

## **APPENDIX O: Biological Resources**



# ADDENDUM

09-DECEMBER-2022

## APPENDIX O – BIOLOGICAL RESOURCES – Proposed ROW Change

**SPUR 399 EXTENSION EIS - US 75 to US 380, Collin County  
CSJs 0364-04-051, 0047-05-058, and 0047-10-002; Dallas District**

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### PURPOSE OF ADDENDUM:

Changes were made to the proposed right-of-way (ROW) limits for the US 380 McKinney project in the 60% Geometric Schematic Design submittal made on 1-JUL-2022. A copy of that submittal is included in Appendix B of this DEIS. This addendum describes where the changes occurred and summarizes how those changes affected the impacts and findings disclosed in the previously approved technical reports that make up the project appendices. The revised impacts to water features based on the proposed ROW changes are disclosed in the DEIS.

### DESCRIPTION OF THE PROPOSED ROW CHANGE

To streamline and accelerate the NEPA process for this project, technical studies were initiated at an early stage in schematic development. Initial technical report submittals were based on the proposed ROW established in JUN-JUL-2021, with progressive modifications made through NOV-2021. The JUL-2022 Geometric Schematic Design submittal reflects the continued refinement of the alternatives and consideration of input received during the MAR-2022 public meeting and ongoing coordination with the City of McKinney, Collin County, and the North Texas Municipal Water District.

The JUL-2022 submittal made adjustments to the proposed ROW limits throughout the length of the proposed alignments to account for drainage, access, and geometric improvements. Areas connecting to existing and planned roadway projects, under the direction of the City of McKinney, have also been included on the schematics and will still be under refinement into the FEIS. A design decision at the crossing of SH 5 in proximity of the East Fork Trinity River also added improvements within the existing ROW extending farther along SH 5 than was previously reviewed.

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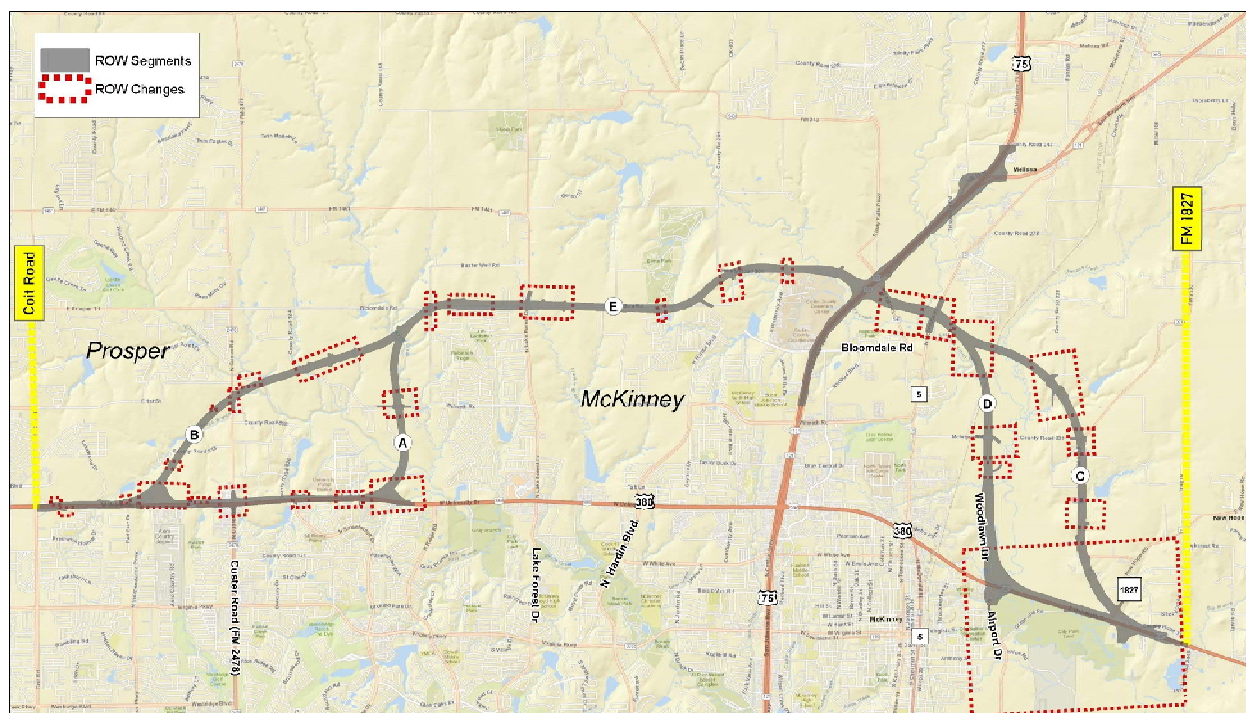
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**Figure 1: Proposed ROW Change – November 2021 to July 2022**

