

4.0 AFFECTED ENVIRONMENT

4.1 NATURAL RESOURCES

4.1.1 Physiology and Soils

The project study area lies within the Southern Outer Piedmont Physiographic Province where topography is characterized by gently sloping to moderately steep landscapes between 0 and 45 percent.^{1,2} Elevations range from 760 feet at Lake Norman to 950 feet above sea level. The Catawba and Iredell County Soil Surveys identify 20 soil types within the project study area, as shown in Table 4.1.1.

**TABLE 4.1.1
SOILS IN THE PROJECT STUDY AREA**

SOIL SERIES	COUNTY	MAPPING UNIT	DRAINAGE CLASS	HYDRIC CLASS ¹
Appling sandy loam ²	C/I	Ap/As	Well drained	Nonhydic
Cecil sandy loam ²	C	Ca	Well drained	Nonhydic
Cecil sandy clay loam ²	I	Ce	Well drained	Nonhydic
Cecil clay loam	C	Ce	Well drained	Nonhydic
Cecil urban-land complex	I	Cg	Well drained	Nonhydic
Chewacla loam ²	C/I	Ch	Somewhat poorly drained	Predominantly Nonhydic
Lloyd clay loam ²	I	Lc	Well drained	Nonhydic
Madison gravelly sandy loam ²	C	Mg	Well drained	Nonhydic
Masada fine sandy loam ²	I	Md	Well drained	Nonhydic
Madison-Bethlehem complex	C	Mh	Well drained	Nonhydic
Madison-Udorthents complex	C	Mk	Well drained	Nonhydic
Pacolet sandy loam	I	Pa	Well drained	Nonhydic
Pacolet sandy clay loam ²	I	Pc	Well drained	Nonhydic
Pacolet gravelly fine sandy loam ²	C	Pc	Well drained	Nonhydic
Pacolet soils	C	Pe	Well drained	Nonhydic
Pacolet-Saw complex	C	Ps	Well drained	Nonhydic
Udorthents, loamy and clayey	C	Ud	Well drained	Nonhydic
Udorthents-Urban land complex	I	Um	Well drained	Nonhydic
Urban land	I	Ur	n/a	Nonhydic
Wedowee sandy loam	C	Wd	Well drained	Nonhydic

NOTES: 1 Nonhydic = <1% hydric components; Predominantly Nonhydic = 1-32% hydric components; Partially Hydric = 33-65% hydric components; Predominantly Hydric = 66-99% hydric components; Hydric = 100% hydric components.

2 Soil types that are farmland of statewide important or prime farmland.

1 United States Department of Agriculture, Natural Resources Conservation Service. 2011. Soil survey of Iredell County, North Carolina. http://soils.usda.gov/survey/printed_surveys/

2 United States Department of Agriculture, Soil Conservation Service. 1975. Soil survey of Catawba County, North Carolina. http://soils.usda.gov/survey/printed_surveys/

4.1.2 Biotic Resources

4.1.2.1 *Terrestrial Communities*

Seven terrestrial communities were identified in the project study area: maintained/disturbed, beech forest, oak hickory forest, managed pine, bottomland hardwood forest, headwater forest, and non-tidal freshwater swamp. Figure 4.1.1 shows the location and extent of these terrestrial communities in the project study area. Table 4.1.2 shows the amount of land coverage for each community type. A brief description of each community is provided below. Scientific names of all species mentioned below are included in the *Natural Resources Technical Report* prepared for the proposed project.³

Maintained/Disturbed includes roads, road shoulders, maintained yards, agricultural activity, and commercial properties. Commercial development is largely concentrated in the eastern portion of the study corridor surrounding the NC 150 intersection with I-77 in Iredell County. The corridor is increasingly residential and rural heading westbound into Catawba County. One industrialized area is the Marshall Steam Station, a four-unit, coal-fired generating facility located on Lake Norman in Catawba County. Vegetation within these maintained and disturbed areas ranges from maintained ornamental landscapes to rural roadside communities. Invasive species such as kudzu and mimosa are common throughout these areas.

The **Beech Forest** community is dominated by American beech, northern red oak, scarlet oak, and mockernut hickory. The lower slopes grading down become more dominated with white oak and understory and herbaceous layers were largely absent due to canopy closure. Vines and herbaceous ground cover included heartleaf, St. John's wort, spotted wintergreen, muscadine grape, Japanese honeysuckle, ebony spleenwort, and hayscented fern.

