Pre-Construction Notification (PCN) Form

For Nationwide Permits and Regional General Permits

(along with corresponding Water Quality Certifications)

April 13, 2022 Ver 4.3

*Please note: fields marked with a red asterisk * below are required. You will not be able to submit the form until all mandatory questions are answered.*

Also, if at any point you wish to print a copy of the E-PCN, all you need to do is right-click on the document and you can print a copy of the form.

Below is a link to the online help file.

https://edocs.deq.nc.gov/WaterResources/0/edoc/624704/PCN%20Help%20File%202018-1-30.pdf

A. Processing Information

Pre-Filing Meeting Date Request was submitted on: *

10/28/2021

If this is a courtesy copy, please fill in this with the submission date.

County (or Counties) where the project is located: *

Wake

Is this a NCDMS Project *

○ Yes ◉ No

Click Yes, only if NCDMS is the applicant or co-applicant.

Is this project a public transportation project? *

○ Yes ◉ No

This is any publicly funded by municipal,state or federal funds road, rail, airport transportation project.

1a. Type(s) of approval sought from the Corps: *

☑ Section 404 Permit (wetlands, streams and waters, Clean Water Act)

☐ Section 10 Permit (navigable waters, tidal waters, Rivers and Harbors Act)

Has this PCN previously been submitted? *

○ Yes

◉ No

1b. What type(s) of permit(s) do you wish to seek authorization? *

☑ Nationwide Permit (NWP)

☐ Regional General Permit (RGP)

☐ Standard (IP)

1c. Has the NWP or GP number been verified by the Corps? *

○ Yes ◉ No

Nationwide Permit (NWP) Number: 57 - Electric Utility Line and Telecommunications Activities – (frequently used)

NWP Numbers (for multiple NWPS):

List all NW numbers you are applying for not on the drop down list.

1d. Type(s) of approval sought from the DWR: *

check all that apply

☐ 401 Water Quality Certification - Regular

☐ Non-404 Jurisdictional General Permit

☐ Individual 401 Water Quality Certification

☐ 401 Water Quality Certification - Express

☑ Riparian Buffer Authorization

1e. Is this notification solely for the record because written approval is not required?

*

For the record only for DWR 401 Certification: ◉ Yes ○ No

For the record only for Corps Permit: ○ Yes ◉ No

1f. Is this an after-the-fact permit application? *

○ Yes ◉ No

1g. Is payment into a mitigation bank or in-lieu fee program proposed for mitigation of impacts?

If so, attach the acceptance letter from mitigation bank or in-lieu fee program.

○ Yes ◉ No

Acceptance Letter Attachment

Click the upload button or drag and drop files here to attach document

FILE TYPE MUST BE PDF

1h. Is the project located in any of NC's twenty coastal counties? *

○ Yes ◉ No

1j. Is the project located in a designated trout watershed? *

○ Yes ◉ No

Link to trout information: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/Trout.aspx

B. Applicant Information

1a. Who is the Primary Contact? *

Chris Rivenbark

1b. Primary Contact Email: *

crivenbark@ncdot.gov

1c. Primary Contact Phone: *

(xxx)xxx-xxxx

(919)707-6152

1d. Who is applying for the permit? *

☑ Owner ☑ Applicant (other than owner)

(Check all that apply)

1e. Is there an Agent/Consultant for this project? *

○ Yes ◉ No

2. Owner Information

2a. Name(s) on recorded deed: *

n/a

2b. Deed book and page no.:

2c. Contact Person:

(for Corporations)

2d. Address *

Street Address

n/a

Address Line 2

City

n/a

State / Province / Region

n/a

Postal / Zip Code

n/a

Country

n/a

2e. Telephone Number: *

(xxx)xxx-xxxx

(919)707-6000

2f. Fax Number:

(xxx)xxx-xxxx

2g. Email Address: *

maturchy@ncdot.gov

3. Applicant Information (if different from owner)

3a. Name: *

NCDOT

3b. Business Name:

(if applicable)

3c. Address *

Street Address

1598 Mail Service Center

Address Line 2

City

Raleigh

State / Province / Region

NC

Postal / Zip Code

27699-1598

Country

US

3d. Telephone Number: *

(919)707-6000

(xxx)xxx-xxxx

3e. Fax Number:

(xxx)xxx-xxxx

3f. Email Address: *

maturchy@ncdot.gov

C. Project Information and Prior Project History

1. Project Information

1a. Name of project: *

Knightdale Town-wide Closed Loop Traffic Signal System (U-6026-Central)

1b. Subdivision name:

(if appropriate)

1c. Nearest municipality / town: *

Knightdale

2. Project Identification

2a. Property Identification Number:

(tax PIN or parcel ID)

2b. Property size:

(in acres)

2c. Project Address

Street Address

Address Line 2

City

State / Province / Region

Postal / Zip Code

Country

2d. Site coordinates in decimal degrees

Please collect site coordinates in decimal degrees. Use between 4-6 digits (unless you are using a survey-grade GPS device) after the decimal place as appropriate, based on how the location was determined. (For example, most mobile phones with GPS provide locational precision in decimal degrees to map coordinates to 5 or 6 digits after the decimal place.)

Latitude: *

35.798655

ex: 34.208504

Longitude: *

-78.476904

-77.796371

3. Surface Waters

3a. Name of the nearest body of water to proposed project: *

Poplar Creek and UTs to Poplar Creek and UTs to Neuse River

3b. Water Resources Classification of nearest receiving water: *

C; NSW

Surface Water Lookup

3c. What river basin(s) is your project located in? *

Neuse

3d. Please provide the 12-digit HUC in which the project is located. *

030202010705, 030202011103

River Basin Lookup

4. Project Description and History

4a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: *

All work will be conducted within NCDOT right-of-way and existing utility corridors, which consists of predominately roadside shoulders and periodically maintained areas.

4b. Have Corps permits or DWR certifications been obtained for this project (including all prior phases) in the past? *

○ Yes ◉ No ○ Unknown

4f. List the total estimated acreage of all existing wetlands on the property:

2.0

4g. List the total estimated linear feet of all existing streams on the property:

(intermittent and perennial)

3,000

4h. Explain the purpose of the proposed project: *

The purpose of the project is to install conduit and aerial lines within existing DOT right-of-way and existing utility corridors to facilitate the Knightdale town-wide, closed loop, computerized traffic signal system.

4i. Describe the overall project in detail, including indirect impacts and the type of equipment to be used: *

The conduit and aerial lines will be installed as well as anchor guys and bore pits. Anticipated equipment to be used includes trenchers, backhoes, and boring equipment.

5. Jurisdictional Determinations

5a. Have the wetlands or streams been delineated on the property or proposed impact areas? *

◉ Yes ○ No ○ Unknown

Comments:

5b. If the Corps made a jurisdictional determination, what type of determination was made? *

○ Preliminary ○ Approved ◉ Not Verified ○ Unknown ○ N/A

Corps AID Number:

Example: SAW-2017-99999

5c. If 5a is yes, who delineated the jurisdictional areas?

Name (if known): Ben Cogdell

Agency/Consultant Company: Atkins

Other:

6. Future Project Plans

6a. Is this a phased project? *

○ Yes ◉ No

Are any other NWP(s), regional general permit(s), or individual permits(s) used, or intended to be used, to authorize any part of the proposed project or related activity? This includes other separate and distant crossing for linear projects that require Department of the Army authorization but don't require pre-construction notification.

D. Proposed Impacts Inventory

1. Impacts Summary

1a. Where are the impacts associated with your project? (check all that apply):

☑ Wetlands ☐ Streams-tributaries ☑ Buffers
☐ Open Waters ☐ Pond Construction

2. Wetland Impacts

If there are wetland impacts proposed on the site, then complete this question for each wetland area impacted.

"W." will be used in the table below to represent the word "wetland".

2a. Site # * (?)	2a1 Reason * (?)	2b. Impact type * (?)	2c. Type of W. *	2d. W. name *	2e. Forested *	2f. Type of Jurisdiction * (?)	2g. Impact area *
SCP-13	Anchor Guy-Fill	P	Bottomland Hardwood Forest	WB	Yes	Both	0.000 (acres)
SCP-13	Anchor Guy	T	Bottomland Hardwood Forest	WB	Yes	Both	0.009 (acres)
SCP-50	Anchor Guy	P	Bottomland Hardwood Forest	WD	No	Both	0.000 (acres)
SCP-50	Anchor Guy	T	Bottomland Hardwood Forest	WD	No	Both	0.006 (acres)

2g. Total Temporary Wetland Impact

0.015

2g. Total Permanent Wetland Impact

0.000

2g. Total Wetland Impact

0.015

2i. Comments:

SCP-13 permanent wetland impact = 0.000092
SCP-50 permanent wetland impact = 0.000092

6. Buffer Impacts (for DWR)

If project will impact a protected riparian buffer, then complete the chart below. Individually list all buffer impacts below.

6a. Project is in which protect basin(s)? *

Check all that apply.

- [x] Neuse
- [ ] Catawba
- [ ] Goose Creek
- [ ] Other
- [ ] Tar-Pamlico
- [ ] Randleman
- [ ] Jordan Lake

6b. Impact Type * (?)	6c. Per or Temp * (?)	6d. Stream name *	6e. Buffer mitigation required? *	6f. Zone 1 impact *	6g. Zone 2 impact *
SCP-17 Guy Anchor-Allowable	P	SD	No	0 (square feet)	79 (square feet)
SCP-23 Guy Anchor-Allowable	P	SS	No	396 (square feet)	4 (square feet)
SCP-50 Fiber Optic Bore-Allowable	P	SI	No	50 (square feet)	230 (square feet)
SCP-50 Guy Anchor-Allowable	P	SI	No	294 (square feet)	310 (square feet)

6h. Total buffer impacts:

	Zone 1	Zone 2
Total Temporary impacts:	0.00	0.00

	Zone 1	Zone 2
Total Permanent impacts:	740.00	623.00

	Zone 1	Zone 2
Total combined buffer impacts:	740.00	623.00

6i. Comments:

E. Impact Justification and Mitigation

1. Avoidance and Minimization

1a. Specifically describe measures taken to avoid or minimize the proposed impacts in designing the project: *

There will be no impact to jurisdictional streams. Impacts to wetlands or riparian buffers will occur only for the installation of guy anchors or bore pits for directional drilling. When possible, lines will use the existing facilities. Impact sites occur within existing public utility easements, so any vegetation clearing would be to herbaceous vegetation and/or small woody saplings,and that no tree clearing (larger than 2-inches diameter at breast height) clearing of woody vegetation is proposed anywhere within the project limits.

1b. Specifically describe measures taken to avoid or minimize the proposed impacts through construction techniques: *

In areas of conflicts with jurisdictional features, the lines will be directionally bored. Installation of lines will be done without equipment crossing (impacting) jurisdictional streams. To the extent practicable, tree cutting will be kept at a minimum.

2. Compensatory Mitigation for Impacts to Waters of the U.S. or Waters of the State

2a. Does the project require Compensatory Mitigation for impacts to Waters of the U.S. or Waters of the State?

- ( ) Yes
- (•) No

2b. If this project DOES NOT require Compensatory Mitigation, explain why:

There are no impacts to jurisdictional streams. Impacts to jurisdictional wetlands is minimal (<0.001 ac.).

NC Stream Temperature Classification Maps can be found under the Mitigation Concepts tab on the Wilmington District's RIBITS website.

F. Stormwater Management and Diffuse Flow Plan (required by DWR)

*** Recent changes to the stormwater rules have required updates to this section .***

1. Diffuse Flow Plan

1a. Does the project include or is it adjacent to protected riparian buffers identified within one of the NC Riparian Buffer Protection Rules?

(•) Yes ( ) No

1b. All buffer impacts and high ground impacts require diffuse flow or other form of stormwater treatment. If the project is subject to a state implemented riparian buffer protection program, include a plan that fully documents how diffuse flow will be maintained.

All Stormwater Control Measures (SCM)s must be designed in accordance with the NC Stormwater Design Manual. Associated supplement forms and other documentation shall be provided.

What type of SCM are you providing?

- [ ] Level Spreader
- [ ] Vegetated Conveyance (lower SHWT)
- [ ] Wetland Swale (higher SHWT)
- [ ] Other SCM that removes minimum 30% nitrogen
- [x] Proposed project will not create concentrated stormwater flow through the buffer

(check all that apply)

For a list of options to meet the diffuse flow requirements, click here.

2. Stormwater Management Plan

2a. Is this a NCDOT project subject to compliance with NCDOT's Individual NPDES permit NCS000250? *

( ) Yes (•) No

2b. Does this project meet the requirements for low density projects as defined in 15A NCAC 02H .1003(2)? *

(•) Yes ( ) No

To look up low density requirement click here 15A NCAC 02H .1003(2).

Comments:

G. Supplementary Information

1. Environmental Documentation

1a. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land? *

(•) Yes ( ) No

1b. If you answered "yes" to the above, does the project require preparation of an environmental document pursuant to the requirements of the National or State (North Carolina) Environmental Policy Act (NEPA/SEPA)? *

(•) Yes ( ) No

1c. If you answered "yes" to the above, has the document review been finalized by the State Clearing House? (If so, attach a copy of the NEPA or SEPA final approval letter.) *

( ) Yes (•) No

Comments: *

Type I Categorical Exclusions do not require submittal to the State Clearing House

2. Violations (DWR Requirement)

2a. Is the site in violation of DWR Water Quality Certification Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), or DWR Surface Water or Wetland Standards or Riparian Buffer Rules (15A NCAC 2B .0200)? *

( ) Yes (•) No

3. Cumulative Impacts (DWR Requirement)

3a. Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality? *

( ) Yes (•) No

3b. If you answered "no," provide a short narrative description.

This project will neither influence nearby land uses nor stimulate growth.

4. Sewage Disposal (DWR Requirement)

4a. Is sewage disposal required by DWR for this project? *

( ) Yes ( ) No (•) N/A

5. Endangered Species and Designated Critical Habitat (Corps Requirement)

5a. Will this project occur in or near an area with federally protected species or habitat? *

(•) Yes ( ) No

5b. Have you checked with the USFWS concerning Endangered Species Act impacts? *

(•) Yes ( ) No

5c. If yes, indicate the USFWS Field Office you have contacted.

Raleigh

5d. Is another Federal agency involved? *

( ) Yes (•) No ( ) Unknown

5e. Is this a DOT project located within Division's 1-8? *

(•) Yes ( ) No

5j. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat? *

N.C. Natural Heritage Program database; USFWS-IPaC website list of species with potential within the study area; biological surveys for protected species,which include Neuse River waterdog, Carolina madtom, dwarf wedgemussel, Atlantic pigtoe and Michaux's sumac. Due to having no impact on jurisdictional streams, aquatic species received a biological opinion of No Effect. Due to a known population of Michaux's sumac in close proximity to the project site, informal concurrence was requested from USFWS. Concurrence was received from the USFWS on September 6, 2022.

6. Essential Fish Habitat (Corps Requirement)

6a. Will this project occur in or near an area designated as an Essential Fish Habitat? *

( ) Yes (•) No

6b. What data sources did you use to determine whether your site would impact an Essential Fish Habitat? *

NMFS county index

7. Historic or Prehistoric Cultural Resources (Corps Requirement)

Link to the State Historic Preservation Office Historic Properties Map (does not include archaeological data: http://gis.ncdcr.gov/hpoweb/

7a. Will this project occur in or near an area that the state, federal or tribal governments have designated as having historic or cultural preservation status (e.g., National Historic Trust designation or properties significant in North Carolina history and archaeology)? *

(•) Yes ( ) No

7b. What data sources did you use to determine whether your site would impact historic or archeological resources? *

NEPA documentation

8. Flood Zone Designation (Corps Requirement)

Link to the FEMA Floodplain Maps: https://msc.fema.gov/portal/search

8a. Will this project occur in a FEMA-designated 100-year floodplain? *

(•) Yes ( ) No

8b. If yes, explain how project meets FEMA requirements:

8c. What source(s) did you use to make the floodplain determination? *

FEMA flood map

Miscellaneous

Comments

Please use the space below to attach all required documentation or any additional information you feel is helpful for application review. Documents should be combined into one file when possible, with a Cover Letter, Table of Contents, and a Cover Sheet for each Section preferred.

Click the upload button or drag and drop files here to attach document

U-6026 Nationwide Wake September 9 2022.pdf 31.38MB

File must be PDF or KMZ

Signature

*

☑ By checking the box and signing below, I certify that:

- The project proponent hereby certifies that all information contained herein is true, accurate, and complete to the best of my knowledge and belief'; and
- The project proponent hereby requests that the certifying authority review and take action on this CWA 401 certification request within the applicable reasonable period of time.
- I have given true, accurate, and complete information on this form;
- I agree that submission of this PCN form is a "transaction" subject to Chapter 66, Article 40 of the NC General Statutes (the "Uniform Electronic Transactions Act");
- I agree to conduct this transaction by electronic means pursuant to Chapter 66, Article 40 of the NC General Statutes (the "Uniform Electronic Transactions Act");

- I understand that an electronic signature has the same legal effect and can be enforced in the same way as a written signature; AND
- I intend to electronically sign and submit the PCN form.

Full Name: *

Mack Christopher Rivenbark, III

Signature *

Date

9/9/2022

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh ES Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726
September 6, 2022

Chris Rivenbark
NC Department of Transportation
1598 Mail Service Center
Raleigh, NC 27699-1598

Dear Mr. Rivenbark:

This letter is in response to your letter of September 1, 2022 which provided the U.S. Fish and Wildlife Service (Service) with the biological conclusion of the North Carolina Department of Transportation that the proposed installation of the Knightdale Town-Wide Closed Loop Computerized Traffic Signal System in Wake County (TIP No. U-6026) may affect, but is not likely to adversely affect the federally endangered Michaux's sumac (*Rhus michauxii*). The following response is provided in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

According to information provided, plant surveys were conducted within the study area on multiple days in October 2018 and June 2021. No specimens of Michaux's sumac were observed. However, a known population occurs in close proximity (~0.1 mile) to the study area. Based on survey results and other available information, the Service concurs with your conclusion that the proposed action may affect, but is not likely to adversely affect Michaux's sumac. In addition, we concur that the action will have no effect on all other federally listed species.

We believe that the requirements of Section 7(a)(2) of the ESA have been satisfied. We remind you that obligations under Section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered in this review; (2) this action is subsequently modified in a manner that was not considered in this review; or (3) a new species is listed or critical habitat determined that may be affected by this identified action. If you have any questions regarding our response, please contact Mr. Gary Jordan at gary_jordan@fws.gov.

Sincerely,

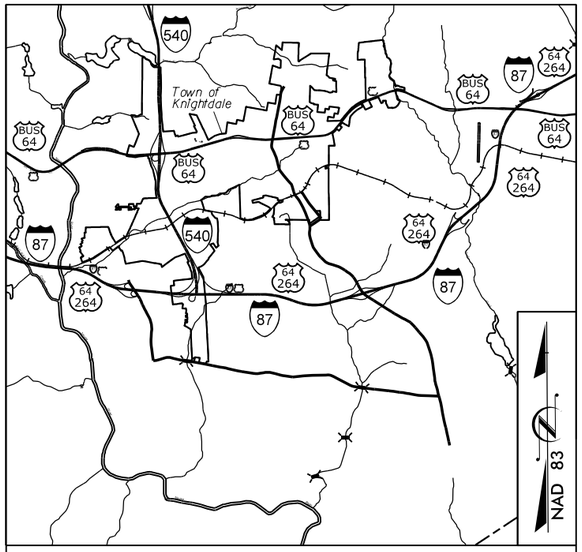
GARY JORDAN
Digitally signed by GARY JORDAN
Date: 2022.09.06 13:56:08 -04'00'

for Pete Benjamin
Field Supervisor

Electronic copy:
Eric Alsmeyer, USACE, Wake Forest, NC
Jason Dilday, NCDOT, Raleigh, NC

TIP PROJECT: U-6026

CONTRACT: C204382



VICINITY MAP

PROJECT REFERENCE NO.	SHEET NO.
U-6026	1

PERMIT DRAWING
SHEET 1 OF 8

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

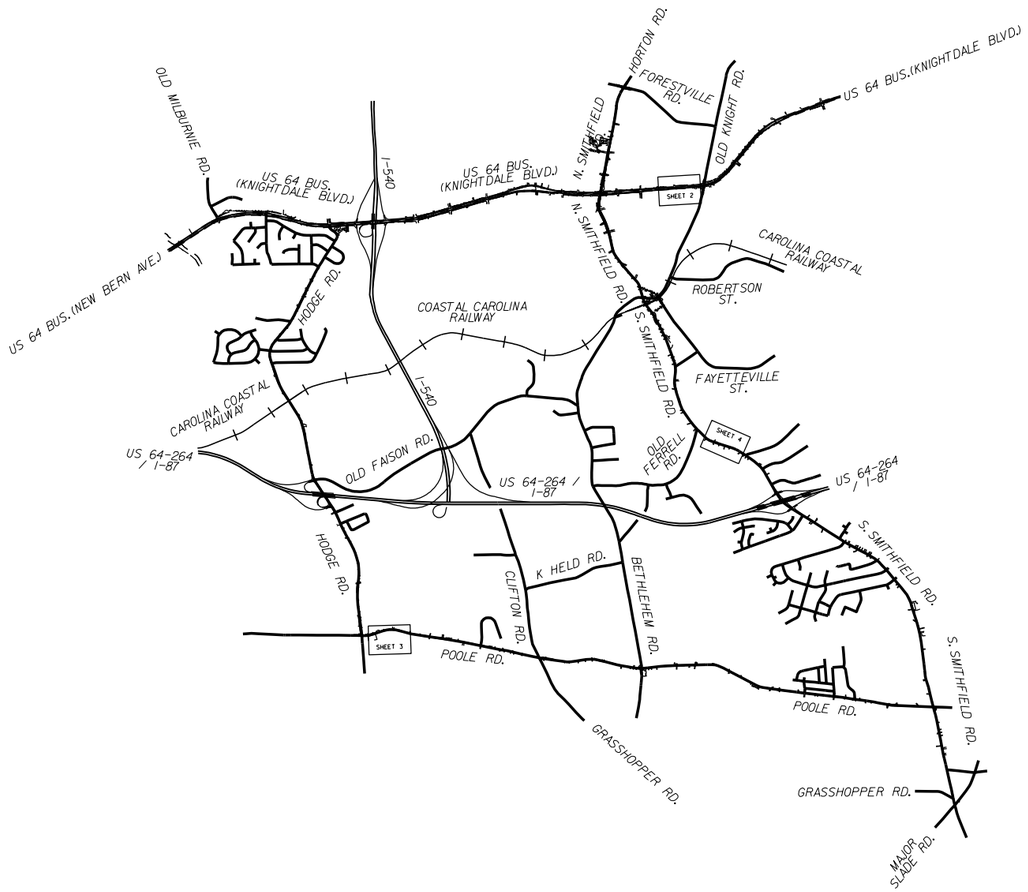
PLANS FOR PROPOSED IMPROVEMENTS

KNIGHTDALE TOWN-WIDE CLOSED LOOP SYSTEM

COMPUTERIZED TRAFFIC SIGNAL SYSTEM

FINAL UTILITY MAKE-READY PLANS

WETLAND AND SURFACE WATER IMPACTS PERMIT



Associated with Final Design Dated July 29, 2022

2018 STANDARD SPECIFICATIONS

LETTING DATE: NOVEMBER 15, 2022

PROJECT LENGTH = 16 MILES

750 Greenfield Parkway, Garner, NC 27529

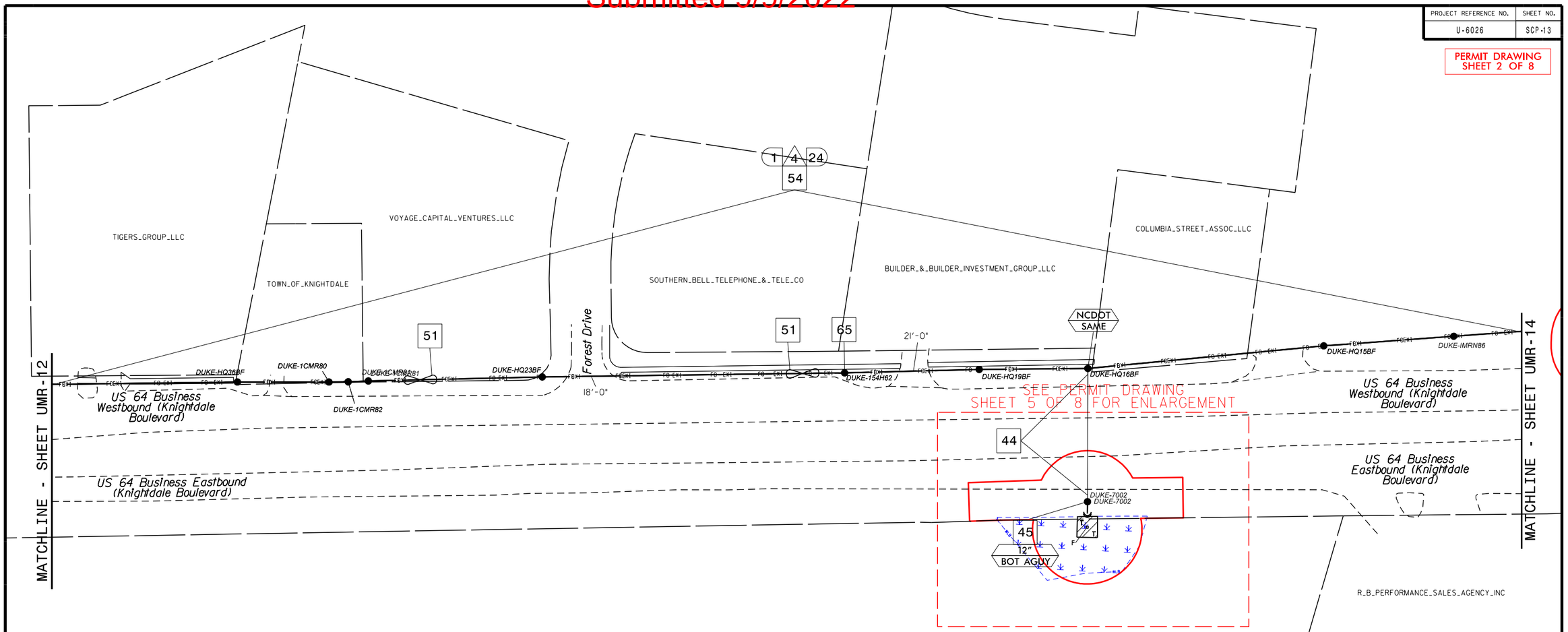
NCDOT CONTACTS:
TRANSPORTATION MOBILITY & SAFETY DIVISION
INTELLIGENT TRANSPORTATION SYSTEMS SECTION
GREGORY A. GREEN - SIGNAL COMMUNICATIONS PROJECT ENGINEER
HEIDI T. BERGGREN - PROJECT DESIGN ENGINEER
DOUG SONDERFAN - DESIGN ENGINEER

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

BRADFORD J. SLOCUM, PE - ATKINS PROJECT MANAGER
ANTHONY M. ENCARNACION, PE - ATKINS PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-13

PERMIT DRAWING
SHEET 2 OF 8



NOTES:
1. UNLESS OTHERWISE NOTED:
   - OVERLASH NEW FIBER OPTIC CABLE TO EXISTING COMMUNICATIONS CABLE.
   - ATTACH NEW MESSENGER CABLE 40" BELOW POWER.
   - ATTACH ON FRONT SIDE (FS) OF POLE.
2. SEAL ALL CONDUIT ENDS WITH DUCT AND CONDUIT SEALER AT ALL JUNCTION BOX / CABINET ENTRANCES.

JANE_P_BEASLEY/EVE_C_SUGGS

- EXISTING UTILITY POLE
- FO — AERIAL FIBER OPTIC CABLE
- EXI — EXISTING COMMUNICATIONS CABLE
- F — FILL IN WETLAND
- T — TEMPORARY FILL IN WETLAND
- PERMIT AREAS

ATTACHMENT POINT:
- XXX / YYY — DISTANCE ABOVE (IN) REFERENCE POINT
- YYY / XXX — REFERENCE POINT DISTANCE BELOW (IN)

CONSTRUCTION NOTE SYMBOLOGY KEY

NUMBER OF CABLE(S) /LOOPS, DETECTOR AMPLIFIERS, GUYS, ANTENNAS — NUMBER OF FIBERS/TWISTED PAIRS
NUMBER OF RISER(S)/ CONDUIT(S) — DIAMETER OF RISER(S)/ CONDUIT(S) (IN)

1. INSTALL CATEGORY 6 CABLE
2. INSTALL LOW VOLTAGE POWER CABLE (24VAC)
3. INSTALL COMPOSITE CCTV CABLE
4. INSTALL SMFO CABLE
5. INSTALL COAXIAL ANTENNA CABLE
6. INSTALL FIBER-OPTIC DROP CABLE
7. INSTALL TRACER WIRE
8. TRENCH OR PLOW
9. INSTALL PVC CONDUIT
10. INSTALL RIGID, GALVANIZED STEEL CONDUIT
11. INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
12. INSTALL RIGID, GALVANIZED STEEL RISER WITH HEAT SHRINK TUBING
13. INSTALL HEAT SHRINK TUBING RETROFIT KIT
14. INSTALL HIGH DENSITY POLYETHYLENE CONDUIT
15. DIRECTIONAL DRILL CONDUIT
16. BORE AND JACK CONDUIT
17. INSTALL CABLE(S) IN EXISTING CONDUIT
18. INSTALL CABLE(S) IN NEW CONDUIT
19. INSTALL CABLE(S) IN EXISTING RISER(S)
20. INSTALL CABLE(S) IN NEW RISER(S)
21. INSTALL CABLE(S) IN EXISTING CABINET ENTRANCE
22. INSTALL NEW CONDUIT INTO CABINET BASE (USE EX CABINET ENTRANCE WHEN AVAILABLE)
23. INSTALL NEW RISER INTO CABINET BASE (USE EX CABINET ENTRANCE WHEN AVAILABLE)
24. INSTALL NEW CONDUIT INTO POLE MOUNTED CABINET
25. INSTALL NEW RISER INTO POLE MOUNTED CABINET
26. INSTALL DIGITAL VIDEO ENCODER
27. INSTALL NEW ETHERNET EDGE SWITCH IN CABINET
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS, AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. INSTALL TYPE 332 HUB CABINET
32. MODIFY EXISTING SPLICE ENCLOSURE OR INTERCONNECT CENTER
33. REMOVE EXISTING SPLICE /HUB / CCTV CABINET
34. INSTALL CABINET FOUNDATION
35. REMOVE EXISTING CABINET FOUNDATION
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL 50' CCTV WOOD POLE
38. INSTALL STANDARD SIZE JUNCTION BOX
39. INSTALL SPECIAL-SIZED JUNCTION BOX
40. INSTALL OVER-SIZED JUNCTION BOX
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48. REMOVE EXISTING COMMUNICATIONS CABLE AND MESSENGER CABLE
49. REMOVE EXISTING COMMUNICATIONS CABLE
50. INSTALL SERVICE CONDUCTORS
51. INSTALL CABLE STORAGE GUIDE(S) [SNOW SHOE(S)] AND STORE 100 FEET OF EACH CABLE
52A. INSTALL DELINEATOR MARKER
52B. INSTALL JUNCTION BOX MARKER
53. STORE 30' OF COMMUNICATIONS CABLE (EACH CABLE)
54. LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
55. LASH CABLE(S) TO EXISTING MESSENGER CABLE
56. LASH CABLE(S) TO NEW MESSENGER CABLE
57. MODIFY EXISTING ELECTRICAL SERVICE
58. INSTALL NEW ELECTRICAL SERVICE FOR CCTV OR RADIO
59. INSTALL NEW POLE MOUNTED CCTV CABINET (336)
60. INSTALL NEW CCTV CABINET (NEMA TYPE 4)
61. REMOVE EXISTING CCTV CAMERA ASSEMBLY
62. NOT USED
63. DRILL-CORE DRILL EXISTING FOUNDATION
64. INTERCEPT AND REROUTE EXISTING CONDUITS
65. BOND MESSENGER TO POLE GROUND
66. BOND RISER TO POLE GROUND
67. BOND TRACER WIRE TO EQUIPMENT GROUND BUS
68. NOT USED
69. HANDLASH AND INSTALL AERIAL CABLE PROTECTOR
70. INSTALL CCTV CABINET DISCONNECT
71. INSTALL MANAGED ETHERNET SWITCH
72. INSTALL CCTV METAL POLE
73. REMOVE EXISTING CCTV METAL POLE
74. REMOVE WIRELESS COMMUNICATIONS EQUIPMENT
75. BACKPULL AND COIL NCDOT ITS CABLE
76. INSTALL HUB SWITCH
77. INSTALL CELLULAR MODEM

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(919) 876-6888 NCBEES #F-0326

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Prepared for the Offices of:
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Transportation Mobility and Safety Division
Intelligent Transportation Systems Section
750 Greenfield Parkway, Garner, NC 27529

Knightdale Signal System Cable Routing Plans

Division 5 | Wake County | Knightdale

PLAN DATE:	June 2022	REVIEWED BY:	MB Toth
PREPARED BY:	AME/JTS	REVIEWED BY:	BJ Slocum

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

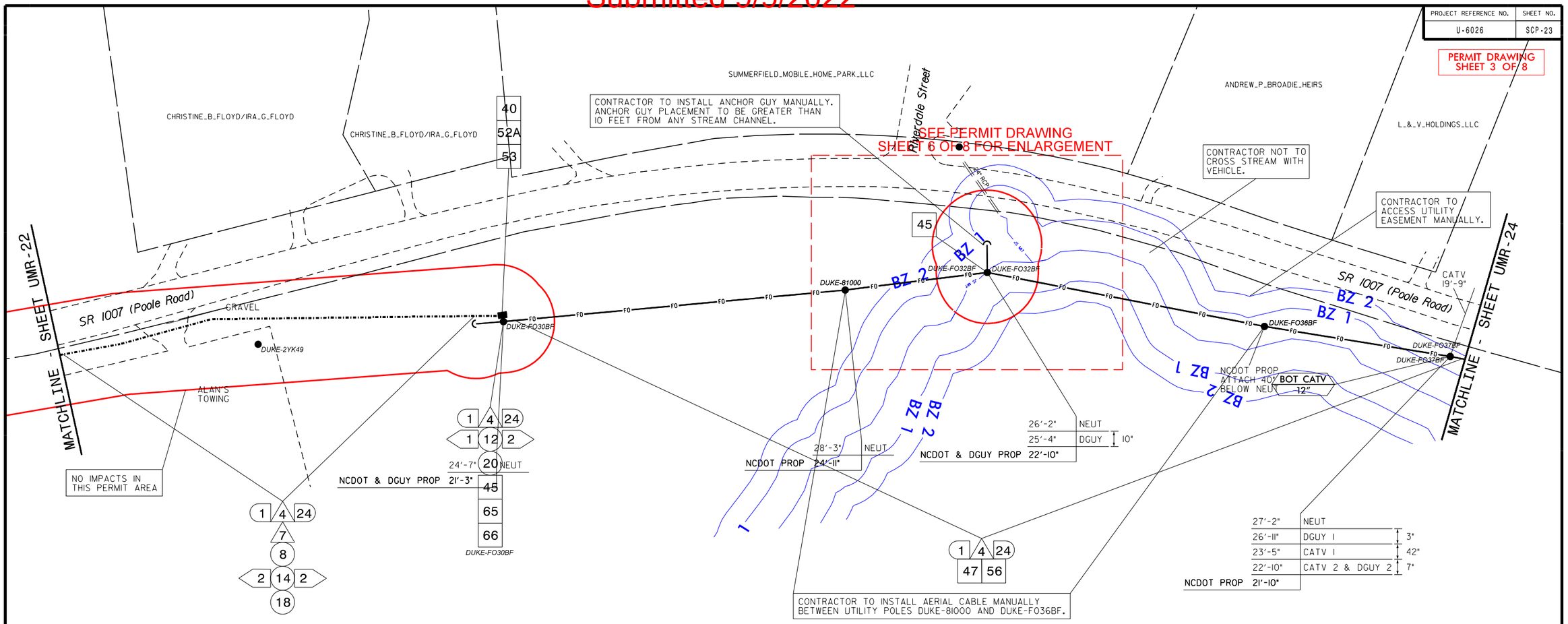
SIGNATURE DATE

CADD Filename: $FILENAME$

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-23

PERMIT DRAWING SHEET 3 OF 8



Summary of permitted construction activities include installation of proposed aerial messenger and downguy on existing Duke Power Pole

NO UMR WORK THIS SHEET

- EXISTING UTILITY POLE
- FO — AERIAL FIBER OPTIC CABLE
- EXI — EXISTING COMMUNICATIONS CABLE
- DD — DIRECTIONAL DRILLING
- REM — EXISTING CABLE TO BE REMOVED
- PERMIT AREAS

ATTACHMENT POINT:

- XXX / YYY — DISTANCE ABOVE (IN) REFERENCE POINT
- YYY / XXX — REFERENCE POINT DISTANCE BELOW (IN)

CONSTRUCTION NOTE SYMBOLOGY KEY

NUMBER OF CABLE(S) /LOOPS, DETECTOR AMPLIFIERS, GUYS, ANTENNAS — NUMBER OF FIBERS/TWISTED PAIRS — NUMBER OF RISER(S)/ CONDUIT(S) — DIAMETER OF RISER(S)/ CONDUIT(S) (IN)

NOTES:
1. UNLESS OTHERWISE NOTED:
   - OVERLASH NEW FIBER OPTIC CABLE TO EXISTING COMMUNICATIONS CABLE.
   - ATTACH NEW MESSENGER CABLE 40" BELOW POWER.
   - ATTACH ON FRONT SIDE (FS) OF POLE.
2. SEAL ALL CONDUIT ENDS WITH DUCT AND CONDUIT SEALER AT ALL JUNCTION BOX / CABINET ENTRANCES.

