Concurrence Point 3
Preferred Alternative Selection (LEDPA)

and

Concurrence Point 4A
Avoidance and Minimization

TIP Project No. R-5808
WBS 46972.1.1

U.S. Route 158 Improvements
From Acorn Hill Road (S.R. 1002) to the Pasquotank County Line
Gates County

April 2020

Purpose of Today's Meeting:

The purpose of this meeting is to discuss Concurrence Points 3 and 4A, identifying the least environmentally damaging practicable alternative (LEDPA) to carry forward as the preferred alternative and documenting avoidance and minimization measures applied to the design of the project.

1. Introduction and Project Overview

1.1 Proposed Action

NCDOT proposes to improve approximately four miles of U.S. 158 in Gates County from Acorn Hill Road (S.R. 1002) to the Pasquotank County Line by widening the existing travel lanes and shoulders as well as stabilizing the side slopes. The proposed project is included in the North Carolina Department of Transportation's (NCDOT) *2020-2029 State Transportation Improvement Program (STIP)* as Project R-5808 with right of way acquisition scheduled to begin in fiscal year (FY) 2021 and construction in FY 2023.

1.2 Updates Since the Last Merger Meeting

The Merger meeting held on April 18, 2019 covered Concurrence Points 2 and 2A. Concurrence was reached on both Concurrence Points (see Section 1.5).

Since the April 2019 Merger meeting, the NCDOT project team has conducted additional field surveys to delineate the water resources on the north side of U.S. 158. These delineations have been field verified by the U.S. Army Corps of Engineers (USACE) and NC Division of Water Resources (NCDWR). The project team has also developed conceptual level designs for three alignment alternatives with estimated construction limits to better quantify anticipated total impacts for purposes of comparing alternatives. The USACE distributed a Public Notice on February 18, 2020 as part of the Section 404 process. No formal written comments were received.

1.3 Meeting Purpose

The purpose of today's meeting is to reach concurrence on the Least Environmentally Damaging Practicable Alternative (LEDPA) (Concurrence Point 3) and to document existing and proposed avoidance and minimization measures (Concurrence Point 4A). At today's meeting, NCDOT will:

- Discuss the anticipated impacts of the three detailed study alternatives.
- Present the avoidance and minimization measures which have been applied to the design of the project and will be evaluated further in final design.

1.4 Study Area Description

The project study area is a 1,000-foot corridor (500 feet on either side of the U.S. 158 centerline). The attached **Figure 1** shows the project vicinity, and **Figure 2** shows the environmental features with anticipated impact areas. The eastern terminus of the project was selected based on the degradation of the slopes on the northern side of U.S. 158 which were mostly confined to the boundary of the Great Dismal Swamp National Wildlife Refuge (Refuge) that ends near the Pasquotank County line. The typical section also changes immediately east of the county line, with a recoverable area (i.e., shoulders) for drivers that is wider in Pasquotank County.

U.S. 158 is a major east-west route in northeastern North Carolina and is a designated NCDOT hurricane evacuation route. The existing facility is a two-lane road with a paved surface width of approximately 26 feet (approximately 11-foot wide lanes and 2-foot paved shoulders) with little to no graded shoulders. Slope degradation is currently occurring on the northern side slopes of U.S. 158 due to erosion from the adjacent standing water body and the burrowing of animals. The Refuge, located adjacent to the northern boundary of the proposed project, is a potential Section 4(f) resource.

1.5 Merger Process History

Prior to Entering Merger: A public meeting was held on Thursday, October 4, 2018 at the Sunbury Fire Department in Sunbury, NC. A total of 27 individuals attended the public meeting, and two written comments were received during the comment period ending October 19, 2018. A summary of written comments is provided in Appendix **B**.

Concurrence Point 1: Concurrence Point 1 for Project R-5808 was reached on February 21, 2019. The agreed upon study area and purpose and need for the project are as follows:

The proposed study area is a 1,000-foot wide corridor, 500 feet on either side of the U.S. 158 centerline, from Acorn Hill Road to the Pasquotank County Line as shown on the attached map.

Facility Deficiency (primary need): The existing traveled way and graded shoulders on U.S. 158 are below the minimum width for a roadway with a design speed of 60 mph and design volume above 2000 vehicles per day as listed in the NCDOT Roadway Design Manual and the AASHTO "A Policy on Geometric Design of Highways and Streets" (2011). Edges of the paved roadway have also been observed to be deteriorating due to unstable slopes and burrowing animals.

Hurricane evacuation (secondary need): U.S. 158 is a hurricane evacuation route, but the current facility deficiencies create potential concerns for large vehicles using the road.

Safety (secondary need): The crash rate for the study corridor, 205.73 crashes per 100 million vehicle miles traveled (MVMT), exceeds the critical crash rate (148.81 MVMT). The narrow road width and limited graded shoulder area may be contributing to some animal crashes and run-off the road crashes as the available recovery area for drivers is minimal.

Facility Deficiency (purpose): The purpose of this project is to bring the U.S. 158 corridor adjacent to the Refuge up to NCDOT and AASHTO standards and stabilize the slopes along the roadway from Acorn Hill Road to the Pasquotank County Line.

Hurricane evacuation (other desirable outcome): Another desirable outcome is to improve the hurricane evacuation route for vehicles along U.S. 158.

Safety (other desirable outcome): Another desirable outcome of this project is to improve safety along this section of the U.S. 158 corridor.

Concurrence Point 2: One detailed study alternative, Widen South, was proposed to be carried forward at the meeting held on February 21, 2019. The Merger Team asked NCDOT to also evaluate a Widen North alternative. Estimated impacts of the Widen North alternative were evaluated following the February 21 meeting and presented to the Merger Team at the April 18, 2019 meeting. Concurrence Point 2 for Project R-5808 was reached on April 18, 2019. The agreed upon alternatives to carry forward were:

- Alternative 1: Widen to the south, holding the northern right of way line and side slopes.
- Alternative 2: Widen to the north outside of the Refuge and widen to the south within the Refuge.
- Alternative 3: Widen to the north within NCDOT right-of-way with remaining widening to the south.
- No Build Alternative: Although the No Build Alternative does not meet purpose and need, it is recommended to be carried forward for comparison.

Concurrence Point 2A: Concurrence Point 2A for Project R-5808 was reached on April 18, 2019. The agreed upon major hydraulic structures were:

- Site 1 – Remove the existing double 12-foot by 6-foot reinforced concrete box culvert and replace with a triple 13-foot and 3-inch by 6-foot and 9-inch aluminum box culvert, buried one -foot.

2. Merger Concurrence Point 3 – Preferred Alternative

2.1 No Build Alternative

The No Build Alternative is a baseline comparative alternative. The No Build Alternative would continue typical maintenance activities but would not make any substantial improvements to the U.S. 158 corridor. The No Build Alternative would not incur any right of way or construction costs. There would be no disruptions caused by construction. There would be no impacts to streams, wetlands, other natural and cultural resources, residences, or businesses, although continued shoulder and slope destabilization may have impacts on adjacent natural resources. The No Build Alternative would not meet the purpose of the project. Although the No Build Alternative would not meet the project purpose, it is recommended to be retained for additional screening to provide a basis for comparing the adverse effects and benefits of the detailed study build alternatives.

2.2 Build Alternatives

For all alternatives, the proposed typical section for Project R-5808 includes two 12-foot lanes with 4-foot paved and 6-foot graded shoulders. Side slopes of 3:1 are proposed in the widening sections. Where the design proposes to hold the existing side slope (on the north side in Alternatives 1 and 2, and on the south side in Alternative 2 outside the Refuge) some small amount of fill will need to be added to the existing slope close to the edge of the roadway and within the existing right-of-way to tie to the existing slope. In Alternative 3, widening to the north may result in more substantial temporary and permanent impacts to the Refuge due to the closer proximity of the permanent construction to the ROW line and the shifting of the slope to the north by approximately four feet.

To stabilize the existing side slopes on the north side of the roadway, rip rap is proposed to be installed on the slope in deteriorating areas within open water. A preliminary evaluation of the open water areas along the north side of the corridor estimated the water to be approximately 3 feet deep at the existing toe of slope. For permitting purposes, USACE and NCDWR will regard the placement of rip rap within a jurisdictional feature as fill.

2.3 Definition of Impact Areas

Buffers to estimate the impact area footprint were applied to each alternative since designs are conceptual and do not include drainage or utility impacts. In sections where the right-of-way and side slopes are proposed to be held, it was assumed no drainage or utility relocations would be needed, but a 10-foot buffer of the proposed slope stakes was used to accommodate fill that will tie into the existing slope and temporary impacts within potential construction easements. In sections with widening, a 25--foot buffer of the proposed slope stakes was used to incorporate potential drainage and utility relocations as well as temporary construction easements.

Definition of the buffers for each alternative are described below and displayed in **red** in **Exhibits 1-4**:

- Alternative 1: Buffered 10 feet to the north and 25 feet to the south.
- Alternative 2: West of the Refuge, Alternative 2 was buffered 25 feet to the north and 10 feet to the south. Adjacent to the Refuge, Alternative 2 was buffered 25 feet to the south and 10 feet to the north.
- Alternative 3: Buffered 25 feet on both sides of the corridor.

Impacts to open water resources due to placement of rip rap outside of the 10-foot buffer were also calculated; this is relevant on the north side of Alternative 1, north side of Alternative 2 within the Refuge, and south side of Alternative 2 west of the Refuge. This accounts for areas where the existing right-of-way and side slopes are being maintained but placement of rip rap on the existing side slopes is proposed as a stabilization measure. The limits of the proposed rip rap placement are also shown on the typical sections in **Exhibits 1-4** in **red**.

The combined open water impact areas are shown in **Exhibits 1-4** in **green** and are defined by the widest limit of either the buffer or proposed rip rap and the inside edge of the open water (shown in **blue**). These combined impacts were quantified and summarized in **Table 1** by alternative and section as described in **Section 2.7**, and in **Appendix A**, by individual feature.

2.4 Alternative 1

Alternative 1 proposes to widen the roadway to the south by holding the northern right-of-way line and side slopes (see **Exhibit 1**). Rip rap (rock plating) is proposed in areas of open water on the northern side slope, partially outside the 10-foot buffer, and has therefore been added to the total impact quantity.

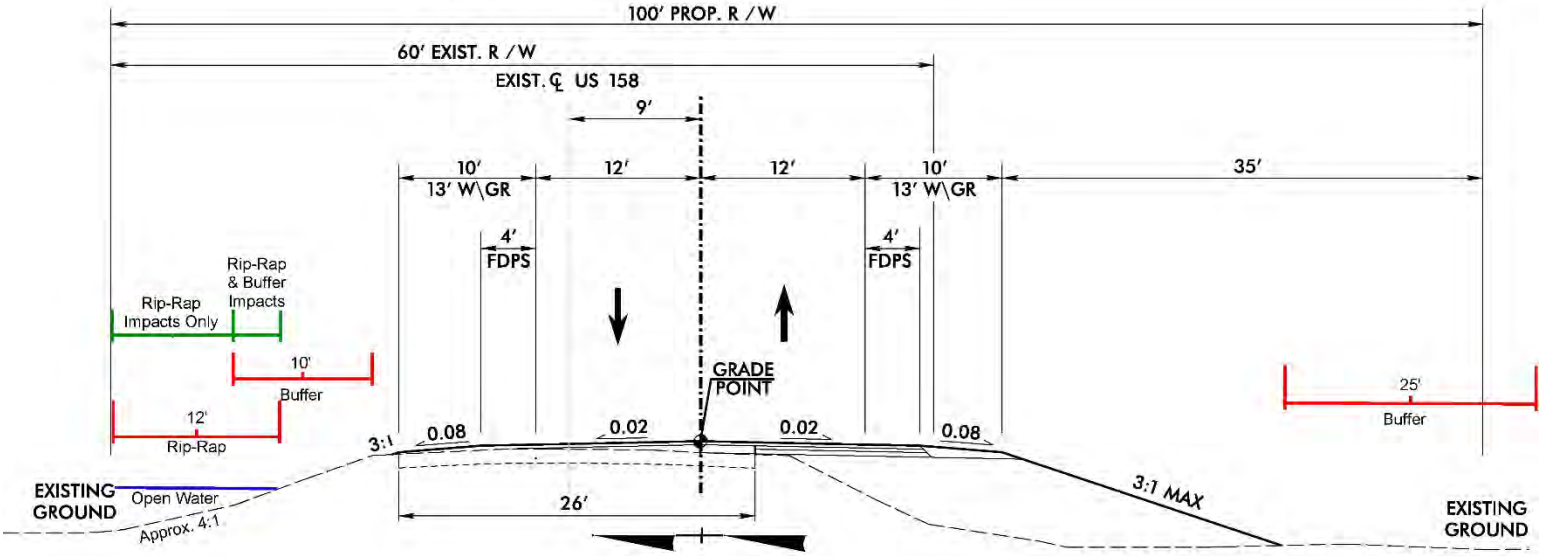


***Exhibit 1**. Alternative 1 and 2 Adjacent to the Refuge Proposed Typical Section*

2.5 Alternative 2

Alternative 2 proposes to widen the roadway to the north by holding the southern right-of-way line and side slopes west of the Refuge (see **Exhibit 2**). Rip rap will be used on the proposed fill slope to maintain slope stability; impacts of this rip rap placement are already included within the buffer calculation. Where U.S. 158 runs adjacent to the Refuge, Alternative 2 proposes to widen to the south and maintain the existing northern side slope, as proposed in Alternative 1 (see **Exhibit 1**). Rip rap is proposed in areas of open water on the northern side slope, partially outside the 10-foot buffer, and has therefore been added to the total impact quantity.

