, the UFA, is the only component where the wetland and stream impacts are dissimilar. Under the pump-around alternative (400 gpm), the proposed impacts for the UFA due to overflooding would be 0.22 acre of wetlands and 393 linear feet of stream. No impacts to wetlands or streams would occur under the high-volumetric flow rate pump-around alternative (49,000 gpm) for the UFA. Similarly, no impacts to wetlands or streams would occur under the gravity alternative for the UFA. All impacts to wetlands, streams and the dredge basin under all three action alternatives would be permanent. Although the pump-around alternative (400 gpm) would have more stream and wetland impacts than the gravity alternative, the pump-around alternative is the preferred approach because:

1. The gravity pipe option requires routing a pipe below contact water storage area WSA-1. The NCDEQ has expressed reservations about routing any new pipe beneath a contact water storage area.

2. The gravity pipe option requires routing a pipe within an existing ash basin which would pose the following challenges:
    a. Pipe routing would be within an existing CCR unit footprint.
    b. Preventing damage of the gravity pipe during adjacent CCR removal activities could be challenging.
    c. Pipe construction would remove existing access routes around the dam.
    d. Additional controls such as thrust blocks and anti-flotation counter-measures would be required.
3. The gravity pipe option would require a breach through the regulatory dam embankment.
4. The gravity pipe system has a higher susceptibility to damage due to proximity of future construction, greater environmental consequences of a failure due to proximity of contact water sources, and would require more maintenance when compared to the piping for the pump-around option.

The high-volumetric flow rate pump-around alternative was considered to be highly problematic and was subsequently dismissed during the preliminary examination of stormwater diversion options. The principal difference between the two pump-around alternatives is the rate of water that would be pumped; i.e., 49,000 gpm under the high-volumetric flow rate pump-around alternative compared to 400 gpm for the pump-around alternative. Although it is theoretically possible to provide a pump system with a capacity of 49,000 gpm, such a solution would not be practical because it would require either several industrial-grade pumps or a large number of traditional pumps. The costs for pump and fuel are estimated to be approximately $6M over a four year period. The power supply would come from a diesel generator which would require fueling, dual containment, and numerous maintenance checks. As such, power supply would be problematic and the pumping system would be cost-prohibitive to install and maintain.

Compensatory mitigation for the proposed impacts to the waters of the U.S. is required under the Section 404 IP. Appropriate avoidance and practicable minimization efforts have been conducted through the analysis of alternative stormwater diversion plan concepts. However, unavoidable impacts to onsite waters of the U.S. are necessary to complete the proposed action. The compensatory mitigation options evaluated for the Project included (1) credit purchase from an approved private mitigation bank, (2) credit purchase through the North Carolina Division of

Mitigation Services (NCDMS) In-Lieu Fee Program, (3) in-kind restoration and enhancement of onsite wetlands and/or stream restoration (PRM), and/or (4) in-kind restoration and enhancement of offsite wetlands and/or stream restoration. Based on the review of the mitigation options available, it was determined that credit purchase through the NCDMS In-Lieu Fee Program was the most viable option to obtain compensatory mitigation for impacts to waters of the U.S. from the Project. There are no mitigation banks offering wetlands and stream credits in the Roanoke River basin at the present time. Onsite mitigation and offsite mitigation opportunities were not explored because the In-Lieu Fee option was already available. The Dan River Steam Station occurs within Hydrologic Unit Code (HUC) 03010103. This HUC is not subject to higher fees within the Roanoke River basin. The exact amount of wetland and stream credits to be purchased, along with the associated cost, will be determined from negotiations with the USACE during the review of the IP application.

The "affected environment" (Project footprint) for the pump-around operation includes the aforementioned Project components. The Project will impact jurisdictional wetlands and streams within the affected environment. However, there will be no adverse effect to land use, geology and topography, soils, terrestrial communities, floodplains, surface waters (rivers and lakes), and groundwater within the Project footprint or the steam station property.

Dan River 134 Project

The Dan River (DR) 134 Project will entail streambank stabilization for a perennial stream located along the eastern boundary of the Dan River Steam Station near its confluence with the Dan River. A portion of the western streambank is eroding with some undercutting occurring along the toe of the bank. The area of streambank instability occurs between two culverted road crossings. It is along this area of instability that rip-rap will be placed to armor the bank to prevent further erosion and stabilize the streambank. Without the proposed action, the streambank would continue to erode and the stability of the bank would continue to decline. Undercutting along the toe of the bank would also contribute to the degradation of the stream. Without the proposed action, the eroded sediment material would be transported directly downstream to the Dan River.

The DR 134 Project will result in an impact of 130 linear feet to a perennial stream from the placement of rip-rap below the Ordinary High Water Mark (OHWM). The rip-rap will be placed along the western bank of the stream between the two culverted road crossings. The impact will be permanent. Separate from the proposed action to stabilize the western bank of the perennial stream was the installation of a culvert at each of the two road crossings of the stream in March of 2016. The USACE authorized the installation of the culverts through a Nationwide Permit, NWP 13, (Action ID SAW-2016-00331) issued on February 18, 2016. The impacts to the stream were identified as temporary in the NWP 13. The impacts are henceforth included in this IP application as permanent. The culverted road crossings were created to facilitate vehicle and equipment access to the northern shoreline of the Dan River. The two culverts will not be removed and the stream will not be restored (via contour reshaping, etc.) to the pre-impact condition. The impact to the stream from the installation of the two culverts comprised 86 linear feet; i.e., 43 linear feet of impact for the northern road crossing and 43 linear feet of impact for the southern road crossing. Compensatory mitigation for these impacts will be obtained through the NCDMS In-Lieu Fee Program. The exact amount of stream credits to be purchased, along with the associated cost, will be determined from negotiations with the USACE during the review of the IP application.

Dan River 131 Project

The DR 131 Project is located at the southernmost road crossing of the two culverted road crossings identified in the DR 134 Project. The proposed action will entail the extension of the culvert pipe downstream to raise the elevation of the crest of the southern road crossing and thus provide a more permanent and stable approach for vehicles and equipment. A permanent and stable approach through the southern road crossing will provide safe access to the northern shoreline of the Dan River. Access to the northern shoreline is necessary for scarp repair, as needed, during the closure of the ash basins and the transport of coal ash from the steam station via a barge loadout area. Therefore, the two road crossings will be maintained indefinitely for future necessity and emergency access to this area.

The DR 131 Project will result in permanent impact of 15 linear feet to the perennial stream from the extension downstream of the culvert pipe at the southern road crossing of the stream.

This impact of 15 linear feet is in addition to the 43 linear feet of impact for the southern road crossing during the March 2016 culvert installation referenced above (Action ID SAW-2016-00331).. Compensatory mitigation for the impact will be obtained through the NCDMS In-Lieu Fee Program. The exact amount of stream credits to be purchased, along with the associated cost, will be determined from negotiations with the USACE during the review of the IP application.

36-Inch Pipe Closure Project

The 36-Inch Pipe Closure Project is a previously permitted project at the Dan River Steam Station. The USACE issued Action ID SAW-2014-01477 on September 29, 2014, for NWP 18. The issued NWP 18 (Minor Discharges) authorized wetland and stream impacts (permanent) resulting from overflooding. The project activities entailed closing (grouting) a 36-inch corrugated metal pipe that transported flow under the Primary Ash Basin (PAB). The impacts to jurisdictional waters also included the establishment of a cofferdam for the grout installation. Pumped flows are discharged to the Dan River through the outfall structure at National Pollutant Discharge Elimination System (NPDES) outfall 002. Although the project was previously permitted under NWP, the proposed action will not be completed prior to the close-out of the ash basins and the expiration of the issued NWP; therefore, the impacts to the jurisdictional waters have been included in the IP application herein. Compensatory mitigation for the impacts to 0.098 acre of wetland and 65 linear feet of stream associated with the 36-Inch Pipe Closure Project is included in this WMP. Compensatory mitigation for the impacts will be obtained through the NCDMS In-Lieu Fee Program.

48-Inch Pipe Closure Project

The 48-Inch Pipe Closure Project is a previously permitted project at the Dan River Steam Station. The USACE issued Action ID SAW-2015-01670 on July 31, 2015, for NWP 18. The issued NWP 18 authorized wetland and stream impacts (permanent) resulting from overflooding. The project activities entailed the clean-up of ash and the impoundment of stormwater at the grouted 48-inch reinforced concrete pipe. Pumped flows are discharged to the Service Water Settling Pond by way of existing piping to a new storm water outfall. Although the project was

previously permitted under NWP, the proposed action will not be completed prior to the close out of the ash basins and the expiration of the issued NWP; therefore, the impacts to the jurisdictional waters have been included in the IP application herein. Compensatory mitigation for the impacts to 0.407 acre of wetlands and 448 linear feet of stream associated with the 48-Inch Pipe Closure Project is included in this WMP. Compensatory mitigation for the impacts will be obtained through the NCDMS In-Lieu Fee Program.

No federally listed, threatened or endangered, animal or plant species were observed by Amec Foster Wheeler during field reconnaissance at the Dan River Steam Station in 2016. The quality of the existing habitat in the Project area is presumed to be less than suitable, or not present, for the listed species with a potential for occurrence in Rockingham County. The listed species included James spinymussel (*Pleurobema collina*), Roanoke logperch (*Percina rex*), and Smooth coneflower (*Echinacea laevigata*), each federally endangered. The results of a query of the North Carolina Natural Heritage Program database included no reported elemental occurrences for these three species within a one-mile radius of the Dan River Steam Station. The implementation of stormwater diversion operations would have no effect on these species or their habitat.

Section 404 of the CWA requires that projects authorized by the USACE do not adversely affect historical properties which are listed or eligible for listing on the National Register of Historic Places (NRHP). Cultural resources are protected by Section 106 of the National Historic Preservation Act (NHPA). Amec Foster Wheeler conducted a cultural resource screening to assess the presence/absence of known cultural resources and NRHP listed resources within a half-mile search radius of the Dan River Steam Station. The screening included a review of available data from the North Carolina State Historic Preservation Office (NCSHPO) online Web GIS Service. No structures or Districts were listed on the NRHP within the Project area or within a half-mile radius. According to the North Carolina Office of State Archaeology records, at least a portion of the Project area has been surveyed for archaeological resources; however, no archaeological remains were discovered during the survey effort. The implementation of stormwater diversion operations is not expected to have an effect on cultural resources or historical properties.

Environmental justice considers sensitive minority and low-income populations in the community to determine whether the proposed action and its alternatives may have a disproportionately high and adverse human health or environmental effect on those populations. Environmental justice analysis is conducted in compliance with Executive Order (EO) 12898. Amec Foster Wheeler examined 2015 U.S. Census Bureau (USCB) data to determine minority and low-income population percentages in the affected area of the Project to facilitate the qualitative assessment of potential environmental justice impacts from the Project. Rockingham County was found to be above average for poverty level and Hispanic, black, American Indian and Alaskan native for several census tracts. None of the two census tracts in Eden had above average levels for these five categories according to the USCB census tract data for Eden and Rockingham County. The two census tracts within the City of Eden have not met the criteria for environmental justice. With these considerations, the implementation of the stormwater diversion operations at the Dan River Steam Station should have no effect on environmental justice for the surrounding residential communities.

Noise is sound that is produced at levels that can be harmful and may be considered as unwanted by the surrounding community, properties and residences. The Noise Control Act of 1972 and EO 12088 require that federal agencies assess the impact of noise to the environment. Distance rapidly attenuates noise; therefore, it is not anticipated that the proposed stormwater diversion operations will occur close enough to existing residential areas to the north and the west of the Project area to cause disturbances. In addition, stormwater diversion operations would occur during daytime hours when residents are away from their homes and would be less disturbed than nighttime hours; therefore, those living in the vicinity of the Dan River Steam Station are not likely to be affected by noise generated by the Project. Because of the absence of noise-sensitive land uses (i.e., religious, commercial, retail, residential, recreational and educational) immediately adjacent to the steam station, the Project is not expected to impact noise-sensitive land uses.

The U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) for certain criteria pollutants. Air quality standards are also provided by the North Carolina Department of Environmental Protection (NCDEQ). The implementation of the stormwater diversion operations at the Dan River Steam Station will not increase air emissions or exceed regulated standards. Controlled actions will include the control of fugitive dust

emissions. Methods to minimize fugitive dust include limiting dusty work on windy days, watering or sweeping roadways often to ensure that vehicle traffic is not spreading dust, reducing speed limits on unpaved surfaces to ten miles per hour and enclose storage piles and handling areas if dusty materials are frequently loaded and unloaded. With these considerations, the stormwater diversion operations are not expected to impact air quality, either locally or regionally.

1.0 INTRODUCTION

1.1 STORMWATER DIVERSION PROJECT

The Dan River Steam Station is a 620 megawatt (MW) combined cycle (CC) power generating facility. The station is located near the southeastern side of the City of Eden in northern Rockingham County (Figures 1 and 2). The Dan River abuts the southern edge of the station.

On August 20, 2014, the North Carolina General Assembly passed S 729, the Coal Ash Management Act of 2014 (CAMA), requiring Duke Energy to phase out wet ash handling. Under CAMA, all coal ash in the state will be covered by North Carolina's solid waste laws. Further, when coal ash is used as fill to build up land for large construction projects, measures like groundwater monitoring and liners will be required.

With the passage of CAMA, Duke Energy will follow a timetable to close all its coal ash ponds. Duke Energy has already responded to reuse the coal ash currently stored at several Duke Energy plants. Duke Energy is committed to safely dismantling its existing older plants as part of a complex, multiyear process known as decommissioning and demolition. By the end of 2013, Duke Energy retired units at nine coal-fired generation sites in North Carolina and South Carolina. The long-term vision for sites with retired coal units across the system is to return them to ground level. During the early stages of the decommissioning and demolition strategy, the company will remove chemicals and other materials, salvage what equipment it can, recycle and repurpose at other sites, and sell any scrap material. In the demolition and restoration phases, Duke Energy will safely remove the powerhouse, chimneys and any auxiliary structures no longer needed. Following this procedure, Duke Energy will fill, grade and seed disturbed areas. This approach is best suited to ensure continued safety, security and environmental compliance at the site in the future, both for the company and the community. Duke Energy will continue to own and steward these properties, and some of them are home to other types of generation. The decommissioning project also extends to some of the company's older natural gas-combustion turbine units across the generation fleet. These sites will move through a similar process as the coal-fired units.

The vast majority of ash generated by Duke Energy is already being managed dry and stored in on-site, lined landfills. Prior to the promulgation of CAMA, engineering work was underway to close ash basins at the retired coal plants. The company has accelerated that work to include closing all ash basins across its six-state service area, both at retired and operating coal plants. Duke Energy has conducted thorough inspections at all of its facilities to ensure basins continue operating safely and reliably until closure. There are several options for closing ash basins. The company's strategy is that site-specific engineering should help inform the methods used and may include a combination of:

- Excavating and relocating ash to a fully lined structural fill
- Excavating and relocating the ash to a lined landfill (on site or off site)
- Capping the ash with an engineered synthetic barrier system, either in place or after being consolidated to a smaller area on site

Schedules for closing basins depend significantly on a variety of factors, including state requirements, the amount of ash at the site, whether plant system conversions are needed and whether new storage facilities will need to be designed, permitted and constructed.

At the Dan River Steam Station, Duke Energy has initiated the process to transport some of the coal ash from the Dan River Steam Station to an existing lined landfill in Jetersville, Virginia. Presently, the excavation and disposal of coal combustion residual (CCR) materials from areas of ash fill will entail the diversion of stormwater to facilitate these actions. Specifically, the implementation of stormwater diversion will require removal of ash from an existing dredge basin, construction of a soil divider berm, and construction of five pipelines. The proposed method for implementing stormwater diversion will incorporate a pump-around operation.

In summary, stormwater diversion measures will be in place during excavation and disposal of CCR materials which is estimated to occur over a period of approximately three to five years. Stormwater diversion measures will be removed and gravity flow will be restored following completion of CCR excavation and disposal activities. This stormwater diversion project is vital to comply with state and federal regulations, will facilitate contact and non-

contact water separation, and will improve site safety. The stormwater diversion project will require stream and wetland impacts by necessity.

The discharge of dredged or fill material into waters of the U.S. and most categories of work in navigable water bodies require U.S. Army Corps of Engineers (USACE) authorization under Section 404 of the Clean Water Act (CWA). This Wetland Master Plan (WMP) is to provide the Wilmington District of the USACE with a basis to evaluate and issue an Individual Permit (IP) and associated certifications for the proposed project (proposed action). The impetus for the alternatives analysis is the need for the diversion of stormwater, as linked to the requirement to be in compliance with CAMA.

The purpose of this WMP is to serve as a source of supplemental information for the Section 404 IP application. This document provides documentation of the current ecological and physical condition of jurisdictional waters and other resources that occur within the project site. The WMP describes the proposed action in light of the public interest in the new facility. Further, this document describes the approach to wetland mitigation outlined in the CWA Section 404 (b)(1) guidelines and followed by the State of North Carolina, to include avoidance, minimization and compensation. The specific objective of this investigation and the WMP document is to provide the USACE Wilmington District, the North Carolina Department of Environmental Quality (NCDEQ), and other commenting and reviewing agencies a basis to evaluate and issue a Section 404 IP and associated certifications for the proposed action.

1.2 DAN RIVER 134 PROJECT

The Dan River (DR) 134 Project will entail streambank stabilization for a perennial stream located along the eastern boundary of the Dan River Steam Station near its confluence with the Dan River (Figure 2). The stream is colloquially known as Railroad Branch Creek; however, for the purpose of the WMP, the feature is referred to as Stream 3 based on prior Amec Foster Wheeler documentation. A portion of the western streambank is eroding with some undercutting occurring along the toe of the bank. The area of streambank instability occurs between two culverted road crossings and focuses on the west bank area. It is along this area of instability that rip-rap will be placed to armor the bank to prevent further erosion and stabilize the streambank.

Separate from the proposed action to stabilize the western bank of Stream 3, but linked to Stream 3 by past activities conducted within this surface water, was the installation of a culvert at each of the aforementioned road crossings of the stream in March of 2016. The USACE authorized the installation of the culverts through the NWP 13 (Action ID SAW-2016-00331) issued on February 18, 2016. The impacts to the stream were identified as temporary in the NWP 13. The impacts are henceforth included in this WMP as permanent. The culverted road crossings were created to facilitate vehicle and equipment access to the northern shoreline of the Dan River. Access to the Dan River shoreline is necessary for scarp repair, as needed, during the closure of the ash basins and the transport of coal ash from the station via a barge loadout area. Therefore, the road crossings will be maintained indefinitely for future necessity and emergency access to this area of the station. The two culverts will not be removed and the stream will not be restored (via contour reshaping, etc.) to the pre-impact condition, including dimension, pattern and profile. The permanent impacts to Stream 3 from the installation of the two culverts are included in Section 6.1.2 of the WMP.

1.3 DAN RIVER 131 PROJECT

The DR 131 Project is located at the southernmost road crossing of the aforementioned two culverted road crossings identified in the DR 134 Project (Figure 2). The proposed action will entail the extension, downstream, of the culvert pipe to raise the elevation of the crest of the southern road crossing and thus provide a more permanent and stable approach for vehicles and equipment through this crossing. A permanent and stable approach through the southern road crossing will provide safe access to the northern shoreline of the Dan River. The northern and southern culverted road crossings along Stream 3 were established in March of 2016 to facilitate vehicle and equipment access to the river. Access to the northern shoreline is necessary for scarp repair, as needed, during the closure of the ash basins and the transport of coal ash from the steam station via a barge loadout area. Therefore, the road crossings will be maintained indefinitely for future necessity and emergency access to this area of the steam station.

1.4 36-INCH PIPE CLOSURE PROJECT

The 36-Inch Pipe Closure Project is a previously permitted project at the Dan River Steam Station. The USACE issued Action ID SAW-2014-01477 on September 29, 2014, for NWP 18. The issued NWP 18 (Minor Discharges) authorized wetland and stream impacts (permanent) resulting from overflooding. The project activities entailed closing (grouting) a 36-inch corrugated metal pipe that transported flow under the Primary Ash Basin (PAB). The impacts to jurisdictional waters also included the establishment of a cofferdam for the grout installation. Pumped flows are discharged to the Dan River through the outfall structure at National Pollutant Discharge Elimination System (NPDES) outfall 002. Although the project was previously permitted under NWP, the proposed action will not be completed prior to the close out of the ash basins and the expiration of the issued NWP; therefore, the impacts to the jurisdictional waters have been included in the IP application herein. Compensatory mitigation for the impacts to wetland and stream areas associated with the 36-Inch Pipe Closure Project is included in this WMP. The general location of the project is shown on Figure 2. The stream and wetland impacts for the project are presented in Section 6.1.4 of the WMP, while the mitigation discussion is presented in Section 7.2.4. The locations of the affected wetland (Wetland H) and the affected stream (Stream 4) are shown on Figure 6 of the WMP. A copy of the issued USACE permit for the 36-Inch Pipe Closure Project (Action ID SAW-2014-01477) is provided in Appendix A.

1.5 48-INCH PIPE CLOSURE PROJECT

The 48-Inch Pipe Closure Project is a previously permitted project at the Dan River Steam Station. The USACE issued Action ID SAW-2015-01670 on July 31, 2015, for NWP 18. The issued NWP 18 authorized wetland and stream impacts (permanent) resulting from overflooding. The project activities entailed the clean-up of ash and the impoundment of stormwater at the grouted 48-inch reinforced concrete pipe. Pumped flows are discharged to the Service Water Settling Pond by way of existing piping to a new storm water outfall. Although the project was previously permitted under NWP, the proposed action will not be completed prior to the close-out of the ash basins and the expiration of the issued NWP; therefore, the impacts to the jurisdictional waters have been included in the IP application herein. Compensatory mitigation for the impacts to stream and wetland areas associated with the 48-Inch Pipe Closure Project is

included in this WMP. The general location of the project is shown on Figure 2. The stream and wetland impacts for the project are presented in Section 6.1.5 of the WMP, while the mitigation discussion is presented in Section 7.2.5. The impacted wetlands and streams are shown on the Plan View drawing for the 48-Inch Pipe Closure Project (included in Appendix A), which was provided to the USACE on July 17, 2015, as part of the Pre-Construction Notification submital package. The jurisdictional limits of the two impacted wetlands and the three impacted streams were based on the land survey of these areas by LDSI in July of 2105. The impacted wetlands and streams were assigned feature identifiers that were specific to the permitting of the 48-Inch Pipe Closure Project. As such, they are not included in the set of jurisdictional waters that comprise the Stormwater Diversion Project, DR 134 Project, and DR 131 project. A copy of the issued USACE permit for the 48-Inch Pipe Closure Project (Action ID SAW-2015-01670) is provided in Appendix A.