Build Alternative	November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)	Change in Proposed ROW (Acres)
PURPLE ALTERNATIVE W/O SPUR	1,047.7	1,113.9	66.2
PURPLE ALTERNATIVE W/ SPUR	1,069.1	1,133.1	64.0
BLUE ALTERNATIVE W/O SPUR	1,042.0	1,083.5	41.5
BLUE ALTERNATIVE W/ SPUR	1,081.3	1,098.9	17.6
BROWN ALTERNATIVE W/O SPUR	1,010.3	1,056.4	46.1
BROWN ALTERNATIVE W/ SPUR	1,049.5	1,071.8	22.3
GOLD ALTERNATIVE W/O SPUR	1,015.9	1,086.8	70.9
GOLD ALTERNATIVE W/ SPUR	1,037.4	1,106.0	68.6

*Illustration of the July 2022 Proposed ROW Changes*



## **EFFECTS OF THE JULY ROW CHANGE ON BIOLOGICAL RESOURCES ANALYSES AND FINDINGS**

**Figures 2** through **5**, summarize the changes in the field verified EMST vegetation types within the proposed ROW for the four Build Alternatives. All stream and river crossings and forested areas (including those identified as potential mussel and bat habitats), water features, and floodplain/floodway areas would still be bridged to the extent practicable.

The changes in ROW anticipated for any of the Build Alternatives would not change the findings made to date. All TPWD BMPs previously considered would remain valid for all Build Alternatives.

**Figure 2: Purple Alternative EMST Proposed ROW Change – November 2021 to July 2022**

PURPLE ALTERNATIVE (A+E+D)					
Veg_ID	EMST Common Name	W/O Spur		W/ Spur	
		November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)	November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)
1102	Edwards Plateau: Live Oak Motte and Woodland	0.0	0.1	0.0	0.1
904	Edwards Plateau: Oak - Hardwood Slope Forest	0.0	0.0	0.0	0.0
1103	Edwards Plateau: Deciduous Oak - Evergreen Motte and Woodland	1.5	1.5	1.5	1.5
1104	Edwards Plateau: Oak - Hardwood Motte and Woodland	3.3	3.5	3.3	3.5
1107	Edwards Plateau: Savanna Grassland	15.4	15.7	15.4	15.7
1802	Central Texas: Floodplain Live Oak Forest	0.0	0.1	0.0	0.1
1803	Central Texas: Floodplain Hardwood - Evergreen Forest	1.3	1.3	1.3	1.3
1804	Central Texas: Floodplain Hardwood Forest	97.2	98.7	101.4	103.1
1807	Central Texas: Floodplain Herbaceous Vegetation	28.2	27.4	28.2	27.6
1902	Central Texas: Riparian Live Oak Forest	0.0	0.0	0.0	0.0
1904	Central Texas: Riparian Hardwood Forest	10.9	12.1	10.9	12.1
1905	Central Texas: Riparian Evergreen Shrubland	0.5	0.5	0.5	0.5
1907	Central Texas: Riparian Herbaceous Vegetation	0.3	0.3	0.3	0.3
207	Blackland Prairie: Disturbance or Tame Grassland	107.9	114.4	109.2	115.8
9000	Barren	13.3	12.8	13.3	12.8
9004	Swamp	0.0	0.0	0.0	0.0
9104	Native Invasive: Deciduous Woodland	62.8	67.2	62.8	67.2
9307	Row Crops	258.8	268.2	261.2	270.3
9410	Urban High Intensity	30.7	40.6	40.7	49.2
9411	Urban Low Intensity	413.2	447.1	416.7	449.7
9600	Open Water	2.4	2.4	2.4	2.4
	Total ROW	<b>1,047.7</b>	<b>1,113.9</b>	<b>1,069.1</b>	<b>1,133.1</b>

**Figure 3: Blue Alternative EMST Proposed ROW Change – November 2021 to July 2022**

BLUE ALTERNATIVE (A+E+C)					
Veg_ID	EMST Common Name	W/O Spur		W/ Spur	
		November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)	November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)
1102	Edwards Plateau: Live Oak Motte and Woodland	0.0	0.0	0.0	0.0
904	Edwards Plateau: Oak - Hardwood Slope Forest	0.0	0.1	0.0	0.1
1103	Edwards Plateau: Deciduous Oak - Evergreen Motte and Woodland	1.5	1.5	1.5	1.5
1104	Edwards Plateau: Oak - Hardwood Motte and Woodland	3.3	3.5	3.3	3.5
1107	Edwards Plateau: Savanna Grassland	15.4	15.7	15.4	15.7
1802	Central Texas: Floodplain Live Oak Forest	0.0	0.1	0.0	0.1
1803	Central Texas: Floodplain Hardwood - Evergreen Forest	0.0	0.0	0.0	0.0
1804	Central Texas: Floodplain Hardwood Forest	90.7	93.7	92.7	93.8
1807	Central Texas: Floodplain Herbaceous Vegetation	13.0	13.4	20.0	13.4
1902	Central Texas: Riparian Live Oak Forest	0.0	0.0	0.0	0.0
1904	Central Texas: Riparian Hardwood Forest	13.7	14.5	13.7	14.5
1905	Central Texas: Riparian Evergreen Shrubland	0.0	0.0	0.0	0.0
1907	Central Texas: Riparian Herbaceous Vegetation	1.9	1.9	1.9	1.9
207	Blackland Prairie: Disturbance or Tame Grassland	173.9	177.8	175.2	184.9
9000	Barren	13.3	12.8	13.3	12.8
9004	Swamp	0.0	0.0	0.0	0.0
9104	Native Invasive: Deciduous Woodland	96.4	101.3	97.5	102.4
9307	Row Crops	147.9	150.3	170.5	153.9
9410	Urban High Intensity	25.9	25.2	26.9	25.2
9411	Urban Low Intensity	442.7	469.2	446.2	472.3
9600	Open Water	2.4	2.5	3.2	2.9
	Total ROW	<b>1,042.0</b>	<b>1,083.5</b>	<b>1,081.3</b>	<b>1,098.9</b>