1. INSTALL CATEGORY 6 CABLE
2. INSTALL LOW VOLTAGE POWER CABLE (24VAC)
3. INSTALL COMPOSITE CCTV CABLE
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12. INSTALL RIGID, GALVANIZED STEEL RISER WITH HEAT SHRINK TUBING
13. INSTALL HEAT SHRINK TUBING RETROFIT KIT
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17. INSTALL CABLE(S) IN EXISTING CONDUIT
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31. INSTALL TYPE 332 HUB CABINET
32. MODIFY EXISTING SPLICE ENCLOSURE OR INTERCONNECT CENTER
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35. REMOVE EXISTING CABINET FOUNDATION
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51. INSTALL CABLE STORAGE GUIDE(S) [SNOW SHOE(S)] AND STORE 100 FEET OF EACH CABLE
52A. INSTALL DELINEATOR MARKER
52B. INSTALL JUNCTION BOX MARKER
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54. LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
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Prepared for the Offices of:
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Transportation Mobility and Safety Division
Intelligent Transportation Systems Section
750 Greenfield Parkway, Garner, NC 27529

Knightdale Signal System Cable Routing Plans

Division 5 | Wake County | Knightdale

PLAN DATE: June 2022 | REVIEWED BY: MB Toth
PREPARED BY: AME/JTS | REVIEWED BY: BJ Slocum

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

SIGNATURE DATE

CADD Filename: $FILENAME$

8/25/2022
pw:**SUSD036343.wsatkins.com:ATKNANC01**Documents**Roads and Bridges**Projects**100063269**Task 14_Hydro**Permit Drawings**U-6026_Hyd_prm_wet_UMR-023.dgn
User:STIF4685

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-50

PERMIT DRAWING
SHEET 4 OF 8

SEE PERMIT DRAWING
SHEET 7 OF 8 FOR ENLARGEMENT

MATCHLINE - SHEET UMR-49

MATCHLINE - SHEET UMR-51

SR 2233 (S.Smithfield Road)

DONNIE_HOLMQUIST/ANNETTE_HOLMQUIST

DONNIE_E_HOLMQUIST/ELAINE_D_HOLMQUIST

ANNETTE_I_HOLMQUIST

C&F_PROPERTIES_LLC

SMITHFIELD_PUD_LLC

FREDDY_V_WALL

VILLAGE_GATE_APARTMENTS_LLC

DIRT ROAD

GRAVEL

CONTRACTOR TO UTILIZE EXISTING ROAD ACCESS FOR INSTALLATION OF DIRECTION DRILLING JUNCTION BOX.

CONTRACTOR TO UTILIZE EXISTING ROAD ACCESS FOR INSTALLATION OF ANCHOR GUY.

NO IMPACTS IN THIS PERMIT AREA

DUKE-GN53BF
CATV 11"
20'-2"
DUKE-GN51BF
CATV 12"
DUKE-GN49
DUKE-GN48BF
DUKE-GN47BF
AT&T-9000
AT&T-9001
12" AT&T
BZ 1
BZ 2

NOTES:
1. UNLESS OTHERWISE NOTED:
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EXISTING UTILITY POLE
FO AERIAL FIBER OPTIC CABLE
EXI EXISTING COMMUNICATIONS CABLE
DD DIRECTIONAL DRILLING
REM EXISTING CABLE TO BE REMOVED
F / F FILL IN WETLAND
T / T TEMPORARY FILL IN WETLAND
PERMIT AREAS

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Transportation Mobility and Safety Division / Intelligent Transportation Systems
750 Greenfield Parkway, Garner, NC 27529

Knightdale Signal System Cable Routing Plans

Division 5 | Wake County | Knightdale

PLAN DATE:	June 2022	REVIEWED BY:	MB Toth
PREPARED BY:	AME/JTS	REVIEWED BY:	BJ Slocum

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

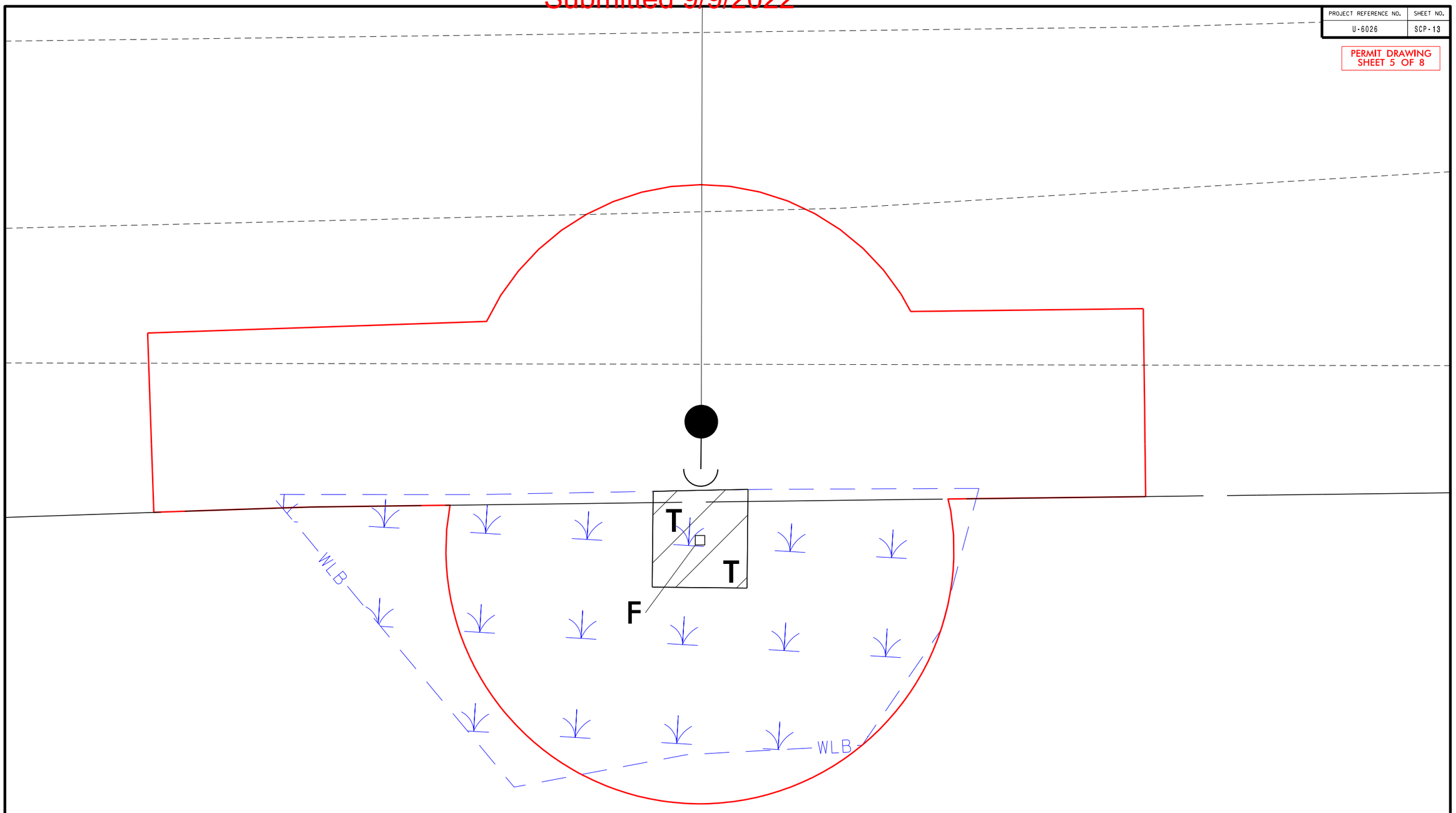
SIGNATURE DATE

CADD Filename: $FILENAME$

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-13

PERMIT DRAWING
SHEET 5 OF 8



- EXISTING UTILITY POLE
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- EXI — EXISTING COMMUNICATIONS CABLE
- F F — FILL IN WETLAND
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- PERMIT AREAS

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Knightdale CLS
Utility Make Ready Plans

Division 5 | Wake County | Knightdale

PLAN DATE:	June 2022	REVIEWED BY:	AM Encarnacion
PREPARED BY:	NAP/JTS	REVIEWED BY:	MB Toth

REVISIONS	INIT.	DATE

SCALE 0 10 1"=10'

CADD Filename: $FILENAME$

8/25/2022
pw:**SUSD036343.wsatkins.com:ATKNANC01**Documents**Roads and Bridges**Projects**10006326**Task 14_Hydro**Permit Drawings**Impact Blow-ups**BLOWUP_U-6026_Hyd_prm_wet_UMR-013.dgn
User:STIF4685

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-23

PERMIT DRAWING
SHEET 6 OF 8

CONTRACTOR TO INSTALL ANCHOR GUY MANUALLY. ANCHOR GUY PLACEMENT TO BE GREATER THAN 10 FEET FROM ANY STREAM CHANNEL.

CONTRACTOR TO INSTALL AERIAL CABLE MANUALLY BETWEEN UTILITY POLES DUKE-81000 AND DUKE-F036BF (SEE SHEET 3).

24" RCP

JS MIT

BZ 1

BZ 2

DUKE-FO32BF

DUKE-81000

FO

EXISTING UTILITY POLE

FO AERIAL FIBER OPTIC CABLE

EXI EXISTING COMMUNICATIONS CABLE

DD DIRECTIONAL DRILLING

REM EXISTING CABLE TO BE REMOVED

PERMIT AREAS

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Prepared for the Offices of:
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750 Greenfield Parkway, Garner, NC 27529

Knightdale CLS
Utility Make Ready Plans

Division 5 Wake County Knightdale

PLAN DATE:	June 2022	REVIEWED BY:	AM Encarnacion
PREPARED BY:	NAP/JTS	REVIEWED BY:	MB Toth

REVISIONS	INIT.	DATE

SCALE 0 10 1"=10'

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CADD Filename: $FILENAME$

8/25/2022
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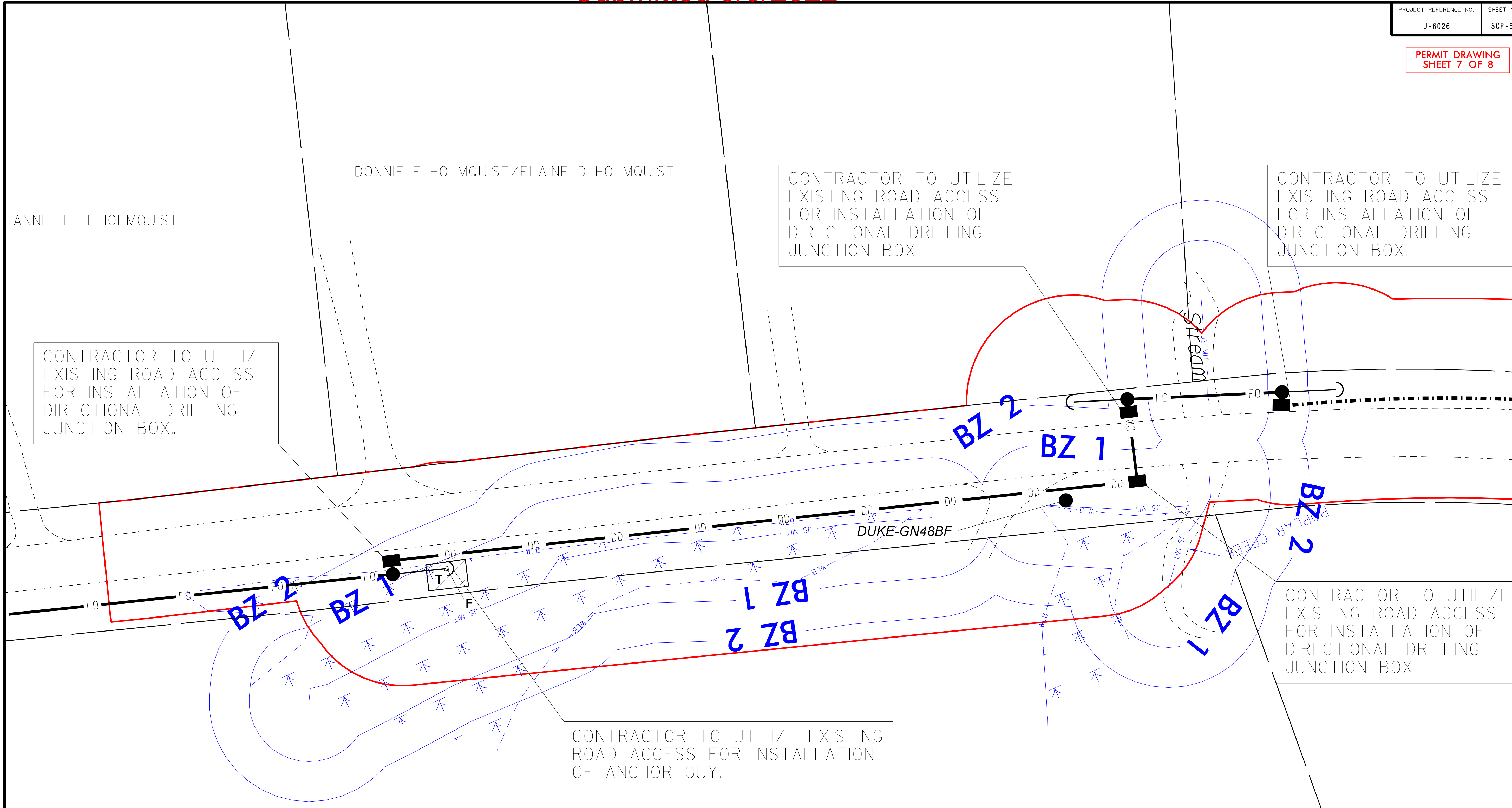
User:STIF4685

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-50

PERMIT DRAWING
SHEET 7 OF 8



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Knightdale CLS
Utility Make Ready Plans

Division 5 Wake County Knightdale

PLAN DATE:	June 2022	REVIEWED BY:	AM Encarnacion
PREPARED BY:	NAP/JTS	REVIEWED BY:	MB Toth

SCALE 0 25
1"=25'

REVISIONS	INIT.	DATE

CADD Filename: $FILENAME$

Submitted 9/9/2022

WETLAND AND SURACE WATER IMPACTS SUMMARY

		WETLAND IMPACTS					SURFACE WATER IMPACTS				
Sheet No.	Impact Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
SCP-13	New Anchor Guy	<0.01	0.01								
SCP-23	New Anchor Guy	0	0								
SCP-50	New Anchor Guy	<0.01	<0.01								
TOTALS*:		**<0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**	**0**	**0**

*Rounded totals are sum of actual impacts

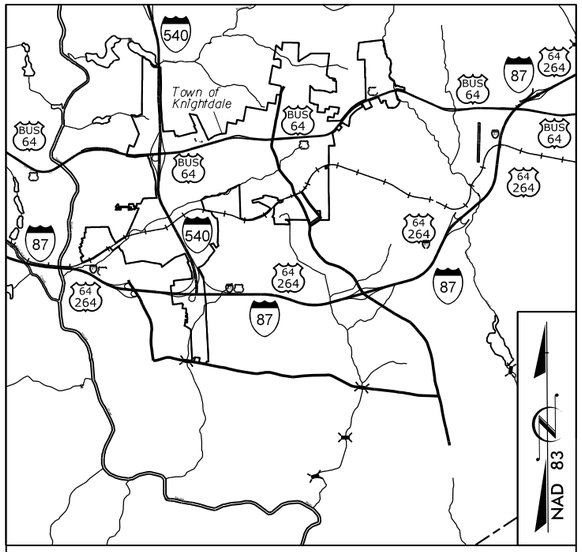
NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/29/22
WAKE
U-6026
47150.1.1
SHEET 8 OF 8

Revised 2018 Feb

TIP PROJECT: U-6026

CONTRACT: C204382



VICINITY MAP

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED IMPROVEMENTS

KNIGHTDALE TOWN-WIDE CLOSED LOOP SYSTEM

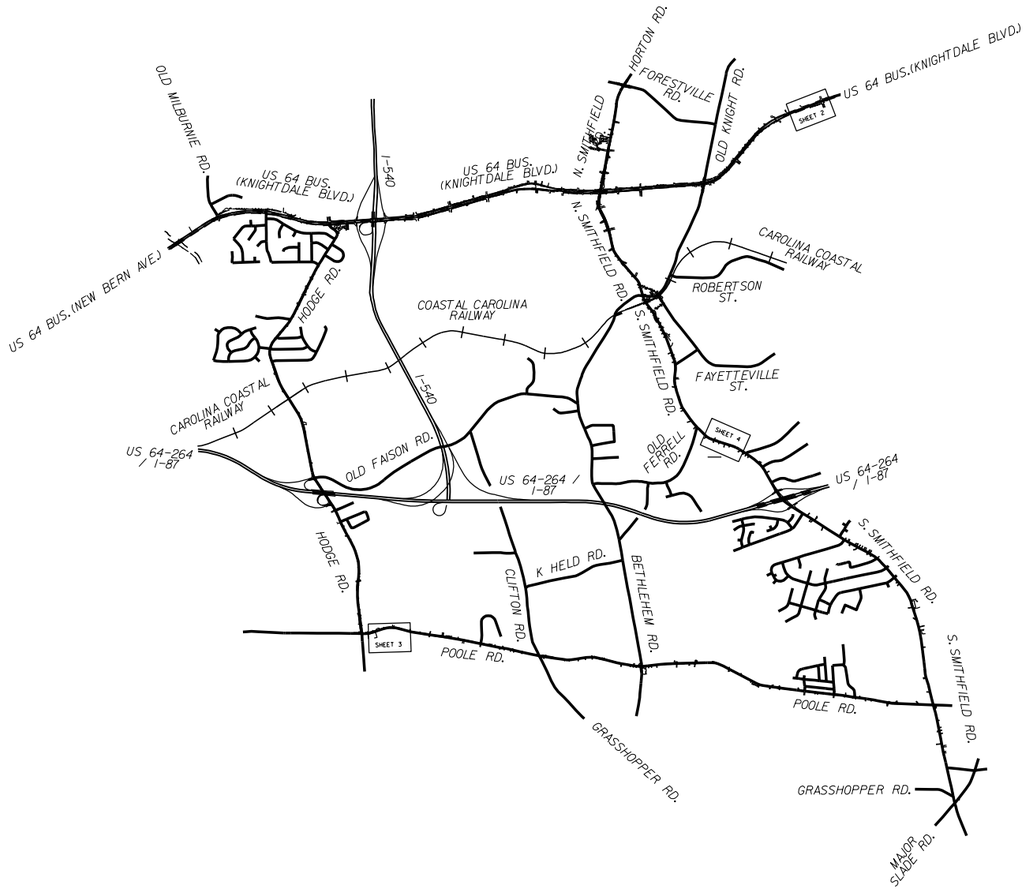
COMPUTERIZED TRAFFIC SIGNAL SYSTEM

FINAL UTILITY MAKE-READY PLANS

BUFFER IMPACTS PERMIT

PROJECT REFERENCE NO.	SHEET NO.
U-6026	1

BUFFER DRAWING SHEET 1 OF 8



Associated with Final Design Dated July 29, 2022

2018 STANDARD SPECIFICATIONS

LETTING DATE: NOVEMBER 15, 2022

PROJECT LENGTH = 16 MILES

750 Greenfield Parkway, Garner, NC 27529

NCDOT CONTACTS:
TRANSPORTATION MOBILITY & SAFETY DIVISION
INTELLIGENT TRANSPORTATION SYSTEMS SECTION
GREGORY A. GREEN - SIGNAL COMMUNICATIONS PROJECT ENGINEER
HEIDI T. BERGGREN - PROJECT DESIGN ENGINEER
DOUG SONDERFAN - DESIGN ENGINEER

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BRADFORD J. SLOCUM, PE - ATKINS PROJECT MANAGER
ANTHONY M. ENCARNACION, PE - ATKINS PROJECT ENGINEER

25-AUG-2022 15:45
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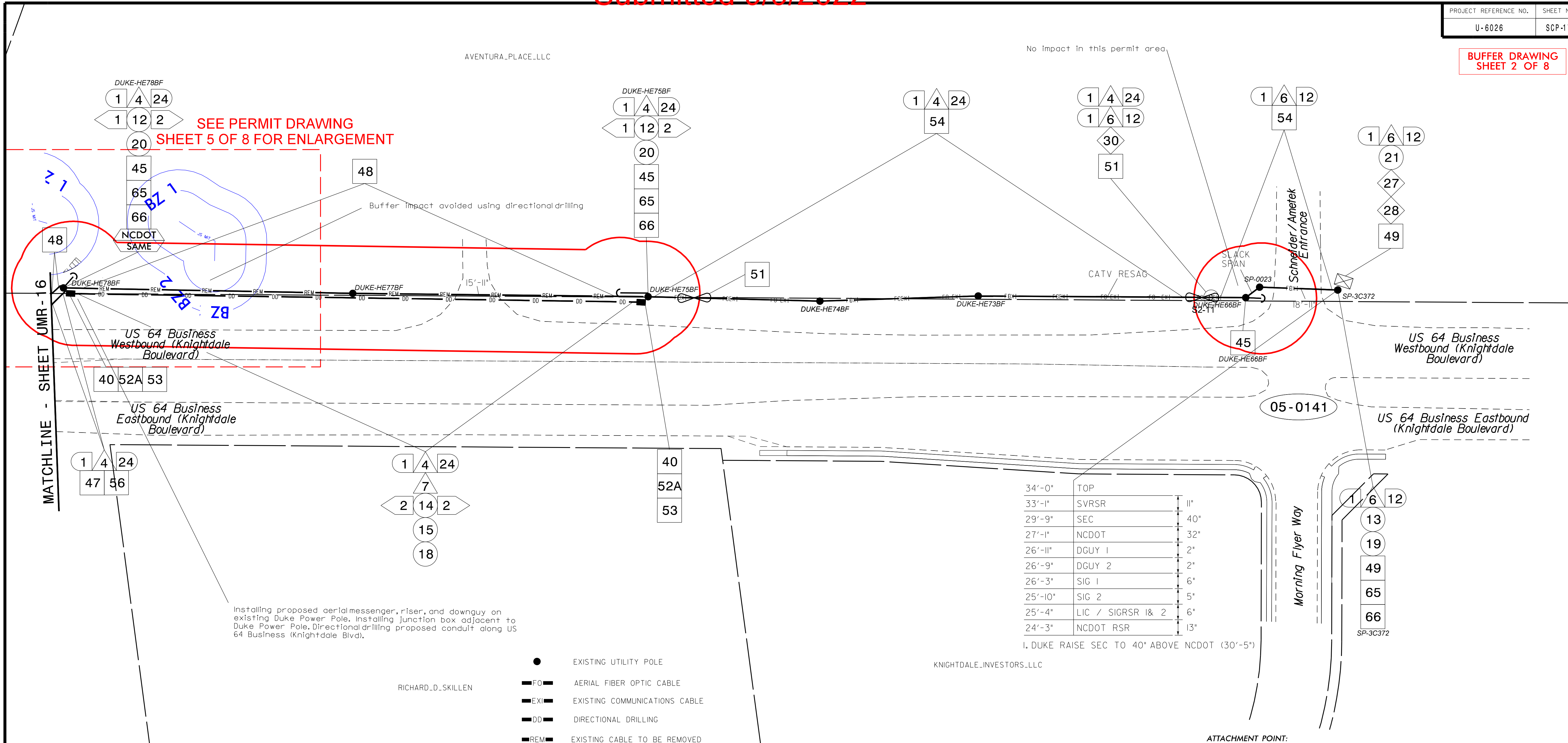
STIF4685 AT LUS491089

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-17

BUFFER DRAWING SHEET 2 OF 8



NOTES:

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10. INSTALL RIGID, GALVANIZED STEEL CONDUIT
11. INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
12. INSTALL RIGID, GALVANIZED STEEL RISER WITH HEAT SHRINK TUBING
13. INSTALL HEAT SHRINK TUBING RETROFIT KIT
14. INSTALL HIGH DENSITY POLYETHYLENE CONDUIT
15. DIRECTIONAL DRILL CONDUIT
16. BORE AND JACK CONDUIT
17. INSTALL CABLE(S) IN EXISTING CONDUIT
18. INSTALL CABLE(S) IN NEW CONDUIT
19. INSTALL CABLE(S) IN EXISTING RISER(S)
20. INSTALL CABLE(S) IN NEW RISER(S)
21. INSTALL CABLE(S) IN EXISTING CABINET ENTRANCE
22. INSTALL NEW CONDUIT INTO CABINET BASE (USE EX CABINET ENTRANCE WHEN AVAILABLE)
23. INSTALL NEW RISER INTO CABINET BASE (USE EX CABINET ENTRANCE WHEN AVAILABLE)
24. INSTALL NEW CONDUIT INTO POLE MOUNTED CABINET
25. INSTALL NEW RISER INTO POLE MOUNTED CABINET
26. INSTALL DIGITAL VIDEO ENCODER
27. INSTALL NEW ETHERNET EDGE SWITCH IN CABINET
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS, AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. INSTALL TYPE 332 HUB CABINET
32. MODIFY EXISTING SPLICE ENCLOSURE OR INTERCONNECT CENTER
33. REMOVE EXISTING SPLICE /HUB / CCTV CABINET
34. INSTALL CABINET FOUNDATION
35. REMOVE EXISTING CABINET FOUNDATION
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL 50' CCTV WOOD POLE
38. INSTALL STANDARD SIZE JUNCTION BOX
39. INSTALL SPECIAL-SIZED JUNCTION BOX
40. INSTALL OVER-SIZED JUNCTION BOX
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48. REMOVE EXISTING COMMUNICATIONS CABLE AND MESSENGER CABLE
49. REMOVE EXISTING COMMUNICATIONS CABLE
50. INSTALL SERVICE CONDUCTORS
51. INSTALL CABLE STORAGE GUIDE(S) [SNOW SHOE(S)] AND STORE 100 FEET OF EACH CABLE
52A. INSTALL DELINEATOR MARKER
52B. INSTALL JUNCTION BOX MARKER
53. STORE 30' OF COMMUNICATIONS CABLE (EACH CABLE)
54. LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
55. LASH CABLE(S) TO EXISTING MESSENGER CABLE
56. LASH CABLE(S) TO NEW MESSENGER CABLE
57. MODIFY EXISTING ELECTRICAL SERVICE
58. INSTALL NEW ELECTRICAL SERVICE FOR CCTV OR RADIO
59. INSTALL NEW POLE MOUNTED CCTV CABINET (336)
60. INSTALL NEW CCTV CABINET (NEMA TYPE 4)
61. REMOVE EXISTING CCTV CAMERA ASSEMBLY
62. NOT USED
63. DRILL/CORE DRILL EXISTING FOUNDATION
64. INTERCEPT AND REROUTE EXISTING CONDUITS
65. BOND MESSENGER TO POLE GROUND
66. BOND RISER TO POLE GROUND
67. BOND TRACER WIRE TO EQUIPMENT GROUND BUS
68. NOT USED
69. HANDLASH AND INSTALL AERIAL CABLE PROTECTOR
70. INSTALL CCTV CABINET DISCONNECT
71. INSTALL MANAGED ETHERNET SWITCH
72. INSTALL CCTV METAL POLE
73. REMOVE EXISTING CCTV METAL POLE
74. REMOVE WIRELESS COMMUNICATIONS EQUIPMENT
75. BACKPULL AND COIL NCDOT ITS CABLE
76. INSTALL HUB SWITCH
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Prepared for the Offices of:

North Carolina Department of Transportation
750 Greenfield Parkway, Garner, NC 27529

SCALE 0 50
1"=50'

Knightdale Signal System
Cable Routing Plans

Division 5	Wake County	Knightdale
PLAN DATE: June 2022	REVIEWED BY: MB Toth	
PREPARED BY: AME/JTS	REVIEWED BY: BJ Slocum	

REVISIONS | INIT. | DATE

SIGNATURE | DATE

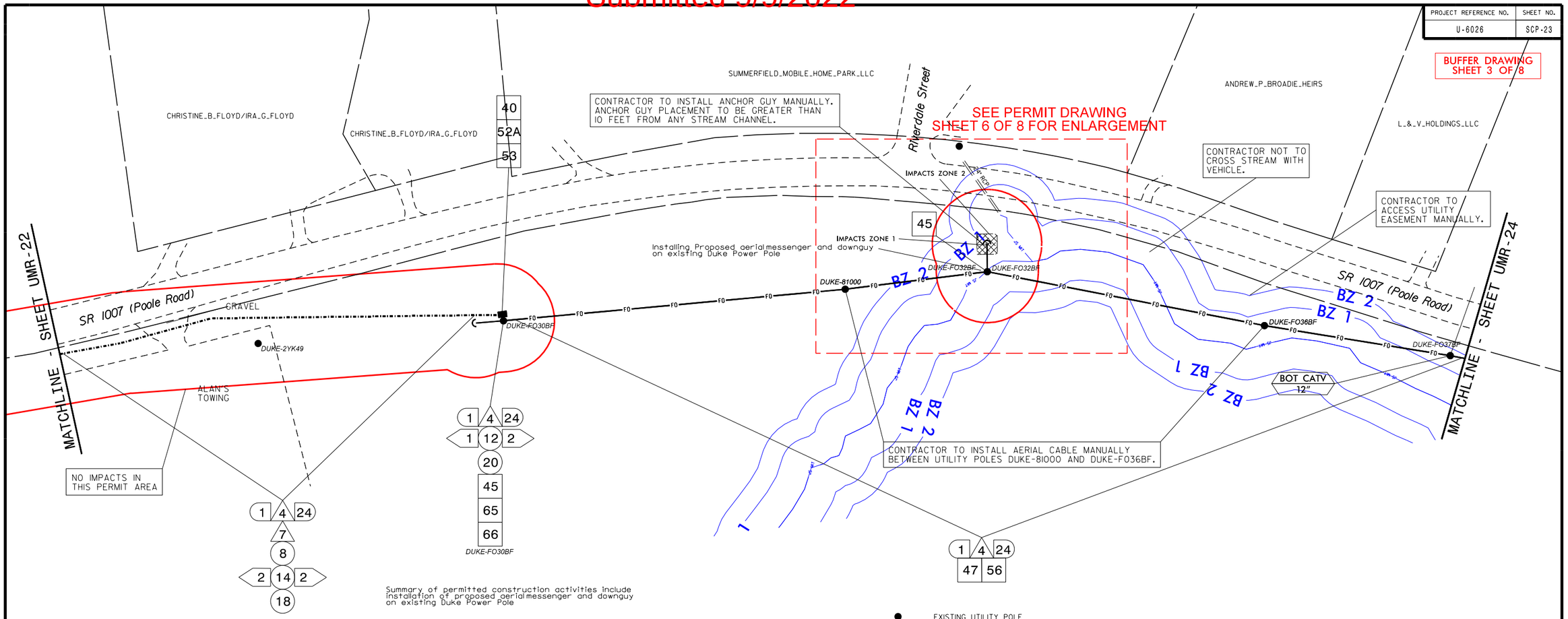
CADD Filename: $FILENAME$

8/25/2022
pw:\\SUSD036343.wsatkins.com:ATKNANC01\Documents\Roads and Bridges\Projects\100063269\Task 14_Hydro\Permit Drawings\U-6026_Hyd_prm_buf_UMR-017.dgn
User:STIF4665

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-23

BUFFER DRAWING
SHEET 3 OF 8



Summary of permitted construction activities include installation of proposed aerial messenger and downguy on existing Duke Power Pole

- EXISTING UTILITY POLE
- FO — AERIAL FIBER OPTIC CABLE
- EXI — EXISTING COMMUNICATIONS CABLE
- DD — DIRECTIONAL DRILLING
- REM — EXISTING CABLE TO BE REMOVED
- IMPACTS ZONE 1
- IMPACTS ZONE 2
- PERMIT AREAS

ATTACHMENT POINT:

- XXX / YYY — DISTANCE ABOVE (IN) REFERENCE POINT
- YYY / XXX — REFERENCE POINT DISTANCE BELOW (IN)

CONSTRUCTION NOTE SYMBOLOGY KEY

NUMBER OF CABLE(S) /LOOPS, DETECTOR AMPLIFIERS, GUYS, ANTENNAS — NUMBER OF FIBERS/TWISTED PAIRS — NUMBER OF RISER(S)/ CONDUIT(S) — DIAMETER OF RISER(S)/ CONDUIT(S) (IN)

NOTES:
1. UNLESS OTHERWISE NOTED:
   - OVERLASH NEW FIBER OPTIC CABLE TO EXISTING COMMUNICATIONS CABLE.
   - ATTACH NEW MESSENGER CABLE 40" BELOW POWER.
   - ATTACH ON FRONT SIDE (FS) OF POLE.
2. SEAL ALL CONDUIT ENDS WITH DUCT AND CONDUIT SEALER AT ALL JUNCTION BOX / CABINET ENTRANCES.

1. INSTALL CATEGORY 6 CABLE
2. INSTALL LOW VOLTAGE POWER CABLE (24VAC)
3. INSTALL COMPOSITE CCTV CABLE
4. INSTALL SMFO CABLE
5. INSTALL COAXIAL ANTENNA CABLE
6. INSTALL FIBER-OPTIC DROP CABLE
7. INSTALL TRACER WIRE
8. TRENCH OR PLOW
9. INSTALL PVC CONDUIT
10. INSTALL RIGID, GALVANIZED STEEL CONDUIT
11. INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for the Offices of:
North Carolina Department of Transportation — Mobility and Safety Division
750 Greenfield Parkway, Garner, NC 27529

Knightdale Signal System Cable Routing Plans

Division 5 | Wake County | Knightdale

PLAN DATE: June 2022 | REVIEWED BY: MB Toth
PREPARED BY: AME/JTS | REVIEWED BY: BJ Slocum

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

SIGNATURE DATE

CADD Filename: $FILENAME$

8/25/2022
pw:**SUSD036343.watkins.com:ATKNANC01**Documents**Roads and Bridges**Projects**100063269**Task 14_Hydro**Permit Drawings**U-6026_Hyd_prm_buf_UMR-023.dgn
User:STIF4685

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-50

BUFFER DRAWING
SHEET 4 OF 8

SEE PERMIT DRAWING
SHEET 7 OF 8 FOR ENLARGEMENT

MATCHLINE - SHEET SCP-54

MATCHLINE - SHEET SCP-56

SR 2233 (S.Smithfield Road)

DONNIE_HOLMQUIST/ANNETTE_HOLMQUIST

DONNIE_E_HOLMQUIST/ELAINE_D_HOLMQUIST

ANNETTE_I_HOLMQUIST

G&F_PROPERTIES_LLC

FREDDY_V_WALL

VILLAGE_GATE_APARTMENTS_LLC

SMITHFIELD_PUD_LLC

CONTRACTOR TO UTILIZE EXISTING ROAD ACCESS FOR INSTALLATION OF DIRECTION DRILLING JUNCTION BOX.

CONTRACTOR TO UTILIZE EXISTING ROAD ACCESS FOR INSTALLATION OF ANCHOR GUY.

NO IMPACTS IN THIS PERMIT AREA

Buffer impact avoided using directional drilling

installing proposed aerial messenger, riser and downguy on existing Duke Power Pole. Installing junction box adjacent to Duke Power Pole. Directional drilling parallel along Smithfield Road for proposed conduit.

DUKE-GN53BF — CATV 11" — 20'-2"

DUKE-GN51BF — CATV 12"

DUKE-GN49

DUKE-GN47BF

DUKE-GN48BF

AT&T-9000

AT&T-9001

IMPACTS ZONE 1

IMPACTS ZONE 2

BZ 1

BZ 2

DIRT ROAD

GRAVEL

EXISTING UTILITY POLE

AERIAL FIBER OPTIC CABLE

EXISTING COMMUNICATIONS CABLE

DIRECTIONAL DRILLING

EXISTING CABLE TO BE REMOVED

OPEN TRENCHING

IMPACTS ZONE 1

IMPACTS ZONE 2

PERMIT AREAS

ATTACHMENT POINT:

XXX / YYY — DISTANCE ABOVE (IN) REFERENCE POINT

YYY / XXX — REFERENCE POINT DISTANCE BELOW (IN)

CONSTRUCTION NOTE SYMBOLOGY KEY

NUMBER OF CABLE(S) /LOOPS, DETECTOR AMPLIFIERS, GUYS, ANTENNAS

NUMBER OF FIBERS/TWISTED PAIRS

NUMBER OF RISER(S)/ CONDUIT(S)

DIAMETER OF RISER(S)/ CONDUIT(S) (IN)

NOTES:
1. UNLESS OTHERWISE NOTED:
   - OVERLASH NEW FIBER OPTIC CABLE TO EXISTING COMMUNICATIONS CABLE.
   - ATTACH NEW MESSENGER CABLE 40" BELOW POWER.
   - ATTACH ON FRONT SIDE (FS) OF POLE.
2. SEAL ALL CONDUIT ENDS WITH DUCT AND CONDUIT SEALER AT ALL JUNCTION BOX / CABINET ENTRANCES.