2.0 PROJECT PURPOSE AND NEED

2.1 STORMWATER DIVERSION PROJECT

2.1.1 Purpose

The purpose of the Project (proposed action) is to divert stormwater to facilitate the excavation and disposal of CCR materials from areas of ash fill within the Dan River Steam Station. The details of the Project are discussed in Section 3.1 of the WMP (Proposed Project Development).

2.1.2 Need

The purpose of the Project is based on the following needs:

1. Address North Carolina regulatory requirements related to diverting stormwater away from the PAB and Secondary Ash Basin (SAB), and disposal of CCR materials
2. Provide separation between water that has contacted CCR material (contact water) and water that has not contacted CCR material (non-contact water)
3. Increase safety by improving site access

North Carolina Regulatory Requirements

The principal action that has accelerated the excavation and removal of CCR materials from coal ash storage ponds (ash basins) at Duke Energy power generating plants with coal-fired facilities is the promulgation of CAMA. The bill, enacted on August 20, 2014, requires Duke Energy to phase out wet ash handling. As such, all coal ash in the state will be covered by North Carolina's solid waste laws. In conjunction with CAMA, the NCDEQ has amassed comprehensive data about coal ash facilities statewide. The information has been essential in NCDEQ's prioritization of closure plans for all 14 facilities with coal ash storage ponds. The Dan River Steam Station is identified as one of these 14 facilities with coal ash storage ponds. With these considerations, the Project will address North Carolina regulatory requirements as related to the diversion of stormwater away from the PAB and SAB, and disposal of CCR materials at the Dan River Steam Station.

Contact and Non-contact Water Separation

The Project must adhere to federal and state water quality standards during the diversion of stormwater. Therefore, the Project has been designed to provide separation between water that has contacted CCR material (contact water) and water that has not contacted CCR material (non-contact water). Specifically, a divider berm will be created to provide separation of contact and non-contact water during CCR removal activities. The details of this component of the Project are presented in Section 3.1 of the WMP.

Increased Site Safety

Duke Energy is expeditiously coordinating removal and disposal of on-site CCR's in lined landfill facilities. CCR removal effort includes removal of CCR material from Ash Fill 1 by rail to an off-site lined landfill, construction of the Dan River Landfill in the footprint of Ash Fill 1, and eventually disposal of ash basin CCR material into the landfill. The proposed divider berm will increase site safety by providing an additional access route to the Ash Fill 1 Dan River Landfill work area which will be utilized to facilitate construction of the landfill and disposal of material into the landfill.

2.2 DAN RIVER 134 PROJECT

2.2.1 Purpose

The purpose of the DR 134 Project (proposed action) is to stabilize a portion of the western streambank of Stream 3 with rip-rap (armoring) to prevent further erosion and increase the stablity of the streambank. The details of the project are discussed in Section 3.2 of the WMP.

2.2.2 Need

Without the proposed action, the streambank would continue to erode and the stability of the bank would continue to decline. Undercutting along the toe of the bank would also contribute to the degradation of the stream. Without the proposed action, the eroded sediment material would be transported directly downstream to the Dan River.

2.3 DAN RIVER 131 PROJECT

2.3.1 Purpose

The purpose of the DR 131 Project (proposed action) is to extend the culvert pipe downstream at the southern road crossing of Stream 3 in order to raise the elevation of the crossing crest for possible future scarp repairs along the Dan River. The details of the project are discussed in Section 3.3 of the WMP.

2.3.2 Need

The proposed action will provide a more permanent and stable approach for vehicles and equipment through this road crossing. A permanent and stable approach through the southern road crossing will provide safe access to the northern shoreline of the Dan River. Access to the northern shoreline is necessary for scarp repair, as needed, during the closure of the ash basins and the transport of coal ash from the steam station via the barge loadout area. The road crossings will be maintained indefinitely for future necessity and emergency access to this area of the steam station.

2.4 36-INCH PIPE CLOSURE PROJECT

2.4.1 Purpose

The project purpose entailed the closing (grouting) of a 36-inch corrugated metal pipe that transported flow under the PAB.

2.4.2 Need

The project was necessary to accomplish the clean-up of ash.

2.5 48-INCH PIPE CLOSURE PROJECT

2.5.1 Purpose

The project purpose entailed the closing (grouting) of a 48-inch reinforced concrete pipe.

2.5.2 Need

The project was necessary to accomplish the clean-up of ash.

3.0 PROPOSED PROJECT DEVELOPMENT

3.1 STORMWATER DIVERSION PROJECT

The diversion of stormwater will be conducted to facilitate the excavation and disposal of CCR materials from areas of ash fill at the Dan River Steam Station. The implementation of stormwater diversion will require removal of ash from an existing dredge basin (located between the current footprints of Ash Fill 1 and Ash Fill 2), construction of a soil divider berm, and construction of five pipelines (Figure 3a). The proposed method for implementing stormwater diversion will incorporate a pump-around operation. The stormwater diversion measures are estimated to occur over a period of approximately three to five years. These measures will be removed and gravity flow will be restored following completion of CCR excavation and disposal activities.

Descriptions of the various Project components are presented below. These Project components, as areas of work, are also shown on Figure 3a.

Sources of Stormwater Requiring Diversion

The predominant sources of stormwater that currently discharge into the PAB and SAB are summarized as follows:

1. Existing 36-inch reinforced concrete pipe (RCP) that discharges flow from the dredge basin between Ash Fills 1 and 2 into the northwest corner of the Secondary Ash Basin (SAB)
2. Existing 36-inch RCP that discharges flow from the wetland adjacent to the ash loadout area into the northern portion of the SAB

The existing 36-inch RCP that discharges flow from the dredge basin (Source 1 above) will be diverted by construction of the proposed divider berm and a pump-around system as described in the following descriptions for the Divider Berm, Upland Flow Area (UFA), and Pipe Line 1. The existing 36-inch RCP that discharges flow from the wetland adjacent to the ash loadout area

(Source 2 above) will be capped as described in the following descriptions for Pipe Lines 4 and 5.

Divider Berm

The divider berm is required to separate contact and non-contact water which is vital to reducing the total amount of contact water requiring treatment. The berm will also improve site safety by providing another means of ingress/egress to the landfill area. A compacted soil or soil/rock fill divider berm will be constructed along the northern edge of the dredge basin between Ash Fills 1 and 2. The divider berm will prevent non-contact water from sources draining north of the berm (UFA) from mixing with potential contact water from sources draining south of the berm (water storage area 1 [WSA-1]). The divider berm will be graded with a superelevation to drain towards WSA-1 and will be surfaced with geotextile and aggregate to facilitate vehicular access.

UFA

The UFA is required to separate non-contact water from contact water. The UFA is the area north of the divider berm and consists of a constructed sump and existing topography. The UFA will be bounded to the south by the divider berm, to the west by Ash Fill 2, to the east by Ash Fill 1, and to the north by existing topography.

WSA-1

WSA-1 is an impoundment designed to provide storage volume for potential contact water runoff from Ash Fills 1 and 2 during removal of CCR from these areas. WSA-1 will also receive pumped contact water flows from water storage area 2 (WSA-2) and water storage area 3 (WSA-3). WSA-1 will be bounded to the north by the proposed divider berm, to the west by Ash Fill 2, to the east by Ash Fill 1, and to the south by the existing dredge dike. Contact water flows will be contained in WSA-1 until the contact water can be pumped via Pipe Lines 2 and 5 to the on-site tank and ultimately to the City of Eden for treatment.

WSA-2

WSA-2 is an existing impoundment designed to control potential contact water seepage from the PAB. WSA-2 is bounded to the north by the existing dredge dike, to the east by an access road, to the south by railroad tracks and the PAB, and to the west by topography. Potential contact water seeps into the WSA-2 area from the Primary Ash Basin. The WSA-2 area will be periodically inundated from stormwater runoff and then pumped to the SAB. The Project will re-route pumping of flows from WSA-2 to WSA-1.

Prior work activities conducted at WSA-2 were permitted by the USACE in 2014. The USACE issued Action ID SAW-2014-01477 on September 29, 2014, for NWP 18. The issued NWP 18 authorized wetland impacts (permanent) resulting from overflooding. The project activities entailed closing a 36-inch corrugated metal pipe that transported flow under the PAB. No additional impacts to waters of the U.S. will be made as part of the previously permitted WSA-2 construction and the implementation of the stormwater diversion operations.

WSA-3

WSA-3 is a proposed impoundment area designed to control potential contact water and provide diversion of flows away from the ash basins. WSA-3 is bounded to the north by the existing dredge dike, to the west by existing topography, to the south by railroad tracks and the Secondary Ash Basin, and to the east by an ash loadout area. Potential contact water runs off from the ash loadout area to WSA-3. Currently, WSA-3 drains into the SAB by gravity via a pipe underneath the railroad tracks. The Project will plug the gravity pipe causing inundation of WSA-3 and pump flows from WSA-3 to WSA-1.

Pipe Line 1: UFA to SW 010

Pipe Line 1 will convey non-contact water to a NPDES permitted outfall. Pipe Line 1 will consist of a pump and pipe system that will convey non-contact water from the UFA to proposed Stormwater NPDES Outfall SW 010. Proposed Outfall SW 010 will be located along the northern edge of the property.

Pipe Line 2: WSA-1 to Manifold

Pipe Line 2 will convey contact water to a manifold and ultimately to the City of Eden for treatment. Pipe Line 2 will convey potential contact water via pumping from WSA-1 south of the proposed divider berm to the manifold located at the crest of the proposed divider berm. Pipe line 2 will consist of a new solid-walled HDPE pipe. The section of pipe from WSA-1 to the manifold will be single-contained because WSA-1 serves as secondary containment. Refer to Pipe Line 5 for a description of the pipe from the manifold to the leachate storage tank.

Pipe Line 3: WSA-2 to WSA-1

Pipe Line 3 will convey potential contact water to WSA-1 and ultimately to the City of Eden for treatment. Pipe Line 3 will convey potential contact water via pumping from the wetland north of the ash basin divider dike (WSA-2) to WSA-1. Pipe Line 3 will consist of a new solid-walled HDPE pipe. The section of pipe within the confines of WSA-1 and WSA-2 will be single-contained because the water storage areas serve as secondary containment. Sections of pipe outside the confines of WSA-1 and WSA-2 will be dual-contained.

Pipe Line 4: WSA-3 to WSA-1

Pipe Line 4 will divert stormwater away from the ash basins and convey potential contact water to WSA-1 and ultimately to the City of Eden for treatment. Pipe Line 4 will convey potential contact water via pumping from the wetland adjacent to the ash loadout area (WSA-3) to WSA-1. Pipe Line 4 will consist of a new solid-walled HDPE pipe. The section of pipe within the confines of WSA-1 and WSA-3 will be single-contained because the water storage areas serve as secondary containment. Sections of pipe outside the confines of WSA-1 and WSA-3 will be dual-contained. The existing 36-inch RCP that discharges flow from the wetland adjacent to the ash loadout area into the northern portion of the SAB will be capped to prevent discharge into the SAB.

Pipe Line 5: SAB to Tank

Pipe Line 5 is required to convey contact water to a tank and ultimately to the City of Eden for treatment. Pipe Line 5 will convey liquids from the SAB to the manifold located at the crest of the

proposed divider berm and on to the proposed tank. Pipe Line 5 will consist of a new solid-walled HDPE pipe. The existing 36-inch RCP that discharges flow from the wetland adjacent to the ash loadout area into the northern portion of the SAB will be used as a conduit beneath the existing railroad tracks for the proposed Pipe Line 5. Pipe Line 5 will be sleeved through an orifice in the pipe cap. The proposed Pipe Line 5 will be extrusion welded to the pipe cap to prevent seepage into the SAB. The section of pipe within the existing 36-inch RCP and within WSA-1 will be single-contained, while other sections of pipe will be dual-contained.

Contact and Non-contact Water Separation

As previously stated herein, a divider berm will provide separation of contact and non-contact water during CCR removal activities. During removal of CCR from Ash Fill 1, contact water will drain to a proposed sediment basin located at the southern corner of Ash Fill 1. The proposed sediment basin will drain by gravity to WSA-1 which will generally be pumped to the storage tank via Pipe Lines 2 and 5.

Contact water generated during removal of CCR material from the PAB and the SAB is anticipated to be contained within the Ash Basins before being pumped to the storage tank via Pipe Line 5.

Contact water generated during removal of CCR from Ash Fill 2 will drain by gravity to WSA-1 which will be pumped to the storage tank via Pipe Lines 2 and 5. A portion of the divider berm will be removed during removal of CCR from Ash Fill 2. A smaller diversion berm consistent with typical Erosion & Sediment Control (E&SC) measures will be installed to maintain the separation of contact and non-contact water along the northern edge of the Ash Fill 2 excavation area.

The proposed divider berm may be removed upon completion of CCR removal, ash basin closure, and ash removal activities, and subsequently restoring gravity drainage and eliminating the need for pumping to provide dewatering. Any piping through the dredge basin will be removed and a new drop inlet will be installed at the toe of slope of the existing dredge dike to discharge into the remaining portion of the existing 36-inch diameter RCP. This results in effectively moving the dredge basin drop inlet from its current position to the upstream toe of slope of the existing dredge dike. The dredge basin will be regraded during final ash removal to promote drainage to the new

drop inlet. The Dam Decommissioning Plan design includes conveying stormwater from areas north of the ash basins across the ash basin footprint and discharging into the Dan River.

3.2 DAN RIVER 134 PROJECT

The DR 134 Project will entail streambank stabilization for Stream 3, a perennial stream located along the eastern boundary of the Dan River Steam Station near its confluence with the Dan River. Rip-rap (armoring) will be placed along the western streambank of Stream 3 to prevent further erosion and increase the stablity of the streambank. The area of streambank instability occurs between two culverted road crossings. Additional details of the project are presented below.

Initial removal of loose material will be performed to be followed by the placement of geotextile fabric to provide soil material retention and then covered by gravel and ultimately North Carolina Department of Transportation Class B rip-rap. The slopes are limited to no steeper than 1.5H:1V to limit grading required and reduce the impact to the stream. Along the length of the repair area a stone toe buttress will be placed into the stream to provide additional protection from erosion at the toe and sliding of the material into the stream.

3.3 DAN RIVER 131 PROJECT

The DR 131 Project is located at the southernmost road crossing of the two culverted road crossings of Stream 3 (Figure 2). The proposed action will entail the extension, downstream, of the culvert pipe to raise the elevation of the crest of the southern road crossing and thus provide a more permanent and stable approach for vehicles and equipment through this crossing. The road crossings will be maintained indefinitely for future needs and emergency access to this area of the steam station.

Crossings are comprised of stone; aggregate and rip-rap. The downstream piped crossing will be extended to raise the crossing elevation. Backfill around the pipe to complete the crossing will also be stone.

4.0 ALTERNATIVES ANALYSIS

4.1 REGULATORY AUTHORITY

In the evaluation of CWA Section 404 permit applications to discharge dredged or fill material into waters of the U.S. including wetlands, the USACE is required to analyze alternatives that could achieve purpose and need. The USACE conducts this analysis pursuant to two main requirements:

1) National Environmental Policy Act of 1969 (NEPA)

NEPA requires federal agencies to consider environmental impacts of the proposed actions and a range of *reasonable* alternatives to those actions. Reasonable alternatives do not require consideration of every conceivable variation of an alternative (40 Code of Federal Regulations [CFR] §1502.14) and must be capable of achieving the basic project goal. The Council on Environmental Quality (CEQ) describes "reasonable" alternatives as those that are practical or feasible from the technical or economic standpoint and use common sense rather than simply desirable from the standpoint of the applicant (CEQ 1981). For alternatives eliminated from further study, a project's environmental documentation must "briefly discuss the reasons for their having been eliminated" (CEQ 1981).

2) CWA Section 404(b)(1) Guidelines

CWA Section 404(b)(1) Guidelines state "no discharge of dredged or fill material shall be permitted if there is a *practicable* alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" (40 C.F.R. § 230.10a). Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purpose.

The foremost objective of the CWA is to restore and maintain the chemical, biological, and physical integrity of the nation's waters through the elimination of discharges of pollutants (33 USC § 466 *et seq*.). Pollutants include dredged and fill materials [40 CFR 230.3(o)], while the nation's waters, or waters of the U.S., include wetlands [40 CFR 230.3(s) (7)]. The U.S. Environmental Protection Agency (USEPA) 404(b)(1) Guidelines (40 CFR 230) provide the criteria that are used in reviewing USACE permit applications, with respect to the authorization of discharge of dredged or fill material into waters of the U.S., including wetlands. Under the USEPA Guidelines, the principal screening action to assess the necessity of permitting a discharge of dredged or fill material into waters of the U.S. is the analysis of practicable alternatives [40 CFR 230.10(a)].

According to 40 CFR Section 230.10(a), a discharge of dredged or fill material will be permitted by the USACE if no practical alternatives to the proposed discharge will have less adverse impact on the aquatic ecosystem and there are no other significant adverse environmental consequences. Under 40 CFR Section 230.10(a)(2), a practicable alternative is an alternative site that is available and capable of being developed after considering costs, existing technology, and logistics in light of overall project purposes. The permit applicant is only required to evaluate alternatives that are considered practicable based on costs, technical factors, or logistical factors that are capable of achieving the overall purpose of the proposed activity.

According to the *Army Corps of Engineers Standard Operating Procedures for the Regulatory Program* (SOP), dated October 15, 1999, the amount of information needed and the level of scrutiny required by the USEPA 404(b)(1) Guidelines is commensurate with the severity of the environmental impact and the scope/cost of the project. The SOP provides that the compliance evaluation procedures under the USEPA 404(b)(1) Guidelines vary to reflect the degree of potential for adverse impacts on the aquatic ecosystems. The alternatives that were considered for the proposed actions at the Dan River Steam Station were evaluated pursuant to the SOP.

4.2 STORMWATER DIVERSION PROJECT

The implementation of stormwater diversion will require removal of ash from an existing dredge basin (located between the current footprints of Ash Fill 1 and Ash Fill 2), construction of a soil divider berm, and construction of five pipelines. The diversion of

stormwater is a significant element of the overall process to excavate and remove CCR materials from the Dan River Steam Station. The excavation and removal of CCR materials is, in turn, a function of the promulgation of CAMA. Therefore, the impetus for the alternatives analysis is linked to this path.

The alternatives analysis herein comprises the set of three action alternatives for the diversion of stormwater: the pump-around alternative (400 gallons per minute [gpm]), the high-volumetric flow rate pump-around alternative (49,000 gpm), and the gravity alternative. These alternatives were examined with respect to Project practicability limits and the need to avoid and/or minimize impacts to waters of the U.S. Wetland and stream impacts were calculated using geographic information system (GIS) applications and overlaying the action alternative footprints onto the database of surveyed waters of the U.S. boundaries. These surveyed jurisdictional boundaries were based on the results of the Verification of Jurisdictional Determination conducted by the USACE Raleigh Regulatory Field Office. The No Build Alternative (No Action Alternative) is also presented herein. From the examination (comparative analysis) of the set of action alternatives, the subsequent preferred alternative is advanced for further examination as related to potential resources impacts.

4.2.1 Pump-around Alternative

Descriptions of the various Project components of the pump-around action alternative (400 gpm) have been provided in Section 3.1 of the WMP. These Project components, as areas of work, are shown on Figure 3a. The resources, features and site attributes that occur within the Project footprint (affected environment), or have the potential to occur in the vicinity of the Dan River Steam Station, include land use, geology/topography, soils, terrestrial communities, wetlands, streams, riparian buffers, open waters, floodplains, stormwater, protected species, cultural resources, environmental justice, noise and air quality. Each resource, feature and attribute for the pump-around alternative is examined in Sections 5 through 12 of the WMP. Based on this review, the only resources that would be impacted by the implementation of this action alternative would be waters of U.S. The impacts to waters of the U.S. for each Project component are presented below.

Divider Berm

Construction of the divider berm will require removal of vegetation and CCR material within the divider berm footprint and placement of fill within the existing jurisdictional dredge basin. The proposed wetland impact is 1.89 acres. This impact value includes the entire dredge basin as the removal of vegetation and CCR from the entire dredge basin must be completed before the construction of the divider berm (placement of fill material) can be initiated. No jurisdictional streams will be impacted as part of divider berm construction.

UFA

The constructed sump portion of the UFA will require excavation of material within the existing, jurisdictional dredge basin. The proposed wetland impact for this action is included in the dredge basin impact (1.89 acres) for the divider berm construction. The UFA Project component will also cause periodic flooding impacts to the stream and wetland complex north of the divider berm. The overflooding impact to wetlands will be 0.22 acre and the overflooding impact to a perennial stream will be 393 linear feet.

WSA-1

Construction of WSA-1 will require removal of vegetation, CCR removal and regrading to promote drainage within the existing jurisdictional dredge basin. The proposed wetland impact for this action is included in the dredge basin impact (1.89 acres) for the divider berm construction. No jurisdictional streams will be impacted as part of WSA-1 construction.

WSA-2

WSA-2 is an existing feature that periodically inundates a jurisdictional wetland. The wetland impacts (permanent) associated with WSA-2 have previously been permitted by the USACE (Action ID SAW-2014-01477), as described in Section 3.1 of the WMP. No additional impacts to waters of the U.S. will be made as part of the previously permitted WSA-2 construction and the implementation of the stormwater diversion operations.

WSA-3

Construction of WSA-3 will periodically inundate a jurisdictional wetland. The proposed wetland impact (overflooding) is 0.19 acre. No streams will be impacted as part of WSA-3 construction.

Pipe Line 1: UFA to SW 010

Construction of Pipe Line 1 will not require any additional stream or wetland impacts.

Pipe Line 2: WSA-1 to Manifold

Construction of Pipe Line 2 will not require any additional stream or wetland impacts.

Pipe Line 3: WSA-2 to WSA-1

Wetland impacts have previously been permitted by the USACE, as described in Section 3.1 of the WMP. Construction of Pipe Line 3 will not require any additional stream or wetland impacts.

Pipe Line 4: WSA-3 to WSA-1

Construction of Pipe Line 4 will not require any additional stream or wetland impacts.

Pipe Line 5: SAB to Tank

Construction of Pipe Line 5 will not require any additional stream or wetland impacts.