The **Oak Hickory Forest** community occurs primarily on upper and mid-slopes and is dominated by northern red oak, scarlet oak, white oak, mockernut hickory, pignut hickory, shagbark hickory, southern sugar maple, and red maple. Species in the understory included green ash, southern sugar maple, blueberry, and box elder. Vines and herbaceous ground cover included heartleaf, St. John's wort, spotted wintergreen, muscadine grape, Japanese honeysuckle, and ebony spleenwort.

The upland **Managed Pine** communities are dominated by monocultures of loblolly pine, Virginia pine, shortleaf pine, and white pine. Other species present in the overstory include blackjack oak, red maple, and winged elm. Shrub and herbaceous cover were mostly

³ Natural Resources Technical Report for the proposed NC 150 Widening. Prepared by Stantec Consulting Services Inc., September 2014.

absent due to canopy closure and the intensive silvicultural activities associated with logging activities. Vines and herbaceous ground cover included muscadine grape, Japanese honeysuckle, ebony spleenwort, and poison ivy.

The **Bottomland Hardwood Forest** community occurs in wetland areas along the floodplain of higher order streams in the project study area where periodic overbank flooding occurs. Dominant species include red maple, river birch, tulip poplar, water oak, sycamore, ironwood, wax myrtle, Chinese privet, sparkleberry, and silky dogwood. Herbaceous and vine species include giant cane, netted chain fern, and common greenbrier.

The **Headwater Forest** community occurs in wetland areas along the floodplains of lower order streams in the project study area. Dominant species include red maple, sweet gum, ironwood, river birch, tulip poplar, and silky dogwood. Common herbaceous species include netted chainfern, southern lady fern, Japanese honeysuckle, and common greenbrier.

The **Non-Tidal Freshwater Marsh** community is primarily made up of herbaceous species and occurs in wet areas where disturbance limits the growth of woody shrubs and trees, particularly relic farm ponds and areas with utility rights of way. Dominant species in this community include red maple, river birch, tag alder, and water oak. Dominant herbaceous species include common rush, cattail, common greenbrier, netted chainfern, and sedge.

**TABLE 4.1.2
TERRESTRIAL COMMUNITIES IN THE PROJECT STUDY AREA**

COMMUNITY	COVERAGE (ACRES)
Maintained/Disturbed	506.6
Managed Pine	78.2
Oak Hickory Forest	79.6
Beech Forest	7.6
Headwater Forest	1.0
Non-Tidal Freshwater Marsh	0.5
Bottomland Hardwood Forest	0.2
Total	673.7

4.1.2.2 Terrestrial Wildlife

Terrestrial communities in the project study area are comprised of both natural and disturbed habitats that may support a diversity of wildlife species (those species actually observed are indicated with *). Mammal species that commonly occupy forest and stream corridors as found within the project study area include eastern cottontail, raccoon, Virginia opossum, red fox, eastern gray squirrel*, and white-tailed deer*. Birds that commonly use forest and forest edge habitats include the American crow*, red shouldered hawk*, northern cardinal*, song sparrow, blue jay*, Carolina chickadee, tufted titmouse. Birds that

may use the open habitat or water bodies within the project study area include American kestrel, belted kingfisher, eastern bluebird, eastern meadowlark, and turkey vulture*. Reptile and amphibian species that may use terrestrial communities located in the project study area include the corn snake, black rat snake, Southern copperhead, American toad, spring peeper, garter snake, eastern box turtle*, eastern fence lizard, five-lined skink.

4.1.2.3 Aquatic Communities

Aquatic communities in the project study area consist of both perennial and intermittent piedmont streams, ponds and Lake Norman. Perennial streams in the project study area could support bluehead chub, redlip shiner, northern dusky salamander, and redbreast sunfish. Intermittent streams in the project study area are relatively small in size and would support aquatic communities of spring peeper, crayfish, and various benthic macroinvertebrates. Pond habitats could support bluegill, blue catfish, green treefrog, and banded water snake. Lake Norman supports a variety of species including striped bass, largemouth bass, spotted bass, blue catfish, flathead catfish, channel catfish, crappie, white perch, snapping turtle, various waterfowl and wading birds.

4.1.2.4 Invasive Species

Six species from the NCDOT Invasive Exotic Plant List for North Carolina were found to occur in the project study area. The species identified were kudzu (Threat), Chinese privet (Threat), Chinese lespedeza (Threat), multiflora rose (Threat), mimosa (Moderate Threat), and Japanese honeysuckle (Moderate Threat).