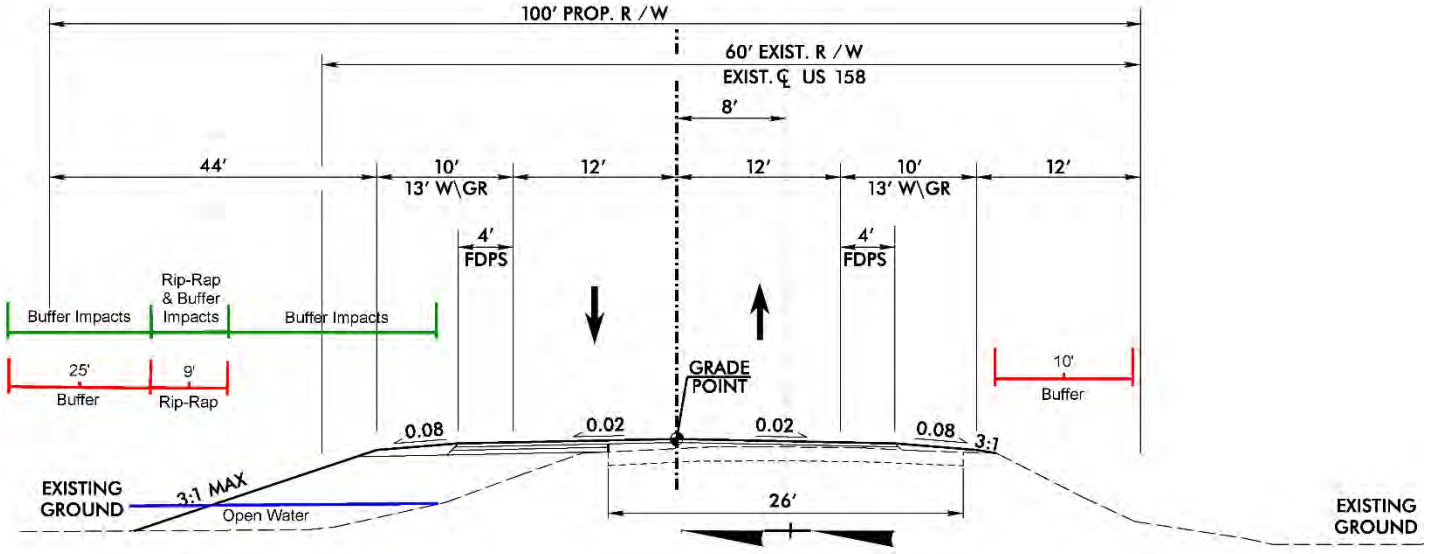


***Exhibit 2**. Alternative 2 Proposed Typical Section West of the Refuge*

2.6 Alternative 3

Alternative 3 proposes to widen the roadway symmetrically west of the Refuge (see **Exhibit 3**). Where U.S. 158 runs adjacent to the Refuge, this alternative proposes to only widen to the north to the extent possible while maintaining the permanent fill impacts within NCDOT ROW (approximately 4 feet). The remainder of the widening (approximately 5 feet) is proposed to the south (see **Exhibit 4**). Rip rap (rock plating or a combination of rock embankment) will be used on the proposed fill slopes to maintain slope stability; impacts of this rip rap placement are already included within the buffer calculation.

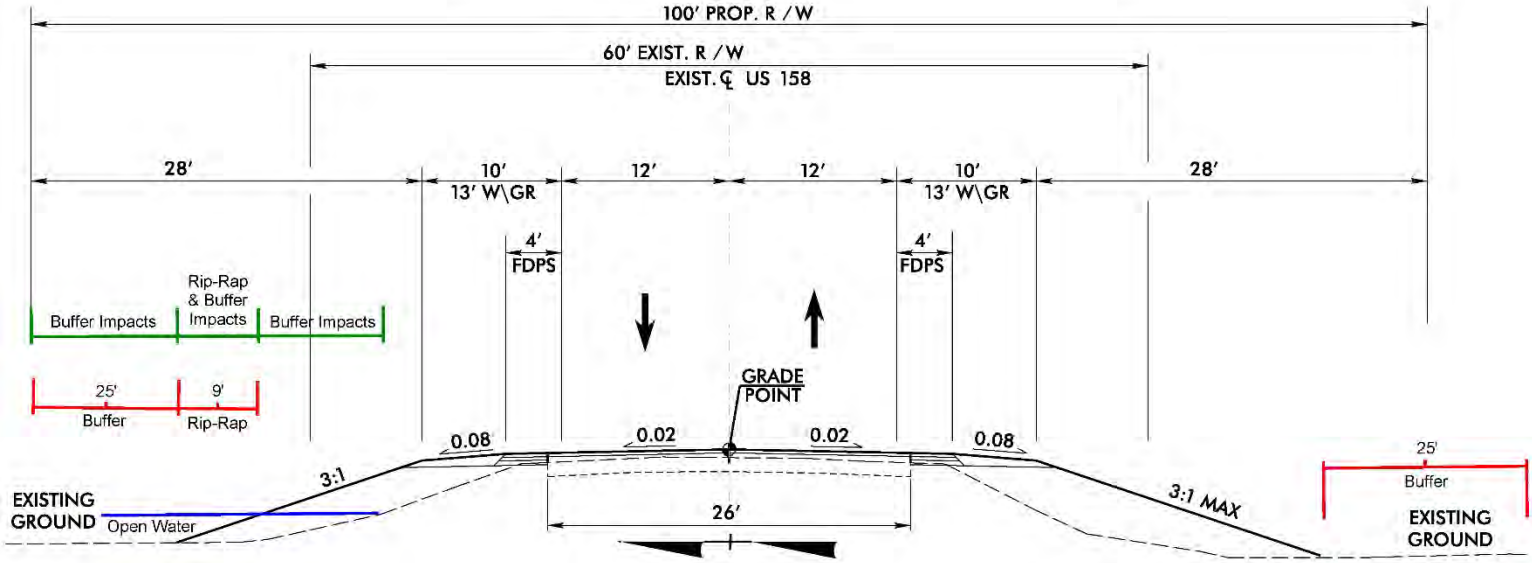


***Exhibit 3**. Alternative 3 Proposed Typical Section West of the Refuge*

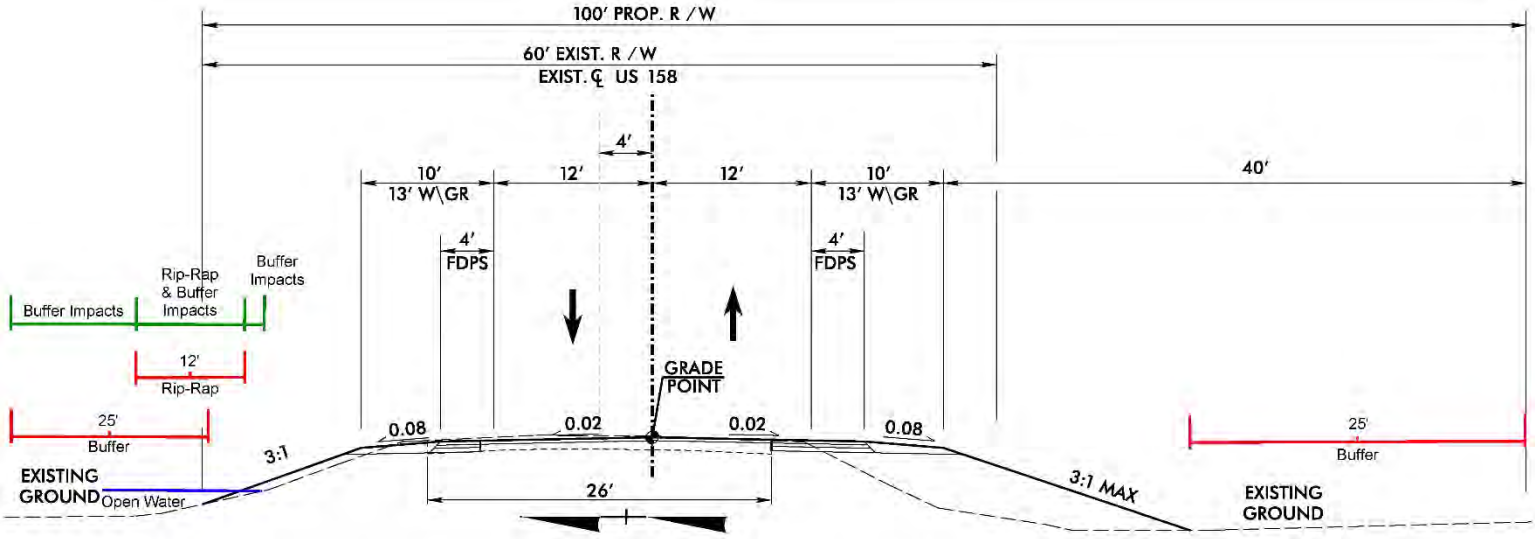


***Exhibit 4**. Alternative 3 Proposed Typical Section Adjacent to the Refuge*

2.7 Anticipated Impacts

Impacts anticipated from the three build alternatives are summarized in **Table 1**. More detailed tables are provided in **Appendix A**. The project was separated into three sections to compare alternatives: Section 1 – Acorn Hill Road to the western boundary of the Refuge (approximately 1.9 miles), Section 2 – U.S. 158 segment adjacent to the Refuge (approximately 1.9 miles), Section 3 – eastern boundary of the Refuge to the eastern project terminus in Pasquotank County (approximately 0.2 miles).

Table 1. *Anticipated Impacts to Jurisdictional Features*

Resource		Alternative 1	Alternative 2	Alternative 3
Wetlands	West Section	8.5 acres	6.1 acres	11.4 acres
	Refuge Section	5.4 acres	5.5 acres	5.4 acres
	East Section	1.3 acres	1.3 acres	1.1 acres
	Total	***15.2 acres***	***12.8 acres***	***17.9 acres***
Streams	West Section	180 linear feet	155 linear feet	165 linear feet
	Refuge Section	0	0	0
	East Section	0	0	0
	Total	***180 linear feet***	***155 linear feet***	***165 linear feet***
Open Water	West Section	0 acres	0.6 acre	0.3 acres
	Refuge Section	2.4 acres*	2.4 acres*	5.2 acres
	East Section	0.3 acres*	0.3 acres*	0.7 acres
	Total	***2.8 acres****	***3.3 acres****	***6.2 acres***
Great Dismal Swamp National Wildlife Refuge (Section 4(f), Federal Land, and subject to USFWS Compatibility)		• Potential temporary direct impacts for construction within the Refuge (10-foot buffer)	• Potential temporary direct impacts for construction within the Refuge (10-foot buffer) • Potential indirect impacts due to permanent placement of fill in jurisdictional features north of U.S. 158 which are well connected to the resources within the Refuge and the larger system which are Section 4(f) protected	• Potential temporary direct impacts for construction within the Refuge (25-foot buffer) • Potential permanent direct impacts due to placement of fill and relocation of existing ditch/drainage system within the Refuge • Potential indirect impacts due to permanent placement of fill in jurisdictional features north of U.S. 158 which are well connected to the resources within the Refuge and the larger system which are Section 4(f) protected
Other Factors		• Construction in more suitable soils reduces risk of future degradation and settlement • Standard construction equipment can be used • Daily lane closures during construction with flagger and barrels. Both lanes open during night-time hours. • Faster construction without dewatering process	• Construction in soft and unsuitable soils presents risk of future degradation and settlement • Larger construction equipment necessary for construction in open water • 24/7 single lane construction site with concrete barriers and automated signal required • Increased safety risk with addition of fixed objects in clear zone during construction • Increased construction duration to construct in open water (dewatering required)	• Construction in soft and unsuitable soils presents risk of future degradation and settlement • Larger construction equipment necessary for construction in open water • 24/7 single lane construction site with concrete barriers and automated signal required • Increased safety risk with addition of fixed objects in clear zone during construction • Increased construction duration to construct in open water (dewatering required)
Relative Cost		-	10% more than Alternative 1	50% more than Alternative 1

NOTE: Stream Impacts are rounded to the nearest 5-foot increment, wetland and open water impacts are rounded to the nearest 0.1 acre.
*Alternative 1 and Alternative 2 impacts include impacts due to the addition of rip rap (fill) on the existing side slope and outside of the 10-foot buffer and are in addition to the impacts estimated within the 10-foot buffer.
Yellow Highlight: Impact values highlighted in yellow have been updated since distribution of the USACE Public Notice in February 2020

Great Dismal Swamp National Wildlife Refuge Impact Considerations

- As a recreational and wildlife refuge resource, the Refuge would be considered a Section 4(f) resource.
- As a federally owned property that is managed by the USFWS, property acquisition within the Refuge would require that the federal land transfer process (23 CFR § 710.601) be followed.
- As a property on the National Refuge System, USFWS would determine if this project is an appropriate use through the Compatibility Process (603 FW 2).
- Additional evaluation is needed to determine the effects of widening to the north on the water flow and water management (collaborating with the Newland Water Management District), the water control structure, and open water habitat. Additional design would be needed to calculate detailed impacts and determine if there are construction-related issues of widening within open water.

