Complete 540 – Triangle Expressway Southeast Extension

Wake and Johnston Counties

STIP Nos. R-2721, R-2828, R-2829

INTERAGENCY PROJECT MEETING

Agenda

July 12, 2017
NCDOT Structure Design Conference Room C
Century Center Building A
9:00 am to 11:00 am (time is subject to change)

Purpose: Project status and review locations of project avoidance and minimization efforts.

- Project Status (including previous interagency meetings)
  - 12/2009 – project introduction and establish Section 6002 Plan
  - 02/2010 – agency scoping
  - 08/2010 – purpose and need
  - 09/2010 – purpose and need
  - 11/2010 – public involvement and alternatives
  - 01/2011 – public involvement and alternatives
  - 08/2012 – alternatives
  - 12/2012 – project advancement
  - 09/2013 – recommended DSAs
  - 12/2013 – finalize DSAs
  - 11/2014 – bridging and minimization
  - 08/2015 – reader friendly Draft EIS
  - Draft Environmental Impact Statement – 11/2015
  - Public Hearing – 12/2015
  - 02/2016 – public involvement and recommended Preferred Alternative
  - 03/2016 – development of DSA design plans and impact minimization
  - 06/2017 – quantitative ICE analysis
  - 07/2017 – minimization
  - Final Environmental Impact Statement
  - Record of Decision

- Preliminary Design (Wetland and Stream Impacts) Table 1 (Handout 24)

- Avoidance and Minimization Measures (Handout 24)
  - Horizontal and/or Vertical Alignment Shifts; Table 2 (Figures 1-41)
  - Bridging: Table 3 (Figures BF-1 – BF-7)
  - Retaining Walls and Noise Barriers (Figures Wall1-Wall14)
  - Interchange Types (Interchange Forms –(Not in Packet)

- Wrap Up/Next Steps

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INTERAGENCY PROJECT MEETING

Handout #24
Impact Minimization for the Preferred Alternative

The purpose of Handout #24 is to provide information on jurisdictional impacts associated with the Complete 540 project and efforts to avoid and minimize those impacts in accordance with Item 11 of the Section 6002 Coordination Plan for the project (latest edition dated November 26, 2013). This material and the associated Interagency Meeting provide an opportunity to consider avoidance and minimization of impacts to jurisdictional resources during the development of more detailed designs for the Preferred Alternative.

Current Jurisdictional Impacts

Table 1 presents jurisdictional impacts of the current preliminary designs for the Preferred Alternative (DSA 2), computed within construction limits (slope stakes) plus an additional 25 feet on each side. The jurisdictional impact categories include streams, riparian buffer zones, wetlands, ponds, floodway, 100-year floodplain, and 500-year floodplain.

For comparison purposes, Table 1 also reports impacts of the previous functional designs for DSA 2, computed within construction limits (slope stakes) plus an additional 40 feet on each side.

Avoidance and Minimization Measures

Horizontal and Vertical Alignment Shifts

Table 2 shows the changes in jurisdictional impacts that resulted from horizontal and vertical alignment shifts from the functional design to the preliminary design of the Preferred Alternative. Reductions in impacts are noted in terms of raw numbers and percentage changes. As indicated above, the preliminary design impacts were computed using slope stakes plus 25 feet and the functional design impacts were computed using slope stakes plus 40 feet. These avoidance and minimization impact areas are graphically represented in Figures 1 through 41.

In Figures 1 through 41, the original impacts for the functional designs (*slope stakes plus 40 feet*) are represented by the shaded transparent pink shape and the pink solid lines represent the previous functional design's horizontal alignment. The solid purple lines represent the current preliminary designs impacts (*slope stakes plus 25 feet*) and the solid yellow lines represent the current preliminary design's horizontal alignment.

Table 2 also reports the total difference between impacts from the previous functional designs and the current preliminary designs as well as the percentage of impact avoidance.

Bridging

Table 3 reports the impact reductions to jurisdictional features by incorporating additional bridging at eight sites along the Preferred Alternative, which were agreed upon at the November 2014 and December 2014 Interagency Meetings. Bridge Figures 1 through 7 (BF-1 through BF-7) show these eight sites. At each of the eight sites, the recommended bridge lengths are longer than what is hydraulically required in order to reduce and minimize jurisdictional impacts.

Table 4 shows the percentage of impacts avoided/minimized due to additional bridging. The first row reports the impacts to streams, wetlands, and other hydraulic features, that would result from providing minimum hydraulic requirements. The second row reports the same impacts with the additional bridging incorporated. The third row reports the difference between the two (actual avoidance) and the fourth row reports the percentage avoidance for each impact.

Noise Sensitive Areas and Retaining Walls

Wall Figures 1 through 14 (WF-1 through WF-14) show where walls were used to help avoid and minimize impacts to residential and other developed areas. In the wall figures, the yellow solid lines represent the likely noise barrier locations and the red solid lines represent retaining wall locations that were added to help minimize impacts to adjacent subdivisions.

The likely noise barrier locations were identified in the Traffic Noise Analysis, completed in May 2015, and have been included in the preliminary designs for the Preferred Alternative. The retaining walls, shown by the red solid lines, were added as a result of a change in the maximum cut slope recommendations. The original functional designs were prepared with 2:1 slopes, but the current preliminary designs incorporate 3:1 maximum cut slopes to conform with the preliminary slope recommendations. This change resulted in additional impacts to some residential communities. Retaining walls were added in these areas to avoid these additional impacts. During final designs, alternative design strategies such as shoulder berm gutters, which may eliminate the need for some of these retaining walls, may be considered.

Interchange Layouts

During the development of the functional designs for all of the original 17 DSAs, multiple meetings with NCDOT were held to identify an interchange layout for each interchange location. In selecting a preferred interchange layout at each location, the project team considered multiple interchange layouts, reviewing the benefits and constraints of each. Approximate stream and wetland impacts under each layout were part of this consideration. The project team sought to select interchange layouts that best minimized overall impacts to jurisdictional features and surrounding residences and businesses, while also maintaining effective traffic operations.

For the preferred alternative, a total of 52 unique interchange layouts were considered for the 13 interchange locations. No figures or impact data are included in minimization packet, but figures for each interchange layout are available at the meeting.

Further Minimization Efforts

During the development of final plans and construction, Best Management Practices (BMPs) will be implemented to help further minimize impacts. For portions of the project that drain into receiving waters that are habitat for protected species, appropriate BMPs will be used. These additional measures will be coordinated at future Interagency Meetings addressing hydraulic design and stormwater management.

TABLE 1

PRELIMINARY DESIGN IMPACTS

TIP	Category	Streams (Linear Feet)	Streams (Each)	Buffer Zone 1 (Acres)	Buffer Zone 2 (Acres)	Wetlands (Acres)	Wetlands (Each)	Riparian (Acres)	Non-Riparian (Acres)	Ponds (Acres)	Ponds (Each)	Floodway (Acres)	100 Yr Flood (Acres)	500 Yr Flood (Acres)
R-2721	**Func. Design**	18,891	45	26.33	16.72	28.96	47	24.28	4.68	5.18	8	9.14	17.16	18.76
	Prelim. Design	**18,574**	**47**	**26.79**	**17.27**	**28.90**	**50**	**26.44**	**2.46**	**5.46**	**7**	**7.99**	**14.88**	**16.44**
	Delta	-317	2	0.46	0.55	-0.06	3.00	2.16	-2.22	0.28	-1	-1.15	-2.28	-2.32
	Percent Difference	-1.68%	4.44%	1.75%	3.29%	-0.21%	6.38%	8.90%	-47.44%	5.41%	-12.50%	-12.59%	-13.30%	-12.39%
R-2828	**Func. Design**	29,850	55	43.83	28.22	25.79	58	24.68	1.11	9.12	15	0.23	14.27	18.48
	Prelim. Design	**24,411**	**47**	**35.13**	**22.53**	**20.98**	**54**	**20.34**	**0.64**	**8.84**	**14**	**0.06**	**12.83**	**16.78**
	Delta	-5,439	-8	-8.70	-5.69	-4.81	-4.00	-4.34	-0.47	-0.28	-1	-0.16	-1.44	-1.70
	Percent Difference	-18.22%	-14.55%	-19.85%	-20.16%	-18.65%	-6.90%	-17.59%	-42.34%	-3.07%	-6.67%	-72.21%	-10.11%	-9.22%
R-2829	**Func. Design**	17,069	39	24.99	17.35	19.58	44	18.28	1.31	6.74	15	8.20	34.43	44.44
	Prelim. Design	**16,470**	**45**	**25.09**	**17.54**	**18.73**	**51**	**17.51**	**1.22**	**10.34**	**18**	**6.83**	**33.66**	**43.10**
	Delta	-599	6	0.10	0.19	-0.85	7.00	-0.77	-0.09	3.60	3	-1.37	-0.77	-1.34
	Percent Difference	-3.51%	15.38%	0.40%	1.10%	-4.34%	15.91%	-4.21%	-6.87%	53.41%	20.00%	-16.75%	-2.23%	-3.02%
	Totals													
	Func. Design	65,810	139	95.15	62.29	74.33	149.00	67.24	7.10	21.04	38	17.57	65.86	81.69
	Prelim. Design	**59,455**	**139**	**87.01**	**57.34**	**68.61**	**155.00**	**64.29**	**4.32**	**24.64**	**39**	**14.88**	**61.37**	**76.32**
	Delta	-6,355	0	-8.14	-4.95	-5.72	6.00	-2.95	-2.78	3.60	1	-2.69	-4.49	-5.37
	Percent Difference	-9.66%	0.00%	-8.55%	-7.95%	-7.70%	4.03%	-4.39%	-39.15%	17.11%	2.63%	-15.30%	-6.82%	-6.58%

Note: Functional Design impacts computed using slope stakes + 40ft; Preliminary Design impacts computed using slope stakes +25ft.

Note: Table 1 reports project impacts differental between functional design and preliminary design. (A negative delta is a reduction of impacts, a positive delta is an increase in impacts.)

TABLE 2

AVOIDANCE FROM ALIGNMENT SHIFTS

TIP	IMPACTS	Figure No.	STREAMS			WETLANDS		
			Stream Impacts	Zone 1 Buffers	Zone 2 Buffers	Wetlands Impacts	Riparian	Non-Riparian
			Linear Feet	Acres	Acres	Acres	Acres	Acres
R-2721	Bells Lake Interchange (-L- 313+00 to 360+00)	8						
	Functional Design		1,527	2.12	1.46	2.34	2.34	0.00
	Preliminary Design		1,376	1.91	1.30	2.29	2.29	0.00
	Avoidance		151	0.21	0.17	0.05	0.05	0.00
	% Avoidance		9.9%	9.9%	11.3%	2.1%	2.1%	0.00
	US 401 (-L- 425+00 to 500+00)							
	Functional Design	10-11	4,971	7.46	4.76	7.03	4.88	2.15
	Preliminary Design		3,913	6.17	3.95	6.69	4.54	2.15
	Avoidance		1,058	1.30	0.81	0.34	0.34	0.00
	% Avoidance		21.3%	17.4%	17.0%	4.8%	6.9%	0.0%
R-2828	US 401 (-L- 500+00 to 520+00)	12						
	Functional Design		1,531	2.82	1.77	1.69	1.51	0.19
	Preliminary Design		1,335	2.68	1.71	1.55	1.42	0.14
	Avoidance		196	0.14	0.06	0.14	0.09	0.05
	% Avoidance		12.8%	5.1%	3.4%	8.2%	5.9%	27.0%
	Old Stage Interchange (-L- 565+00 to 615+00)	13-14						
	Functional Design		489	1.16	0.86	2.24	2.20	0.04
	Preliminary Design		377	0.87	0.63	1.98	1.94	0.04
	Avoidance		112	0.29	0.23	0.26	0.26	0.00
	% Avoidance		22.9%	25.0%	26.7%	11.7%	11.9%	2.3%
	NC 50 (Benson Rd) Interchange (-L- 755+00 to 805+00)	18						
	Functional Design		981	1.96	1.45	1.81	1.81	0.00
	Preliminary Design		915	1.64	1.36	1.26	1.26	0.00
	Avoidance		66	0.32	0.08	0.55	0.55	0.00
	% Avoidance		6.7%	16.4%	5.7%	30.3%	30.3%	0.00
	Swift Creek/Turner Farms (-L- 805+00 to 920+00)	19-21						
	Functional Design		7,092	9.68	6.35	5.46	4.96	0.51
	Preliminary Design		6,501	8.72	5.69	4.14	4.05	0.09
	Avoidance		591	0.96	0.65	1.32	0.91	0.41
	% Avoidance		8.3%	9.9%	10.3%	24.3%	18.4%	82.0%

Note: Functional Design impacts computed using slope stakes + 40ft; Preliminary Design impacts computed using slope stakes +25ft.

Note: Table 2 reports impact avoidance due to project alignment shifts. (Positive avoidance is a reduction of impacts, negative avoidance is an increase in impacts)

TABLE 2 (cont.)

AVOIDANCE FROM ALIGNMENT SHIFTS

TIP	IMPACTS / AVOIDANCE FROM ALIGNMENT SHIFTS	Figure No.	STREAMS			WETLANDS		
			Stream Impacts	Zone 1 Buffers	Zone 2 Buffers	Wetlands Impacts	Riparian	Non-Riparian
			Linear Feet	Acres	Acres	Acres	Acres	Acres
R-2829	I-40 Interchange Shift (-L- 955+00 to 990+00)	27						
	Functional Design		495	0.80	0.60	2.85	2.67	0.18
	Preliminary Design		521	0.68	0.51	0.94	0.77	0.18
	Avoidance		-26	0.12	0.09	1.91	1.91	0.00
	% Avoidance		-5.3%	14.6%	15.1%	66.9%	71.4%	0.0%
	Auburn Knightdale Interchange (1335+00 to 1360+00)	37						
	Functional Design		1,955	2.75	1.77	1.45	1.45	0.00
	Preliminary Design		1,850	2.56	1.62	1.15	1.15	0.00
	Avoidance		105	0.19	0.15	0.30	0.30	0.00
	% Avoidance		5.4%	6.8%	8.3%	20.5%	20.5%	0.00
	US 64 /264 Interchange (1445+00 to 1495+00)	40-41						
	Functional Design		1,491	2.22	1.57	3.71	3.71	0.00
	Preliminary Design		1,596	2.87	2.11	5.39	5.39	0.00
	Avoidance		-105	-0.65	-0.54	-1.68	-1.68	0.00
	% Avoidance		-7.0%	-29.1%	-34.6%	-45.4%	-45.4%	0.00

Total	Functional Design		20,532	30.97	20.58	28.59	25.53	3.06
	Preliminary Design		18,384	28.10	18.88	25.41	22.81	2.59
	Avoidance		2,148	2.88	1.69	3.18	2.71	0.47
	% Avoidance		10.5%	9.3%	8.2%	11.1%	10.6%	15.2%

Note: Functional Design impacts computed using slope stakes + 40ft; Preliminary Design impacts computed using slope stakes +25ft.

Note: Table 2 reports impact avoidance due to project alignment shifts. (Positive avoidance is a reduction of impacts, negative avoidance is an increase in impacts)

TABLE 3

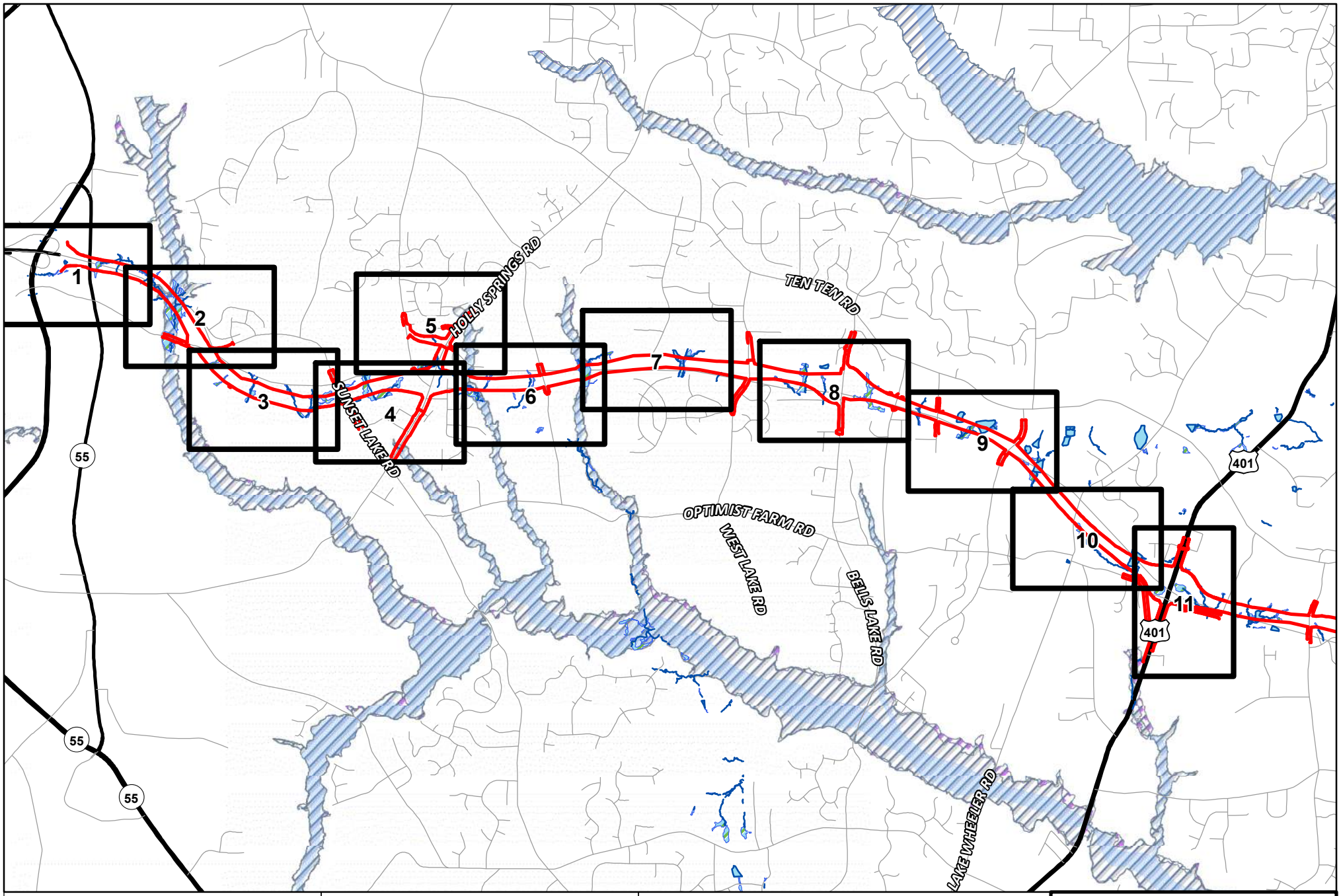
IMPACT SAVINGS (REDUCTION) BY ADDITIONAL BRIDGING

TIP	Site No.	Figure No.		STREAMS (Savings)				WETLANDS (Savings)				HYDRAULIC (Savings)			
				Stream Impacts	Zone 1 Buffers	Zone 2 Buffers		Wetlands Impacts	Riparian	Non-Riparian		Number of Ponds	Ponds	100 Year Floodplain	Critical Watershed
				Linear Feet	Acres	Acres		Acres	Acres	Acres		Each	Acres	Acres	Acres
R-2721															
	1	BF-1		272	0.23	0.04		0.003	0.003	0.00		0	0.00	0.01	0.00
	1A	BF-1		126	0.16	0.01		0.00	0.00	0.00		0	0.00	0.00	0.00
	8	BF-2		0	0.00	0.00		2.17	2.17	0.00		0	0.00	0.00	0.00
	Total			398	0.40	0.05		2.18	2.18	0.00		0	0.00	0.01	0.00
R-2828	16	BF-3		373	0.52	0.33		1.52	1.52	0.00		0	0.00	0.00	0.00
	21	BF-4		1,495	1.82	1.13		4.39	4.39	0.00		0	0.00	0.00	0.00
	24	BF-5		1,619	2.53	1.96		8.62	8.62	0.00		0	0.00	7.02	0.00
	Total			3,487	4.87	3.42		14.53	14.53	0.00		0	0.00	7.02	0.00
R-2829	33	BF-6		208	0.39	0.35		1.97	1.97	0.00		0	0.00	2.14	0.00
	63	BF-7		39	0.07	0.05		5.56	5.56	0.00		0	0.00	0.00	0.00
	Total			247	0.46	0.40		7.53	7.53	0.00		0	0.00	2.14	0.00

TABLE 4

IMPACT (% AVOIDANCE) BY ADDITIONAL BRIDGING

TIP	IMPACT SAVING FROM BRIDGING	STREAMS			WETLANDS			HYDRAULIC			
		Stream Impacts	Zone 1 Buffers	Zone 2 Buffers	Wetlands Impacts	Riparian	Non-Riparian	Number of Ponds	Ponds	100 Year Floodplain	Critical Watershed
		Linear Feet	Acres	Acres	Acres	Acres	Acres	Each	Acres	Acres	Acres
R-2721	w/o Additional Bridging	18,972	27.19	17.33	31.08	28.62	2.46	7	5.46	14.89	0.00
	w/ Additional Bridging	18,574	26.79	17.27	28.90	26.44	2.46	7	5.46	14.88	0.00
	Avoidance	398	0.40	0.05	2.18	2.18	0.00	0	0.00	0.01	0.00
	% Avoidance	2.1%	1.5%	0.3%	7.0%	7.6%	0.0%	0.0%	0.0%	0.1%	0.0%
R-2828	w/o Additional Bridging	27,898	40.00	25.92	35.51	34.87	0.64	14	8.84	19.85	0.00
	w/ Additional Bridging	24,411	35.13	22.53	20.98	20.34	0.64	14	8.84	12.83	0.00
	Avoidance	3,487	4.87	3.38	14.53	14.53	0.00	0	0.00	7.02	0.00
	% Avoidance	12.5%	12.2%	13.1%	40.9%	41.7%	0.0%	0.0%	0.0%	35.4%	0.0%
R-2829	w/o Additional Bridging	16,717	25.59	18.00	26.26	25.04	1.22	18	10.34	35.80	0.00
	w/ Additional Bridging	16,470	25.09	17.54	18.73	17.51	1.22	18	10.34	33.66	0.00
	Avoidance	247	0.50	0.46	7.53	7.53	0.00	0	0.00	2.14	0.00
	% Avoidance	1.5%	1.9%	2.6%	28.7%	30.1%	0.0%	0.0%	0.0%	6.0%	0.0%
Total	w/o Additional Bridging	63,587	92.77	61.24	92.86	88.53	4.33	39.00	24.64	70.54	0.00
	w/ Additional Bridging	59,455	87.01	57.34	68.61	64.29	4.32	39.00	24.64	61.37	0.00
	Avoidance	4,132	5.76	3.91	24.25	24.24	0.01	0.00	0.00	9.17	0.00
	% Avoidance	6.5%	6.2%	6.4%	26.1%	27.4%	0.2%	0.0%	0.0%	13.0%	0.0%



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

N

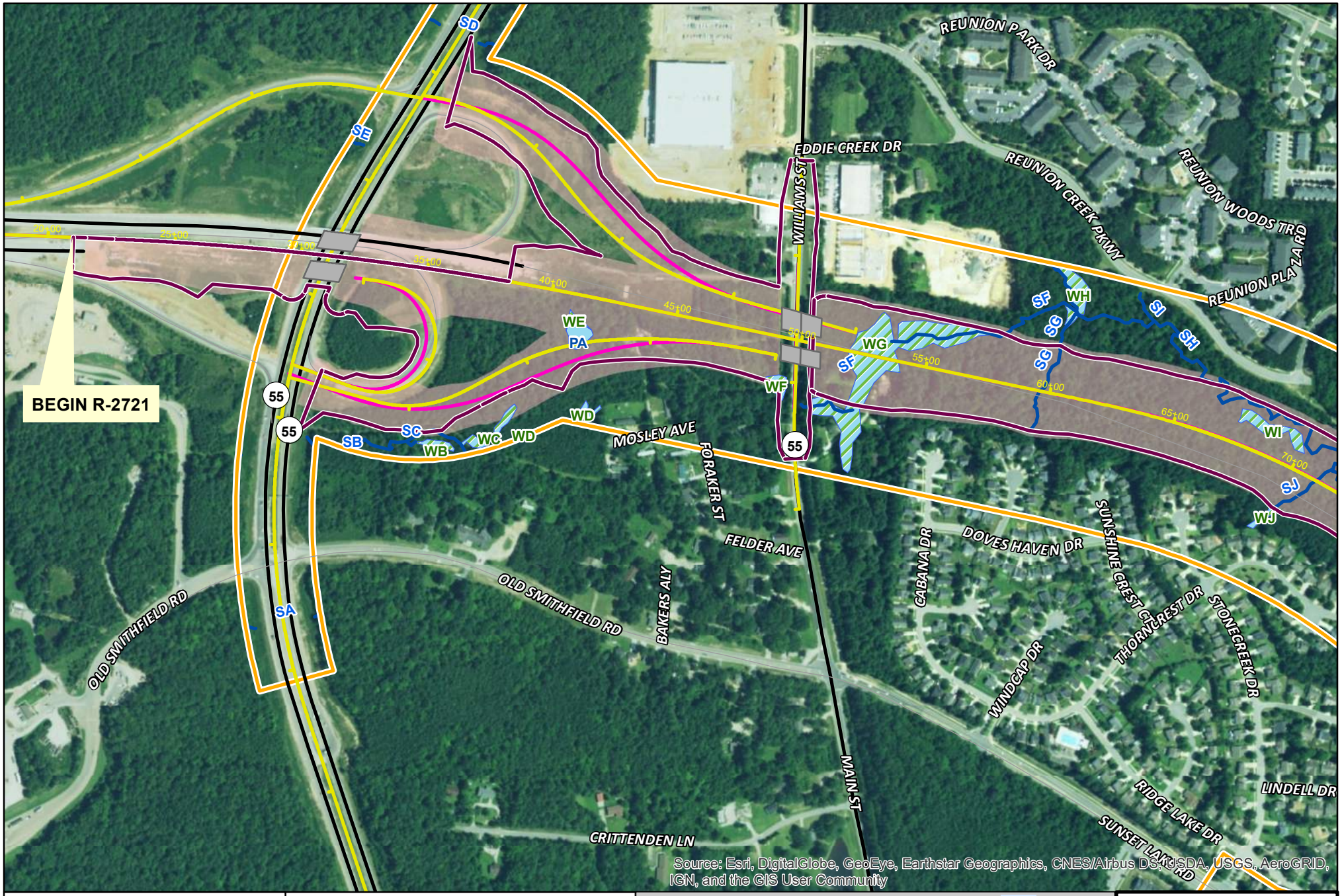
NOT TO SCALE

Flood Source: Wake County GIS

Figure Borders
Stream
SR Route
Wetland
Pond
Right Of Way
Floodway
100-Year Floodplain
500-Year Floodplain