4.1.3 Water Resources and Water Quality

Water resources in the project study area are part of the Catawba River Basin [U.S. Geological Survey (USGS) Hydrologic Unit 03050101]. In addition to Lake Norman (Catawba River), 16 streams and one pond connected to jurisdictional stream features were identified in the project study area, as listed in Table 4.1.3. The location of each water resource is shown in Figure 4.1.2. The physical characteristics of these streams are provided in Table 4.1.4.

Lake Norman – Lake Norman was created when the Catawba River was dammed by the creation of the Cowans Ford Dam. NC 150 crosses Lake Norman on bridges in 5 locations within the project study area. The full pond elevation of Lake Norman is 760 feet. According to the Duke Energy website, “The water of Lake Norman is used in two ways to provide electricity to the Piedmont Carolinas. It is used to power the generators at Cowans Ford Hydroelectric Station and by Marshall Steam Station and McGuire Nuclear Station to cool the steam that drives the turbines. The lake provides a dependable supply of water to Lincoln County, Davidson, Mooresville, Charlotte-Mecklenburg and Huntersville, North Carolina. Duke Energy partnered with the state in the establishment of the Lake Norman State Park. In addition, Duke Energy has built two bank fishing areas and eight public

boating access areas along the shoreline.” For the purposes of this report, Lake Norman is defined, at a minimum, as the area below full pond elevation (760’). For Lake Norman, the FERC boundary is at “full pond” or 760’ above mean sea level. Any crossings of this contour require a permit from FERC. Twenty-five acres of the lake are present within the project study area.

**TABLE 4.1.3
WATER RESOURCES IN THE PROJECT STUDY AREA**

STREAM NAME	MAP ID	NCDWR INDEX NUMBER	BEST USAGE CLASSIFICATION
Lake Norman (Catawba River)	Lake Norman	11-(75)	WS-IV,B;CA
Beaverdam Creek	Beaverdam Creek 1	11-94	WS-IV,B;CA
Beaverdam Creek	Beaverdam Creek 2	11-94	WS-IV,B;CA
Beaverdam Creek	Beaverdam Creek 3	11-94	WS-IV,B;CA
Bettie Creek	Bettie Creek 1	11-95	WS-IV,B;CA
Bettie Creek	Bettie Creek 2	11-95	WS-IV,B;CA
Bettie Creek	Bettie Creek 3	11-95	WS-IV,B;CA
UT Killian Creek	SA	11-119-2-(0.5)	C
UT Killian Creek	SB	11-119-2-(0.5)	C
UT Lake Norman	SC	11-(75)	WS-IV,B;CA
UT Bettie Creek	SD	11-95	WS-IV,B;CA
UT Bettie Creek	SE	11-95	WS-IV,B;CA
UT Bettie Creek	SF	11-95	WS-IV,B;CA
UT Bettie Creek	SG	11-95	WS-IV,B;CA
UT Lake Norman	SH1	11-(75)	WS-IV,B;CA
UT Lake Norman	SH2	11-(75)	WS-IV,B;CA
UT Beaverdam Creek	SI	11-94	WS-IV,B;CA
UT Beaverdam Creek	SJ	11-94	WS-IV,B;CA
UT Lake Norman	SK	11-(75)	WS-IV,B;CA
UT Lake Norman	SL	11-(75)	WS-IV,B;CA
UT Lake Norman	SM	11-(75)	WS-IV,B;CA
UT Lake Norman	SN	11-(75)	WS-IV,B;CA

NOTES: WS-IV: Water Supply IV – Highly Developed; CA: Critical Area; B: Class B – Primary Recreation, Fresh Water; C: Class C – Aquatic Life, Secondary Recreation, Fresh Water; UT: Unnamed Tributary

**TABLE 4.1.4
PHYSICAL CHARACTERISTICS OF WATER RESOURCES IN THE PROJECT STUDY AREA**

MAP ID	BANK HEIGHT (FT)	BANKFULL WIDTH (FT)	WATER DEPTH (IN)	CHANNEL SUBSTRATE	VELOCITY	CLARITY
Lake Norman*	n/a	n/a	n/a	n/a	n/a	n/a
Beaverdam Creek 1	2.5	5-6	3	Silt/Sand/ Gravel	Moderate	Clear
Beaverdam Creek 2	2.5-9	8-25	3	Clay/Silt	Moderate	Clear
Beaverdam Creek 3	3-5	10-12	3-15	Sand/ Bedrock	Moderate	Clear
Bettie Creek 1	1	2	6	Sand	Slow	Clear
Bettie Creek 2	4	6	2-4	Sand/Gravel	Moderate	Slightly Turbid