2.8 NCDOT Recommended Alternative

NCDOT recommends Alternative 1. Although Alternative 1 has greater impacts to streams (25 feet) and wetlands (2.4 acres) than Alternative 2, NCDOT has considered the following benefits of Alternative 1:

- Lower potential for permanent direct and indirect impacts to the Great Dismal Swamp National Wildlife Refuge
- Fewer open water impacts
- Lower risk of future slope degradation and settlement due to construction in more suitable soils resulting in:
    - Less frequent impacts to surrounding environment during maintenance activities
    - Less cost to maintain
- Greater use of standard construction equipment and practices resulting in:
    - Shorter construction duration
    - Less disruption to traffic during construction
    - Safer work zone environment
    - Smaller footprint and impact to environmental resources
    - Lower cost to construct

3. Merger Concurrence Point 4A – Avoidance and Minimization Measures

NCDOT has attempted to avoid and minimize impacts to water resources during development of the preliminary functional designs by applying the following strategies:

- Alternatives 1 and 2 reduce construction impacts by using offset widening rather than symmetrical widening, resulting in fewer environmentally sensitive areas being affected by construction.
- Alternatives 1 and 2 avoided permanent impacts within the Refuge by shifting the alignment.
- Alternative 3 was developed to reduce wetland impacts across from the Refuge and investigated a third option (symmetrical widening) west of the Refuge.
- Alternatives 2 and 3 included shifting the roadway alignment to minimize wetland impacts.
- Fill embankments with 3:1 slopes were applied along the entire corridor rather than the original 6:1 slopes envisioned to reduce impacts to natural/environmental resources.

In addition, NCDOT will continue to refine the alignment of the LEDPA to further minimize impacts to streams and wetlands during final design.

4. Schedule

- Categorical Exclusion – Spring 2020
- C.P. 4B and 4C Meeting – Spring 2021
- Submit Permit Application – Spring 2021
- Begin Right of Way Acquisition – Fall 2021
- Construction – FY 2023

Section 404/NEPA Interagency Agreement

Concurrence Point 3
Preferred Alternative/Least Environmentally Damaging Practicable Alternative (LEDPA)

Project Title: Improvements to U.S. 158 from Acorn Hill Road (S.R. 1002) to the Pasquotank County Line
TIP Project No.: R-5808
WBS No.: 46972.1.1

Preferred Alternative:
Alternative 1: Widen the roadway to the south by holding the northern right-of-way line and side slopes.

Typical section: Two 12-foot lanes, 4-foot paved shoulders, and 6-foot graded shoulders, with slope stabilization measures on the northern side slopes in areas of deterioration.

The Project Team has concurred with the above alternative as the preferred alternative/LEDPA.

Name	Agency	Date
	FHWA	
	USACE	
	USFWS	
	USEPA	
	NCDOT	
	NCWRC	
	NCDEQ	
	NCSHPO	
	ARPO	
	NCDCM	

Section 404/NEPA Interagency Agreement

Concurrence Point 4A
Avoidance and Minimization Measures

Project Title:	Improvements to U.S. 158 from Acorn Hill Road (S.R. 1002) to the Pasquotank County Line
TIP Project No.:	R-5808
WBS No.:	46972.1.1

Avoidance and Minimization Measures

The Project Team has concurred on this date to include the following avoidance and minimization measures:

- Alternatives 1 and 2 reduce construction impacts by using offset widening rather than symmetrical widening, resulting in fewer environmentally sensitive areas being affected by construction.
- Alternatives 1 and 2 avoided permanent impacts within the Great Dismal Swamp National Wildlife Refuge by shifting the alignment.
- Alternative 3 was developed to reduce wetland impacts across from the Great Dismal Swamp National Wildlife Refuge and investigated a third option (symmetrical widening) west of the Great Dismal Swamp National Wildlife Refuge.
- Alternatives 2 and 3 included shifting the roadway alignment to minimize wetland impacts.
- Fill embankments with 3:1 slopes were applied along the entire corridor rather than the original 6:1 slopes envisioned to reduce impacts to resources.

Additional avoidance and minimization measures including continuing to refine the alignment will be considered by NCDOT during final design

Name	Agency	Date
	FHWA	
	USACE	
	USFWS	
	USEPA	
	NCDOT	
	NCWRC	
	NCDEQ	
	NCSHPO	
	ARPO	
	NCDCM	

Figures

Figure 1: Vicinity Map

Figure 2: Anticipated Impacts Cover Map

Figure 2.0.A-G: Impact Areas Map

Figure 2.1.A-G: Alternative 1 Impacts Map

Figure 2.2.A-G: Alternative 2 Impacts Map

Figure 2.3.A-G: Alternative 3 Impacts Map

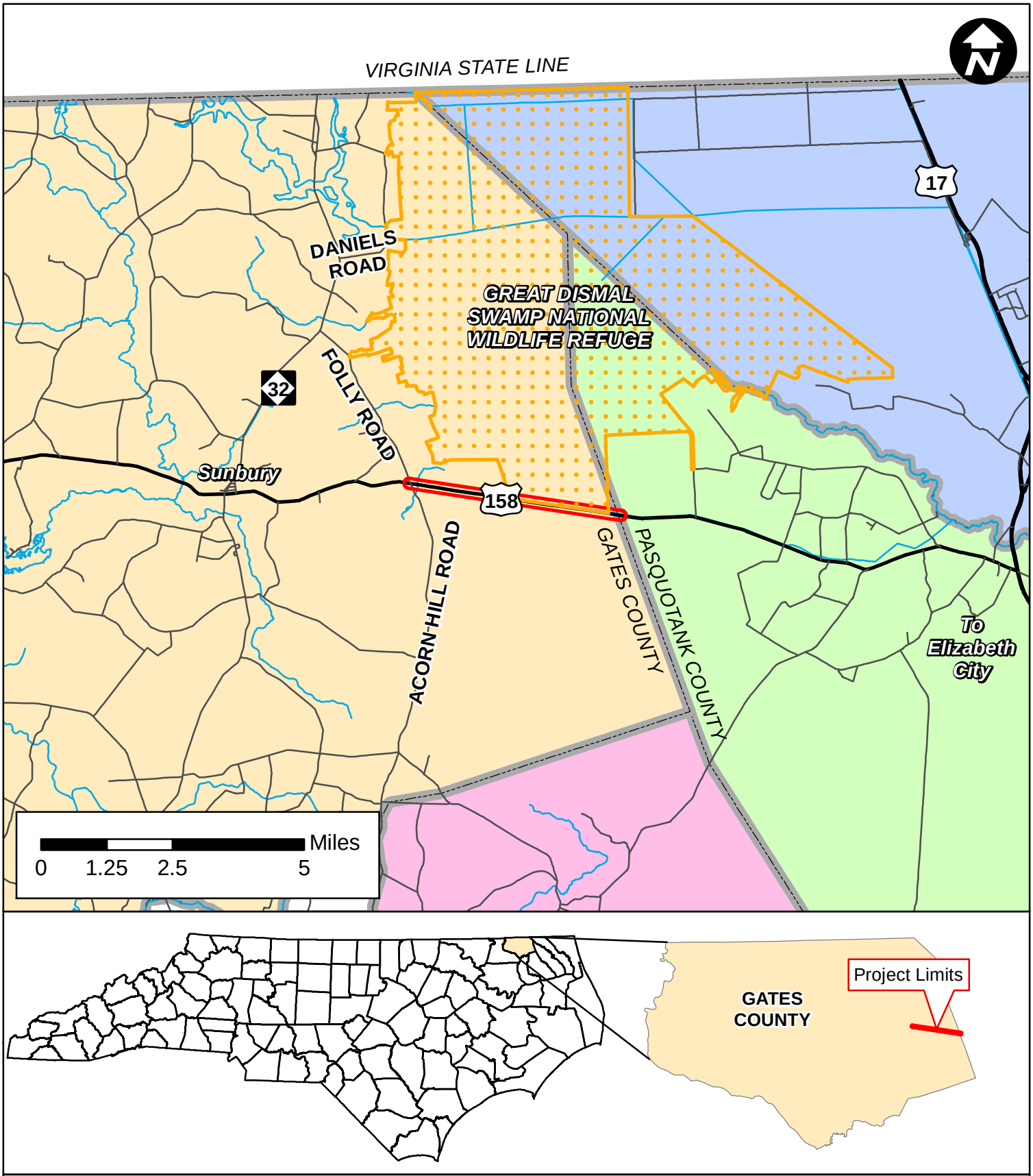


Figure 1: Vicinity Map
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

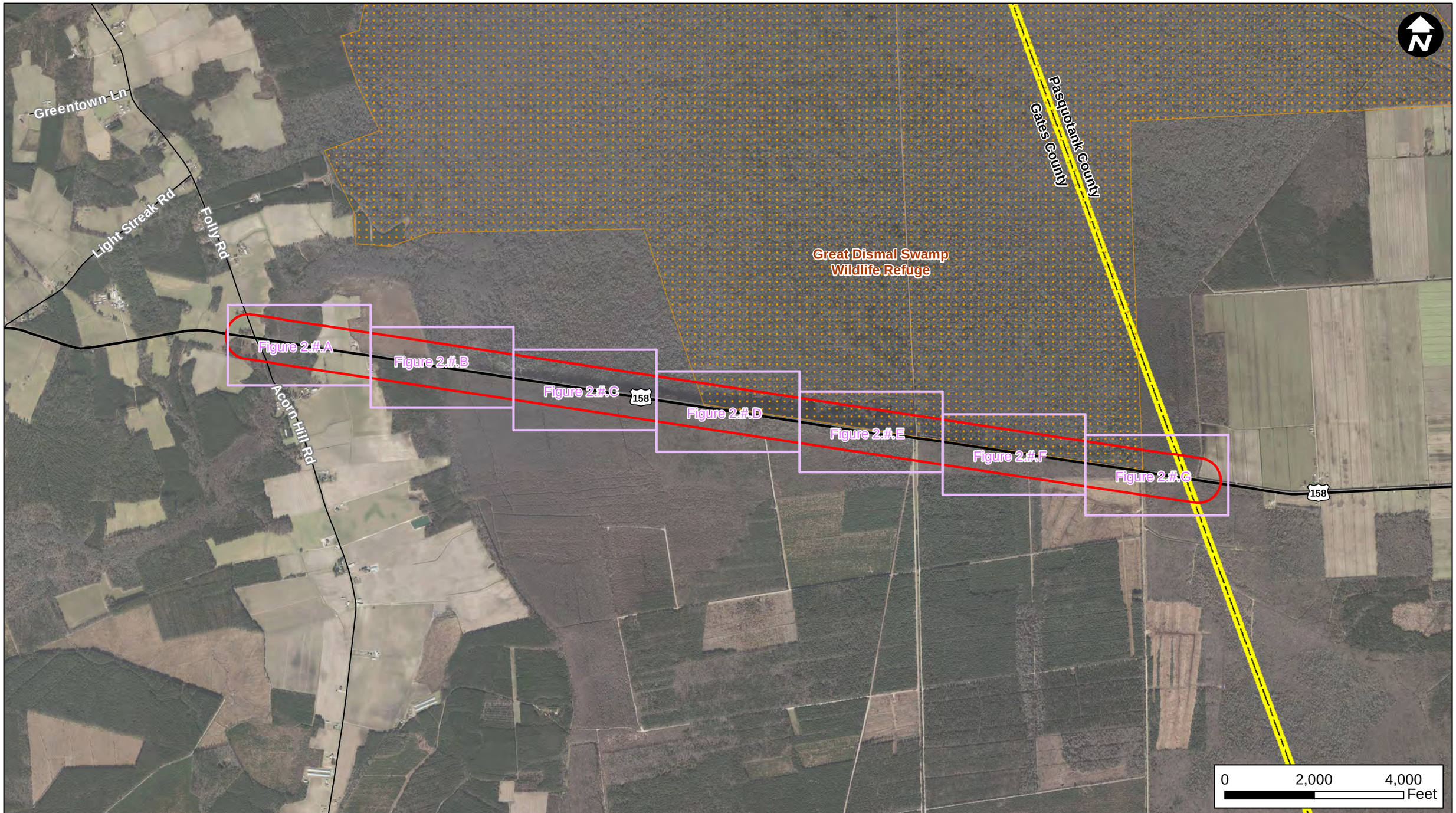


Figure 2.A-2.G Extents

Project Study Area

Great Dismal Swamp National Wildlife Refuge

County Line

Figure 2 Anticipated Impacts Map
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Folly Rd