4.2.2 High-volumetric Flow Rate Pump-around Alternative

The high-volumetric flow rate pump-around alternative is nearly identical to the pump-around alternative. The principal difference is the rate of water that would be pumped. High-volume capacity pumps would be used to pump water at a rate of 49,000 gpm under the high-volumetric flow rate pump-around alternative. The pump-around alternative would pump at a significantly lower rate of 400 gpm. The overall Project components of the high-volumetric flow rate pump-

around alternative, as areas of work, are shown on Figure 3b. The resources, features and attributes of analysis that occur within the Project footprint (affected environment) of the high-volumetric flow rate pump-around alternative, or have the potential to occur in the vicinity of the Dan River Steam Station, include the same set of resources, features and site attributes examined for the pump-around alternative. Based on the review of this information, the only resource impacted by the implementation of the high-volumetric flow rate pump-around alternative would be waters of the U.S. The impacts to waters of the U.S. for all but one of the Project components under the high-volumetric flow rate pump-around alternative would be identical to the impacts for the same Project components under the pump-around alternative. Under the high-volumetric flow rate pump-around alternative, no overflooding to the stream and wetland complex north of the divider berm would occur; i.e., within the the UFA Project component.

The preferred stormwater diversion pumping option is to utilize a 400 gpm pump system. The preferred pumping option (400 gpm) is less than the peak runoff rate for the 25-year, 24-hour storm event (approximately 109 cubic feet per second [cfs] = 49,000 gpm); therefore, the preferred pumping option would lead to periodic inundation of the stream and wetland complex in the UFA. Although it is theoretically possible to provide a pump system with a capacity of 49,000 gpm, such a solution would not be practical because it would require either several industrial-grade pumps or a large number of traditional pumps. The costs for pump and fuel are estimated to be approximately $6M over a four year period. The power supply would come from a diesel generator which would require fueling, dual containment, and numerous maintenance checks. As such, power supply would be problematic and the pumping system would be cost-prohibitive to install and maintain.

With the above considerations, the high-volumetric flow rate pump-around alternative was dismissed from futher consideration and the focus of the alternatives analysis was centered on the pump-around alternative and the gravity alternative, as presented in Sections 4.2.1 and 4.2.3, respectively, herein.

4.2.3 Gravity Alternative

The majority of the Project components of the pump-around action alternative comprise the gravity action alternative. The overall Project components of the gravity alternative, as areas of work, are shown on Figure 4. The resources, features and attributes of analysis that occur within the Project footprint (affected environment) of the gravity alternative, or have the potential to occur in the vicinity of the Dan River Steam Station, include the same set of resources, features, and site attributes examined for the pump-around alternative. Based on the review of this information, the only resources impacted by the implementation of the gravity alternative would be waters of U.S. The impacts to waters of the U.S. for each Project component are presented below.

Divider Berm

The construction of the divider berm is an identical component between both action alternatives. Therefore, the proposed wetland impact (1.89 acres) to the existing jurisdictional dredge basin is identical between alternatives. This impact value includes the entire dredge basin as the removal of vegetation and CCR from the entire dredge basin must be completed before the construction of the divider berm can be initiated. No jurisdictional streams will be impacted as part of divider berm construction.

UFA

Identical to the pump-around alternative, the constructed sump portion of the UFA will require excavation of material within the existing jurisdictional dredge basin under the gravity alternative. The proposed wetland impact for this action is included in the dredge basin impact (1.89 acres) for the divider berm construction. The gravity alternative will not cause overflooding impacts to the stream and wetland complex north of the divider berm.

WSA-1

Identical to the pump-around alternative, the construction of WSA-1 will require removal of vegetation, CCR removal and regrading to promote drainage within the existing jurisdictional dredge basin under the gravity alternative. The proposed wetland impact for this action is included

in the dredge basin impact (1.89 acres) for the divider berm construction. No jurisdictional streams will be impacted as part of WSA-1 construction.

WSA-2

WSA-2 is an existing feature that periodically inundates a jurisdictional wetland. The wetland impacts associated with WSA-2 have previously been permitted by the USACE, as described in Section 3.1 of the WMP. No additional impacts to waters of the U.S. will be made as part of the previously permitted WSA-2 construction and the implementation of the stormwater diversion operations.

WSA-3

Identical to the pump-around alternative, the construction of WSA-3 will periodically inundate a jurisdictional wetland under the gravity alternative (0.19 acre of overflooding impact). No streams will be impacted as part of WSA-3 construction.

Pipe Line 1: UFA to SW 010

Pipe Line 1 is required to convey non-contact water to an NPDES permitted outfall. Under the gravity alternative, Pipe Line 1 will consist of a gravity pipe system that will convey non-contact water from the UFA to proposed Stormwater NPDES Outfall SW-010. Outfall SW-010 will be located along the eastern edge of the property for the gravity alternative. Construction of Pipe Line 1 will not require any additional stream or wetland impacts.

Pipe Line 2: WSA-1 to Manifold

Construction of Pipe Line 2 will not require any additional stream or wetland impacts.

Pipe Line 3: WSA-2 to WSA-1

Wetland impacts have previously been permitted by the USACE, as described in Section 3.1 of the WMP. Construction of Pipe Line 3 will not require any additional stream or wetland impacts.

Pipe Line 4: WSA-3 to WSA-1

Construction of Pipe Line 4 will not require any additional stream or wetland impacts.

Pipe Line 5: SAB to Tank

Construction of Pipe Line 5 will not require any additional stream or wetland impacts.

4.2.4 Comparison of Action Alternative Impacts

Table 1 presents the potential impacts by Project component to wetlands, streams, and the dredge basin under the pump-around alternative (400 gpm), the high-volumetric flow rate pump-around alternative (49,000 gpm), and the gravity alternative.

Table 1. Proposed impacts to jurisdictional wetlands, streams, and dredge basin for the Stormwater Diversion Project, Dan River Steam Station, Rockingham County, North Carolina.

Project Component	Action Alternative	Proposed Impacts		
		Wetlands (acres)	Streams (linear feet)	Dredge Basin (acres)
UFA	Pump-around	0.22	393	--
	High-volumetric Flow Rate Pump-around	--	--	--
	Gravity	--	--	--
WSA-1	Pump-around	--	--	1.89
	High-volumetric Flow Rate Pump-around	--	--	1.89
	Gravity	--	--	1.89
WSA-2 Previously Permitted	Pump-around	0.11	--	--
	High-volumetric Flow Rate Pump-around	0.11	--	--
	Gravity	0.11	--	--

Project Component	Action Alternative	Proposed Impacts		
		Wetlands (acres)	Streams (linear feet)	Dredge Basin (acres)
WSA-3	Pump-around	0.19	--	--
	High-volumetric Flow Rate Pump-around	0.19	--	--
	Gravity	0.19	--	--

The wetland impacts associated with WSA-2 (0.11 acre) have previously been permitted by the USACE, as described in Section 3.1 of the WMP. This impact is common to all three action alternatives. The proposed wetland impact associated with WSA-3 (0.19 acre) would occur under all action alternatives. The proposed impact to the dredge basin (1.89 acres) associated with WSA-1 would also occur under all action alternatives. The remaining Project component, the UFA, is the only component where the wetland and stream impacts are dissimilar. Under the pump-around alternative (400 gpm), the proposed impacts for the UFA, due to overflooding, would be 0.22 acre of wetlands and 393 linear feet of stream. No impacts to wetlands or streams would occur under the high-volumetric flow rate pump-around alternative (49,000 gpm) for the UFA. Similarly, no impacts to wetlands or streams would occur under the gravity alternative for the UFA. All impacts to wetlands, streams, and the dredge basin under all three action alternatives would be permanent. This presumption is based on recent permitting discussions with USACE Raleigh Regulatory Field Office staff and the understanding of compensatory mitigation requirements associated with NWP issued by the USACE for other Dan River Steam Station projects in the past three years.

The Project is vital to comply with state and federal regulations, will facilitate contact and non-contact water separation, and will improve site safety. The Project will require stream and wetland impacts by necessity. As described above, the amount of stream and wetland impacts differs between the pump-around alternative and the gravity alternative. Although the pump-around alternative will have more stream and wetland impacts, the pump-around alternative is the preferred approach because:

1. The gravity pipe option requires routing a pipe below contact water storage area WSA-1. The NCDEQ has expressed reservations about routing any new pipe beneath a contact water storage area.

2. The gravity pipe option requires routing a pipe within an existing ash basin which would pose the following challenges:

    a. Pipe routing would be within an existing CCR unit footprint.
    b. Preventing damage of the gravity pipe during adjacent CCR removal activities could be challenging.
    c. Pipe construction would remove existing access routes around the dam.
    d. Additional controls such as thrust blocks and anti-flotation counter-measures would be required.

3. The gravity pipe option would require a breach through the regulatory dam embankment.

4. The gravity pipe system has a higher susceptibility to damage due to proximity of future construction, greater environmental consequences of a failure due to proximity of contact water sources, and would require more maintenance when compared to the piping for the pump-around option.

As previously stated earlier in the WMP, the high-volumetric flow rate pump-around alternative was considered to be highly problematic and was subsequently dismissed during the preliminary examination of stormwater diversion options. Although it is theoretically possible to provide a pump system with a capacity of 49,000 gpm, such a solution would not be practical because it would require either several industrial-grade pumps or a large number of traditional pumps. The costs for pump and fuel are estimated to be approximately $6M over a four year period. The power supply would come from a diesel generator which would require fueling, dual containment, and numerous maintenance checks. Overall, power supply would be problematic and the pumping system would be cost-prohibitive to install and maintain.

4.2.5 No Build Alternative

Under the No Build Alternative, implementation of stormwater diversion activities would not occur; therefore, there would be no impacts to waters of the U.S.

4.2.6 Avoidance and Minimization of Impacts

Appropriate and practicable steps to minimize potential adverse impacts to wetlands, streams, and ponds were considered through analysis of the development concepts during Project planning and the examination of the action alternatives. To generate the final preferred alternative, further design modifications were completed for the Project. The complete avoidance of waters of the U.S. was not practicable as the excavation and disposal of CCR materials at the Dan River Steam Station ultimately required under CAMA could not be accomplished without some impact to such waters. However, the stormwater diversion operations will be conducted in a manner to reduce the potential for degradation of downstream waters.

Off-site Alternative for Stormwater Diversion

The off-site alternative for stormwater diversion would include the same design components as the high-volumetric flow rate pump-around alternative (49,000 gpm), but would additionally require a series of large tanks to temporarily store the excess stormwater until it could be discharged to the City of Eden. The following discussion provides further details on the off-site alternative.

Duke Energy has a permit with the City of Eden to discharge 200 gpm of flow to the City for treatment with the potential to increase to 400 gpm of discharge; therefore, an off-site alternative was considered to pump stormwater to the City of Eden. The off-site alternative would generally consist of the 49,000 gpm pump alternative with the ultimate discharge point being the City of Eden.

Leachate generated at the Dan River Landfill would be conveyed to the City of Eden for treatment; therefore, the flow capacity available for diverted stormwater would be less than the permitted capacity. Additionally, the pump system would need to have a capacity of 49,000 gpm to prevent

inundation of the stream and wetland complex in the UFA. The maximum allowable permitted flow (200 to 400 gpm, less quantity of leachate generated) is less than the peak runoff rate for the 25-year, 24-hour storm event (approximately 109 cfs = 49,000 gpm); therefore, large on-site equalization tanks would be required to temporarily store the excess stormwater for eventual discharge to the city. The off-site alternative would require a series of large equalization tanks in addition to the pump, power supply and cost considerations discussed in the 49,000 gpm pump alternative description (i.e., high-volumetric flow rate pump-around alternative). In summary, the Project constraints are such that there is no viable off-site alternative. It is noted that the aforementioned large equalization tanks would not be used under the other on-site action alterntives; i.e., the on-site alternatives would discharge to existing surface drainage features.

Proposed Rip-rap Energy Dissipator

No jurisdictional wetlands or streams will be impacted by the construction of the proposed rip-rap energy dissipator. The energy dissipator is a design component of the pump-around alterrnative. The siting of this energy dissipator was completed in a manner to avoid a group of wetlands (interconnected by a stream feature) occurring within the northern portion of the Dan River Steam Station. The proposed location of the energy dissipator is shown on Figures 3a and 3b.

E&SC Plan

All development projects in North Carolina that disturb an acre or greater of land require an approved E&SC Plan. E&SC Plans must be produced in accordance with the *North Carolina Erosion and Sediment Control Planning and Design Manual*, dated May 2013. This manual includes best management practices (BMPs) for reducing erosion and sedimentation during construction. This requires proper site preparation techniques, surface stabilization, runoff control measures, diffuse flow through the riparian buffer, inlet and outlet protection, and stream protection. Rockingham County uses this manual when directing developers during new development or redevelopment that exceeds one acre (PTRC 2012). As Rockingham County is not NPDES Phase II nor is the watershed in a regulated community, it has no post-construction soil and erosion or stormwater control obligations. Rockingham County relies upon the NCDEQ Winston-Salem Regional Office to oversee and enforce their federal soil and erosion control

requirements for new construction. Stormwater diversion activities of the Project will be conducted in a manner to minimize the potential for erosion and sedimentation.

Storm Runoff Event

Typical E&SC impoundments are designed for the 10-year design storm. The proposed divider berm does not have an emergency spillway; therefore, the engineer considered the 25-year event as the appropriate design storm. It should be noted that the water surface elevation of the 25-year event was calculated to be at elevation 548.05 feet above mean sea level (amsl). The divider berm elevation is approximately 554 feet amsl, indicating storage capacity in excess of the 25-year event.

4.3 DAN RIVER 134 PROJECT

No alternatives are identified for the DR 134 Project as the stabilization of the eroding streambank of Stream 3 is the only action that can be accomplished to retard the continued degradation of the stream. The method of stabilization is also limited; i.e., the use of rip-rap to armor the streambank is presumed to be the optimal action to assure bank stability over time given materials and established engineering techniques. Under the No Action Alternative, the proposed action would not be accomplished and the streambank would continue to erode and the stability of the bank would continue to decline.

The proposed action will result in an impact of 130 linear feet to Stream 3 from the placement of rip-rap below the ordinary high water mark (OHWM). Avoidance measures are not appropriate, as the continued eroding of the streambank cannot be ignored. The proposed stream impact cannot be minimized as the stabilization of the streambank cannot be assured without the placement of rip-rap both above and below the OHWM. A portion of the streambank within the proposed work area is eroding below the OHWM. If this portion of the streambank is not armored with rip-rap, erosion will continue from this area of the bank (below the OHWM) and overall stream stabilization will not be possible.

4.4 DAN RIVER 131 PROJECT

No alternatives are identified for the DR 131 Project as the extension of the culvert pipe downstream to raise the elevation of the crest of the southern road crossing is the only action that can be accomplished to provide a more permanent and stable approach for vehicles and equipment through this crossing. The proposed action is appropriate given materials and established engineering techniques. Under the No Action Alternative, the proposed action would not be accomplished and the approach through the road crossing would be impermanent. Furthermore, the crossing would destabilize over time.

The proposed action will result in an impact of 15 linear feet to Stream 3 from the extension of the culvert pipe. This impact of 15 linear feet is in addition to the 43 linear feet of impact for the southern road crossing during the March 2016 culvert installation referenced above (Action ID SAW-2016-00331). Avoidance and minimization measures are not appropriate, as the approach through the road crossing cannot be made permanent and the stability of the crossing canot be assured without extending the pipe and raising the crest of the crossing. A permanent and stable approach through the road crossing will provide safe access to the northern shoreline of the Dan River for scarp repair in the vicinity of the barge loadout area. The southern road crossing, along with the northern crossing, will be maintained indefinitely for future needs and emergency access to this area of the steam station.

4.5 36-INCH PIPE CLOSURE PROJECT

No alternatives are identified for the proposed action. The project was previously permitted by the USACE under NWP 18.

4.6 48-INCH PIPE CLOSURE PROJECT

No alternatives are identified for the proposed action. The project was previously permitted by the USACE under NWP 18.

5.0 WATERS OF THE U.S./WETLANDS

5.1 STORMWATER DIVERSION PROJECT

The implementation of stormwater diversion will require removal of ash from the existing dredge basin (located between the current footprints of Ash Fill 1 and Ash Fill 2), construction of a soil divider berm, and construction of five pipelines. The preferred method for implementing stormwater diversion will incorporate a pump-around operation (400 gpm). The components of the pump-around operation described in Section 3.1 of the WMP include Divider Berm, UFA, WSA-1, WSA-2, WSA-3, and Pipe Lines 1, 2, 3, 4 and 5. Each component is shown on Figure 3a. The "affected environment" (Project footprint) for the pump-around operation therefore includes the aforementioned Project components. The Project will impact jurisdictional wetlands and streams within the affected environment. The waters of the U.S. within the Dan River Steam Station and the affected environment are discussed in this report section. In addition, relevant background information is presented and includes the set of natural resources and physical features that occur within the plant property and the affected environment. The set of topics includes land use, geology and topography, soils, terrestrial communities, wetlands, streams, riparian buffers, open waters, floodplains, surface waters, and groundwater. These topics are discussed below.

5.1.1 Land Use

The Dan River Steam Station is a 620 MW CC power generating facility. The station property comprises the following features: power generation plant and associated operations buildings, trailers, sheds, and parking areas; contractor parking area and trailers; utility right-of-ways; paved and unpaved roadways; PAB and SAB; Ash Fill 1 (proposed northeast landfill area); Ash Fill 2; materials and equipment yard; maintained areas (grassed or landscaped); natural vegetated areas, including forested uplands and wetlands; and manmade ponds and stream features. The Dan River abuts the southern boundary of the station. Woodland abuts the western, northern and eastern station boundaries. Surrounding land use includes low density residential and golf course, near the northern and western boundaries. The station is accessed from the north by South Edgewood Road.

Affected Environment

The Project area primarily encompasses woodland, open areas (maintained or otherwise), three separate wetland areas, and the dredge basin on the western side of Ash Fill 1 and the eastern side of Ash Fill 2.

5.1.2 Geology and Topography

The Dan River Steam Station is located in the Piedmont Physiographic Region of North Carolina. The North Carolina Geological Map of Region G, which includes Guilford, Rockingham, Caswell, Randolph, Davidson and Alamance Counties, indicates that the Eden area is located between two of the ten belts of the Piedmont of North Carolina and the Triassic Basin (Carpenter 1982). It is geologically complex. The belts to either side of the Triassic Basin are the Inner Piedmont to the west and the Milton Belt to the east. The Inner Piedmont is metamorphosed rocks, primarily amphibole, which dates from the Cambrian period/late Proterozoic Era, and several forms of schist, which date from the same period. The Milton Belt is metavolcanic rock, felsic and intrusive rocks from the Cambrian period/late Proterozoic Era, 680 to 710 million years before present. Some granitic rocks from the Silurian period (429 million years before present) are also found locally (Carpenter 1982).

The Triassic Basin, dating from 290 to 200 million years before present, runs through the middle of the Eden area (Sherwood 1998). According to the Rockingham County Soil Survey, the topography of the Triassic Basin is 50 to 300 feet lower than the surrounding topography of earlier age (NRCS 1992). The Triassic Basin is predominated by sandstones, conglomerates and unmetamorphosed shale. Streams of Triassic age carried silt, sand and gravel to an environment much like the Holocene East African rift valley (Sherwood 1998). The Cow Branch, Stoneville and Pine Hall Formations are the primary formations (PTRC 2012). They are locally in fault contact with the metamorphic rocks and are truncated by the Dan River fault along the northwest side of the Basin. The wide stream channels are found within the Basin (PTRPO 2012).

Affected Environment

The Dan River Steam Station lies between 490 and 630 feet above mean sea level. The Project will have no effect on the local geologic features of the Dan River Steam Station and will not alter the topography as no contours shall be redesigned, with the exception of the proposed divider berm and the dredge basin. As part of the pump-around operations, a compacted soil or soil/rock fill divider berm will be constructed along the northern edge of the dredge area between Ash Fills 1 and 2. The dredge area will be regraded during final ash removal to promote drainage to a new drop inlet. These alterations to site topography are not presumed to be significant as the area of affect encompasses previously disturbed topography (PTRC and NCCWMTF 2012).

5.1.3 Soils

Figure 5 depicts the soil types (map units) occurring within the Dan River Steam Station. The soil types are also presented in Table 2 below. Among the 11 soil types that occur within the steam station property, only one is listed as a hydric map unit; i.e., Dan River loam, 0 to 2 percent slopes, frequently flooded (DaA). This hydric map unit occurs at the southwest corner of the station and along the southern/southeastern boundary abutting the Dan River.

Table 2. Soil types occurring within the Dan River Steam Station, Rockingham County, North Carolina.

Soil Type	Map Unit Symbol	Hydric / Non-hydric
Ayersville gravelly loam, 4 to 15 percent slopes	AyC	Non-hydric
Ayersville gravelly loam, 15 to 45 percent slopes	AyF	Non-hydric
Clover sandy loam, 2 to 8 percent slopes	CmB	Non-hydric
Clover sandy loam, 8 to 15 percent slopes	CmD	Non-hydric
Dan River loam, 0 to 2 percent slopes, frequently flooded	DaA	Hydric
Pinkston fine sandy loam, 15 to 45 percent slopes	PnF	Non-hydric

Stoneville loam, 2 to 8 percent slopes	SvB	Non-hydric
Stoneville loam, 8 to 15 percent slopes	SvD	Non-hydric
Stoneville-Urban land complex, 2 to 10 percent slopes	SwC	Non-hydric
Udorthents, loamy	Ud	Non-hydric
Water	W	Non-hydric

Affected Environment

No hydric soils (hydric map units) occur within the Project area; i.e., the wetland/stream/pond complex located along the western edge of Ash Fill 1, the dredge basin, and Wetlands A and H. Figure 6 shows the jurisdictional wetland areas and stream features on the Dan River Steam Station. Wetlands B, C, D, E, F, G and J occur within the Udorthents, loamy (Ud) map unit. Wetland B also occurs within the Clover sandy loam, 2 to 8 percent slopes (CmB) map unit. Wetlands A and H are underlain by the Clover sandy loam, 8 to 15 percent slopes (CmD) map unit. The majority of the dredge basin is also underlain by the CmD map unit.

5.1.4 Terrestrial Communities

The dominant terrestrial communities on the Dan River Steam Station comprise pine forest, upland hardwood forest, and mixed pine-hardwood upland forest. Shrub and brushland and open, maintained (grassed) areas also occur on the property. These latter areas encompass disturbed/altered land within the station property which may have been forested in the past. Information on the terrestrial communities and species composition within the Project area is discussed below.