IMPACTS

R-2721 Figure Index



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

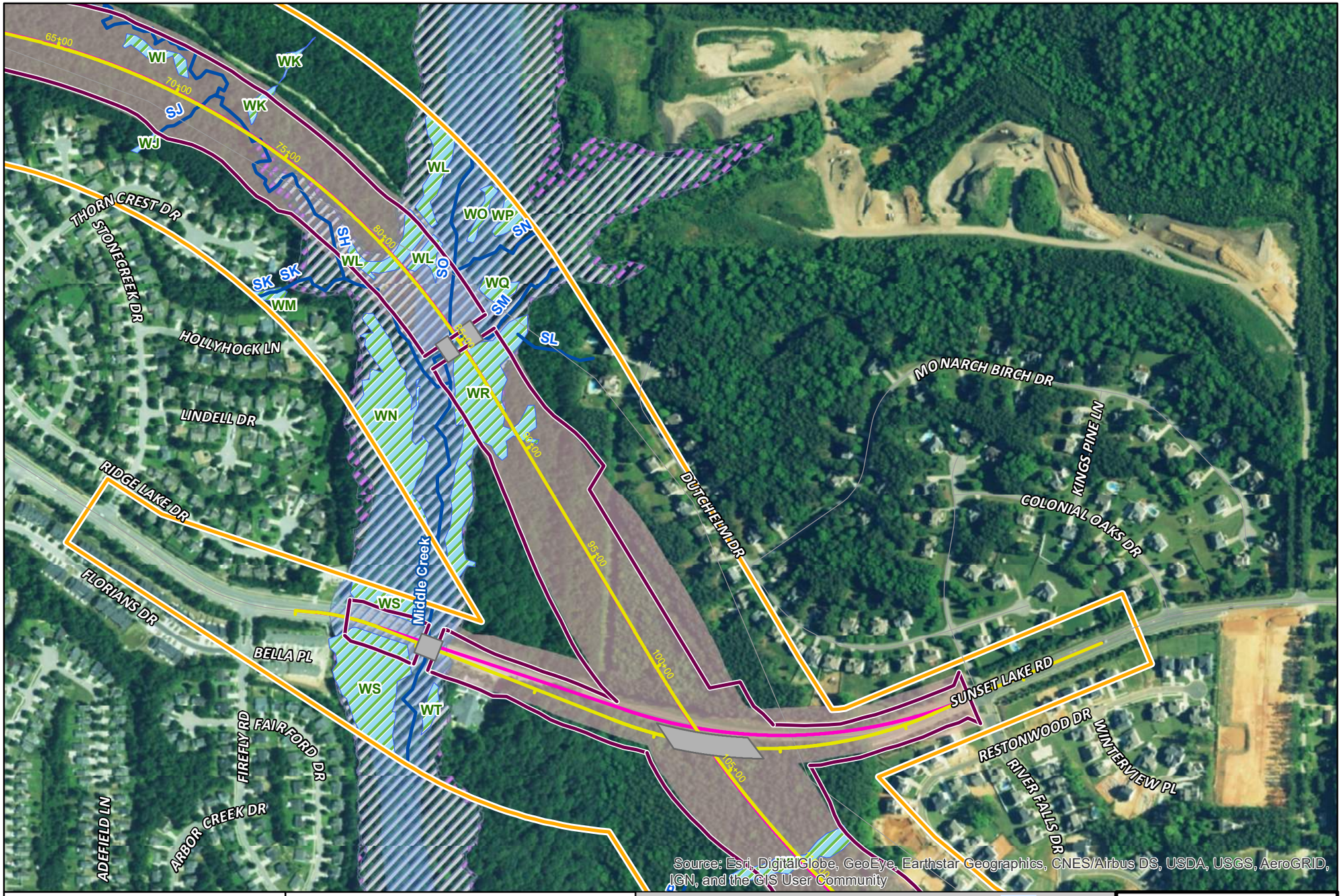
Flood Source: Wake County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Bridge
- Culvert
- Prel. Design Alignment
- Func. Design Alignment
- Prel. Design SS+25
- Func. Design SS+40
- Orange Corridor
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Railroad
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

IMPACTS

Figure 1



NORTH CAROLINA Turnpike Authority

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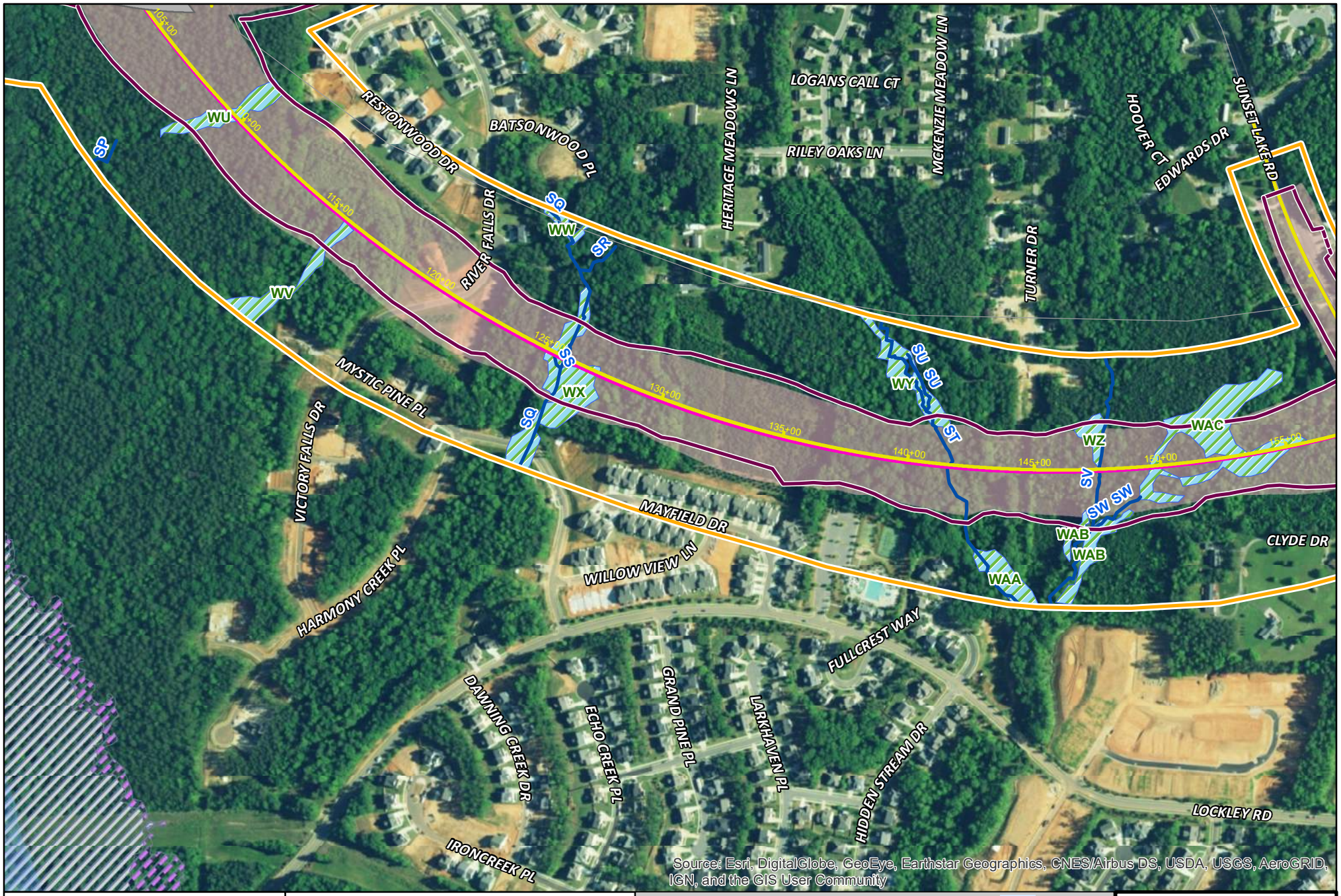
IMPACTS

Figure 2



NORTH CAROLINA Turnpike Authority

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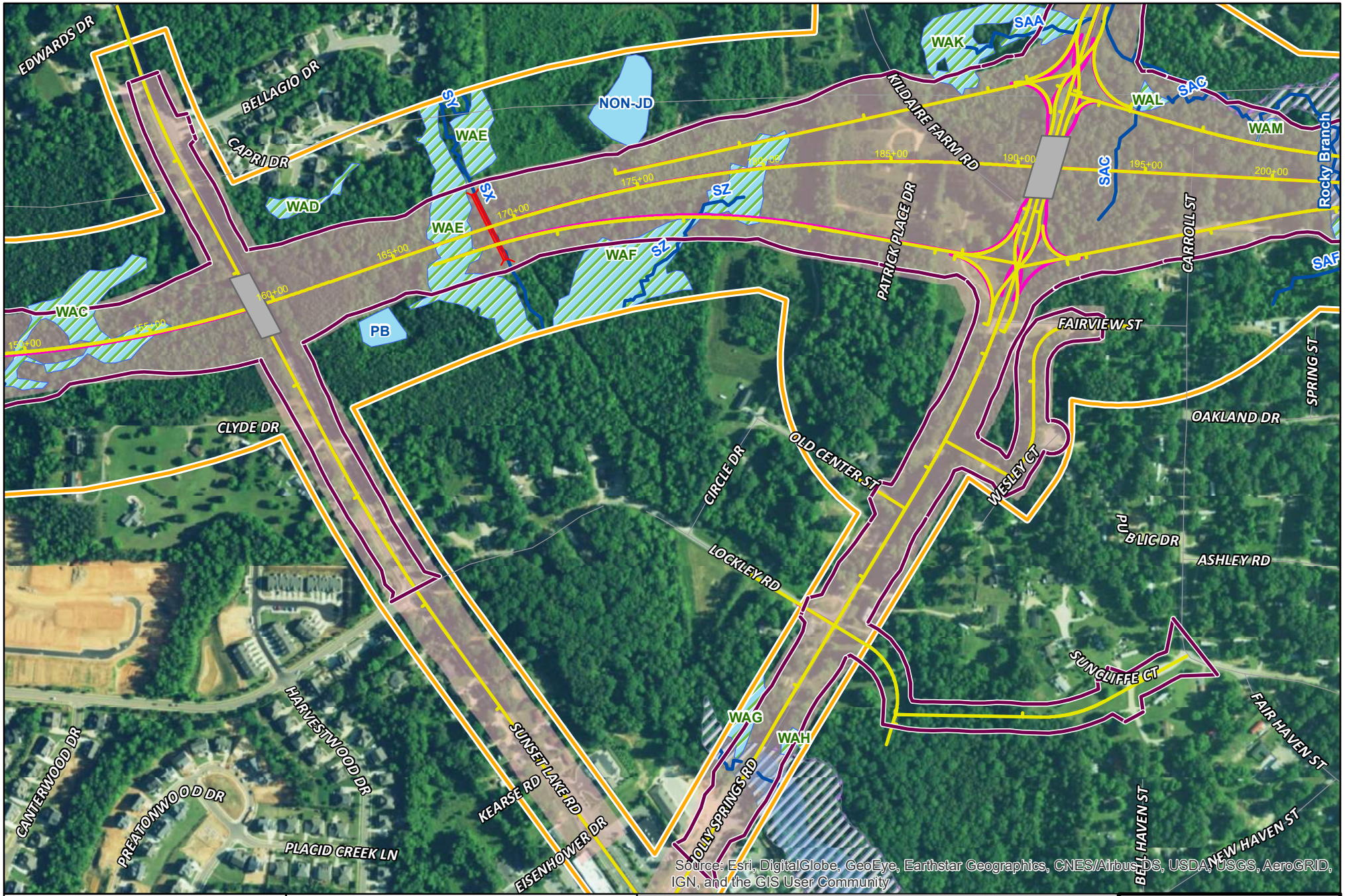
IMPACTS

Figure 3



NORTH CAROLINA Turnpike Authority

COMPLETE 540
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PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Source: Wake County GIS

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IMPACTS

Figure 4

NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Source: Wake County GIS

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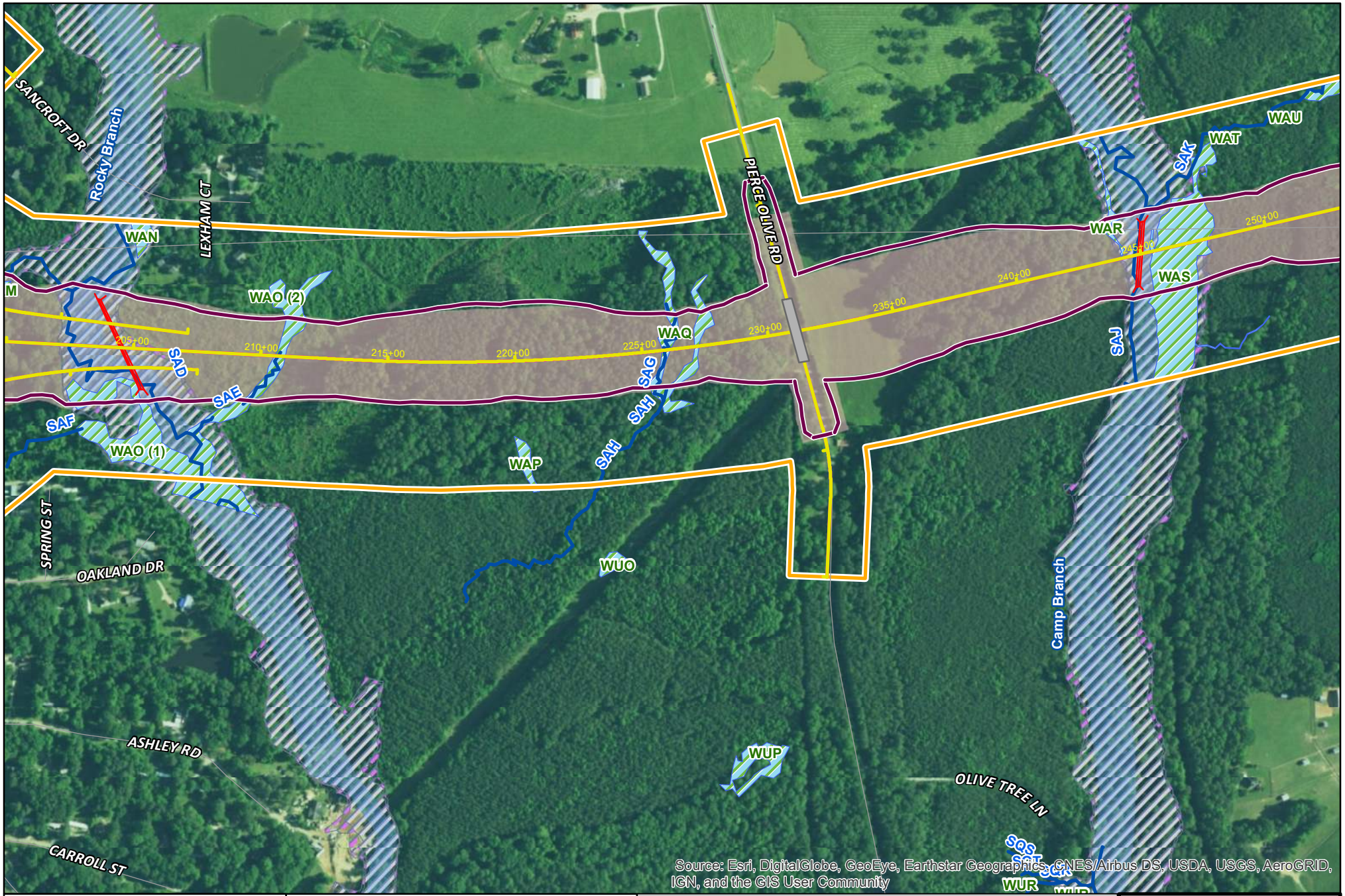
IMPACTS

Figure 5



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

N

0 250 500 1,000 Feet

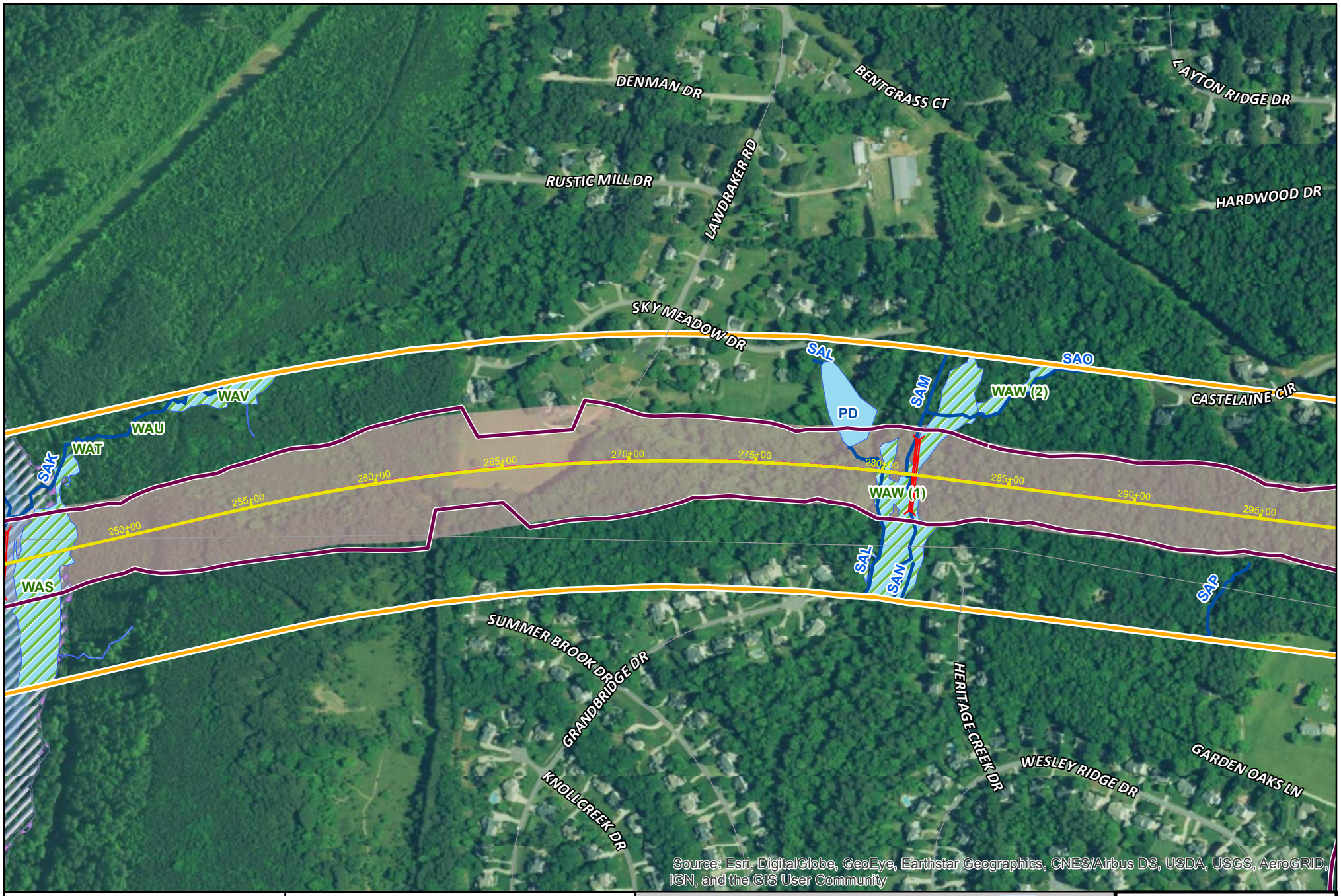
Flood Source: Wake County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Bridge
- Culvert
- Prel. Design Alignment
- Func. Design Alignment
- Prel. Design SS+25
- Func. Design SS+40
- Orange Corridor
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Railroad
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

IMPACTS

Figure 6



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

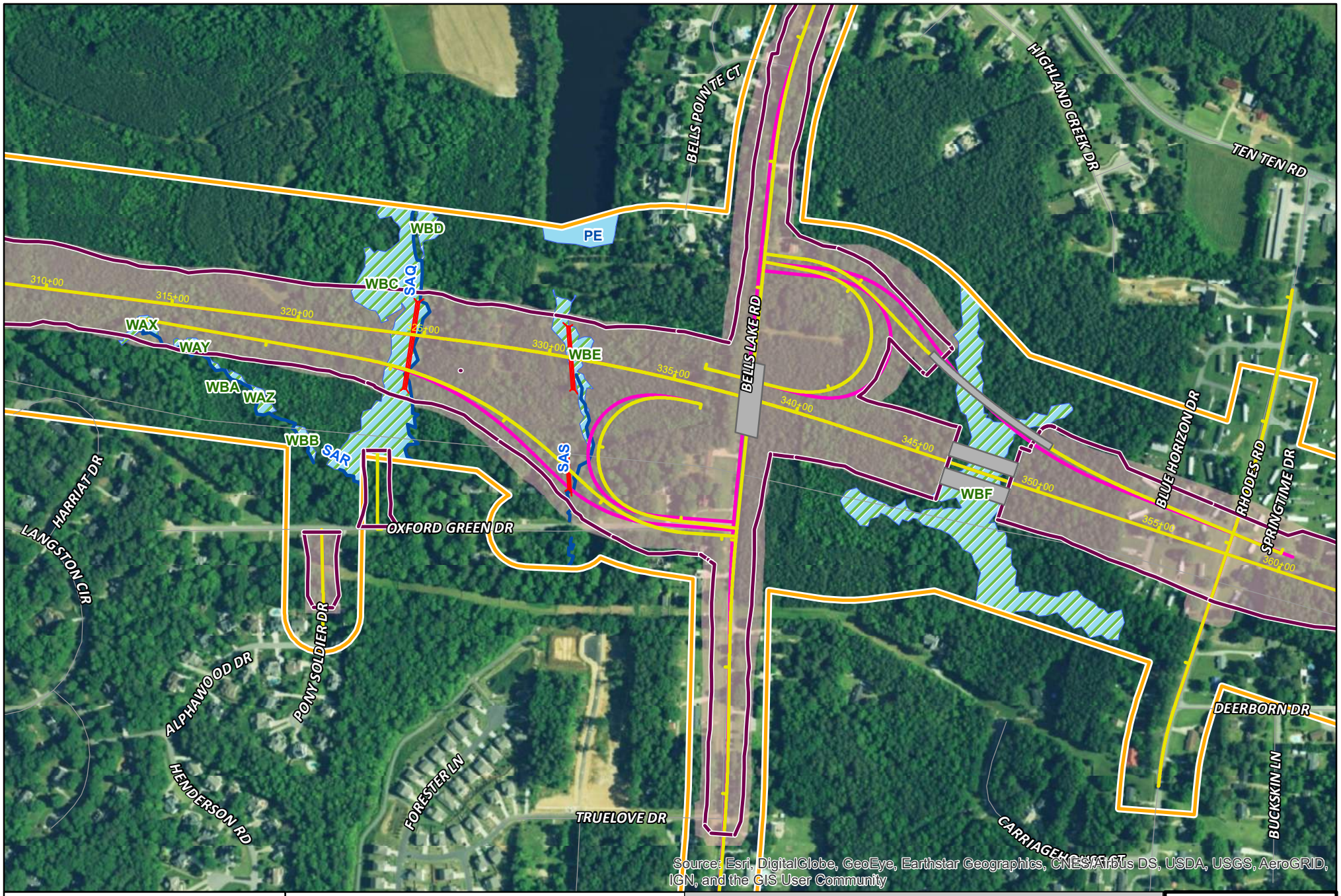
Flood Source: Wake County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Bridge
- Culvert
- Prel. Design Alignment
- Func. Design Alignment
- Prel. Design SS+25
- Func. Design SS+40
- Orange Corridor
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Railroad
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

IMPACTS

Figure 7



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Source: Wake County GIS

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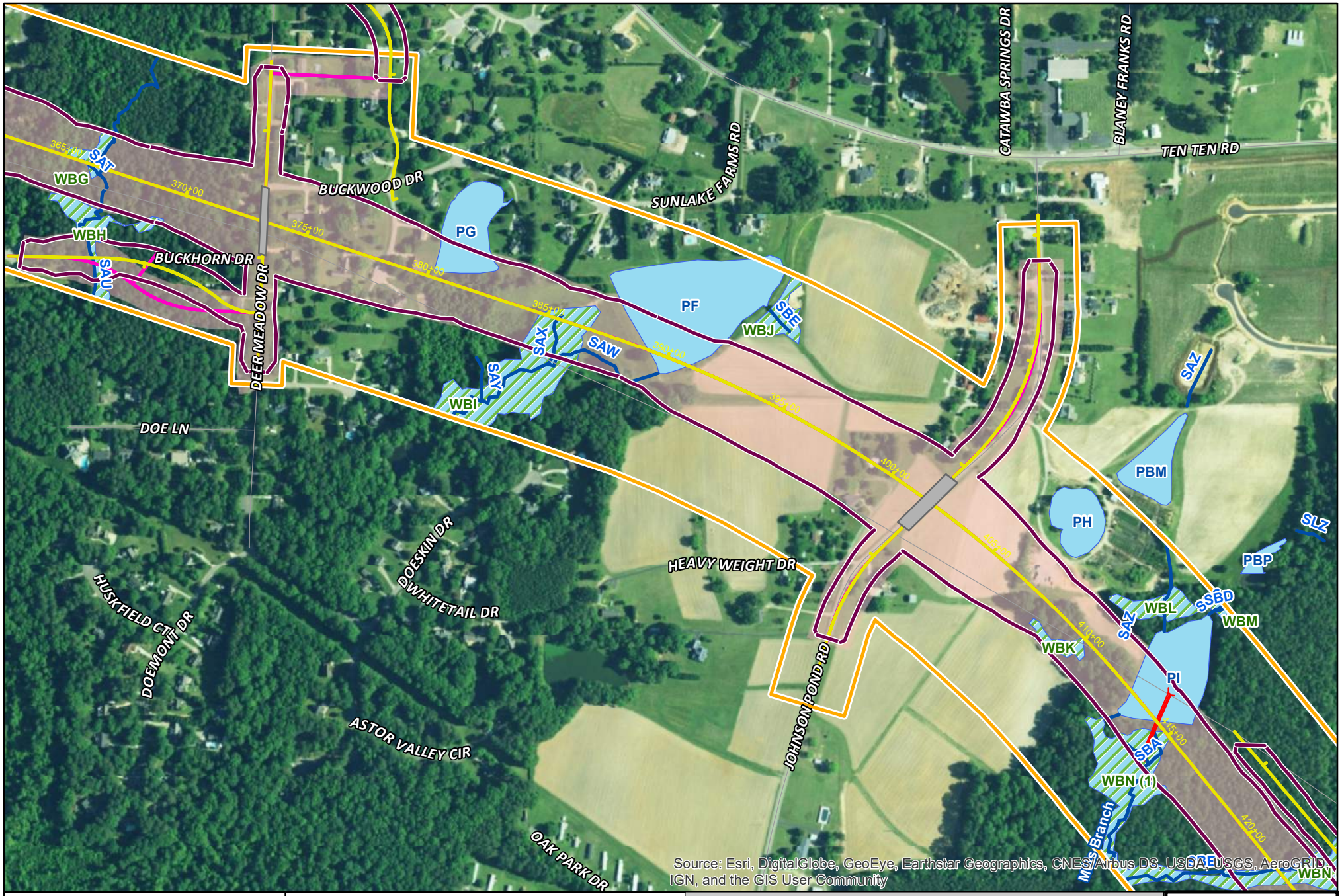
- Culvert
- Prel. Design Alignment
- Func. Design Alignment
- Prel. Design SS+25
- Func. Design SS+40
- Orange Corridor
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Railroad
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