Acorn Hill Rd

WA

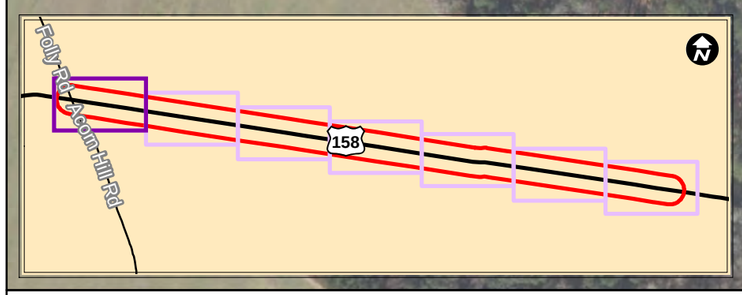
WA

Jones Pond

158

Figure 2.0.B

Figure 2.0.B



0 100 200 400 Feet

Alternative 1 Impact Area

Alternative 2 Impact Area

Alternative 3 Impact Area

Delineated Wetlands

Delineated Streams

Figure 2.0.A Anticipated Impacts Map
Impact Areas
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Alternative 1 Impact Area
Alternative 2 Impact Area
Alternative 3 Impact Area
Delineated Wetlands
Delineated Open Water

Figure 2.0.B Anticipated Impacts Map
Impact Areas
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

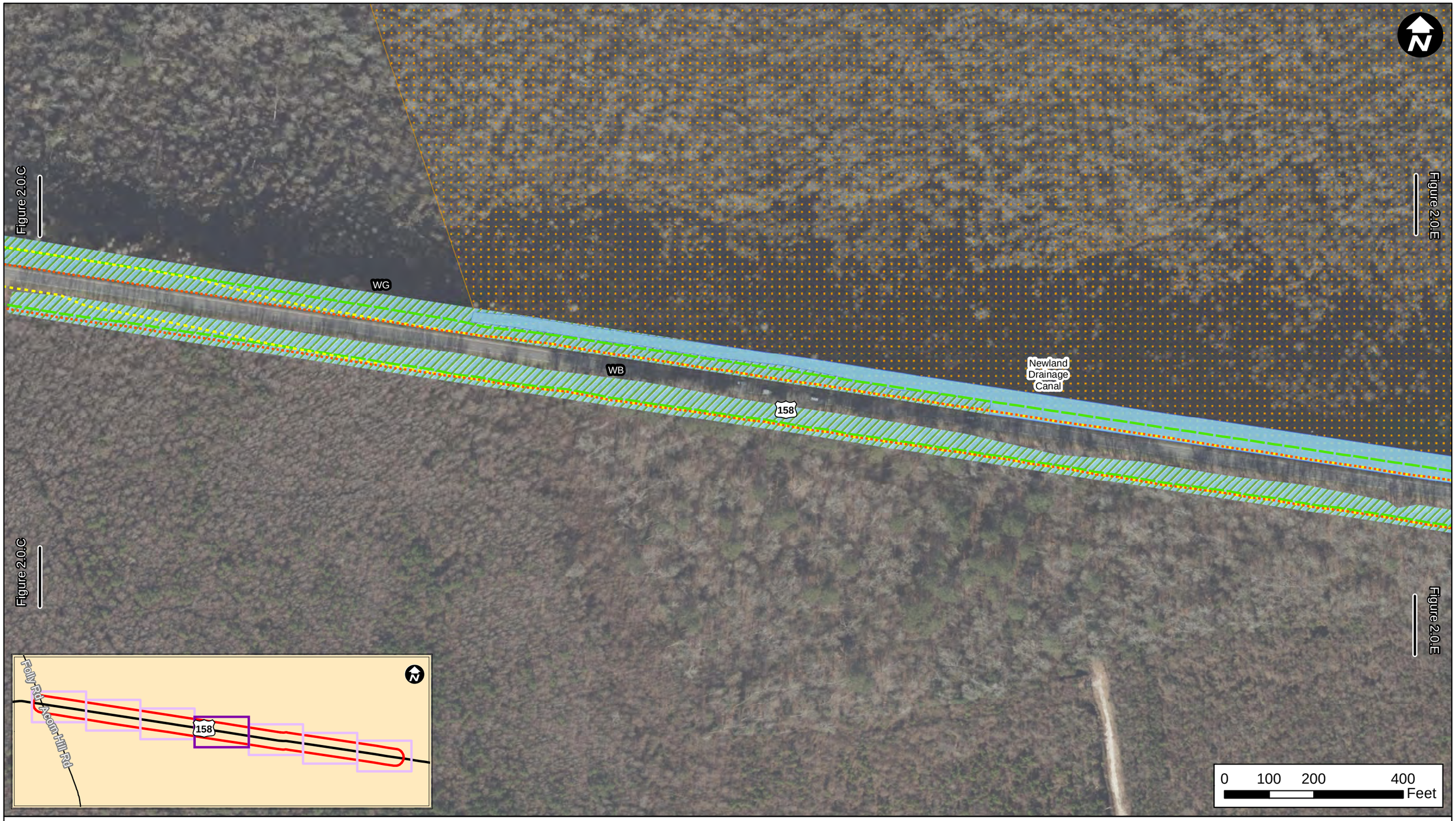
Alternative 1 Impact Area

Alternative 2 Impact Area

Alternative 3 Impact Area

Delineated Wetlands

Figure 2.0.C Anticipated Impacts Map
Impact Areas
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Alternative 1 Impact Area
Alternative 2 Impact Area
Alternative 3 Impact Area
Great Dismal Swamp National Wildlife Refuge
Delineated Wetlands
Delineated Open Water

Figure 2.0.D Anticipated Impacts Map
Impact Areas
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Figure 2.0.D

Figure 2.0.F

Newland Drainage Canal

WB

158

Newland Drainage Canal

OWA

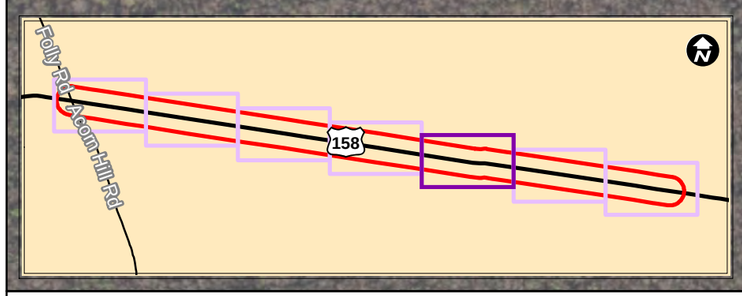
OWB

OWC

WC

Figure 2.0.D

Figure 2.0.F



0 100 200 400 Feet

Alternative 1 Impact Area

Alternative 2 Impact Area

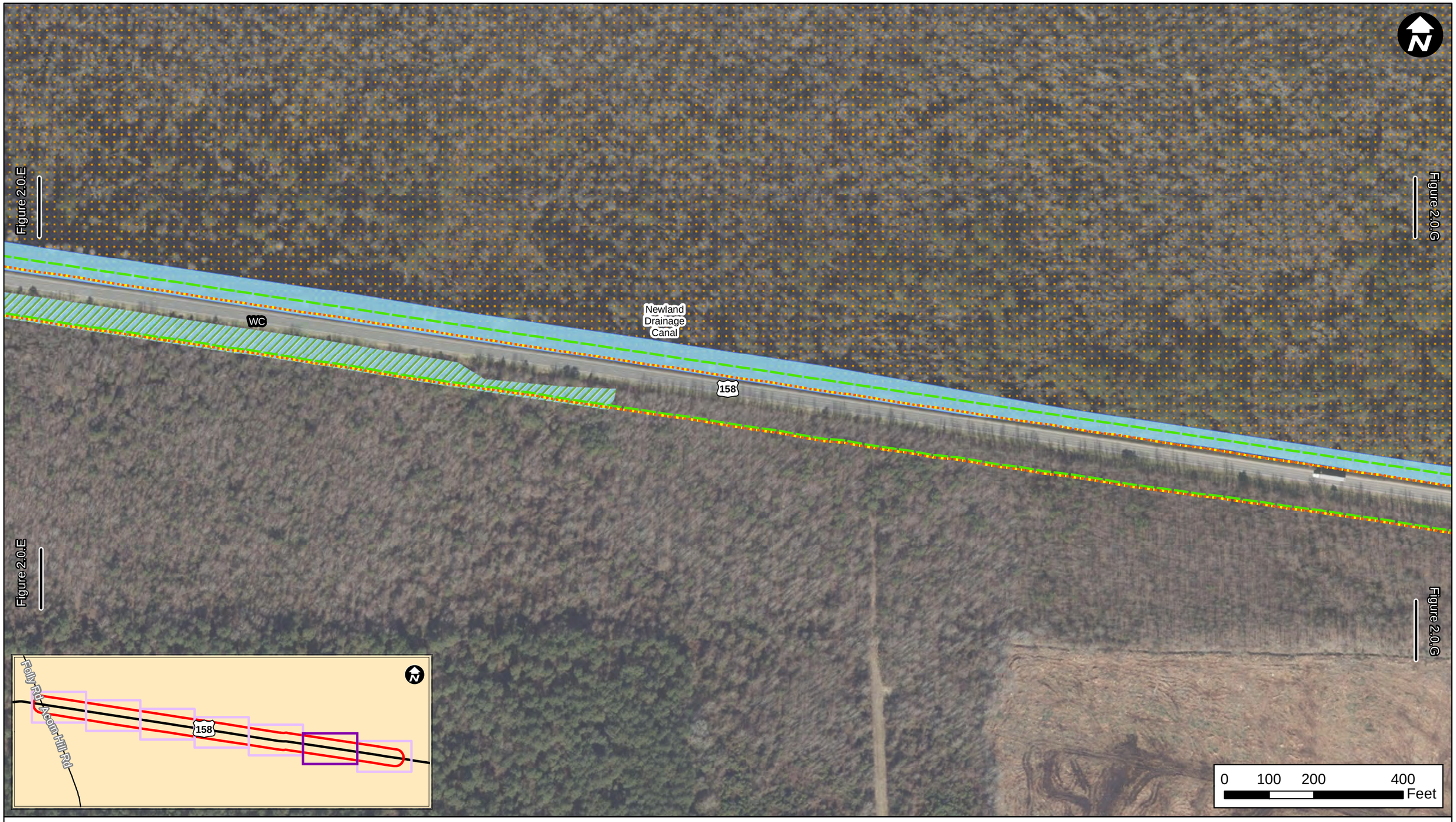
Alternative 3 Impact Area

Great Dismal Swamp National Wildlife Refuge

Delineated Wetlands

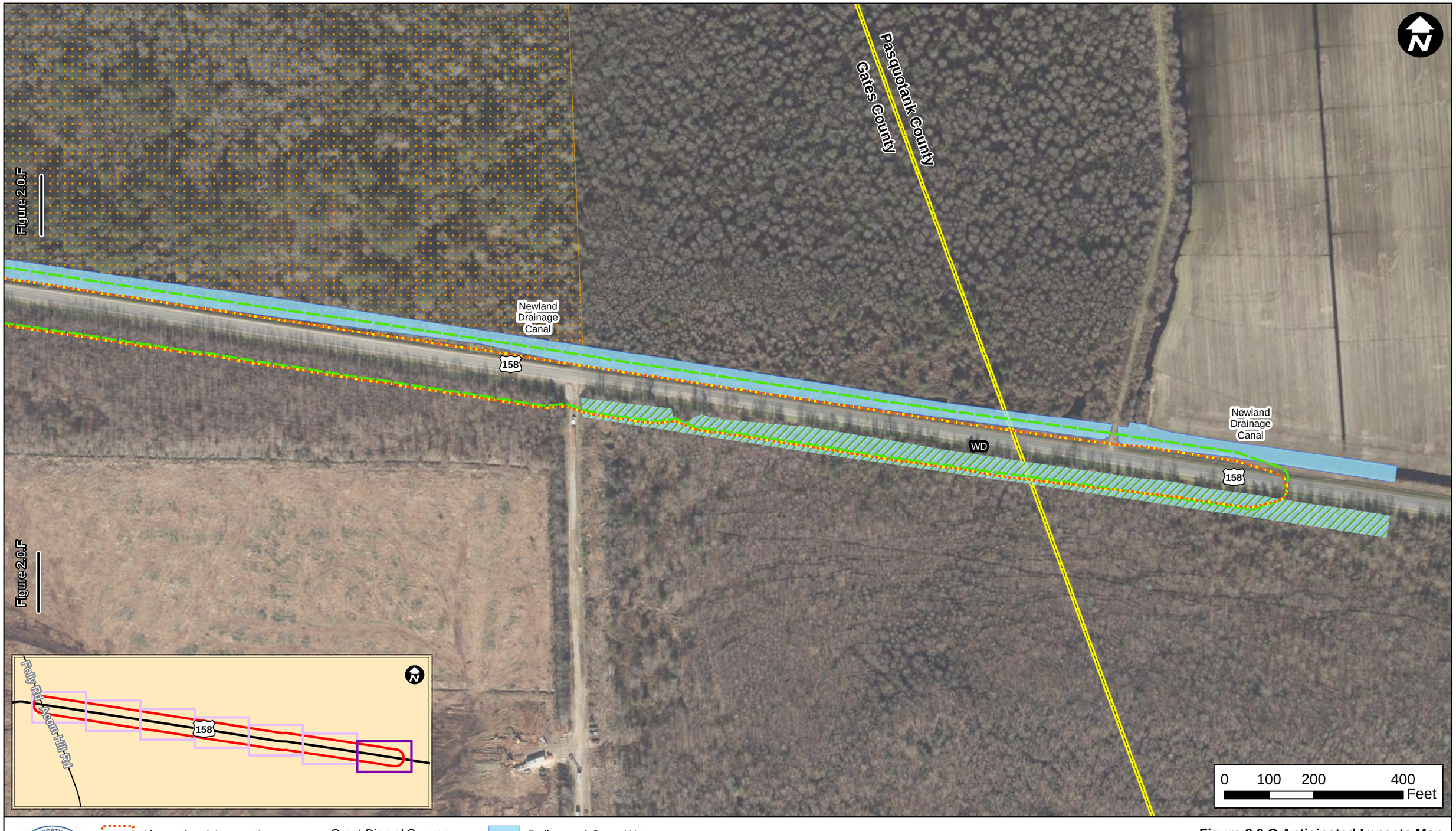
Delineated Open Water

Figure 2.0.E Anticipated Impacts Map
Impact Areas
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