Affected Environment

The terrestrial communities that surround the aforementioned wetland/stream/pond complex (western edge of Ash Fill 1) include pine forest, upland hardwood forest and mixed pine-hardwood upland forest. The pine forest community occurs to the north and west of the complex. This community is dominated by Virginia pine (*Pinus virginiana*) in the canopy and shrub strata. The groundstory is very sparse with scattered grasses, vines and forbs. The upland hardwood forest community abuts the streams and wetlands of the complex. The canopy stratum includes white oak (*Quercus alba*), northern red oak (*Quercus rubra*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum* var. *rubrum*), mockernut hickory (*Carya alba*), and black cherry (*Prunus serotina*). The shrub stratum consists of American holly (*Ilex opaca*), saplings of the aforementioned hardwood species, and scattered occurrences of Chinese privet (*Ligustrum sinense*), an invasive, noxious shrub species. The groundstory vegetation includes panic grasses (*Panicum* spp.), Japanese honeysuckle (*Lonicera japonica*), blackberry (*Rubus* spp.), common greenbrier (*Smilax rotundifolia*), wild onion (*Allium canadense*), and eastern red cedar seedlings (*Juniperus virginiana* var. *virginiana*). Climbing vine species primarily include muscadine (*Vitis rotundifolia* var. *rotundifolia*). The mixed pine-hardwood upland forest community is interspersed between the pine forest and upland hardwood forest areas and comprises plant species common to both communities. The canopy stratum contains a mixture of Virginia pine and hardwood trees. Finally, the central portion of the complex encompasses an electrical power transmission line (corridor). This periodically maintained corridor is vegetated with a mixture of grasses, forbs, vines, shrubs and tree seedlings. Silverberry (*Elaeagnus umbellata*), an invasive, noxious shrub species, is fairly common.

Maintained (mowed) land abuts the majority of the dredge basin. The vegetation includes grasses and scattered forbs. A mixed pine-hardwood upland forest abuts the northern end of the dredge basin. A portion of this forested community upslope of the northeast corner of the basin has been recently timbered. The terrestrial communities in the vicinity of Wetland A primarily include a stand of Virginia pine on the west side of the wetland. A small fringe of hardwood trees abuts the wetland: red maple, American elm, and yellow poplar (*Liriodendron tulipifera*). Maintained (mowed) land occurs to the northwest and northeast of the wetland. Wetland A occurs on the west side of the rail line at the ash loadout area. The northern half of Wetland H is bordered by

maintained land while the southern half of this wetland is bordered by mixed pine-hardwood upland forest. Wetland H occurs on the west side of the rail line.

The wetland community descriptions and information on species composition for the waters of the U.S. within the Project area are discussed in Section 5.1.5 below. Botanical taxonomic nomenclature is in accordance with Weakley (Weakley 2015).

5.1.5 Wetlands

Waters of the U.S., including ponds, streams and wetlands, are defined by 33 CFR Part 328.3 *et al.* and are protected by Section 404 and other applicable sections of the CWA (33 USC 1344). Impacts to regulated resources under Section 404 of the CWA are administered and enforced by the USACE Wilmington District.

In January and April 2015, Amec Foster Wheeler performed an on-site evaluation for the presence of potentially jurisdictional surface waters on the Dan River Steam Station. Potentially jurisdictional wetland areas were delineated (flagged) using the Routine On-Site Determination Method as defined in the USACE Wetland Delineation Manual[1] and the Eastern Mountains and Piedmont regional supplement[2]. This technique uses a multi-parameter approach which requires positive evidence of three criteria: hydrophytic vegetation, hydric soils and wetland hydrology. Areas exhibiting wetland characteristics within the station boundary were considered potentially jurisdictional waters. The landward limits of wetlands were subsequently marked in the field with

[1] Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station. Vicksburg, MS.

[2] Environmental Laboratory. 2012. "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)," Technical Report ERDC/EL TR-12-9. U.S. Army Engineer Waterways Experiment Station. Vicksburg, MS.

labeled survey tape tied to vegetation or stakes. The location of each flag point was acquired by a Global Positioning System device.

As part of the jurisdictional waters evaluation, Amec Foster Wheeler performed an in-house review of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) Rockingham County Soil Survey GIS data (Figure 5) (NRCS 2017), the U.S. Geological Survey (USGS) digital 7.5′ topography (Figure 7; *Southeast Eden, North Carolina* Quadrangle) (USGS 2017), and the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) geographic information system GIS data (Figure 8) (USFWS 2016). These maps were used to direct the on-site investigation and highlight areas having listed hydric soils or topographic configurations suggesting the presence of wetlands or streams.

Amec Foster Wheeler, on behalf of Duke Energy, submitted a request for Verification of Jurisdictional Determination (JD) to the USACE Raleigh Regulatory Field Office for the delineated wetland areas within the Dan River Steam Station. This request for Verification of JD included the work areas within the Project area. Mr. David Bailey of the USACE conducted the site inspection of the Dan River Steam Station on November 13, 2015. The USACE has not issued an Approved JD at this time. The landward limits of the jurisdictional wetlands (flag points) within the property were surveyed by LDSI, Inc., a registered Professional Land Surveyor.

Based on the field approved jurisdictional feature delineation, 17 jurisdictional wetland areas occurred within the Dan River Steam Station (Wetlands A through Q) (Figure 6). These 17 wetlands were classified as headwater forest, with the exception of Wetland L which was classified as bottomland hardwood forest, and Wetland A, hardwood flat (Schafale and Weakley 1990). The classifications of these wetlands were based on the North Carolina Wetland Assessment Method (NC WAM) per the methodology outlined in the NC WAM *User Manual*[3] (Version 4.1), effective October, 2010. Many of these wetlands comprised

[3] N.C. Wetland Functional Assessment Team. 2010. "N.C. Wetland Assessment Method (NC WAM) User Manual, Version 4.1". North Carolina Wetland Functional Assessment Team. Raleigh, NC.

herbaceous/shrub/scrub areas within maintained electrical power transmission line corridors or facility open areas. Information on the size, corresponding NC WAM classification, and general location within the station property for the 17 jurisdictional wetlands is presented in Table 3.

Table 3. Wetlands within the Dan River Steam Station, Rockingham County, North Carolina.

Wetland ID	NC WAM Classification	Size (acres)	General Site Location within Steam Station Property
Wetland A	Hardwood Flat	0.19	East central
Wetland B	Headwater Forest	0.40	Northeast quadrant
Wetland C	Headwater Forest	0.06	Northeast quadrant
Wetland D	Headwater Forest	0.16	Northeast quadrant
Wetland E	Headwater Forest	0.01	Northeast quadrant
Wetland F	Headwater Forest	0.16	Northeast quadrant
Wetland G	Headwater Forest	0.07	Northeast quadrant
Wetland H	Headwater Forest	0.11	East central
Wetland I	Headwater Forest	0.29	South central
Wetland J	Headwater Forest	0.10	Northeast quadrant
Wetland K	Headwater Forest	0.19	Northern edge
Wetland L	Bottomland Hardwood Forest	0.94	Western edge
Wetland M	Headwater Forest	0.04	Northern edge
Wetland N	Headwater Forest	0.10	Northern edge
Wetland O	Headwater Forest	0.07	West central

Wetland ID	NC WAM Classification	Size (acres)	General Site Location within Steam Station Property
Wetland P	Headwater Forest	0.05	West central
Wetland Q	Headwater Forest	0.02	Eastern edge

Affected Environment

The Project area vicinity encompasses nine jurisdictional wetland areas (Figure 6a). Seven of the wetlands, Wetlands B, C, D, E, F, G and J, occur along the western edge of Fill Area 1 and comprise what has been described herein as the northern wetland/stream/pond complex. This complex occurs immediately north of the proposed divider berm. Wetlands A occurs on the west side of the rail line at the ash loadout area. Wetland H also occurs on the west side of the rail line. The level of function of each wetland (relative to reference condition) was assessed using NC WAM on November 2, 2016. Information on the size, NC WAM classification, NC WAM overall wetland rating, and riparian nature of these nine wetlands is presented in Table 4. The USACE Eastern Mountain and Piedmont Wetland Determination Data Forms for these wetland areas were included in the Verification of JD request package previously submitted to the USACE. The NC WAM Wetland Assessment Forms for the wetland areas are located in Appendix B. Ground level photography of current site conditions for the wetlands is provided in Appendix C.

Table 4. Wetlands within the Stormwater Diversion Project area vicinity, Dan River Steam Station, Rockingham County, North Carolina.

Wetland ID	NC WAM Classification	NC WAM Overall Wetland Rating	Size (acres)	Riparian / Non-riparian
Wetland A	Hardwood Flat	Medium	0.19	Non-riparian
Wetland B	Headwater Forest	Low	0.40	Riparian
Wetland C	Headwater Forest	Low	0.06	Riparian
Wetland D	Headwater Forest	Medium	0.16	Riparian

Wetland ID	NC WAM Classification	NC WAM Overall Wetland Rating	Size (acres)	Riparian / Non-riparian
Wetland E	Headwater Forest	Low	0.01	Riparian
Wetland F	Headwater Forest	Low	0.16	Riparian
Wetland G	Headwater Forest	Medium	0.07	Riparian
Wetland H	Headwater Forest	Medium	0.11	Riparian
Wetland J	Headwater Forest	Medium	0.10	Riparian
Total Acreage			1.26	

Wetlands C, D and G are dominated by an overstory of sweetgum, red maple and sycamore (*Platanus occidentalis*). Virginia pine is also present but typically uncommon. The midstory consists of small trees or saplings of the aforementioned hardwoods. The understory vegetation includes greenbrier, Japanese honeysuckle and sedges (*Carex* spp.). Wetlands B, E and J are predominantly herbaceous areas which occur within an electrical powerline corridor and/or facility open area. Wetland F comprises forested and herbaceous areas. The vegetation in the non-forested areas is primarily herbaceous due to the nature of the disturbance activities within the maintained areas which prevents development of the canopy and shrub strata. The vegetation includes soft rush (*Juncus effusus*), panicgrass, sawtooth blackberry (*Rubus argutus*), broomsedge (*Andropogon virginicus*), and bladder sedge (*Carex intumescens*). Scattered occurrences of sweetgum saplings and silverling are present within the electrical powerline corridor where it intersects the wetlands. The vegetation within Wetland A includes soft rush, panicgrass, sedges, and scattered saplings of black willow (*Salix nigra*), sweetgum and red maple. Wetland H is similar in vegetative composition to Wetland A. Wetlands A, D, G, H and J have a NC WAM overall rating of medium, while Wetlands B, C, E and F have a NC WAM overall rating of low.

The NRCS Soil Survey (Figure 5) indicated the presence of no hydric soils (hydric map units) within the Project area. Wetlands B, C, D, E, F, G and J occur within the Udorthents, loamy (Ud) map unit. Wetland B also occurs within the Clover sandy loam, 2 to 8 percent slopes (CmB) map unit. Wetlands A and H are underlain by the Clover sandy loam, 8 to 15 percent slopes (CmD) map unit. None of the aforementioned wetland areas appear on the USGS topographic map (Figure 7) or the USFWS NWI map (Figure 8).

Wetlands A, D, F and H occur within the Project area (inclusive of various Project components) and will be affected by the implementation of the pump-around stormwater diversion operations. Wetlands B, C, E, G and J occur in the general vicinity of the Project components but will not be affected by the stormwater diversion operations.

The Project area also encompasses a dredge basin which occurs between Ash Fills 1 and 2 (Figure 6a). Regulatory jurisdiction was exerted by the USACE over the basin in late 2016. The basin contains CCR material throughout its entire area. Non-native phragmites (*Phragmites australis*), an aggressive perennial wetland grass, has become established and is the dominant plant species in the basin. Wetland D is hydrologically and vegetatively connected to the dredge basin. The basin was not depicted on the NRCS Rockingham County Soil Survey (hardcopy version) (NRCS 1992) and the USGS topographic map (Figure 7); however, a freshwater pond feature was depicted at the southern end of the basin on the USFWS NWI Map (Figure 8). The majority of the basin is underlain by Clover sandy loam, 8 to 15 percent slopes (CmD), a non-hydric map unit. A NC WAM overall rating of low was recorded for the dredge basin. The NC WAM Wetland Assessment Form and the USACE Eastern Mountain and Piedmont Wetland Determination Data Form are located in Appendix B. Ground level photography of current site conditions is provided in Appendix C. The boundary of the dredge basin was delineated by Amec Foster Wheeler on December 20, 2016. The size of the basin is 1.89 acres based on the survey of the delineated boundary in January 2016 by Fleming Engineering, Inc. The Wetland Delineation Survey Plat of the jurisdictional dredge basin is provided in Appendix D.

The dredge basin occurs within the Project area and will be affected by the implementation of the pump-around stormwater diversion operations.

5.1.6 Streams

Potential jurisdictional streams on the Dan River Steam Station were evaluated in January and April, 2015, by Amec Foster Wheeler personnel using the NCDEQ Division of Water Resources (NCDWR) *Methodology for Identification of Intermittent and Perennial Streams and Their Origins*[4] (Version 4.11), effective September 1, 2010. USACE Stream Quality Assessment Worksheets were also completed for each stream. The extents of these streams were delineated and included in the request for Verification of JD to the USACE Raleigh Regulatory Field Office. The landward limits of the jurisdictional streams (flag points) within the steam station property were surveyed by LDSI, Inc.

Based on the field approved jurisdictional feature delineation, 12 jurisdictional streams occurred within the Dan River Steam Station (Streams 1 through 16) (Figure 6). The NCDWR Stream Identification scores and classifications and the USACE Stream Quality Assessment Worksheet scores are presented in Table 5 for these 12 streams.

Table 5. Streams within the Dan River Steam Station, Rockingham County, North Carolina.

Stream ID	NCDWR Stream Score[1]	NCDWR Stream Classification	USACE Stream Score	Length (linear feet)	General Site Location within Steam Station Property
Stream 1	33.5	Perennial	51	758	Northeast quadrant
Stream 2	32.5	Perennial	37	128	Northeast quadrant
Stream 3	34	Perennial	46	700	Eastern edge

[4] North Carolina Division of Water Quality. 2010. "Methodology for Identification of Intermittent and Perennial Streams and their Origins, Version 4.11". North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, NC.

Stream ID	NCDWR Stream Score[1]	NCDWR Stream Classification	USACE Stream Score	Length (linear feet)	General Site Location within Steam Station Property
Stream 4	30	Perennial	56	73	East central
Stream 5	31	Perennial	57	217	South central
Stream 6	32.5	Perennial	37	134	Northeast quadrant
Stream 7	26.5	Intermittent	45	305	Northern edge
Stream 8	39	Perennial	54	2,787	Western edge
Stream 10	22	Intermittent	42	599	Northwest quadrant
Stream 12	22	Intermittent	37	224	West central
Stream 13	30	Perennial	42	1,057	West central
Stream 14	22	Intermittent	41	261	Southwest quadrant
Stream 15	26.5	Intermittent	45	40	Northern edge
Stream 16	26.5	Intermittent	45	53	Eastern edge

[1] NCDWR scoring: <19= ephemeral; 19 to <30 = intermittent; ≥30 = perennial

Affected Environment

The Project area vicinity encompasses three jurisdictional streams, Streams 1, 2 and 6 (Figure 6a). These streams occur along the western edge of Ash Fill 1 and are imbedded within the complex of wetlands comprising Wetlands B, C, D, E, F, G and J. The level of function of each stream (relative to reference condition) was assessed on November 2, 2016, by Amec Foster Wheeler using the North Carolina Stream Assessment Method (NC SAM) per the methodology

outlined in the NC SAM *Draft User Manual* [5], effective March, 2013. Information on the reach length, NCDWR Stream Identification score and classification, NC SAM overall stream rating, and USACE Stream Quality Assessment Worksheet score of these three streams is presented in Table 6. The NCDWR Stream Identification Forms and the USACE Stream Quality Assessment Worksheets for these streams were included in the Verification of JD request package previously submitted to the USACE. The NC SAM Stream Assessment Forms for the streams are located in Appendix B. Ground level photography of current site conditions for the streams is provided in Appendix C.

Table 6. Streams within the Stormwater Diversion Project area vicinity, Dan River Steam Station, Rockingham County, North Carolina.

Stream ID	NCDWR Stream Score[1]	NCDWR Stream Classification[1]	NC SAM Overall Rating	USACE Stream Score	Entire Reach Length (linear feet)
Stream 1 (upstream/northern portion of reach)	33.5	Perennial	High	51	758
Stream 1 (downstream/southern portion of reach)	33.5	Perennial	High	51	758
Stream 1 (within powerline corridor)	33.5	Perennial	Low	51	758
Stream 2	32.5	Perennial	High	37	128
Stream 6	32.5	Perennial	Medium	37	134
Total Linear Feet					**1,020**

[1] NCDWR scoring: <19= ephemeral; 19 to <30 = intermittent; ≥30 = perennial

[5] N.C. Stream Functional Assessment Team. 2013. "N.C. Stream Assessment Method (NC SAM) Draft User Manual". North Carolina Stream Functional Assessment Team. Raleigh, NC.

Stream 1 is the longest feature (758 feet). Portions of this reach occur within Wetlands C, D, E, and F. The northern and southern portions of Stream 1 occur within a hardwood forest and have NC SAM overall ratings of high. The central portion of Stream 1 occurs within a powerline corridor and has a NC SAM overall rating of low. Stream 2 (128 feet) drains into Stream 1. Stream 2 occurs within Wetland F and upland hardwood forest and has a NC SAM overall rating of high. Stream 6 (134 feet) occurs within a powerline corridor and a forested upland. The western end of the reach abuts Wetland J. Stream 6 has a NC SAM overall rating of medium.

No stream features were depicted within the Project area on the NRCS Rockingham County Soil Survey (hardcopy version), USGS topographic map (Figure 7), or USFWS NWI Map (Figure 8). The Dan River Steam Station is located within the Roanoke River Basin (Hydrologic Unit Code [HUC] 03010103).

Stream 1 occurs within the Project area and will be affected by the implementation of the pump-around stormwater diversion operations. Although Streams 2 and 6 occur in the general vicinity of the Project components, these surface waters will not be affected by the stormwater diversion operations.

5.1.7 Riparian Buffers

The Dan River Steam Station is not located within a river basin which has delegated NCDEQ Riparian Buffer Rules. Therefore, State of North Carolina stream buffers will not apply to the Project. The Dan River Steam Station is located in the Roanoke River Basin.

The Rockingham County Watershed Protection Ordinance requires a minimum 100-foot buffer be established around perennial and intermittent stream features which are shown on the most recent version of the USGS 7.5-minute topographic quadrangle. Stream 3, which occurs along the eastern boundary of the Dan River Steam Station, would be subject to a 100-foot vegetative buffer, as the stream was shown as a dashed blue-line feature on the USGS topographic map (Figure 7). Stream 3 is not part of the Project area.

Affected Environment

No stream features (i.e., mapped blue-line features) were depicted within the Project area on the USGS topographic map (Figure 7). Therefore, Rockingham County Watershed Protection Ordinance buffers would not be required around Streams 1, 2 and 6 which occur within the Project area.

5.1.8 Open Waters

One jurisdictional pond, Pond AA (0.04 acre), was delineated within the northeast portion of the Dan River Steam Station (Figure 6a). The pond was a former sediment basin, but has since been abandoned.

Affected Environment

Pond AA occurs at the northern end of the wetland/stream/pond complex (western edge of Ash Fill 1) and abuts Wetland B. The pond was not depicted on the NRCS Rockingham County Soil Survey (hardcopy version), USGS topographic map (Figure 7), or USFWS NWI Map (Figure 8). Although Pond AA occurs in the general vicinity of the Project components, this open water area will not be affected by the implementation of the pump-around stormwater diversion operations.

5.1.9 Floodplains

Floodplain Management is conducted in compliance with Executive Order (EO) 11988. The National Flood Insurance Program (NFIP) was created in 1968 to protect lives and property and to reduce the financial burden of providing disaster assistance. The NFIP is administered by the Federal Emergency Management Agency (FEMA). The NFIP is based on a mutual agreement between the federal government and communities. In partnership with FEMA, the State of North Carolina has produced flood maps in accordance with FEMA standards. Communities must adopt and enforce minimum floodplain management regulations so that development is undertaken in ways that reduce exposure to flooding. Amec Foster Wheeler reviewed Digital Flood Insurance Rate Maps (DFIRM) to determine whether any portion of the Dan River Steam Station lies within the regulatory 100-year floodplain (FIRM Panels 7989 and 7999, effective date July 3, 2007)

(FEMA 2014). The review of the FEMA DFIRM delineated flood boundaries, specifically the regulated 100-year flood boundary, identified the area next to the Dan River and the area encompassing Streams 3 and 16 and Wetland Q (eastern boundary of steam station) as occurring within the 100-year flood zone (Figure 9). The western edge of the steam station, as including Streams 8 and 14, the western end of Stream 13, and Wetland L, also occurs within the 100-year flood zone.

Amec Foster Wheeler also reviewed the Rockingham County Flood Damage Prevention Ordinance (Rockingham County 2007) to determine the extent of local government requirements for work in floodplains at the Dan River Steam Station. According to the Flood Damage Prevention Ordinance, work conducted within flood-prone areas would require a Floodplain Development Permit, specifically, Section B - Floodplain Development Application, Permit and Certification Requirements. The application for the Floodplain Development Permit must be submitted for review by the county before any development activity begins. Work conducted within the 100-year floodplain would require review/consultation with the Rockingham County Water Resources Department and/or Floodplain Administrator.

Affected Environment

The review of the FEMA DFIRM delineated flood boundaries for the Dan River Steam Station identified that no jurisdictional surface waters within the Project area lie within the 100-year flood zone (Figure 9). For this evaluation, the Project area encompasses the work to be conducted within the wetland/stream/pond complex (western side of Ash Fill 1), the dredge basin, Wetland A, and Wetland H. Any other work areas associated with the Project that lie within the 100-year flood zone, but not within the aforementioned jurisdictional surface waters, will be addressed separately by the stormwater engineer for the project.