1 INSTALL CATEGORY 6 CABLE	11 INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD	22 INSTALL NEW CONDUIT INTO CABINET BASE (USE EX CABINET ENTRANCE WHEN AVAILABLE)	32 MODIFY EXISTING SPLICE ENCLOSURE OR INTERCONNECT CENTER	43 REMOVE EXISTING WOOD POLE	54 LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE	66 BOND RISER TO POLE GROUND
2 INSTALL LOW VOLTAGE POWER CABLE (24VAC)	12 INSTALL RIGID, GALVANIZED STEEL RISER WITH HEAT SHRINK TUBING	23 INSTALL NEW RISER INTO CABINET BASE (USE EX CABINET ENTRANCE WHEN AVAILABLE)	33 REMOVE EXISTING SPLICE /HUB / CCTV CABINET	44 INSTALL AERIAL GUY ASSEMBLY	55 LASH CABLE(S) TO EXISTING MESSENGER CABLE	67 BOND TRACER WIRE TO EQUIPMENT GROUND BUS
3 INSTALL COMPOSITE CCTV CABLE	13 INSTALL HEAT SHRINK TUBING RETROFIT KIT	24 INSTALL NEW CONDUIT INTO POLE MOUNTED CABINET	34 INSTALL CABINET FOUNDATION	45 INSTALL STANDARD GUY ASSEMBLY	56 LASH CABLE(S) TO NEW MESSENGER CABLE	68 NOT USED
4 INSTALL SMFO CABLE	14 INSTALL HIGH DENSITY POLYETHYLENE CONDUIT	25 INSTALL NEW RISER INTO POLE MOUNTED CABINET	35 REMOVE EXISTING CABINET FOUNDATION	46 INSTALL SIDEWALK GUY ASSEMBLY	57 MODIFY EXISTING ELECTRICAL SERVICE	69 HANDLASH AND INSTALL AERIAL CABLE PROTECTOR
5 INSTALL COAXIAL ANTENNA CABLE	15 DIRECTIONAL DRILL CONDUIT	26 INSTALL DIGITAL VIDEO ENCODER	36 INSTALL CCTV CAMERA ASSEMBLY	47 INSTALL MESSENGER CABLE	58 INSTALL NEW ELECTRICAL SERVICE FOR CCTV OR RADIO	70 INSTALL CCTV CABINET DISCONNECT
6 INSTALL FIBER-OPTIC DROP CABLE	16 BORE AND JACK CONDUIT	27 INSTALL NEW ETHERNET EDGE SWITCH IN CABINET	37 INSTALL 50' CCTV WOOD POLE	48 REMOVE EXISTING COMMUNICATIONS CABLE AND MESSENGER CABLE	59 INSTALL NEW POLE MOUNTED CCTV CABINET (336)	71 INSTALL MANAGED ETHERNET SWITCH
7 INSTALL TRACER WIRE	17 INSTALL CABLE(S) IN EXISTING CONDUIT	28 INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS, AND FUSION SPLICE CABLE IN CABINET	38 INSTALL STANDARD SIZE JUNCTION BOX	49 REMOVE EXISTING COMMUNICATIONS CABLE	60 INSTALL NEW CCTV CABINET (NEMA TYPE 4)	72 INSTALL CCTV METAL POLE
8 TRENCH OR PLOW	18 INSTALL CABLE(S) IN NEW CONDUIT	29 INSTALL UNDERGROUND SPLICE ENCLOSURE	39 INSTALL SPECIAL-SIZED JUNCTION BOX	50 INSTALL SERVICE CONDUCTORS	61 REMOVE EXISTING CCTV CAMERA ASSEMBLY	73 REMOVE EXISTING CCTV METAL POLE
9 INSTALL PVC CONDUIT	19 INSTALL CABLE(S) IN EXISTING RISER(S)	30 INSTALL AERIAL SPLICE ENCLOSURE	40 INSTALL OVER-SIZED JUNCTION BOX	51 INSTALL CABLE STORAGE GUIDE(S) (SNOW SHOE(S)) AND STORE 100 FEET OF EACH CABLE	62 NOT USED	74 REMOVE WIRELESS COMMUNICATIONS EQUIPMENT
10 INSTALL RIGID, GALVANIZED STEEL CONDUIT	20 INSTALL CABLE(S) IN NEW RISER(S)	31 INSTALL TYPE 332 HUB CABINET	41 REMOVE EXISTING JUNCTION BOX	52A INSTALL DELINEATOR MARKER	63 DRILL/CORE DRILL EXISTING FOUNDATION	75 BACKPULL AND COIL NCDOT ITS CABLE
	21 INSTALL CABLE(S) IN EXISTING CABINET ENTRANCE		42 INSTALL WOOD POLE	52B INSTALL JUNCTION BOX MARKER	64 INTERCEPT AND REROUTE EXISTING CONDUITS	76 INSTALL HUB SWITCH
				53 STORE 30' OF COMMUNICATIONS CABLE (EACH CABLE)	65 BOND MESSENGER TO POLE GROUND	77 INSTALL CELLULAR MODEM

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Prepared for the Offices of:
750 Greenfield Parkway, Garner, NC 27529

Knightdale Signal System Cable Routing Plans

Division 5 Wake County Knightdale

PLAN DATE: June 2022 REVIEWED BY: MB Toth

PREPARED BY: AME/JTS REVIEWED BY: BJ Slocum

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

SIGNATURE DATE

CADD Filename: $FILENAME$

8/25/2022
pw:**SUS\D036343.wsatkins.com:ATKNANC01**Documents**Roads and Bridges**Projects**100063269**Task 14_Hydro**Permit Drawings**U-6026_Hyd_prm_buf_UMR-050.dgn
User:STITF4685

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-17

BUFFER DRAWING
SHEET 5 OF 8

BZ 1

JS MIT

BZ 1

JS MIT

BZ 2

REM DD REM DD REM DD REM DD REM DD

EXISTING UTILITY POLE
FO AERIAL FIBER OPTIC CABLE
EXI EXISTING COMMUNICATIONS CABLE
DD DIRECTIONAL DRILLING
REM EXISTING CABLE TO BE REMOVED
IMPACTS ZONE 1
IMPACTS ZONE 2
PERMIT AREAS

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Intelligent Transportation Systems Section
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
750 Greenfield Parkway, Garner, NC 27529

Knightdale CLS
Utility Make Ready Plans

Division 5 Wake County Knightdale

PLAN DATE:	June 2022	REVIEWED BY:	AM Encarnacion
PREPARED BY:	NAP/JTS	REVIEWED BY:	MB Toth

REVISIONS	INIT.	DATE

SCALE 0 10 1"=10'

CADD Filename: $FILENAME$

8/25/2022
pw:**SUSD036343.wsatkins.com:ATKNANC01**Documents**Roads and Bridges**Projects**100632693**Task 14_Hydro**Permit Drawings**Impact Blow-ups**BLOWUP_U-6026_Hyd_prm_buf_UMR-017.dgn
User:STIF4685

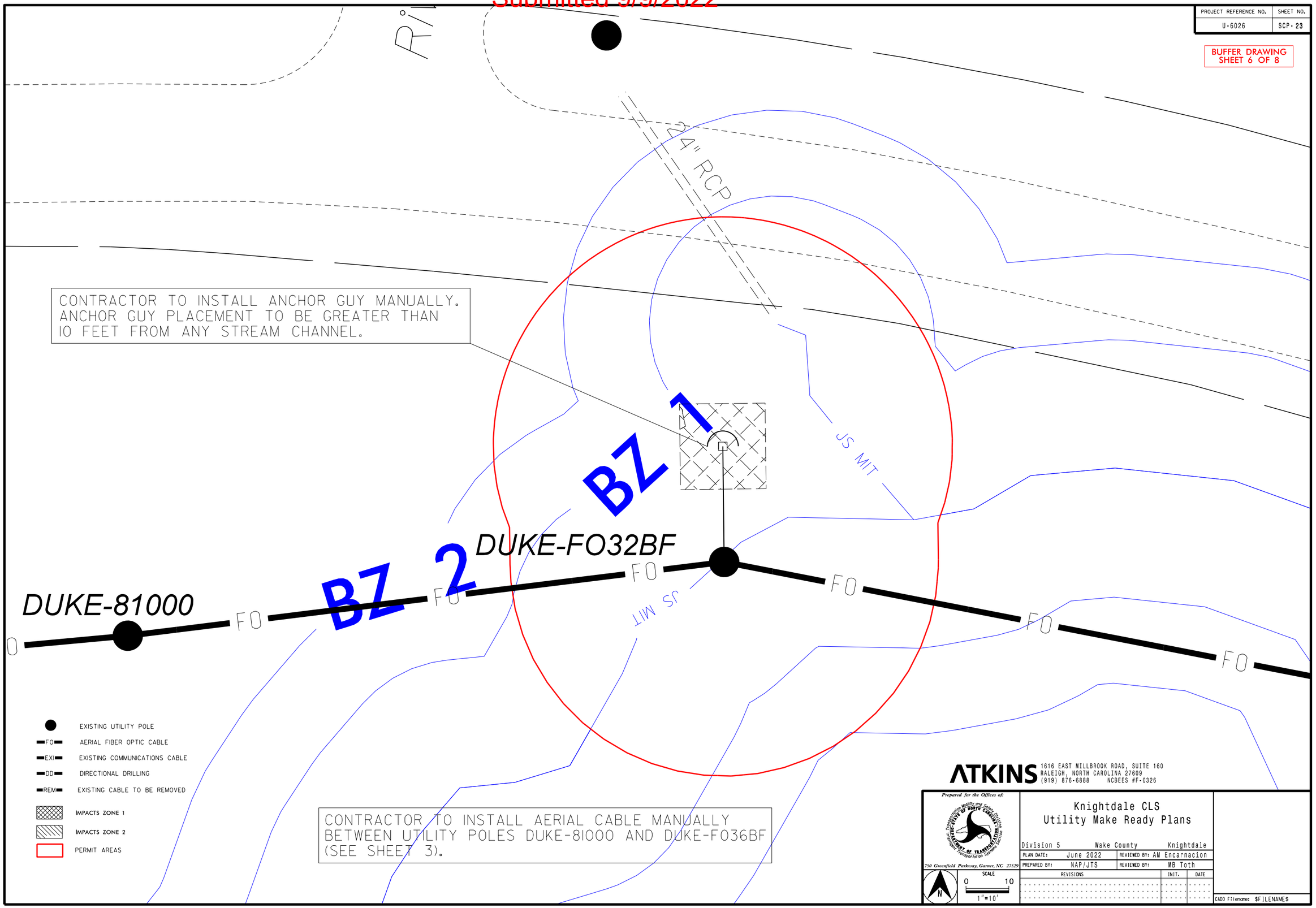
Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-23

BUFFER DRAWING
SHEET 6 OF 8

CONTRACTOR TO INSTALL ANCHOR GUY MANUALLY. ANCHOR GUY PLACEMENT TO BE GREATER THAN 10 FEET FROM ANY STREAM CHANNEL.

CONTRACTOR TO INSTALL AERIAL CABLE MANUALLY BETWEEN UTILITY POLES DUKE-81000 AND DUKE-FO36BF (SEE SHEET 3).



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Knightdale CLS
Utility Make Ready Plans

Division 5 Wake County Knightdale

PLAN DATE:	June 2022	REVIEWED BY:	AM Encarnacion
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8/25/2022
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User:STIF4685

Submitted 9/9/2022

PROJECT REFERENCE NO.	SHEET NO.
U-6026	SCP-50

BUFFER DRAWING
SHEET 7 OF 8

DONNIE_E_HOLMQUIST/ELAINE_D_HOLMQUIST

TE_I_HOLMQUIST

CONTRACTOR TO UTILIZE EXISTING ROAD ACCESS FOR INSTALLATION OF DIRECTIONAL DRILLING JUNCTION BOX.

CONTRACTOR TO UTILIZE EXISTING ROAD ACCESS FOR INSTALLATION OF DIRECTIONAL DRILLING JUNCTION BOX.

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CONTRACTOR TO UTILIZE EXISTING ROAD ACCESS FOR INSTALLATION OF ANCHOR GUY.

Stream

PAPLAR CREEK

DUKE-GN48BF

DUKE-GI

IMPACTS ZONE 1

IMPACTS ZONE 2

BZ 1

BZ 2

FO

DD

WLB

JS MIT

EXISTING UTILITY POLE

AERIAL FIBER OPTIC CABLE

EXISTING COMMUNICATIONS CABLE

DIRECTIONAL DRILLING

EXISTING CABLE TO BE REMOVED

OPEN TRENCHING

IMPACTS ZONE 1

IMPACTS ZONE 2

PERMIT AREAS

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SCALE
0 25
1"=25'

Knightdale CLS
Utility Make Ready Plans

Division 5 | Wake County | Knightdale

PLAN DATE:	June 2022	REVIEWED BY:	AM Encarnacion
PREPARED BY:	NAP/JTS	REVIEWED BY:	MB Toth

REVISIONS	INIT.	DATE

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Submitted 9/9/2022

RIPARIAN BUFFER IMPACTS SUMMARY

Sheet No.	Structure Size / Type	IMPACTS									BUFFER REPLACEMENT	
		TYPE			ALLOWABLE			ALLOWABLE WITH MITIGATION				
		Directional Drill/Bore	Aerial	Open Trench	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
SCP-17	Guy Anchor		X		0	79	79	0	0	0		
SCP-23	Guy Anchor		X		396	4	396	0	0	0		
SCP-50	Fiber Optic Cable	X		X	50	230	230	0	0	0		
	Guy Anchor		X		294	310	600	0	0	0		
TOTALS*:					**740**	**623**	**1363**	**0**	**0**	**0**	**0**	**0**

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/29/22
WAKE
U-6026
47150.1.1
SHEET 8 OF 8

Revised 2018 Feb

Jurisdictional Determination Request

US Army Corps of Engineers
Wilmington District

This form is intended for use by anyone requesting a jurisdictional determination (JD) from the U.S. Army Corps of Engineers, Wilmington District (Corps). Please include all supporting information, as described within each category, with your request. You may submit your request via mail, electronic mail, or facsimile. Requests should be sent to the appropriate project manager of the county in which the property is located. A current list of project managers by assigned counties can be found on-line at: http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/Contact/CountyLocator.aspx, by calling 910-251-4633, or by contacting any of the field offices listed below. Once your request is received you will be contacted by a Corps project manager.

ASHEVILLE & CHARLOTTE REGULATORY FIELD OFFICES
US Army Corps of Engineers
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006
General Number: (828) 271-7980
Fax Number: (828) 281-8120

RALEIGH REGULATORY FIELD OFFICE
US Army Corps of Engineers
3331 Heritage Trade Drive, Suite 105
Wake Forest, North Carolina 27587
General Number: (919) 554-4884
Fax Number: (919) 562-0421

WASHINGTON REGULATORY FIELD OFFICE
US Army Corps of Engineers
2407 West Fifth Street
Washington, North Carolina 27889
General Number: (910) 251-4610
Fax Number: (252) 975-1399

WILMINGTON REGULATORY FIELD OFFICE
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, North Carolina 28403
General Number: 910-251-4633
Fax Number: (910) 251-4025

INSTRUCTIONS:

All requestors must complete Parts A, B, C, D, E, F and G.

NOTE TO CONSULTANTS AND AGENCIES: If you are requesting a JD on behalf of a paying client or your agency, please note the specific submittal requirements in **Part H**.

NOTE ON PART D – PROPERTY OWNER AUTHORIZATION: Please be aware that all JD requests must include the current property owner authorization for the Corps to proceed with the determination, which may include inspection of the property when necessary. This form must be signed by the current property owner(s) or the owner(s) authorized agent to be considered a complete request.

NOTE ON PART D - NCDOT REQUESTS: Property owner authorization/notification for JD requests associated with North Carolina Department of Transportation (NCDOT) projects will be conducted according to the current NCDOT/USACE protocols.

NOTE TO USDA PROGRAM PARTICIPANTS: A Corps approved or preliminary JD may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should also request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

A. PARCEL INFORMATION

Street Address: US-64 Business Rd, Hodge Rd, Poole Rd, Smithfield Rd; NCDOT STIP U-6026

City, State: Knightdale, NC

County: Wake

Parcel Index Number(s) (PIN): N/A (linear transportation project)

B. REQUESTOR INFORMATION

Name: Jason Dilday

Mailing Address: NCDOT Century Center Building A

1000 Birch Ridge Drive, Raleigh, NC 27610

Telephone Number: 919-707-6111

Electronic Mail Address: jldilday@ncdot.gov

Select one:

- [ ] I am the current property owner.
- [ ] I am an Authorized Agent or Environmental Consultant[1]
- [x] Interested Buyer or Under Contract to Purchase
- [ ] Other, please explain. _____

C. PROPERTY OWNER INFORMATION[2]

Name: NCDOT-EAU, Attn: Jason Dilday

Mailing Address: NCDOT Century Center Building A

1000 Birch Ridge Drive, Raleigh, NC 27610

Telephone Number: 919-707-6111

Electronic Mail Address: jldilday@ncdot.gov

[1] Must provide completed Agent Authorization Form/Letter.

[2] Documentation of ownership also needs to be provided with request (copy of Deed, County GIS/Parcel/Tax Record).

D. PROPERTY ACCESS CERTIFICATION[3,4]

By signing below, I authorize representatives of the Wilmington District, U.S. Army Corps of Engineers (Corps) to enter upon the property herein described for the purpose of conducting on-site investigations, if necessary, and issuing a jurisdictional determination pursuant to Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. I, the undersigned, am either a duly authorized owner of record of the property identified herein, or acting as the duly authorized agent of the owner of record of the property.

_____

Print Name

Capacity: ☐ Owner ☐ Authorized Agent[5]

_____

Date

_____

Signature

E. REASON FOR JD REQUEST: (Check as many as applicable)

☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.

☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.

☒ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.

☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.

☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 10 list and/or is subject to the ebb and flow of the tide.

☐ A Corps JD is required in order obtain my local/state authorization.

☐ I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.

☐ I believe that the site may be comprised entirely of dry land.

☐ Other:_____

[3] For NCDOT requests following the current NCDOT/USACE protocols, skip to Part E.

[4] If there are multiple parcels owned by different parties, please provide the following for each additional parcel on a continuation sheet.

[5] Must provide agent authorization form/letter signed by owner(s).

F. JURISDICTIONAL DETERMINATION (JD) TYPE (Select One)

[X] I am requesting that the Corps provide a preliminary JD for the property identified herein.

A Preliminary Jurisdictional Determination (PJD) provides an indication that there may be "waters of the United States" or "navigable waters of the United States"on a property. PJDs are sufficient as the basis for permit decisions. For the purposes of permitting, all waters and wetlands on the property will be treated as if they are jurisdictional "waters of the United States". PJDs cannot be appealed (33 C.F.R. 331.2); however, a PJD is "preliminary" in the sense that an approved JD can be requested at any time. PJDs do not expire.

[ ] I am requesting that the Corps provide an approved JD for the property identified herein.

An Approved Jurisdictional Determination (AJD) is a determination that jurisdictional "waters of the United States" or "navigable waters of the United States" are either present or absent on a site. An approved JD identifies the limits of waters on a site determined to be jurisdictional under the Clean Water Act and/or Rivers and Harbors Act. Approved JDs are sufficient as the basis for permit decisions. AJDs are appealable (33 C.F.R. 331.2). The results of the AJD will be posted on the Corps website. A landowner, permit applicant, or other "affected party" (33 C.F.R. 331.2) who receives an AJD may rely upon the AJD for five years (subject to certain limited exceptions explained in Regulatory Guidance Letter 05-02).

[ ] I am unclear as to which JD I would like to request and require additional information to inform my decision.

G. ALL REQUESTS

[X] Map of Property or Project Area. This Map must clearly depict the boundaries of the review area.

[X] Size of Property or Review Area 51.66 acres.

[ ] The property boundary (or review area boundary) is clearly physically marked on the site.

H. REQUESTS FROM CONSULTANTS

[X] Project Coordinates (Decimal Degrees): Latitude: 35.798727

Longitude: -78.476707

[X] A legible delineation map depicting the aquatic resources and the property/review area. Delineation maps must be no larger than 11x17 and should contain the following: (Corps signature of submitted survey plats will occur after the submitted delineation map has been reviewed and approved).[6]

- North Arrow
- Graphical Scale
- Boundary of Review Area
- Date
- Location of data points for each Wetland Determination Data Form or tributary assessment reach.

For Approved Jurisdictional Determinations:

- Jurisdictional wetland features should be labeled as Wetland Waters of the US, 404 wetlands, etc. Please include the acreage of these features.
- Jurisdictional non-wetland features (i.e. tidal/navigable waters, tributaries, impoundments) should be labeled as Non-Wetland Waters of the US, stream, tributary, open water, relatively permanent water, pond, etc. Please include the acreage or linear length of each of these features as appropriate.
- Isolated waters, waters that lack a significant nexus to navigable waters, or non-jurisdictional upland features should be identified as Non-Jurisdictional. Please include a justification in the label regarding why the feature is non-jurisdictional (i.e. "Isolated", "No Significant Nexus", or "Upland Feature"). Please include the acreage or linear length of these features as appropriate.

For Preliminary Jurisdictional Determinations:

- Wetland and non-wetland features should not be identified as Jurisdictional, 404, Waters of the United States, or anything that implies jurisdiction. These features can be identified as Potential Waters of the United States, Potential Non-wetland Waters of the United States, wetland, stream, open water, etc. Please include the acreage and linear length of these features as appropriate.

[X] Completed Wetland Determination Data Forms for appropriate region
(at least one wetland and one upland form needs to be completed for each wetland type)

[6] Please refer to the guidance document titled "Survey Standards for Jurisdictional Determinations" to ensure that the supplied map meets the necessary mapping standards. http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Jurisdiction/

- [X] Completed appropriate Jurisdictional Determination form
  - **PJDs,** please complete a Preliminary Jurisdictional Determination Form[7] and include the Aquatic Resource Table
  - **AJDs**, please complete an Approved Jurisdictional Determination Form[8]
- [X] Vicinity Map
- [X] Aerial Photograph
- [X] USGS Topographic Map
- [X] Soil Survey Map
- [ ] Other Maps, as appropriate (e.g. National Wetland Inventory Map, Proposed Site Plan, previous delineation maps, LIDAR maps, FEMA floodplain maps)
- [ ] Landscape Photos (if taken)
- [X] NCSAM and/or NCWAM Assessment Forms and Rating Sheets
- [X] NC Division of Water Resources Stream Identification Forms
- [ ] Other Assessment Forms

[7] www.saw.usace.army.mil/Portals/59/docs/regulatory/regdocs/JD/RGL_08-02_App_A_Prelim_JD_Form_fillable.pdf
[8] Please see http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Jurisdiction/

Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

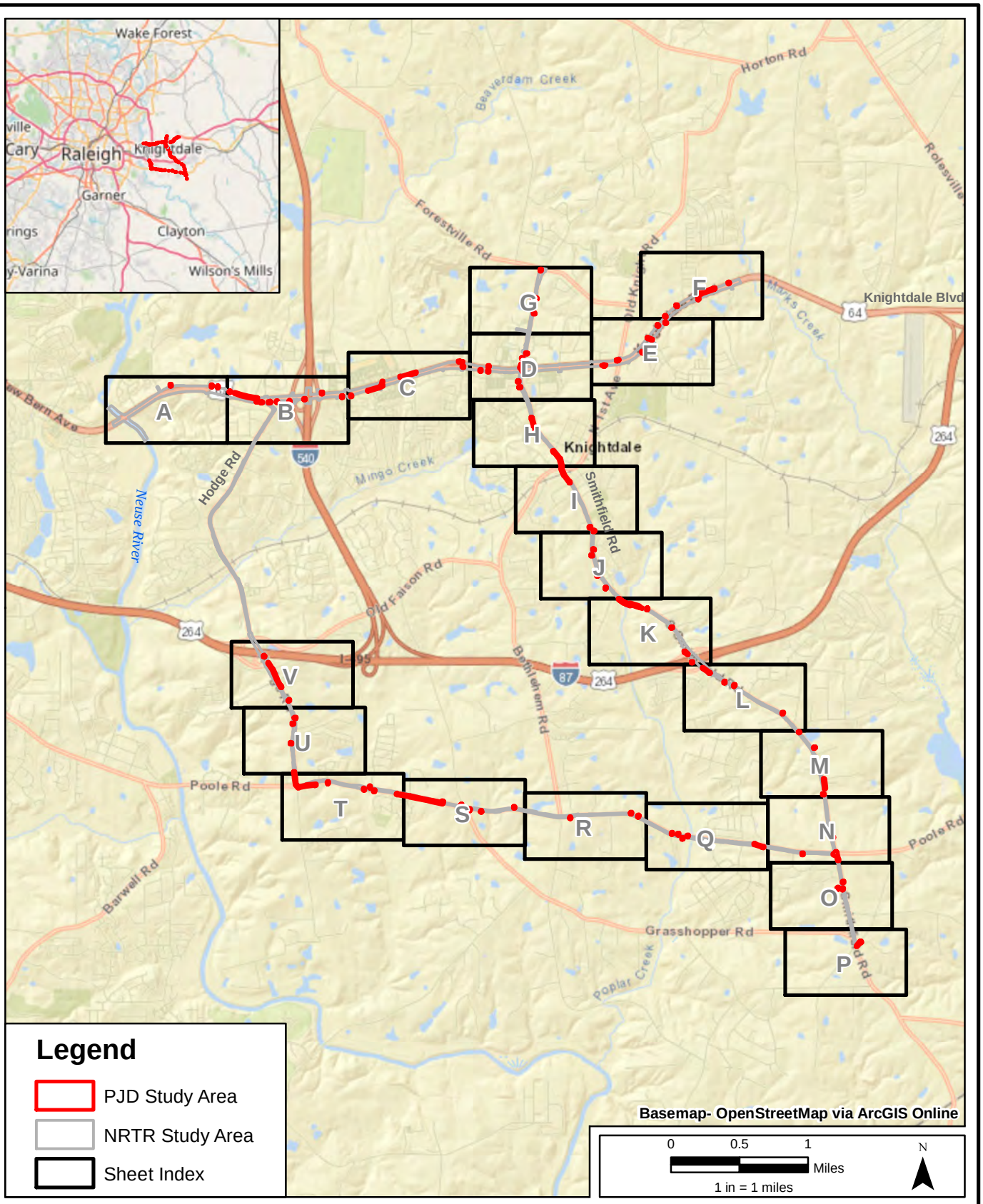
Appendix 1: Fixures

Figure 1—Vicinity Map

Figure2—Preliminary Jurisdictional Determination Waters Map (Aerial)

Figure 3—Topographic Map

Figure 4—Soils Map



Prepared By:	Prepared For:	Vicinity Map	Dwn By: RLG	FIGURE
ATKINS	NC DOT	**Knightdale Town-wide Closed Loop System** **Project U-6026** WAKE COUNTY, NORTH CAROLINA	Ckd By: BEC Date: 7/27/2021 Project No.: 100063269	1

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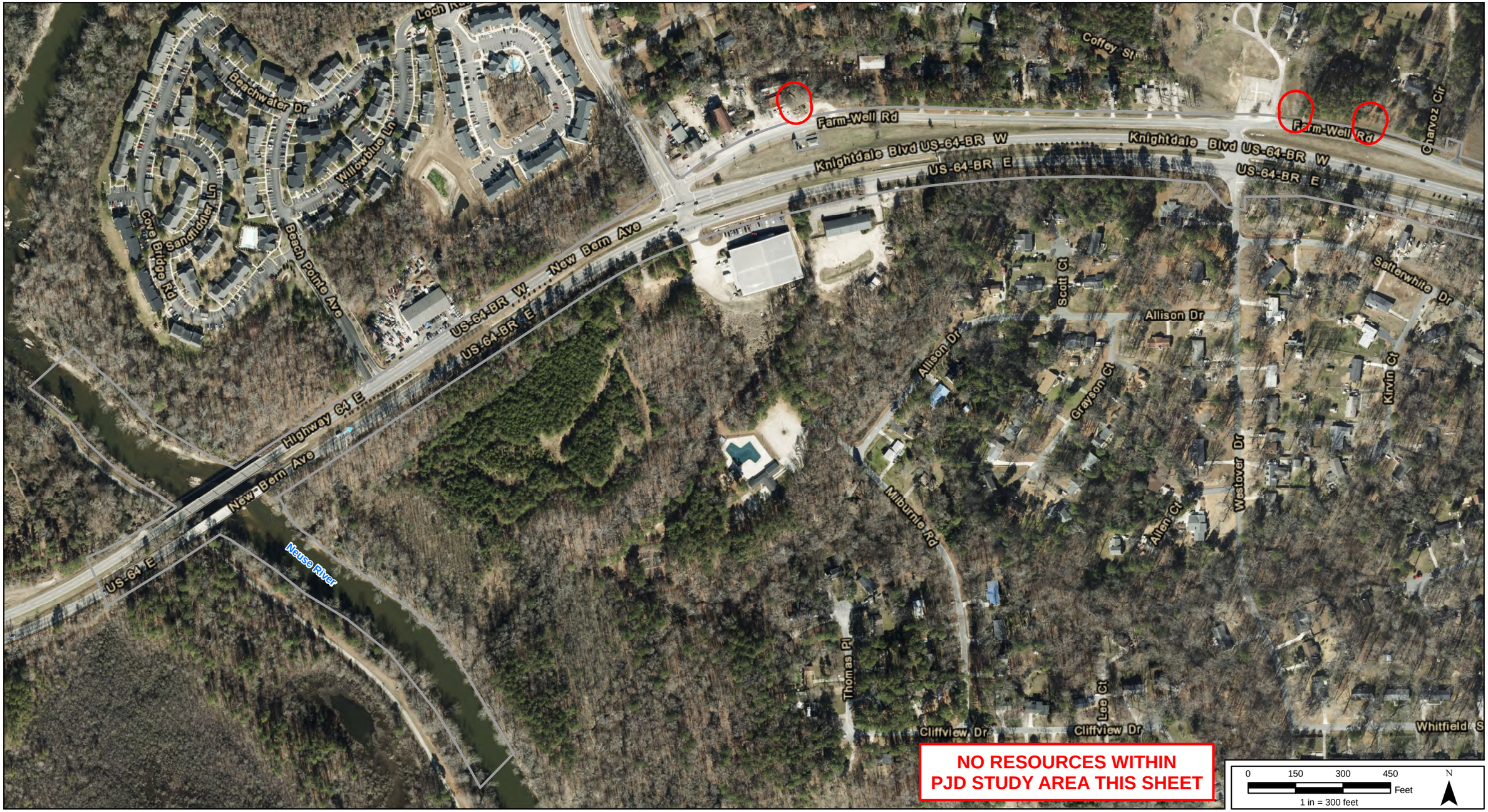

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2A

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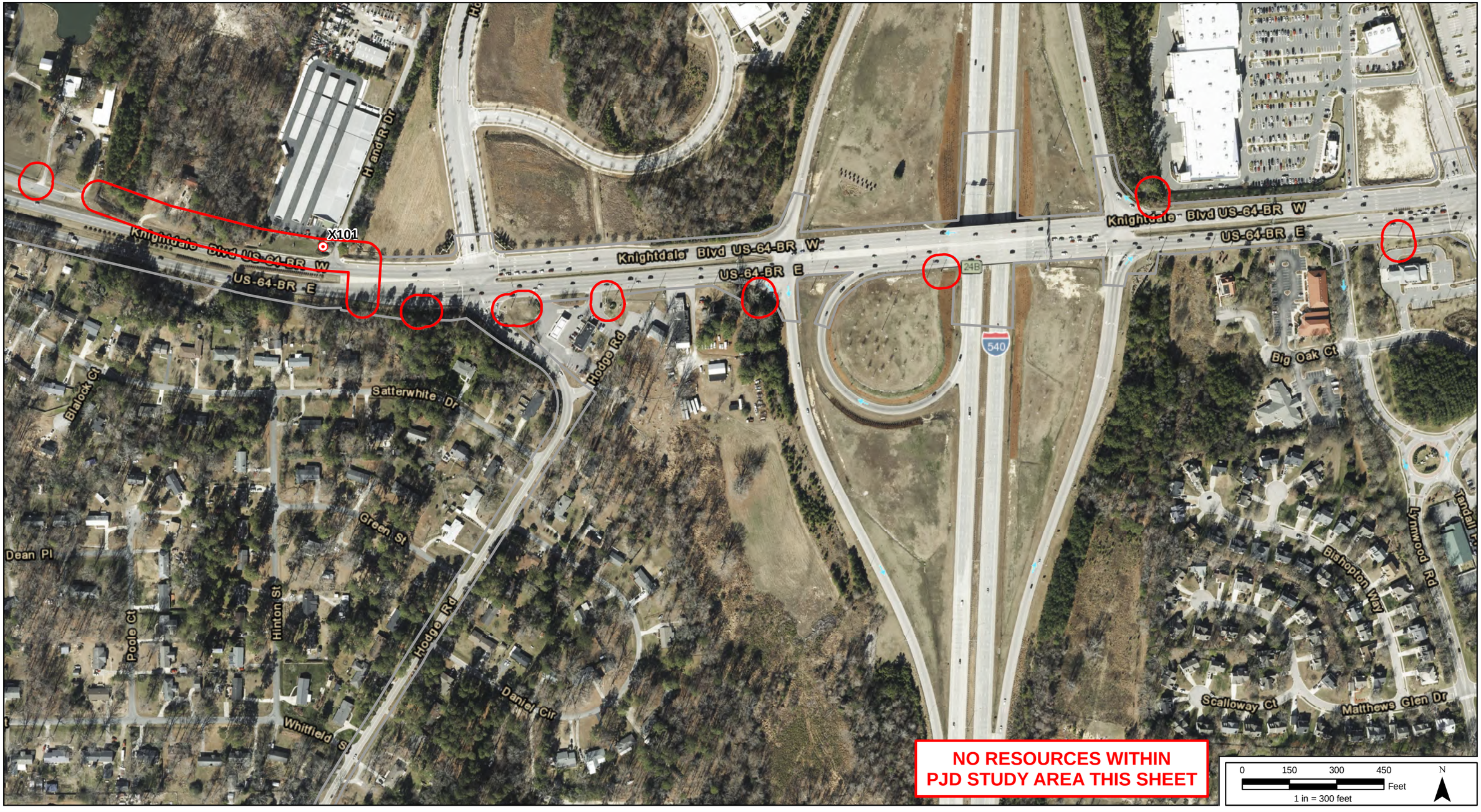

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2B

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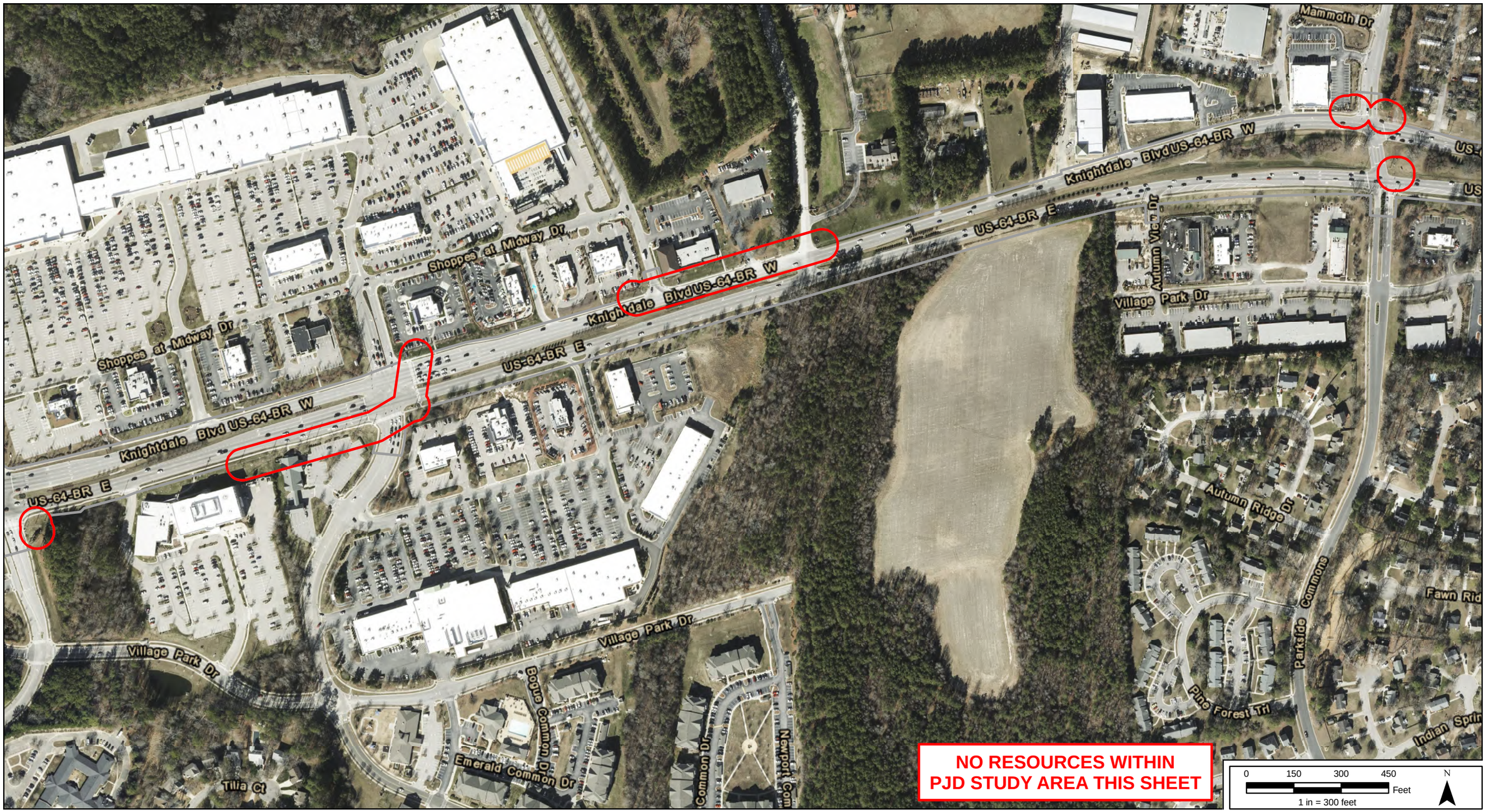

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2C

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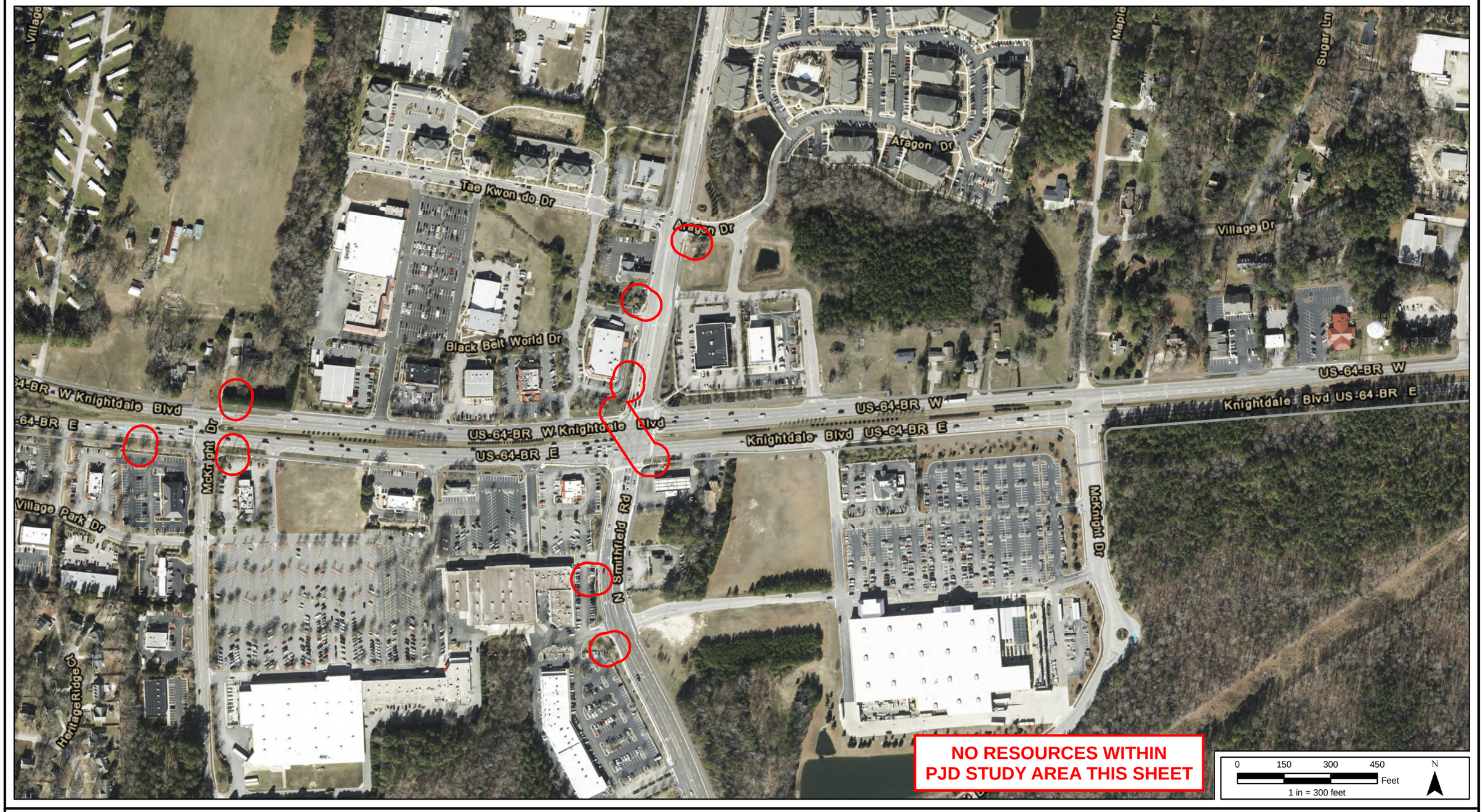