**Figure 4: Brown Alternative EMST Proposed ROW Change – November 2021 to July 2022**

BROWN ALTERNATIVE (B+E+C)					
Veg_ID	EMST Common Name	W/O Spur		W/ Spur	
		November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)	November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)
1102	Edwards Plateau: Live Oak Motte and Woodland	2.5	0.9	2.5	2.8
904	Edwards Plateau: Oak - Hardwood Slope Forest	0.9	2.8	0.9	2.8
1103	Edwards Plateau: Deciduous Oak - Evergreen Motte and Woodland	1.5	1.5	1.5	1.5
1104	Edwards Plateau: Oak - Hardwood Motte and Woodland	3.0	3.0	3.0	3.0
1107	Edwards Plateau: Savanna Grassland	16.5	16.5	16.5	16.5
1802	Central Texas: Floodplain Live Oak Forest	0.2	0.2	0.2	0.2
1803	Central Texas: Floodplain Hardwood - Evergreen Forest	0.0	0.0	0.0	0.0
1804	Central Texas: Floodplain Hardwood Forest	79.4	81.6	81.3	81.7
1807	Central Texas: Floodplain Herbaceous Vegetation	15.4	15.5	22.5	15.5
1902	Central Texas: Riparian Live Oak Forest	0.3	0.5	0.3	0.5
1904	Central Texas: Riparian Hardwood Forest	14.2	15.4	14.2	15.4
1905	Central Texas: Riparian Evergreen Shrubland	0.0	0.0	0.0	0.0
1907	Central Texas: Riparian Herbaceous Vegetation	1.9	1.9	1.9	1.9
207	Blackland Prairie: Disturbance or Tame Grassland	200.5	197.9	201.8	205.0
9000	Barren	13.3	12.8	13.3	12.8
9004	Swamp	0.3	0.3	0.3	0.3
9104	Native Invasive: Deciduous Woodland	96.6	103.2	97.7	104.4
9307	Row Crops	152.5	168.4	175.0	172.0
9410	Urban High Intensity	20.1	18.7	21.1	18.7
9411	Urban Low Intensity	388.8	410.6	392.2	413.7
9600	Open Water	4.9	5.0	5.7	5.4
	Total ROW	<b>1,010.3</b>	<b>1,056.7</b>	<b>1,049.5</b>	<b>1,071.8</b>

**Figure 5: Gold Alternative EMST Proposed ROW Change – November 2021 to July 2022**

GOLD ALTERNATIVE (B+E+D)					
Veg_ID	EMST Common Name	W/O Spur		W/ Spur	
		November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)	November 2021 Proposed ROW (Acres)	July 2022 Proposed ROW (Acres)
1102	Edwards Plateau: Live Oak Motte and Woodland	2.5	2.8	2.5	2.8
904	Edwards Plateau: Oak - Hardwood Slope Forest	0.9	0.9	0.9	0.9
1103	Edwards Plateau: Deciduous Oak - Evergreen Motte and Woodland	1.5	1.5	1.5	1.5
1104	Edwards Plateau: Oak - Hardwood Motte and Woodland	3.0	3.0	3.0	3.0
1107	Edwards Plateau: Savanna Grassland	16.5	16.5	16.5	16.5
1802	Central Texas: Floodplain Live Oak Forest	0.2	0.2	0.2	0.2
1803	Central Texas: Floodplain Hardwood - Evergreen Forest	1.3	1.3	1.3	1.3
1804	Central Texas: Floodplain Hardwood Forest	85.9	86.6	90.1	90.9
1807	Central Texas: Floodplain Herbaceous Vegetation	30.6	29.5	30.6	29.6
1902	Central Texas: Riparian Live Oak Forest	0.3	0.5	0.3	0.5
1904	Central Texas: Riparian Hardwood Forest	11.5	12.9	11.5	12.9
1905	Central Texas: Riparian Evergreen Shrubland	0.5	0.5	0.5	0.5
1907	Central Texas: Riparian Herbaceous Vegetation	0.3	0.3	0.3	0.3
207	Blackland Prairie: Disturbance or Tame Grassland	134.5	134.5	135.8	135.9
9000	Barren	13.3	12.8	13.3	12.8
9004	Swamp	0.3	0.3	0.3	0.3
9104	Native Invasive: Deciduous Woodland	63.0	69.1	63.0	69.1
9307	Row Crops	263.6	286.4	266.0	288.4
9410	Urban High Intensity	24.8	34.0	34.9	42.6
9411	Urban Low Intensity	359.0	388.4	362.5	391.1
9600	Open Water	4.9	4.9	4.9	4.9
	Total ROW	<b>1,015.9</b>	<b>1,086.8</b>	<b>1,037.4</b>	<b>1,106.0</b>