**TABLE 4.1.4 cont.
PHYSICAL CHARACTERISTICS OF WATER RESOURCES IN THE PROJECT STUDY AREA**

MAP ID	BANK HEIGHT (FT)	BANKFULL WIDTH (FT)	WATER DEPTH (IN)	CHANNEL SUBSTRATE	VELOCITY	CLARITY
Bettie Creek 3	4	15	24-36	Silt/Sand/ Gravel/ Cobble/ Bedrock	Slow	Turbid
SA	2	4	4	Sand	Moderate	Slightly Turbid
SB	6	20	6	Sand/ Cobble	Slow	Slightly Turbid
SC	6	4	1-4	Sand/Gravel	Moderate	Clear
SD	4-6	2	6-8	Sand/Gravel	Moderate	Slightly Turbid
SE	2-12	3-4	2-5	Clay/Silt/Sand	Moderate	Clear
SF	3	1	2	Clay/Silt/Sand	Moderate	Clear
SG	2-12	3-4	2-5	Clay/Silt/Sand	Moderate	Clear
SH1	0.5	1	2	Clay/Silt/Sand	Slow	Clear
SH2	2-3	10-15	20	Clay/Silt/Sand	Slow	Clear
SI	2-5	4	0-3	Sand	Slow	Clear
SJ	1	1	0	Clay/Silt	N/A	N/A
SK	0.5-2	1-2	3	Clay/Sand	Fast	Clear
SL	10	15	2-12	Sand/Gravel/ Cobble	Moderate	Slightly Turbid
SM	5-6	7-8	4-7	Sand/Gravel/ Cobble	Moderate	Clear
SN	10-12	10-12	2-12	Sand/ Gravel/ Cobble	Moderate	Clear

* Lake Norman was not assessed for physical water characteristics.

Water Quality

Best Usage Classifications – The NCDWR classifies stream segments according to their highest supportable use. Unless otherwise stated, unnamed tributaries with no designated best usage classification share the classification of their respective receiving waters. Class C waters are protected for aquatic life propagation and survival, fishing, wildlife, secondary recreation, 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. There are no restrictions on watershed development activities for Class C waters.

There are no High Quality Waters (HQWs), Outstanding Resource Waters (ORWs), trout waters, primary nursery areas, or designated anadromous fish waters, or Primary Nursery Areas (PNA) are present within the project study area. Additionally, there are no HQWs or ORW streams within one mile downstream of the project study area. Lake Norman is a water supply lake and it, and its tributaries, are designated as Water Supply-IV, Class B waters. From Lake Norman to east of Doolie Road/Perth Road, Lake Norman is a WS-IV Critical Area. From Doolie Road/Perth Road to east of I-77 is a WS-IV Protected Area. The project is within the Catawba River Basin, which is managed by NC Division of Water Resources' (NCDWR) Catawba River Basinwide Water Quality Plan (September 2004). The

waterbody that makes up Lake Norman, the Catawba River, is listed within the 2014 303(d) Impaired Waters List⁴ for a PCB Fish Tissue Advisory based on sampling completed in 2012.

Lake Norman is also subject to Catawba River Basin buffer rules which are discussed in further detail below.

Catawba River Riparian Buffer Rules – Permanent riparian buffer protection rules were enacted by the State for the main stem of the Catawba River and its main stem lakes below Lake James south to the North Carolina/South Carolina border (15 NCAC 02B.0243-0244). Lake Norman is one of the main stem lakes in which the buffer rules apply. The buffer protection rules apply within 50 feet of all riparian shorelines along the Catawba River main stem and the seven main stem lakes. The buffer is 50 feet wide, measured from the water's edge or at full pond in lakes. There are two zones, Zone 1 is the 30 feet nearest the water and Zone 2 is 20 feet landward of Zone 1. Grading and clearing of vegetation in Zone 1 is not allowed except for certain uses. Zone 2 can be cleared and graded but must be re-vegetated to maintain diffuse flow to Zone 1. Certain activities (including road crossings) may be allowable with mitigation but must be approved by the NCDWR. If it can be shown that there are "no practical alternatives" to the proposed activity, a variance may be allowed with mitigation.