IMPACTS

Figure 8



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Source: Wake County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

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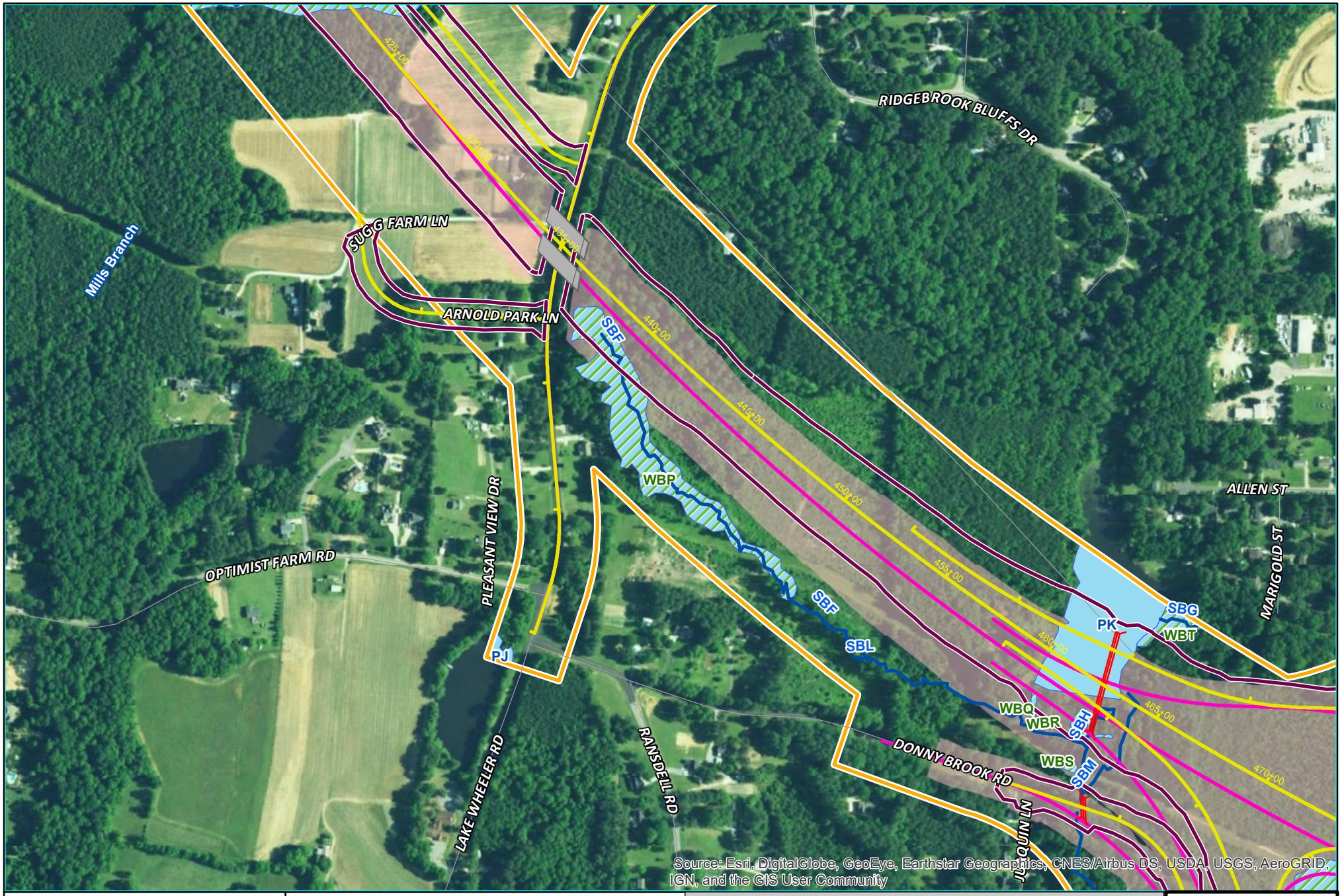
- Prel. Design Alignment
- Func. Design Alignment
- Prel. Design SS+25
- Func. Design SS+40
- Orange Corridor
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Railroad
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

IMPACTS

Figure 9



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Source: Wake County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

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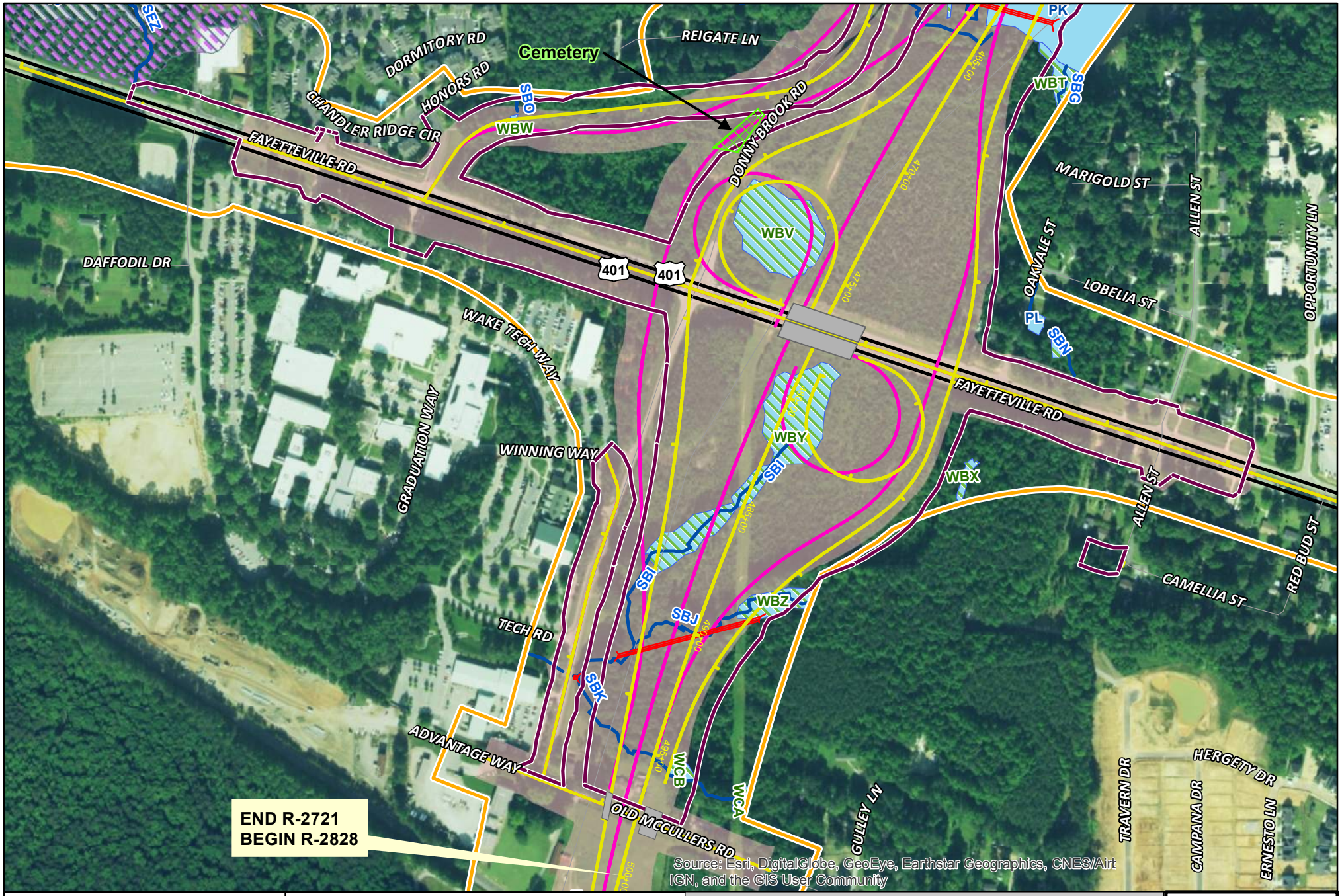
- Culvert
- Prel. Design Alignment
- Func. Design Alignment
- Prel. Design SS+25
- Func. Design SS+40
- Orange Corridor
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Railroad
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

IMPACTS

Figure 10



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2721
Wake County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Source: Wake County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

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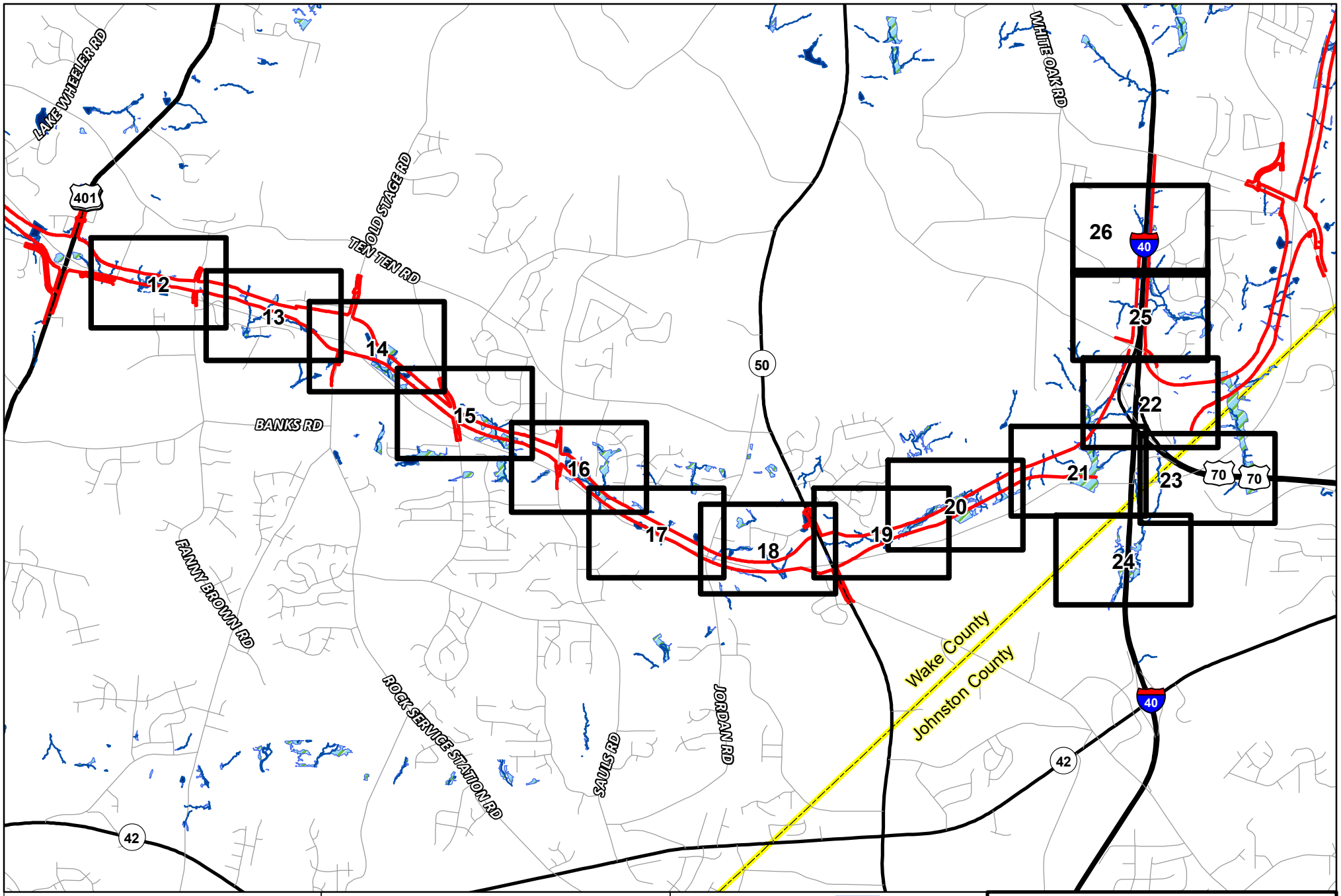
- Culvert
- Prel. Design Alignment
- Func. Design Alignment
- Prel. Design SS+25
- Func. Design SS+40
- Orange Corridor
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Railroad
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain

IMPACTS

Figure 11



NORTH CAROLINA Turnpike Authority

COMPLETE 540

TIP R-2828

Wake and Johnston Counties

PRELIMINARY : SUBJECT TO CHANGE

NOT TO SCALE

Flood Sources: Wake & Johnston Counties GIS

Figure Borders

County Line

Stream

SR Route

Wetland

Pond

Right Of Way

IMPACTS

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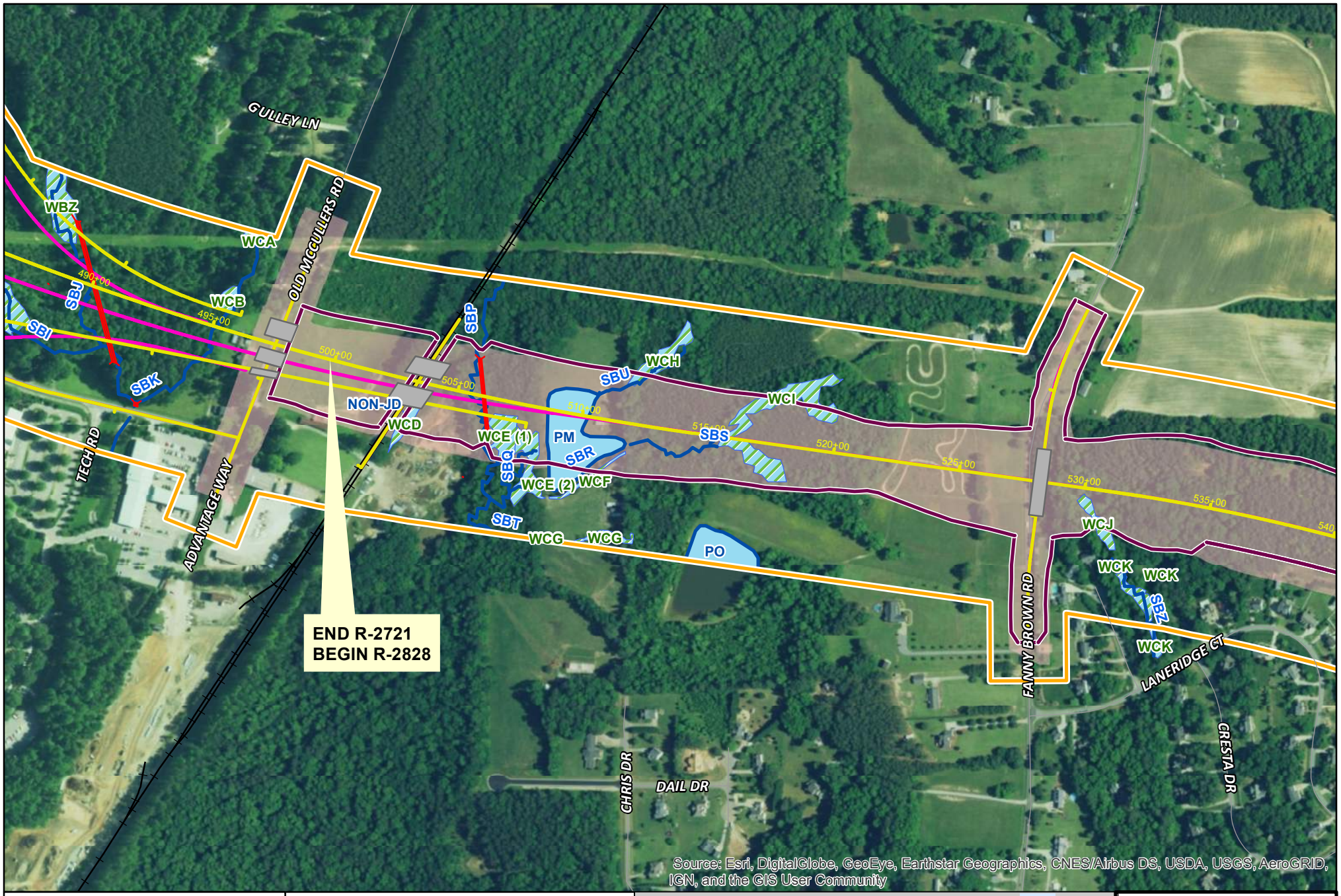


NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

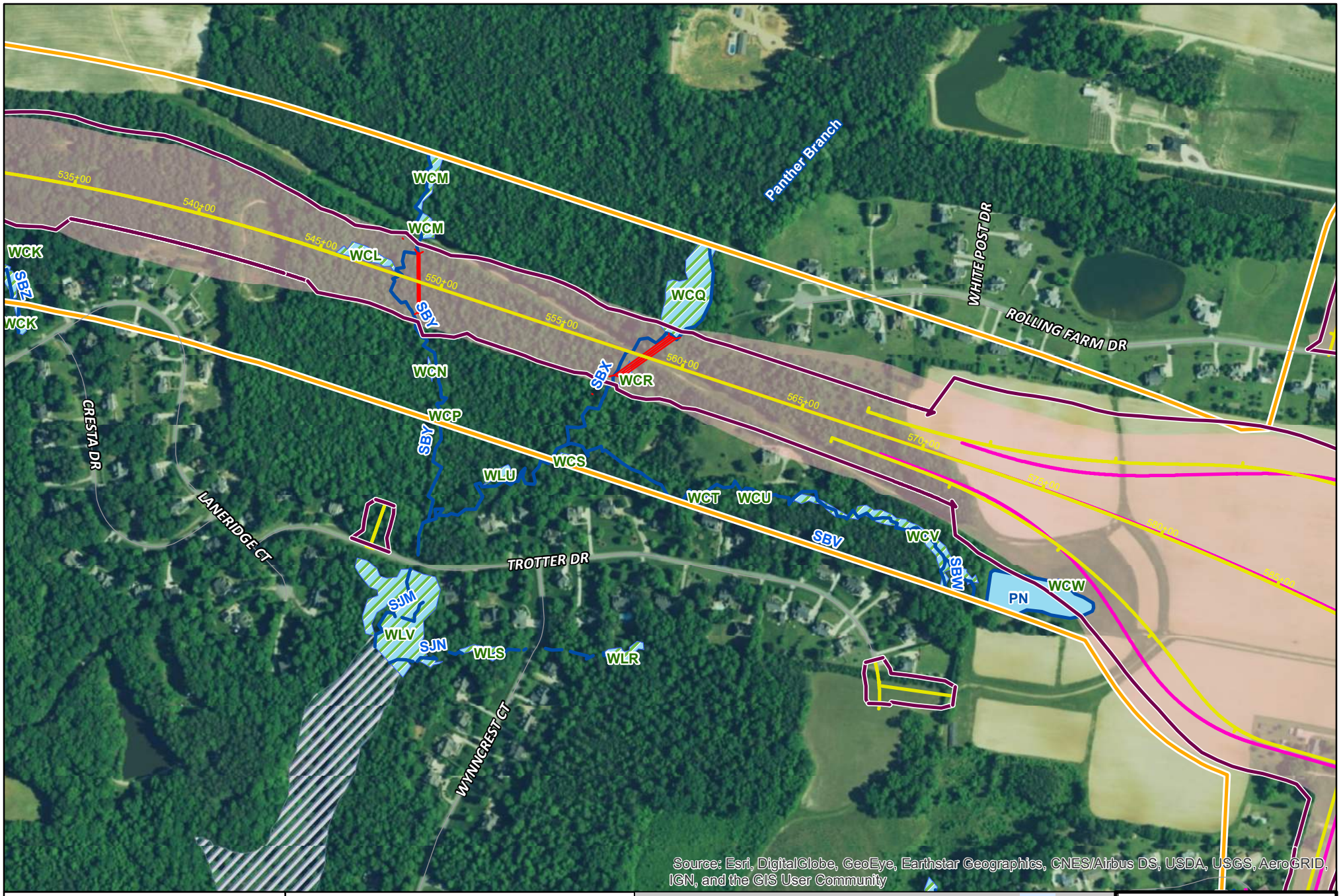
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 12



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

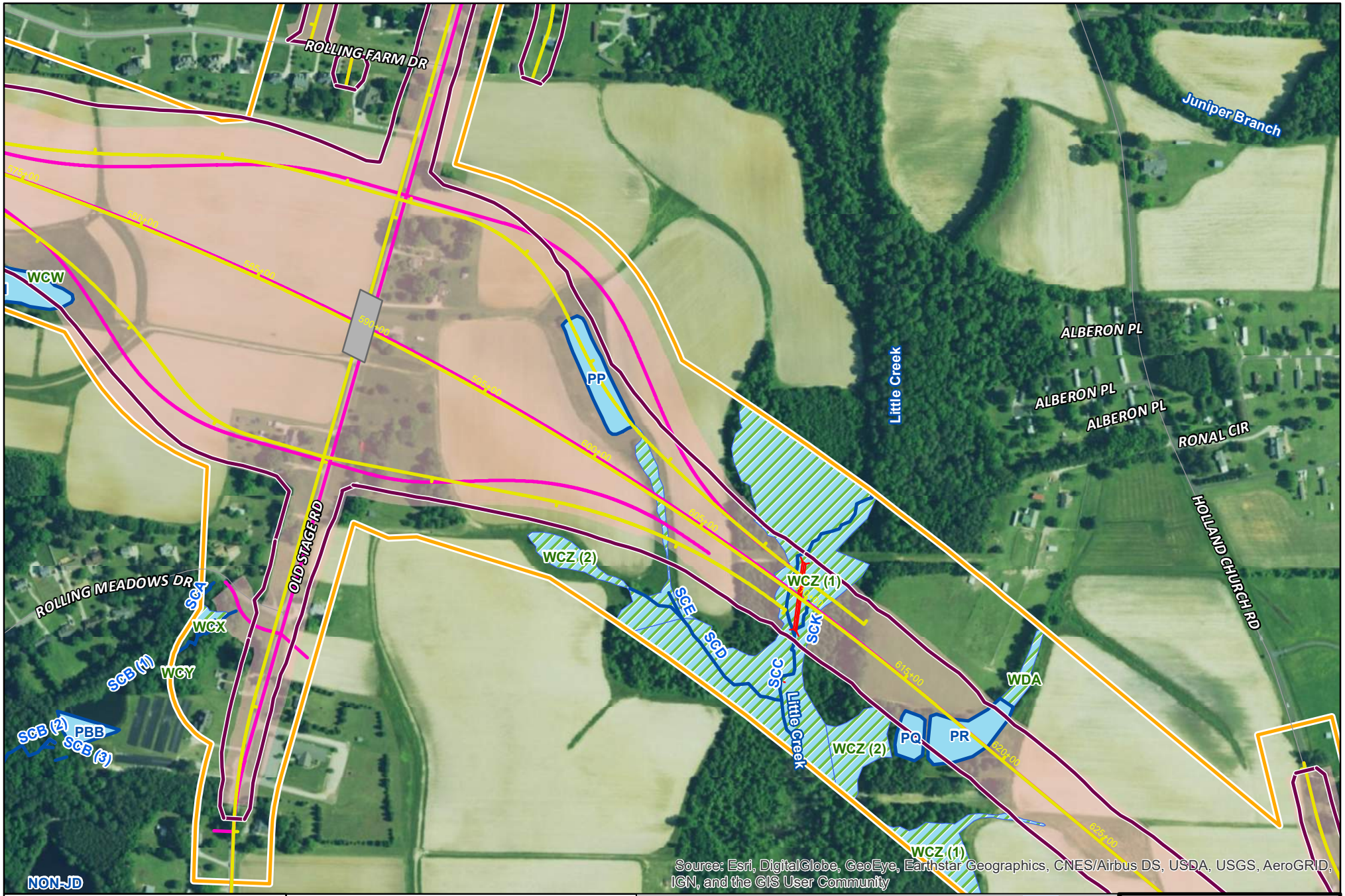
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 13



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

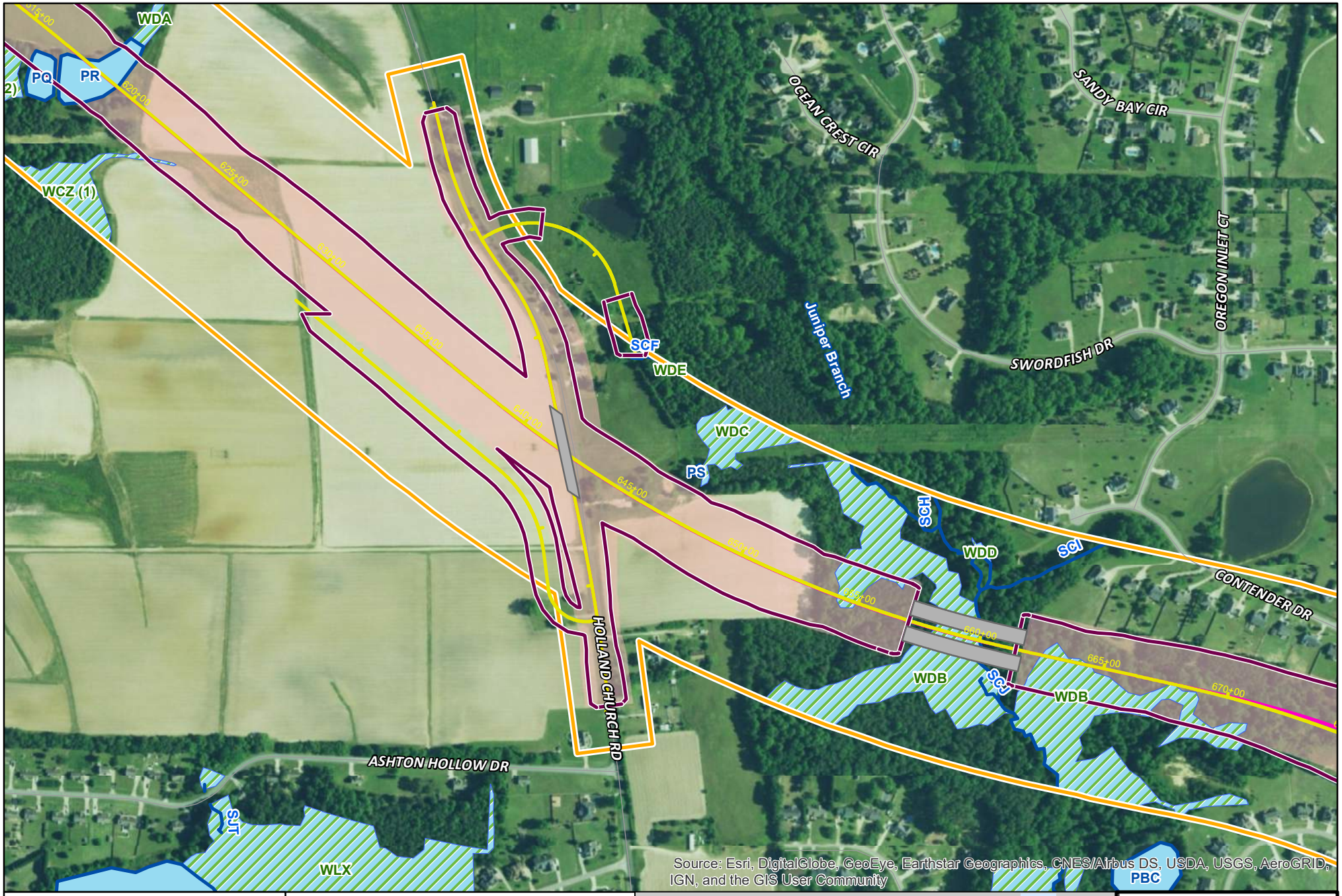
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 14