**Appendix O-1: Species Analysis Spreadsheet**

## SPECIES ANALYSIS SUMMARY

Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Federal Status	Effect/Take Determination for Federally Listed Species	State Status	Impact Determination for State-Listed Species	Explanation for Effect/Take and/or Impact Determination	Presence/Absence survey conducted?
Collin	Birds	Black Rail	<i>Laterallus jamaicensis</i>	Black rails are year-round residents of the central and upper coast and migrants in the eastern part of the state. The species nests in salt, brackish, and freshwater marshes, pond borders, wet meadows, and wetlands with hydrophytic grass species. Water depth is an important and key habitat component, as the species typically is found where water is less than two to four centimeters deep. Other significant habitat factors may include vegetation density, distance to open water, and water regime stability. Nesting typically occurs in the highest sections of the marsh, which have mesic to hydric soils and are flooded by only the highest tides. Nests are built in areas with saturated or shallowly flooded soils and dense vegetation on damp ground, on mat of previous year's dead grasses, or over shallow water. In salt or brackish marshes, typical habitat includes dense stands of cordgrasses ( <i>Spartina</i> sp.), spikegrasses ( <i>Distichlis</i> sp.), and needlerush ( <i>Juncus</i> sp.), or, in more upland saltbush communities along marsh edges. Typical freshwater habitat includes species such as cattail ( <i>Typha</i> ) and bulrush ( <i>Scirpus</i> sp.). Non-breeding habitat is thought to be similar to breeding habitat.	Y	Several emergent wetlands were observed in the action area during field visits in August 2020, June/July 2021, and September 2021 by Derek Green. Four of them contained cattails and after discussions with species specialist, Dennis Palafox, were determined to be suitable habitat. Two were in the project area itself, one was adjacent to the project area, and the fourth was in the project vicinity.	T	No effect or take	T	No impact	Suitable habitat for the Black Rail occurs in the action area. However, occupancy cannot be confirmed until the areas are surveyed. Occupancy will be determined by USFWS protocols prior to construction. Bird BMPs would be implemented.	N
Collin	Birds	Least Tern - Migratory	<i>Sternula (=Sterna) antillarum</i>	The interior population (subspecies <i>athalassos</i> ) of the Least Tern nests on bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with inland rivers and reservoirs. It occasionally nests on man-made structures such as sand and gravel pits or gravel rooftops. Preferred habitat includes sand and gravel bars within a wide unobstructed river channel, or open flats along shorelines of lakes and reservoirs. Colony sites can move annually, depending on landscape disturbance and vegetation growth at established colonies. It is known to nest at three reservoirs along the Rio Grande River, on the Canadian River in the northern Panhandle, and along the Red River.	N/A	The project area is outside the breeding and wintering range of this species. Although suitable stopover habitat may be present, Least Tern is not expected to regularly occur and any use of this habitat would be incidental.	—	N/A	E	No impact	The project area does not contain suitable breeding or wintering habitat for the Least Tern.	N

Prepared Date: 1/21/2022



SPECIES ANALYSIS SUMMARY  
Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Federal Status	Effect/Take Determination for Federally Listed Species	State Status	Impact Determination for State-Listed Species	Explanation for Effect/Take and/or Impact Determination	Presence/Absence survey conducted?
Collin	Birds	Piping Plover - Migratory	<i>Charadrius melodus</i>	This migratory species overwinters in Texas, where it occurs on beaches, ephemeral sand flats, barrier islands, sand, mud, algal flats, washover passes, salt marshes, lagoons, and dunes along the Gulf Coast and adjacent offshore islands, including spoil islands in the Intracoastal Waterway. Algal flats appear to be the highest quality habitat because of their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low or very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast.	N/A	The list of federally threatened and endangered species indicates that based on the project location within the migratory route, effects to Piping Plover only need be considered for wind energy projects. The project area is outside the breeding and wintering range of this species. Although suitable stopover habitat may be present, Piping Plover is not expected to regularly occur and any use of this habitat would be incidental.	T	No effect or Take	T	No impact	The project is not a wind energy project within the migratory route and does not contain suitable breeding and wintering habitat for the Piping Plover.	N