4.1.4 Jurisdictional Issues

Section 404 of the Clean Water Act prohibits discharges of dredged or fill material into "Waters of the United States", except in accordance with a permit. The term Waters of the United States has broad meaning and incorporates both wetlands and surface waters. The US Army Corps of Engineers (USACE) is responsible for issuing permits and enforcing permitting requirements under Section 404 of the CWA. The USEPA issues the regulations, known as Section 404(b)(1) Guidelines, that the USACE must follow when issuing Section 404 permits. USEPA also participates in the permitting process. The USACE regulatory program is defined in 33 CFR 321-330. In addition, Executive Order 11990 requires that new construction in wetlands be avoided to the extent possible, and that all practical measure be taken to minimize or mitigate impacts to wetlands.

Rivers, streams, lakes, wetlands and ponds are subject to jurisdictional consideration under the Section 404 Program. The NCDWR also has regulatory input through Section 401 of the CWA, Water Quality Certification. Section 401 requires an applicant for a Section 404 permit to obtain certification from the State that the project complies with State water quality standards.

Clean Water Act Waters of the United States – Sixteen jurisdictional streams and 12 jurisdictional wetland areas were identified within the project study area as shown in Tables 4.1.5 and 4.1.6. The location of these streams is shown in Figure 4.1.2.

⁴ 2014 NC 303(d) List – Category 5 Final December 19, 2014.

http://portal.ncdenr.org/c/document_library/get_file?uuid=28b97405-55da-4b21-aac3-f580ee810593&groupId=38364

**TABLE 4.1.5
JURISDICTIONAL CHARACTERISTICS OF WATER RESOURCES IN THE PROJECT STUDY AREA**

MAP ID	AREA (AC) OR LENGTH (LF)	CLASSIFICATION	COMPENSATORY MITIGATION REQUIRED	RIVER BASIN BUFFER
Lake Norman*	25.0	n/a	No	Subject
Pond 1	0.03	n/a	No	Not subject
Beaverdam Creek 1	397	Perennial	Yes	Not subject
Beaverdam Creek 2	280	Perennial	Yes	Not subject
Beaverdam Creek 3	743	Perennial	Yes	Not subject
Bettie Creek 1	378	Intermittent	Yes	Not subject
Bettie Creek 2	439	Perennial	Yes	Not subject
Bettie Creek 3	642	Perennial	Yes	Not subject
SA	333	Perennial	Yes	Not subject
SB	324	Perennial	Yes	Not subject
SC	273	Intermittent	Yes	Not subject
SD	268	Perennial	Yes	Not subject
SE	1,164	Perennial	Yes	Not subject
SE	40	Intermittent	Yes	Not subject
SF	33	Intermittent	Yes	Not subject
SG	131	Intermittent	Yes	Not subject
SH1	39	Intermittent	Yes	Not subject
SH2	150	Perennial	Yes	Not subject
SI	53	Intermittent	Yes	Not subject
SJ	45	Intermittent	Yes	Not subject
SK	173	Intermittent	Yes	Not subject
SL	158	Perennial	Yes	Not subject
SM	82	Perennial	Yes	Not subject
SN	192	Perennial	Yes	Not subject

*Lake Norman full pond elevation is 760 feet. All jurisdictional streams in the project study area have been designated as warm water streams for the purposes of stream mitigation.

**TABLE 4.1.6
JURISDICTIONAL CHARACTERISTICS OF WETLANDS IN THE PROJECT STUDY AREA**

MAP ID	NCWAM CLASSIFICATION	HYDROLOGIC CLASSIFICATION	NCDWR WETLAND RATING	AREA (AC)
WA	Non-Tidal Freshwater Marsh	Riparian	44	0.06
WB	Headwater Forest	Riparian	34	0.57
WC	Bottomland Hardwood Forest	Riparian	39	0.01
WD	Headwater Forest	Riparian	30	0.02
WE	Headwater Forest	Riparian	62	0.30
WF	Headwater Forest	Riparian	28	<0.01
WG	Non-Tidal Freshwater Marsh	Riparian	39	0.06
WH	Headwater Forest	Riparian	28	0.01
WI	Headwater Forest	Riparian	28	0.03
WJ	Headwater Forest	Riparian	28	0.03
WK	Non-Tidal Freshwater Marsh	Riparian	61	0.39
WM	Bottomland Hardwood Forest	Riparian	35	0.17