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

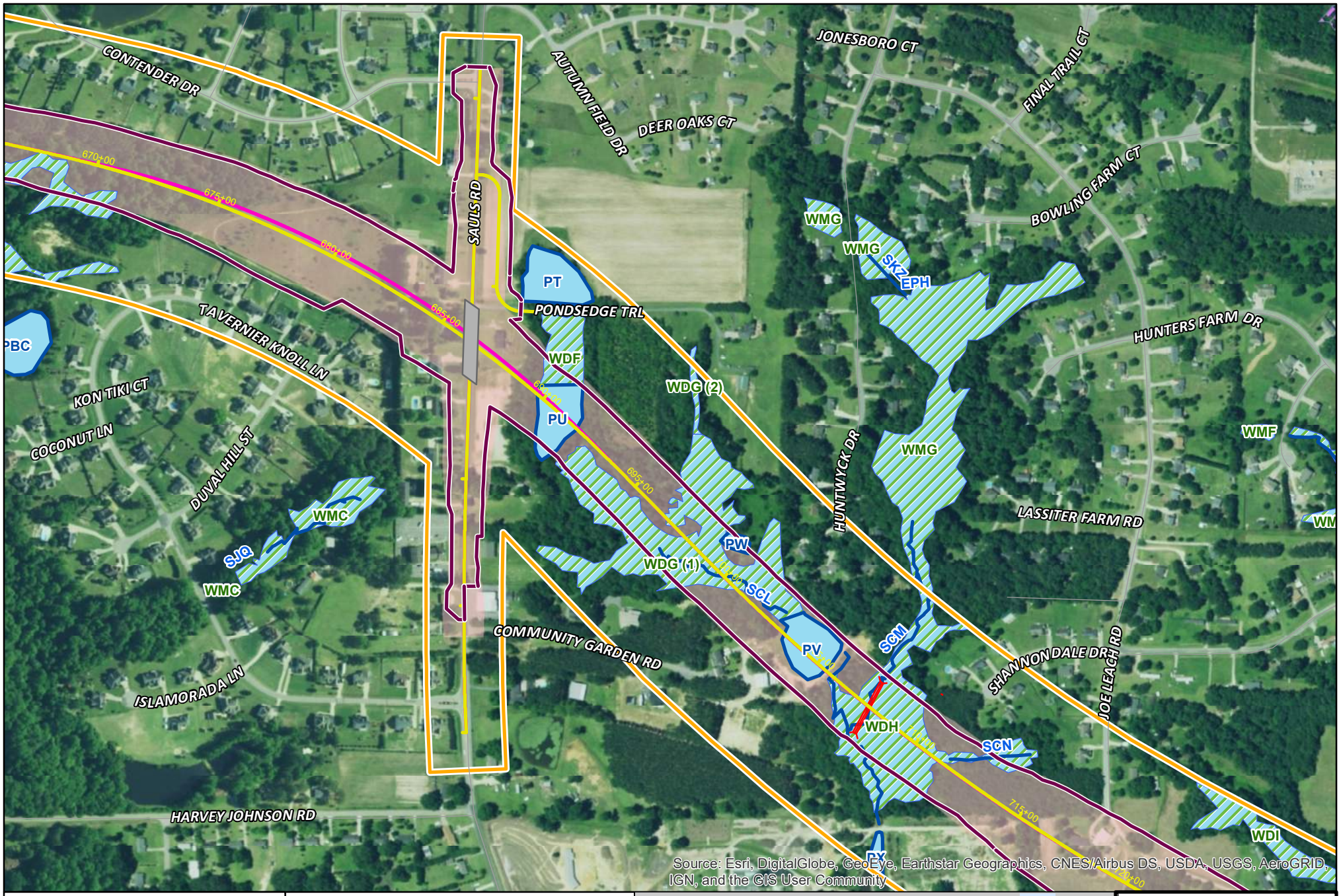
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 15



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

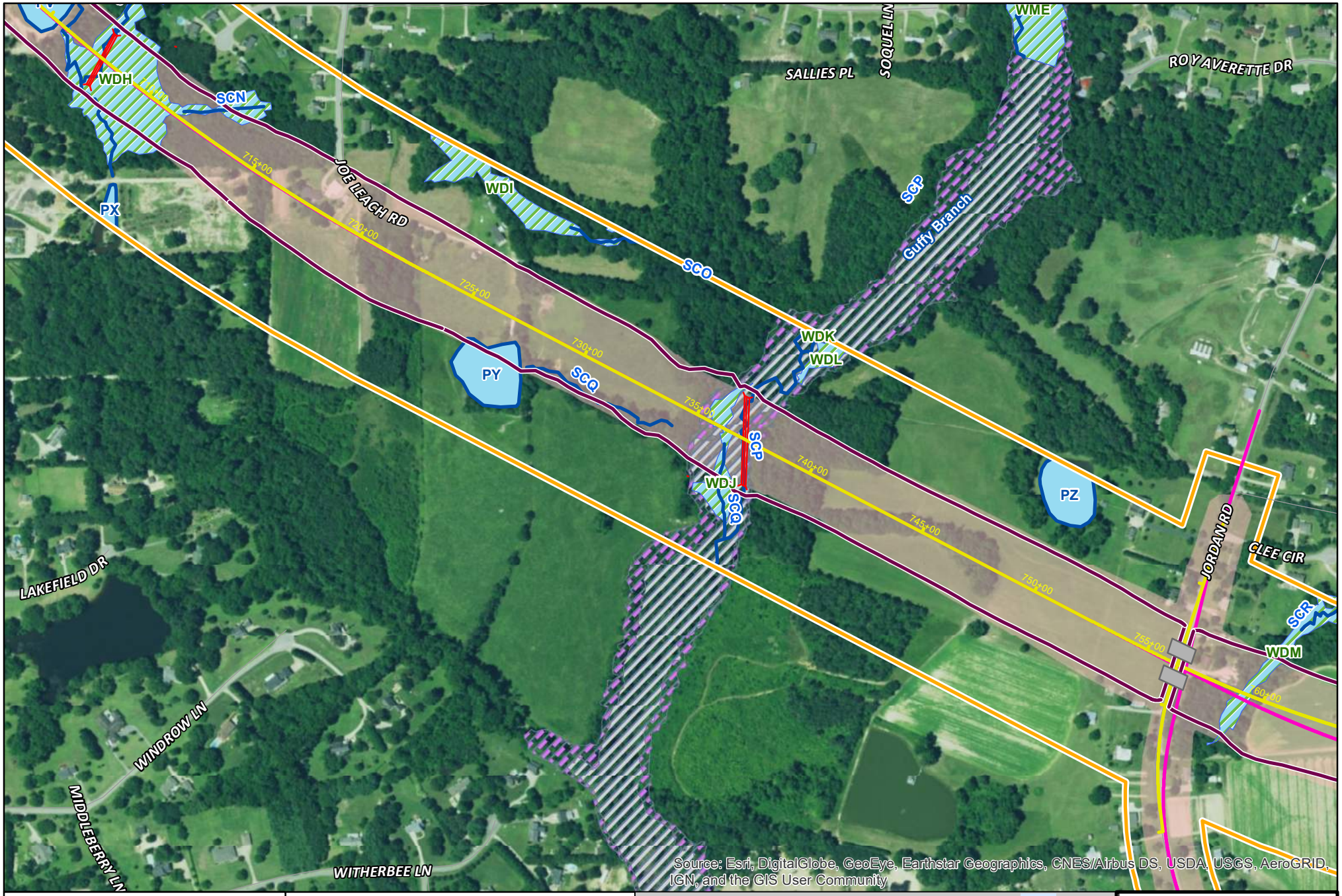
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 16



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

N

0 250 500 1,000 Feet

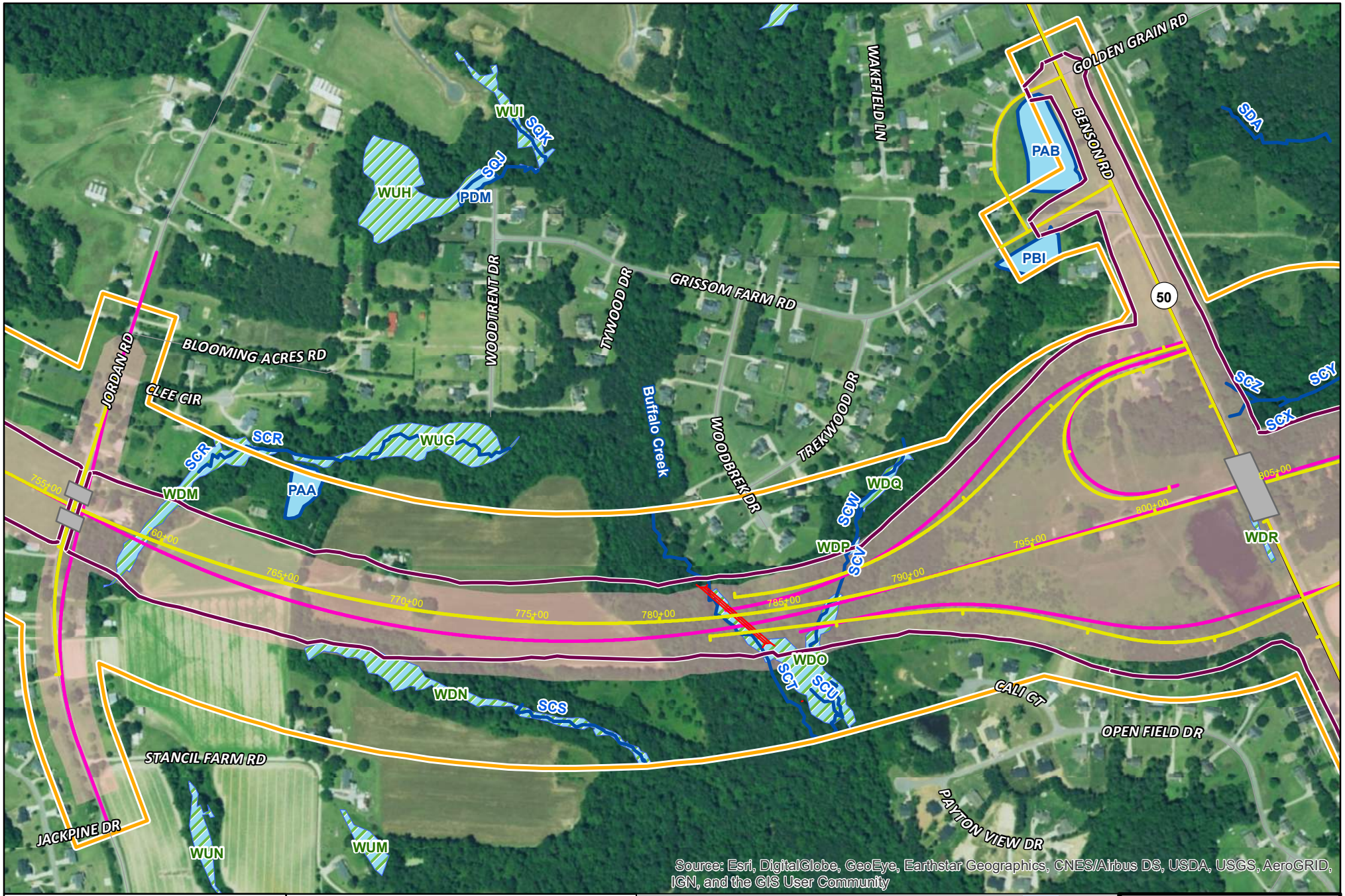
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

Prel. Design SS+25	Prel. Design Alignment	Surveyed Streams	Floodway
Func. Design SS+40	Func. Design Alignment	Surveyed Wetlands	100-Year Floodplain
Prop. Bridge	Orange Corridor	Surveyed Ponds	500-Year Floodplain
Prop. Culvert	Green Corridor	Railroad	

IMPACTS

Figure 17



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

N

0 250 500 1,000 Feet

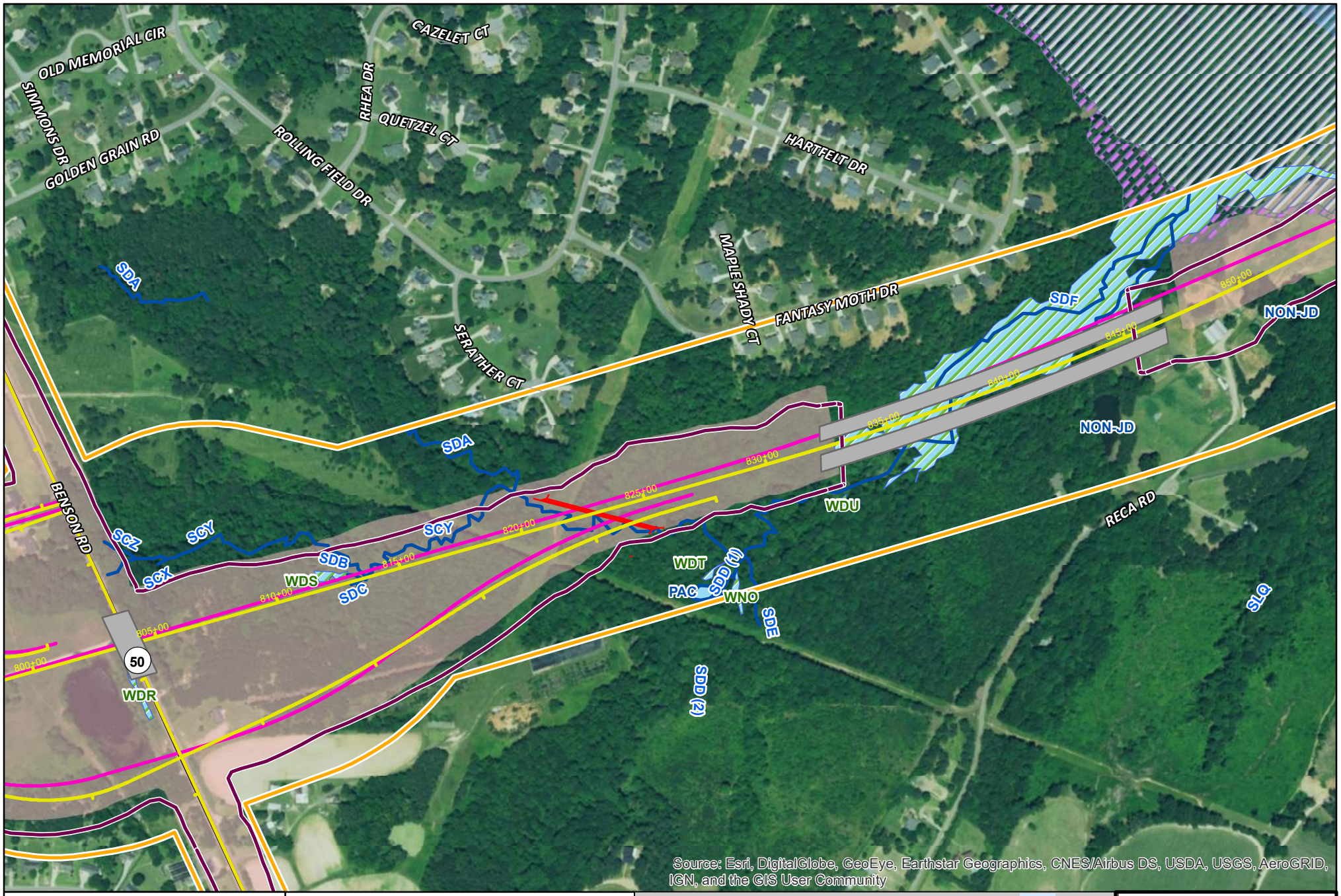
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 18



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

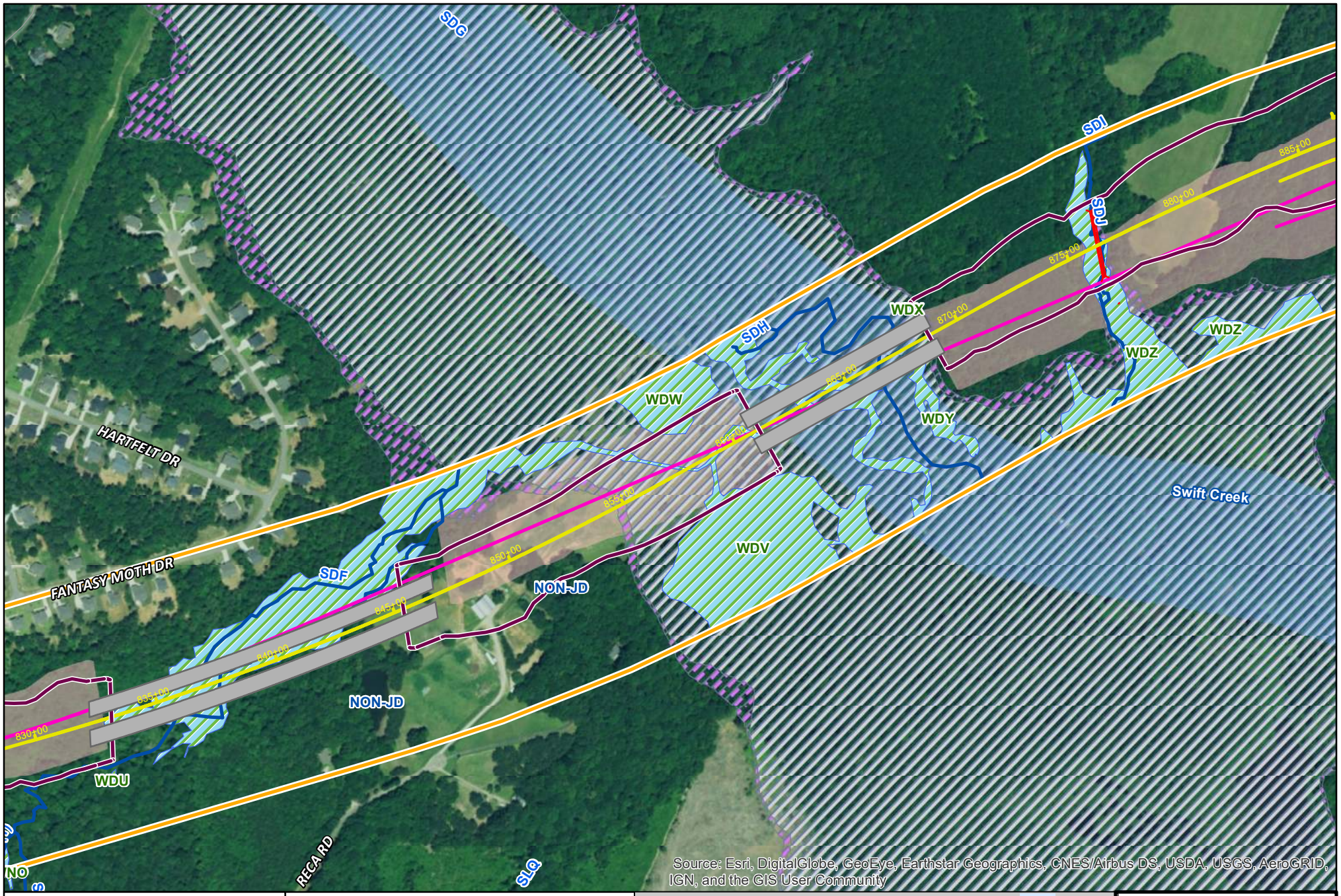
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 19



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

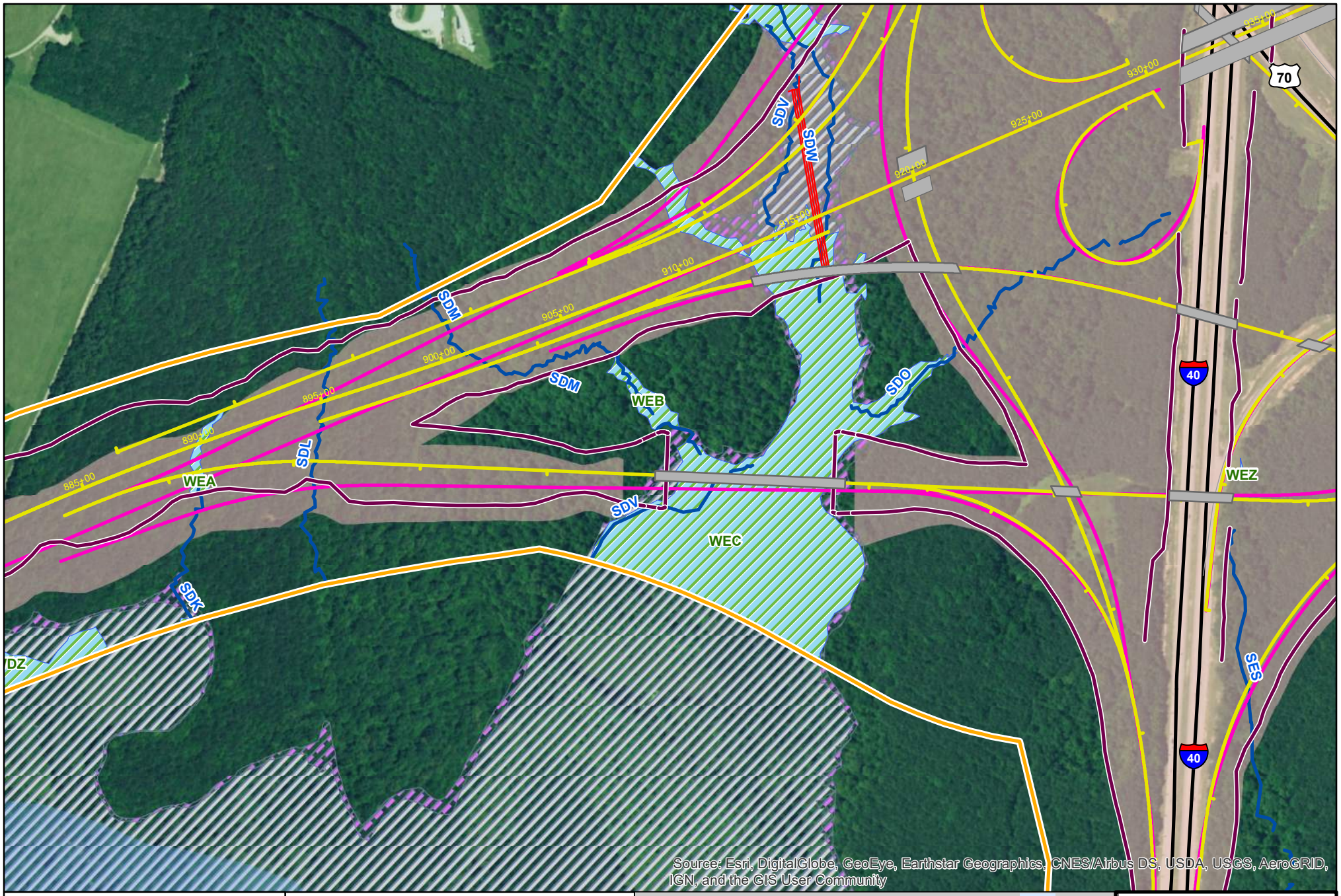
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 20



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

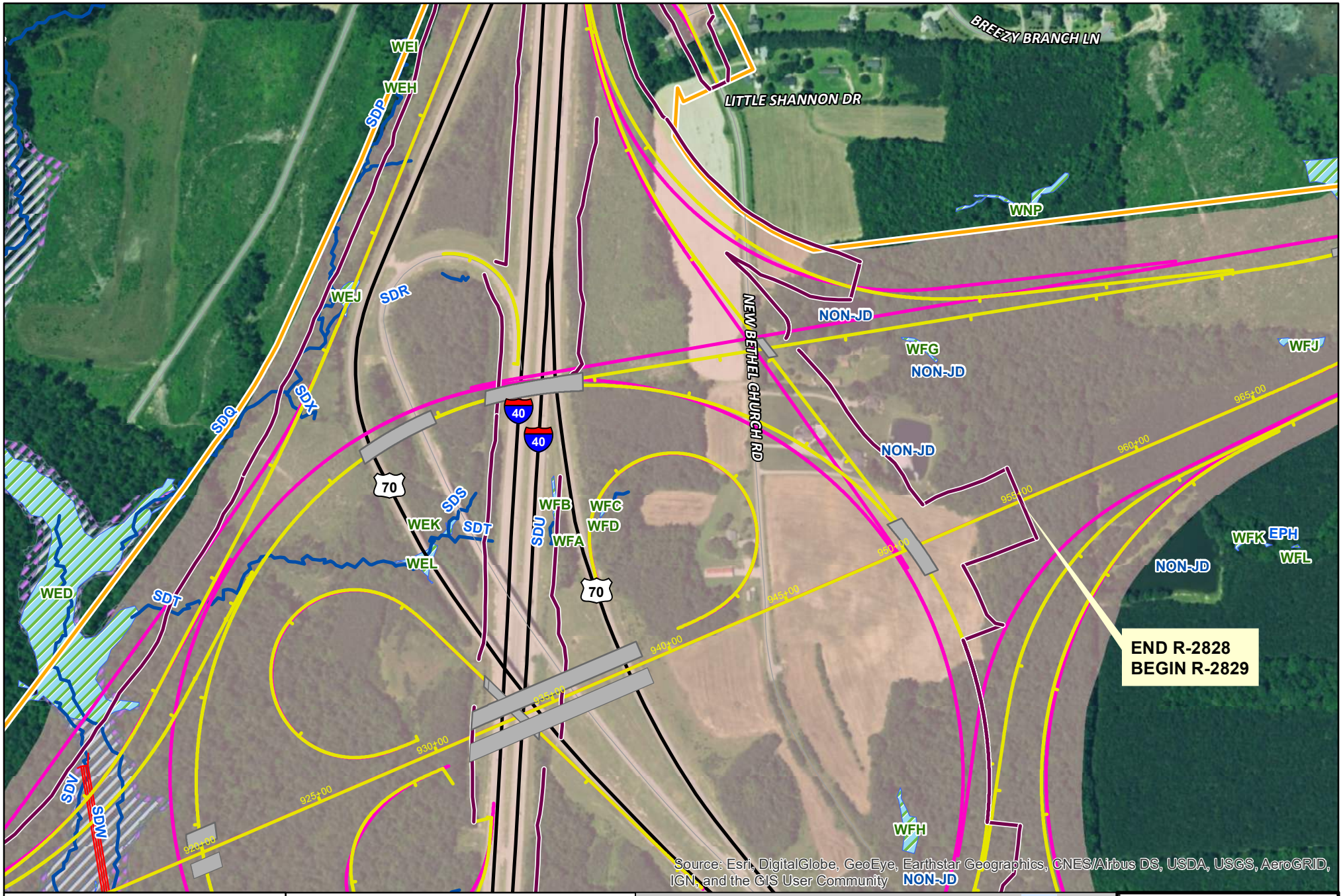
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 21