5.1.10 Surface Waters

Surface waters include streams, rivers, lakes, and reservoirs. The Dan River Steam Station basin is located entirely within the Upper Dan sub-basin which is contained within the Roanoke River basin, part of the Piedmont Physiographic Region. No major, natural water bodies occur within the steam station. The Dan River abuts the southern boundary of the station. The Dan River

rises on the eastern slope of the Blue Ridge Mountains in Patrick County, Virginia. From its origin, it travels 200 miles passing through Stokes, Rockingham, Caswell and Pittsylvania Counties before reaching Halifax County, Virginia, where it enters the Kerr Reservoir. The Dan River Watershed forms part of the headwaters of the Roanoke River, a major source of the Albemarle Sound in coastal North Carolina. The surface water classification listed for the Dan River, as based on the most recent NCDEQ surface water data (NCDEQ 2017a), is "C". This classification includes waters protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized or incidental manner. The Dan River is not listed as impaired in the vicinity of the Dan River Steam Station; i.e., it is not included on the "Draft 2016 303(d) List" of impaired waters (NCDEQ 2017a). Stream 3, which is located in the southeast corner of the steam station property, drains directly into the Dan River.

Affected Environment

Stream 1 occurs within the Project area and will be affected by the implementation of the pump-around stormwater diversion operations. Although Streams 2 and 6 and pond AA occur in the general vicinity of the Project components, these surface waters will not be affected by the stormwater diversion operations. Discussions of these three streams and Pond AA are presented in Sections 5.1.6 and 5.1.8, respectively.

5.1.11 Groundwater

Groundwater refers to subsurface hydrologic resources that are used for domestic, agricultural, and industrial purposes. Groundwater is stored in natural geologic formations called aquifers. In the Piedmont Physiographic Region of North Carolina, two major aquifer systems exist and usually interact with one another (NCDEQ 2017b). The surficial materials or regolith of these provinces form the unconfined aquifer. The fractured rock beneath is the unconfined, to semi-confined, bedrock aquifer. The surficial aquifer typically feeds the fractures in the bedrock aquifer. These two aquifers are further described below (NCDEQ 2017b).

- Surficial aquifer: This aquifer is widely used throughout the state for individual home wells. The surficial aquifer is the shallowest and most susceptible to contamination from septic tank systems and other pollution sources. Commonly, large diameter wells (up to 3 feet in diameter) are drilled up to 60 feet deep to store large quantities of water in the well casing. The surficial aquifer is also very sensitive to variations in rainfall amounts; i.e., they are the first to dry-up in a drought.

- Fractured bedrock aquifer: This aquifer is widely used for home water supply. Usually six-inch wells are drilled to intercept water bearing fractures which are more common in valleys or draws. Thick sequences of regolith (surficial aquifer) above fractured bedrock can improve well yields. Industries and county or municipal well fields look for these higher yielding bedrock wells.

Affected Environment

The diversion of stormwater will not draw water from subsurface/groundwater sources. Therefore, the implementation of stormwater diversion operations should have no pronounced effect on the surficial aquifer or the fractured bedrock aquifer.

5.2 DAN RIVER 134 PROJECT

The DR 134 Project will entail streambank stabilization for Stream 3, a perennial stream located along the eastern boundary of the Dan River Steam Station near its confluence with the Dan River. Rip-rap (armoring) will be placed along the western streambank of Stream 3 to prevent further erosion and increase the stablity of the streambank. The area of streambank instability occurs between two culverted road crossings and focuses on the west bank area. Therefore, the “affected environment” (project footprint) for the stream stabilization effort essentially encompasses the portion of the stream reach that occurs between the aforementioned two road crossings. Relevant background information was presented in Sections 5.1.1 through 5.1.11 of the WMP for the proposed stormwater diversion operations, the plant property and the affected environment. The set of topics included: land use, geology and topography, soils, terrestrial communities, wetlands, streams, riparian buffers, open waters, floodplains, surface waters, and groundwater. These topics are discussed below for the DR 134 Project and its affected environment.

5.2.1 Land Use

Section 5.1.1 of the WMP included topical information on land use for the Dan River Steam Station. The land use abutting the affected environment of the DR 134 Project singularly includes woodland. Land use in the vicinity of the project includes an unpaved roadway, maintained grassed areas, and the SAB to the west. The Dan River occurs to the south (abuts the southern boundary of the station).

5.2.2 Geology and Topography

Section 5.1.2 of the WMP included topical information on geology and topography for the Dan River Steam Station. The DR 134 Project will have no effect on the local geologic features of the steam station and will not alter the surrounding topography as no contours shall be redesigned. The placement of rip-rap along the western streambank of Stream 3 will not alter the pattern (i.e., sinuosity) or profile (i.e., mean water surface slope) of the affected portion of the stream reach. Stream dimension, as including a stream's width, mean depth, width/depth ratio, maximum depth, floodprone area width, and entrenchment ratio, will not be adversely affected by the addition of rip-rap along the western streambank.

5.2.3 Soils

Section 5.1.3 of the WMP included topical information on soils within the Dan River Steam Station. The DR 134 Project occurs within the Dan River loam, 0 to 2 percent slopes, frequently flooded (DaA) map unit, which is a hydric soil (Figure 5). The placement of rip-rap along the western streambank of Stream 3 (affected environment) will not entail the excavation of soil.

5.2.4 Terrestrial Communities

Section 5.1.4 of the WMP included topical information on terrestrial communities within the Dan River Steam Station. The DR 134 Project occurs within an upland hardwood forest. The placement of rip-rap along the western streambank of Stream 3 (affected environment) will not adversely affect this woodland. Some cutting of trees and clearing of underbrush (shrubs and saplings) in the uplands may be necessary to facilitate the on-site construction activities.

5.2.5 Wetlands

Section 5.1.5 of the WMP included topical information on wetlands within the Dan River Steam Station. No wetlands occur within the DR 134 Project (affected environment). The nearest wetland is Wetland Q, a headwater forest (Figure 6). Wetland Q occurs to the north of the affected environment and is hydrologically connected to Stream 3 via a short intermittent channel (Stream 16). No wetland features were depicted within the affected environment on the USFWS NWI Map (Figure 8).

5.2.6 Streams

Section 5.1.6 of the WMP included topical information on streams within the Dan River Steam Station. Stream 3 occurs within the DR 134 Project (affected environment) (Figure 6a). The proposed action will result in an impact of 130 linear feet to Stream 3 from the placement of rip-rap below the OHWM. The rip-rap will be placed along the western bank of the stream between two culverted road crossings. The proposed action will not affect Stream 16, a short intermittent channel that flows into the northern portion of Stream 3.

5.2.7 Riparian Buffers

The Dan River Steam Station is not located within a river basin which has delegated NCDEQ Riparian Buffer Rules. Therefore, State of North Carolina stream buffers will not apply to the DR 134 Project. The Rockingham County Watershed Protection Ordinance requires a minimum 100-foot buffer be established around perennial and intermittent stream features which are shown on the most recent version of the USGS 7.5-minute topographic quadrangle. Stream 3 would be subject to a 100-foot vegetative buffer, as the stream was shown as a dashed blue-line feature on the USGS topographic map (Figure 7). Stream 3 is also depicted on the NRCS Rockingham County Soil Survey (hardcopy version). The placement of rip-rap within Stream 3 would be limited to the western bank of the stream. Rip-rap would not be placed within the riparian buffer (uplands) that would extend landward from the top-of-bank of the stream.

5.2.8 Open Waters

Section 5.1.8 of the WMP included topical information on open waters (ponds) within the Dan River Steam Station. No ponds occur within the DR 134 Project (affected environment) (Figure 6). No freshwater ponds were depicted within the affected environment on the USFWS NWI Map (Figure 8).

5.2.9 Floodplains

Section 5.1.9 of the WMP included topical information on floodplains for the Dan River Steam Station. The review of the FEMA DFIRM delineated flood boundaries, specifically the regulated 100-year flood boundary, identified the area next to the Dan River and the area encompassing Streams 3 and 16 and Wetland Q (eastern boundary of steam station) as occurring within the 100-year flood zone (Figure 9). According to the Rockingham County Flood Damage Prevention Ordinance (Rockingham County 2007), work conducted within flood-prone areas would require a Floodplain Development Permit, specifically, Section B - Floodplain Development Application, Permit and Certification Requirements. The application for the Floodplain Development Permit must be submitted for review by the county before any development activity begins. Work conducted within the 100-year floodplain would require review/consultation with the Rockingham County Water Resources Department and/or Floodplain Administrator. The DR 134 Project lies within the 100-year flood zone; therefore, the proposed action will be addressed with the county by the stormwater engineer for the project.

5.2.10 Surface Waters

Section 5.1.10 of the WMP included topical information on surface waters for the Dan River Steam Station. Surface waters include streams, rivers, lakes, and reservoirs. No major, natural water bodies occur within the steam station or the DR 134 Project (affected environment). The Dan River abuts the southern boundary of the station. Stream 3, which is located in the southeast corner of the steam station property, drains directly into the Dan River. A discussion of Stream 3 is presented in Section 5.2.6 of the WMP, as related to the DR 134 Project and the affected environment.

5.2.11 Groundwater

Section 5.1.11 of the WMP included topical information on groundwater for the Dan River Steam Station. Groundwater refers to subsurface hydrologic resources that are used for domestic, agricultural, and industrial purposes. Groundwater is stored in natural geologic formations called aquifers, including surficial aquifer and fractured bedrock aquifer. The DR 134 Project will not draw water from subsurface/groundwater sources. Therefore, the streambank stabilization proposed for Stream 3 should have no adverse effect on the surficial aquifer or the fractured bedrock aquifer.

5.3 DAN RIVER 131 PROJECT

The DR 131 Project will entail the extensionof the culvert pipe downstream at the southern road crossing of Stream 3. Stream 3, a perennial stream, is located along the eastern boundary of the Dan River Steam Station near its confluence with the Dan River. The "affected environment" (project footprint) for the project encompasses the stream reach at the southern road crossing and a short distance immediately downstream of the crossing. The affected environment of the DR 131 Project essentially abuts the southern end of the affected environment of the DR 134 Project. As such, the relevant background information that was presented for the DR 134 Project (Sections 5.2.1 through 5.2.11) are germaine to the DR 131 Project and the discussion of relevant background information for the latter project. The topics (i.e., land use, geology and topography, soils, terrestrial communities, wetlands, streams, riparian buffers, open waters, floodplains, surface waters, and groundwater) are discussed below for the DR 131 Project and its affected environment.

5.3.1 Land Use

The land use abutting the affected environment of the DR 131 Project singularly includes woodland. Land use in the vicinity of the project includes an unpaved roadway, maintained grassed areas, and the SAB to the west. The Dan River occurs to the south (abuts the southern boundary of the station).

5.3.2 Geology and Topography

The DR 131 Project will have no effect on the local geologic features of the steam station. The extension of the culvert pipe to raise the crest of the southern road crossing will not adversely affect the dimension, pattern, and profile of Stream 3 within the work area. The changes to topography (contours) will include:

- The raising of the crest (elevation) of the road crossing by raising the height of the culvert.
- The altering of the existing grade along the approach to the road crossing to facilitate the tie in to the crossing.
- The clearing of trees and vegetation and removing of stumps to grade along the northern side of the proposed scarp repair area (northern shoreline of Dan River).

5.3.3 Soils

The DR 131 Project occurs within the Dan River loam, 0 to 2 percent slopes, frequently flooded (DaA) map unit, which is a hydric soil (Figure 5). The extension of the culvert pipe within Stream 3 downstream of the southern road crossing will only result in minor soil excavations in the stream to place the culvert extension and then backfill the crossing with stone.

5.3.4 Terrestrial Communities

The DR 131 Project occurs within an upland hardwood forest. The extension of the culvert pipe at the southern road crossing (affected environment) will not adversely affect this woodland. Some cutting of trees and clearing of underbrush (shrubs and saplings) in the uplands may be necessary to facilitate the on-site construction activities.

The clearing of trees and vegetation and removing of stumps to grade along the northern side of the proposed scarp repair area (northern shoreline of Dan River) will not adversely affect the quantity and quality of upland hardwood forest on the Dan River Steam Station or throughout Rockingham County. The tree clearing area will not exceed one-quarter acre of disturbance based on current site plan details.

5.3.5 Wetlands

No wetlands occur within the DR 131 Project (affected environment). The nearest wetland is Wetland Q, a headwater forest (Figure 6). Wetland Q occurs to the north of the northern road crossing of Stream 3. No wetland features were depicted within the affected environment on the USFWS NWI Map (Figure 8).

5.3.6 Streams

Stream 3 occurs within the DR 131 Project (affected environment) (Figure 6a). The proposed action will result in an impact of 15 linear feet to Stream 3 from the extension, downstream, of the culvert pipe at the southern road crossing of Stream 3. The proposed action will not affect Stream 16, a short intermittent channel that flows into the northern portion of Stream 3.

5.3.7 Riparian Buffers

NCDEQ Riparian Buffer Rules will not apply to the DR 131 Project. Pusuant to the Rockingham County Watershed Protection Ordinance, Stream 3 would be subject to a 100-foot vegetative buffer, as the stream was shown as a dashed blue-line feature on the USGS topographic map (Figure 7). The proposed action is not likely to impact woodland within the buffer.

5.3.8 Open Waters

No ponds occur within the DR 131 Project (affected environment) (Figure 6). No freshwater ponds were depicted within the affected environment on the USFWS NWI Map (Figure 8).

5.3.9 Floodplains

The DR 131 Project (affected environment) occurs within the regulated 100-year flood boundary based on the mapped FEMA DFIRM delineated flood boundaries (Figure 9). Work conducted within flood-prone areas would require a Floodplain Development Permit pursuant to the Rockingham County Flood Damage Prevention Ordinance (Rockingham County 2007). The DR

131 Project lies within the 100-year flood zone; therefore, the proposed action will be addressed with the county by the stormwater engineer for the project.

5.3.10 Surface Waters

No major, natural water bodies occur within the steam station or the DR 131 Project (affected environment). The Dan River abuts the southern boundary of the station. Stream 3, which is located in the southeast corner of the steam station property, drains directly into the Dan River. A discussion of Stream 3 is presented in Section 5.3.6 of the WMP, as related to the DR 131 Project and the affected environment.

5.3.11 Groundwater

The DR 131 Project will not draw water from subsurface/groundwater sources. Therefore, the extension of the culvert pipe to raise the elevation of the crest of the southern road crossing should have no adverse effect on the surficial aquifer or the fractured bedrock aquifer.

6.0 PROPOSED WATERS OF THE U.S. IMPACTS

6.1 EXTENT OF IMPACTS

6.1.1 Stormwater Diversion Project

Wetlands A, D, F, and H, Stream 1, and the dredge basin occur within the Project area (inclusive of various Project components) and will be affected by the implementation of the pump-around stormwater diversion operations. Although Wetlands B, C, E, G and J, Streams 2 and 6, and Pond AA occur in the general vicinity of the Project components, these waters of the U.S. will not be affected by the stormwater diversion operations. Prior work activities conducted at WSA-2, as affecting Wetland H, were permitted by the USACE (Action ID SAW-2014-01477, issued on September 29, 2014). The issued NWP 18 authorized impacts (permanent) to Wetland H resulting from overflooding.

All impacts to waters of the U.S. from the implementation of the stormwater diversion operations are classified herein as permanent, as based on prior conversations in 2016 with Mr. David Bailey of the USACE, Raleigh Regulatory Field Office. The impacts to Wetlands A, D and F, Wetland H (impacts previously permitted), and Stream 1 will be due to overflooding. The construction of the Project component WSA-1 will require removal of vegetation, CCR removal, and regrading to promote drainage within the existing dredge basin area. Specifically, the cumulative impacts to the dredge basin area footprint will include dredging, cut/fill, and overflooding. The initial impact to the dredge basin will be dredging; i.e., the removal of hydrophytic vegetation, primarily phragmites, and the excavation of CCR material. The removed phragmites will be placed in a burn box. The stormwater diversion measures will be in place during the excavation and disposal of CCR materials, which is estimated to occur over a period of approximately three to five years. Table 7 presents acreage and linear foot values of the proposed impacts to jurisdictional wetlands and streams within the respective Project components. The Plan View drawing of the Project components, including the work areas where the impacts to waters of the U.S. will occur, is provided in Appendix E. Cross-section drawings of Wetlands A, D and F, Stream 1, and the dredge basin are also provided in Appendix E. The locations of the cross-sections are shown on Figure 3a and the Plan View drawing.

At a February 17, 2017, pre-application meeting with Mr. David Bailey of the USACE and Ms. Sue Homewood of the NCDWR, agency staff requested that the engineering design calculations for the Project be re-examined to remove the sump volume from the stage-storage curve for the UFA due to concerns about groundwater infiltration into the sump. Based on the results of this analysis, the impacts from overflooding to Wetlands D and F and Stream 1 for the preferred pump-around alternative increased from the impact values that were previously reported for these features at the time of the pre-application meeting. The impact to Wetlands D and F increased from 0.21 to 0.22 acre, while the impact to Stream 1 increased from 354 to 393 linear feet.

Table 7. Proposed impacts to jurisdictional wetlands, streams, and dredge basin for the Stormwater Diversion Project, DR 134 Project, DR 131 Project, 36-Inch Pipe Closure Project, and 48-Inch Pipe Closure Project, Dan River Steam Station, Rockingham County, North Carolina.

Resource Type	Project Component	Proposed Impacts	
		Wetlands (acres)	Streams (linear feet)
Stormwater Diversion Project			
Wetland A	WSA-3	0.19	-
Wetland D	UFA	0.16	-
Wetland F	UFA	0.06	-
Stream 1	UFA	-	393
Dredge Basin	WSA-1	1.89	-
Total		**2.29**	**393**
DR 134 Project (includes prior work activities)			
Stream 3	Bank Stabilization	-	130
Stream 3	Culvert Installation (March 2016)	-	86
DR 131 Project			
Stream 3	Culvert Pipe Extension	-	15
Total DR 134 and DR 131 (Stream 3)			**231**
36-Inch Pipe Closure Project (previously permitted)			
Wetland H	Pipe Closure with Overflooding (includes fill for cofferdam)	0.098	-

Resource Type	Project Component	Proposed Impacts	
		Wetlands (acres)	Streams (linear feet)
Stream 4	Pipe Closure with Overflooding	-	65
48-Inch Pipe Closure Project (previously permtted)			
Wetlands	Pipe Closure with Overflooding	0.407	-
Streams	Pipe Closure with Overflooding	-	448

6.1.2 Dan River 134 Project

The DR 134 Project will result in an impact of 130 linear feet to Stream 3 from the placement of rip-rap below the OHWM. The rip-rap will be placed along the western bank of the stream between two culverted road crossings. The impact will be permanent. The proposed action will not impact Stream 16, a short intermittent channel that flows into the northern portion of Stream 3, or Wetland Q, which is hydrologically connected to Stream 3 via Stream 16. Table 7 includes the linear foot value of the proposed impact to Stream 3 for the DR 134 Project. The Plan View drawing of the proposed action, including the work area where the impact to Stream 3 will occur, is provided in Appendix E.

Separate from the proposed action to stabilize the western bank of Stream 3, but linked to Stream 3 by past activities conducted within this surface water, was the installation of a culvert at each of the aforementioned road crossings of the stream in March of 2016. The USACE authorized the installation of the culverts through a NWP (Action ID SAW-2016-00331). The impacts to the stream were identified as temporary in the issued NWP. The impacts are henceforth included in the WMP as permanent. The culverted road crossings were created to facilitate vehicle and equipment access to the northern shoreline of the Dan River. Access to the Dan River shoreline is necessary for scarp repair, as needed, during the closure of the ash basins and the transport of coal ash from the station via a barge loadout area. Therefore, the road crossings will be maintained indefinitely for future necessity and emergency access to this area of the station. The two culverts will not be removed and the stream will not be restored (via contour reshaping, etc.) to the pre-impact condition, including dimension, pattern, and profile. The impact to Stream 3 from the installation of the two culverts comprised 86 linear feet; i.e., 43 linear feet of impact for

the northern road crossing and 43 linear feet of impact for the southern road crossing. Table 7 includes the linear foot value of these permanent impacts to Stream 3. The survey plat of the two impact areas within Stream 3 is provided in Appendix E.

6.1.3 Dan River 131 Project

The DR 131 Project will result in an impact of 15 linear feet to Stream 3 from the extension, downstream, of the culvert pipe at the southern road crossing of Stream 3. This impact will be permanent. This impact of 15 linear feet is in addition to the 43 linear feet of impact for the southern road crossing during the March 2016 culvert installation referenced above (Action ID SAW-2016-00331). Table 7 includes the linear foot value of the proposed impact to Stream 3 for the DR 131 Project. The Plan View drawing of the proposed action, including the work area where the impact to Stream 3 will occur, is provided in Appendix E.

6.1.4 36-Inch Pipe Closure Project

Action ID SAW-2014-01477, issued by the USACE for the 36-Inch Pipe Closure Project, provided the following description of the project area and activity: “The proposed project includes a permanent discharge of fill material into 0.001 acre of wetlands and 4 linear feet (8 square feet) of streams, resulting in the permanent conversion of 0.097 acre of wetlands and 61 linear feet (0.003 acre) of stream to open waters in order to close a 36-inch corrugated metal pipe that flows under an existing coal ash basin.” The total amount of wetland impact is 0.098 acre and encompasses Wetland H. The total amount of stream impact is 65 linear feet and encompasses Stream 4. These impacts to jurisdictional waters are included in Table 7.

6.1.5 48-Inch Pipe Closure Project

Action ID SAW-2015-01670, issued by the USACE for the 48-Inch Pipe Closure Project, provided the following description of the project area and activity: “The proposed project includes the permanent conversion of 0.407 acre of wetlands and 448 linear feet of stream to open waters in order to close a 48-inch corrugated metal pipe that flows under an existing coal ash basin.” The impacted wetlands and streams are shown on the Plan View drawing for the 48-Inch Pipe Closure Project (included in Appendix A herein), which was provided to the

USACE on July 17, 2015, as part of the Pre-Construction Notification submital package. The jurisdictional limits of the two impacted wetlands and the three impacted streams were based on the land survey of these areas by LDSI in July of 2105. The impacted wetlands and streams were assigned feature identifiers that were specific to the permitting of the 48-Inch Pipe Closure Project. As such, they are not included in the set of jurisdictional waters that comprise the Stormwater Diversion Project, DR 134 Project, and DR 131 project. The wetland and stream impacts for the 48-Inch Pipe Closure Project are included in Table 7.