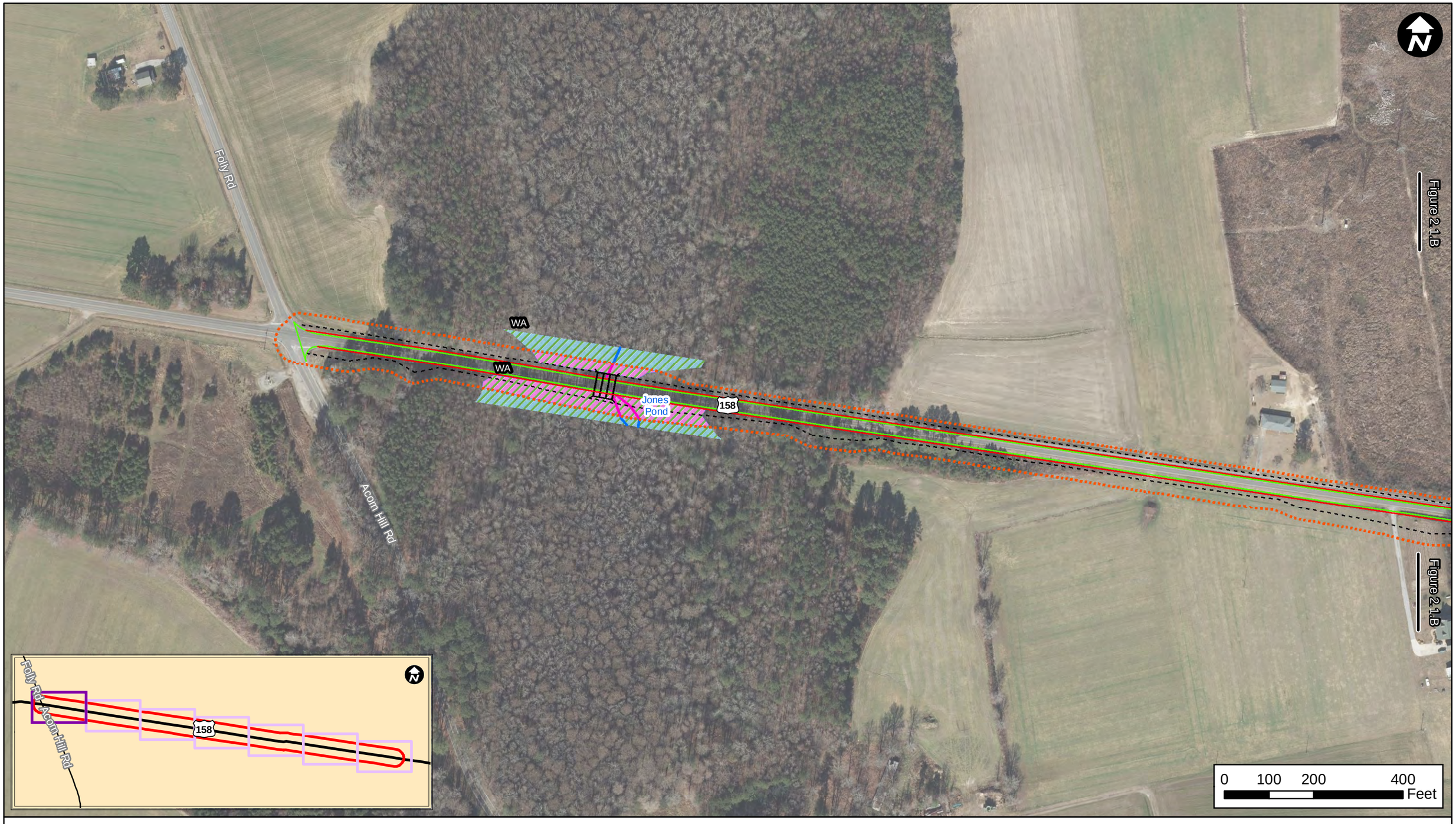
Alternative 1 Impact Area
Alternative 2 Impact Area
Alternative 3 Impact Area
Great Dismal Swamp National Wildlife Refuge
Delineated Wetlands
Delineated Open Water

Figure 2.0.F Anticipated Impacts Map
Impact Areas
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Alternative 1 Impact Area
Alternative 2 Impact Area
Alternative 3 Impact Area
Great Dismal Swamp National Wildlife Refuge
Delineated Wetlands
Delineated Open Water
County Line

Figure 2.0.G Anticipated Impacts Map
Impact Areas
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Roadway Culvert
Proposed Slope Stakes
Alternative 1 Stream Impacts
Delineated Streams
Alternative 1 Wetland Impacts
Delineated Wetlands
Alternative 1 Impact Area

Figure 2.1.A Anticipated Impacts Map
Alternative 1
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
Delineated Open Water
Alternative 1 Wetland Impacts
Delineated Wetlands
Alternative 1 Impact Area

Figure 2.1.B Anticipated Impacts Map
Alternative 1
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Figure 2.1.B

Figure 2.1.D

WB

WG

WB

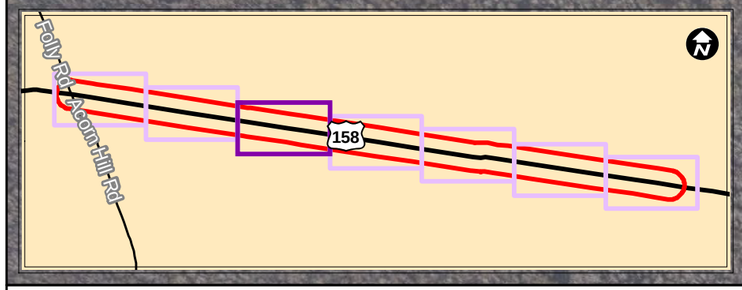
158

WB

WB

Figure 2.1.B

Figure 2.1.D



0 100 200 400 Feet

Proposed Edge of Travel

Proposed Paved Shoulder

Proposed Slope Stakes

Alternative 1 Wetland Impacts

Delineated Wetlands

Alternative 1 Impact Area

Figure 2.1.C Anticipated Impacts Map
Alternative 1
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Figure 2.1.C

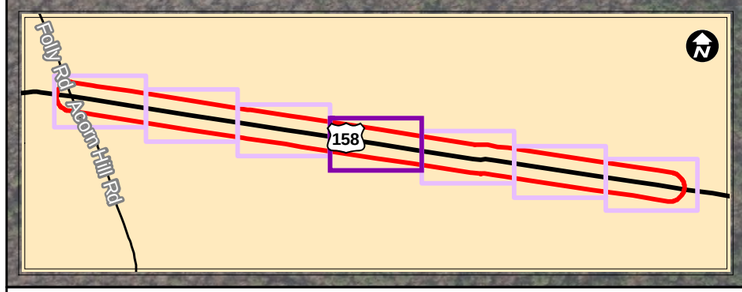
Figure 2.1.E

WG

WB

158

Newland Drainage Canal



0 100 200 400 Feet

Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes

Alternative 1 Open Water Impacts
Delineated Open Water

Alternative 1 Wetland Impacts
Delineated Wetlands

Great Dismal Swamp National Wildlife Refuge
Alternative 1 Impact Area

Figure 2.1.D Anticipated Impacts Map
Alternative 1
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Figure 2.1.D