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

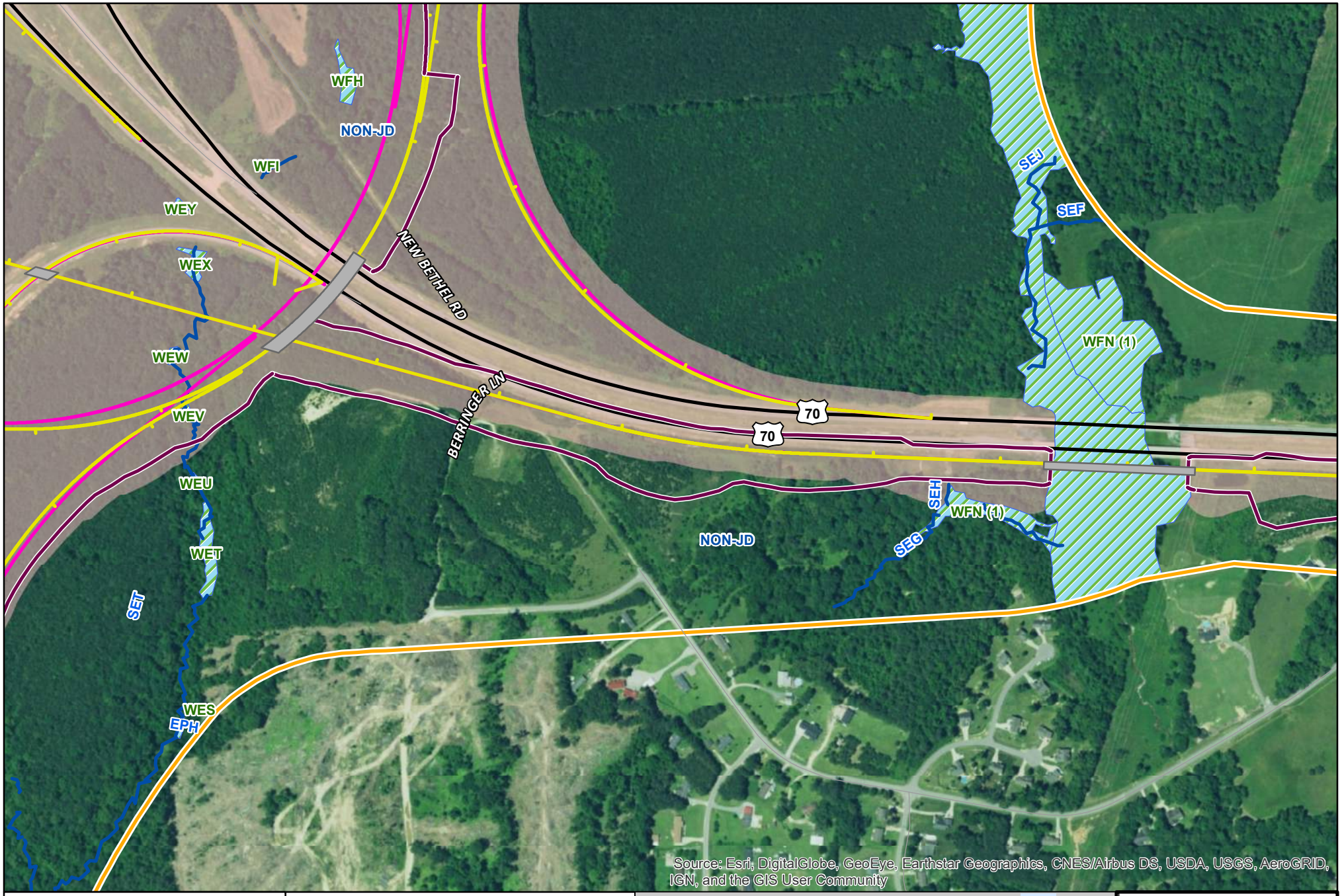
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 22



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

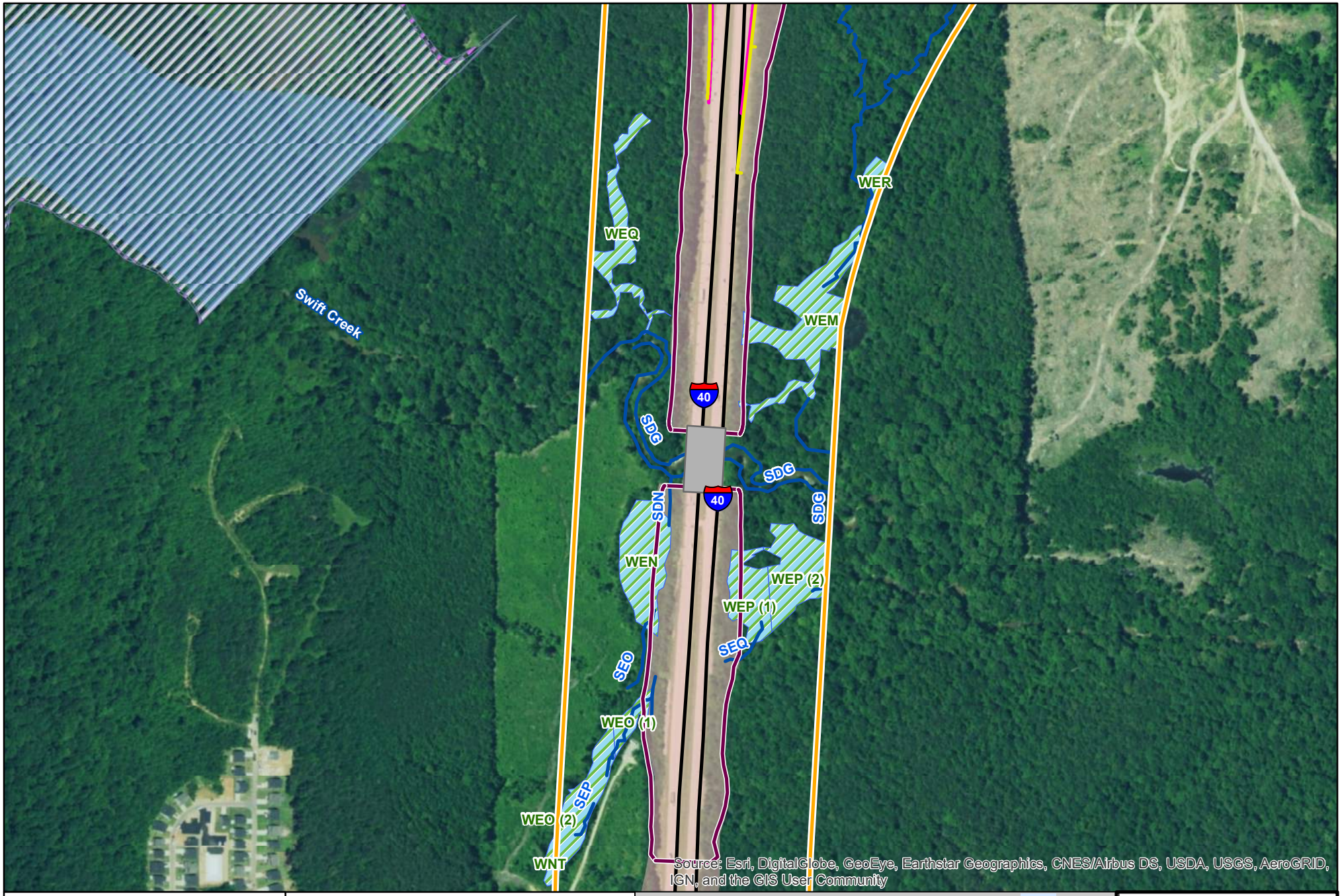
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 23



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

N

0 250 500 1,000 Feet

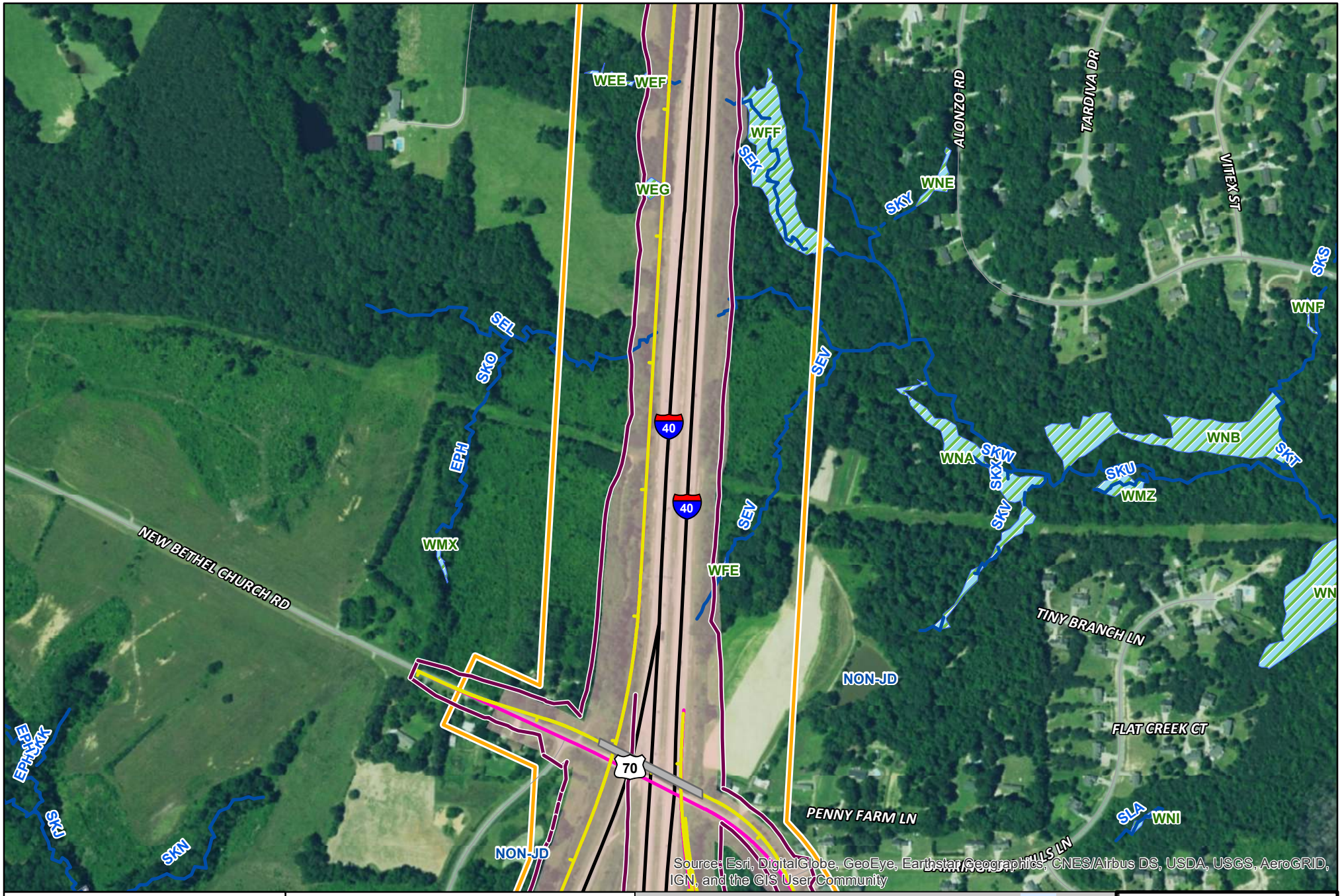
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 24



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

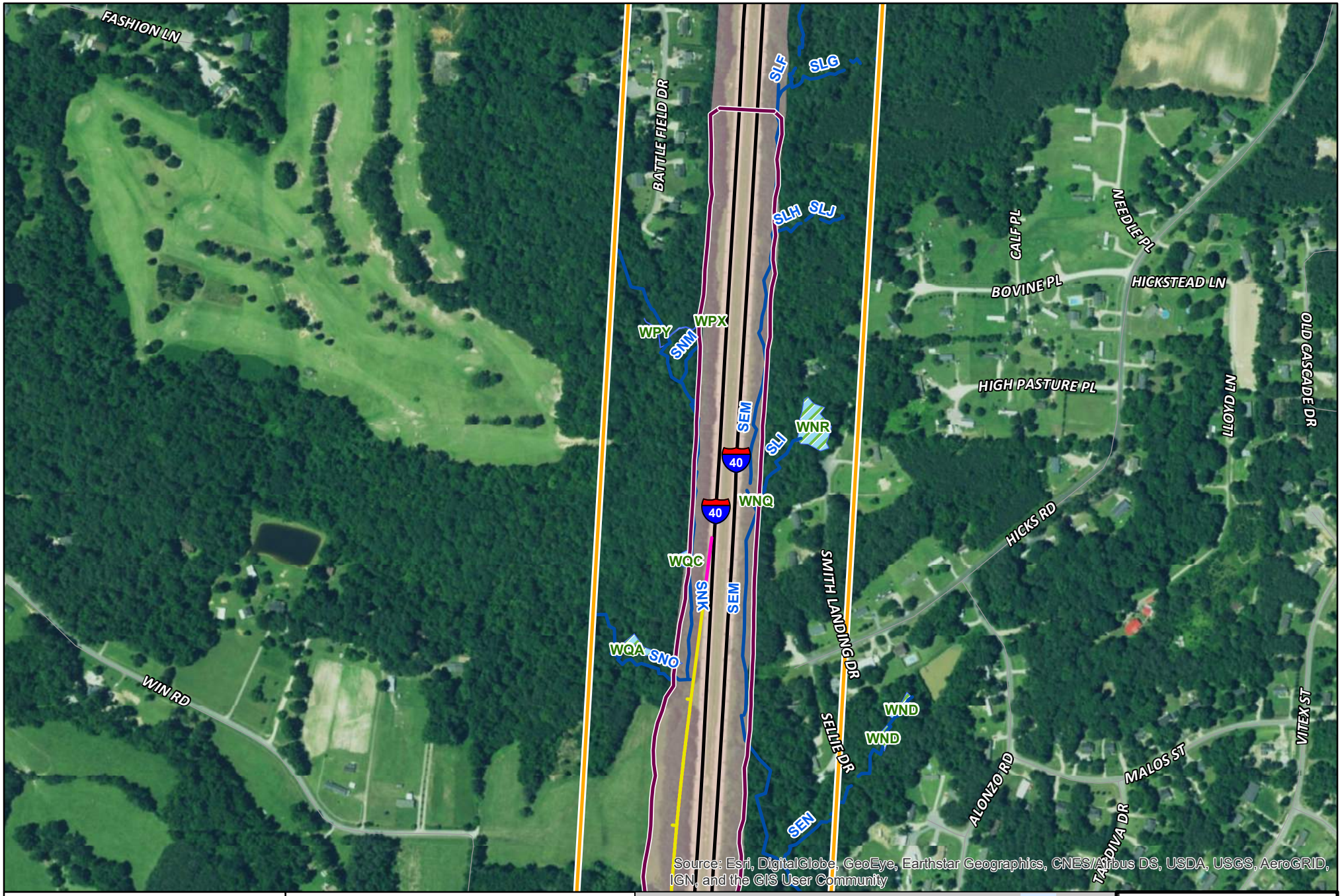
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 25



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2828
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

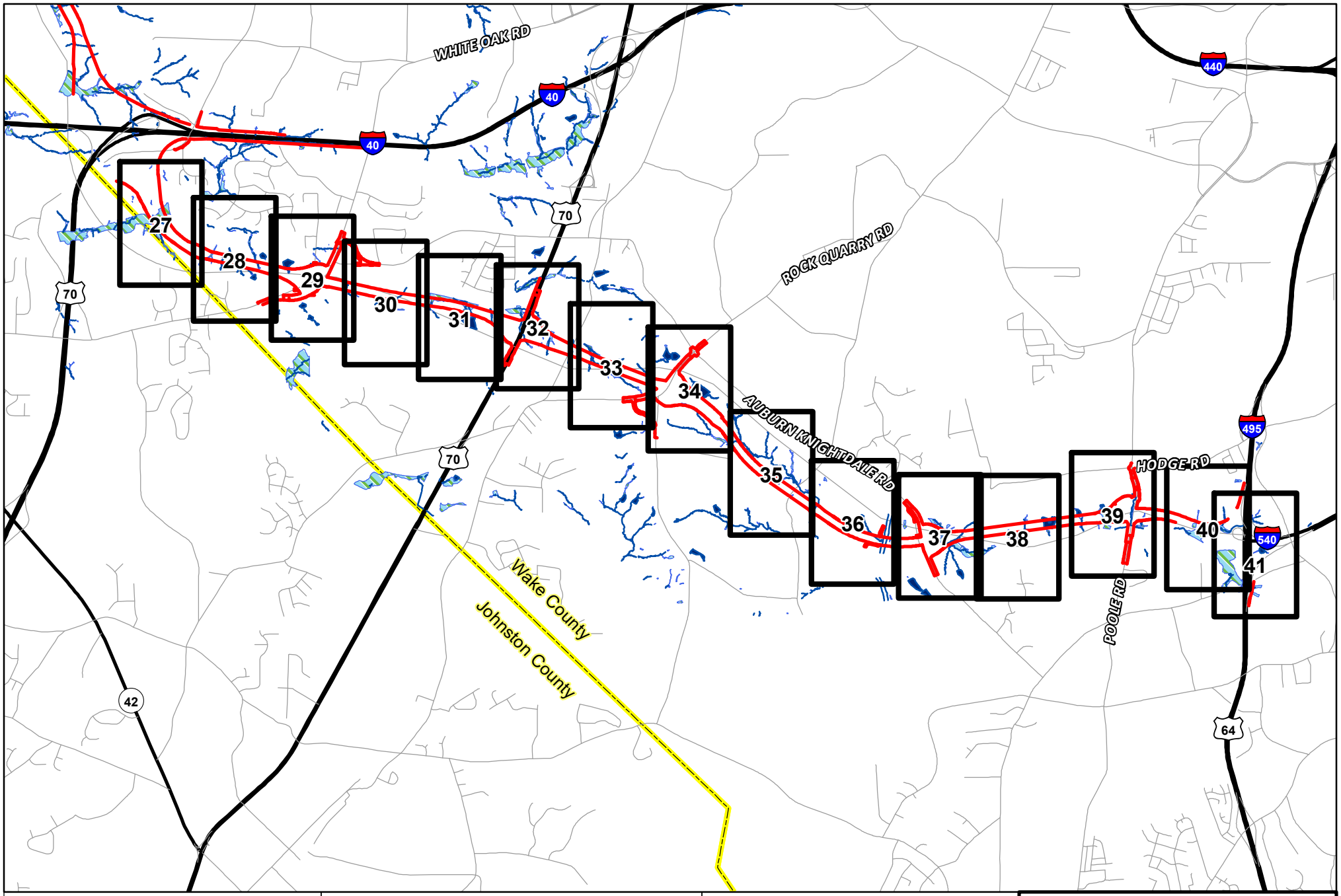
Flood Sources: Wake & Johnston Counties GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design SS+25
- Prel. Design Alignment
- Surveyed Streams
- Floodway
- Func. Design SS+40
- Func. Design Alignment
- Surveyed Wetlands
- 100-Year Floodplain
- Prop. Bridge
- Orange Corridor
- Surveyed Ponds
- 500-Year Floodplain
- Prop. Culvert
- Green Corridor
- Railroad

IMPACTS

Figure 26



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake County

PRELIMINARY : SUBJECT TO CHANGE

NOT TO SCALE

Flood Source: Wake County GIS

Figure Borders
County Line
Stream
SR Route
Wetland
Pond
Right Of Way

IMPACTS

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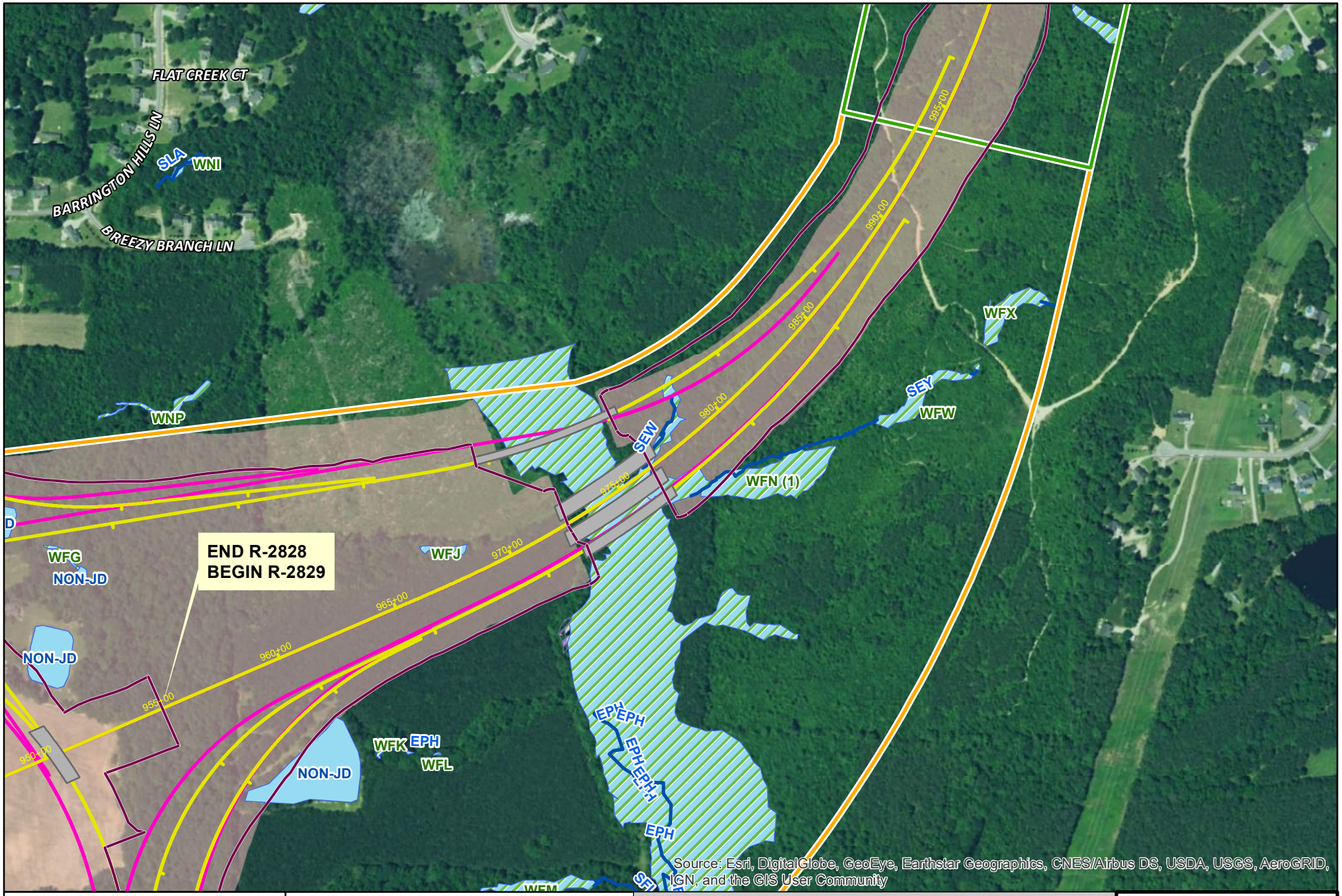


NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

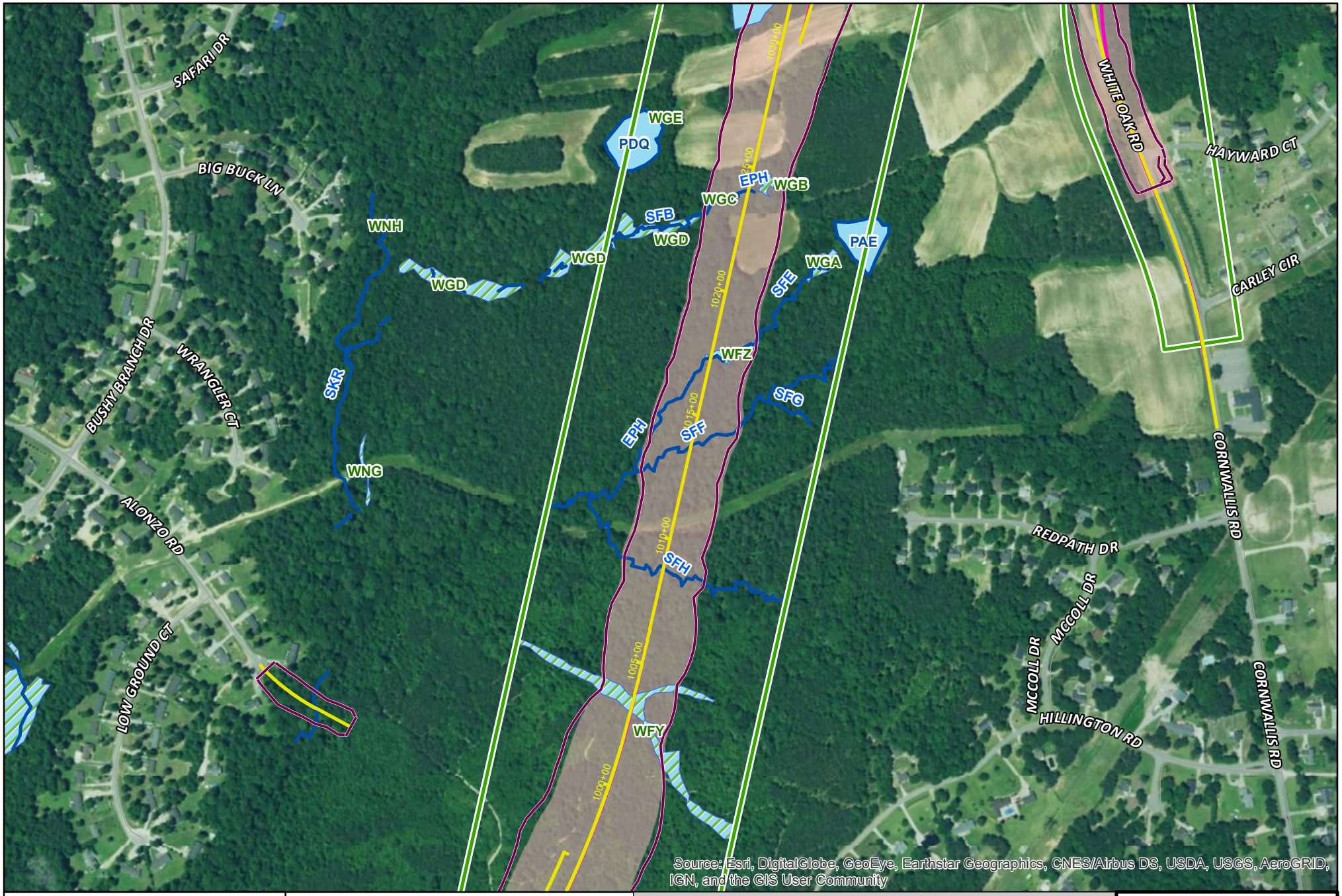
Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design Alignment
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 27



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

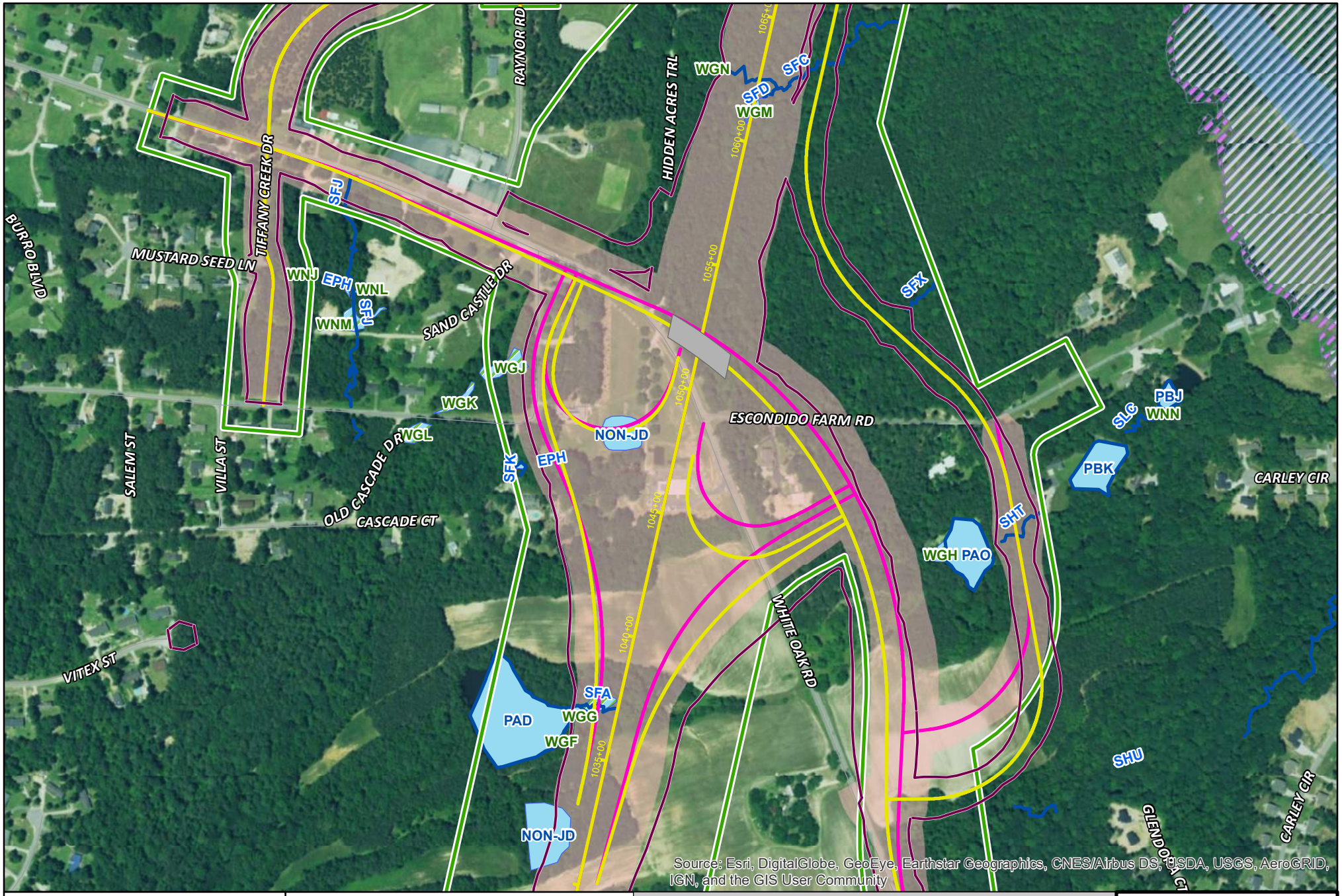
Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design Alignment
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 28



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

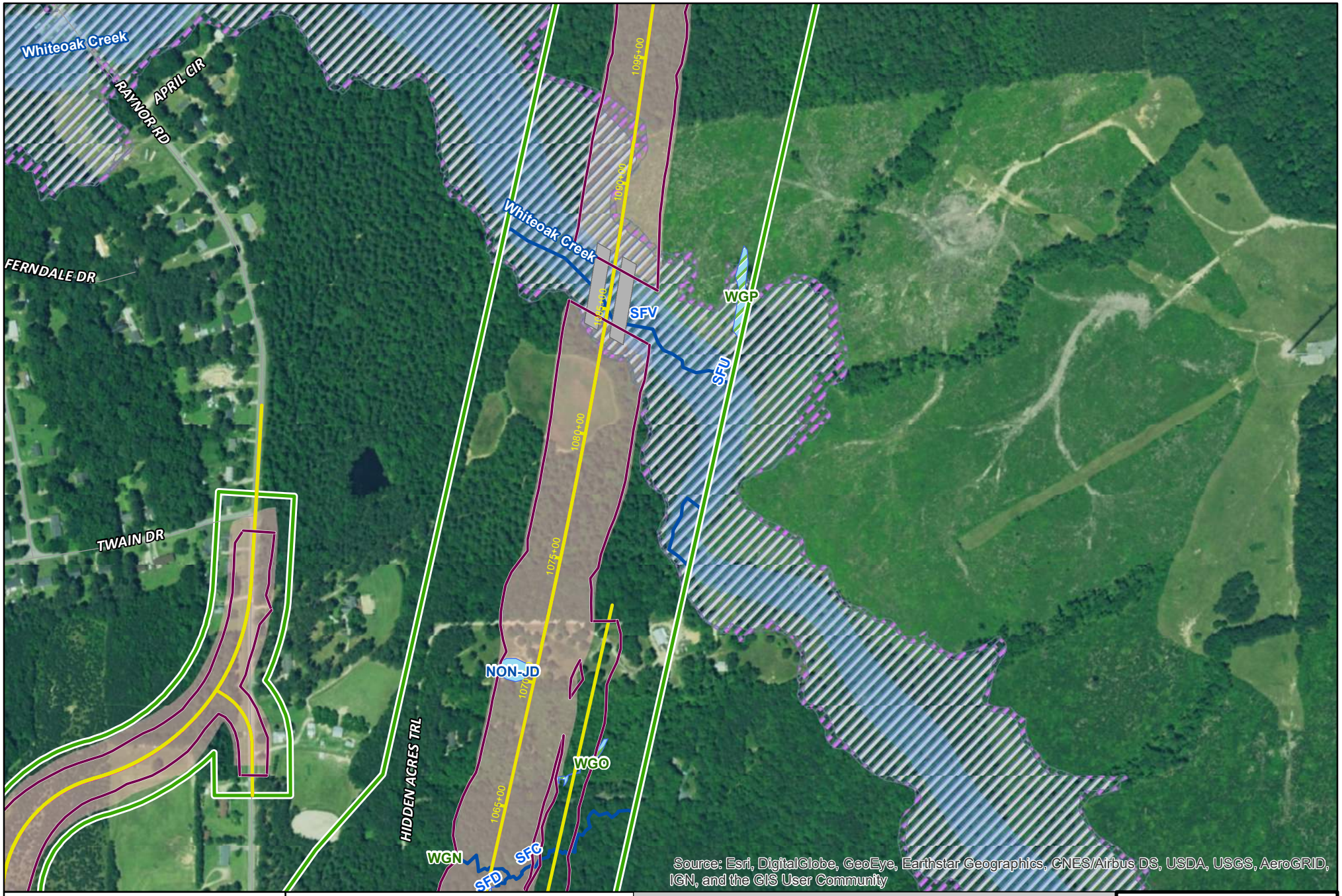
Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design Alignment
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 29



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

N

0 250 500 1,000 Feet

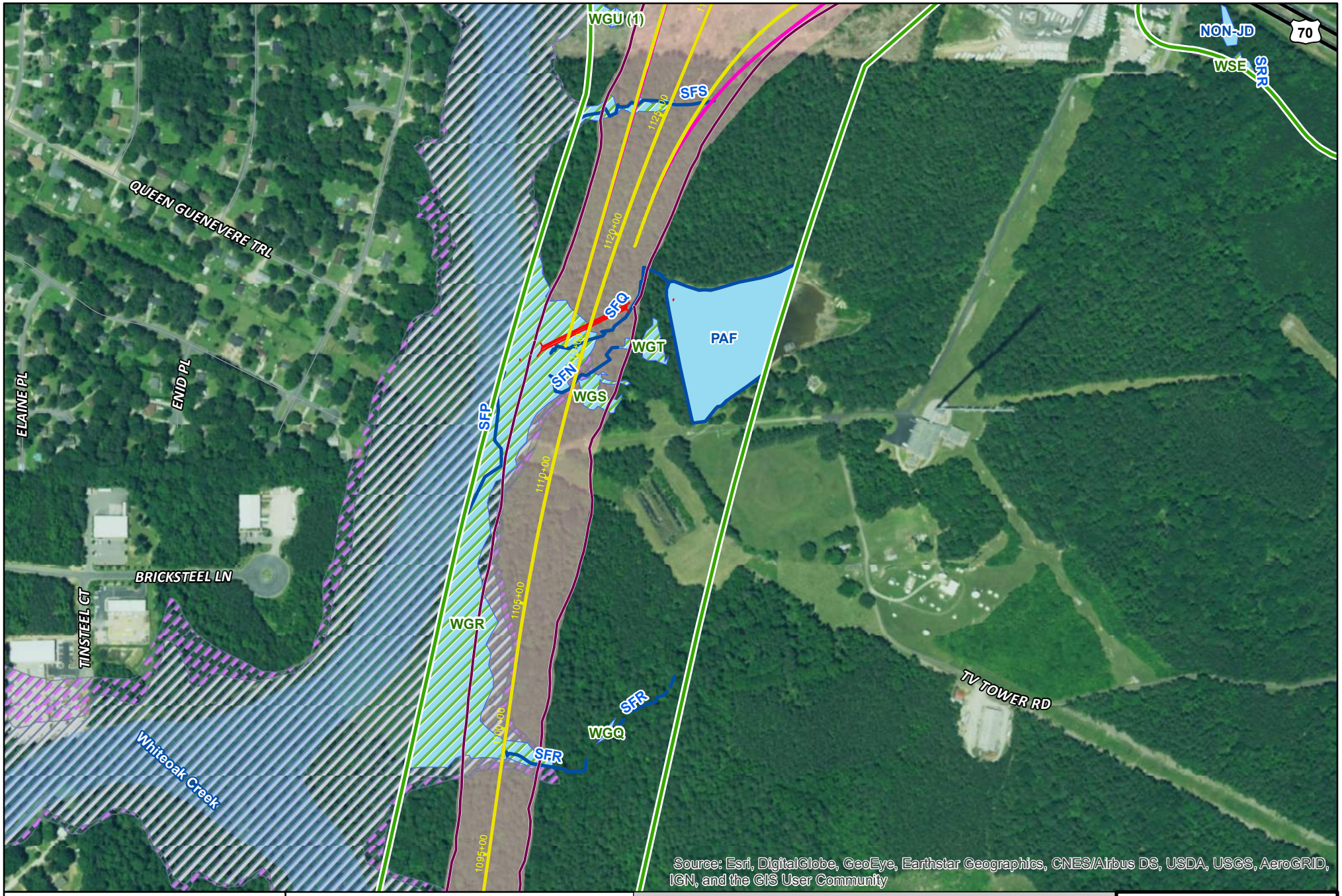
Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design Alignment
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 30



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

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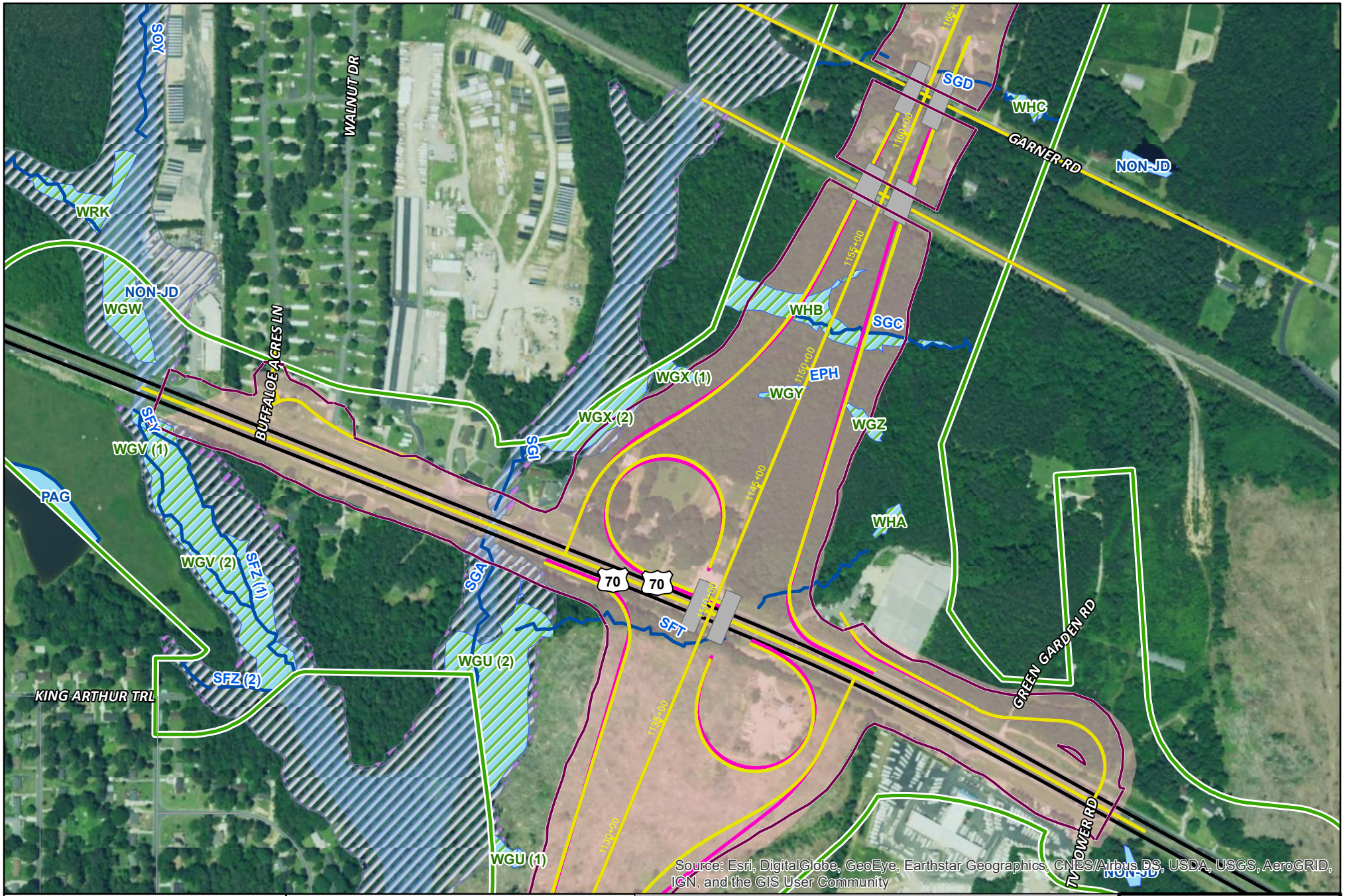
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 31



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

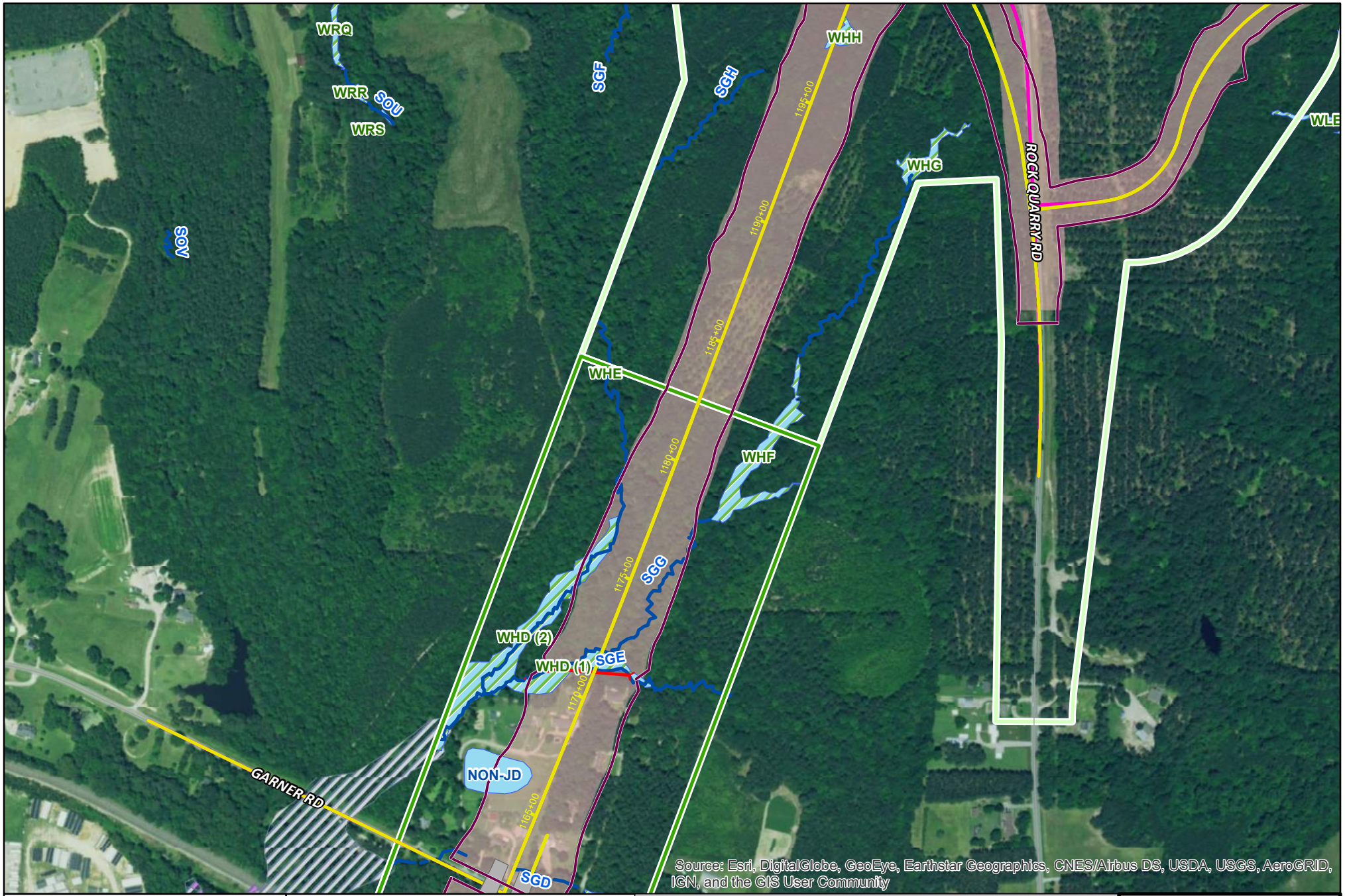
Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design Alignment
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 32



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

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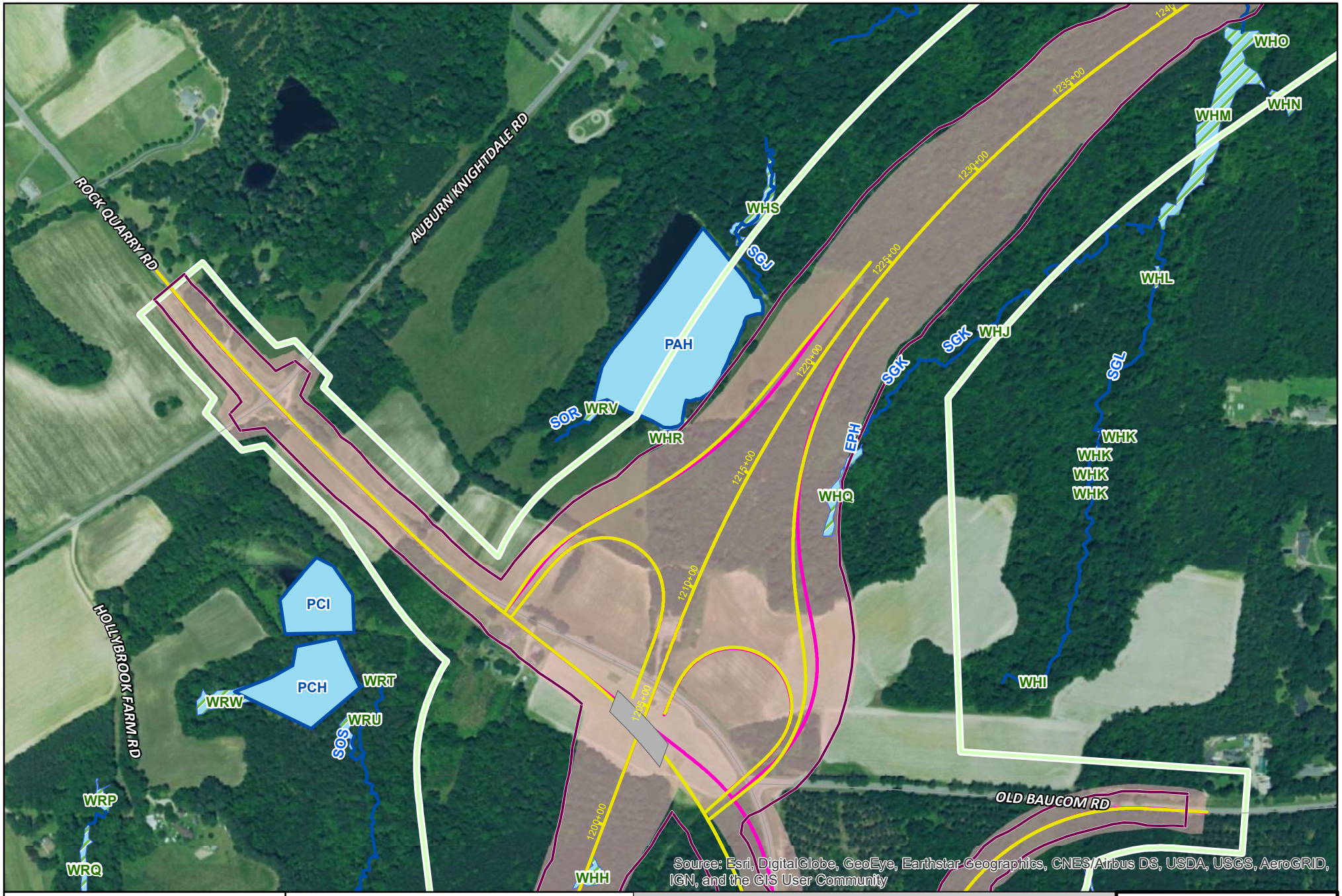
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 33



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Sources: Wake & Johnston County GIS