6.2 CUMULATIVE IMPACTS

6.2.1 Stormwater Diversion Project

The USACE is required to determine both potential short-term and long-term effects of a proposed discharge of dredge and fill material on the physical, chemical, and biological components of an aquatic environment, including the effects of cumulative impacts. A review of potential cumulative impacts to waters of the U.S. as a result of the implementation of the stormwater diversion operations indicates that the proposed discharge would have no significant adverse effects on the aquatic ecosystem. The rationale for this presumption is based on the following considerations:

- No contact water will be discharged into waters of the U.S. (wetlands and streams); therefore, the water quality of downstream receiving waters, specifically the Dan River, will not be impaired.
- Separation will be provided between water that has contacted CCR material (contact water) and water that has not contacted CCR material (non-contact water), thereby preventing opportunities for the degradation of the aquatic ecosystem.
- The overflooding impacts to wetlands and a perennial stream are to be classified as permanent; however, once the stormwater diversion operations have been concluded, the flooding of these jurisdictional waters will cease.
- The proposed impacts to the aforementioned waters of the U.S. from the implementation of stormwater diversion operations should have no cumulative effect on the quality of other jurisdictional waters occurring within the Dan River Steam Station or beyond the station property. This presumption is based on the review of environmental documentation

regarding known current and past federal and non-federal actions at the steam station. Projects in the planning phase were also considered, including reasonably foreseeable (rather than speculative) actions that have the potential to interact with the proposed action. To have reasonable assurances that there would be cumulative effects to projects when considered together or incrementally, the projects need to occur within similar timeframes and within a geographic area coinciding with the proposed action.

6.2.2 Dan River 134 Project

The DR 134 Project will entail the placement of rip-rap along the western bank of Stream 3. If the proposed action is not completed, the streambank will continue to erode and the stability of the bank will continue to decline. Furthermore, the eroded sediment material would be transported directly downstream to receiving waters, thus affecting water quality within the Dan River. This sedimentation is cumulative if not reversed by the stabilization of the streambank. With the proposed action, no cumulative effects are anticipated.

6.2.3 Dan River 131 Project

The DR 131 Project will entail the the extension, downstream, of the culvert pipe to raise the elevation of the crest of the southern road crossing of Stream 3. If the proposed action is not completed, a permanent and stable approach through the road crossing cannot be provided for future necessity and emergency access to this area of the steam station. This scenario would also affect safe access to the northern shoreline of the Dan River for scarp repair in the vicinity of the barge loadout area. Without the proposed action, access to the scarp repair area would be delayed, thus increasing the potential for erosion along the river shoreline over time. With the proposed action, no cumulative effects are anticipated.

7.0 COMPENSATORY MITIGATION

7.1 MITIGATION REQUIREMENTS

On April 10, 2008, the Department of Defense, in conjunction with the USEPA, issued Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (33 CFR Parts 325 and 332; 40 CFR Part 230). This mitigation rule is designed to improve planning and management of compensatory mitigation projects for impacts which are authorized under Department of the Army permits. The rule stresses a watershed approach to mitigation project locations and requires ecological performance standards and annual monitoring of an implemented mitigation plan. The rule emphasizes that qualitative evaluations of impacted area should be conducted and included in a compensatory mitigation plan and that the compensatory mitigation hierarchy should be followed as closely as possible. The compensatory mitigation hierarchy prioritizes certain types of mitigation over other types because mitigation should be conducive to replacing the functions and values of impacted aquatic resources.

The compensatory mitigation hierarchy is as follows:

- Credits from a USACE-approved mitigation bank
- Advance credits from an in-lieu-fee program
- Permittee-responsible mitigation (PRM) using a watershed approach
- PRM on-site
- PRM off-site

7.2 MITIGATION PLAN

7.2.1 Stormwater Diversion Project

Compensatory mitigation for the proposed impacts is required under the Section 404 IP. Appropriate avoidance and practicable minimization efforts have been conducted through the analysis of alternative stormwater diversion plan concepts. However, unavoidable impacts to onsite waters of the U.S. are necessary to complete the proposed action. The details of the

proposed compensatory mitigation plan for these unavoidable impacts are presented below for the preferred pump-around alternative.

The compensatory mitigation options evaluated for the Project (proposed action) included (1) credit purchase from an approved private mitigation bank, (2) credit purchase through the North Carolina Division of Mitigation Services (NCDMS) In-Lieu Fee Program, (3) in-kind restoration and enhancement of onsite wetlands and/or stream restoration (PRM), and/or (4) in-kind restoration and enhancement of offsite wetlands and/or stream restoration. Based on the review of the mitigation options available, it was determined that credit purchase through the NCDMS In-Lieu Fee Program was the most viable option to obtain compensatory mitigation for impacts to waters of the U.S. under the proposed action. There are no mitigation banks offering wetlands and stream credits in the Roanoke River basin at the present time. Onsite mitigation and offsite mitigation opportunities were not explored because the In-Lieu Fee option was already available.

Wetland and stream mitigation credits are currently available through the NCDMS In-Lieu Fee Program. The Dan River Steam Station occurs within HUC 03010103. This HUC is not subject to higher fees within the Roanoke River basin. Table 8 presents the NCDMS mitigation costs for impacts to jurisdictional riparian wetlands, non-riparian wetlands, cool water streams, and the dredge basin. Fees for wetlands are calculated in quarter-acre increments. There is a flat fee for each increment of 0.25 acre; as such, amounts up to 0.25 acre are invoiced at the quarter-acre level and amounts between 0.25 and 0.50 acres are invoiced at the half-acre level. Mitigation ratios were applied as follows (final mitigation ratios to be confirmed by the USACE):

- A mitigation ratio of 2:1 was applied for riparian wetlands with a NC WAM overall rating of medium or low and associated impacts limited to overflooding.
- A mitigation ratio of 2:1 was applied for non-riparian wetlands with a NC WAM overall rating of medium or low and associated impacts limited to overflooding
- A mitigation ratio of 1:1 was applied for the dredge basin (NC WAM overall rating of low) and associated impacts of vegetation removal, impoundment, and regrading.
- A mitigation ratio of 2:1 was applied for perennial streams with a NC SAM overall rating of medium or high and associated impacts limited to overflooding.

- As required by State rules, fees for wetlands are calculated in quarter-acre increments. There is a flat fee for each increment of 0.25 acre; as such, amounts up to 0.25 acre are invoiced at the quarter-acre level, while amounts between 0.25 and 0.50 acre are invoiced at the half-acre level.

No mitigation is offered herein for impacts to Wetland H as the authorized impacts for overflooding (permanent) to this wetland were previously permitted by the USACE via issuance of NWP 18 (Action ID SAW-2014-01477, issued on September 29, 2014). As the Dan River Steam Station does not occur within any watershed in the state where Riparian Buffer Rules are administered by the State of North Carolina, no mitigation is included in Table 8 for impacts to riparian buffers. The cost estimates presented in Table 8 are preliminary estimates based on mitigation ratios that have not been verified by the USACE.

Table 8. Potential mitigation costs for impacts to waters of the U.S., Stormwater Diversion Project, DR 134 Project, DR 131 Project, 36-Inch Pipe Closure Project, and 48-Inch Pipe Closure Project, Dan River Steam Station, Rockingham County, North Carolina.

Fee Category	Features	Proposed Impacts
Stormwater Diversion Project		
Riparian Wetland	Wetland D - NC WAM Medium Rating	0.16 acre
	Wetland F - NC WAM Low Rating	0.06 acre
Non-riparian Wetland	Wetland A - NC WAM Medium Rating	0.19 acre
Dredge Basin	NC WAM Low Rating	1.89 acre
Perennial Stream	Stream 1 - NC SAM High Rating	393 linear feet
DR 134 Project (includes prior work activities)		
Perennial Stream	Stream 3 - Bank Stabilization	130 linear feet

Perennial Stream	Stream 3 - Culvert Installation (March 2016)	86 linear feet
DR 131 Project		
Perennial Stream	Stream 3 - Culvert Pipe Extension	15 linear feet
36-Inch Pipe Closure Project		
Riparian Wetland	Wetland H - Pipe Closure with Overflooding	0.098 acre
Perennial Stream	Stream 4 - Pipe Closure with Overflooding	65 linear feet
48-Inch Pipe Closure Project		
Non-riparian Wetland	Pipe Closure with Overflooding	0.407 acre
Perennial Stream	Pipe Closure with Overflooding	448 linear feet
All Projects Combined		
Fee Category	**Total Impacts (NCDMS Calculations)**	**Cost**
Riparian Wetland	0.318 acre (0.50 acre inc. X 2 mit. ratio X $40,297 unit cost)	$40,297
Non-riparian Wetland	0.597 acre (0.75 acre inc. X 2 mit. ratio X $26,445 unit cost)	$39,667
Dredge Basin	1.89 acres (2.00 acre inc. X 1 mit. ratio X $26,445 unit cost)	$52,890
Perennial Stream	1137 linear feet (1137 linear feet. X 2 mit. ratio X $297 unit cost)	$675,378
Sum of All Costs		**$808,232**

[1] Total cost not approved as yet by the USACE.

7.2.2 Dan River 134 Project

Compensatory mitigation for the 130 linear feet of permanent impact to Stream 3 from bank stabilization will be obtained through the NCDMS In-Lieu Fee Program (credit purchase). A mitigation ratio of 2:1 was applied for the proposed stream impact (e.g., perennial streams with a NC SAM overall rating of medium or high). Table 8 presents the NCDMS mitigation cost for this impact.

Compensatory mitigation for the 86 linear feet of permanent impact to Stream 3 from the March 2016 installation of the two culverts (road crossings) will also be obtained through the NCDMS In-Lieu Fee Program. A mitigation ratio of 2:1 was applied for the proposed stream impact. Table 8 presents the NCDMS mitigation cost for these impacts.

7.2.3 Dan River 131 Project

Compensatory mitigation for the 15 linear feet of permanent impact to Stream 3 will be obtained through the NCDMS In-Lieu Fee Program. A mitigation ratio of 2:1 was applied for the proposed stream impact. Table 8 presents the NCDMS mitigation cost for this impact.

7.2.4 36-Inch Pipe Closure Project

The total amount of wetland and stream impacts for the 36-Inch Pipe Closure Project (USACE Action ID SAW-2014-01477) are 0.098 acre and 65 linear feet, respectively. Compensatory mitigation for these permanent impacts will be obtained through the NCDMS In-Lieu Fee Program. A mitigation ratio of 2:1 was applied for the wetland and stream impacts. Table 8 presents the NCDMS mitigation costs for these impacts.

7.2.5 48-Inch Pipe Closure Project

The total amount of wetland and stream impacts for the 48-Inch Pipe Closure Project (USACE Action ID SAW-2015-01670) are 0.407 acre and 448 linear feet, respectively. Compensatory mitigation for these permanent impacts will be obtained through the NCDMS In-Lieu Fee Program. A mitigation ratio of 2:1 was applied for the wetland and stream impacts. Table 8 presents the NCDMS mitigation costs for these impacts.

8.0 PROTECTED SPECIES

8.1 BACKGROUND

Certain plant and animal species are protected by the Federal Endangered Species Act (ESA) of 1973 (16 USC 1531-1544, December 28, 1973, as amended 1976–1982, 1984, and 1988), which is administered and enforced by the USFWS, Region 4. USACE IP and Nationwide Permit General Condition 11 require that projects authorized by the USACE do not adversely affect federally protected species. Should a finding of adverse effect be presumed by the USACE, coordination with the USFWS is typically required to avoid impacts or minimize impacts to the practicable extent (Section 7 Consultation).

Amec Foster Wheeler conducted a records search to identify documented federally protected species (threatened or endangered) and federal Species of Concern which have elemental occurrences in Rockingham County. As specifically related to the North Carolina Natural Heritage Program (NCNHP) database search, the query of elemental occurrences encompassed a one-mile radius of the Dan River Steam Station. Both federal and state databases were reviewed:

- NCNHP database (NCNHP 2017)
- USFWS Information for Planning and Conservation (IPaC) database (USFWS 2017a)
- USFWS Environmental Conservation Online System (ECOS) (USFWS 2017b)
- Raleigh Ecological Services Field Office website (USFWS 2017c)

The purpose of the records search was to determine whether federally listed plant and animal species or designated critical habitat may be near the Dan River Steam Station. Table 9 presents the results of the records search for Rockingham County. Known habitats used by the species listed in Table 9 were compared with the habitats occurring within the Dan River Steam Station to determine the potential for occurrence for each species. The potential, or likelihood, of occurrence as listed in Table 9 was based on the following factors:

- A comparison of the known habitat use by these species
- The habitats (if present) within the steam station
- The quantity, quality, and proximity of these habitats

- Observations of these species or their sign during field reconnaissance

The likelihood of occurrence for listed species was rated as high, moderate, low or unlikely based on the above criteria.

Table 9. Potential for occurrence of federally listed animal and plant species within the Dan River Steam Station, Rockingham County, North Carolina.

Common Name (*Scientific Name*)	Federal Status	General Habitat Description	Potential for Occurrence
Freshwater Bivalves			
James spinymussel (*Pleurobema collina*)	E	Free-flowing streams with a variety of flow regimes. This mussel is found in a variety of substrates that are free from silt. Occurs in the James River drainage and the Dan/Mayo River systems within the Roanoke River drainage in Virginia, North Carolina, and West Virginia.	Unlikely
Fishes			
Roanoke logperch (*Percina rex*)	E	Medium to large sized warm, clear streams and small rivers of moderate to low gradient. Adults usually occupy riffles, runs, and pools containing sand, gravel, or boulders that are free of silt. Dan River Watershed within Rockingham County.	Unlikely
Vascular Plants			
Smooth coneflower (*Echinacea laevigata*)	E	Typically found in open woods, glades, cedar barrens, roadsides, clear-cuts, dry limestone bluffs, and powerline rights-of-way, usually on magnesium and calcium rich soils.	Low

Sources: NCNHP List of Rare Plant Species of North Carolina; USFWS IPaC; USFWS Environmental Conservation Online System - Species Profiles; County list (USFWS Raleigh Ecological Services); NatureServe Explorer Codes: E = Endangered.

8.2 AFFECTED ENVIRONMENT

8.2.1 Stormwater Diversion Project

Amec Foster Wheeler conducted a general field reconnaissance of the Project area on November 2, 2016, and January 5, 2017. No federally listed, threatened or endangered, animal or plant species were observed during the field reconnaissance. The quality of the existing habitat in the Project area is presumed to be less than suitable, or not present, for the listed species with a potential for occurrence in Rockingham County. The NCNHP database query results included

none of the three federally endangered species identified in Table 9; i.e., there were no reported elemental occurrences within a one-mile radius of the Dan River Steam Station. The results of the January 5, 2017, database search request to the NCNHP are included in Appendix F. The results of the January 10, 2017, query of the USFWS IPaC database are also included in Appendix F. Each listed species identified in Table 9 is discussed below.

The James spinymussel (*Pleurobema collina*), a federally endangered mussel species, is known from the upper watershed of the Roanoke River basin in small, headwater tributaries. This species requires free flowing streams with a variety of flow regimes. It is found in a variety of substrates that are free from silt. Amec Foster Wheeler presumed that potentially suitable habitat for the James spinymussel was not present within the Project area; i.e., within the wetland/stream/pond complex located along the western side of Ash Fill 1. To confirm this presumption, a visual inspection of Streams 1, 2 and 6 was conducted on November 2, 2016. The James spinymussel was not observed. Streams 2 and 6 were dry at the time of the stream bed inspection. Furthermore, this headwater stream complex does not connect to downstream waters that, in turn, flow into the Dan River. With these considerations, an unlikely potential for occurrence within the Project area was presumed for this species. The implementation of stormwater diversion operations would have no effect on the species and its habitat.

The Roanoke logperch (*Percina rex*) is known from portions of the Chowan and Roanoke River basins within the Ridge and Valley, Piedmont and Upper Coastal Plain Physiographic Regions, including recent collections in the Dan River, Mayo River and Smith River watersheds in North Carolina. Streams 1, 2 and 6 within the wetland/stream/pond complex do not provide suitable habitat for this species. In addition, this headwater stream complex does not connect to downstream waters that flow into the Dan River. With these considerations, an unlikely potential for occurrence within the Project area was presumed for this species. The implementation of stormwater diversion operations would have no effect on the species and its habitat.

Smooth coneflower (*Echinacea laevigata*) is a perennial herb typically found in meadows, open woodlands, cedar barrens, clear cuts, and roadside and utility rights-of-way. The species grows best where there is abundant sunlight, little competition in the herbaceous layer, and periodic disturbances. Although there are scattered openings within the Dan River Steam Station,

including openings in woodlands, maintained areas along roadways, and utility corridors, Amec Foster Wheeler presumed that the potential for occurrence of the smooth coneflower was low. The powerline corridors within the Project area exhibit a dense herbaceous layer and along some of the corridors woody shrub species, including silverberry, is recruited. No smooth coneflower plants were observed during site reconnaissance of the Project area on November 2, 2016, and January 5, 2017. With these considerations, a low potential for occurrence within the Project area was presumed for this species. The implementation of stormwater diversion operations would have no effect on the species and its habitat.

Amec Foster Wheeler also reviewed the NCNHP database query results for state-listed threatened and endangered species with historic and current elements of occurrence within a one-mile radius of the Dan River Steam Station. The stream features within the Project area do not offer suitable habitat for the green floater (*Lasmigona subviridis*), an endangered mussel species, or the bigeye jumprock (*Moxostoma ariommum*), an endangered fish species. No green floater specimens were observed during the visual inspection of Streams 1, 2 and 6 (stream bed) on November 2, 2016. Spreading Jacob's-ladder (*Polemonium reptans* var. *reptans*), a threatened plant species, occupies moist, nutrient-rich forests such as bottomlands and rich slopes. This species was not observed during site reconnaissance of the Project area on November 2, 2016, and January 5, 2017. In addition, according to the NCNHP database query results, the last observation date (in Rockingham County) reported for this species was in May of 1956.

8.2.2 Dan River 134 Project

Section 8.1 of the WMP included topical information on protected species for the Dan River Steam Station. No federally listed, threatened or endangered, animal or plant species were observed during field reconnaissance conducted in the vicinity of Stream 3 on December 20, 2016. The NCNHP database query results included none of the three federally endangered species identified in Table 9; i.e., there were no reported elemental occurrences within a one-mile radius of the Dan River Steam Station. The results of the January 5, 2017, database search request to the NCNHP are included in Appendix F. The results of the January 10, 2017, query of the USFWS IPaC database are also included in Appendix F. An unlikely potential for occurrence within the DR 134 Project (affected environment) was presumed for the James spinymussel, Roanoke

logperch, and smooth coneflower. The bank stabilization action for Stream 3 would have no effect on local or regional populations of these species.

8.2.3 Dan River 131 Project

The instream habitat of Stream 3 and the woodland habitat surrounding the stream are virtually the same between the DR 131 Project and the DR 134 Project. As such, the presumptions on potential for occurrence of protected species presented in Section 8.2.2 for the DR 134 Project would apply to the DR 131 Project. The extension of the culvert pipe at the southern road crossing of Stream 3 would have no effect on local or regional populations of James spinymussel, Roanoke logperch, and smooth coneflower.

9.0 CULTURAL RESOURCES

9.1 BACKGROUND

Section 404 of the CWA requires that projects authorized by the USACE do not adversely affect historical properties which are listed or eligible for listing on the National Register of Historic Places (NRHP). Cultural resources are protected by Section 106 of the National Historic Preservation Act (NHPA). The Section 106 process consists of consultation with state and federal agencies, consultation with Native American tribes by the lead federal agency, and the identification and evaluation of cultural resources for inclusion in the NRHP.

Amec Foster Wheeler conducted a cultural resource screening to assess the presence/absence of known cultural resources and NRHP-listed resources within a half-mile search radius of the Dan River Steam Station. The research included a review of archaeological files at the North Carolina State Historic Preservation Office (NCSHPO) and the online NCSHPO Web GIS Service (NCSHPO 2017). The investigation did not include field efforts to identify or verify cultural resources, and no formal coordination with the NCSHPO office was included in this review.

9.2 AFFECTED ENVIRONMENT

9.2.1 Stormwater Diversion Project

No structures or Districts were listed on the NRHP within the Project area or within a half-mile radius. According to the North Carolina Office of State Archaeology records, at least a portion of the Project area has been surveyed for archaeological resources (Surveys ER 92-8133, ER 05-2334 and CH 08-0528), as shown on Figure 10. No archaeological remains were discovered during the surveys identified above. In 2014, Amec Foster Wheeler conducted a Phase I archaeological survey on a 129-acre tract next to the Dan River Steam Station (Amec Foster Wheeler 2014). Two archaeological sites were identified, sites 31RK210 and 31RK12. Site 31RK210 is a mid-19th to early 20th century site, while 31RK12 is a Late Prehistoric site. With regard to NRHP status, site 31RK210 is not eligible and 31RK12 is eligible. Three additional sites were identified within a half-mile of the Project area: 31RK61, 31RK5 and 31RK1. With regard to NRHP status, site 31RK61 is unassessed and further work is recommended for 31RK5. Site 31RK1 is listed on the NRHP. Table 10 presents these sites and their NRHP status.

Table 10. Identified archaeological sites within a half-mile radius or vicinity of the Dan River Steam Station, Rockingham County, North Carolina.

Site Number	Description	NRHP Status
Sites within Half-mile Radius of Steam Station		
31RK61	Prehistoric Burials	Unassessed
31RK5	Prehistoric Woodland	Further work recommended
31RK1	Lower Sauratown Site	Listed on NRHP
Sites in Vicinity of Steam Station		
31RK210	Mid 19th - early 20th century	Not eligible
31RK12	Late Prehistoric	Eligible

The implementation of stormwater diversion operations is not expected to have an effect on these five identified cultural resources due to the footprint of the Project and its distance to these resources. As a part of the permit process, required and routine consultation with the NCSHPO under Section 106 of the CWA will be undertaken by the USACE Wilmington District.

9.2.2 Dan River 134 Project

Section 9.2.1 of the WMP included topical information on cultural resources for the Dan River Steam Station. No structures or Districts were listed on the NRHP within the DR 134 Project (affected environment) or within a half-mile radius. Although a portion of the Dan River Steam Station has been surveyed for archaeological resources according to the North Carolina Office of State Archaeology records, the survey areas (Surveys ER 92-8133, ER 05-2334 and CH 08-0528) do not encompass the affected environment (Figure 10). A Phase I archaeological survey conducted by Amec Foster Wheeler in 2014 on a 129-acre tract east of the station also does not encompass the affected environment (Figure 10). Two sites were identified within a half-mile of the affected environment (31RK61 and 31RK1) (Figure 10). With regard to NRHP status, site 31RK61 is unassessed. Site 31RK1 is listed on the NRHP. Table 10 presents these sites and their NRHP status. The bank stabilization action for Stream 3 is not expected to have an effect

on cultural resources due to the footprint of the project and its distance to these resources. As a part of the permit process, required and routine consultation with the NCSHPO under Section 106 of the CWA will be undertaken by the USACE Wilmington District.