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2D

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2E

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2F

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2G

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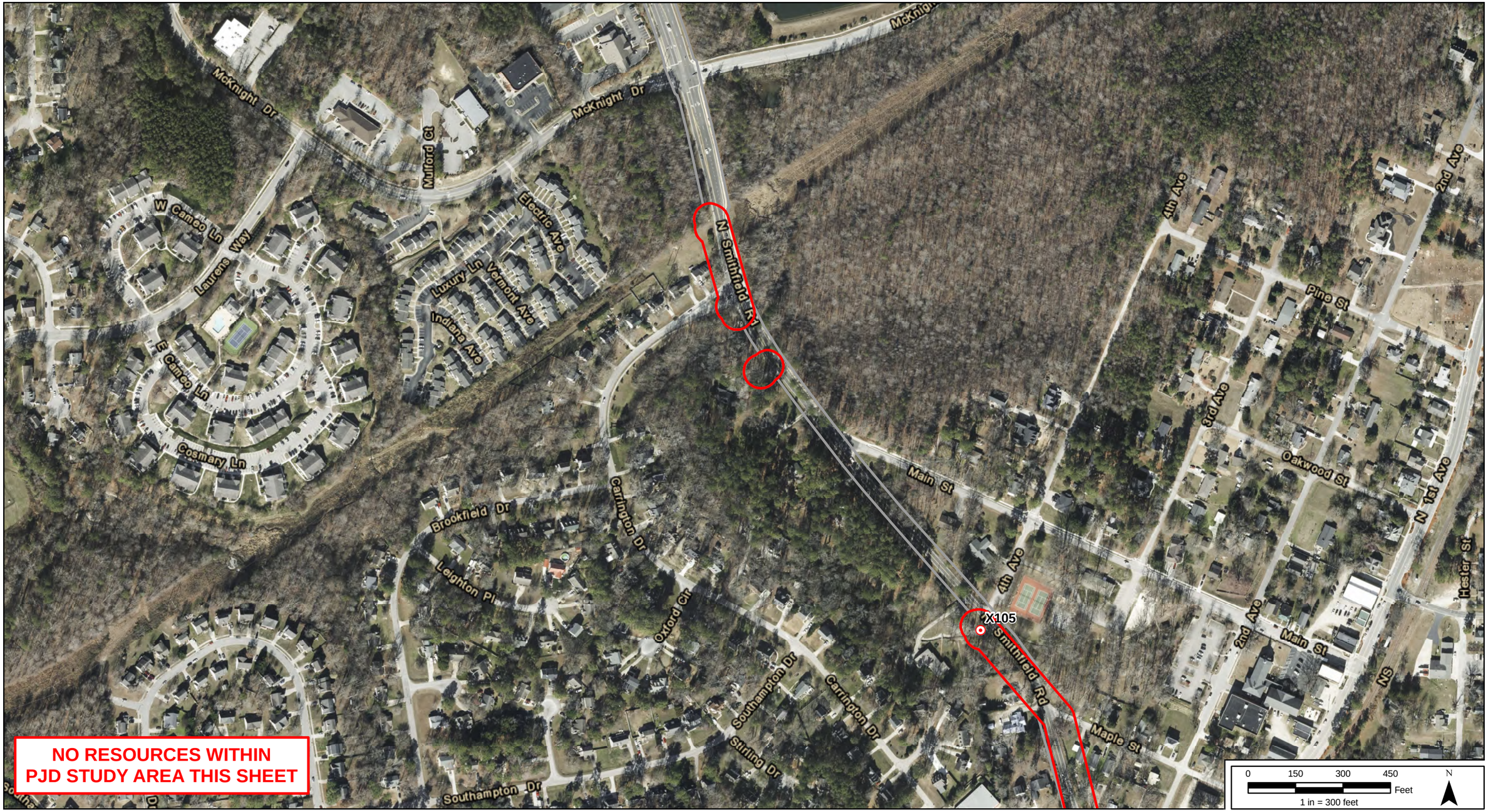

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2H

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2I

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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- Data Form Locations
- Traffic Flow Direction
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2J

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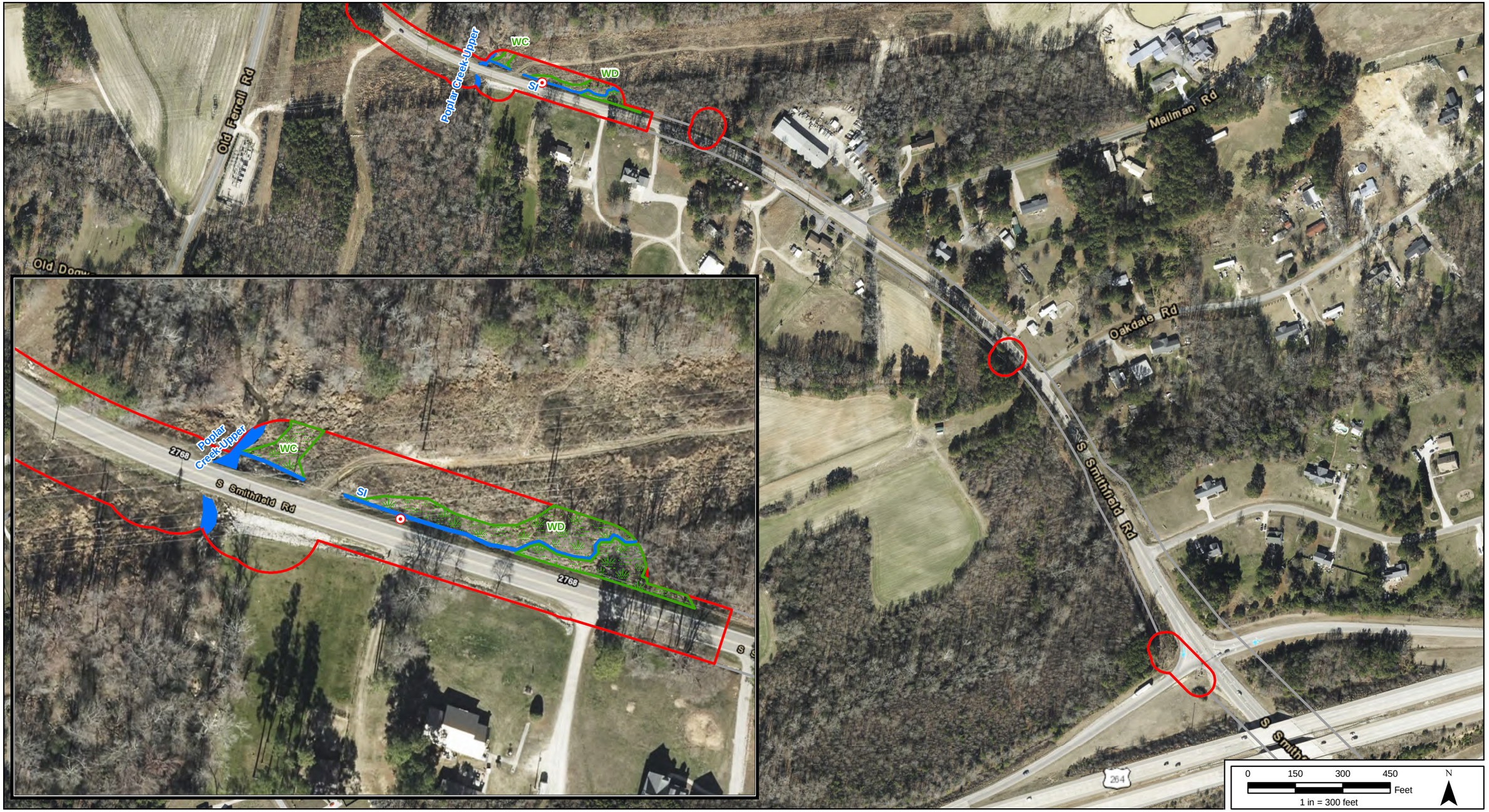

0 150 300 450 Feet

1 in = 300 feet

N

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2K

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Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2L

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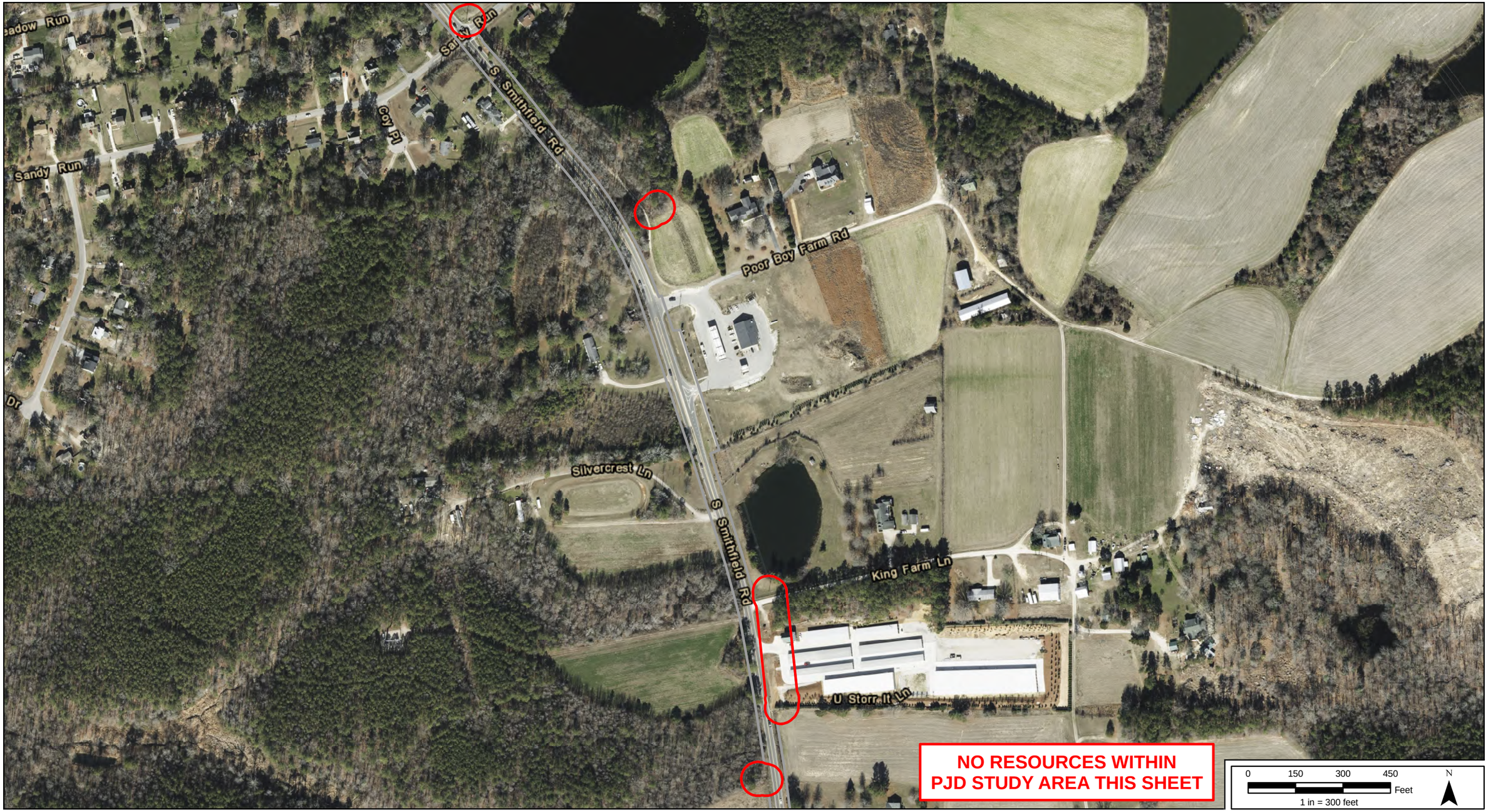

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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- Data Form Locations
- Traffic Flow Direction
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2M

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2N

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2O

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2P

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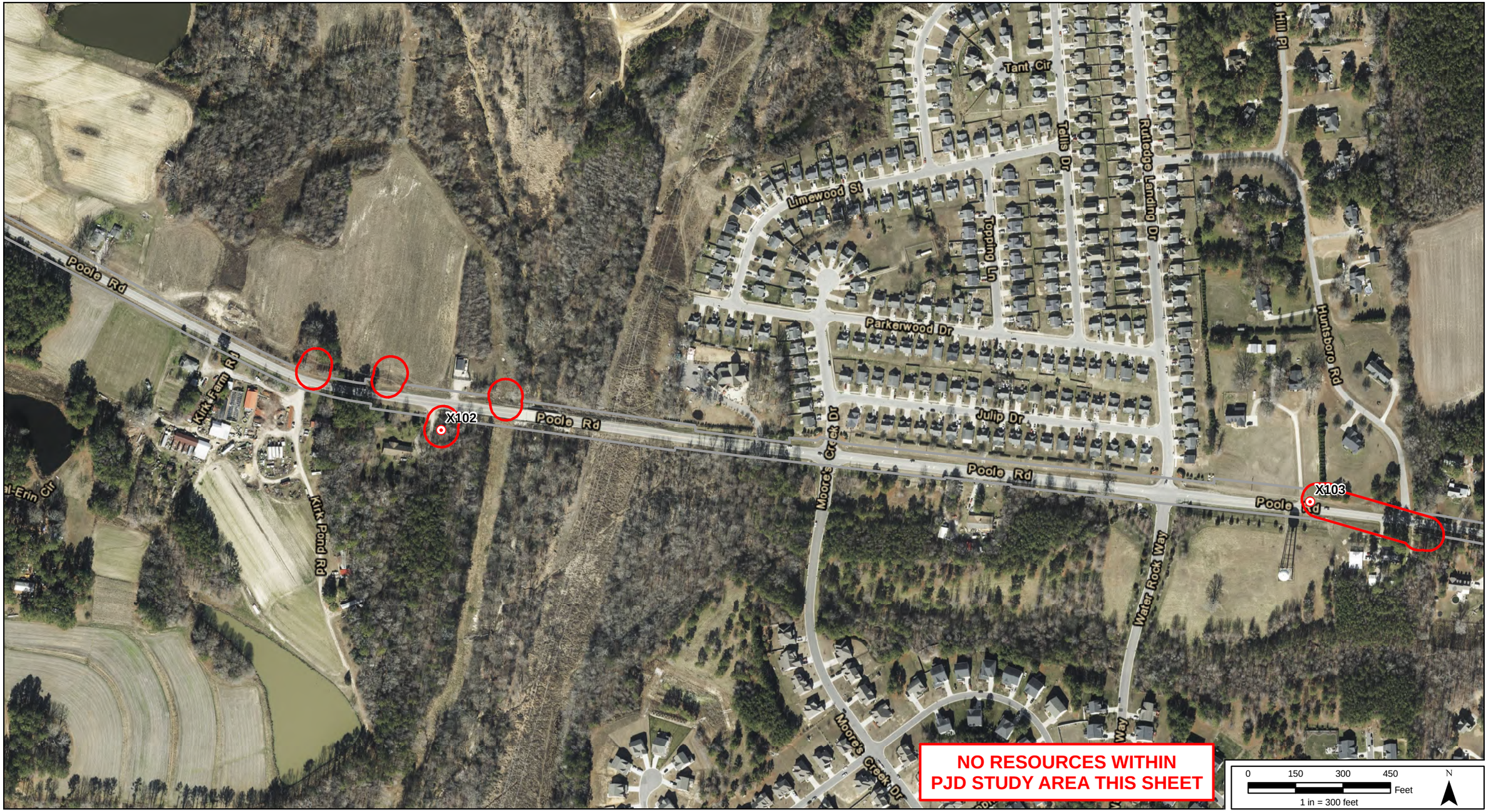

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2Q

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
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- PJD Study Area
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2R

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2S

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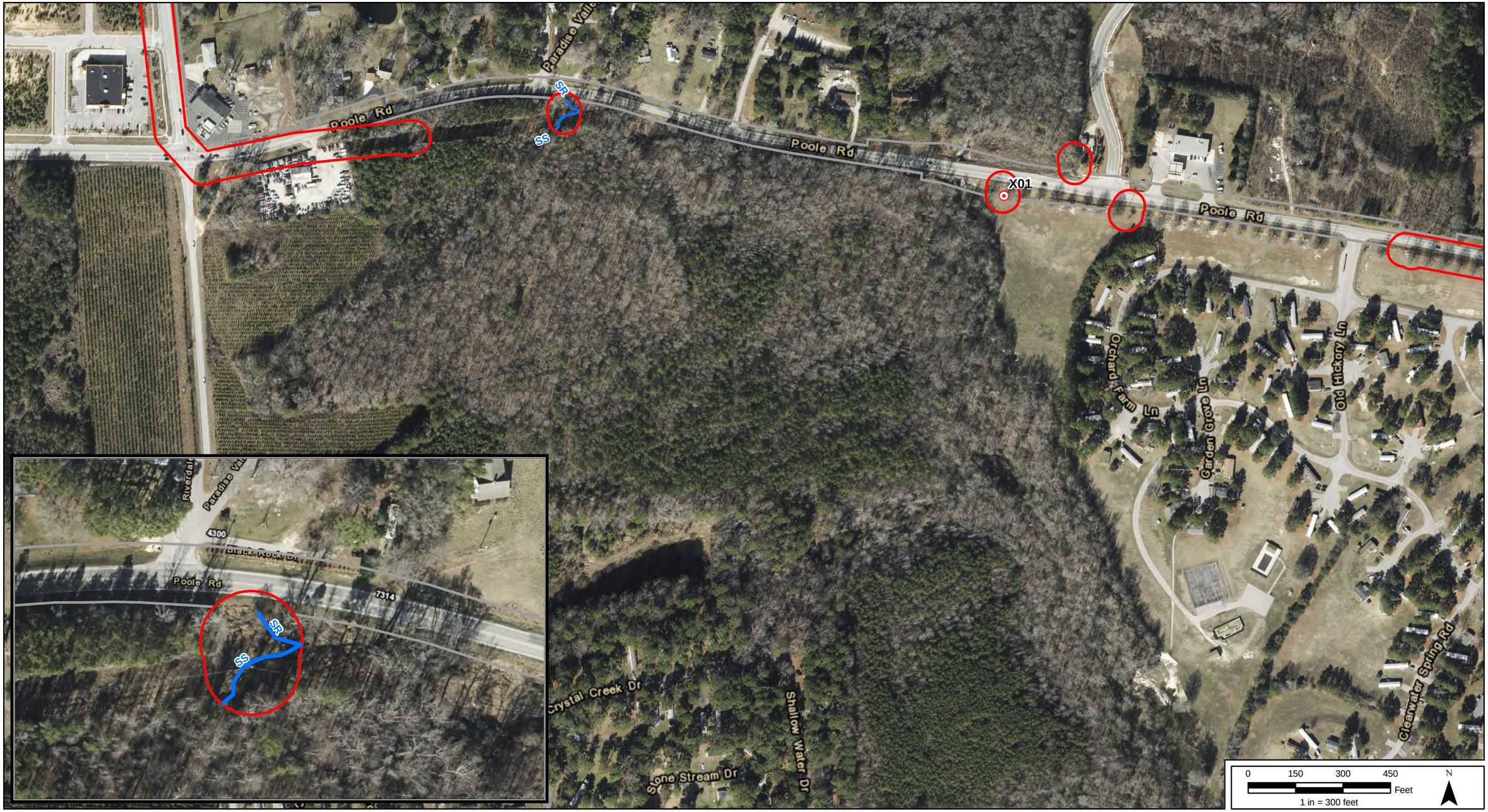

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- Traffic Flow Direction
- PJD Study Area
- NRTR Study Area

Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2T

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Preliminary Jurisdictional Determination Waters Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 2U

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 2V

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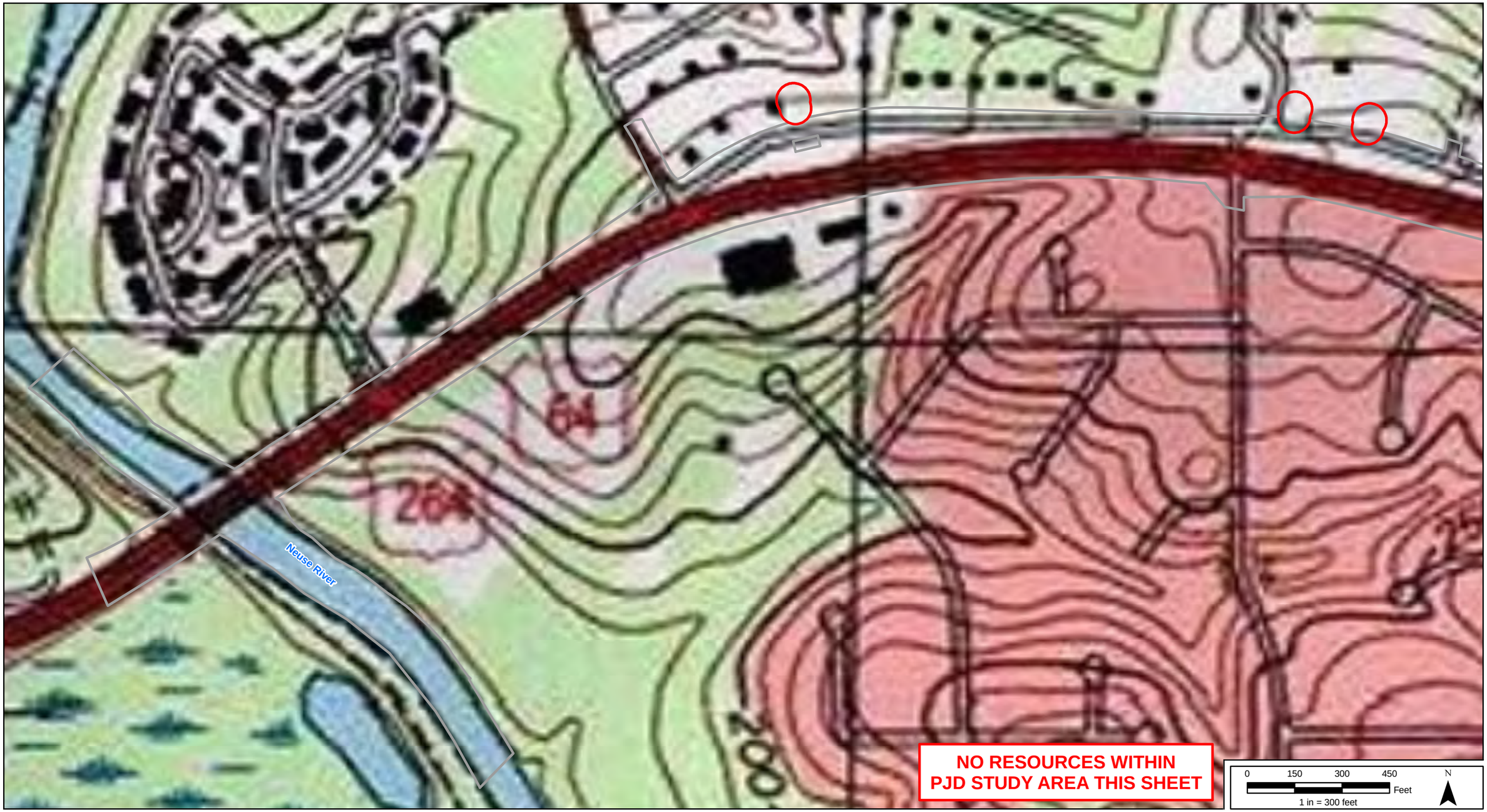

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 3A

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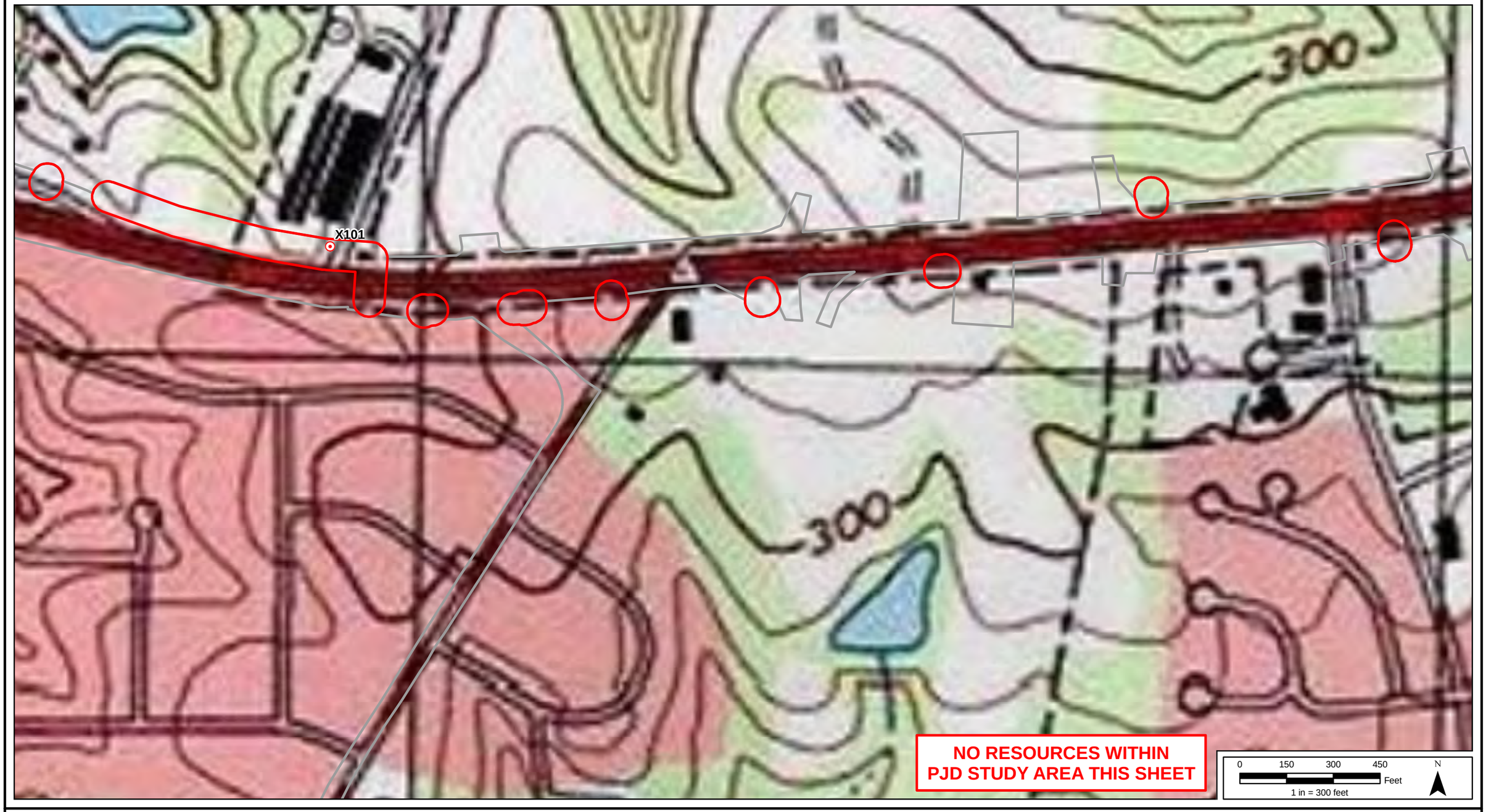

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Project No.:	100063221

FIGURE 3B

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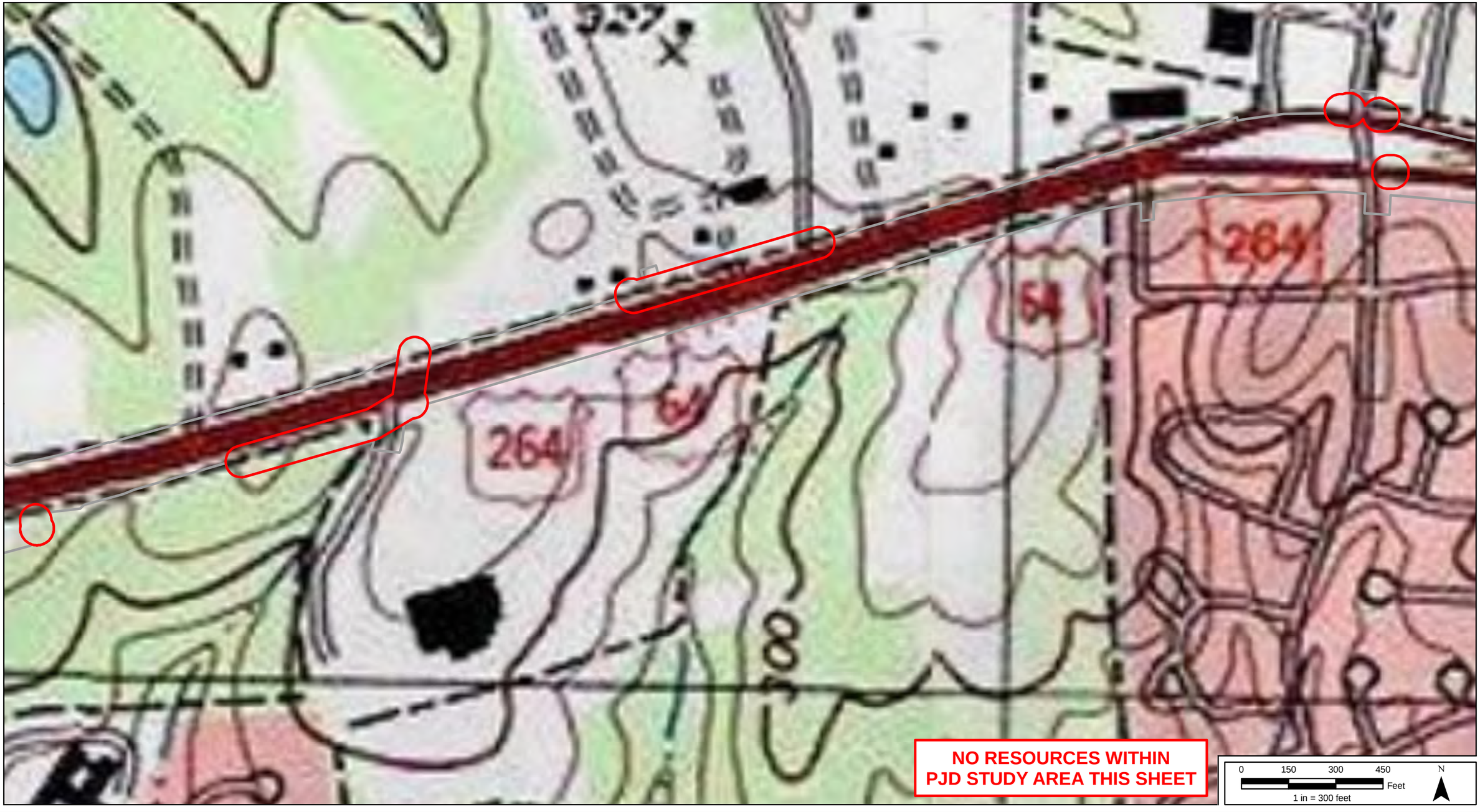

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 3C

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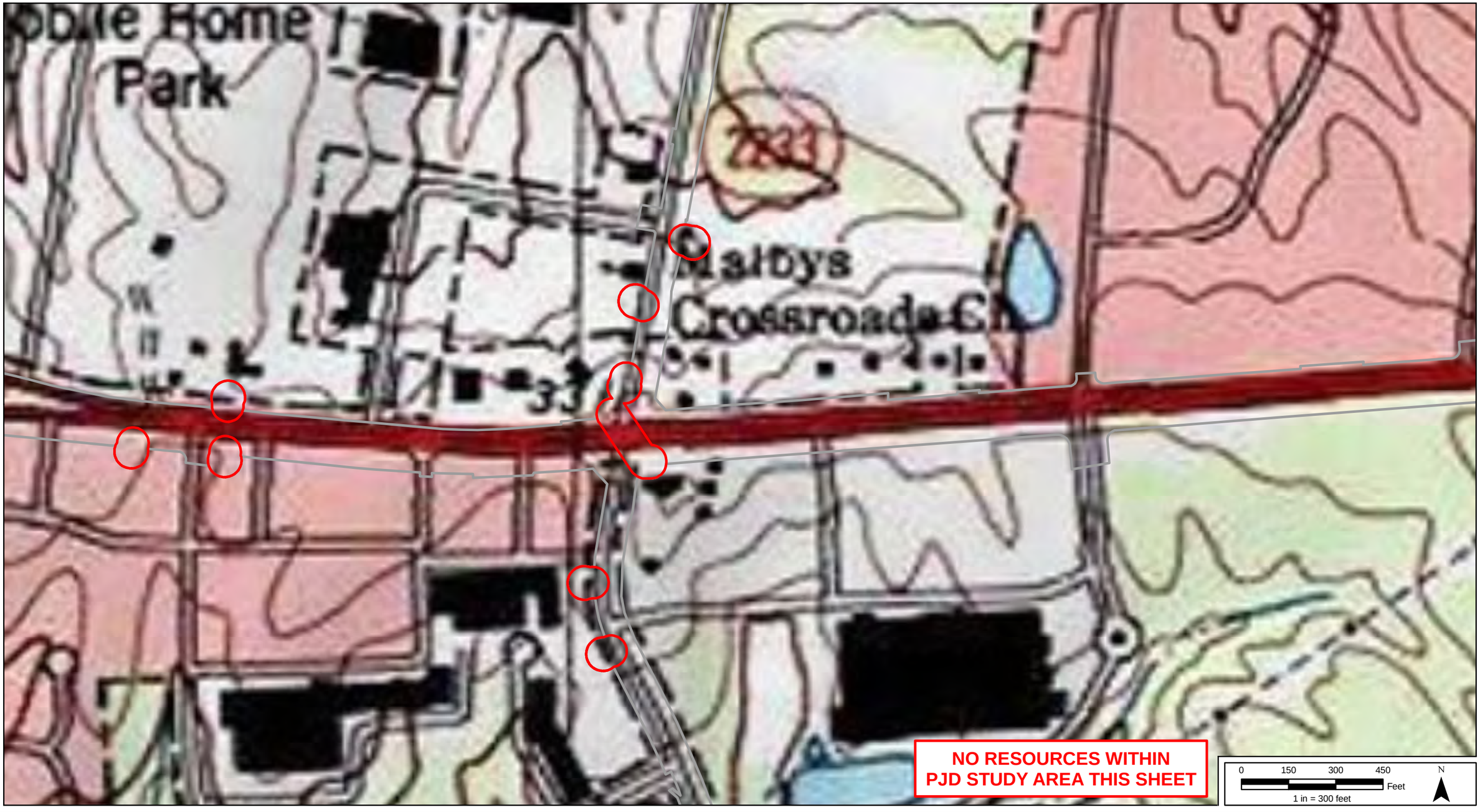

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Date:	7/26/2021
Project No.:	100063221

FIGURE 3D

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Date:	7/26/2021
Project No.:	100063221

FIGURE 3E

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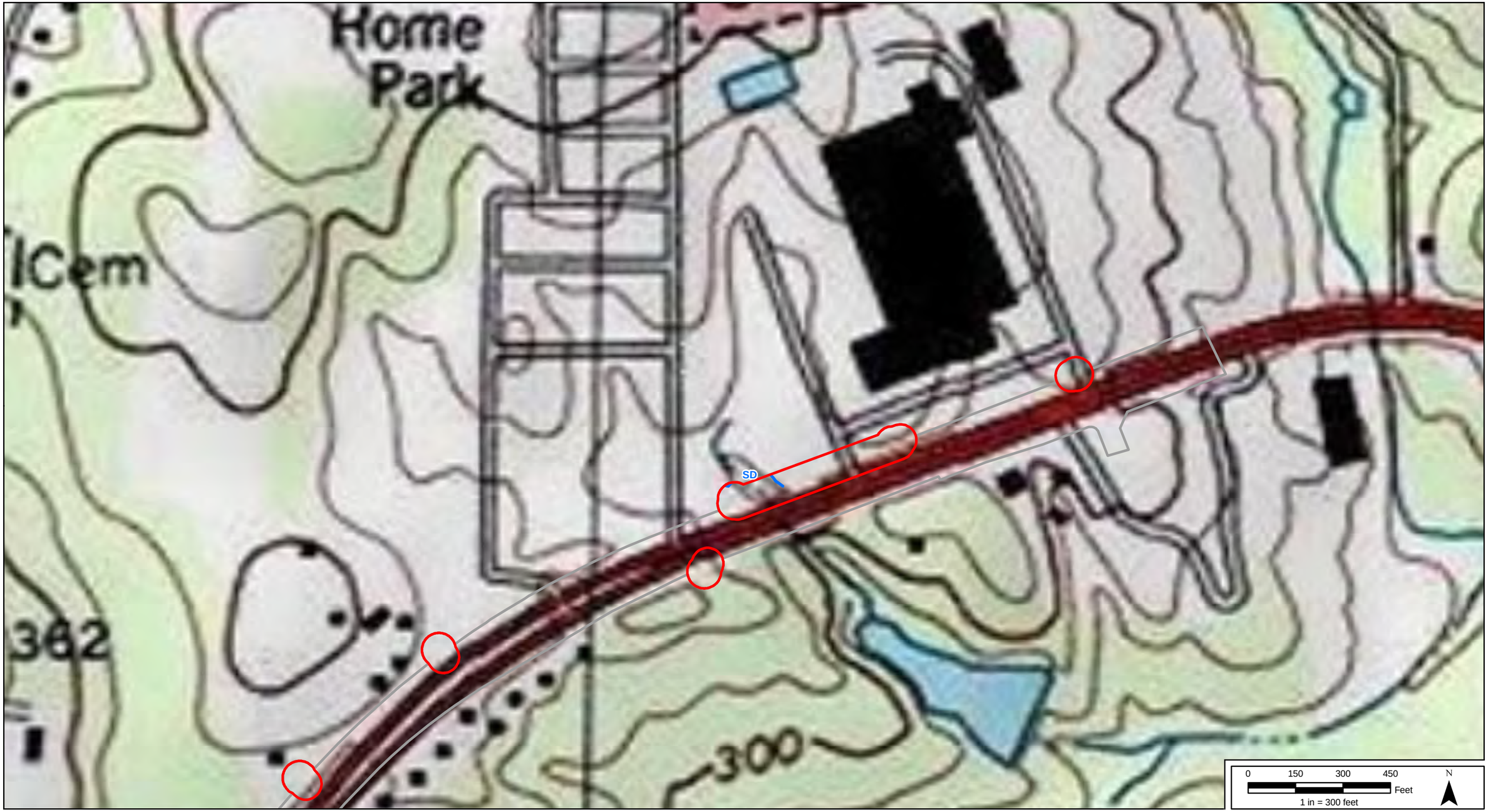

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
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Topographic Map