## SPECIES ANALYSIS SUMMARY

Project Name: US 380

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Collin	Birds	Red Knot - Migratory	<i>Calidris canutus rufa</i>	The species is a winter resident and migrant in Texas. It is primarily found in marine habitats such as sandy beaches, salt marshes, lagoons, mudflats of estuaries and bays, and mangrove swamps during winter months. It primarily occurs along the Gulf coast on tidal flats and beaches and less frequently in marshes and flooded fields. It has occasionally been observed along shorelines of large lakes and freshwater marshes.	N/A	The list of federally threatened and endangered species indicates that based on the project location within the migratory route, effects to Red Knot only need be considered for wind energy projects. The project area is outside the breeding and wintering range of this species. Although suitable stopover habitat may be present, Red Knot is not expected to regularly occur and any use of this habitat would be incidental.	T	No effect or Take	T	No impact	The project is not a wind energy project within the migratory route and does not contain suitable breeding and wintering habitat for the Red Knot.	N
Collin	Birds	White-faced Ibis	<i>Plegadis chihi</i>	The species is found in the Western Gulf Coastal Plains ecoregion of Texas. Preferred habitat includes freshwater wetlands, marshes, ponds, rivers, irrigated land, and sloughs, but it occasionally forages in brackish or saltwater marshes. It nests in marshes in low trees, on the ground in bulrushes ( <i>Scirpus</i> sp.) or reeds, or on floating mats.	Y	Edges of creeks, small ponds, wet meadows, and flooded cropland would provide suitable habitat in the project area and vicinity for this species during migration. Such habitat was observed during field visits in August 2020, June/July 2021, and September 2021 by Derek Green.	—	N/A	T	May impact	Suitable habitat is present in the project area for the White-faced Ibis. Bird BMPs would be implemented.	N

Prepared Date: 1/21/2022

Prepared by: Derek Green

TxDOT ENV Spreadsheet Template date: November 9, 2021.

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## SPECIES ANALYSIS SUMMARY

Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Federal Status	Effect/Take Determination for Federally Listed Species	State Status	Impact Determination for State-Listed Species	Explanation for Effect/Take and/or Impact Determination	Presence/Absence survey conducted?
Collin	Birds	Whooping Crane	<i>Grus americana</i>	The species breeds in Canada and winters on the Texas coast at Aransas National Wildlife Refuge. During migration it typically stops to rest and feed in open bottomlands of large rivers and marshes but, like other waterbirds, it may also utilize flooded croplands, playas, large wetlands associated with lakes, small ponds, and various other aquatic features. Typical migration habitat includes sites with good horizontal visibility, water depth of 30 centimeters or less, and minimum wetland size of 0.04 hectare for roosting.	Y	The project lies at the edge of the Whooping Crane migration corridor within the zone that encompasses 95 percent of known sightings. Suitable stopover habitat, such as flooded croplands, dry croplands, emergent wetlands, and small ponds were observed in the project area and vicinity by Derek Green during the August 2020, June/July 2021, and September 2021 field visits.	E	No effect or take	E	No impact	Suitable habitat is present in the project area for the Whooping Crane. Migratory stopover occurrence would be incidental and ephemeral.	N
Collin	Birds	Wood Stork	<i>Mycteria americana</i>	The species breeds in Mexico, and nesting sites have not been recorded in Texas since 1960. However, post-breeding migrants disperse into Texas in the summer. Foraging habitat includes freshwater prairie ponds, flooded pastures or fields, ditches, and other shallow standing water with an open canopy, occasionally including brackish wetlands. The species typically roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries).	Y	Edges of creeks with an open canopy, small ponds, flooded meadows, and flooded cropland would provide suitable habitat in the project area and vicinity for this species during post-breeding migration. Such habitat was observed during field visits in August 2020, June/July 2021, and September 2021 by Derek Green.	—	N/A	T	May impact	Suitable habitat is present in the project area for the Wood Stork. Bird BMPs would be implemented.	N

Prepared Date: 1/21/2022

SPECIES ANALYSIS SUMMARY  
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Collin	Insects	Monarch Butterfly	<i>Danaus plexippus</i>	Found statewide. Adults are found in a variety of habitats including native prairies, pastures, open woodlands and savannas, desert scrub, roadsides, and other habitats with abundant nectar plants, including urbanized areas. Although adults may be present year round, they are primarily encountered between March and November, and are most commonly observed in the summer and fall during breeding and migration. Caterpillars are found on various species of the family Asclepiadaceae (occasionally treated as a subfamily of Apocynaceae). Common host plants in Texas include milkweeds ( <i>Asclepias</i> spp.) milkweed vines ( <i>Matelea</i> spp.), climbing milkweed ( <i>Funastrum</i> spp.), swallowworts ( <i>Cynanchum</i> spp.) and Anglepod ( <i>Gonolobus suberosus</i> ). Caterpillars are most frequently observed between April and September.”	Y	Prairie, grassland, pastureland, open woodland, and roadside habitats were observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021. Milkweed was also observed in the project area. Several recent sightings of the monarch butterfly have been recorded from the McKinney area and from the project vicinity -- for example Erwin Park (iNaturalist, 2022).	C	May affect	—	N/A	The project may affect the monarch butterfly. While TxDOT is a Partner in the Nationwide Candidate Conservation Agreement for Monarch Butterfly on Energy and Transportation Lands, the project involves new location and would not be completed before FY 2024, when USFWS intends to propose listing. If this species is listed during the life of this project, the effects to monarch butterflies will be reevaluated to determine the appropriate course of action, which may include conference or consultation with USFWS.	N