9.2.3 Dan River 131 Project

The discussion of cultural resources for the DR 134 Project (Section 9.2.2 above) is applicable to the DR 131 Project, as the affected environment of the former project abuts the affected environment of the latter project. The extension of the culvert pipe at the southern road crossing of Stream 3 is not expected to have an effect on cultural resources due to the footprint of the project and its distance to these resources.

10.0 ENVIRONMENTAL JUSTICE

10.1 BACKGROUND

Environmental justice considers sensitive minority and low-income populations in the community to determine whether the proposed action and its alternatives may have a disproportionately high and adverse human health or environmental effect on those populations. Environmental justice analysis is conducted in compliance with EO 12898 (59 FR 7629), *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*. Based on guidance from the CEQ, minority populations should be identified where either (a) the minority population of the area exceeds 50 percent (%), or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). Low-income populations are defined as those below the federal poverty thresholds identified using statistical poverty thresholds from the U.S. Census. USEPA guidance states, “The composition of the population should be compared to the characteristics of the population (e.g., percentage of minority populations residing near a proposed project versus the percentage of minority populations located within a single or multiple-county area surrounding the proposed project” (USEPA 1998). Applying this methodology to the identification of low-income populations and minorities, the percentage of low-income and minority populations in the vicinity of the Dan River Steam Station (Rockingham County) is compared to the percentage of low-income and minority populations located within North Carolina. Specifically, a low-income or minority population is identified when an area has a poverty rate or minority population percentage that is significantly greater than the state.

To summarize, EO 12898 instructs federal agencies to identify and address, within the scope of the proposed programs, policies and activities that are disproportionately high in and/or may have potentially adverse effects on human health or environmental effects that may occur if such projects are being implemented. Furthermore, according to CEQ guidelines, U.S. Census Bureau data are typically used to determine minority and low-income population percentages in the affected area of a project in order to conduct a qualitative assessment of potential environmental justice impacts.

10.2 AFFECTED ENVIRONMENT

10.2.1 Stormwater Diversion Project

As of the 2015 U.S. Census, the racial composition for the City of Eden is approximately 78% Caucasian. The percentage of the population that is black or African American is 18.6%. Hispanics comprise 6.1% of the population of the city. Approximately 0.9% are reported as American Indian or Alaskan native. Three census tracts are present within the City of Eden. They are identified by the U.S. Census as Census Tracts 405.01, 405.02, and 403.

U.S. Census Bureau data for 2015 indicate that the median household annual income for Census Tract 403, which includes the Dan River Steam Station and the majority of the City of Eden, is $37,274 below the average of median annual household income for North Carolina of $46,868, and the national median household income of $53,889 per year.

In Census Tract 403, the percentage of individuals living below the poverty level is 43.9%, compared with 18.4% for Rockingham County and 13.5% for the United States according to the newest (2015) data. Rockingham County was found to be above average for poverty level and Hispanic, black, American Indian and Alaskan native for several census tracts. None of the census tracts in Eden had above average levels for these five categories according to the U.S. Bureau of the Census census tract data for Eden and Rockingham County, North Carolina (U.S. Bureau of the Census 2015). Thus, the three census tracts within the city have not met the criteria for environmental justice.

With the above considerations, the implementation of the stormwater diversion operations at the Dan River Steam Station should have no effect on environmental justice for the surrounding residential communities.

10.2.2 Dan River 134 Project

Section 10.2.1 of the WMP included topical information on environmental justice for the Dan River Steam Station. None of the census tracts in the City of Eden had above average levels for the examined five categories (poverty level, Hispanic, black, American Indian, and Alaskan native) according to the U.S. Bureau of the Census census tract data for Eden and Rockingham County,

North Carolina (U.S. Bureau of the Census 2015). Thus, the three census tracts within the city have not met the criteria for environmental justice. The bank stabilization action for Stream 3 should have no effect on environmental justice for the surrounding residential communities.

10.2.3 Dan River 131 Project

The discussion of environmental justice for the DR 134 Project (Section 10.2.2 above) is applicable to the DR 131 Project, as the affected environment of the former project abuts the affected environment of the latter project. The extension of the culvert pipe at the southern road crossing of Stream 3 should have no effect on environmental justice for the surrounding residential communities.

11.0 NOISE

11.1 BACKGROUND

Noise is sound that is produced at levels that can be harmful and may be considered as unwanted by the surrounding community, properties and residences. The Noise Control Act of 1972 (PL 92-574) and EO 12088 require that federal agencies assess the impact of noise to the environment. Guidelines for noise have been established by the USEPA based on a calculation of noise by the daytime and nighttime averages, referred to as the Day/Night Levels (Ldn) (USEPA 1974). The Ldn is reported as A-weighted decibels (dBA) that occur within a 24-hour period. Table 11 presents USEPA standard noise levels for various community types. Noise levels can vary depending on setting, built environment, and distance to the noise source. Noise levels by environment can be variable with levels at 40 decibles (dB) for wilderness areas and 90 dB for urban areas. Rural communities typically have lower dB than their urban counterparts with rural communities around 50 dB or less. The USEPA has calculated that an individual exposed to a noise level of 73 dB for eight hours a day for 40 years would have a hearing loss smaller than 5 dB for 96% of the population.

Table 11. USEPA standard noise levels for various community types.

Community	Day/Night Average (Ldn – dBA)
Rural	35 to 50
Quiet Suburb	50
Normal Suburb	55
Urban Residential	60
Noisy Urban	65
Very Noisy Urban	70

11.2 AFFECTED ENVIRONMENT

11.2.1 Stormwater Diversion Project

Grading operations are the noisiest activities with equipment generating noise levels as high as 70 to 95 dBA within 50 feet of their operation. Distance would rapidly attenuate noise, and it is not anticipated that the proposed stormwater diversion operations will occur close enough to existing residential areas to the north and the west of the Project area to cause disturbances. In addition, stormwater diversion operations would occur during daytime hours when residents are away from their homes and would be less disturbed than nighttime hours; therefore, those living in the vicinity of the Dan River Steam Station are not likely to be affected by noise generated by the Project.

Noise impacts will be generally localized at the vicinity of the Project. Earthmoving equipment and other construction machinery and vehicles will create localized increases in noise levels. These temporary noise impacts should not disrupt normal Dan River Steam Station operations. Noise levels generally dissipate as distance from their origin increases. Distance from the Project area must be considered when evaluating potential noise impacts to land uses adjacent to or near the Project. The proposed stormwater diversion operations will take place entirely within the property boundaries of the Dan River Steam Station. Because of the absence of noise-sensitive land uses (i.e., religious, commercial, retail, residential, recreational and educational) immediately adjacent to the steam station, the Project is not expected to impact noise-sensitive land uses.

11.2.2 Dan River 134 Project

Section 11.2.1 of the WMP included topical information on noise for the Dan River Steam Station. Noise impacts from construction equipment and vehicles will be generally localized at the vicinity of the DR 134 Project. These temporary noise impacts will dissipate as distance from their origin increases. In addition, the proposed action will take place entirely within the Dan River Steam Station property boundaries. Because of the absence of noise-sensitive land uses (i.e., religious, commercial, retail, residential, recreational and educational) immediately adjacent to the steam station, the bank stabilization action for Stream 3 is not expected to impact noise-sensitive land uses.

11.2.3 Dan River 131 Project

Noise impacts from construction equipment and vehicles will be generally localized at the vicinity of the DR 131 Project. These temporary noise impacts will dissipate as distance from their origin increases. The proposed action will take place entirely within the Dan River Steam Station property boundaries. Because of the absence of noise-sensitive land uses immediately adjacent to the steam station, the work to extend the culvert pipe at the southern road crossing of Stream 3 is not expected to impact noise-sensitive land uses.

12.0 AIR QUALITY

12.1 BACKGROUND

The USEPA has established National Ambient Air Quality Standards (NAAQS) in 40 CFR 50 for the following criteria pollutants: sulfur dioxide (SO_2), particulate matter (with an aerodynamic diameter of less than 10 microns) (PM10), fine particulate matter (with an aerodynamic diameter of less than 2.5 microns) (PM2.5), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), and lead.

Air quality standards are provided by NCDEQ (NCDEQ 2015), while regulations are contained in two subchapters of the North Carolina Administrative Code (NCAC). Regulations that limit air pollution emissions from stationary sources located within North Carolina are codified under NCAC Title 15A - Environment and Natural Resources, Chapter 02 – Environmental Management, Subchapter 02D - Air Pollution Control Requirements (15A NCAC 02D). Stationary source air quality permitting procedures are codified under Subchapter 02Q – Air Quality Permit Procedures (15A NCAC 02Q) (NCDEQ 2013).

12.2 AFFECTED ENVIRONMENT

12.2.1 Stormwater Diversion Project

The nearest air quality monitoring station to the Dan River Steam Station in Rockingham County is the station at Bethany School on Bethany Road (Highway 65) in the City of Reidvsille, which is overseen by the Winston-Salem Regional Office. O_3, SO_2, NO_2, PM2.5, PM10, and ultraviolet radiation are the parameters which are measured at this air quality monitoring station. Rockingham County is an attainment area for O_3 as of August 2015, an attainment area for SO_2 (August 2015, with new data to be collected beginning January 2017), and an attainment area for annual PM 2.5 (NCDEQ 2017c).

The implementation of the stormwater diversion operations at the Dan River Steam Station will not increase air emissions or exceed regulated standards. Controlled actions will include the control of fugitive dust emissions. "Fugitive dust emissions" means particulate matter that does not pass through a process stack or vent and that is generated within plant property boundaries

from activities such as unloading and loading areas, process areas, stockpiles, stock pile working, plant parking lots and plant roads (including access roads and haul roads). Methods to minimize fugitive dust include limiting dusty work on windy days, watering or sweeping roadways often to ensure that vehicle traffic is not spreading dust, reducing speed limits on unpaved surfaces to ten miles per hour and enclose storage piles and handling areas if dusty materials are frequently loaded and unloaded.

With the above considerations, the stormwater diversion operations are not expected to impact air quality, either locally or regionally.

12.2.2 Dan River 134 Project

Section 12.2.1 of the WMP included topical information on air quality for the Dan River Steam Station. The bank stabilization action for Stream 3 will not increase air emissions or exceed regulated standards. Controlled actions will include the control of fugitive dust emissions. The DR 134 Project is not expected to impact air quality, either locally or regionally.

12.2.3 Dan River 131 Project

The work to extend the culvert pipe at the southern road crossing of Stream 3 will not increase air emissions or exceed regulated standards. Controlled actions will include the control of fugitive dust emissions. The DR 131 Project is not expected to impact air quality, either locally or regionally.

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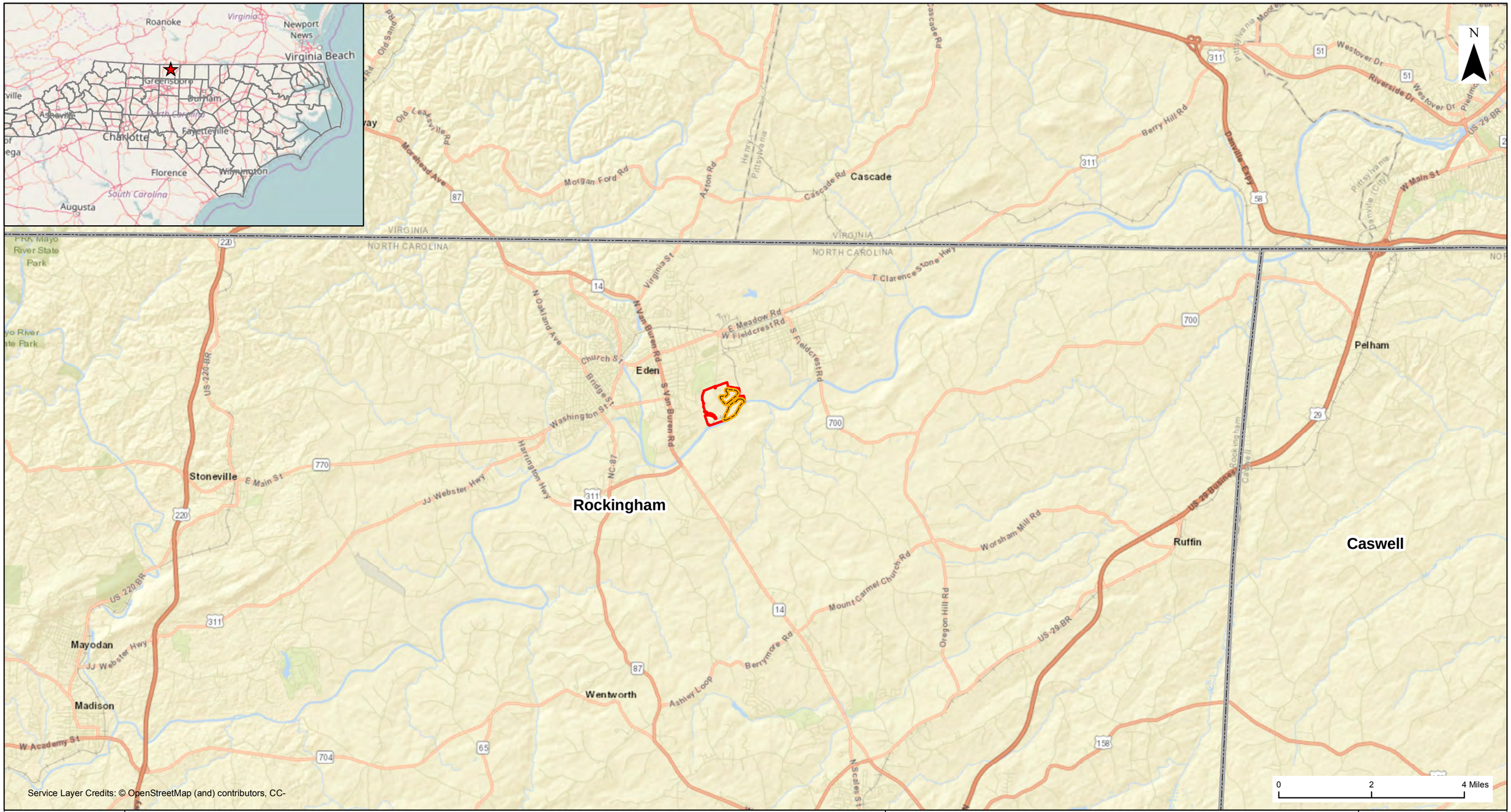
FIGURES



Service Layer Credits: © OpenStreetMap (and) contributors, CC-

amec foster wheeler

Ash Ponds

Station Boundary

County Boundary

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

Figure 1 - Site Location Map
Stormwater Diversion Project and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO: 7810-16-0761

FIGURE NO: 1

DUKE ENERGY

P:\Energy\Projects\Duke\2016\7810-16-0559 Dan River Stormwater Diversion and Individual Permit Application\INDIVIDUAL PERMIT APPLICATION\GIS\Figure1.mxd, User: jason.hightower; Date: 2/8/2017 8:14:30 AM

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Ash Ponds
Station Boundary
Stormwater Diversion Project Area
DR 131 Project Area
DR 134 Project Area
36 Inch Pipe Closure Project (USACE ID : SAW-2014-01477)
48 inch Pipe Closure Project (USACE ID : SAW-2015-01670)

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

Figure 2 - Site Aerial Map
Stormwater Diversion Project and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO:	7810-16-0761	FIGURE NO:	2

DUKE ENERGY

P:\Energy\Projects\Duke\2016\7810-16-0559 Dan River Stormwater Diversion and Individual Permit Application\INDIVIDUAL PERMIT APPLICATION\GIS\Figure2.mxd, User: jason.hightower; Date: 4/26/2017 3:20:51 PM

DUKE PROPERTY

PROPOSED BORROW AREA

PROPOSED RIP RAP ENERGY DISSIPATOR (SW-010) (10' X 12')

PROPOSED TIE-IN WITH CITY OF EDEN SANITARY SEWER

PROPOSED FORCE MAIN FROM STORAGE TANK TO TIE-IN WITH CITY OF EDEN

CONTACT WATER TANK AND SECONDARY CONTAINMENT AREA

EDGEWOOD ROAD

PROPOSED DAN RIVER LANDFILL (EXISTING ASH FILL 1 AREA)

CELL 1

CELL 2

CELL 3

ASH FILL 2

LINE 5 - SAB TO CONTACT WATER TANK

APPROX. LOCATION OF NEW TOWER

EXISTING TOWER TO BE RE-LOCATED

25-YEAR, 24 HOUR RUNOFF INUNDATION ELEVATION = 548.05'

LINE 1 - UFA TO SW010 (PUMP AROUND)

APPROX. LOCATION OF EXISTING POLE TO BE REMOVED

UPLAND FLOW AREA (UFA)

SEE INSET A

PROPOSED DIVIDER BERM

WATER STORAGE AREA (WSA 1)

WATER STORAGE AREA (WSA 3)

LINE 4 - WSA 3 TO WSA 1

CAP EXISTING PIPE

25-YEAR, 24 HOUR RUNOFF INUNDATION ELEVATION = 535.6'

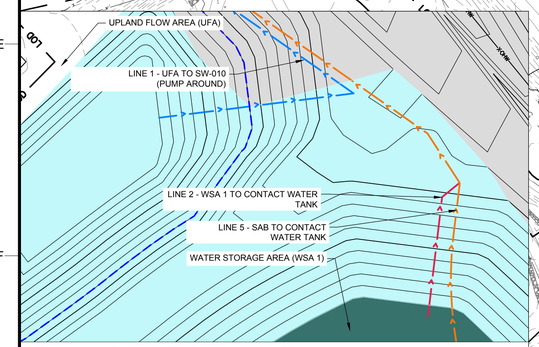
LINE 3 - WSA 2 TO WSA 1

WATER STORAGE AREA (WSA 2)

25-YEAR, 24 HOUR RUNOFF INUNDATION ELEVATION = 520.7'

SECONDARY ASH BASIN (SAB)

PRIMARY ASH BASIN



40 0 40 80 FT

PROPOSED STREAM AND WETLAND IMPACTS - PUMP AROUND ALTERNATIVE

Area Name	Water Surface Elevation due to runoff from 25-year, 24-hour Design storm (ft)	Stream Impacts (linear feet)	Wetland Impacts (acres)	Notes
UFA	548.05	393	0.22	Not Previously permitted
WSA-1	545.91	0	1.89	Not Previously permitted
WSA-2	520.65	65	0.10	Previously permitted
WSA-3	535.6	NA	0.19	Not Previously permitted
TOTAL		**458**	**2.40**	Not Previously permitted

LEGEND

- EXISTING MAJOR CONTOUR (10') [REF. 1, 2]
- EXISTING MINOR CONTOUR (2') [REF. 1, 2]
- PROPOSED MAJOR CONTOUR (10')
- PROPOSED MINOR CONTOUR (2')
- COMPOSITE LIMITS OF DISTURBANCE (SEE NOTE 1)
- LANDFILL AREA (UNDER SEPARATE CONTRACT)
- DREDGE AREA
- STORMWATER DIVERSION AREA
- STORAGE TANK AND APPURTENANT FACILITIES
- BORROW AREA (UNDER SEPARATE CONTRACT)
- FORCE MAIN
- STORMWATER DIVERSION PIPE LINE 1
- STORMWATER DIVERSION PIPE LINE 2
- STORMWATER DIVERSION PIPE LINE 3
- STORMWATER DIVERSION PIPE LINE 4
- STORMWATER DIVERSION PIPE LINE 5
- EXISTING PROPERTY BOUNDARY
- EXISTING 100-YEAR FLOODPLAIN
- EXISTING STREAM
- EXISTING WETLAND
- EXISTING SANITARY SEWER FORCE MAIN
- EXISTING GRAVITY SANITARY SEWER PIPE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING NATURAL GAS PIPELINE
- EXISTING NATURAL GAS PIPELINE (NOT SURVEYED)
- EXISTING OVERHEAD ELECTRIC UTILITY
- EXISTING UTILITY EASEMENT
- EXISTING FENCE
- EXISTING VEGETATION BOUNDARY
- EXISTING PIPES
- EXISTING RIPRAP
- INUNDATION BOUNDARY (SEE NOTE 2)

NOTES:
1. COMPOSITE LIMITS OF DISTURBANCE INCLUDES INITIAL SUBMITTAL, APPROVED ADDENDA 1 THROUGH 6.

2. INUNDATION BOUNDARY REFLECTS WATER SURFACE ELEVATION DUE TO RUNOFF FROM THE 25-YEAR, 24-HOUR DESIGN STORM.

150 0 150 300 FT

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
2. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM LIGHT DETECTION AND RANGING (LIDAR) OBTAINED FROM NCDOT WEBSITE ON AUGUST 7, 2015.