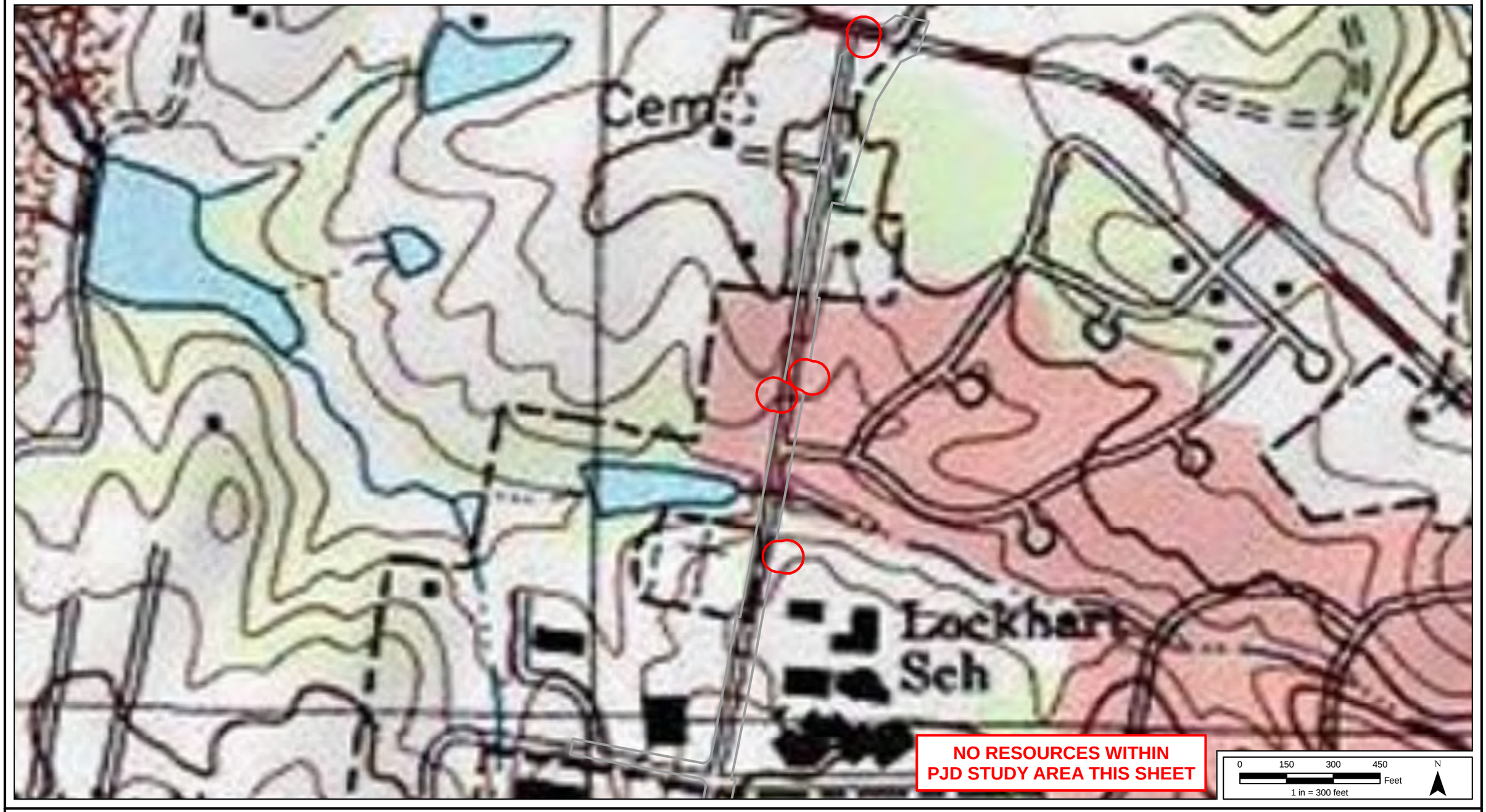
Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 3F

D:\ITS\ITS_Knightdale\Figure3_JD_Topo_v2.mxd



Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

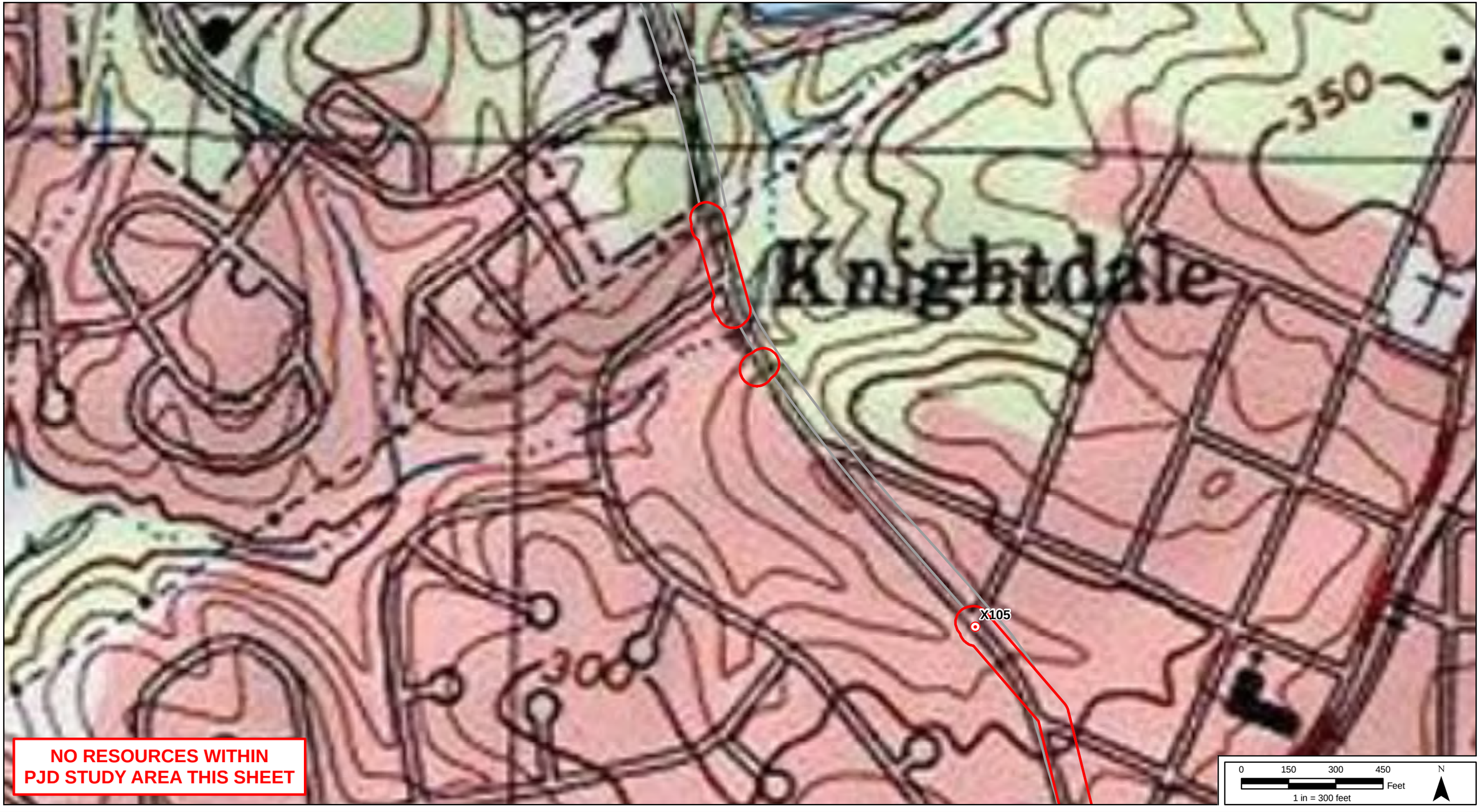
Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 3G

D:\ITS\ITS_Knightdale\Figure3_JD_Topo_v2.mxd



Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 3H

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 3I

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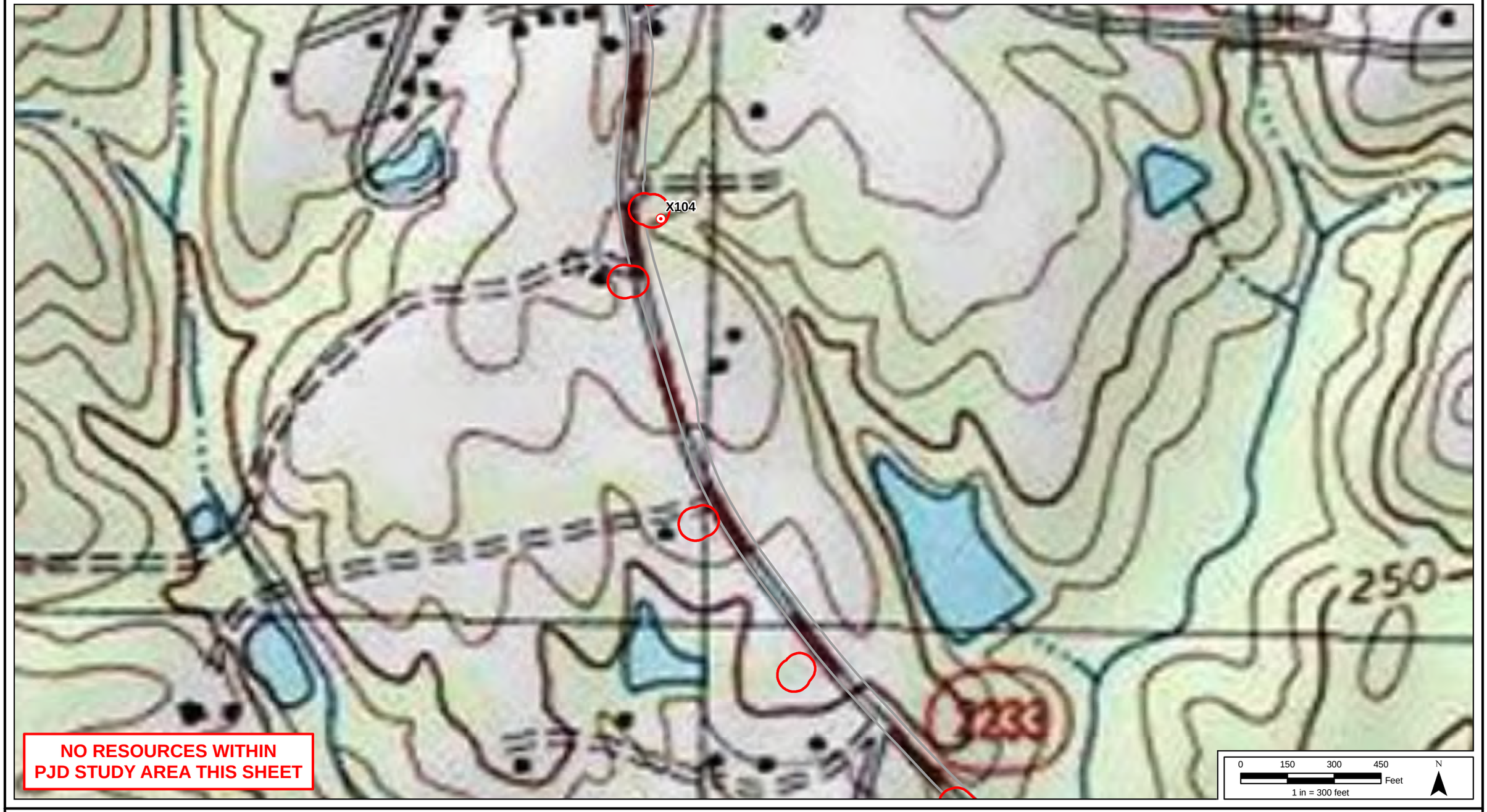

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 3J

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 3K

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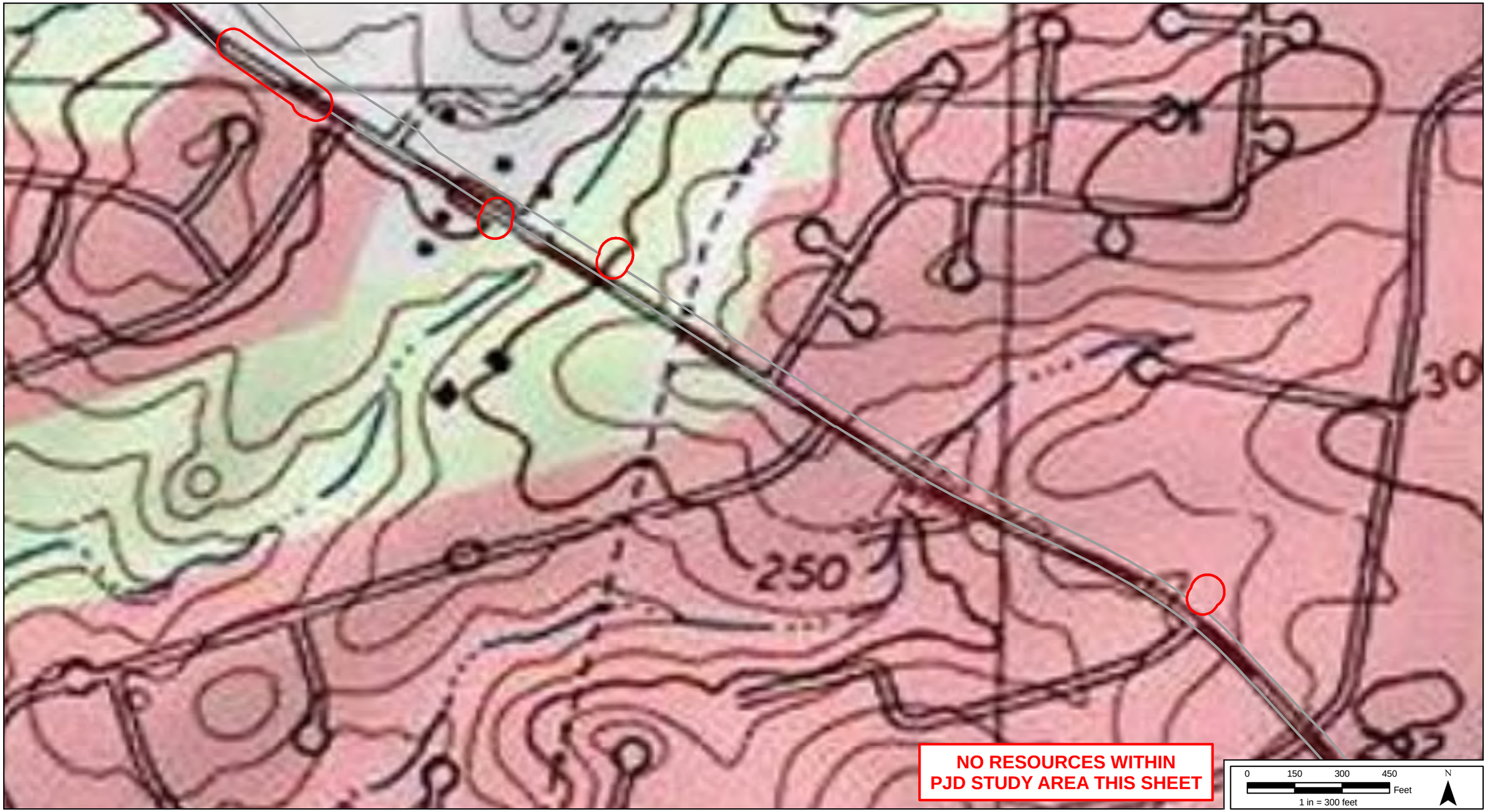

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 3L

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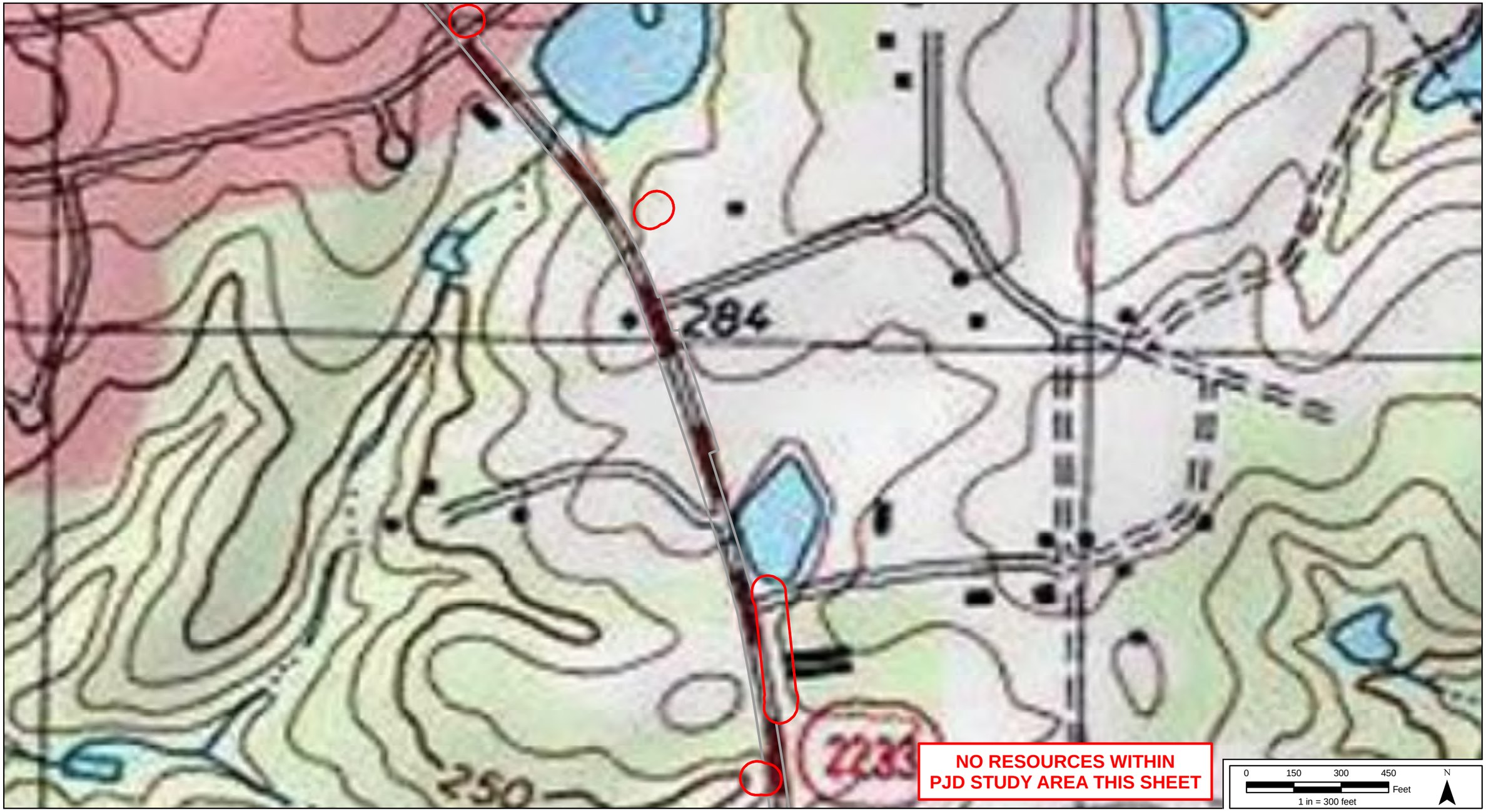

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 3M

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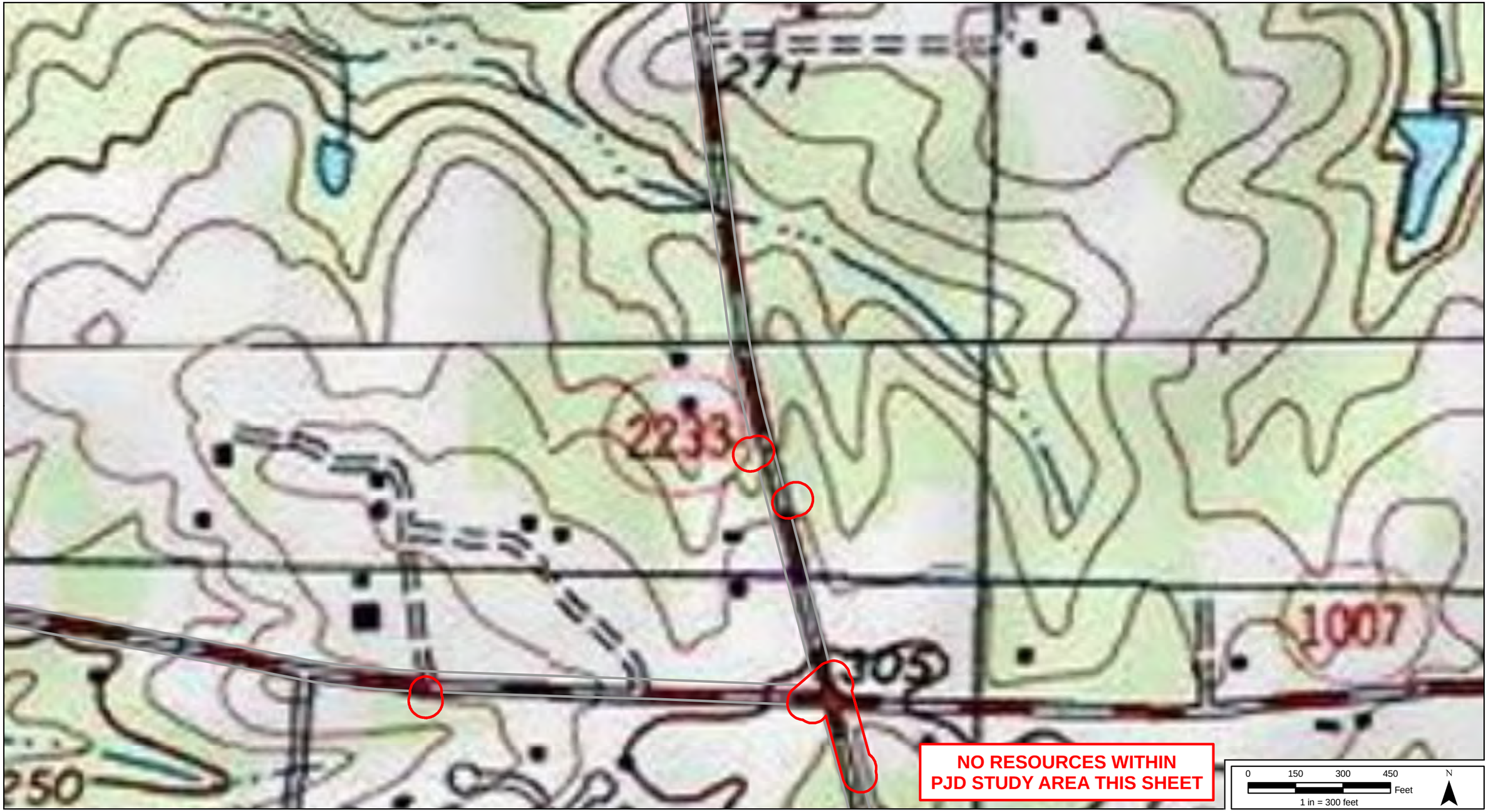
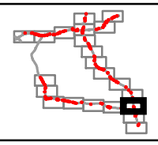


Prepared By:
ATKINS

Prepared For:
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- PJD Study Area
- NRTR Study Area



Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE
3N

D:\ITS\ITS_Knightdale\Figure3_JD_Topo_v2.mxd

NO RESOURCES WITHIN PJD STUDY AREA THIS SHEET

0 150 300 450 Feet

1 in = 300 feet

N

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
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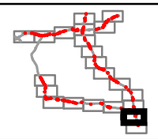
- PJD Study Area
- NRTR Study Area



Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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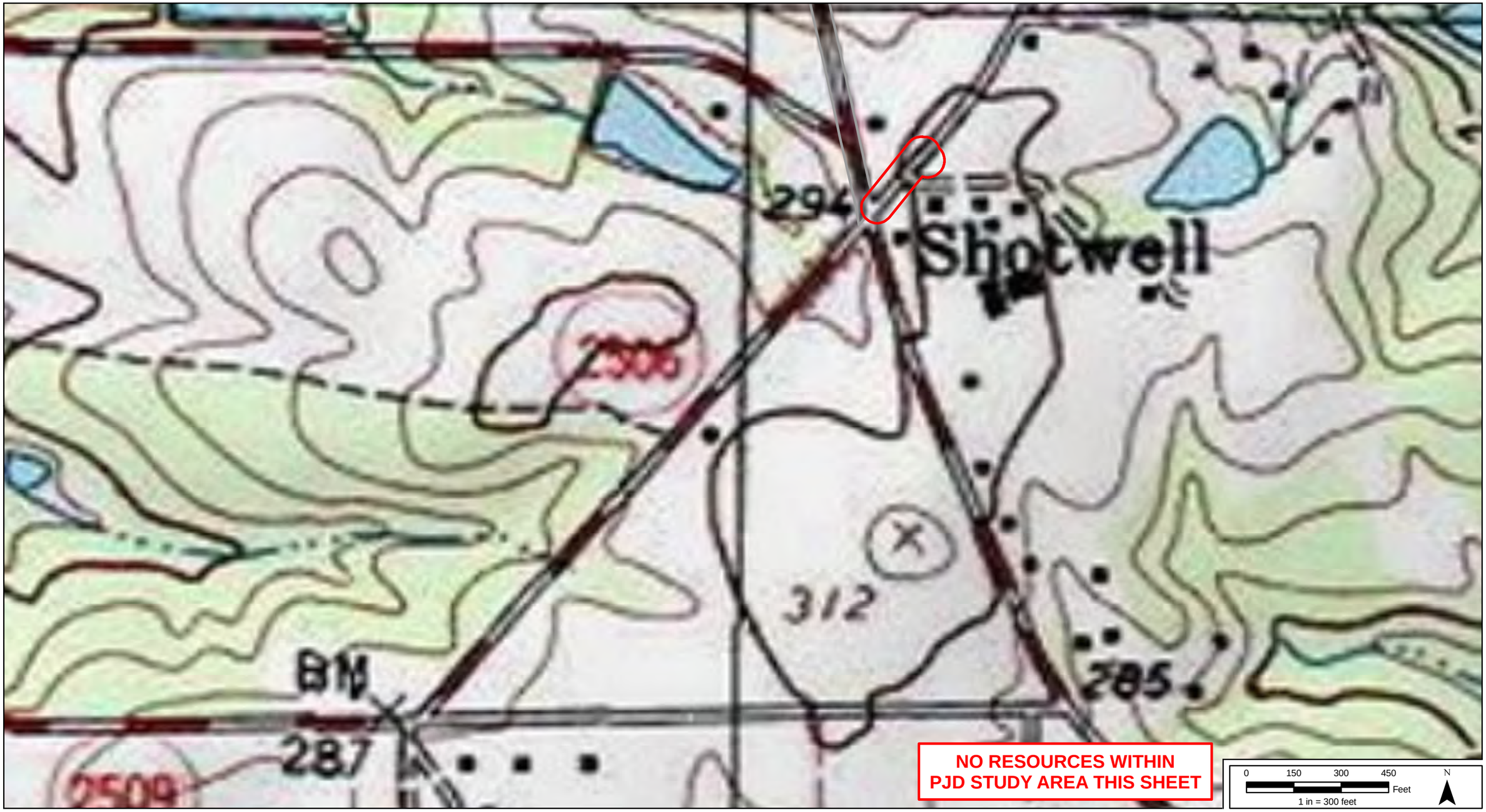
Date:	7/26/2021
Project No.:	100063221

FIGURE 30

D:\ITS\ITS_Knightdale\Figure3_JD_Topo_v2.mxd



NO RESOURCES WITHIN PJD STUDY AREA THIS SHEET

0 150 300 450 Feet
1 in = 300 feet
N

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Date:	7/26/2021
Project No.:	100063221

FIGURE 3P

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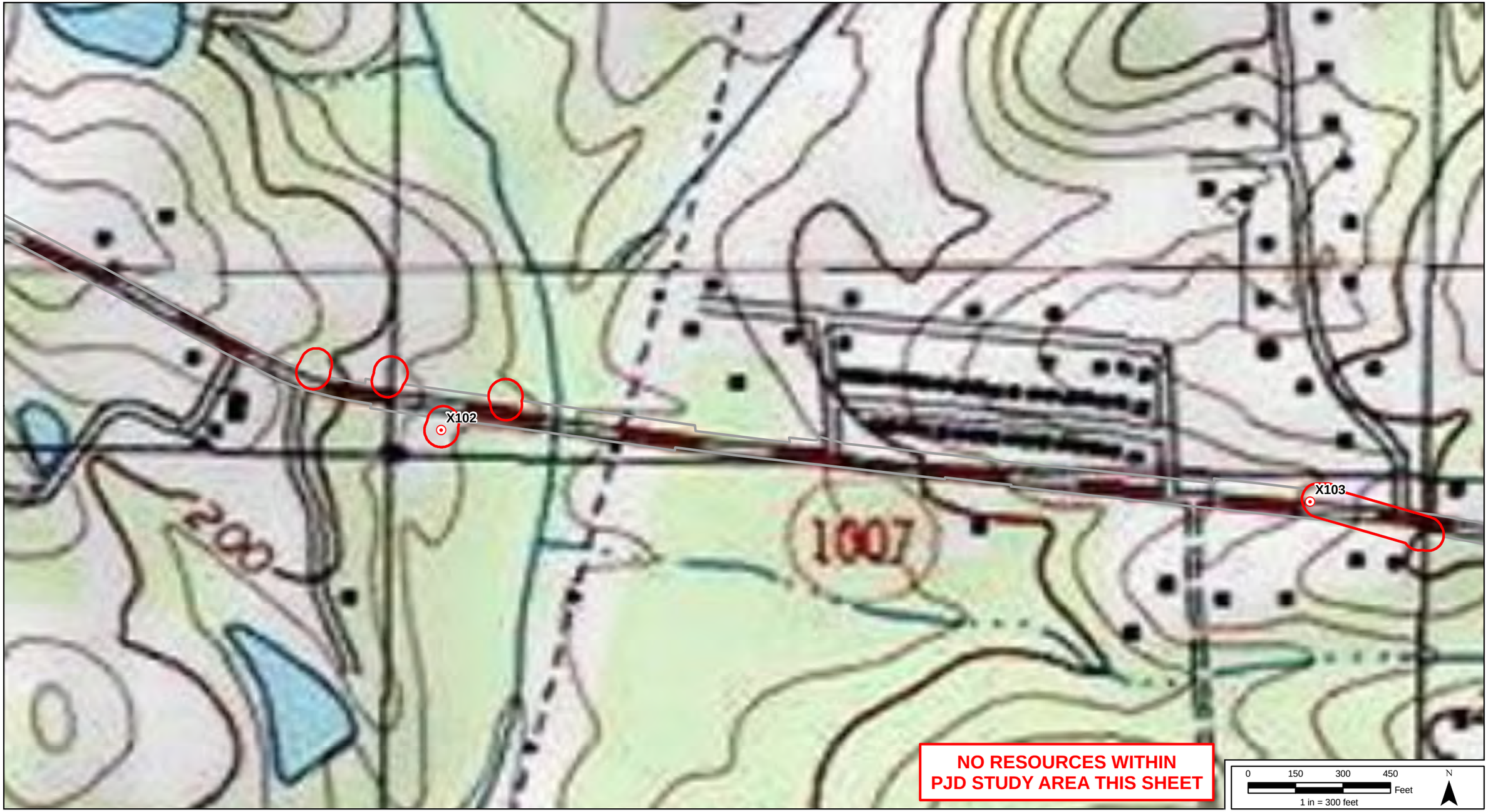

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Date:	7/26/2021
Project No.:	100063221

FIGURE 3Q

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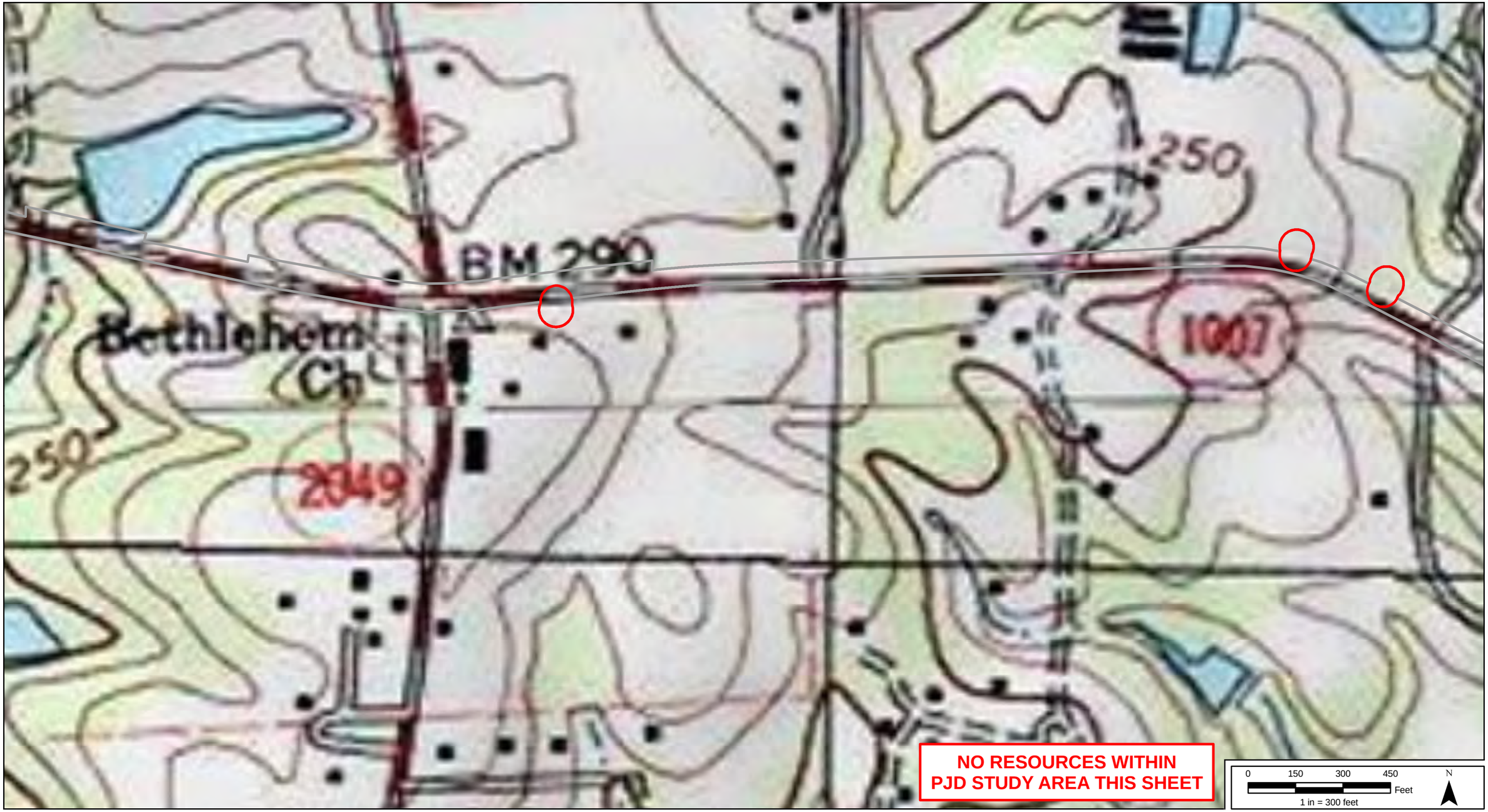

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Date:	7/26/2021
Project No.:	100063221

FIGURE 3R

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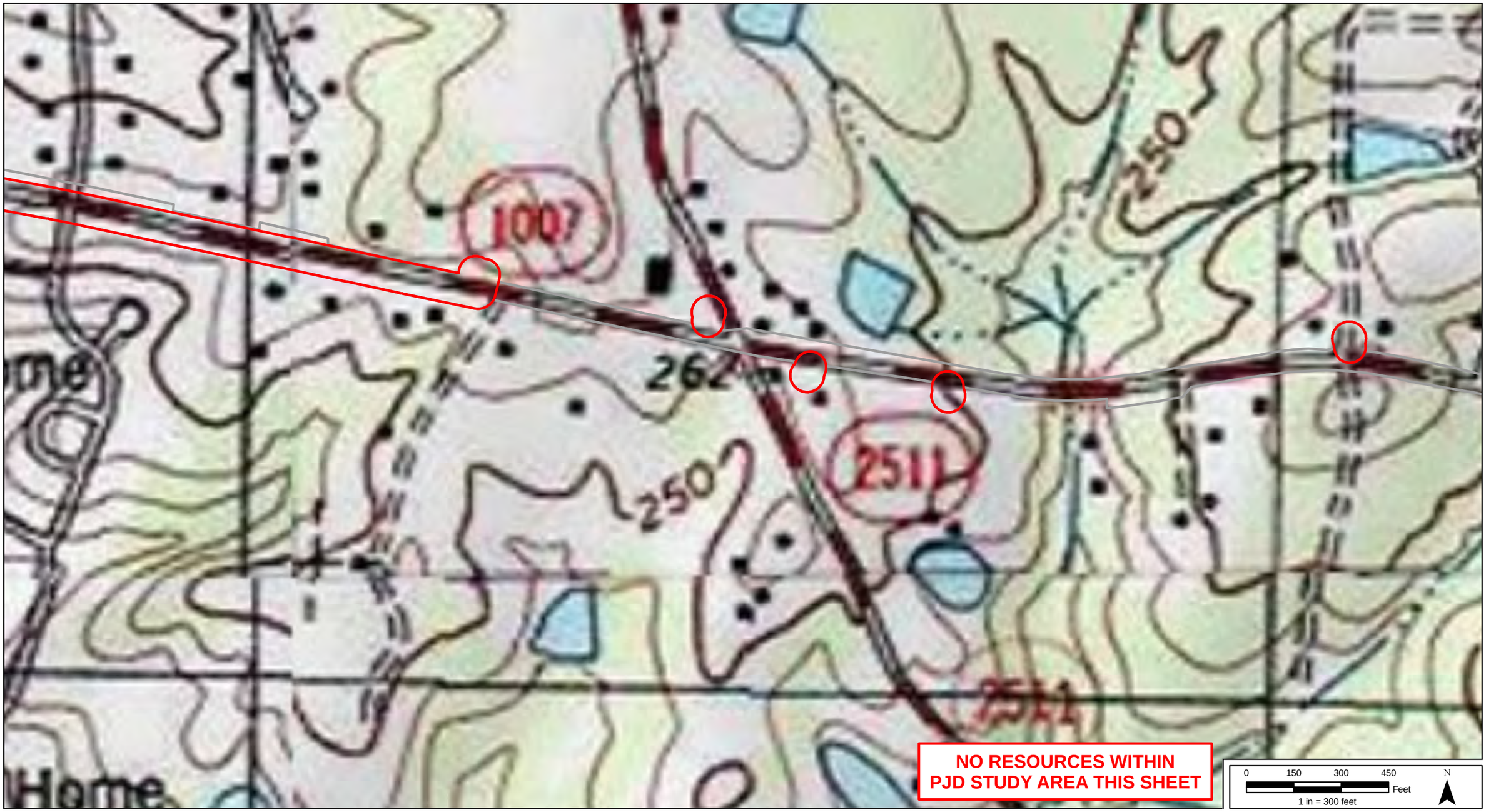

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Date:	7/26/2021
Project No.:	100063221

FIGURE 3S

D:\ITS\ITS_Knightdale\Figure3_JD_Topo_v2.mxd

Prepared By: ATKINS

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- Potential Non-Wetland Waters of the US (Streams)
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Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Date:	7/26/2021
Project No.:	100063221

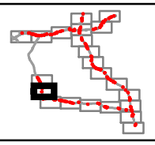
FIGURE 3T

D:\ITS\ITS_Knightdale\Figure3_JD_Topo_v2.mxd

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- PJD Study Area
- NRTR Study Area



Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 3U

D:\IT\S\ITS_Knightdale\Figure3_JD_Topo_v2.mxd

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- PJD Study Area
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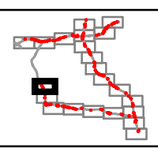


Topographic Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 3V

D:\ITS\ITS_Knightdale\Figure3_JD_Topo_v2.mxd

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- PJD Study Area
- NRTR Study Area

Soil Survey Map

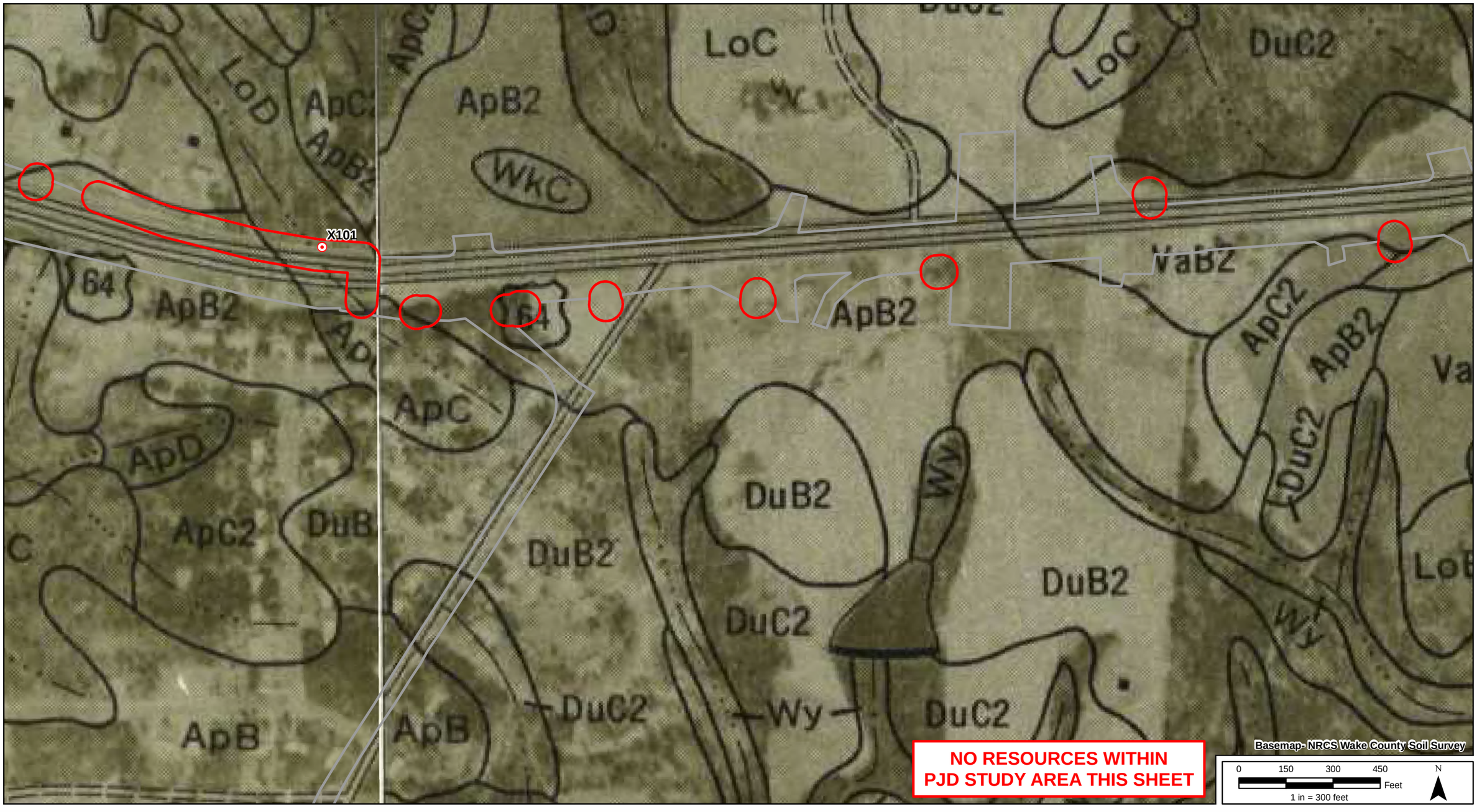
Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4A

D:\ITS\ITS_Knightdale\Figure4_JD_Soils_v2.mxd



Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
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Soil Survey Map

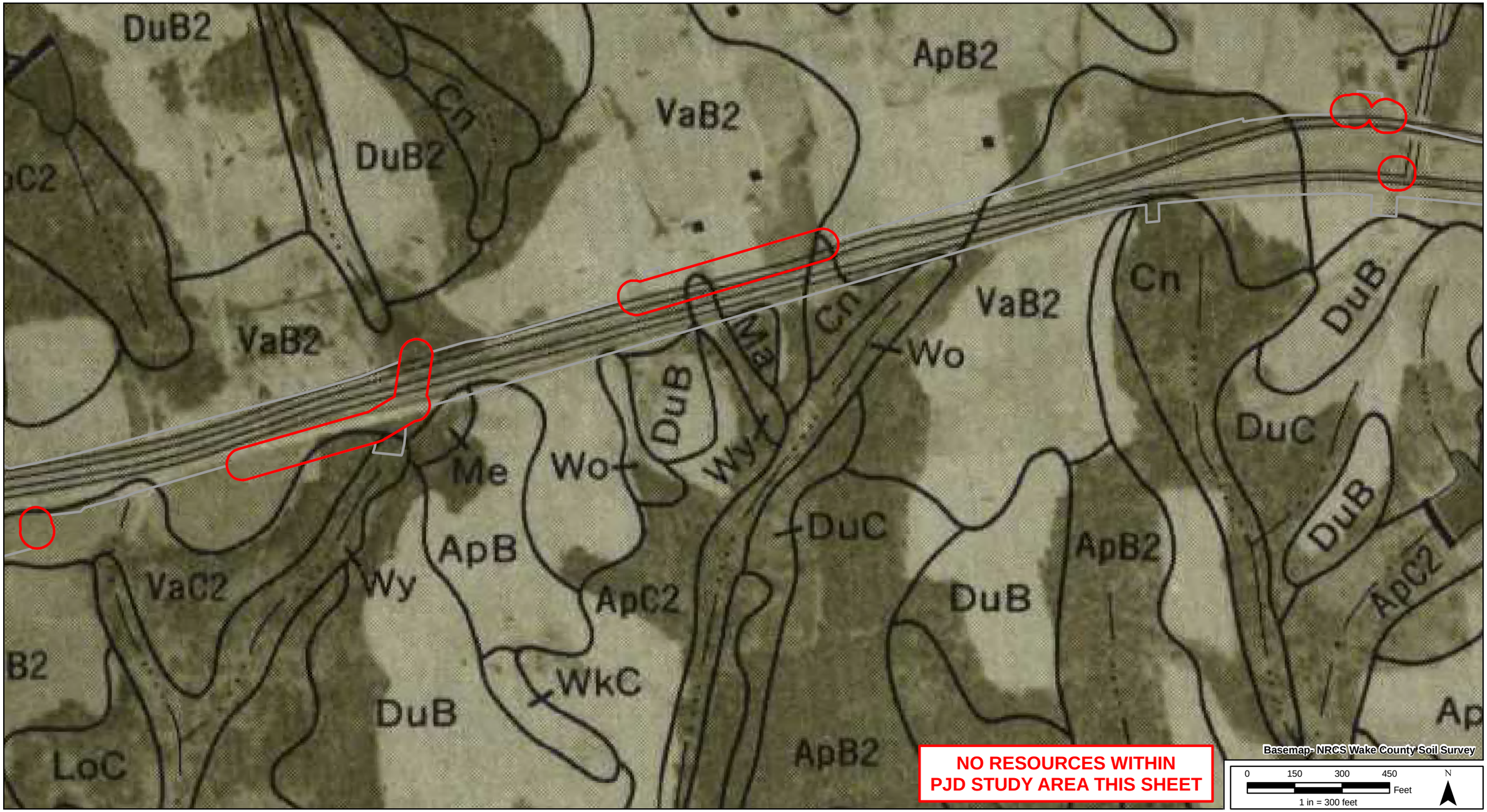
Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4B

D:\ITS\ITS_Knightdale\Figure4_JD_Soils_v2.mxd



Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- PJD Study Area
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Soil Survey Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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Date:	7/26/2021
Project No.:	100063221

FIGURE 4C

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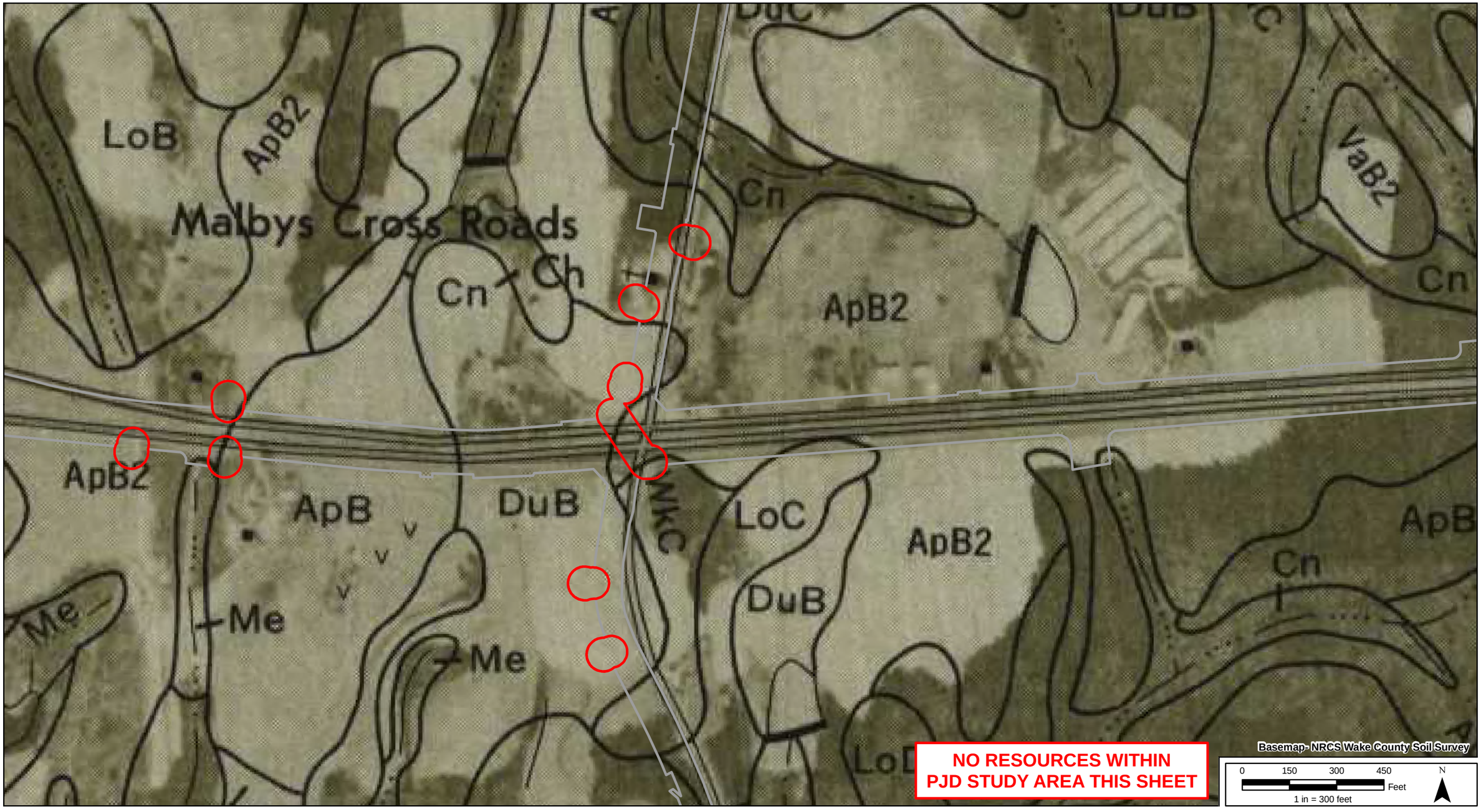

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- PJD Study Area
- NRTR Study Area

Soil Survey Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4D

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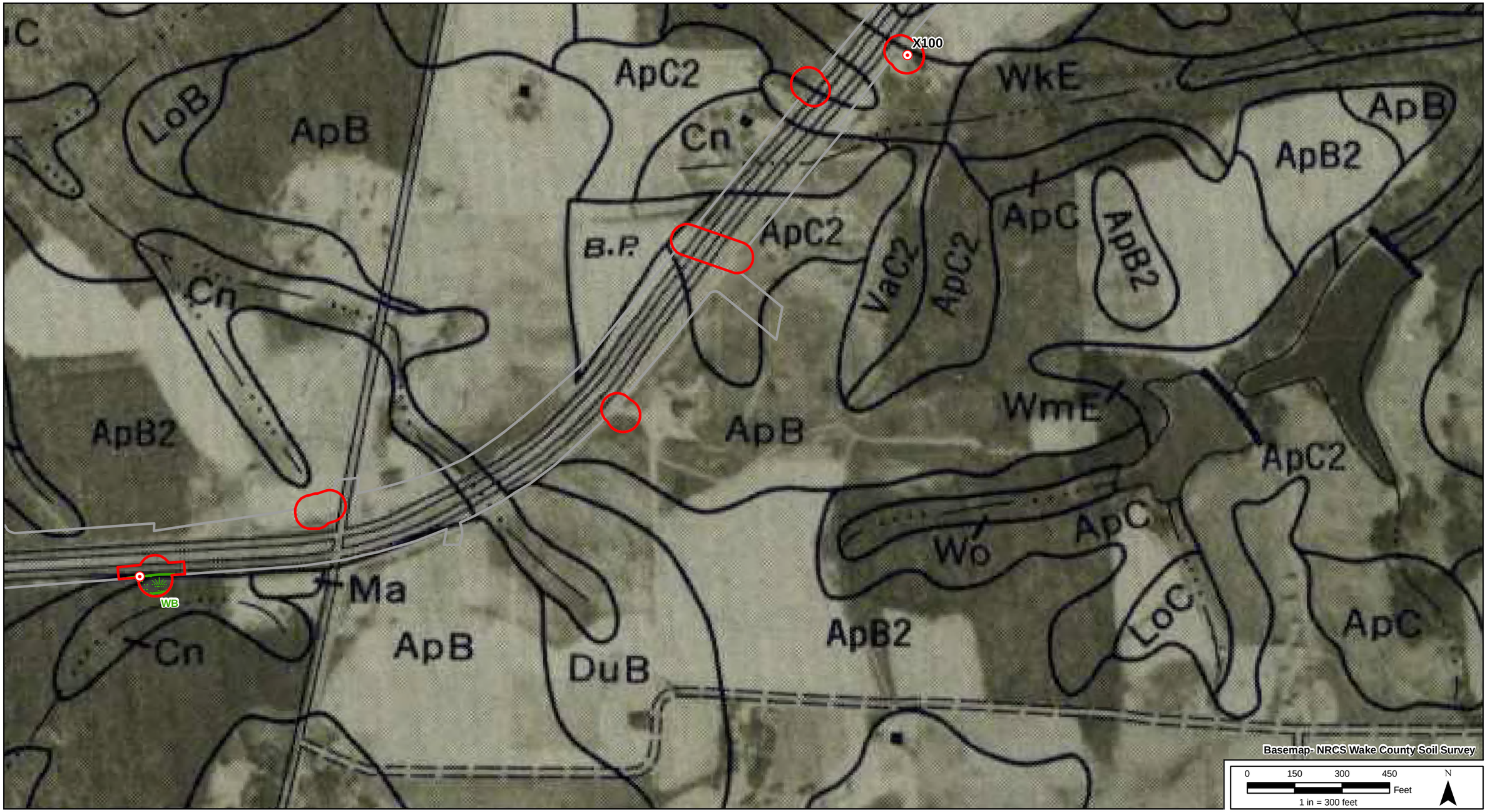

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- Potential Non-Wetland Waters of the US (Streams)
- Potential Wetland Waters of the US
- Data Form Locations
- PJD Study Area
- NRTR Study Area

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 4E

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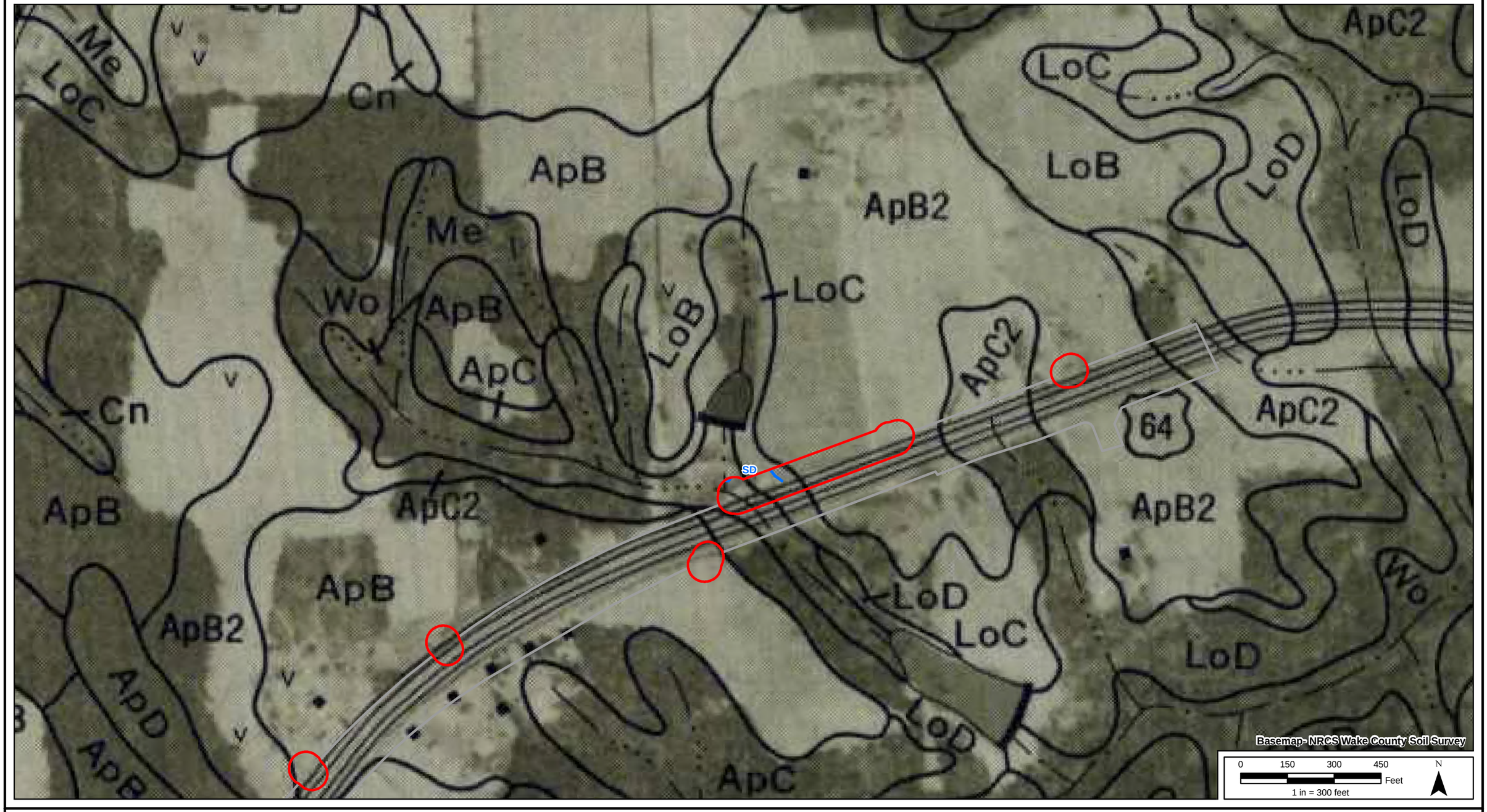

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Date:	7/26/2021
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FIGURE 4F

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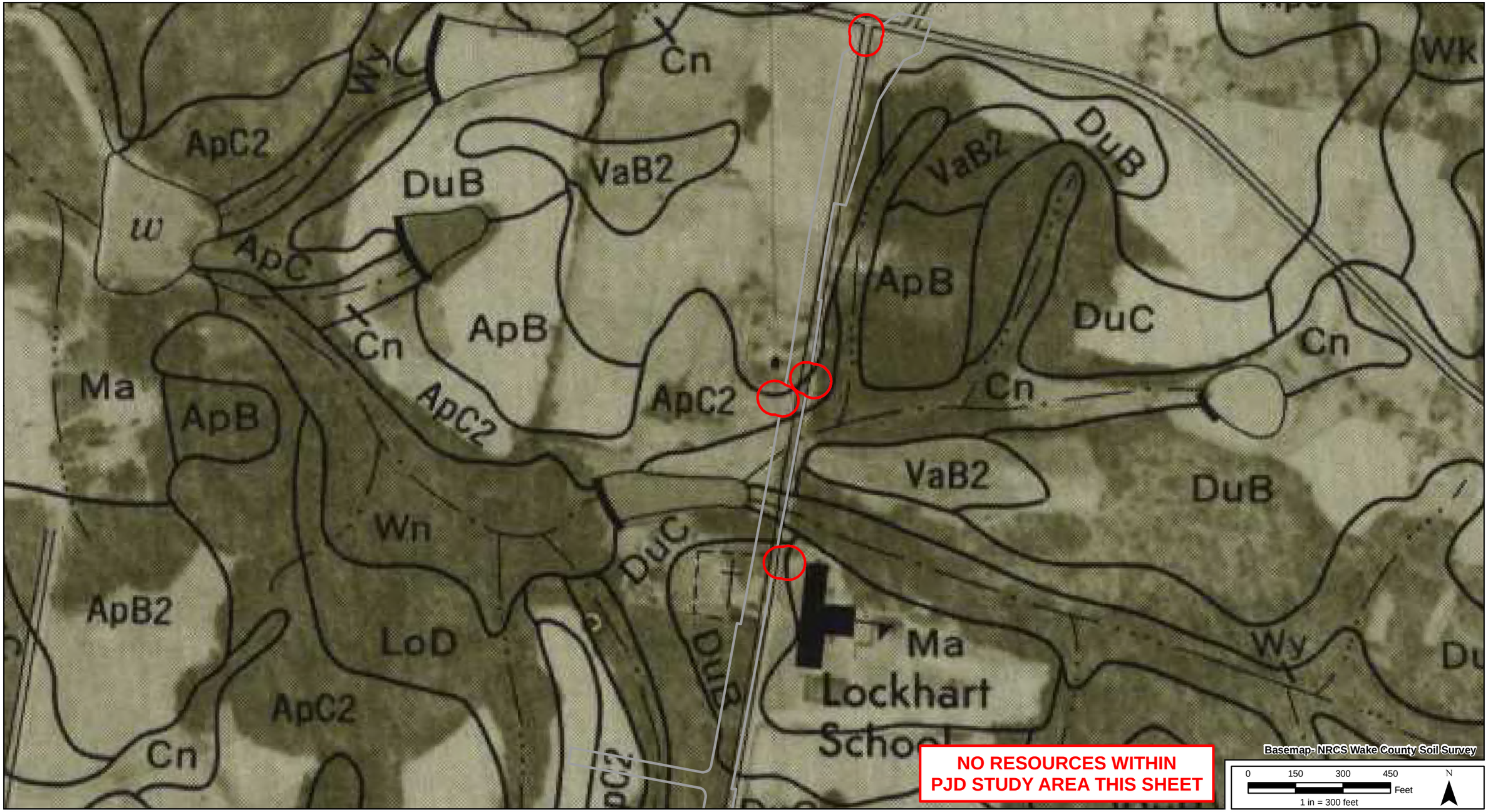

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4G

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4H

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NO RESOURCES WITHIN PJD STUDY AREA THIS SHEET

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4I

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Date:	7/26/2021
Project No.:	100063221

FIGURE 4J

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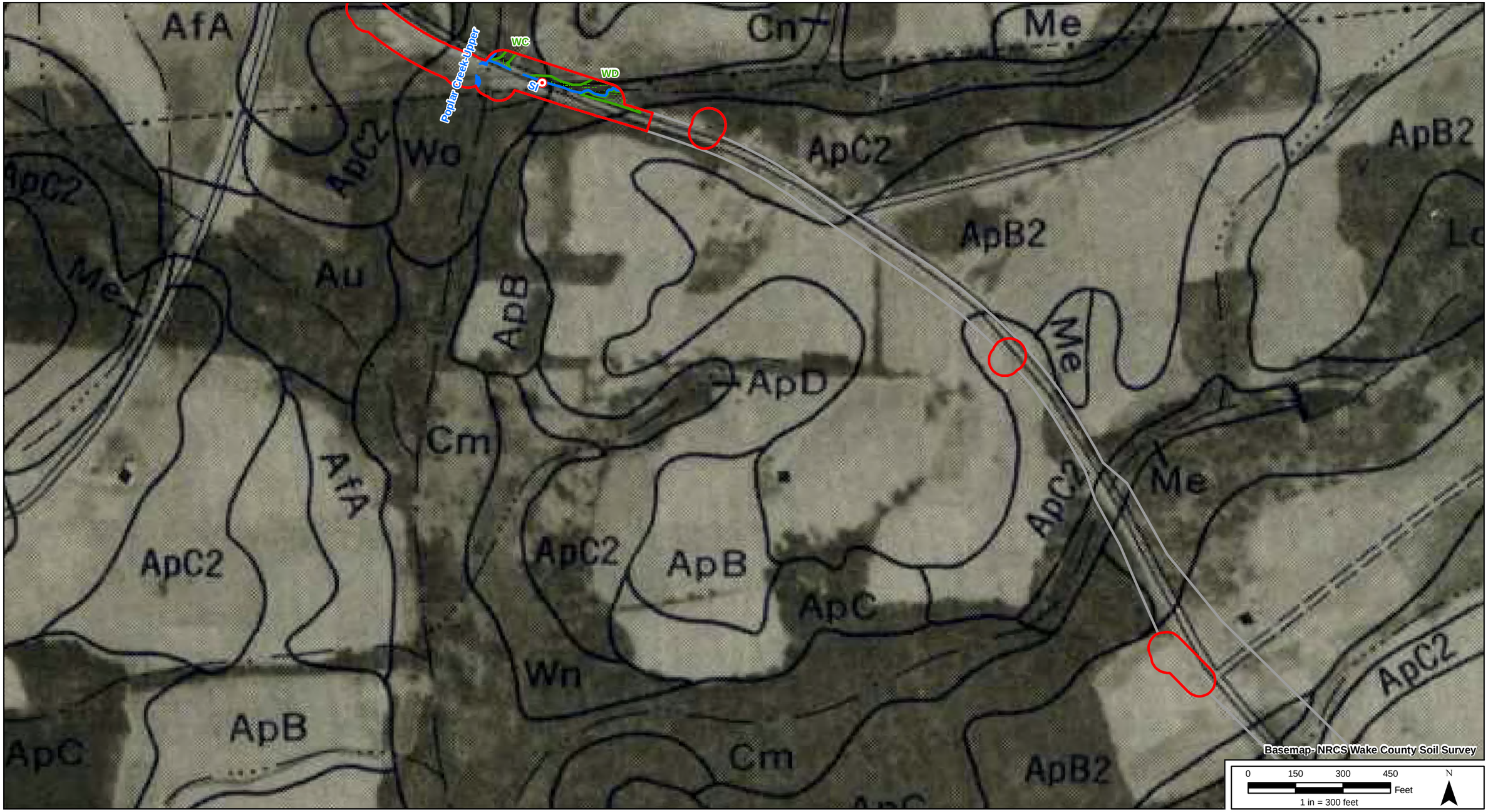

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Potential Non-Wetland Waters of the US (Streams)

Potential Wetland Waters of the US

Data Form Locations

PJD Study Area

NRTR Study Area

Soil Survey Map

Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4K

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Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

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Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4L

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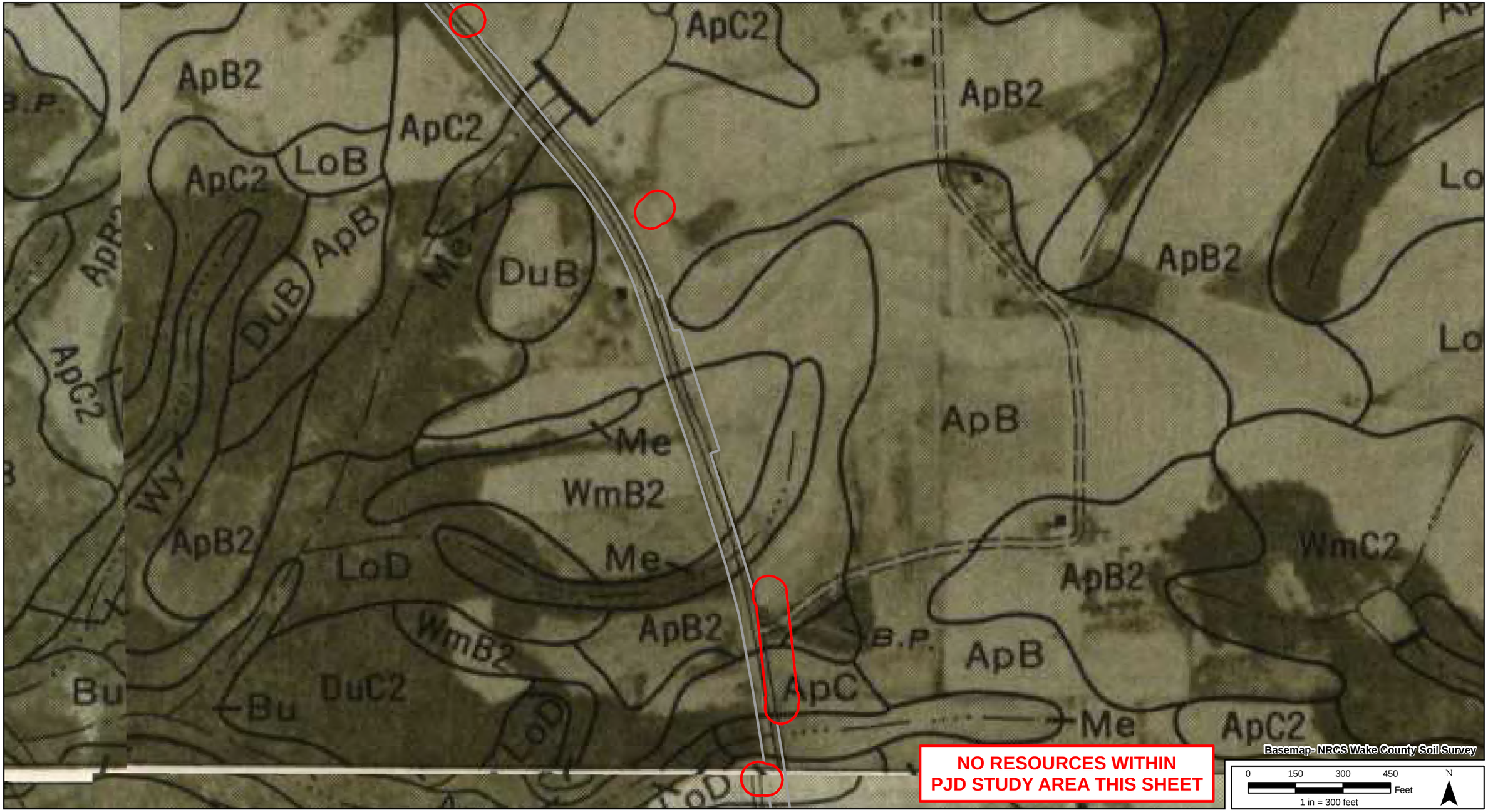

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Date:	7/26/2021
Project No.:	100063221

FIGURE 4M

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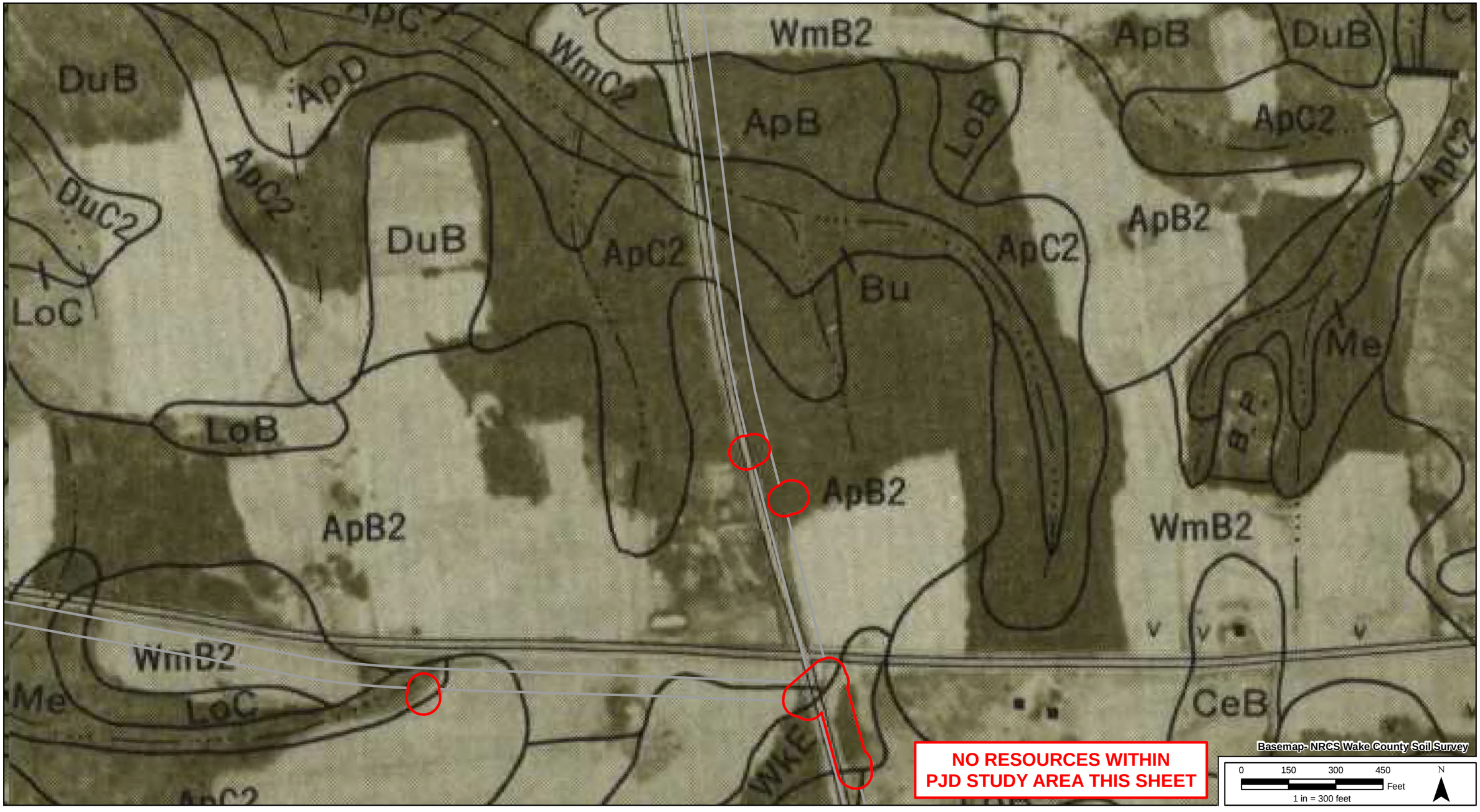

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
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FIGURE 4N

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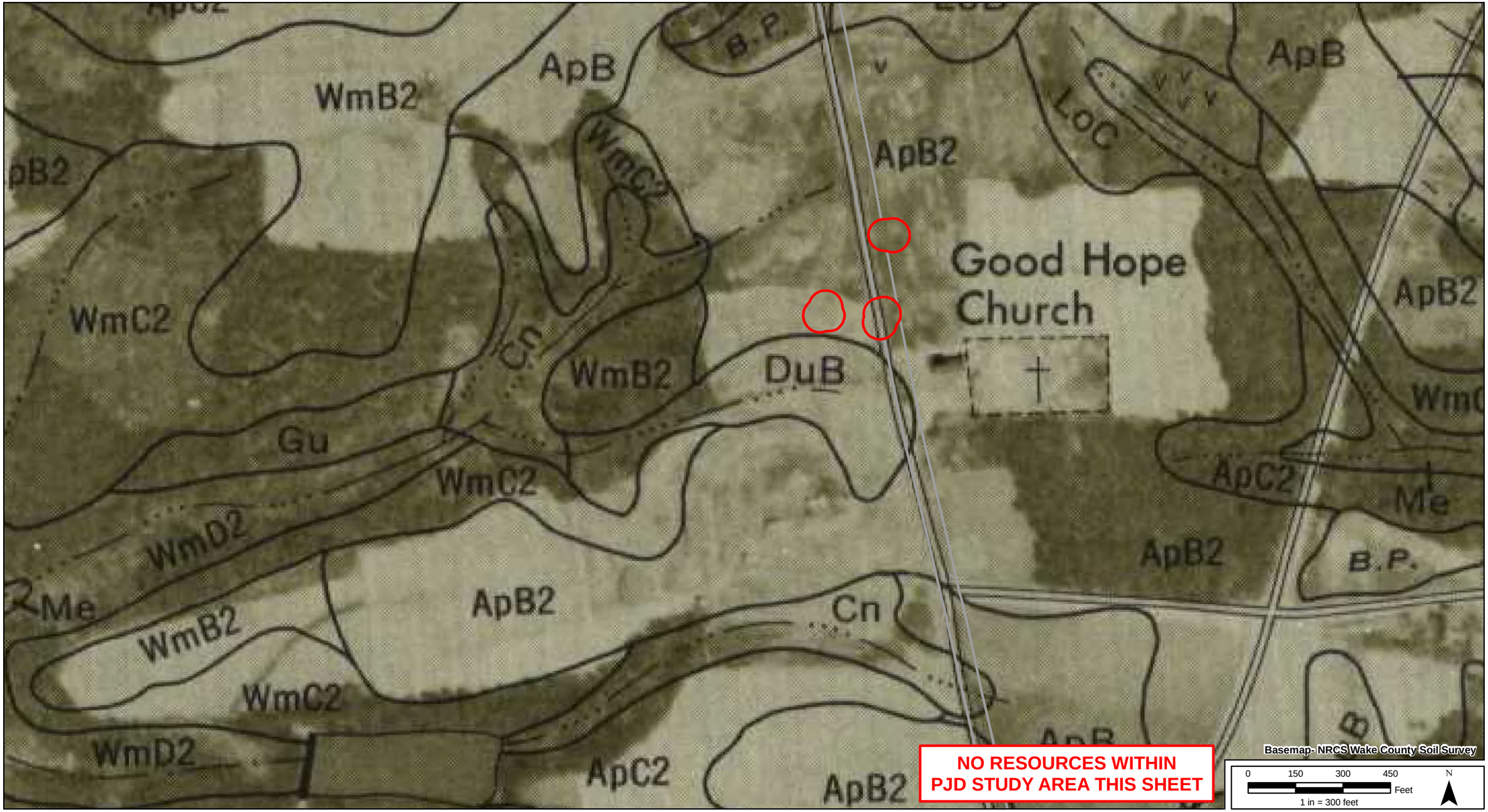