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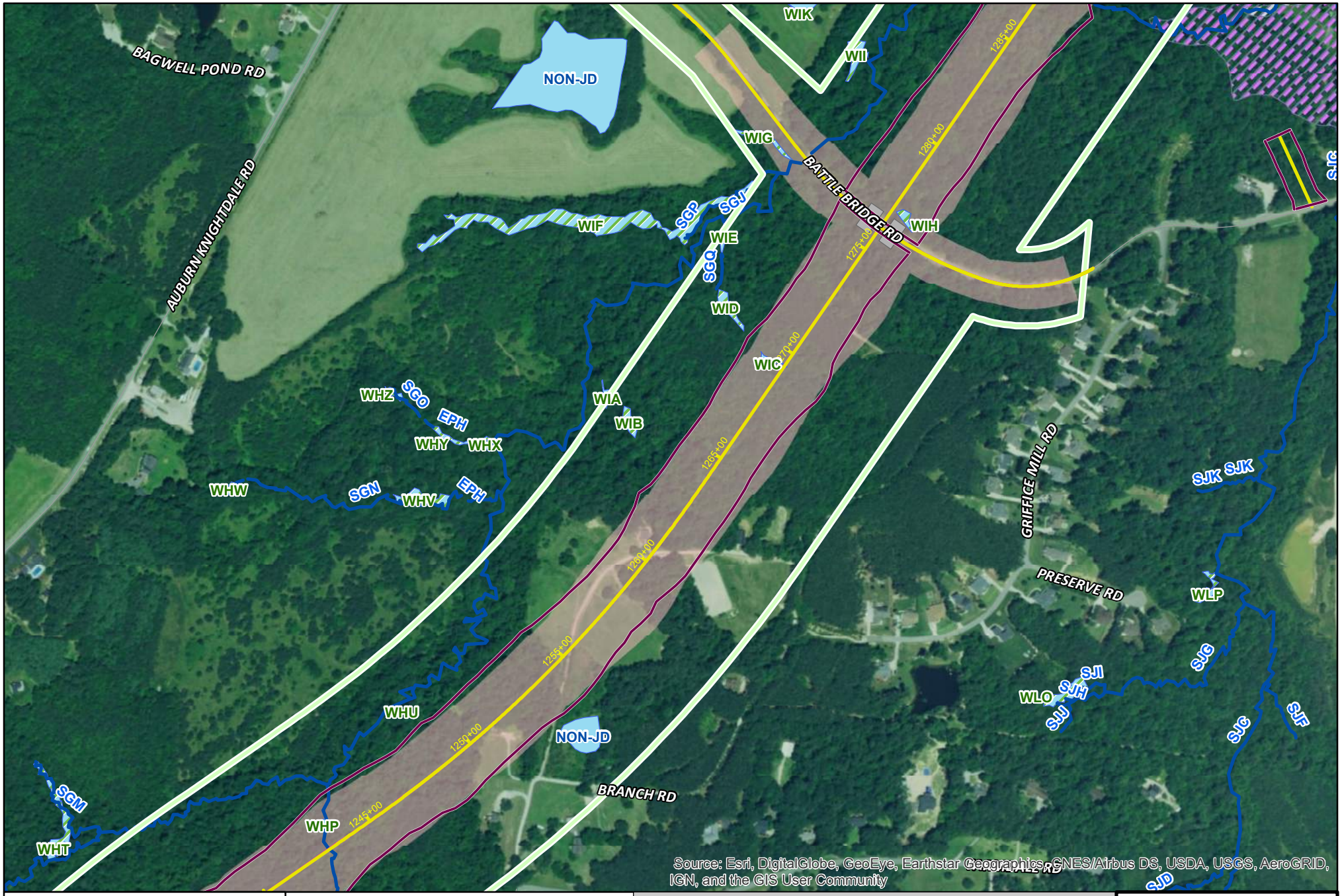
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 34



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

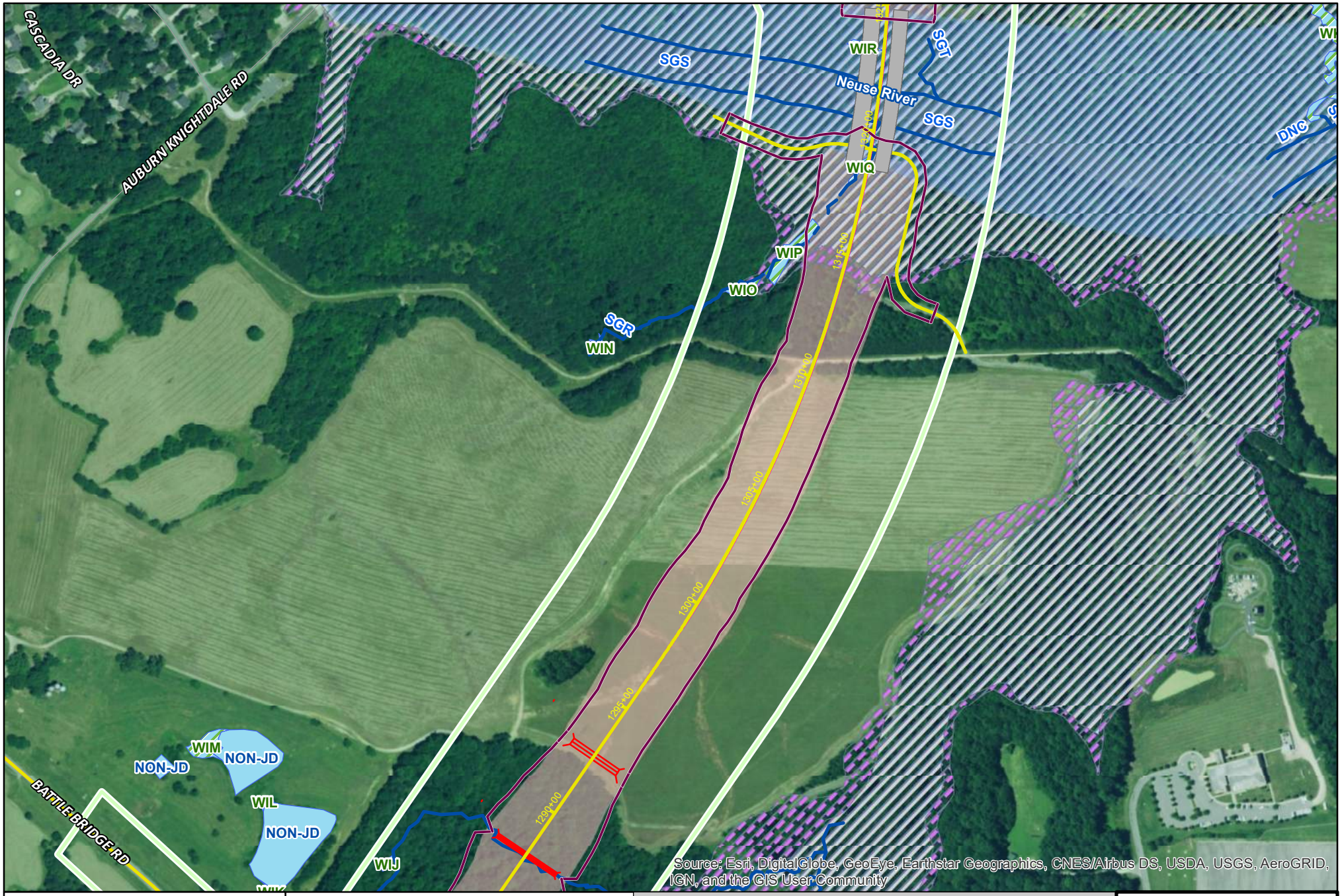
Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design Alignment
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 35



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

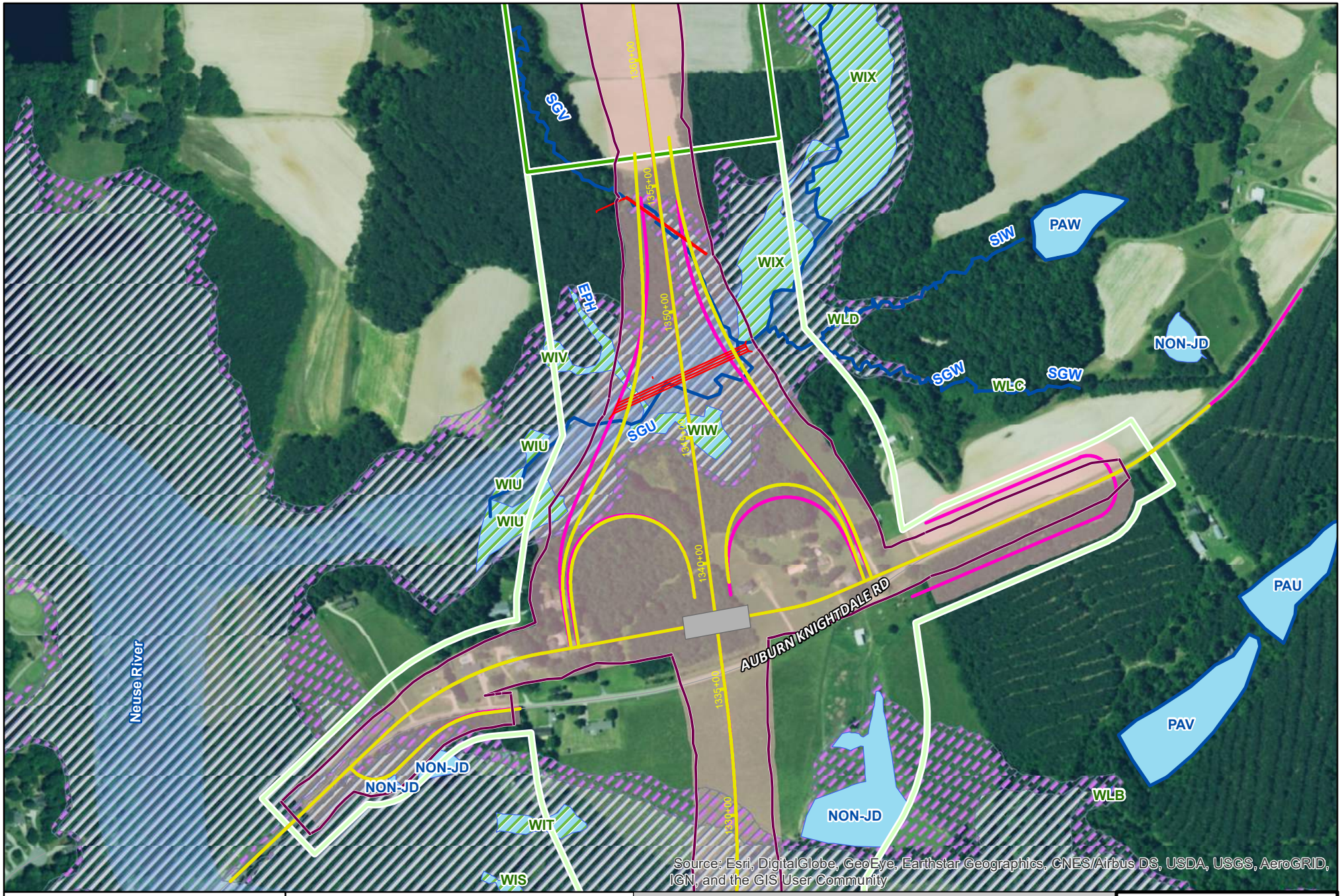
Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

- Prel. Design Alignment
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 36



NORTH CAROLINA Turnpike Authority

COMPLETE 540

TIP R-2829

Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Sources: Wake & Johnston County GIS

Areas outside the study corridors to be supplemented with additional natural resources surveys.

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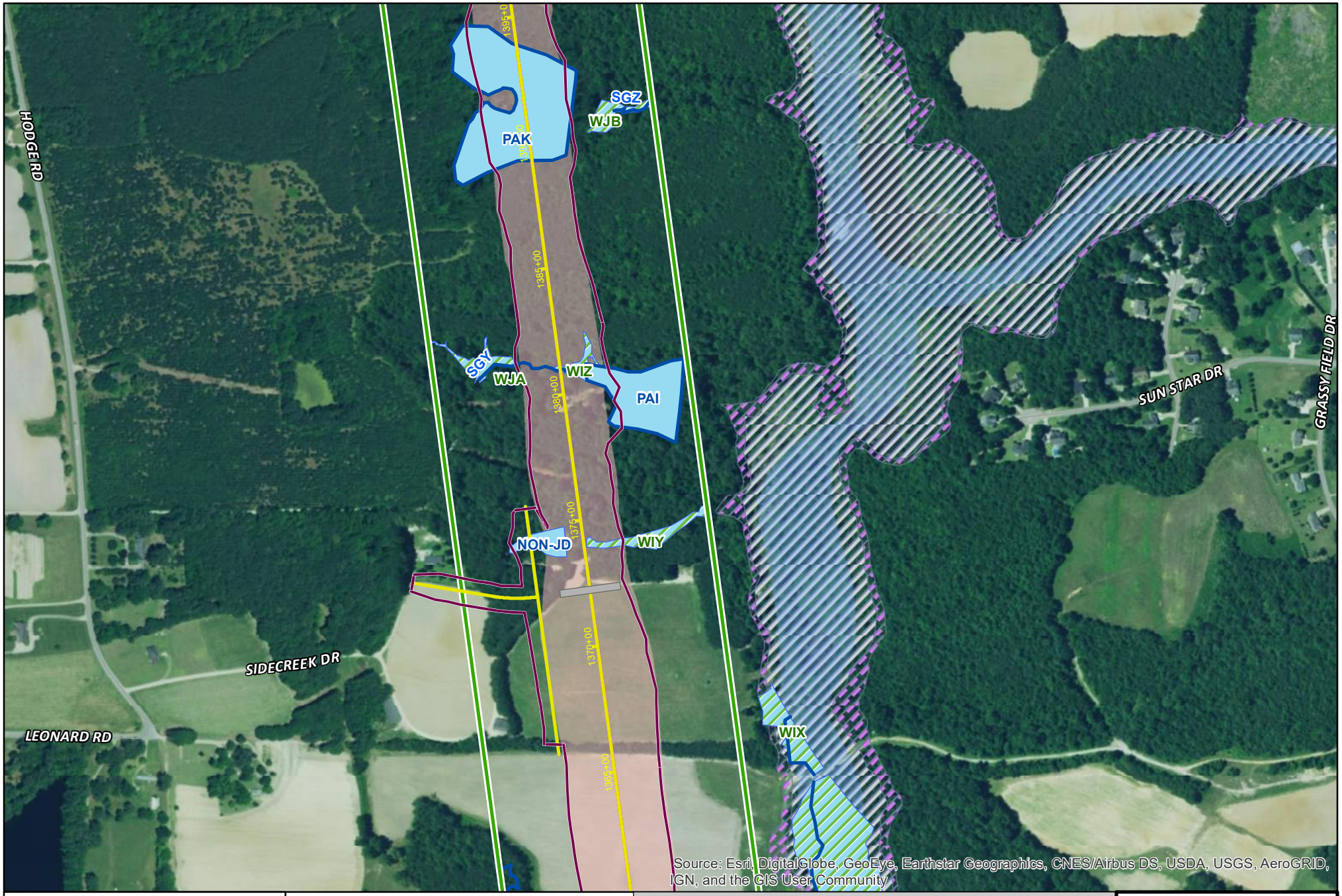
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 37



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Sources: Wake & Johnston County GIS

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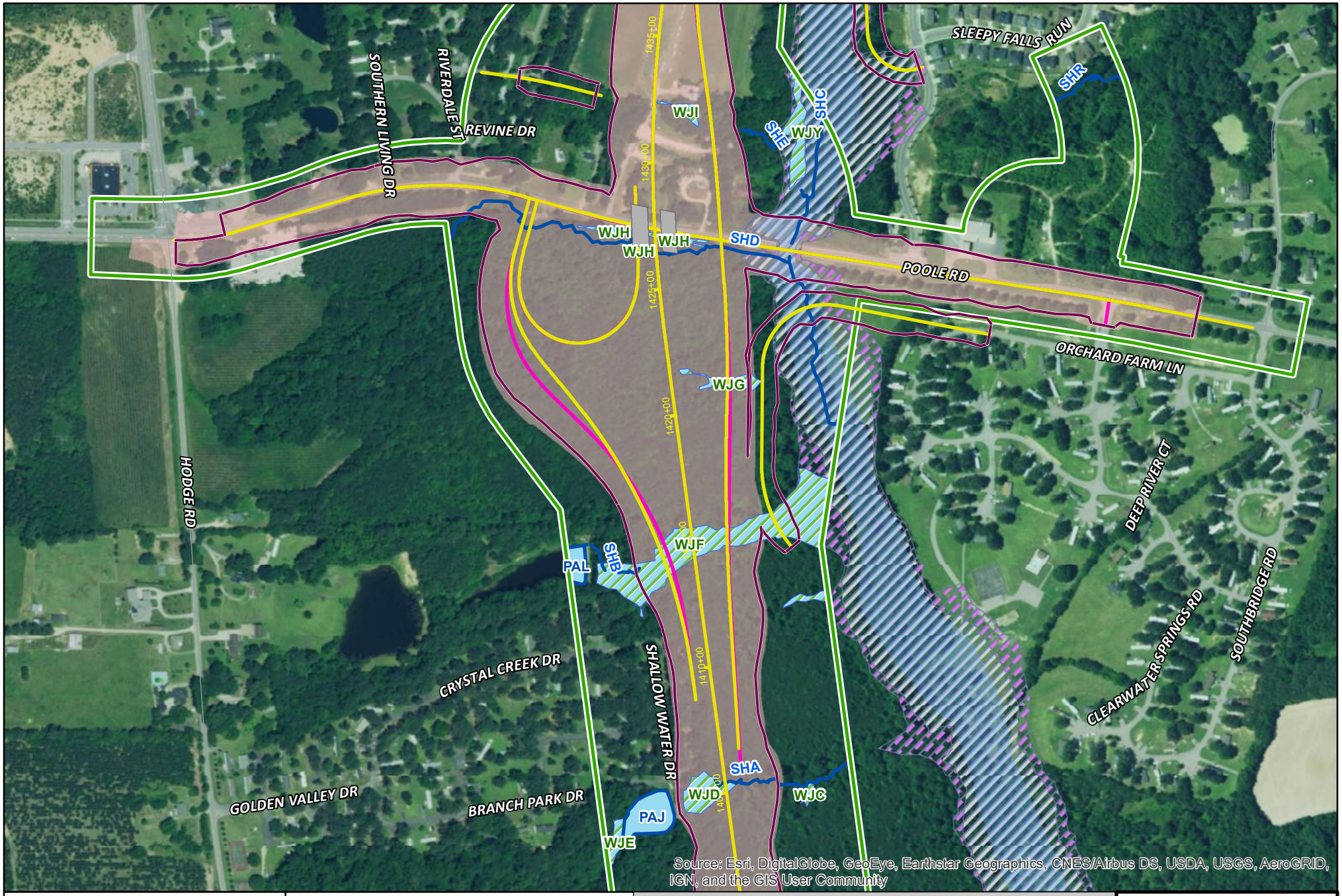
- Prel. Design Alignment
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 38



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Sources: Wake & Johnston County GIS

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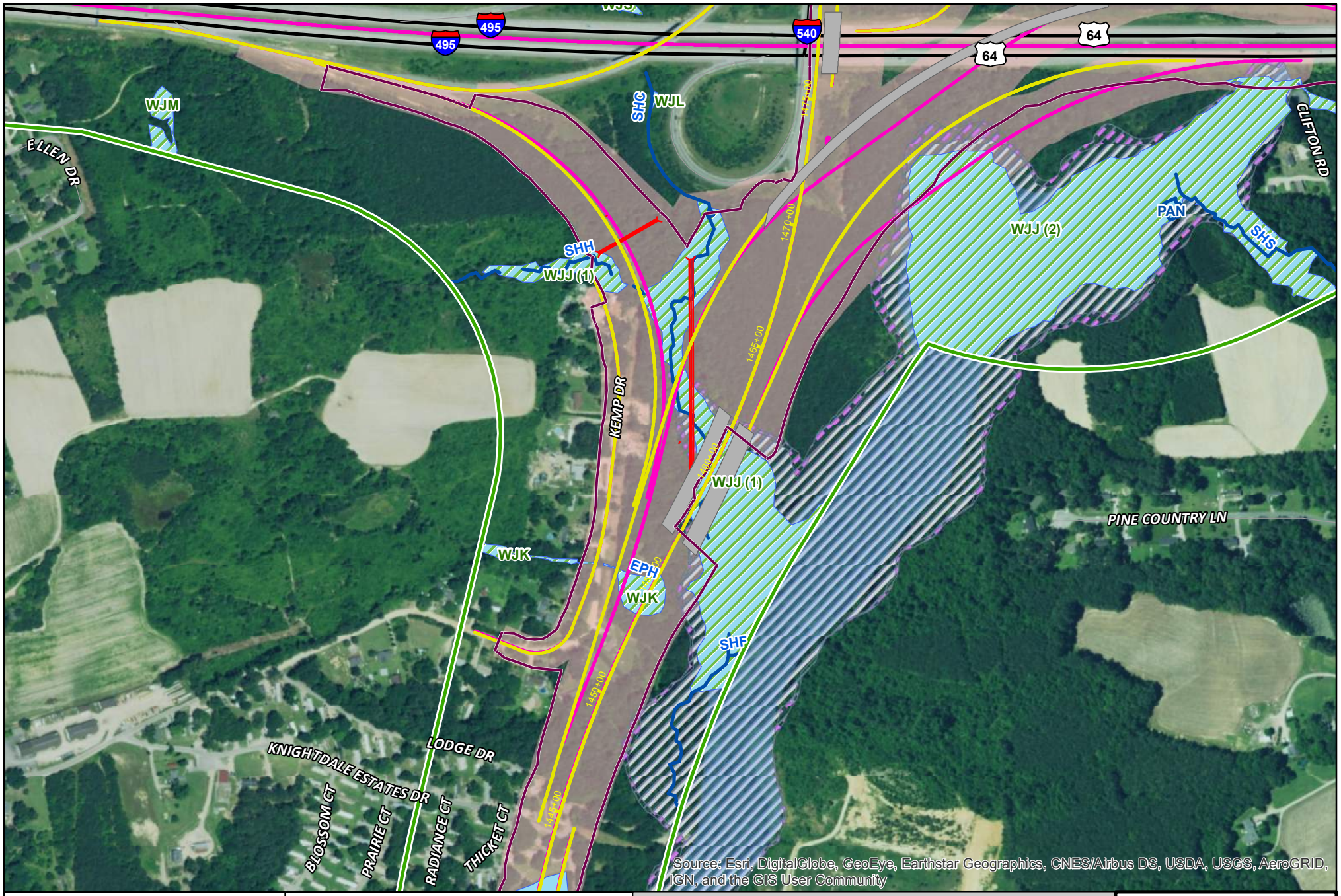
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 39



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Sources: Wake & Johnston County GIS

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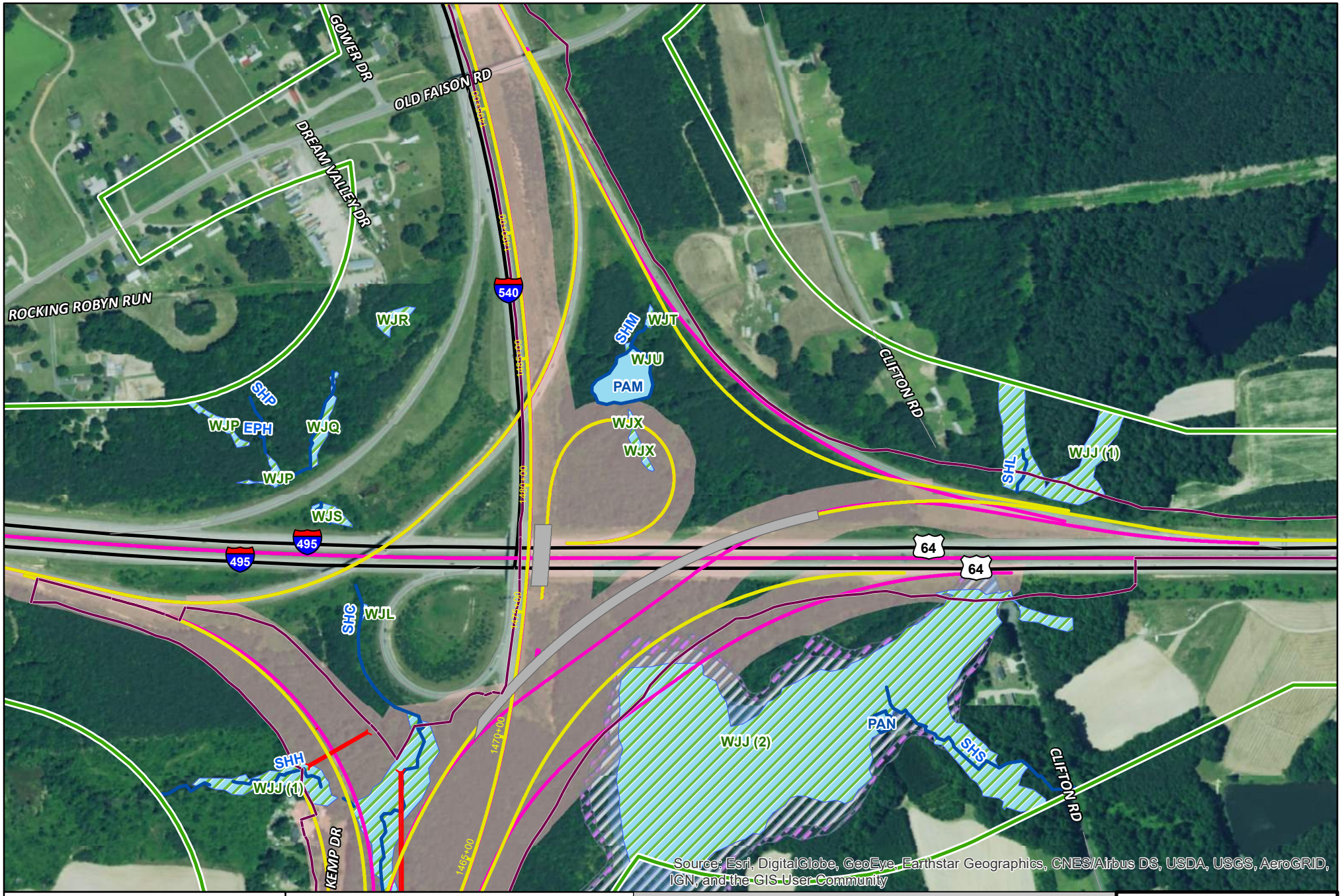
- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 40



NORTH CAROLINA Turnpike Authority

COMPLETE 540
TIP R-2829
Wake & Johnston County

PRELIMINARY : SUBJECT TO CHANGE

0 250 500 1,000 Feet

Flood Sources: Wake & Johnston County GIS

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- Func. Design Alignment
- Prop. Bridge
- Prop. Culvert
- Prel. Design SS+25
- Func. Design SS+40
- Railroad
- Surveyed Streams
- Surveyed Wetlands
- Surveyed Ponds
- Floodway
- 100-Year Floodplain
- 500-Year Floodplain
- Orange Corridor
- Green Corridor
- Mint Corridor

IMPACTS

Figure 41

SITE 1 & 1A – MIDDLE CREEK

HYDRAULIC SITE NO. SITE #
WETLAND WETLAND
STREAM STREAM
100 YR. FLOOD

COMPLETE 540
Triangle Expressway Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
200' 0' 200' 400'
100'

SH SO WO WP SN SM SITE 1 WL WQ SL WM WR WN SK WS SO SITE 1A

BEGIN BRIDGE -L- STA.84+56.31
END BRIDGE -L- STA.85+46.25
BEGIN BRIDGE -Y3- STA.15+101.87
END BRIDGE -Y3- STA.15+91.87

EXISTING COLONIAL PIPELINE

CULVERT (3@11'X11') TO BE REPLACE BY BRIDGE

CULVERT (3@11'X11') TO BE REPLACE BY BRIDGE

SUNSET LAKE RD

TOTAL DA (SITE 1) = 3,446 AC.
TOTAL DA (SITE 1A) = 3,554 AC.
CALC. Q50 = 3,700 CFS
NEUSE RIVER BASIN
FEMA DETAILED STUDY = YES
PANEL 0750
MIDDLE CREEK

BRIDGE FIGURE BF–1

SITE 8 – UT TO MIDDLE CREEK

HYDRAULIC SITE NO. SITE #
WETLAND WETLAND
STREAM STREAM
100 YR. FLOOD

COMPLETE 540
Triangle Expressway Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
200' 0' 200' 400'
100'