ABSAT ISSUE #	DATE	DESIGN

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CHARLOTTE, NC 28208
TEL: (704) 357-8600
FAX: (704) 357-8638
LICENSURE:
NC ENG: F-1253
NC GEOLOGY: C-247

amec foster wheeler

SEAL

NOT FOR CONSTRUCTION

TITLE

PREFERRED PUMP ALTERNATIVE (400 GPM)

DAN RIVER STEAM STATION

INDIVIDUAL PERMIT APPLICATION

FOR

ISSUED FOR PERMITTING - NOT RELEASED FOR CONSTRUCTION

DUKE ENERGY®

SCALE: AS SHOWN	DES: CSJ		
DWG TYPE: DWG	DFTR: CSJ		
JOB NO: 7810-16-0559	CHKD: CHR		
DATE: 4/24/2017	ENGR: CHR		
FILENAME: PUMP AROUND ALTERNATIVE.dwg	APPD: CHR		

DWG SIZE	DRAWING NO.	REVISION
ANSI D 22"x34"	3A	0

DUKE PROPERTY

DUKE PROPERTY

DUKE PROPERTY

DUKE PROPERTY

DUKE PROPERTY

PROPOSED BORROW AREA

PROPOSED RIP RAP ENERGY DISSIPATOR (SW-010) (26' X 20')

PROPOSED TIE-IN WITH CITY OF EDEN SANITARY SEWER

PROPOSED FORCE MAIN FROM STORAGE TANK TO TIE-IN WITH CITY OF EDEN

CONTACT WATER TANK AND SECONDARY CONTAINMENT AREA

EDGEWOOD ROAD

PROPOSED DAN RIVER LANDFILL (EXISTING ASH FILL 1 AREA)

CELL 1

CELL 2

CELL 3

LINE 5 - SAB TO CONTACT WATER TANK

APPROX. LOCATION OF NEW TOWER

EXISTING TOWER TO BE RE-LOCATED

LINE 1 - UFA TO SW-010 (PUMP AROUND)

UPLAND FLOW AREA (UFA)

APPROX. LOCATION OF EXISTING POLE TO BE REMOVED

25-YEAR, 24 HOUR RUNOFF INUNDATION ELEVATION = 539.5'

SEE INSET A

PROPOSED DIVIDER BERM

ASH FILL 2

WATER STORAGE AREA (WSA 1)

WATER STORAGE AREA (WSA 3)

LINE 4 - WSA 3 TO WSA 1

LINE 5 - SAB TO CONTACT WATER TANK

CAP EXISTING PIPE

EXISTING TOWER TO BE RE-LOCATED

APPROX. LOCATION OF NEW TOWER

25-YEAR, 24 HOUR RUNOFF INUNDATION ELEVATION = 535.6'

LINE 3 - WSA 2 TO WSA 1

WATER STORAGE AREA (WSA 2)

25-YEAR, 24 HOUR RUNOFF INUNDATION ELEVATION = 520.7'

SECONDARY ASH BASIN (SAB)

PRIMARY ASH BASIN

UPLAND FLOW AREA (UFA)

LINE 1 - UFA TO SW-010 (PUMP AROUND)

LINE 2 - WSA 1 TO CONTACT WATER TANK

LINE 5 - SAB TO CONTACT WATER TANK

WATER STORAGE AREA (WSA 1)

40 0 40 80 FT

PROPOSED STREAM AND WETLAND IMPACTS - PUMP AROUND ALTERNATIVE

Area Name	Water Surface Elevation due to runoff from 25-year, 24-hour Design storm (ft)	Stream Impacts (linear feet)	Wetland Impacts (acres)	Notes
UFA	539.5	0	0.00	Not Previously permitted
WSA-1	545.91	0	1.89	Not Previously permitted
WSA-2	520.65	65	0.1	Previously permitted
WSA-3	535.6	NA	0.19	Not Previously permitted
TOTAL		**65**	**2.18**	Not Previously permitted

LEGEND

- EXISTING MAJOR CONTOUR (10') [REF. 1, 2]
- EXISTING MINOR CONTOUR (2') [REF. 1, 2]
- PROPOSED MAJOR CONTOUR (10')
- PROPOSED MINOR CONTOUR (2')
- COMPOSITE LIMITS OF DISTURBANCE (SEE NOTE 1)
- LANDFILL AREA (UNDER SEPARATE CONTRACT)
- DREDGE AREA
- STORMWATER DIVERSION AREA
- STORAGE TANK AND APPURTENANT FACILITIES
- BORROW AREA (UNDER SEPARATE CONTRACT)
- FORCE MAIN
- STORMWATER DIVERSION PIPE LINE 1
- STORMWATER DIVERSION PIPE LINE 2
- STORMWATER DIVERSION PIPE LINE 3
- STORMWATER DIVERSION PIPE LINE 4
- STORMWATER DIVERSION PIPE LINE 5
- EXISTING PROPERTY BOUNDARY
- EXISTING 100-YEAR FLOODPLAIN
- EXISTING STREAM
- EXISTING WETLAND
- EXISTING SANITARY SEWER FORCE MAIN
- EXISTING GRAVITY SANITARY SEWER PIPE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING NATURAL GAS PIPELINE
- EXISTING NATURAL GAS PIPELINE (NOT SURVEYED)
- EXISTING OVERHEAD ELECTRIC UTILITY
- EXISTING UTILITY EASEMENT
- EXISTING FENCE
- EXISTING VEGETATION BOUNDARY
- EXISTING PIPES
- EXISTING RIPRAP
- INUNDATION BOUNDARY (SEE NOTE 2)

NOTES:
1. COMPOSITE LIMITS OF DISTURBANCE INCLUDES INITIAL SUBMITTAL, APPROVED ADDENDA 1 THROUGH 6.

2. INUNDATION BOUNDARY REFLECTS WATER SURFACE ELEVATION DUE TO RUNOFF FROM THE 25-YEAR, 24-HOUR DESIGN STORM.

150 0 150 300 FT

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
2. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM LIGHT DETECTION AND RANGING (LIDAR) OBTAINED FROM NCDOT WEBSITE ON AUGUST 7, 2015.

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TEL: (704) 357-8600
FAX: (704) 357-8638
LICENSURE:
NC ENG: F-1253
NC GEOLOGY: C-247

amec foster wheeler

SEAL

NOT FOR CONSTRUCTION

TITLE

PUMP ALTERNATIVE (49,000 GPM)

DAN RIVER STEAM STATION

INDIVIDUAL PERMIT APPLICATION

FOR

ISSUED FOR PERMITTING - NOT RELEASED FOR CONSTRUCTION

DUKE ENERGY®

SCALE: AS SHOWN	DES: CSJ		
DWG TYPE: DWG	DFTR: CSJ		
JOB NO: 7810-16-0559	CHKD: CHR		
DATE: 4/24/2017	ENGR: CHR		
FILENAME: PUMP AROUND ALTERNATIVE.dwg	APPD: CHR		
DWG SIZE	DRAWING NO.	REVISION	
ANSI D 22"x34"	3B	0	

DUKE PROPERTY

DUKE PROPERTY

DUKE PROPERTY

DUKE PROPERTY

DUKE PROPERTY

PROPOSED BORROW AREA

PROPOSED TIE-IN WITH CITY OF EDEN SANITARY SEWER

PROPOSED FORCE MAIN FROM STORAGE TANK TO TIE-IN WITH CITY OF EDEN

CONTACT WATER TANK AND SECONDARY CONTAINMENT AREA

EDGEWOOD ROAD

PROPOSED DAN RIVER LANDFILL (EXISTING ASH FILL 1 AREA)

CELL 1

CELL 2

CELL 3

ASH FILL 2

LINE 5 - SAB TO CONTACT WATER TANK

APPROX. LOCATION OF NEW TOWER

EXISTING TOWER TO BE RE-LOCATED

APPROX. LOCATION OF EXISTING POLE TO BE REMOVED

UPLAND FLOW AREA (UFA)

SEE INSET A

PROPOSED DIVIDER BERM

WATER STORAGE AREA (WSA 1)

WATER STORAGE AREA (WSA 2)

WATER STORAGE AREA (WSA 3)

LINE 3 - WSA 2 TO WSA 1

LINE 4 - WSA 3 TO WSA 1

LINE 1 - UFA TO SW-010 (GRAVITY)

CAP EXISTING PIPE

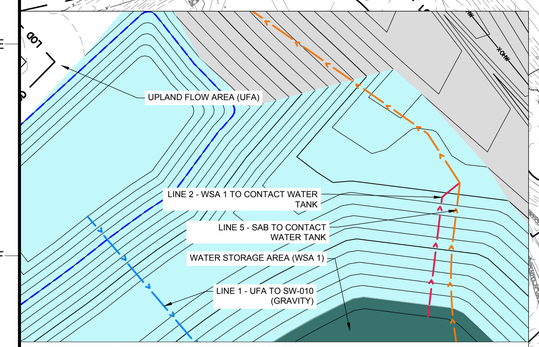
GABION CHUTE (OUTFALL SW-010)

25-YEAR, 24 HOUR RUNOFF INUNDATION ELEVATION = 535.6'

25-YEAR, 24 HOUR RUNOFF INUNDATION ELEVATION = 520.7'

SECONDARY ASH BASIN (SAB)

PRIMARY ASH BASIN



40 0 40 80 FT

PROPOSED STREAM AND WETLAND IMPACTS - GRAVITY ALTERNATIVE

Area Name	Water Surface Elevation due to runoff from 25-year, 24-hour Design storm (ft)	Stream Impacts (linear feet)	Wetland Impacts (acres)	Notes
UFA	539.5	0	0.00	Not Previously permitted
WSA-1	545.91	0	1.89	Not Previously permitted
WSA-2	520.65	65	0.10	Previously permitted
WSA-3	535.6	NA	0.19	Not Previously permitted
TOTAL (NEW IMPACTS)		**65**	**2.18**	Not Previously permitted

LEGEND

- EXISTING MAJOR CONTOUR (10') [REF. 1, 2]
- EXISTING MINOR CONTOUR (2') [REF. 1, 2]
- PROPOSED MAJOR CONTOUR (10')
- PROPOSED MINOR CONTOUR (2')
- COMPOSITE LIMITS OF DISTURBANCE (SEE NOTE 1)
- LANDFILL AREA (UNDER SEPARATE CONTRACT)
- DREDGE AREA
- STORMWATER DIVERSION AREA
- STORAGE TANK AND APPURTENANT FACILITIES
- BORROW AREA (UNDER SEPARATE CONTRACT)
- FORCE MAIN
- STORMWATER DIVERSION PIPE LINE 1
- STORMWATER DIVERSION PIPE LINE 2
- STORMWATER DIVERSION PIPE LINE 3
- STORMWATER DIVERSION PIPE LINE 4
- STORMWATER DIVERSION PIPE LINE 5
- EXISTING PROPERTY BOUNDARY
- EXISTING 100-YEAR FLOODPLAIN
- EXISTING STREAM
- EXISTING WETLAND
- EXISTING SANITARY SEWER FORCE MAIN
- EXISTING GRAVITY SANITARY SEWER PIPE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING NATURAL GAS PIPELINE
- EXISTING NATURAL GAS PIPELINE (NOT SURVEYED)
- EXISTING OVERHEAD ELECTRIC UTILITY
- EXISTING UTILITY EASEMENT
- EXISTING FENCE
- EXISTING VEGETATION BOUNDARY
- EXISTING PIPES
- EXISTING RIPRAP
- INUNDATION BOUNDARY (SEE NOTE 2)

NOTES:
1. COMPOSITE LIMITS OF DISTURBANCE INCLUDES INITIAL SUBMITTAL, APPROVED ADDENDA 1 THROUGH 6.

2. INUNDATION BOUNDARY REFLECTS WATER SURFACE ELEVATION DUE TO RUNOFF FROM THE 25-YEAR, 24-HOUR DESIGN STORM.

150 0 150 300 FT

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
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NC ENG: F-1253
NC GEOLOGY: C-247

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SEAL

NOT FOR CONSTRUCTION

TITLE

GRAVITY OPTION

DAN RIVER STEAM STATION

INDIVIDUAL PERMIT APPLICATION

FOR

ISSUED FOR PERMITTING - NOT RELEASED FOR CONSTRUCTION

DUKE ENERGY®

SCALE: AS SHOWN	DES: CSJ		
DWG TYPE: DWG	DFTR: CSJ		
JOB NO: 7810-16-0559	CHKD: CHR		
DATE: 4/24/2017	ENGR: CHR		
FILENAME: GRAVITY ALTERNATIVE.dwg	APPD: CHR		
DWG SIZE	DRAWING NO.	REVISION	
ANSI D 22"x34"	4	0	

Soil Type	Map Unit Symbol
Ayersville gravelly loam, 4 to 15 percent slopes	AyC
Ayersville gravelly loam, 15 to 45 percent slopes	AyF
Clover sandy loam, 2 to 8 percent slopes	CmB
Clover sandy loam, 8 to 15 percent slopes	CmD
Dan River loam, 0 to 2 percent slopes, frequently flooded	DaA
Pinkston fine sandy loam, 15 to 45 percent slopes	PnF
Stoneville loam, 2 to 8 percent slopes	SvB
Stoneville loam, 8 to 15 percent slopes	SvD
Stoneville-Urban land complex, 2 to 10 percent slopes	SwC
Udorthents, loamy	Ud
Water	W

Ash Fill 1

Ash Fill 2

Secondary Ash Basin

Primary Ash Basin

N

0 600 1,200 Feet

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye

Station Boundary

Ash Ponds

Soils

48 inch Pipe Closure Project

36 Inch Pipe Closure Project

Stormwater Diversion Project Area

DR 134 Project Area

DR 131 Project Area

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

Figure 5 - NRCS Soils Map Stormwater Diversion Project and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO: 7810-16-0761

FIGURE NO: 5

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Station Boundary
Ash Ponds
48-Inch Pipe Closure Project
36-Inch Pipe Closure Project
Streams
Wetlands
Ponds
Stormwater Diversion Project Area
DR 134 Project Area
DR 131 Project Area

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

Figure 6a - Jurisdictional Waters Map
Stormwater Diversion Project and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO: 7810-16-0761

FIGURE NO: **6a**

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P:\Energy\Projects\Duke\2016\7810-16-0559 Dan River Stormwater Diversion and Individual Permit Application\INDIVIDUAL PERMIT APPLICATION\GIS\Figure6.mxd, User: jason.hightower; Date: 4/26/2017 3:24:03 PM

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Station Boundary
Ash Ponds
36-Inch Pipe Closure Project
Streams
Wetlands
Ponds
Stormwater Diversion Project Area
DR 134 Project Area
DR 131 Project Area

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

Figure 6b - Jurisdictional Waters Map
Stormwater Diversion Project
and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO:	7810-16-0761	FIGURE NO:	6b

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Station Boundary
Ash Ponds
48-Inch Pipe Closure Project
36-Inch Pipe Closure Project
Stormwater Diversion Project Area
DR 134 Project Area
DR 131 Project Area

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

Figure 7 - USGS Topographic Map Stormwater Diversion Project and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO: 7810-16-0761

FIGURE NO: 7

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Station Boundary
Ash Ponds
Stormwater Diversion Project Area
Freshwater Pond
Lake
Riverine
DR 134 Project Area
DR 131 Project Area
48-Inch Pipe Closure Project
36-Inch Pipe Closure Project

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

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Figure 8 - USFWS National Wetlands Inventory Stormwater Diversion Project and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO:	7810-16-0761	FIGURE NO:	8

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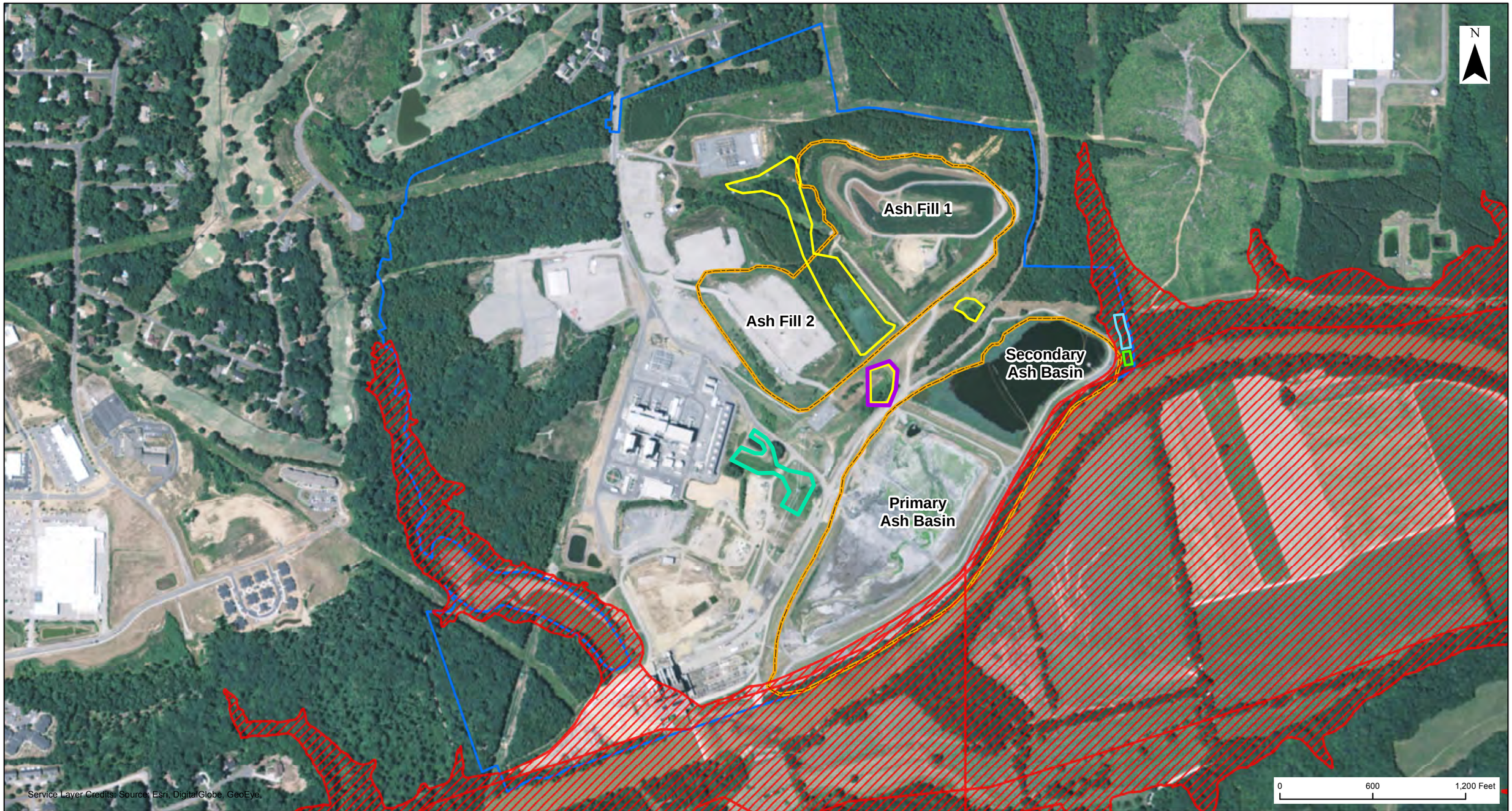

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Station Boundary
Ash Ponds
Stormwater Diversion Project Area
100yr Flood Boundary
36-Inch Pipe Closure Project
DR 134 Project Area
DR 131 Project Area
48-Inch Pipe Closure Project

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

Figure 9 - Floodplain Map Stormwater Diversion Project and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO:	7810-16-0761	FIGURE NO:	9

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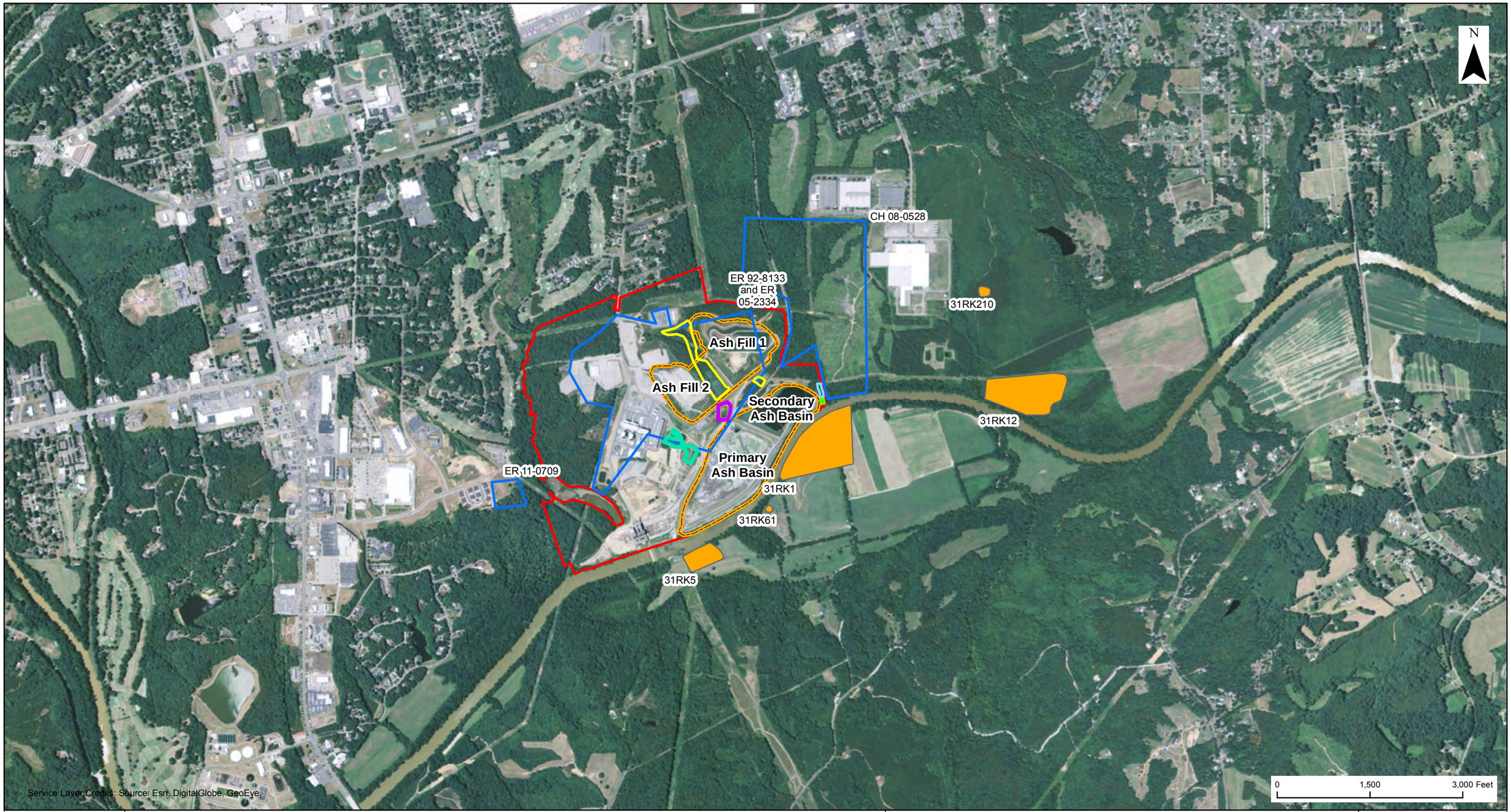

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- Station Boundary
- Ash Ponds
- Stormwater Diversion Project Area
- Potential Archaeological Sites
- Previous Archaeological Surveys
- DR 134 Project Area
- DR 131 Project Area
- 36-Inch Pipe Closure Project
- 48-Inch Pipe Closure Project

NOTE: THIS FIGURE IS FOR REFERENCE ONLY.

Figure 10 - Cultural Resources Map
Stormwater Diversion Project
and Associated Projects

Dan River Steam Station
Rockingham County, NC

PROJECT NO:	7810-16-0761	FIGURE NO:	10

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