SPECIES ANALYSIS SUMMARY  
Project Name: US 380

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Collin	Mollusks	Louisiana Pigtoe	<i>Pleurobema riddellii</i>	Freshwater mussel currently found in the Sabine, Neches, and Trinity River basins in Texas. The species occurs in streams to medium-sized rivers with moderate flow. In Texas, the species has only been documented occurring in relatively shallow lotic waters with preferable substrate being sand and sand with gravel and silt. It is not generally known to tolerate impoundments.	Y	Rutherford Branch, Gentle Creek, Wilson Creek, Stover Creek, Honey Creek, and East Fork Trinity River may provide habitat for this species, as determined by Derek Green during field visits in August 2020, June-July 2021, and September 2021. Many of the stream crossings were not verified in the field because right-of-entry was not granted. Perennial streams were delineated by HDR, Inc.	—	N/A	T	May impact	Suitable habitat is present in the project area, and the Freshwater Mussel BMPs would be implemented.	N

SPECIES ANALYSIS SUMMARY  
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Collin	Mollusks	Texas Fawnsfoot	<i>Truncilla macrodon</i>	A freshwater mussel that is currently limited to the Brazos, Colorado, and Trinity River basins in Texas. The species occupies large streams to medium rivers and is intolerant of impoundment. Little is known about the species due to lack of representative specimens, however it is thought that the species prefers protected areas near shore in water with a moderate current over mud, sandy mud, and gravel substrates. It is also found in perennial irrigation canals for rice.	Y	Rutherford Branch, Gentle Creek, Wilson Creek, Stover Creek, Honey Creek, and East Fork Trinity River may provide habitat for this species, as determined by Derek Green during field visits in August 2020, June-July 2021, and September 2021. Many of the stream crossings were not verified in the field because right-of-entry was not granted. Perennial streams were delineated by HDR, Inc.	PT	May affect	T	May impact	Suitable habitat is present in the action area, and the Texas fawnsfoot may be affected. Freshwater Mussel BMPs would be implemented. If this species is fully listed during the life of this project, the effects to Texas fawnsfoot would be reevaluated to determine the appropriate course of action, which may include conference or consultation with USFWS.	N

SPECIES ANALYSIS SUMMARY  
Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Federal Status	Effect/Take Determination for Federally Listed Species	State Status	Impact Determination for State-Listed Species	Explanation for Effect/Take and/or Impact Determination	Presence/Absence survey conducted?
Collin	Mollusks	Texas Heelsplitter	<i>Potamilus amphichaenus</i>	A freshwater mussel currently known from the Trinity, Neches, and Sabine River basins. The species occurs in small streams to medium rivers with sand or mud substrate. It is found in flowing water but not in riffles or shoals. It prefers quiet waters and can be found in reservoirs.	Y	An SCS reservoir, a pond just northeast of the US 380-Airport Drive intersection, Rutherford Branch, Gentle Creek, Wilson Creek, Stover Creek, Honey Creek, and East Fork Trinity River may provide habitat for this species, as determined by Derek Green during field visits in August 2020, June-July 2021, and September 2021. Many of the stream crossings were not verified in the field because right-of-entry was not granted. Perennial streams were delineated by HDR, Inc.	—	N/A	T	May impact	Suitable habitat is present in the project area, and the Freshwater Mussel BMPs would be implemented.	N

SPECIES ANALYSIS SUMMARY  
Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Federal Status	Effect/Take Determination for Federally Listed Species	State Status	Impact Determination for State-Listed Species	Explanation for Effect/Take and/or Impact Determination	Presence/Absence survey conducted?
Collin	Reptiles	Alligator Snapping Turtle	<i>Macrochelys temminckii</i>	Occurs in East Texas where it inhabits perennial water bodies such as the deep water of rivers, canals, lakes, and oxbows, along with swamps, bayous, and ponds near deep running water. Preferred habitat is usually in water with a mud bottom and abundant aquatic vegetation, but the species may use sand-bottomed creeks.	Y	Suitable habitat is present in an SCS reservoir, a pond just northeast of the US 380-Airport Drive intersection, Rutherford Branch, Wilson Creek, Stover Creek, Honey Creek, and East Fork Trinity River.	PT	May affect	T	May impact	Suitable habitat is present in the project area. Species-specific BMPs would be implemented and include the following: 1) Minimize impacts to wetland and riverine habitats, 2) Aquatic Amphibian and Reptile BMP, and 3) Water Quality BMP. If this species is fully listed during the life of this project, the effects to alligator snapping turtle would be reevaluated to determine the appropriate course of action, which may include conference or consultation with USFWS.	N
Collin	Reptiles	Texas Horned Lizard	<i>Phrynosoma cornutum</i>	The species is found in semi-arid open areas with scattered vegetation comprised of bunchgrass, cacti, yucca, mesquite, acacia, juniper, or other woody shrubs and small trees commonly found in loose sandy or loamy soils.	N	The loose sandy or loamy soils with cacti/yucca/bunchgrass vegetation associated with this species were not observed in the project area during field visits in August 2020, June/July 2021, and September 2021 by Derek Green.	—	N/A	T	No impact	No suitable habitat is present in the project area.	N