Figure 2.1.F

Newland Drainage Canal

WB

158

Newland Drainage Canal

OWA

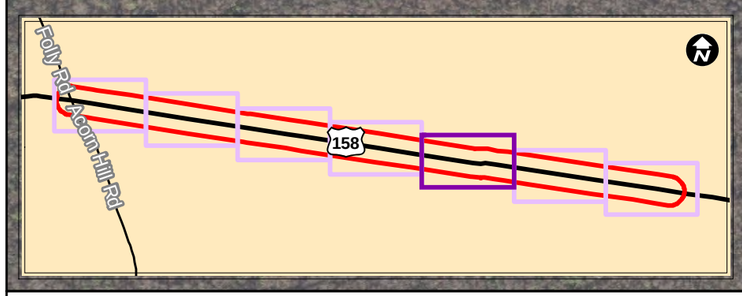
OWB

OWC

WC

Figure 2.1.D

Figure 2.1.F



0 100 200 400 Feet

Proposed Edge of Travel

Proposed Paved Shoulder

Proposed Slope Stakes

Alternative 1 Open Water Impacts

Delineated Open Water

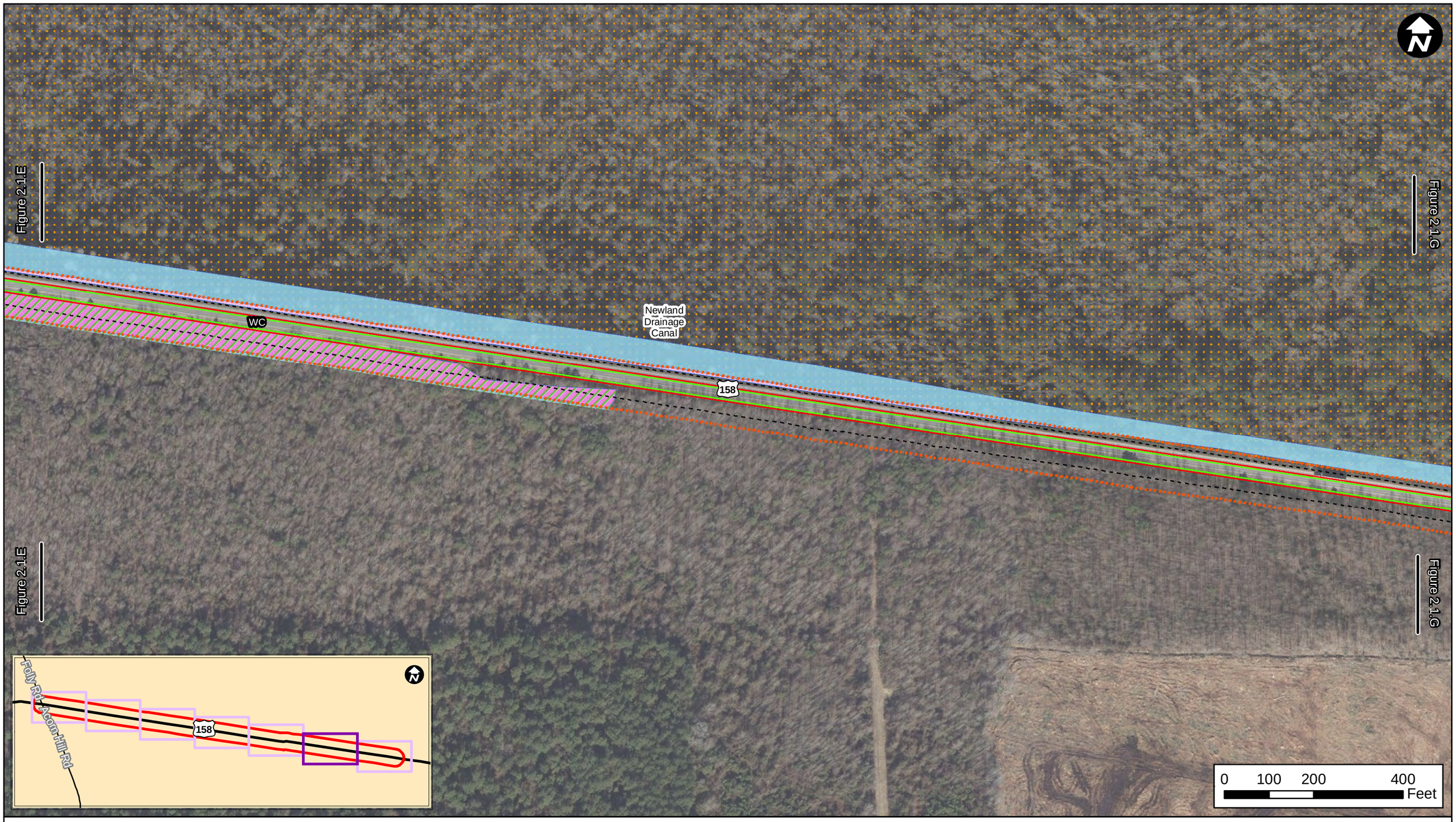
Alternative 1 Wetland Impacts

Delineated Wetlands

Great Dismal Swamp National Wildlife Refuge

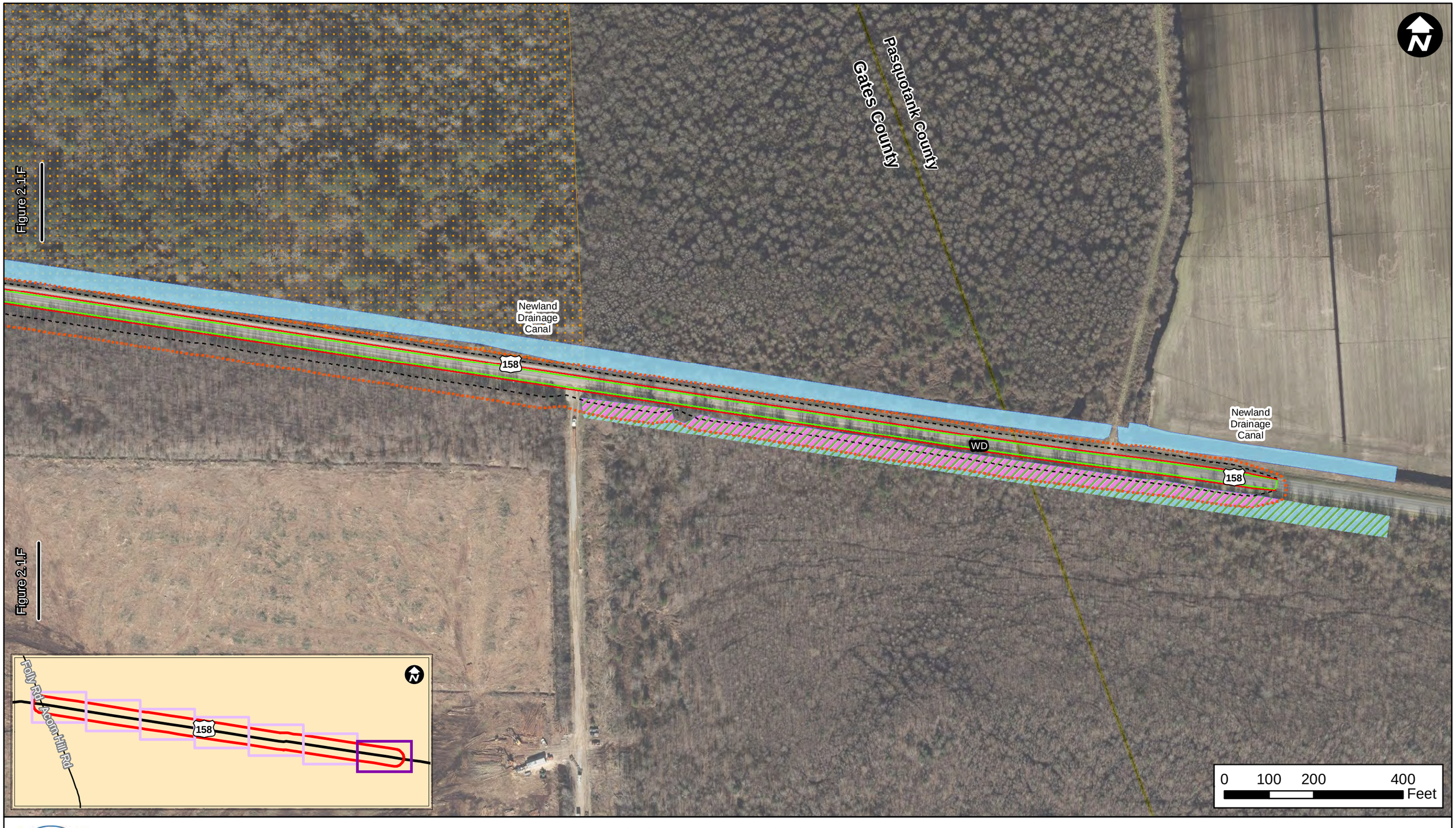
Alternative 1 Impact Area

Figure 2.1.E Anticipated Impacts Map
Alternative 1
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



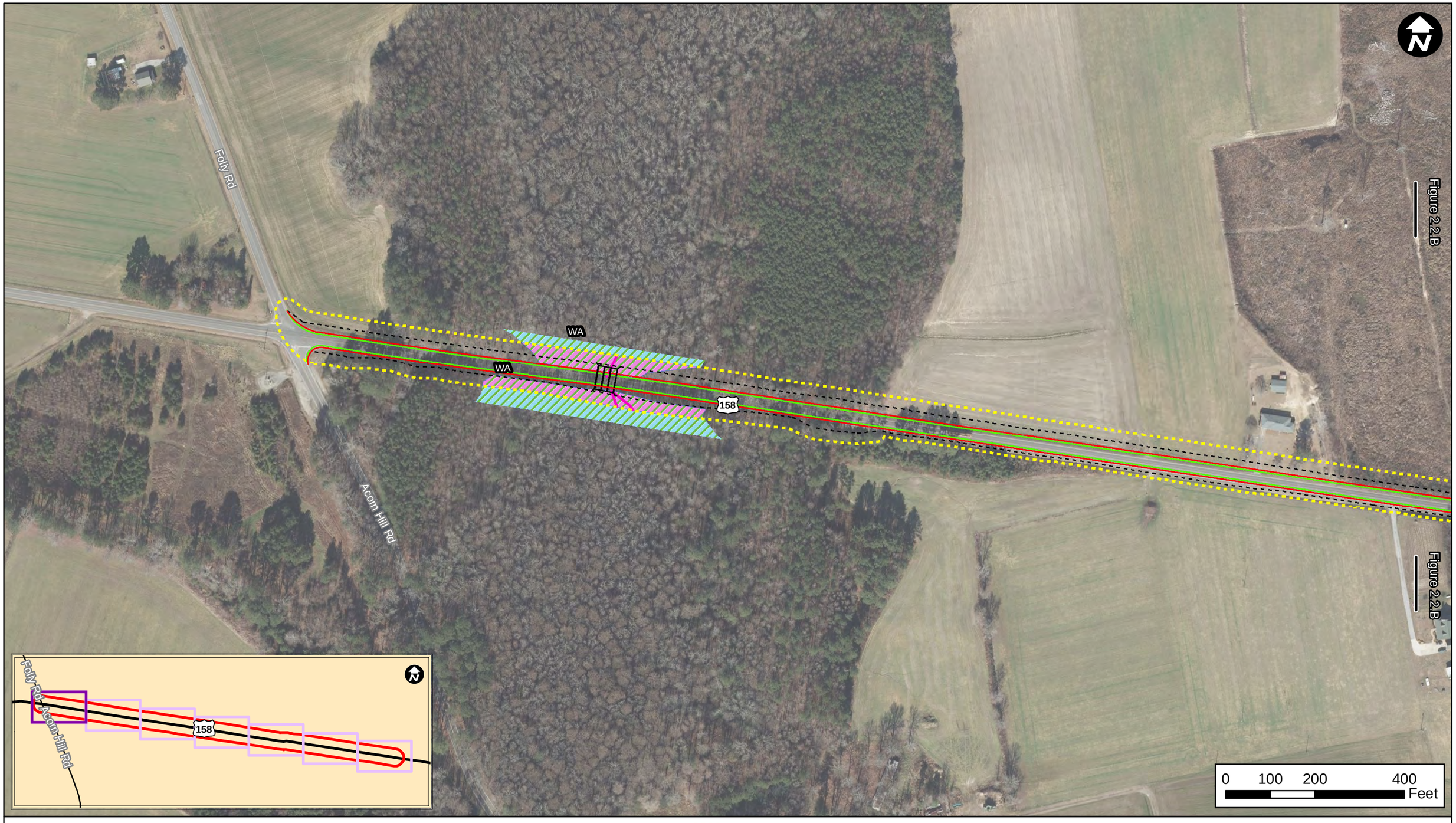
Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
Alternative 1 Open Water Impacts
Delineated Open Water
Alternative 1 Wetland Impacts
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 1 Impact Area

Figure 2.1.F Anticipated Impacts Map
Alternative 1
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
County Line
Alternative 1 Open Water Impacts
Delineated Open Water
Alternative 1 Wetland Impacts
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 1 Impact Area

Figure 2.1.G Anticipated Impacts Map
Alternative 1
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Proposed Slope Stakes
Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Roadway Culvert
Alternative 2 Stream Impacts
Delineated Streams
Alternative 2 Wetland Impacts
Delineated Wetlands
Alternative 2 Impact Area

Figure 2.2.A Anticipated Impacts Map
Alternative 2
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Figure 2.2.A

Figure 2.2.C

WE

WF

WB

Newland Drainage Canal

Newland Drainage Canal

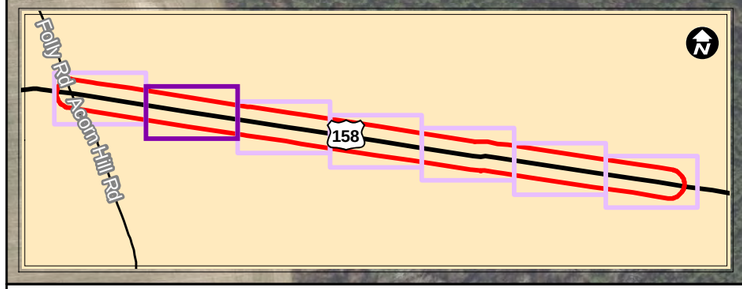
158

WG

WB

Figure 2.2.A

Figure 2.2.C



0 100 200 400 Feet

Proposed Slope Stakes

Proposed Edge of Travel

Proposed Paved Shoulder

Delineated Streams

Alternative 2 Open Water Impacts

Delineated Open Water

Alternative 2 Wetland Impacts

Delineated Wetlands

Alternative 2 Impact Area

Figure 2.2.B Anticipated Impacts Map
Alternative 2
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Proposed Slope Stakes
Proposed Edge of Travel
Proposed Paved Shoulder
Delineated Streams
Alternative 2 Wetland Impacts
Delineated Wetlands
Alternative 2 Impact Area

Figure 2.2.C Anticipated Impacts Map
Alternative 2
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Figure 2.2.C

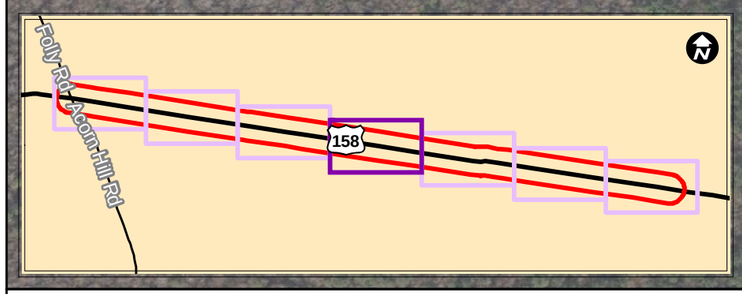
Figure 2.2.E

WG

WB

158

Newland Drainage Canal



0 100 200 400 Feet

Proposed Slope Stakes
Proposed Edge of Travel
Proposed Paved Shoulder
Delineated Streams
Alternative 2 Open Water Impacts
Delineated Open Water
Alternative 2 Wetland Impacts
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 2 Impact Area

Figure 2.2.D Anticipated Impacts Map
Alternative 2
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Figure 2.2.D