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
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FIGURE 40

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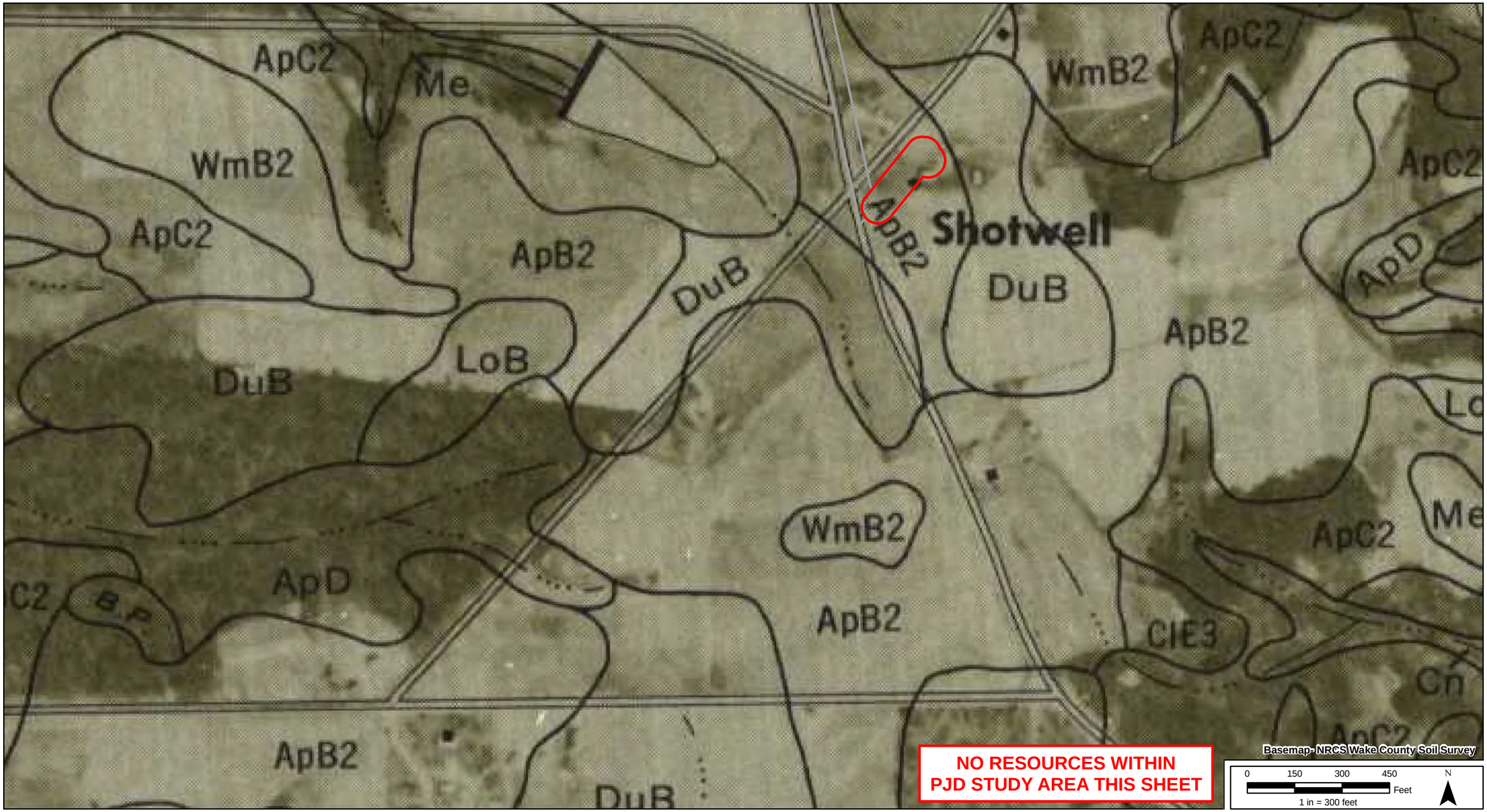

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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WAKE COUNTY, NORTH CAROLINA

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FIGURE 4P

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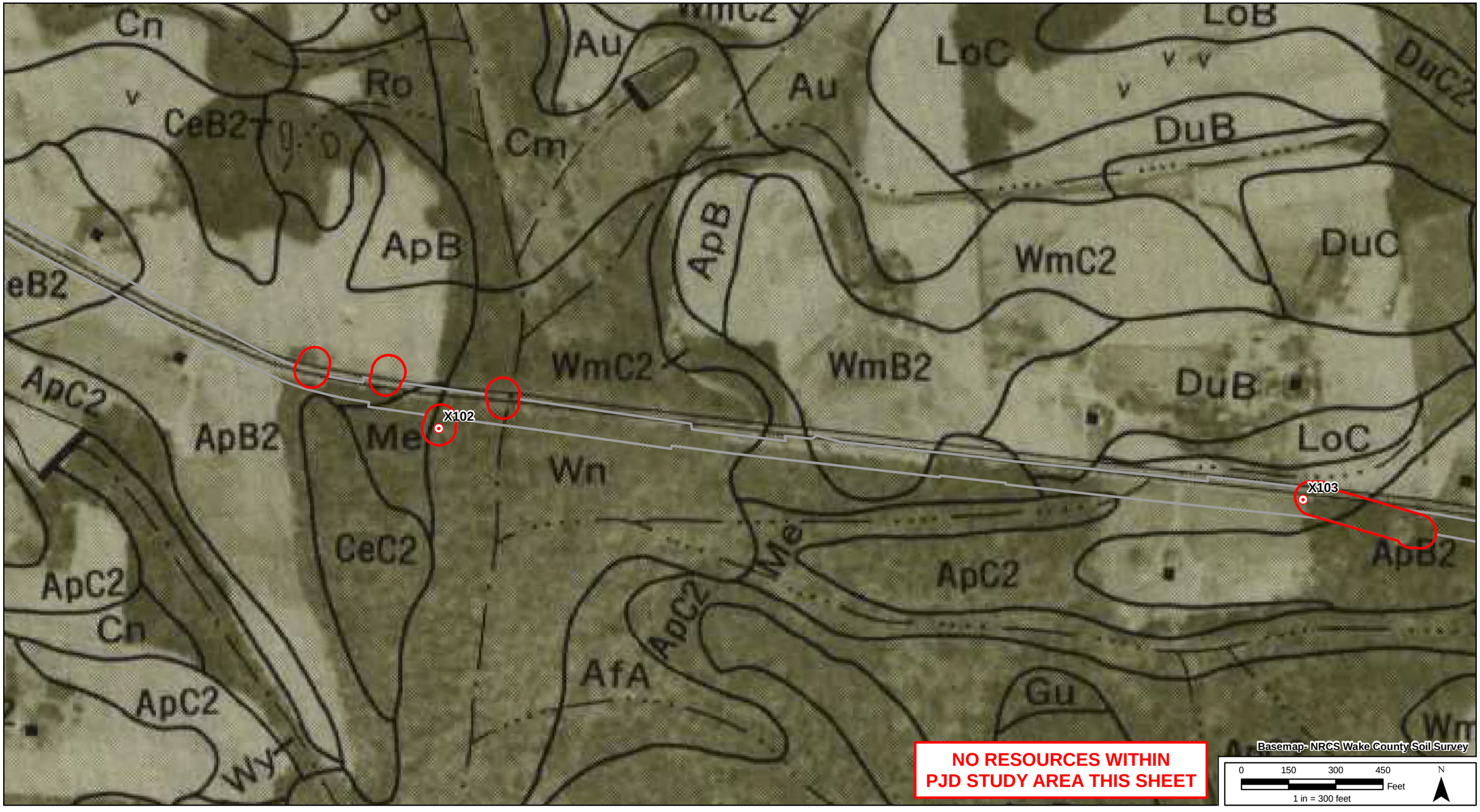

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
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Project No.:	100063221

FIGURE 4Q

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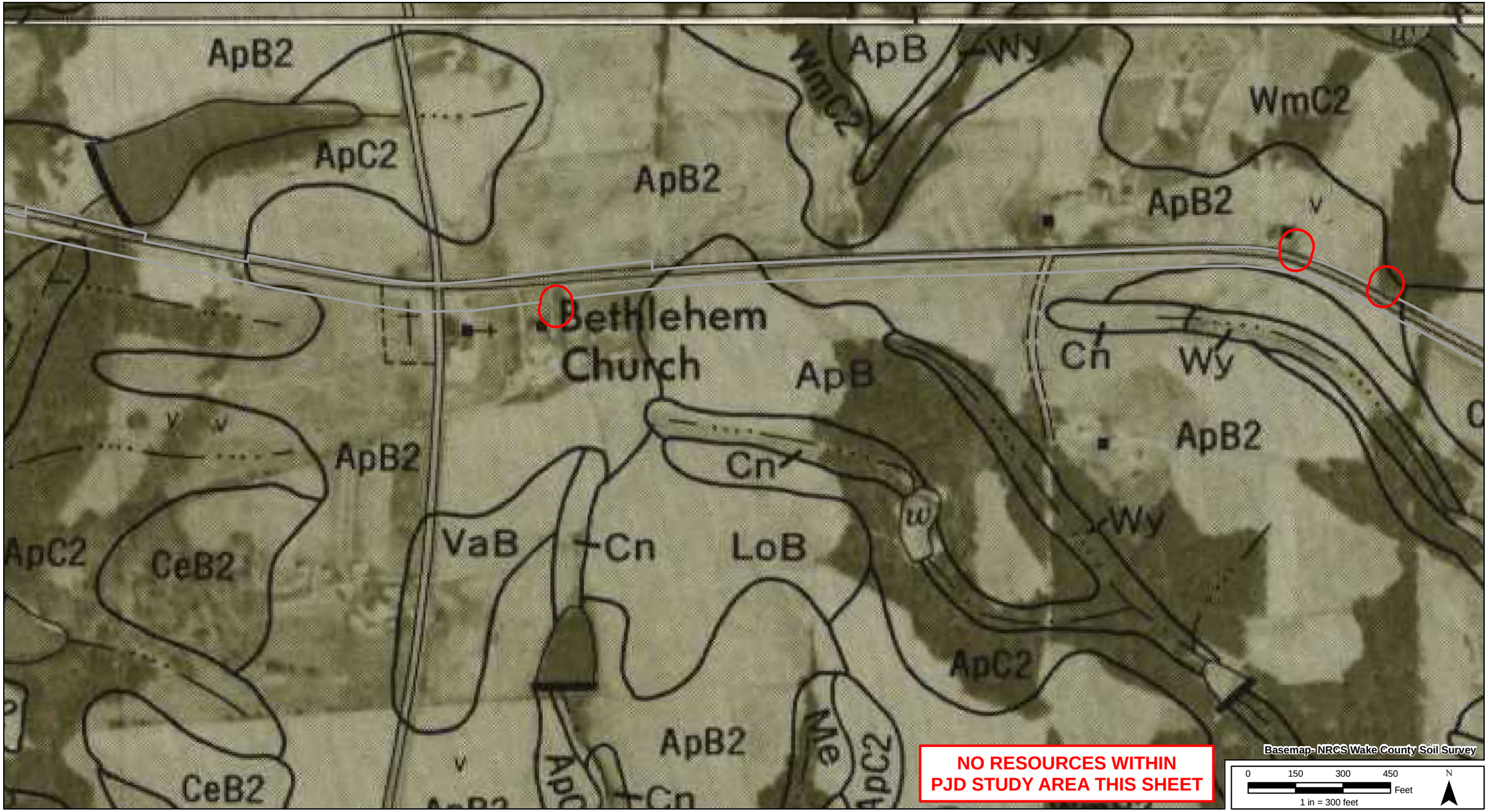

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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WAKE COUNTY, NORTH CAROLINA

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Project No.:	100063221

FIGURE 4R

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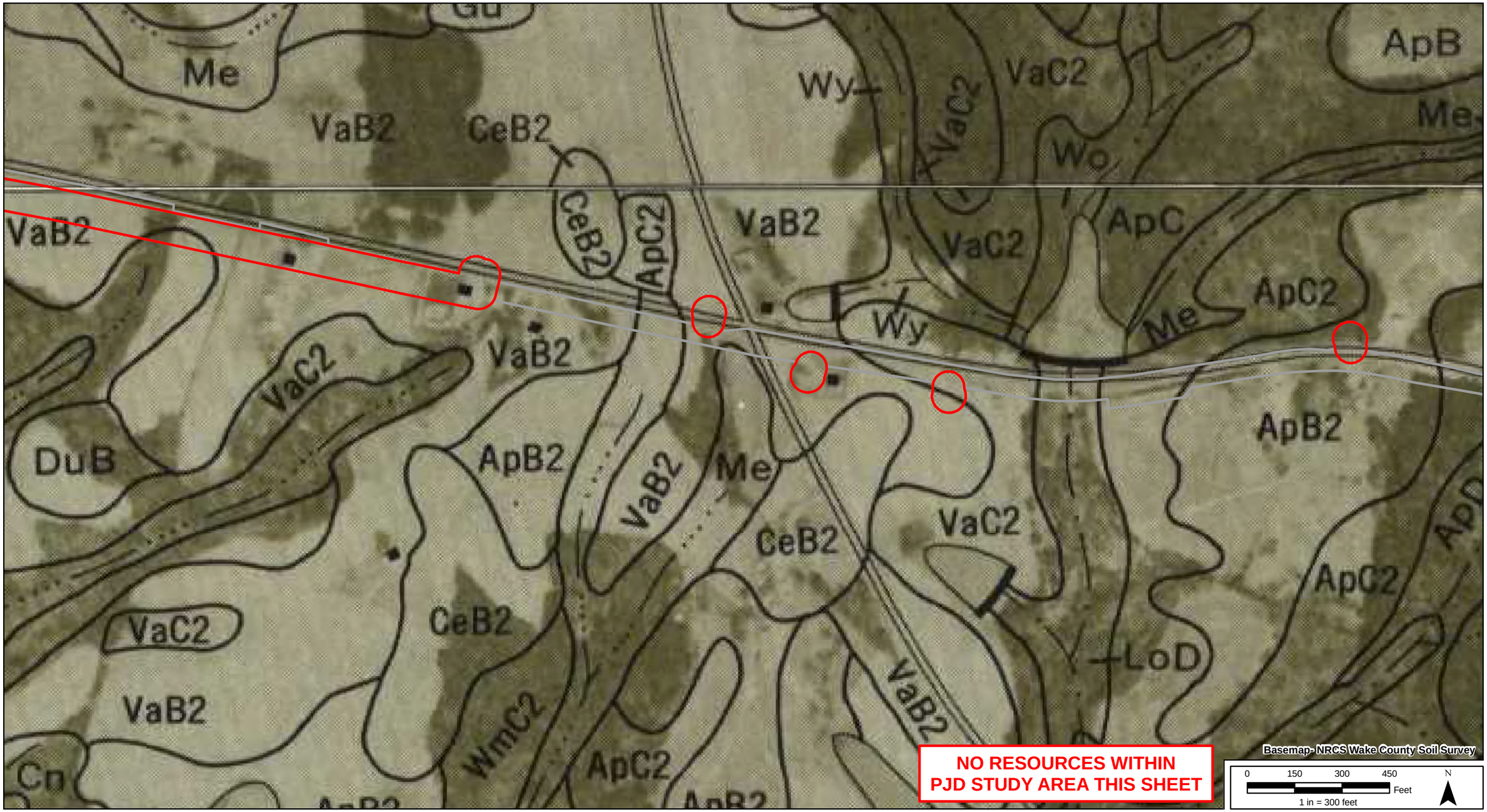

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Knightdale Town-wide Closed Loop System
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WAKE COUNTY, NORTH CAROLINA

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FIGURE 4S

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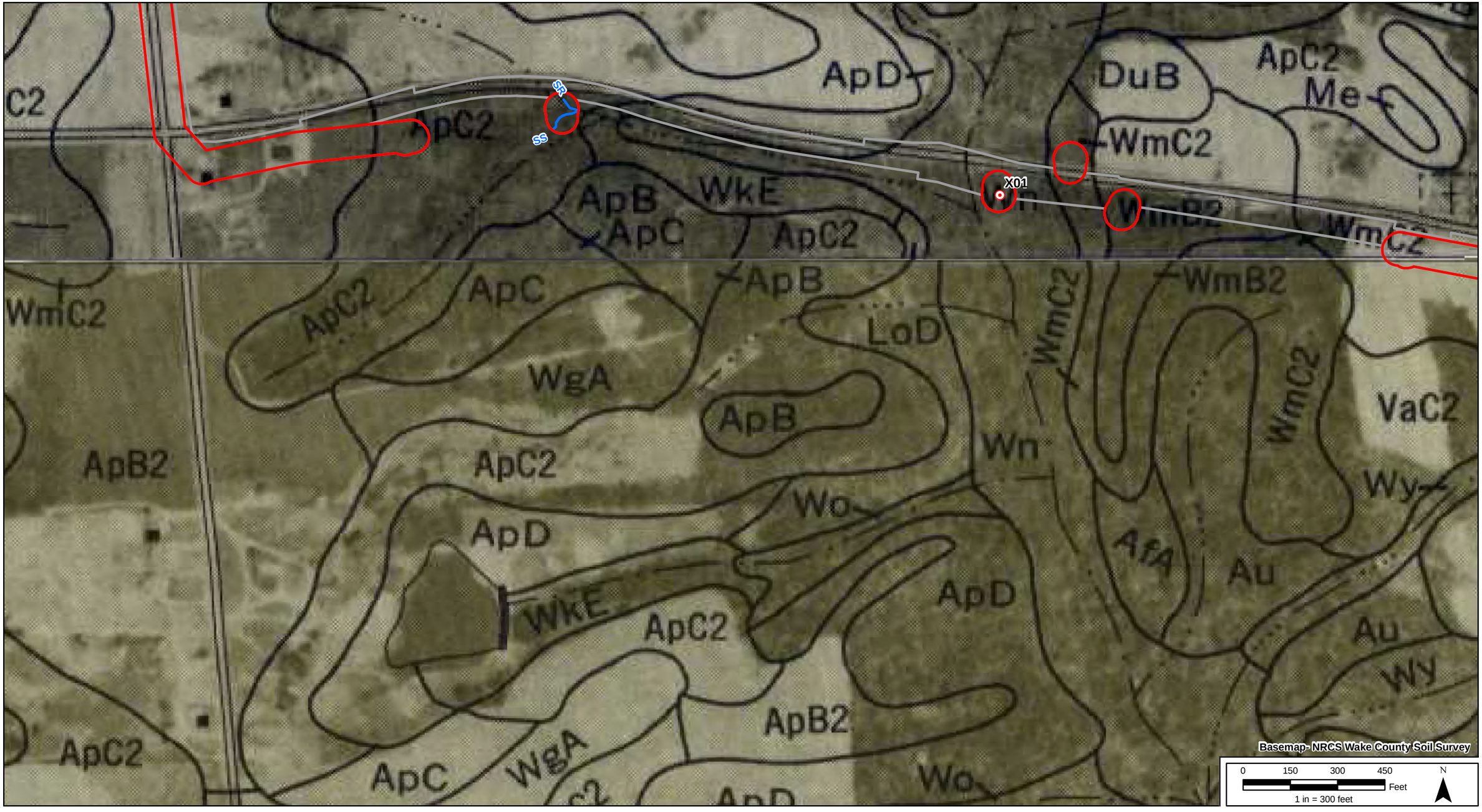

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4T

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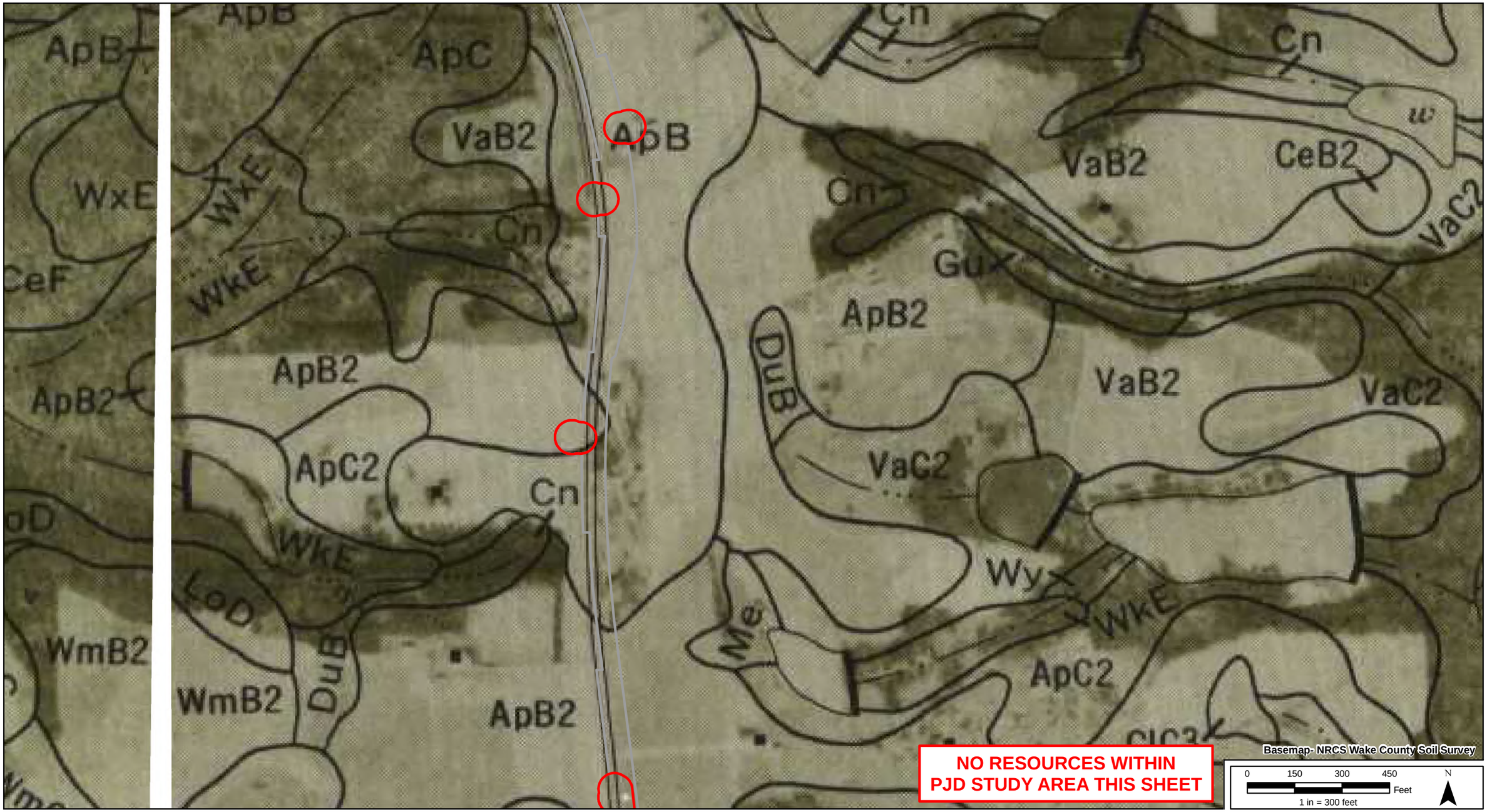

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Knightdale Town-wide Closed Loop System
Project U-6026

WAKE COUNTY, NORTH CAROLINA

Dwn By:	RLG
Ckd By:	BEC
Date:	7/26/2021
Project No.:	100063221

FIGURE 4U

D:\ITS\ITS_Knightdale\Figure4_JD_Soils_v2.mxd

Prepared By: ATKINS

Prepared For: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Project No.:	100063221

FIGURE 4V

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Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD:

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Jason Dilday, Century Center Building A, 1000 Birch Ridge Drive, Raleigh, NC 27610

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: North Carolina County/parish/borough: Wake City: Knightdale

Center coordinates of site (lat/long in degree decimal format):

Lat.: 35.798727 Long.: -78.476707

Universal Transverse Mercator:

Name of nearest waterbody: Neuse River

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

☐ Field Determination. Date(s):

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)

1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

☒ Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: Please refer to Appendix 1.

☐ Data sheets prepared/submitted by or on behalf of the PJD requestor.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report. Rationale: _____.

☐ Data sheets prepared by the Corps: _____.

☐ Corps navigable waters' study: _____.

☐ U.S. Geological Survey Hydrologic Atlas: _____.
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.

☒ U.S. Geological Survey map(s). Cite scale & quad name: 1:24,000 Knightdale Quad.

☒ Natural Resources Conservation Service Soil Survey. Citation: Soil Survey of Wake County, North Carolina, November 1970.

☐ National wetlands inventory map(s). Cite name: _____.

☐ State/local wetland inventory map(s): _____.

☐ FEMA/FIRM maps: _____.

☐ 100-year Floodplain Elevation is: _____.(National Geodetic Vertical Datum of 1929)

☒ Photographs: ☒ Aerial (Name & Date): NC One Map, Aerial flown 2017.
or ☐ Other (Name & Date): _____.

☐ Previous determination(s). File no. and date of response letter: _____.

☐ Other information (please specify): _____.

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Mack C. Rivenbark, III
Digitally signed by Mack C. Rivenbark, III
Date: 2022.09.09 08:36:50 -04'00'

Signature and date of Regulatory staff member completing PJD

Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)[1]

[1] Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

Appendix 3: Tables

Table of Aquatic Resources in Review Area which "May Be" Subject to Regulatory Jurisdiction

Characteristics of Streams within the Study Area

Characteristics of Wetlands within the Study Area

Surface Water Characteristics

Aquatic Upload Table

Table of Aquatic Resources in Review Area which "May Be" Subject to Regulatory Jurisdiction

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acres/linear feet)	Type of Aquatic Resource (Wetland/Non-Wetland)	Geographic Authority to which the Aquatic Resource "May Be" Subject (Section 404 or Section 10/404)
SD	35.80645	-78.46434	85 lf	Non-Wetland	Section 404
SI	35.77328	-78.47217	413 lf	Non-Wetland	Section 404
SR	35.75451	-78.51303	62 lf	Non-Wetland	Section 404
SS	35.75451	-78.51303	114 lf	Non-Wetland	Section 404
Poplar Creek	35.77344	-78.47333	88 lf	Non-Wetland	Section 404
WB	35.79871	-78.47691	0.13 ac	Wetland	Section 404
WC	35.77352	-78.47343	0.05 ac	Wetland	Section 404
WD	35.77335	-78.47307	0.24 ac	Wetland	Section 404

Characteristics of Streams in the Study Area

Map ID	Length (ft.)	Classification	Compensatory Mitigation Required	River Basin Buffer
SD	85	Perennial	Undetermined	Subject
SI	413	Perennial	Undetermined	Subject
SR	62	Intermittent	Undetermined	Subject
SS	114	Intermittent	Undetermined	Subject
Poplar Creek	88	Perennial	Undetermined	Subject
Total	**762**			

Characteristics of Wetlands in the Study Area

Map ID	NCWAM Classification	NCWAM Rating	Hydrologic Classification	Area (ac.) in Study Area
WB	Headwater Forest	Low	Riparian	0.13
WC	Bottomland Hardwood Forest	Low	Riparian	0.05
WD	Headwater Forest	Medium	Riparian	0.24
			Total	**0.42**

Waters_Name	State	Cowardin_Code	HGM_Code	Meas_Type	Amount	Units	Waters_Type	Latitude	Longitude	Local_Waterway
SD	NORTH CAROLINA	R3UB	RIVERINE	Linear	85	FOOT	RPW	35.80645	-78.46434	Marks Creek
SI	NORTH CAROLINA	R3UB	RIVERINE	Linear	413	FOOT	RPWWD	35.77328	-78.47217	Poplar Creek
SR	NORTH CAROLINA	R4SB	RIVERINE	Linear	62	FOOT	RPW	35.75451	-78.51303	Neuse River
SS	NORTH CAROLINA	R4SB	RIVERINE	Linear	114	FOOT	RPW	35.75451	-78.51303	Neuse River
Poplar Creek	NORTH CAROLINA	R3UB	RIVERINE	Linear	88	FOOT	RPWWD	35.77344	-78.47333	Neuse River
WB	NORTH CAROLINA	PFO	RIVERINE	Area	0.13	ACRE	RPWWN	35.79871	-78.47691	Mingo Creek
WC	NORTH CAROLINA	PSS	RIVERINE	Area	0.05	ACRE	RPWWD	35.77352	-78.47343	Poplar Creek
WD	NORTH CAROLINA	PSS	RIVERINE	Area	0.24	ACRE	RPWWD	35.77335	-78.47307	Poplar Creek

Appendix 4: Field Data Forms

Wetland Determination Data Forms

NCDWQ Stream Identification Forms

NCWAM Data Forms

NCSAM Data Forms

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Knightdale ITS; U-6026 City/County: Wake Sampling Date: 6/7/2021
Applicant/Owner: North Carolina Department of Transportation State: NC Sampling Point: BK03
Investigator(s): B. Cogdell-Atkins Section, Township, Range: Knightdale USGS 1:24,000 Quadrangle
Landform (hillslope, terrace, etc.): flatwoods Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): P-136 Lat: 35.798708 Long: -78.476911 Datum: NAD83
Soil Map Unit Name: CnA-Colfax Sandy Loam NWI classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____
Water Table Present? Yes _____ No X Depth (inches): _____
Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: BK03

Tree Stratum (Plot size: 30' rad.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	40	Yes	FAC
2. Quercus nigra	10	No	FAC
3. Pinus taeda	5	No	FAC
4. Liquidambar styraciflua	5	No	FAC
5.			
6.			
	60	= Total Cover	
50% of total cover: 30		20% of total cover:	12

Sapling Stratum (Plot size: 15' rad.)			
1. Acer rubrum	10	Yes	FAC
2. Liquidambar styraciflua	5	Yes	FAC
3.			
4.			
5.			
6.			
	15	= Total Cover	
50% of total cover: 7.5		20% of total cover:	3

Shrub Stratum (Plot size: 15' rad.)			
1.			
2.			
3.			
4.			
5.			
6.			
	0	= Total Cover	
50% of total cover: N/A		20% of total cover:	N/A

Herb Stratum (Plot size: 5' rad.)			
1. Microstegium vimineum	50	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50	= Total Cover	
50% of total cover: 25		20% of total cover:	10

Woody Vine Stratum (Plot size: 30' rad.)			
1. Smilax rotundifolia	30	Yes	FAC
2. Toxicodendron radicans	20	Yes	FAC
3. Parthenocissus quinquefolia	5	No	FACU
4.			
5.			
	55	= Total Cover	
50% of total cover: 27.5		20% of total cover:	11

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: BK03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/2	100					Clay loam	
2-8	10YR 5/1	80	10YR 7/6	20	C	M	Clay loam	
8-12+	10YR 5/1	100					Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Knightdale ITS; U-6026 City/County: Wake Sampling Date: 6/7/2021
Applicant/Owner: North Carolina Department of Transportation State: NC Sampling Point: BK03
Investigator(s): B. Cogdell-Atkins Section, Township, Range: Knightdale USGS 1:24,000 Quadrangle
Landform (hillslope, terrace, etc.): flatwoods Local relief (concave, convex, none): None Slope (%): 0-3
Subregion (LRR or MLRA): P-136 Lat: 35.798708 Long: -78.476911 Datum: NAD83
Soil Map Unit Name: CnA-Colfax Sandy Loam NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil X, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks: Hardpan beginning at 6" in soil profile. Unable to penetrate beyond 12 inches in sample location.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: BK03

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' rad.)			
1. Liquidambar styraciflua	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling Stratum (Plot size: 15' rad.)			
1. Liquidambar styraciflua	25	Yes	FAC
2. Ulmus rubra	5	No	FAC
3.			
4.			
5.			
6.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 6		
Shrub Stratum (Plot size: 15' rad.)			
1. Rosa multiflora	15	Yes	FACU
2.			
3.			
4.			
5.			
6.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		
Herb Stratum (Plot size: 5' rad.)			
1. Microstegium vimineum	50	Yes	FAC
2. Toxicodendron radicans	20	Yes	FAC
3. Solidago canadensis	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75 = Total Cover		
50% of total cover: 37.5	20% of total cover: 15		
Woody Vine Stratum (Plot size: 30' rad.)			
1. Toxicodendron radicans	10	Yes	FAC
2. Wisteria sinensis	5	No	N/A
3.			
4.			
5.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: BK03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/4	100					Clay loam	
6-12+	10yr 4/5	100					Clay loam	hardpan beginning at 6" depth

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Knightdale ITS; U-6026 City/County: Wake Sampling Date: 6/2/2021
Applicant/Owner: North Carolina Department of Transportation State: NC Sampling Point: BD06
Investigator(s): B. Cogdell-Atkins Section, Township, Range: Knightdale USGS 1:24,000 Quadrangle
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): P-136 Lat: 35.773345 Long: -78.473072 Datum: NAD83
Soil Map Unit Name: CnA-Colfax Sandy Loam NWI classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): 0
Water Table Present? Yes X No _____ Depth (inches): 6
Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): surface

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: BD06

Tree Stratum (Plot size: 30' rad.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	0 = Total Cover		

50% of total cover: N/A 20% of total cover: N/A

Sapling Stratum (Plot size: 15' rad.)			
1.			
2.			
3.			
4.			
5.			
6.			
	0 = Total Cover		

50% of total cover: N/A 20% of total cover: N/A

Shrub Stratum (Plot size: 15' rad.)			
1. Rosa multiflora	20	Yes	FACU
2. Alnus serrulata	15	Yes	OBL
3. Rubus argutus	5	No	FACU
4. Acer rubrum	5	No	FAC
5. Morella cerifera	5	No	FAC
6.			
	50 = Total Cover		

50% of total cover: 25 20% of total cover: 10

Herb Stratum (Plot size: 5' rad.)			
1. Carex lupulina	50	Yes	OBL
2. Juncus effusus	20	Yes	FACW
3. Woodwardia areolata	5	No	FACW
4. Impatiens capensis	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	80 = Total Cover		

50% of total cover: 40 20% of total cover: 16

Woody Vine Stratum (Plot size: 30' rad.)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

50% of total cover: N/A 20% of total cover: N/A

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: BD06

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/3	100					Loam	
2-6	10RY 5/1	90	10YR 5/6	10	C	M	Clay loam	
6-18+	10YR 6/1	95	10YR 5/6	5	C	M	Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Knightdale ITS; U-6026 City/County: Wake Sampling Date: 06/02/2021
Applicant/Owner: North Carolina Department of Transportation State: NC Sampling Point: BD06
Investigator(s): B. Cogdell-Atkins Section, Township, Range: Knightdale USGS 1:24,000 Quadrangle
Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Fillslope Slope (%): 0-3
Subregion (LRR or MLRA): P-136 Lat: 35.773345 Long: -78.473072 Datum: NAD83
Soil Map Unit Name: CnA-Colfax Sandy Loam NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil X, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks: Data form location occurs at wetland boundary along roadside toe of slope. Soil is largely comprised of fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: BD06

Tree Stratum (Plot size: 30' rad.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	0 = Total Cover		
50% of total cover: N/A	20% of total cover: N/A		
Sapling Stratum (Plot size: 15' rad.)			
1.			
2.			
3.			
4.			
5.			
6.			
	0 = Total Cover		
50% of total cover: N/A	20% of total cover: N/A		
Shrub Stratum (Plot size: 15' rad.)			
1.			
2.			
3.			
4.			
5.			
6.			
	0 = Total Cover		
50% of total cover: N/A	20% of total cover: N/A		
Herb Stratum (Plot size: 5' rad.)			
1. Paspalum notatum	60	Yes	FACU
2. Taraxacum officinale	10	No	FACU
3. Salanum carolinense	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75 = Total Cover		
50% of total cover: 37.5	20% of total cover: 15		
Woody Vine Stratum (Plot size: 30' rad.)			
1. Rosa multiflora	5	Yes	FACU
2. Parthenocissus quinquefolia	5	Yes	FACU
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	0	x 2 =	
FAC species	0	x 3 =	
FACU species	85	x 4 =	340
UPL species	0	x 5 =	
Column Totals:	85 (A)		340 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: BD06

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/3	100					Clay Loam	
6-12+	Roadside Fill							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Knightdale ITS; U-6026 City/County: Wake Sampling Date: 6/7/2021
Applicant/Owner: North Carolina Department of Transportation State: NC Sampling Point: X01
Investigator(s): B. Cogdell-Atkins Section, Township, Range: Raleigh East USGS 1:24,000 Quadrangle
Landform (hillslope, terrace, etc.): flatwoods Local relief (concave, convex, none): None Slope (%): 0-2
Subregion (LRR or MLRA): P-136 Lat: 35.753859 Long: -78.508306 Datum: NAD83
Soil Map Unit Name: WnA-Colfax Wehadkee Silt Loam NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks: Maintained turf/lawn dominated by fescue

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: X01

Tree Stratum (Plot size: 30' rad.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	0 = Total Cover		
50% of total cover: N/A	20% of total cover: N/A		
Sapling Stratum (Plot size: 15' rad.)			
1.			
2.			
3.			
4.			
5.			
6.			
	0 = Total Cover		
50% of total cover: N/A	20% of total cover: N/A		
Shrub Stratum (Plot size: 15' rad.)			
1.			
2.			
3.			
4.			
5.			
6.			
	0 = Total Cover		
50% of total cover: N/A	20% of total cover: N/A		
Herb Stratum (Plot size: 5' rad.)			
1. Festuca rubra	85	Yes	FACU
2. Eupotorium Capillioflium	10	No	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95 = Total Cover		
50% of total cover: 47.5	20% of total cover: 19		
Woody Vine Stratum (Plot size: 30' rad.)			
1. Rubus argutus	10	Yes	FACU
2.			
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	105	x 4 =	420
UPL species	0	x 5 =	0
Column Totals:	105 (A)		420 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: X01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/4	100					Clay loam	
6-12+	10yr 4/5	100					Clay loam	hardpan beginning at 6" depth

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

0-6 10YR 4/4 100 Clay loam

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Knightdale ITS: U-6026 City/County: Wake Sampling Date: 6/7/2021
Applicant/Owner: North Carolina Department of Transportation State: NC Sampling Point: X102
Investigator(s): B. Cogdell-Atkins Section, Township, Range: Raleigh East USGS 1:24,000 Quadrangle
Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2
Subregion (LRR or MLRA): P-136 Lat: 35.748601 Long: -78.466894 Datum: NAD83
Soil Map Unit Name: MeA-Mantachie Sandy Loam NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: X102

Tree Stratum (Plot size: 30' rad.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus shumardii	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		
Sapling Stratum (Plot size: 15' rad.)			
1. Juniperus virginiana	10	Yes	FACU
2. Rhus copallinum	5	Yes	FACU
3.			
4.			
5.			
6.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		
Shrub Stratum (Plot size: 15' rad.)			
1. Juniperus virginiana	5	Yes	FACU
2. Rhus copallinum	5	Yes	FACU
3.			
4.			
5.			
6.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		
Herb Stratum (Plot size: 5' rad.)			
1. Sorghum halepense	40	Yes	FACU
2. Daucus carolta	10	Yes	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 = Total Cover		
50% of total cover: 25	20% of total cover: 10		
Woody Vine Stratum (Plot size: 30' rad.)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: N/A	20% of total cover: N/A		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 14 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	65	x 4 =	260
UPL species	10	x 5 =	50
Column Totals:	90 (A)		355 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: X102