SPECIES ANALYSIS SUMMARY (SGCN)  
Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Amphibian	Southern crawfish frog	<i>Lithobates areolatus areolatus</i>	Terrestrial and aquatic: The terrestrial habitat is primarily grassland and can vary from pasture to intact prairie; it can also include small prairies in the middle of large forested areas. Aquatic habitat is any body of water but preferred habitat is ephemeral wetlands (TPWD, 2021a).	Y	Grasslands in the project area could provide terrestrial habitat, while creeks, other waterbodies, and wetlands in the project area could provide habitat for reproduction. Such habitat was observed during field visits in August 2020, June/July 2021, and September 2021 by Derek Green.	May impact	Suitable habitat is present in the project area. Species-specific BMPs would be implemented and include the following: 1) Minimize impacts to wetland habitats including isolated ephemeral pools, 2) Aquatic Amphibian and Reptile BMPs, 3) Terrestrial Amphibian and Reptile BMPs, 4) Water Quality BMPs, and 5) Vegetation BMPs.	N
Collin	Amphibian	Strecker's chorus frog	<i>Pseudacris streckeri</i>	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates (TPWD, 2021a).	Y	Wooded floodplains in the project area could provide terrestrial habitat, while creeks, other waterbodies, and wetlands in the project area could provide habitat for reproduction. Such habitat was observed during field visits in August 2020, June/July 2021, and September 2021 by Derek Green.	May impact	Suitable habitat is present in the project area. Species-specific BMPs would be implemented and include the following: 1) Aquatic Amphibian and Reptile BMPs, 2) Terrestrial Amphibian and Reptile BMPs, 3) Water Quality BMPs, and 4) Vegetation BMPs.	N

SPECIES ANALYSIS SUMMARY (SGCN)  
Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Amphibian	Woodhouse's toad	<i>Anaxyrus woodhousii</i>	This species uses a wide variety of terrestrial habitats, including forests, grasslands, and barrier island sand dunes; it requires aquatic habitats for reproduction, which are equally varied (TPWD, 2021a).	Y	Forested areas and grasslands in the project area could provide terrestrial habitat, while creeks, other waterbodies, and wetlands in the project area could provide habitat for reproduction. Such habitat was observed during field visits in August 2020, June/July 2021, and September 2021 by Derek Green. Several records in vicinity of project (iNaturalist, 2021; TPWD, 2021b).	May impact	Suitable habitat is present in the project area. Species-specific BMPs would be implemented and include the following: 1) Aquatic Amphibian and Reptile BMPs, 2) Terrestrial Amphibian and Reptile BMPs, 3) Water Quality BMPs, and 4) Vegetation BMPs.	N

SPECIES ANALYSIS SUMMARY (SGCN)  
Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Bird	Bald eagle	<i>Haliaeetus leucocephalus</i>	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds (TPWD, 2021a).	Y	Recent sightings have been reported for this species from several waterbodies, including Towne Lake and Lavon Lake, in the vicinity of the project (eBird, 2021; iNaturalist, 2021). An inactive nest is located along the East Fork Trinity River approximately 1 mile southeast of the project area. An adult bald eagle was observed carrying nesting material by BMCD ecologists Derek Green and Gary Newgord on March 31, 2021. The nest is thought to be farther east of the inactive nest. The closest potential roosting habitat in the project area is approximately 2.5 miles northeast of the nest along the East Fork Trinity River (Segment D). However, the trees in this area may be too far from large waterbodies.	May impact	Roosting habitat occurs in the project area at the crossing of the East Fork Trinity River on Segment D. TxDOT would comply with the BGEPA and implement the Bird BMPs.	N

## SPECIES ANALYSIS SUMMARY (SGCN)

Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Bird	Chestnut-collared longspur	<i>Calcarius ornatus</i>	Occurs in open shortgrass settings, especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands (TPWD, 2021a).	Y	"ROW Crops" were commonly observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021. After harvesting, these areas provide the shortgrass settings interspersed with bare ground favored by this species during the winter. Some areas containing "Central Texas: Floodplain Herbaceous Vegetation" and "Blackland Prairie: Disturbance or Tame Grassland" that were observed during the site visits would also provide habitat.	May impact	Suitable habitat is present in the project area. The Bird BMPs would be implemented.	N
Collin	Bird	Western burrowing owl	<i>Athene cunicularia hypugaea</i>	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows (TPWD, 2021a).	Y	Suitable wintering habitat, such as open grasslands and savannas, was observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021.	May impact	Suitable habitat is present in the project area. The Bird BMP would be implemented.	N
Collin	Crustacean	A cave obligate isopod	<i>Caecidotea bilineata</i>	A spring obligate. <i>Caecidotea bilineata</i> is known only from non-cave groundwater habitats in deposits of Cretaceous age. It is presumably a phreatobite. Fine-scale habitat requirements unknown (TPWD, 2021a).	Y	Cretaceous-age deposits (Austin Group [Kau]) occur in the project area.	May impact	Suitable habitat may be present in the project area. Aquatic Invertebrate BMP would be implemented.	N