Figure 2.2.F

Newland Drainage Canal

WB

158

Newland Drainage Canal

OWA

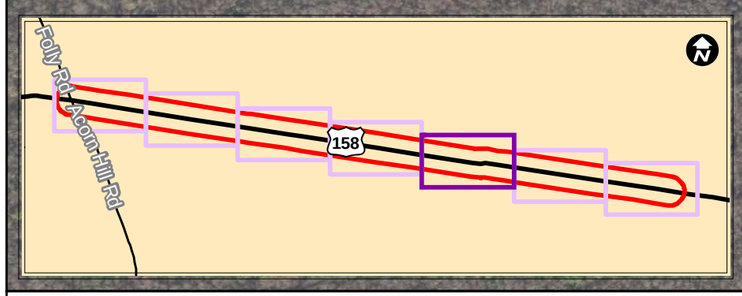
OWB

OWC

WC

Figure 2.2.D

Figure 2.2.F



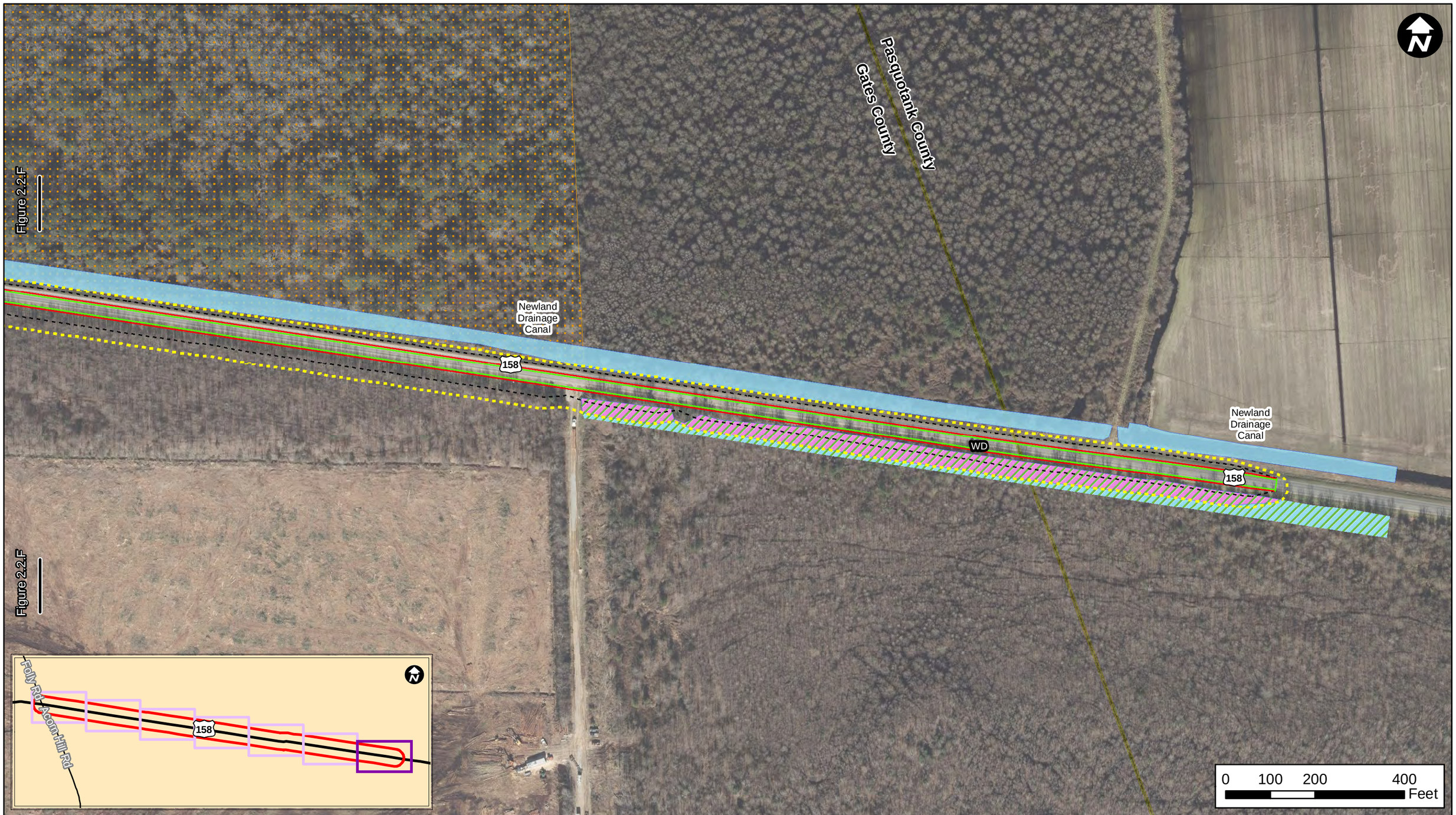
0 100 200 400 Feet

- Proposed Slope Stakes
- Proposed Edge of Travel
- Proposed Paved Shoulder
- Delineated Streams
- Alternative 2 Open Water Impacts
- Delineated Open Water
- Alternative 2 Wetland Impacts
- Delineated Wetlands
- Great Dismal Swamp National Wildlife Refuge
- Alternative 2 Impact Area

Figure 2.2.E Anticipated Impacts Map
Alternative 2
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Proposed Slope Stakes
Proposed Edge of Travel
Proposed Paved Shoulder
Delineated Streams
Alternative 2 Open Water Impacts
Delineated Open Water
Alternative 2 Wetland Impacts
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 2 Impact Area

Figure 2.2.F Anticipated Impacts Map
Alternative 2
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Proposed Slope Stakes
Proposed Edge of Travel
Proposed Paved Shoulder
County Line
Delineated Streams
Alternative 2 Open Water Impacts
Delineated Open Water
Alternative 2 Wetland Impacts
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 2 Impact Area

Figure 2.2.G Anticipated Impacts Map
Alternative 2
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

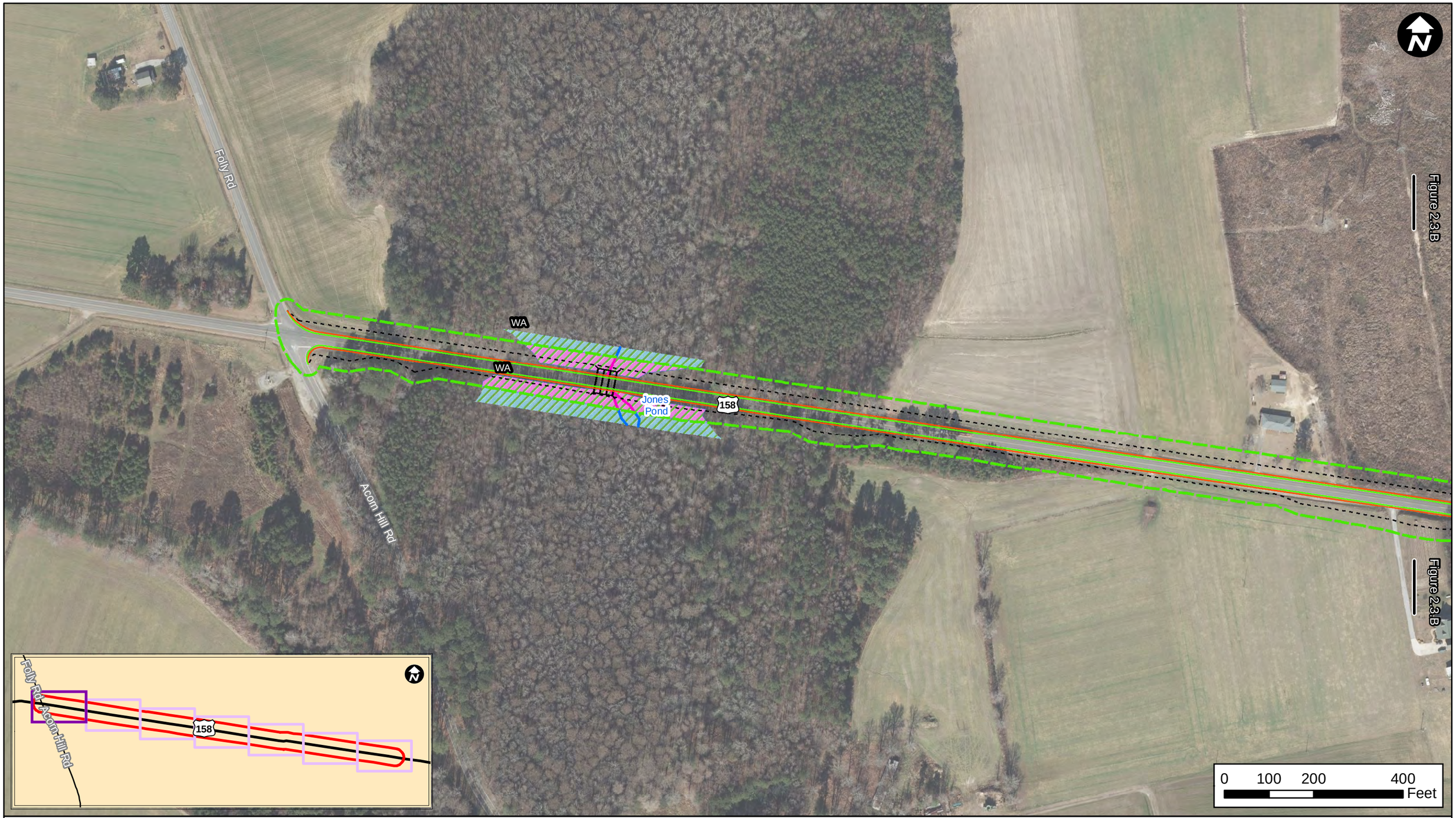


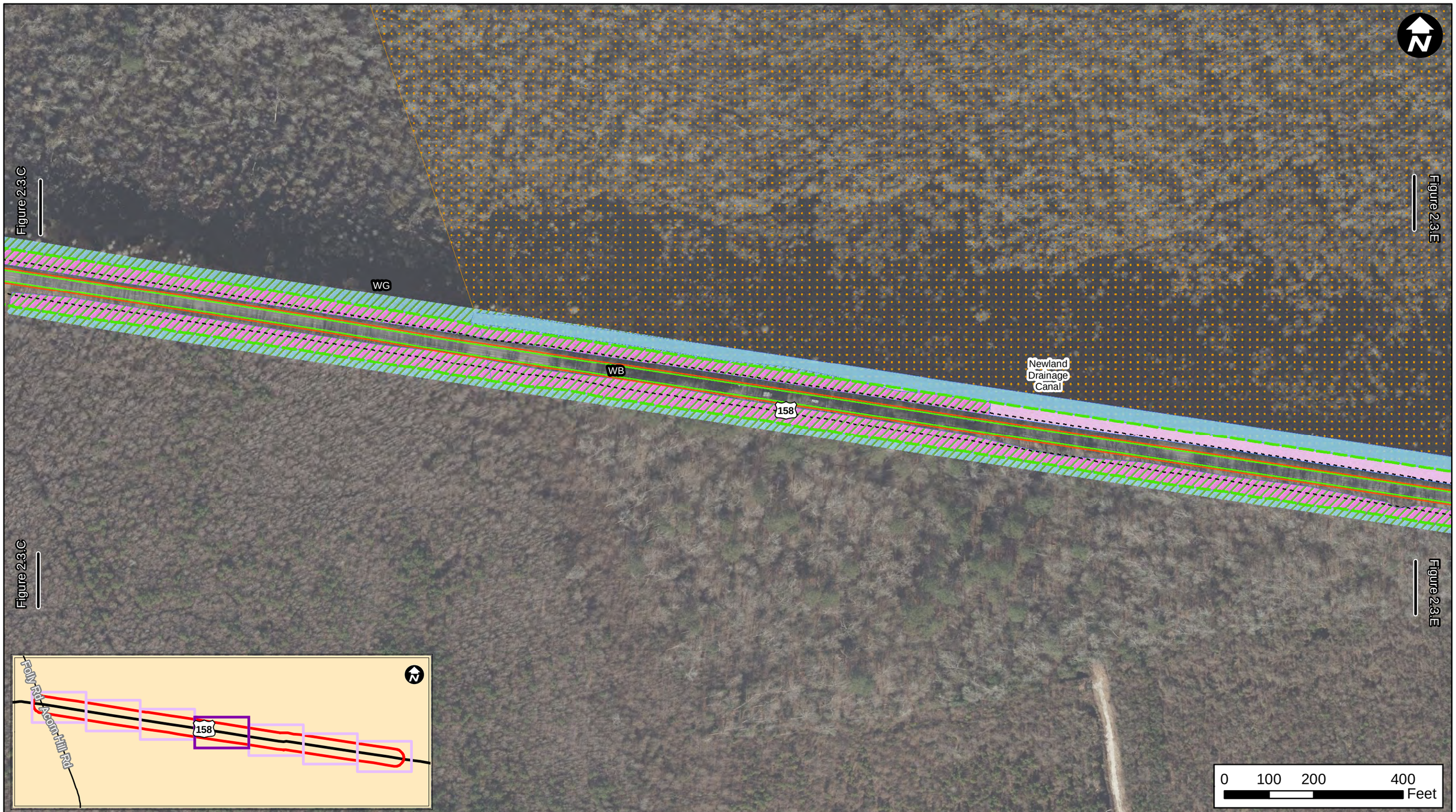
Figure 2.3.A Anticipated Impacts Map
Alternative 3
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Proposed Edge of Travel
Proposed Paved Shoulder
Slope Stakes
Alternative 3 Wetland Impacts
Delineated Wetlands
Alternative 3 Open Water Impacts
Delineated Open Water
Alternative 3 Impact Area

Figure 2.3.B Anticipated Impacts Map
Alternative 3
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