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/4	100					Clay Loam	
6-12	10YR 4/5	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** X

Remarks:

NC DWQ Stream Identification Form Version 4.11

Date: 06/07/2021	**Project/Site**: Knightdale ITS	**Latitude:** 35.806449
Evaluator: B. Cogdell-Atkins	**County:** Wake	**Longitude:** -78.464335
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** *e.g. Quad Name*: Knightdale

A. Geomorphology (Subtotal = 14.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	0	1	(2)	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	No = (0)		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	1	(2)	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = (3)	

C. Biology (Subtotal = 6)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = (0)			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 6/2/2021 4:00:00 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.773278604666601**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.472166989666604**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 31.25	**Stream Determination** **Perennial**	**Other** *e.g. Quad Name*: Knightdale

A. Geomorphology (Subtotal = 15.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank			Moderate (2)	
2. Sinuosity of channel along thalweg				Strong (3)
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence			Moderate (2)	
4. Particle size of stream substrate		Weak (1)		
5. Active/relict floodplain				Strong (3)
6. Depositional bars or benches			Moderate (2)	
7. Recent alluvial deposits		Weak (1)		
8. Headcuts	Absent (0)			
9. Grade control	Absent (0)			
10. Natural valley			Strong (1.5)	
11. Second or greater order channel	No (0)			

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)	
12. Presence of Baseflow	Strong (3)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Absent (1.5)
15. Sediment on plants or debris	Weak (0.5)
16. Organic debris lines or piles	Moderate (1)
17. Soil-based evidence of high water table?	Yes (3)

C. Biology (Subtotal = 6.75)	
18. Fibrous roots in streambed	Absent (3)
19. Rooted upland plants in streambed	Absent (3)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	FACW (0.75)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Within wetland BB

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 6/2/2021 4:00:00 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.754506150833301**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.513027425000004**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 28	**Stream Determination** **Intermittent**	**Other** *e.g. Quad Name*: Raleigh East

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank			Moderate (2)	
2. Sinuosity of channel along thalweg			Moderate (2)	
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence		Weak (1)		
4. Particle size of stream substrate		Weak (1)		
5. Active/relict floodplain		Weak (1)		
6. Depositional bars or benches			Moderate (2)	
7. Recent alluvial deposits			Moderate (2)	
8. Headcuts	Absent (0)			
9. Grade control				Strong (1.5)
10. Natural valley				Strong (1.5)
11. Second or greater order channel	No (0)			

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)	
12. Presence of Baseflow	Moderate (2)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Absent (1.5)
15. Sediment on plants or debris	Strong (1.5)
16. Organic debris lines or piles	Moderate (1)
17. Soil-based evidence of high water table?	Yes (3)

C. Biology (Subtotal = 5)	
18. Fibrous roots in streambed	Weak (2)
19. Rooted upland plants in streambed	Absent (3)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	Other (0)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

SS

NC DWQ Stream Identification Form Version 4.11

Date: 6/2/2021 5:56:23 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.754506150833301**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.513027425000004**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 28	**Stream Determination** **Intermittent**	**Other** *e.g. Quad Name*:Raleigh East

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank			Moderate (2)	
2. Sinuosity of channel along thalweg			Moderate (2)	
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence		Weak (1)		
4. Particle size of stream substrate		Weak (1)		
5. Active/relict floodplain		Weak (1)		
6. Depositional bars or benches			Moderate (2)	
7. Recent alluvial deposits			Moderate (2)	
8. Headcuts	Absent (0)			
9. Grade control				Strong (1.5)
10. Natural valley				Strong (1.5)
11. Second or greater order channel	No (0)			

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)	
12. Presence of Baseflow	Moderate (2)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Absent (1.5)
15. Sediment on plants or debris	Strong (1.5)
16. Organic debris lines or piles	Moderate (1)
17. Soil-based evidence of high water table?	Yes (3)

C. Biology (Subtotal = 5)	
18. Fibrous roots in streambed	Weak (2)
19. Rooted upland plants in streambed	Absent (3)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	Other (0)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 6/2/2021 3:22:43 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.773441326166598**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.473331647666598**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 36.5	**Stream Determination** **Perennial**	**Other** *e.g. Quad Name*: Knightdale

A. Geomorphology (Subtotal = 21.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank			Strong (3)	
2. Sinuosity of channel along thalweg			Moderate (2)	
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence			Moderate (2)	
4. Particle size of stream substrate			Moderate (2)	
5. Active/relict floodplain			Strong (3)	
6. Depositional bars or benches			Strong (3)	
7. Recent alluvial deposits			Moderate (2)	
8. Headcuts			Absent (0)	
9. Grade control			Absent (0)	
10. Natural valley			Strong (1.5)	
11. Second or greater order channel			Yes (3)	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)	
12. Presence of Baseflow	Strong (3)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Absent (1.5)
15. Sediment on plants or debris	Moderate (1)
16. Organic debris lines or piles	Weak (0.5)
17. Soil-based evidence of high water table?	Yes (3)

C. Biology (Subtotal = 6)	
18. Fibrous roots in streambed	Absent (3)
19. Rooted upland plants in streambed	Absent (3)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	Other (0)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

X100

NC DWQ Stream Identification Form Version 4.11

Date: 6/7/2021 4:00:00 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.803055106695503**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.468646500332696**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 13.5	**Stream Determination** Ephemeral	**Other** *e.g. Quad Name*: *Knightdale*

A. Geomorphology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank		Weak (1)		
2. Sinuosity of channel along thalweg		Weak (1)		
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence		Weak (1)		
4. Particle size of stream substrate		Weak (1)		
5. Active/relict floodplain		Weak (1)		
6. Depositional bars or benches		Absent (0)		
7. Recent alluvial deposits		Weak (1)		
8. Headcuts		Absent (0)		
9. Grade control		Absent (0)		
10. Natural valley			Strong (1.5)	
11. Second or greater order channel		No (0)		

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3)	
12. Presence of Baseflow	Absent (0)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Weak (1)
15. Sediment on plants or debris	Moderate (1)
16. Organic debris lines or piles	Moderate (1)
17. Soil-based evidence of high water table?	No (0)

C. Biology (Subtotal = 3)	
18. Fibrous roots in streambed	Moderate (1)
19. Rooted upland plants in streambed	Weak (2)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	Other (0)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

X101

NC DWQ Stream Identification Form Version 4.11

Date: 6/7/2021 4:00:00 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.795469672561403**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.522320196828105**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 14.5	**Stream Determination** Ephemeral	**Other** *e.g. Quad Name*: *Raleigh East*

A. Geomorphology (Subtotal = 7)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank		Weak (1)		
2. Sinuosity of channel along thalweg		Weak (1)		
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence		Absent (0)		
4. Particle size of stream substrate			Moderate (2)	
5. Active/relict floodplain		Weak (1)		
6. Depositional bars or benches		Absent (0)		
7. Recent alluvial deposits		Weak (1)		
8. Headcuts		Absent (0)		
9. Grade control		Absent (0)		
10. Natural valley			Moderate (1)	
11. Second or greater order channel		No (0)		

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 1.5)	
12. Presence of Baseflow	Absent (0)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Weak (1)
15. Sediment on plants or debris	Weak (0.5)
16. Organic debris lines or piles	Absent (0)
17. Soil-based evidence of high water table?	No (0)

C. Biology (Subtotal = 6)	
18. Fibrous roots in streambed	Absent (3)
19. Rooted upland plants in streambed	Absent (3)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	Other (0)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

X103

NC DWQ Stream Identification Form Version 4.11

Date: 6/7/2021 4:00:00 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.747971787982998**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.457685272279406**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 3	**Stream Determination** **Ephemeral**	**Other** *e.g. Quad Name*: *Clayton*

A. Geomorphology (Subtotal = 1.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	Absent (0)			
2. Sinuosity of channel along thalweg	Absent (0)			
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	Absent (0)			
4. Particle size of stream substrate	Absent (0)			
5. Active/relict floodplain		Weak (1)		
6. Depositional bars or benches	Absent (0)			
7. Recent alluvial deposits	Absent (0)			
8. Headcuts	Absent (0)			
9. Grade control	Absent (0)			
10. Natural valley		Weak (0.5)		
11. Second or greater order channel	No (0)			

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 1.5)	
12. Presence of Baseflow	Absent (0)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Absent (1.5)
15. Sediment on plants or debris	Absent (0)
16. Organic debris lines or piles	Absent (0)
17. Soil-based evidence of high water table?	No (0)

C. Biology (Subtotal = 0)	
18. Fibrous roots in streambed	Strong (0)
19. Rooted upland plants in streambed	Strong (0)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	Other (0)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

X104

NC DWQ Stream Identification Form Version 4.11

Date: 6/1/2021 4:00:00 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.779204014500003**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.478151124500002**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 10.5	**Stream Determination** Ephemeral	**Other** *e.g. Quad Name*: *Knightdale*

A. Geomorphology (Subtotal = 4.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank		Weak (1)		
2. Sinuosity of channel along thalweg		Weak (1)		
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence		Absent (0)		
4. Particle size of stream substrate		Weak (1)		
5. Active/relict floodplain		Absent (0)		
6. Depositional bars or benches		Absent (0)		
7. Recent alluvial deposits		Weak (1)		
8. Headcuts		Absent (0)		
9. Grade control		Absent (0)		
10. Natural valley		Weak (0.5)		
11. Second or greater order channel		No (0)		

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 4)	
12. Presence of Baseflow	Absent (0)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Strong (0)
15. Sediment on plants or debris	Weak (0.5)
16. Organic debris lines or piles	Weak (0.5)
17. Soil-based evidence of high water table?	Yes (3)

C. Biology (Subtotal = 2)	
18. Fibrous roots in streambed	Moderate (1)
19. Rooted upland plants in streambed	Moderate (1)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	Other (0)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Privet in channel, turns into wetland outside SA boundary

Sketch:

X105

NC DWQ Stream Identification Form Version 4.11

Date: 6/1/2021 4:00:00 PM	**Project/Site**: Knightdale ITS	**Latitude: 35.789646550999997**
Evaluator: Ben Cogdell, Rainor Gresham	**County: Wake**	**Longitude: -78.483314693500006**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 125	**Stream Determination** **Ephemeral**	**Other** *e.g. Quad Name*: *Knightdale*

A. Geomorphology (Subtotal = 4.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank			Moderate (2)	
2. Sinuosity of channel along thalweg		Weak (1)		
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	Absent (0)			
4. Particle size of stream substrate	Absent (0)			
5. Active/relict floodplain		Weak (1)		
6. Depositional bars or benches	Absent (0)			
7. Recent alluvial deposits	Absent (0)			
8. Headcuts	Absent (0)			
9. Grade control	Absent (0)			
10. Natural valley		Weak (0.5)		
11. Second or greater order channel	No (0)			

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 2)	
12. Presence of Baseflow	Absent (0)
13. Iron oxidizing bacteria	Absent (0)
14. Leaf litter	Absent (1.5)
15. Sediment on plants or debris	Weak (0.5)
16. Organic debris lines or piles	Absent (0)
17. Soil-based evidence of high water table?	No (0)

C. Biology (Subtotal = 6)	
18. Fibrous roots in streambed	Absent (3)
19. Rooted upland plants in streambed	Absent (3)
20. Macrobenthos (note diversity and abundance)	Absent (0)
21. Aquatic Mollusks	Absent (0)
22. Fish	Absent (0)
23. Crayfish	Absent (0)
24. Amphibians	Absent (0)
25. Algae	Absent (0)
26. Wetland plants in streambed	Other (0)

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Concrete flume

Sketch:

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name		Date of Evaluation	6/7/2021
Applicant/Owner Name	NCDOT	Wetland Site Name	WB
Wetland Type	Headwater Forest	Assessor Name/Organization	B. Cogdell - Atkins
Level III Ecoregion	Piedmont	Nearest Named Water Body	Mingo Creek
River Basin	Neuse	USGS 8-Digit Catalogue Unit	03020201
County	Wake	NCDWR Region	Raleigh
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.798708, -78.476911

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☒A Soil ribbon < 1 inch
- ☐B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☒A	☒A	☒A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☐Yes ☒No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☐≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☐No

7e. Is stream or other open water sheltered or exposed?
- ☐Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☒C	☒C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☒I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☐K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☒C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☒B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☒B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☒A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☒A	☒A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

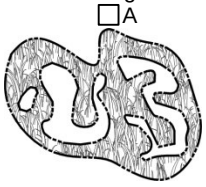
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

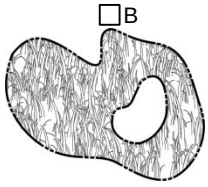
Include both natural debris and man-placed natural debris.

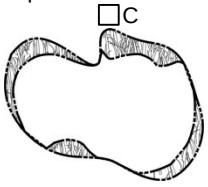
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

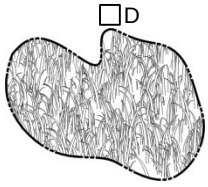
21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A 

☐B 

☐C 

☐D 

22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☒C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WB	Date of Assessment	6/7/2021
Wetland Type	Headwater Forest	Assessor Name/Organization	B. Cogdell - Atkins

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	NO
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	NO
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**HIGH**
Water Quality	Pathogen Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**MEDIUM**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**MEDIUM**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**LOW**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name		Date of Evaluation	6/2/2021
Applicant/Owner Name	NCDOT	Wetland Site Name	WC
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	B. Cogdell-Atkins
Level III Ecoregion	Piedmont	Nearest Named Water Body	Poplar Creek
River Basin	Neuse	USGS 8-Digit Catalogue Unit	03020201
County	Wake	NCDWR Region	Raleigh
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.773515, -78.473433

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☒ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☒A	Water storage capacity and duration are not altered.
☒B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☒A Soil ribbon < 1 inch
- ☐B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☒A	☒A	☒A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☒D	☒D	☒D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☒A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☒Yes ☐No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☒E	☒E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☒J	From 0.01 to < 0.1 acre
☐K	☐K	☐K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☒C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☒B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☒B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☒B	☒B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☒A	☒A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

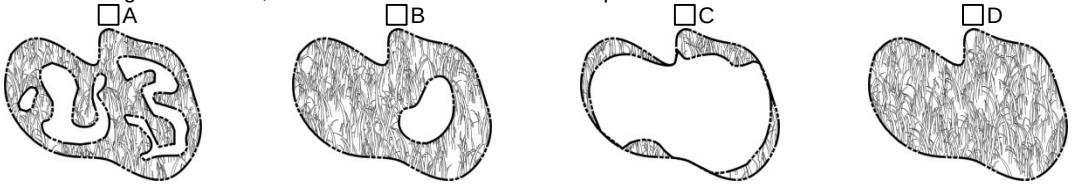
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☒C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WC	Date of Assessment	6/2/2021
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	B. Cogdell-Atkins

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	YES
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**MEDIUM**
Water Quality	Pathogen Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**MEDIUM**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**MEDIUM**
	Condition/Opportunity	**MEDIUM**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name		Date of Evaluation	6/2/2021
Applicant/Owner Name	NCDOT	Wetland Site Name	WD
Wetland Type	Headwater Forest	Assessor Name/Organization	B. Cogdell-Atkins
Level III Ecoregion	Piedmont	Nearest Named Water Body	Poplar Creek
River Basin	Neuse	USGS 8-Digit Catalogue Unit	03020201
County	Wake	NCDWR Region	Raleigh
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.773345, -78.473072

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☐ Federally protected species or State endangered or threatened species
☒ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☒A	Water storage capacity and duration are not altered.
☒B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☒A Soil ribbon < 1 inch
- ☐B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☒A	☒A	☒A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☒D	☒D	☒D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☒C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☒Yes ☐No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☒C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☒E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☒B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☒A	☒A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

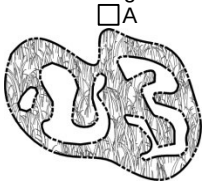
☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

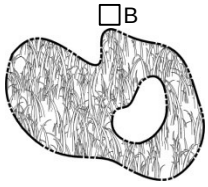
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

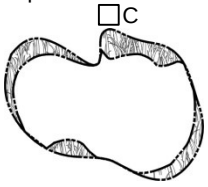
Include both natural debris and man-placed natural debris.
☒A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☐B Not A

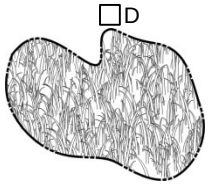
21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A 

☐B 

☐C 

☐D 

22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☒C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WD	Date of Assessment	6/2/2021
Wetland Type	Headwater Forest	Assessor Name/Organization	B. Cogdell-Atkins

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	NO
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**HIGH**
Water Quality	Pathogen Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**MEDIUM**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**MEDIUM**
	Condition/Opportunity	**MEDIUM**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **MEDIUM**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Knightdale ITS
2. Date of evaluation: 06/07/2021
3. Applicant/owner name: NCDOT
4. Assessor name/organization: B. Cogdell-Atkins
5. County: Wake
6. Nearest named water body on USGS 7.5-minute quad: Mark's Creek
7. River basin: Neuse
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.806449, -78.464335

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): SD
10. Length of assessment reach evaluated (feet): 85
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 5
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐ Mountains (M) ☒ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**): ☒A  (more sinuous stream, flatter valley slope) ☐B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi^2) ☒Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
    - ☐Section 10 water
    - ☐Classified Trout Waters
    - ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
    - ☐Essential Fish Habitat
    - ☐Primary Nursery Area
    - ☐ High Quality Waters/Outstanding Resource Waters
    - ☐Publicly owned property
    - ☒NCDWR Riparian buffer rule in effect
    - ☐Nutrient Sensitive Waters
    - ☐Anadromous fish
    - ☐303(d) List
    - ☐CAMA Area of Environmental Concern (AEC)
    - ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
    - ☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☐Yes ☒No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- ☒A Water throughout assessment reach.
- ☐B No flow, water in pools only.
- ☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric

- ☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☒B Not A

4. Feature Longitudinal Profile – assessment reach metric

- ☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- ☐A < 10% of channel unstable
- ☒B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☒C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☒B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☐F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☒Yes ☐No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☒Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☒	☐	☐	☐	☐	Cobble (64 – 256 mm)
☐	☒	☐	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☐	☒	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☐	☒	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☒Yes ☐No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☒Yes ☐No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☒	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☒C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☒A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☐E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☒D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☐F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☒B Degraded (example: scattered trees)
- ☐C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☐A	☐A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☒B	☐B	☒B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☒E	☐E	☒E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☒D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☒B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☐A	☒A	Medium to high stem density
☒B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☒Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Knightdale ITS	Date of Assessment	06/07/2021
Stream Category	Pa2	Assessor Name/Organization	B. Cogdell-Atkins

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	
(2) Baseflow	**HIGH**	
(2) Flood Flow	**LOW**	
(3) Streamside Area Attenuation	**LOW**	
(4) Floodplain Access	**LOW**	
(4) Wooded Riparian Buffer	**MEDIUM**	
(4) Microtopography	**LOW**	
(3) Stream Stability	**LOW**	
(4) Channel Stability	**MEDIUM**	
(4) Sediment Transport	**LOW**	
(4) Stream Geomorphology	**MEDIUM**	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	**LOW**	
(2) Baseflow	**HIGH**	
(2) Streamside Area Vegetation	**LOW**	
(3) Upland Pollutant Filtration	**LOW**	
(3) Thermoregulation	**MEDIUM**	
(2) Indicators of Stressors	**NO**	
(2) Aquatic Life Tolerance	**LOW**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**LOW**	
(2) In-stream Habitat	**LOW**	
(3) Baseflow	**HIGH**	
(3) Substrate	**MEDIUM**	
(3) Stream Stability	**MEDIUM**	
(3) In-stream Habitat	**LOW**	
(2) Stream-side Habitat	**LOW**	
(3) Stream-side Habitat	**LOW**	
(3) Thermoregulation	**MEDIUM**	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	**LOW**	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Knightdale ITS
2. Date of evaluation: 6/2/2021
3. Applicant/owner name: NCDOT
4. Assessor name/organization: B. Cogdell - Atkins
5. County: Wake
6. Nearest named water body on USGS 7.5-minute quad: Poplar Creek
7. River basin: Neuse
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.773278, -78.472166

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): SI
10. Length of assessment reach evaluated (feet): 413
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐ Mountains (M) ☒ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**): ☒A  (more sinuous stream, flatter valley slope) ☐B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi^2) ☒Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
    - ☐Section 10 water
    - ☐Classified Trout Waters
    - ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
    - ☐Essential Fish Habitat
    - ☐Primary Nursery Area
    - ☐ High Quality Waters/Outstanding Resource Waters
    - ☐Publicly owned property
    - ☒NCDWR Riparian buffer rule in effect
    - ☐Nutrient Sensitive Waters
    - ☐Anadromous fish
    - ☐303(d) List
    - ☐CAMA Area of Environmental Concern (AEC)
    - ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
    - ☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☐Yes ☒No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- ☒A Water throughout assessment reach.
- ☐B No flow, water in pools only.
- ☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric

- ☒A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☐B Not A

4. Feature Longitudinal Profile – assessment reach metric

- ☐A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☒B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- ☒A < 10% of channel unstable
- ☐B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☒C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☒B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☐F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☐Yes ☒No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☒B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☐Yes ☒No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☒	☐	☐	☐	☐	Cobble (64 – 256 mm)
☒	☐	☐	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☐	☒	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☒Yes ☐No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☐A	☐A	Little or no alteration to water storage capacity over a majority of the streamside area
☒B	☒B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☒Y	☒Y	Are wetlands present in the streamside area?
☐N	☐N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

☒A	Streams and/or springs (jurisdictional discharges)
☐B	Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
☐C	Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
☐D	Evidence of bank seepage or sweating (iron in water indicates seepage)
☐E	Stream bed or bank soil reduced (dig through deposited sediment if present)
☐F	None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

☐A	Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
☐B	Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
☐C	Urban stream (≥ 24% impervious surface for watershed)
☒D	Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
☐E	Assessment reach relocated to valley edge
☐F	None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

☐A	Stream shading is appropriate for stream category (may include gaps associated with natural processes)
☒B	Degraded (example: scattered trees)
☐C	Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
☐A	☐A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☒C	☒C	☒C	☒C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☒D	☒D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☒B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☒A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☒Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Knightdale ITS	Date of Assessment	6/2/2021
Stream Category	Pa2	Assessor Name/Organization	B. Cogdell - Atkins

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	
(2) Baseflow	**MEDIUM**	
(2) Flood Flow	**LOW**	
(3) Streamside Area Attenuation	**LOW**	
(4) Floodplain Access	**LOW**	
(4) Wooded Riparian Buffer	**HIGH**	
(4) Microtopography	**LOW**	
(3) Stream Stability	**MEDIUM**	
(4) Channel Stability	**HIGH**	
(4) Sediment Transport	**LOW**	
(4) Stream Geomorphology	**MEDIUM**	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	**LOW**	
(2) Baseflow	**MEDIUM**	
(2) Streamside Area Vegetation	**LOW**	
(3) Upland Pollutant Filtration	**LOW**	
(3) Thermoregulation	**MEDIUM**	
(2) Indicators of Stressors	**NO**	
(2) Aquatic Life Tolerance	**LOW**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**LOW**	
(2) In-stream Habitat	**LOW**	
(3) Baseflow	**MEDIUM**	
(3) Substrate	**LOW**	
(3) Stream Stability	**HIGH**	
(3) In-stream Habitat	**LOW**	
(2) Stream-side Habitat	**LOW**	
(3) Stream-side Habitat	**LOW**	
(3) Thermoregulation	**MEDIUM**	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	**LOW**	

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Knightdale ITS
2. Date of evaluation: 06/02/2021
3. Applicant/owner name: NCDOT
4. Assessor name/organization: B. Cogdell - Atkins
5. County: Wake
6. Nearest named water body on USGS 7.5-minute quad: Neuse River
7. River basin: Neuse
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.754506, -78.513027

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): SR
10. Length of assessment reach evaluated (feet): 62
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐ Mountains (M) ☒ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
    ☐A  (more sinuous stream, flatter valley slope)
    ☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
    - ☐Section 10 water
    - ☐Classified Trout Waters
    - ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
    - ☐Essential Fish Habitat
    - ☐Primary Nursery Area
    - ☐ High Quality Waters/Outstanding Resource Waters
    - ☐Publicly owned property
    - ☐NCDWR Riparian buffer rule in effect
    - ☐Nutrient Sensitive Waters
    - ☐Anadromous fish
    - ☐303(d) List
    - ☐CAMA Area of Environmental Concern (AEC)
    - ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
    - ☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☐Yes ☒No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- ☒A Water throughout assessment reach.
- ☐B No flow, water in pools only.
- ☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric

- ☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☒B Not A

4. Feature Longitudinal Profile – assessment reach metric

- ☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- ☐A < 10% of channel unstable
- ☒B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☒B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☐F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☒Yes ☐No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☐Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☒	☐	☐	☐	☐	Cobble (64 – 256 mm)
☒	☐	☐	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☐	☒	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☒Yes ☐No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☐C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☒A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☐E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☒B Degraded (example: scattered trees)
- ☐C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☐A	☐A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☒D	☒D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☒D	☒D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☒

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☒A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☒Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Knightdale ITS	Date of Assessment	06/02/2021
Stream Category	Pb1	Assessor Name/Organization	B. Cogdell - Atkins

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**MEDIUM**	**MEDIUM**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	NA	NA
(3) Stream Stability	**LOW**	**LOW**
(4) Channel Stability	**MEDIUM**	**MEDIUM**
(4) Sediment Transport	**LOW**	**LOW**
(4) Stream Geomorphology	**MEDIUM**	**MEDIUM**
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	**HIGH**	**HIGH**
(2) Baseflow	**HIGH**	**HIGH**
(2) Streamside Area Vegetation	**MEDIUM**	**MEDIUM**
(3) Upland Pollutant Filtration	**MEDIUM**	**MEDIUM**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Indicators of Stressors	**NO**	**NO**
(2) Aquatic Life Tolerance	**HIGH**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**LOW**	**LOW**
(2) In-stream Habitat	**LOW**	**LOW**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**LOW**	**LOW**
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(3) In-stream Habitat	**LOW**	**LOW**
(2) Stream-side Habitat	**LOW**	**LOW**
(3) Stream-side Habitat	**LOW**	**LOW**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	**LOW**	**LOW**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Knightdale ITS
2. Date of evaluation: 06/02/2021
3. Applicant/owner name: NCDOT
4. Assessor name/organization: B. Cogdell - Atkins
5. County: Wake
6. Nearest named water body on USGS 7.5-minute quad: Neuse River
7. River basin: Neuse
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.754506, -78.513027

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): SS
10. Length of assessment reach evaluated (feet): 114
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 3
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☐Perennial flow ☒Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐ Mountains (M) ☒ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
    ☐A  (more sinuous stream, flatter valley slope)
    ☒B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☒Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☐Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
    - ☐Section 10 water
    - ☐Classified Trout Waters
    - ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
    - ☐Essential Fish Habitat
    - ☐Primary Nursery Area
    - ☐ High Quality Waters/Outstanding Resource Waters
    - ☐Publicly owned property
    - ☐NCDWR Riparian buffer rule in effect
    - ☐Nutrient Sensitive Waters
    - ☐Anadromous fish
    - ☐303(d) List
    - ☐CAMA Area of Environmental Concern (AEC)
    - ☐Documented presence of a federal and/or state listed protected species within the assessment area. List species:
    - ☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☐Yes ☒No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- ☒A Water throughout assessment reach.
- ☐B No flow, water in pools only.
- ☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric

- ☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☒B Not A

4. Feature Longitudinal Profile – assessment reach metric

- ☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- ☐A < 10% of channel unstable
- ☒B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☐A	☐A	Little or no evidence of conditions that adversely affect reference interaction
☒B	☒B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☒B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☐F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☒Yes ☐No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☐D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☒E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☐Yes ☐No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☒	☐	☐	☐	☐	Cobble (64 – 256 mm)
☒	☐	☐	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☐	☒	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☒	☐	☐	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☒Yes ☐No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☐Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☐Yes ☒No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☐	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☐	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☐Y	☐Y	Are wetlands present in the streamside area?
☒N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☒A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☐E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☐D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☒F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☒B Degraded (example: scattered trees)
- ☐C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated LB	Vegetated RB	Wooded LB	Wooded RB	
☐A	☐A	☐A	☐A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☐C	☐C	☐C	☐C	From 30 to < 50 feet wide
☒D	☒D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☒E	☒E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☐B	☐B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☒D	☒D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☒

Abuts LB	Abuts RB	< 30 feet LB	< 30 feet RB	30-50 feet LB	30-50 feet RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☒A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☐B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☒C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☒Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Knightdale ITS	Date of Assessment	06/02/2021
Stream Category	Pb1	Assessor Name/Organization	B. Cogdell - Atkins

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	NO
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(2) Flood Flow	**LOW**	**LOW**
(3) Streamside Area Attenuation	**LOW**	**LOW**
(4) Floodplain Access	**MEDIUM**	**MEDIUM**
(4) Wooded Riparian Buffer	**LOW**	**LOW**
(4) Microtopography	NA	NA
(3) Stream Stability	**LOW**	**LOW**
(4) Channel Stability	**MEDIUM**	**MEDIUM**
(4) Sediment Transport	**LOW**	**LOW**
(4) Stream Geomorphology	**MEDIUM**	**MEDIUM**
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	**LOW**	**LOW**
(2) Baseflow	**HIGH**	**HIGH**
(2) Streamside Area Vegetation	**MEDIUM**	**MEDIUM**
(3) Upland Pollutant Filtration	**MEDIUM**	**MEDIUM**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Indicators of Stressors	**NO**	**NO**
(2) Aquatic Life Tolerance	**LOW**	**NA**
(2) Intertidal Zone Filtration	NA	NA
(1) Habitat	**LOW**	**LOW**
(2) In-stream Habitat	**LOW**	**LOW**
(3) Baseflow	**HIGH**	**HIGH**
(3) Substrate	**LOW**	**LOW**
(3) Stream Stability	**MEDIUM**	**MEDIUM**
(3) In-stream Habitat	**LOW**	**LOW**
(2) Stream-side Habitat	**LOW**	**LOW**
(3) Stream-side Habitat	**LOW**	**LOW**
(3) Thermoregulation	**MEDIUM**	**MEDIUM**
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	**LOW**	**LOW**

NC SAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 2.1

USACE AID #: NCDWR #:

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT/SITE INFORMATION:

1. Project name (if any): Knightdale ITS
2. Date of evaluation: 06/02/2021
3. Applicant/owner name: NCDOT
4. Assessor name/organization: B. Cogdell-Atkins
5. County: Wake
6. Nearest named water body on USGS 7.5-minute quad: Poplar Creek
7. River basin: Neuse
8. Site coordinates (decimal degrees, at lower end of assessment reach): 35.773441, 78.473331

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Poplar Creek-Upper
10. Length of assessment reach evaluated (feet): 88
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3 ☐Unable to assess channel depth.
12. Channel width at top of bank (feet): 12
13. Is assessment reach a swamp steam? ☐Yes ☐No
14. Feature type: ☒Perennial flow ☐Intermittent flow ☐Tidal Marsh Stream

STREAM CATEGORY INFORMATION:

15. NC SAM Zone: ☐ Mountains (M) ☒ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (**skip for Tidal Marsh Stream**):
☒A  (more sinuous stream, flatter valley slope)
☐B  (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream**) ☐Size 1 (< 0.1 mi^2) ☐Size 2 (0.1 to < 0.5 mi^2) ☒Size 3 (0.5 to < 5 mi^2) ☐Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.
☐Section 10 water ☐Classified Trout Waters ☐Water Supply Watershed (☐I ☐II ☐III ☐IV ☐V)
☐Essential Fish Habitat ☐Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐Publicly owned property ☒NCDWR Riparian buffer rule in effect ☐Nutrient Sensitive Waters
☐Anadromous fish ☐303(d) List ☐CAMA Area of Environmental Concern (AEC)
☐Documented presence of a federal and/or state listed protected species within the assessment area.
List species:
☐Designated Critical Habitat (list species)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☐Yes ☒No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)
- ☒A Water throughout assessment reach.
- ☐B No flow, water in pools only.
- ☐C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric
- ☐A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- ☒B Not A

3. Feature Pattern – assessment reach metric
- ☐A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- ☒B Not A

4. Feature Longitudinal Profile – assessment reach metric
- ☒A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- ☐B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
- ☒A < 10% of channel unstable
- ☐B 10 to 25% of channel unstable
- ☐C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
☒A	☒A	Little or no evidence of conditions that adversely affect reference interaction
☐B	☐B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
☐C	☐C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric
Check all that apply.

- ☐A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☒B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐D Odor (not including natural sulfide odors)
- ☐E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
- ☐F Livestock with access to stream or intertidal zone
- ☐G Excessive algae in stream or intertidal zone
- ☐H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- ☐I Other: _____ (explain in "Notes/Sketch" section)
- ☐J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)
For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☐A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒C No drought conditions

9. Large or Dangerous Stream – assessment reach metric
☐Yes ☒No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric
10a. ☒Yes ☐No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. **Check all that occur** (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- ☐A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- ☐B Multiple sticks and/or leaf packs and/or emergent vegetation
- ☐C Multiple snags and logs (including lap trees)
- ☒D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
- ☐E Little or no habitat

Check for Tidal Marsh Streams Only

- ☐F 5% oysters or other natural hard bottoms
- ☐G Submerged aquatic vegetation
- ☐H Low-tide refugia (pools)
- ☐I Sand bottom
- ☐J 5% vertical bank along the marsh
- ☐K Little or no habitat

**************************************REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS************************************

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☐Yes ☒No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- ☒A Riffle-run section **(evaluate 11c)**
- ☒B Pool-glide section **(evaluate 11d)**
- ☐C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**. Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
☒	☐	☐	☐	☐	Bedrock/saprolite
☒	☐	☐	☐	☐	Boulder (256 – 4096 mm)
☒	☐	☐	☐	☐	Cobble (64 – 256 mm)
☒	☐	☐	☐	☐	Gravel (2 – 64 mm)
☐	☐	☐	☐	☒	Sand (.062 – 2 mm)
☐	☐	☒	☐	☐	Silt/clay (< 0.062 mm)
☐	☐	☒	☐	☐	Detritus
☒	☐	☐	☐	☐	Artificial (rip-rap, concrete, etc.)

11d. ☒Yes ☐No Are pools filled with sediment? (**skip for Size 4 Coastal Plain streams and Tidal Marsh Streams**)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. ☒Yes ☐No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ☐No Water ☐Other: _____

12b. ☒Yes ☐No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1	>1	Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
☒	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles
☐	☐	Caddisfly larvae (T)
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans
☐	☐	Mayfly larvae (E)
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)
☐	☐	Midges/mosquito larvae
☒	☐	Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
☐	☐	Mussels/Clams (not *Corbicula*)
☒	☐	Other fish
☐	☐	Salamanders/tadpoles
☐	☐	Snails
☐	☐	Stonefly larvae (P)
☐	☐	Tipulid larvae
☐	☐	Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB	RB	
☒A	☒A	Little or no alteration to water storage capacity over a majority of the streamside area
☐B	☐B	Moderate alteration to water storage capacity over a majority of the streamside area
☐C	☐C	Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB	RB	
☐A	☐A	Majority of streamside area with depressions able to pond water ≥ 6 inches deep
☐B	☐B	Majority of streamside area with depressions able to pond water 3 to 6 inches deep
☒C	☒C	Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB	RB	
☒Y	☐Y	Are wetlands present in the streamside area?
☐N	☒N	

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of <u>and</u> draining to the assessment reach.

- ☒A Streams and/or springs (jurisdictional discharges)
- ☐B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- ☐C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- ☐D Evidence of bank seepage or sweating (iron in water indicates seepage)
- ☐E Stream bed or bank soil reduced (dig through deposited sediment if present)
- ☐F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- ☐A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- ☐B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- ☐C Urban stream (≥ 24% impervious surface for watershed)
- ☒D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- ☐E Assessment reach relocated to valley edge
- ☐F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- ☐A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- ☒B Degraded (example: scattered trees)
- ☐C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
☐A	☒A	☐A	☒A	≥ 100 feet wide or extends to the edge of the watershed
☐B	☐B	☐B	☐B	From 50 to < 100 feet wide
☒C	☐C	☒C	☐C	From 30 to < 50 feet wide
☐D	☐D	☐D	☐D	From 10 to < 30 feet wide
☐E	☐E	☐E	☐E	< 10 feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
☐A	☐A	Mature forest
☒B	☒B	Non-mature woody vegetation or modified vegetation structure
☐C	☐C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
☐D	☐D	Maintained shrubs
☐E	☐E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☒

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
☐A	☐A	☐A	☐A	☐A	☐A	Row crops
☐B	☐B	☐B	☐B	☐B	☐B	Maintained turf
☐C	☐C	☐C	☐C	☐C	☐C	Pasture (no livestock)/commercial horticulture
☐D	☐D	☐D	☐D	☐D	☐D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

LB	RB	
☒A	☒A	Medium to high stem density
☐B	☐B	Low stem density
☐C	☐C	No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
☒A	☒A	The total length of buffer breaks is < 25 percent.
☐B	☐B	The total length of buffer breaks is between 25 and 50 percent.
☐C	☐C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
☐A	☐A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
☐B	☒B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
☒C	☐C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐Yes ☒No Was conductivity measurement recorded?
If No, select one of the following reasons. ☐No Water ☒Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

☐A < 46 ☐B 46 to < 67 ☐C 67 to < 79 ☐D 79 to < 230 ☐E ≥ 230

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Knightdale ITS	Date of Assessment	06/02/2021
Stream Category	Pa3	Assessor Name/Organization	B. Cogdell-Atkins

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**HIGH**	
(2) Baseflow	**HIGH**	
(2) Flood Flow	**HIGH**	
(3) Streamside Area Attenuation	**HIGH**	
(4) Floodplain Access	**HIGH**	
(4) Wooded Riparian Buffer	**HIGH**	
(4) Microtopography	**LOW**	
(3) Stream Stability	**MEDIUM**	
(4) Channel Stability	**HIGH**	
(4) Sediment Transport	**LOW**	
(4) Stream Geomorphology	**MEDIUM**	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	**MEDIUM**	
(2) Baseflow	**HIGH**	
(2) Streamside Area Vegetation	**HIGH**	
(3) Upland Pollutant Filtration	**HIGH**	
(3) Thermoregulation	**MEDIUM**	
(2) Indicators of Stressors	**NO**	
(2) Aquatic Life Tolerance	**LOW**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**LOW**	
(2) In-stream Habitat	**LOW**	
(3) Baseflow	**HIGH**	
(3) Substrate	**LOW**	
(3) Stream Stability	**MEDIUM**	
(3) In-stream Habitat	**LOW**	
(2) Stream-side Habitat	**HIGH**	
(3) Stream-side Habitat	**HIGH**	
(3) Thermoregulation	**MEDIUM**	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	**MEDIUM**	