CULVERT(2@5'X5') TO BE REPLACED BY BRIDGE

BELLS LAKE RD

RHODES RD

WBE

SITE 7

SAS

SITE 8

CULVERT(2@5'X5') TO BE REPLACED BY BRIDGE

WBF

BEGIN BRIDGE -L- ST A 346+23.96

END BRIDGE -L- ST A 348+93.89

TOTAL DA = 93 AC.
CALC. Q50 = 179.5 CFS
NEUSE RIVER BASIN
FEMA DETAILED STUDY = NO
PANEL 0770
UT TO MIDDLE CREEK

BRIDGE FIGURE BF–2

SITE 16 – JUNIPER BRANCH

HYDRAULIC SITE NO. SITE #
WETLAND WETLAND
STREAM STREAM
100 YR. FLOOD

COMPLETE 540
Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
200′ 0′ 200′ 400′
100′

POWERLINE
CONTENDER DR
HOLLAND CHURCH RD
SITE 16
WDC
WDB
SCG
SCH
SCI
SCJ
WMB
CULVERT(2@9'X6') TO BE REPLACED BY BRIDGE
-Y18A- POT Sta. 19+38.61
POC Sta. 641+97.57 = POT Sta. 20+32.67
Δ =136° 31' 54"
-Y18- PT Sta. 17+14.11
-Y18- POT Sta. 13+60.00 = -Y18B- POT Sta. 10+00.00
-Y18- PC Sta. 12+56.25
-Y18- POT Sta. 10+00.00
BEGIN BRIDGE -L- +/-STA.657+08
END BRIDGE -L- +/-STA.661+73
-L- CS Sta. 660+00.86
-L- ST Sta. 663+15.86
-L- TS Sta. 666+31.36
-L- SC Sta. 669+81.36
GRAU 350 TL-3
CAT-1
WLB
STM
645+00
650+00
655+00
660+00
665+00
670+00
675+00

TOTAL DA = 426 AC.
CALC. Q50 = 750 CFS
NEUSE RIVER BASIN
FEMA DETAILED STUDY = NO
PANEL 1608
JUNIPER BRANCH

BRIDGE FIGURE BF–3

SITE 21 – UT TO SWIFT CREEK

HYDRAULIC SITE NO. SITE #
WETLAND WETLAND
STREAM STREAM
100 YR. FLOOD

COMPLETE 540
Triangle Expressway Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
200′ 0′ 200′ 400′
100′

POWERLINE

CULVERT(3@7′X5′) TO BE REPLACED BY BRIDGE

BEGIN BRIDGE
-L- STA.832+21.30

-L- PC Sta. 829+71.34

-L- PT Sta. 857+28.52

SITE 21

SDF

SCY

WDV

SCY

WDV

SDD

SDE

-L- POT Sta. 827+71.30= -Y2IRPD- ST Sta. 10+00.00 71.00 RT

-Y2IRPD- SC Sta. 12+10.00

END BRIDGE
-L- STA.846+71.30

825+00 830+00 835+00 840+00 845+00 850+00 855+00

TOTAL DA = 332 AC.
CALC. Q50 = 650 CFS
NEUSE RIVER BASIN
FEMA DETAILED STUDY = NO
PANEL 1628
UT TO SWIFT CREEK

BRIDGE FIGURE BF–4

SITE 24 – UT TO SWIFT CREEK

HYDRAULIC SITE NO. SITE #
WETLAND WETLAND
STREAM STREAM
100 YR. FLOOD

COMPLETE 540
Triangle Expressway Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
200' 0' 200' 400'
100'

SDM
WEB
SDV
WEC
SDO
WED
SDW
SDT
SITE 24

CULVERT (3@9'X5') TO BE REPLACED BY BRIDGE

BEGIN BRIDGE -Y22FLYCC- STA. 34+25.93

BEGIN BRIDGE -Y22RPCD- STA. 18+81.35

END BRIDGE -Y22FLYCC- STA. 41+74.14

END BRIDGE -Y22RPCD- STA. 26+98.42

SRS Sta. 12+00.00

PROPOSED SGR'S

TOTAL DA = 487 AC.
CALC. Q50 = 800 CFS
NEUSE RIVER BASIN
FEMA DETAILED STUDY = YES
PANEL 1628
UT TO SWIFT CREEK

BRIDGE FIGURE BF–5

SITE 33 – UT TO NEUSE RIVER

HYDRAULIC SITE NO. SITE #
WETLAND WETLAND
STREAM STREAM
100 YR. FLOOD

COMPLETE 540
Triangle Expressway Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
200' 0' 200' 400'
100'

SITE 33

CULVERT(2@7'X6') TO BE REPLACED BY BRIDGE

TOTAL DA = 199 AC.
CALC. Q50 = 600 CFS
NEUSE RIVER BASIN
FEMA DETAILED STUDY = YES
PANEL 1743
UT TO NEUSE RIVER

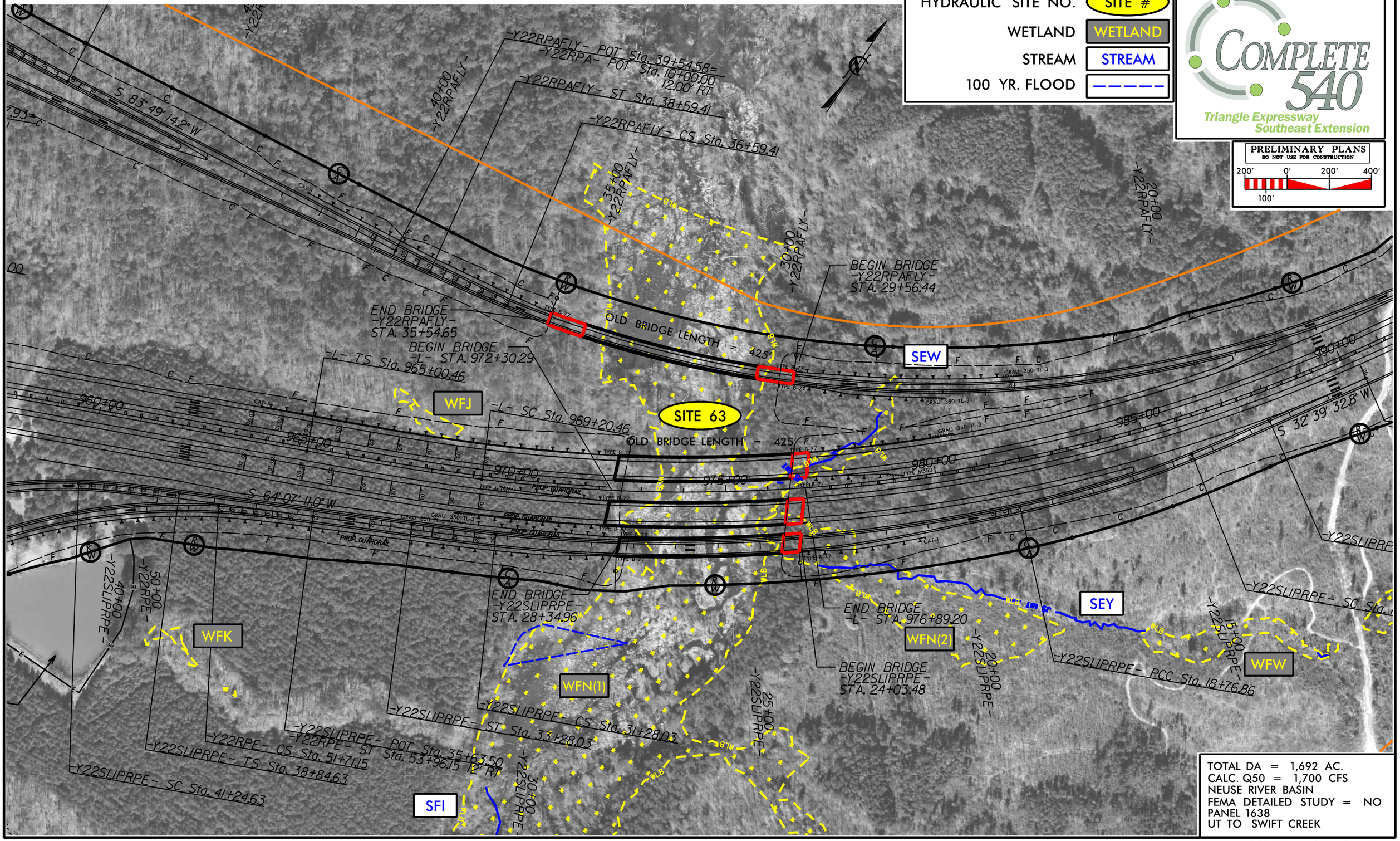
BRIDGE FIGURE BF–6

SITE 63 – UT TO SWIFT CREEK

HYDRAULIC SITE NO. SITE #
WETLAND WETLAND
STREAM STREAM
100 YR. FLOOD

COMPLETE 540
Triangle Expressway Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
200′ 0′ 200′ 400′
100′



TOTAL DA = 1,692 AC.
CALC. Q50 = 1,700 CFS
NEUSE RIVER BASIN
FEMA DETAILED STUDY = NO
PANEL 1638
UT TO SWIFT CREEK

BRIDGE FIGURE BF–7

WALL FIGURE 1

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

500′ 0′ 500′ 1000′
250′

REUNION PARK

55

BEGIN RETAINING WALL
-L- STA. 92+50.00

FAIR OAKS

DUTCH ELM DR.

END RETAINING WALL
-L- STA. 102+00.00

SUNSET HILLS

RIVER FALLS DR

WOODCREEK

SUNSET LAKE RD.

55

OLD SMITHFIELD RD.

WALL FIGURE 2

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

200′ 0′ 200′ 400′

100′

RIVER FALLS DR.

WOODCREEK

LOCKLEY RD.

BEGIN RETAINING WALL
–L– STA. 131+00.00

END RETAINING WALL
–L– STA. 135+00.00

WALL FIGURE 3

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

200′ 0′ 200′ 400′

100′

BEGIN RETAINING WALL
–L– STA. 264+00.00

END RETAINING WALL
–L– STA. 268+00.00

END RETAINING WALL
–L– STA. 265+00.00

BEGIN RETAINING WALL
–L– STA. 262+00.00

SOUTH LAKE

SOUTH LAKE

SKY MEADOW DR.

GRANDBRIDGE DR.

JAMISON PARK

JAMISON PARK

JAMISON PARK

HERITAGE CREEK DR.

–L– CS Sta. 280+59.00

–L– ST Sta. 282+69.00

WALL FIGURE 4

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

200' 0' 200' 400'
100'

END RETAINING WALL
–Y8RPA– STA. 17+00.00

BEGIN RETAINING WALL
–Y8RPA– STA. 10+00.00

BLUE SKIES

SR 1405 RHODES RD.

DEER MEADOW DR.

DEERBORN DR.

ROAD EXTENSION

DEERFIELD PARK

–Y8RPA– SRS Sta. 28+15.28

–Y8RPA– CS Sta. 26+15.28

–Y8RPA– TS Sta. 14+67.57

–Y8RPA– SC Sta. 16+67.57

–Y8LPA– SC Sta. 15+00.00

–L– ST Sta. 343+02.78

–L– POT Sta. 359+88.39=
–Y8RPA– POT Sta. 10+00.00
71.00' LT

–Y9– PC Sta. 20+47.89

–Y9– PT Sta. 13+35.41

–Y9– PC Sta. 10+00.00

–L– POT Sta. 373+23.78=
–Y10– POT Sta. 16+42.27
Δ=105° 39' 33.2"

–Y10– POT Sta. 22+74.14

–Y10A– PRC
Sta. 11+72.49

–Y10A– PC Sta. 10+16.76

–Y10A– PT
Sta. 16+56.25

–Y10A– POT Sta. 20+39.94

N 67° 33' 00.7" W

S 71° 40' 00.7" E

N 88° 36' 00.0" W

N 18° 44' 26.8" E

WALL FIGURE 5

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

200' 0' 200' 400'
100'

-Y12- CS Sta. 38+08.61

35+00 -Y12-

-Y12- SC Sta. 32+77.17

-Y12A-

20+00 -Y12A-

15+00 -Y12A-

25+00 -Y12A-

-Y12- TS Sta. 30+77.17

-Y12A- PC Sta. 10+52.63

-Y12A- PT Sta. 11+99.48

-Y12- POT Sta. 26+73.64

-L- PC Sta. 423+88.20

SR 1371 LAKE WHEELER RD

-Y12- POT Sta. 28+75.00=
-Y12A- POT Sta. 10+00.00

-L- POC Sta. 434+96.31=
-Y12- POC Sta. 25+49.08
=120° 29' 19"

N 15° 57' 26" E

N 4° 52' 25" W

N 18° 20' 24" E

-Y12- PT Sta. 25+73.22

-Y12- POT Sta. 22+49.26=
-Y12B- POT Sta. 10+00.00

20+00 -Y12B-

15+00 -Y12B-

-Y12- PC Sta. 19+84.23

-Y12B- PC Sta. 14+91.38

-Y12- PT Sta. 15+10.59

-Y12B- POT Sta. 20+12.74

-Y12B- PT Sta. 18+36.47

Sta. 415+19.36

S 39° 10' 00.9" E

GRAU 350 TL-3

TYPE M350

TYPE B-77

CAT-1

WLB

JS MIT

TYPE-M350

WALL FIGURE 6

PROP. RETAINING WALL

NOISE SENSITIVE AREAS

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

500′ 0′ 500′ 1000′

250′

OLD STAGE PLACE

END RETAINING WALL
–L– STA. 570+00.00

ROLLING FARM DR.

BEGIN RETAINING WALL
–L– STA. 560+50.00

B

A

C

D

END RETAINING WALL
–L– STA. 545+00.00

BEGIN RETAINING WALL
–L– STA. 561+00.00

END RETAINING WALL
–L– STA. 572+00.00

LANERIDGE CT.

BEGIN RETAINING WALL
–L– STA. 535+00.00

SR 2723 FANNY BROWN RD.

LANERIDGE

ROLLING MEADOWS

SR 1006 OLD STAGE RD.

WALL FIGURE 7

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

500′ 0′ 500′ 1000′

250′

CREST OF CAROLINA

POTENTIAL UTILITY RELOCATION

SR 2727 YIP SAULS RD.

AUTUMN CREST FARM

TURNER FARMS

JOE LEACH RD.

TAVERNIER

HOLLAND FARMS

BEGIN RETAINING WALL
–L– STA. 681+00.00

END RETAINING WALL
–L– STA. 684+00.00

RETAINING WALL SHOWN ON WALL FIGURE 8

TAVERNIER KNOLL LN.

WALL FIGURE 8

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

100' 0' 100' 200'
50'

–Y19– PT Sta. 20+26.33

20+00 –Y19–

END RETAINING WALL
–Y19– STA. 18+65.00

BEGIN RETAINING WALL
–Y19– STA. 18+45.00

END RETAINING WALL
–Y19– STA. 18+20.00

BEGIN RETAINING WALL
–Y19– STA. 16+30.00

END RETAINING WALL
–Y19– STA. 16+05.00

BEGIN RETAINING WALL
–Y19– STA. 15+80.00

15+00 –Y19–

–Y19– PC Sta. 15+02.75

–Y19– PT Sta. 13+13.13

JUNIPER LEVEL MISSIONARY BAPTIST CHURCH

PANTHER BRANCH SCHOOL

HPB

WLB

JS

N 0°04'43.6" W

SR 2227 –Y19– SAULS RD

WALL FIGURE 9

PROP. RETAINING WALL

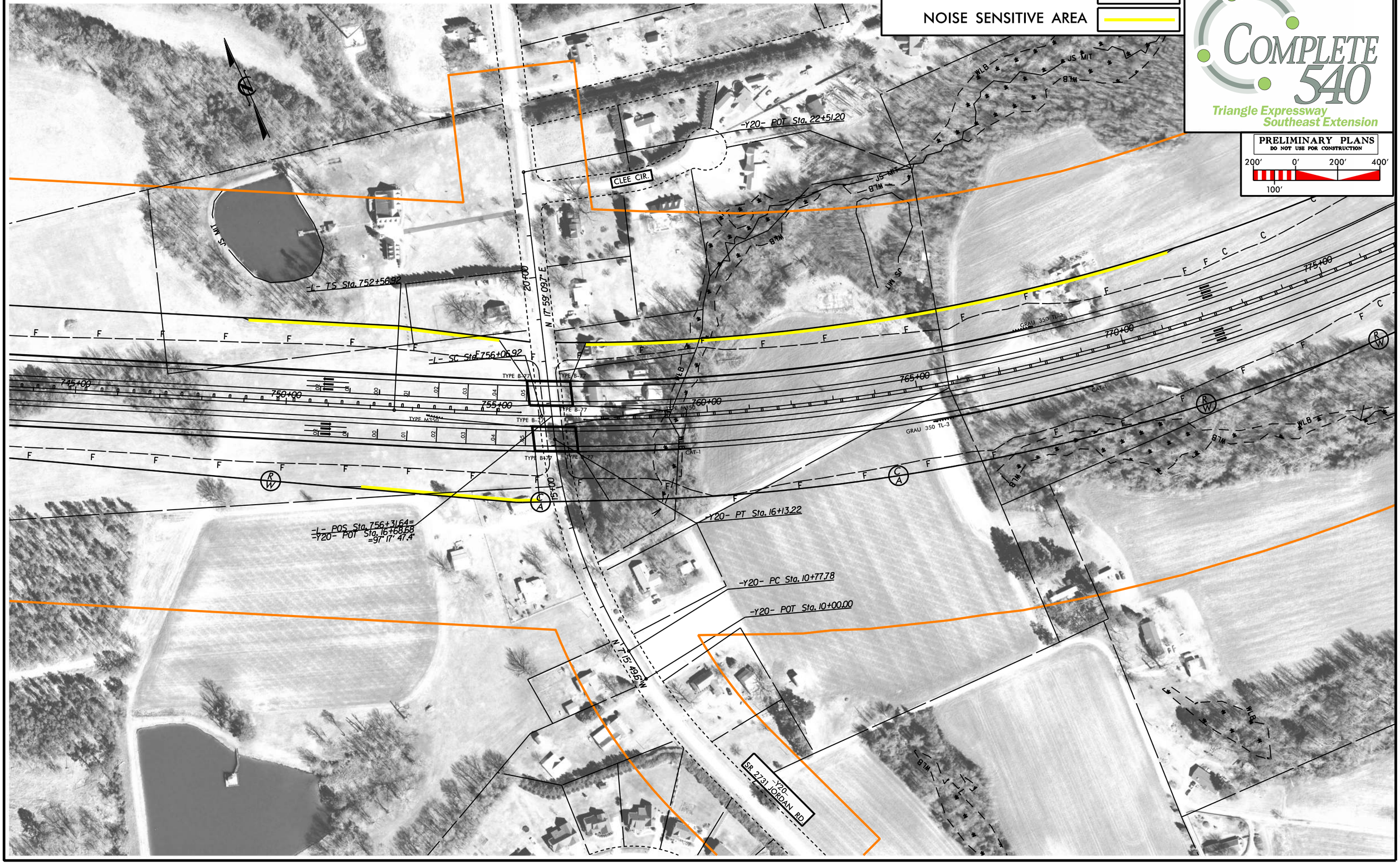
NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

200' 0' 200' 400'
100'



WALL FIGURE 10

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

200' 0' 200' 400'
100'

A

-Y22RPAFLY- POT Sta. 39+54.58=
-Y22RPA- POT Sta. 10+00.00
12.00' RT

-Y22RPAFLY- ST Sta. 38+59.41

-Y22RPAFLY- CS Sta. 36+59.41

-Y22RPAFLY- POT Sta. 20+47.93=
POT Sta. 56+66.01

S 83° 49' 14.2" W

-Y22RPA- ST Sta. 12+16.00

-L- TS Sta. 965+00.46

END RETAINING WALL
-L- STA. 968+75.00

-L- SC Sta. 969+20.46

S 64° 07' 11.0" W

93+43.60=
Sta. 10+00.00

BEGIN RETAINING WALL
-L- STA. 958+75.00

POND TO BE DRAINED

-Y22SLIPRPE- CS Sta. 31+28.03

-Y22SLIPRPE- ST Sta. 33+28.03

-Y22SLIPRPE- POT Sta. 35+63.50
-Y22RPE- ST Sta. 53+96.15 12' RT

-Y22RPE- CS Sta. 51+71.15

-Y22SLIPRPE- TS Sta. 38+84.63

-Y22SLIPRPE- PCC Sta. 18

WALL FIGURE 11

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

100' 0' 100' 200'
50'

-Y24- POT Sta. 14+89.38=
-Y24A- POT Sta. 10+00.00

-Y24-
US 70 BUSINES

GRAU 350 TL-3

CAT-1

S 68° 27' 50.8" E

END WALL
STA. 20+75.00, 100.00 LT.

-Y24A-
WALNUT DR.

BEGIN WALL
STA. 17+25.00, 100.00 LT.

-Y24A- PT Sta. 17+57.12

-Y24A- PC Sta. 10+74.90

-Y24B- PC Sta. 10+58.05

-Y24B- PT Sta. 11+09.87

-Y24B- POT Sta. 12+00.00

N 28° 37' 00.0" E

N 21° 46' 12.0" W

N 55° 42.3" E

-Y24A- POC Sta. 11+58.00=
-Y24B- POT Sta. 10+00.00
-Y24A- PRC Sta. 12+66.99

-Y24 15+00

WALNUT DR.

BUFFALOE'S ACRE RD.

WALL FIGURE 12

PROP. RETAINING WALL

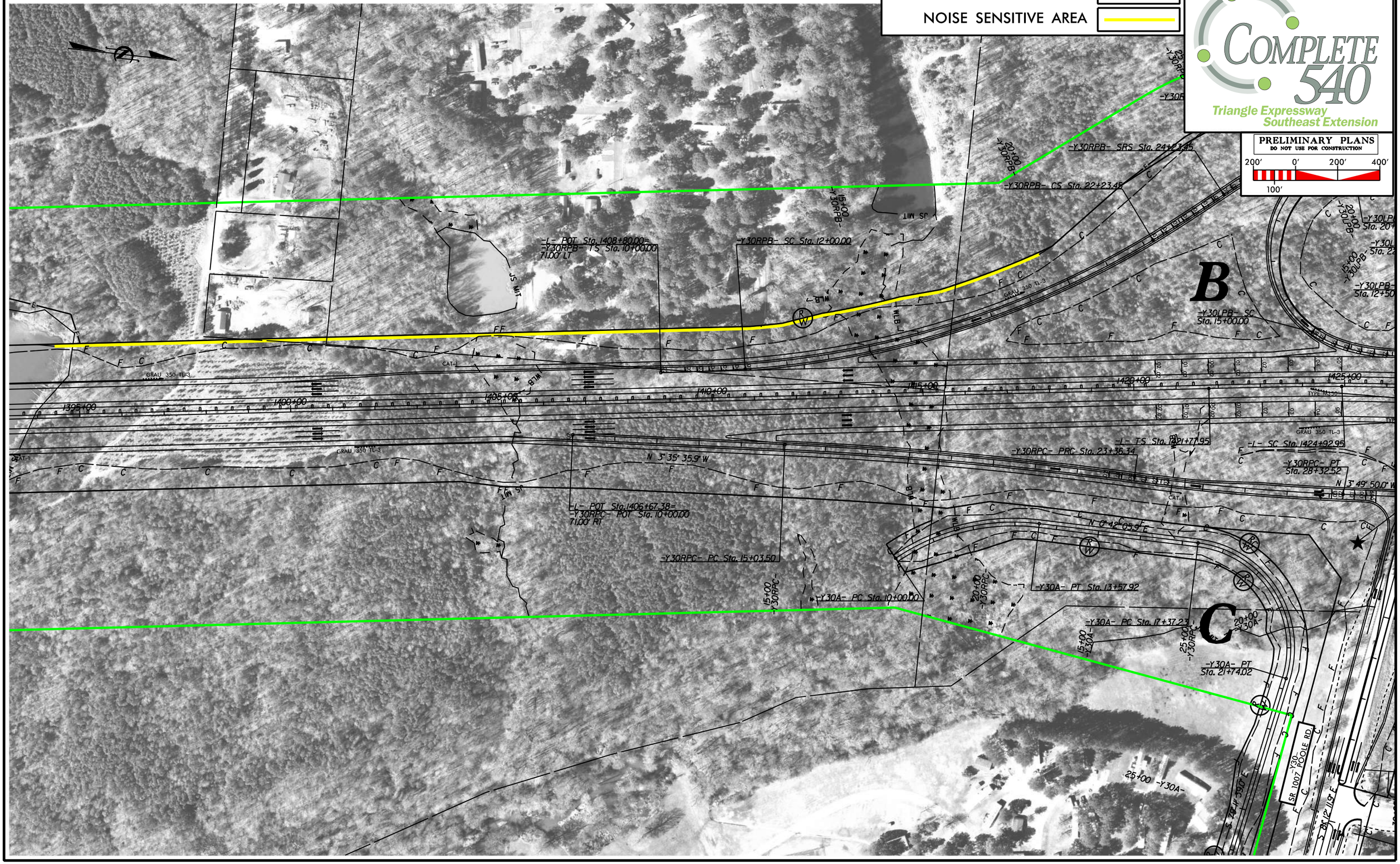
NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

200' 0' 200' 400'
100'



WALL FIGURE 13

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

300′ 0′ 300′ 600′

150′

KNIGHTDALE ESTATES

KEMP DR

STONEY FALLS WAY

SR 1007 -Y30- POOLE RD

POPLAR CREEK

END RETAINING WALL
-Y31RPDB- STA. 53+21.90

BEGIN RETAINING WALL
-Y31RPDB- STA. 52+32.00

WALL FIGURE 14

PROP. RETAINING WALL

NOISE SENSITIVE AREA

COMPLETE 540

Triangle Expressway
Southeast Extension

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

200' 0' 200' 400'
100'

OLD FAISON RD.

-L- CS Sta. 1507+15.71

-L- ST Sta. 1511+09.41

1500+00 F

1505+00

1510+00

1515+00

1520+00

1525+00

N 28° 15' 00.0" W

N 27° 48' 01.6" W

-L- POT Sta. 1512+55.03=
-Y31RPBD- PT Sta. 72+06.75
77.53 RT

-Y31RPBD- PC Sta. 70+10.59

70+00
-Y31RPBD-

65+00
-Y31RPBD-

60+00
-Y31RPBD-

-Y31RPBD- POT Sta. 55+80.57
-Y31RPBD- ST Sta. 40+01.40
12.00 RT

40+00
-Y31RPBD-

KINGMAN DR.

CHURCHILL

AGILE DR.