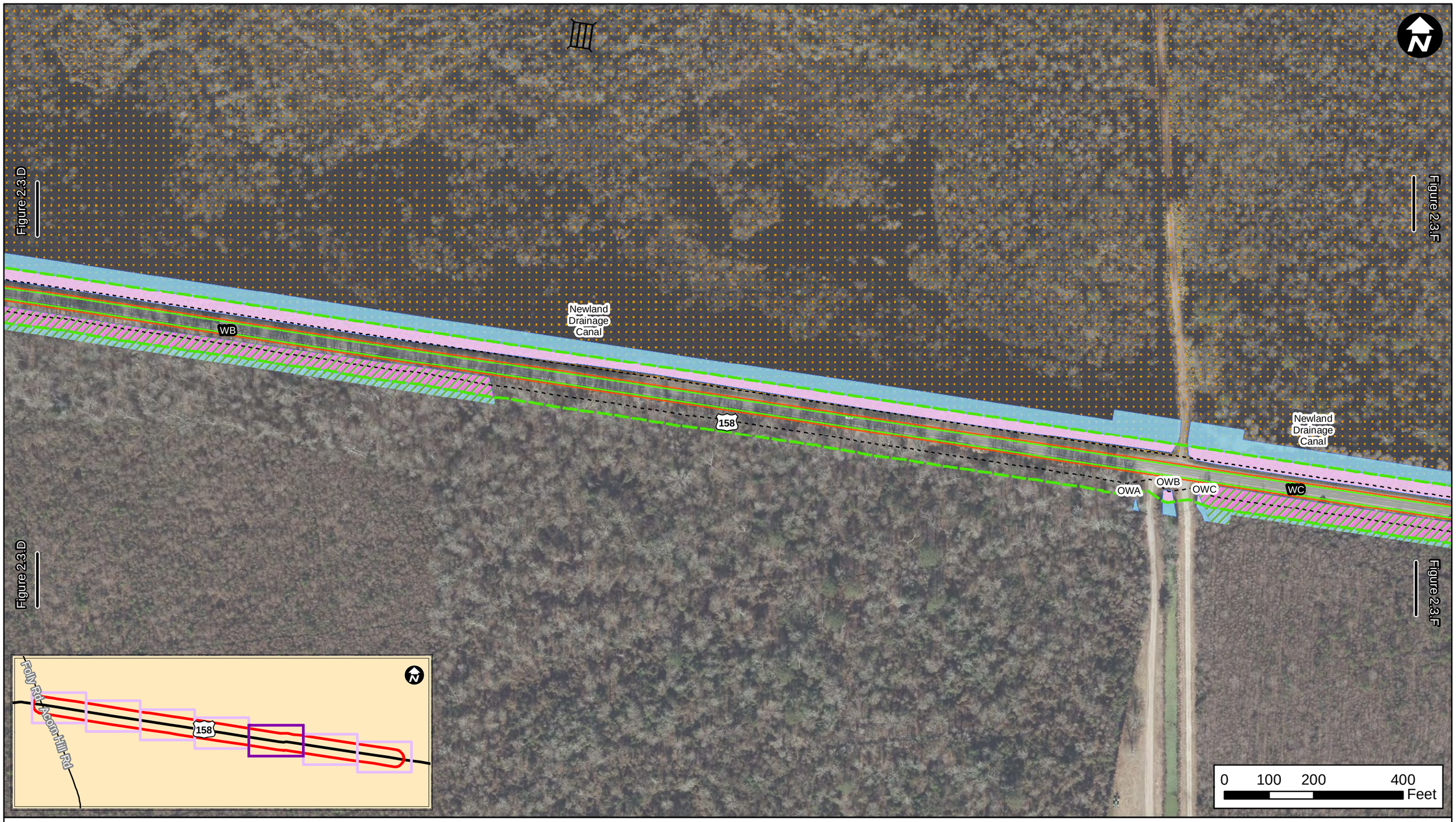
Proposed Edge of Travel
Proposed Paved Shoulder
Slope Stakes
Alternative 3 Wetland Impacts
Delineated Wetlands
Alternative 3 Impact Area

Figure 2.3.C Anticipated Impacts Map
Alternative 3
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Proposed Edge of Travel
Proposed Paved Shoulder
Slope Stakes
Alternative 3 Wetland Impacts
Delineated Wetlands
Alternative 3 Open Water Impacts
Delineated Open Water
Great Dismal Swamp National Wildlife Refuge
Alternative 3 Impact Area

Figure 2.3.D Anticipated Impacts Map
Alternative 3
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Roadway Culvert
Slope Stakes
Alternative 3 Wetland Impacts
Delineated Wetlands
Alternative 3 Open Water Impacts
Delineated Open Water
Great Dismal Swamp National Wildlife Refuge
Alternative 3 Impact Area

Figure 2.3.E Anticipated Impacts Map
Alternative 3
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

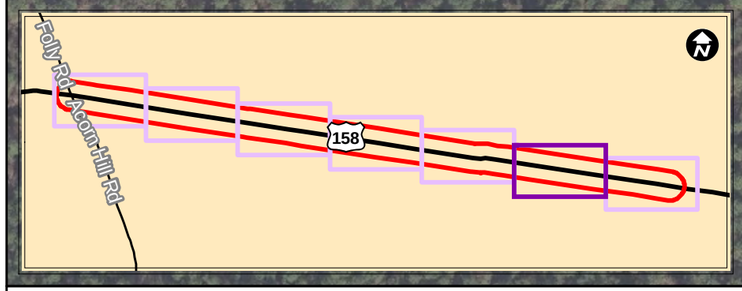
Figure 2.3.E

Figure 2.3.G

WC

Newland Drainage Canal

158



0 100 200 400 Feet

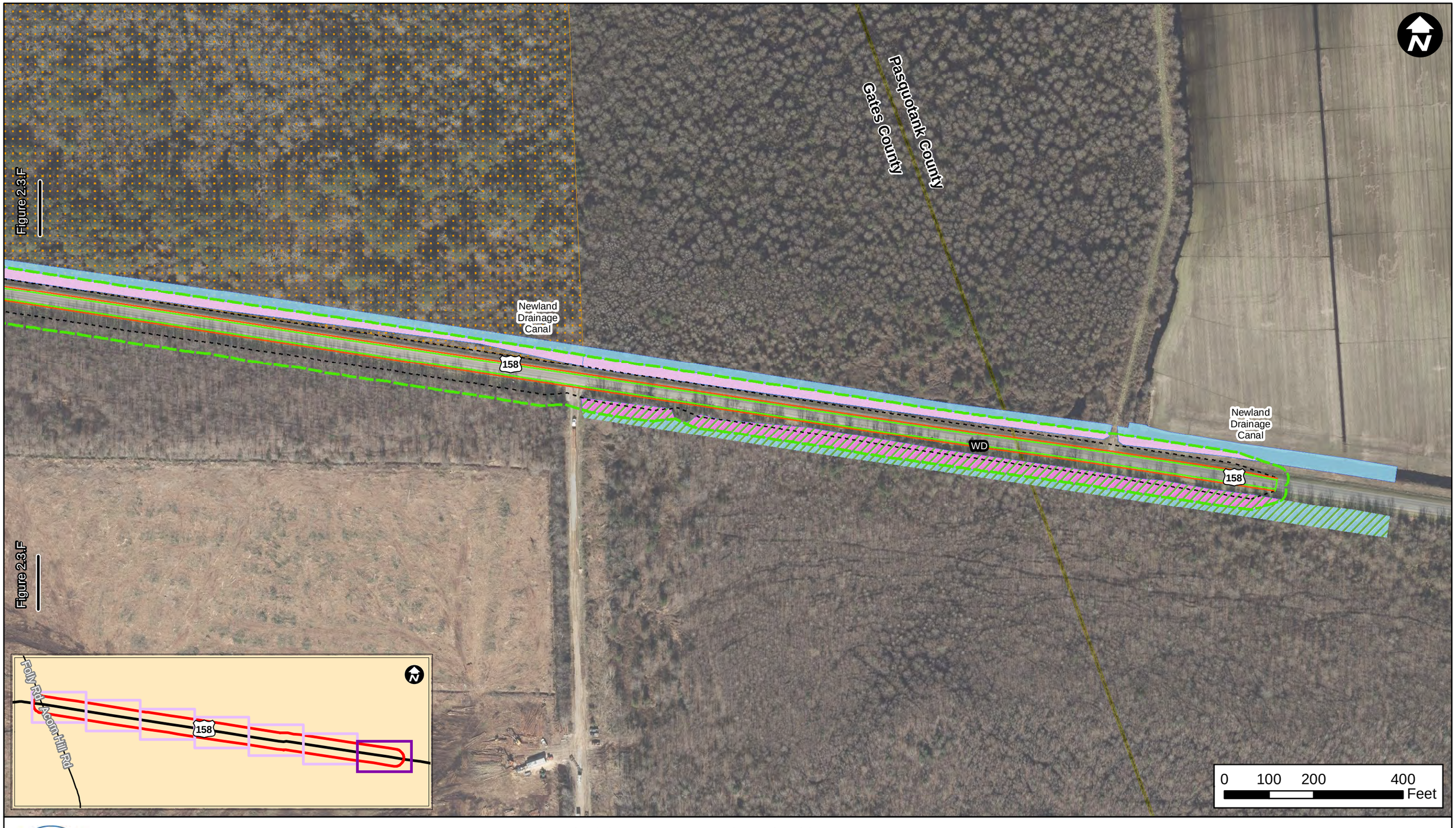
Proposed Edge of Travel
Proposed Paved Shoulder
Slope Stakes

Alternative 3 Wetland Impacts
Delineated Wetlands

Alternative 3 Open Water Impacts
Delineated Open Water

Great Dismal Swamp National Wildlife Refuge
Alternative 3 Impact Area

Figure 2.3.F Anticipated Impacts Map
Alternative 3
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



Proposed Edge of Travel
Proposed Paved Shoulder
Slope Stakes
County Line
Alternative 3 Wetland Impacts
Delineated Wetlands
Alternative 3 Open Water Impacts
Delineated Open Water
Great Dismal Swamp National Wildlife Refuge
Alternative 3 Impact Area

Figure 2.3.G Anticipated Impacts Map
Alternative 3
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

Appendix A: Detailed Impact Tables

Impacts were calculated using the following buffers:

- Alternative 1: Buffered 10 feet to the north and 25 feet to the south.
- Alternative 2: West of the Refuge, Alternative 2 was buffered 25 feet to the north and 10 feet to the south. Adjacent to the Refuge, Alternative 2 was buffered 10 feet to the north and 25 feet to the south.
- Alternative 3: Buffered 25 feet on both sides of the corridor.

Table A1. Anticipated Wetland Impacts (acres)

Feature	Alternative 1	Alternative 2	Alternative 3	Figure
WA	0.6	0.6	0.6	Figure 2.1-3.A
WB	11.1	3.9	9.2	Figures 2.1-3.B - 2.1-3.E
WC	2.1	2.1	1.9	Figures 2.1-3.E - 2.1-3.F
WD	1.3	1.3	1.1	Figure 2.1-3.G
WE	0	0.3	0.2	Figure 2.1-3.B
WF	0	<0.1	<0.1	Figure 2.1-3.B
WG	0.2	4.7	4.8	Figures 2.1-3.B - 2.1-3.D
Total	***15.2***	***12.8***	***17.8***	

NOTE: Wetland impacts are rounded to the nearest 0.1-acre increment.

Table A2*. Anticipated Stream Impacts (ft)*

Feature	Alternative 1	Alternative 2	Alternative 3	Figure
Jones Pond	180	155	165	Figure 2.A

NOTE: Stream Impacts are rounded to the nearest 5-foot increment.

Table A3*. Anticipated Open Water Impacts (acres)*

Feature	Alternative 1	Alternative 2	Alternative 3	Figure
Newland Drainage Canal	2.7*	3.3*	6.1	Figures 2.1-3.B and 2.1-3.D - 2.1-3.G
OWB	<0.1	<0.1	<0.1	Figure 2.1-3.E
OWC	<0.1	<0.1	<0.1	Figure 2.1-3.E
Total	***2.8****	***3.3****	***6.2***	

NOTE: Open Water impacts are rounded to the nearest 0.1-acre increment.

*Alternative 1 and Alternative 2 impacts include impacts due to the addition of rip rap (fill) on the existing side slope and outside of the 10-foot buffer and are in addition to the impacts estimated within the 10-foot buffer.

Appendix B: Public Comment Summary

A public meeting was held for the NCDOT R-5808 project on Thursday, October 4, 2018 from 5 – 7 p.m. at the Sunbury Fire Department in Sunbury, NC. A total of 27 individuals attended the public meeting, and a total of two written comments were received during the comment period ending October 19, 2018. Responses to comments received are included below in *italics*.

- Increased traffic and speed have increased roadkill. Request signs warning drivers of wildlife and reducing the speed to 35 mph.
    - *The current posted speed of 55 mph will be maintained on this section of roadway to be consistent with guidelines for a rural arterial with level terrain. This will also maintain the existing traffic flow and driver expectation. However, measures to mitigate wildlife impacts may be considered.*
- A resident near the corridor is interested in selling borrow material for the project. His property is on the north side of 158, close to the intersection of Acorn Hill and 158.