Prepared Date: 1/21/2022

## SPECIES ANALYSIS SUMMARY (SGCN)

Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Crustacean	Parkhill prairie crayfish	<i>Procambarus steigmani</i>	Burrower in long-grass prairie; all animals were collected with traps, thus there is no knowledge of depths of burrows; herbivore; crepuscular, nocturnal (TPWD, 2021a).	Y	During a site visit in August 2020 by Derek Green, crayfish burrows/chimneys were observed in the project area in a grassland (EMST "Floodplain Herbaceous Vegetation"). Given the recent sightings of the Parkhill prairie crayfish in the McKinney area (iNaturalist, 2022) and that the only other prairie crayfish in Texas ( <i>Procambarus gracilis</i> ) occurs in a county bordering Oklahoma, the burrows were likely those of the Parkhill prairie crayfish.	May impact	Suitable habitat is present in the project area. The Crayfish BMP would be implemented.	N
Collin	Mammal	Big brown bat	<i>Eptesicus fuscus</i>	Any wooded areas or woodlands except south Texas. Riparian areas in west Texas (TPWD, 2021a).	Y	Suitable woodland habitat was observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021.	May impact	Suitable habitat is present in the project area. Bat BMP would be implemented.	N
Collin	Mammal	Eastern red bat	<i>Lasiurus borealis</i>	Red bats are migratory bats that are common across Texas. They are most common in the eastern and central parts of the State, due to their requirement of forests for foliage roosting. West Texas specimens are associated with forested areas (cottonwoods). These bats are highly mobile, seasonally migratory, and practice a type of "wandering migration." Associations with specific habitat is difficult unless specific migratory stopover sites or wintering grounds are found. Likely associated with any forested area in East, Central, and North Texas but can occur Statewide (TPWD, 2021a).	Y	Suitable woodland habitat was observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021.	May impact	Suitable habitat is present in the project area. Bat BMP would be implemented.	N

Prepared Date: 1/21/2022

## SPECIES ANALYSIS SUMMARY (SGCN)

Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Mammal	Eastern spotted skunk	<i>Spilogale putorius</i>	A generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands. Prefers wooded, brushy areas; tallgrass prairies (TPWD, 2021a).	Y	Open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands were observed in the project area and vicinity during field visits by Derek Green in August 2020, June/July 2021, and September 2021. Has been recorded from the project vicinity (TPWD, 2021b).	May impact	Suitable habitat is present in the project area. General Design and Construction BMP would be implemented.	N
Collin	Mammal	Hoary bat	<i>Lasiurus cinereus</i>	Hoary bats are highly migratory, high-flying bats that have been noted throughout the State. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage-roosting species) but are also found in unforested parts of the State and lowland deserts. Tend to be captured over water and large, open flyways (TPWD, 2021a).	Y	Suitable woodland habitat was observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021.	May impact	Suitable habitat is present in the project area. Bat BMP would be implemented.	N
Collin	Mammal	Long-tailed weasel	<i>Mustela frenata</i>	Includes brushlands, fence rows, upland woods and bottomland hardwoods, forest edges and rocky desert scrub. Usually live close to water (TPWD, 2021a).	Y	Suitable woodland habitat and fence rows were observed in the project area and vicinity during field visits by Derek Green in August 2020, June/July 2021, and September 2021.	May impact	Suitable habitat is present in the project area. General Design and Construction BMP would be implemented.	N

Prepared Date: 1/21/2022

## SPECIES ANALYSIS SUMMARY (SGCN)

Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Mammal	Mountain lion	<i>Puma concolor</i>	Generalist; found in a wide range of habitats Statewide. Found most frequently in rugged mountains and riparian zones (TPWD, 2021a).	Y	Known to occur in the project area (landowner showed BMcD ecologist Derek Green cell phone photos of mountain lion footprints [scaled against his hand] on his property along Honey Creek during a site visit on August 24, 2020). This animal was passing through the area and was observed farther east at a later date. Riparian and woodland habitat along Wilson Creek, Honey Creek, and East Fork Trinity River, among others, in the project area may provide a travel corridor.	May impact	Suitable habitat is present in the project area. General Design and Construction BMP would be implemented.	N
Collin	Mammal	Muskrat	<i>Ondatra zibethicus</i>	Found in fresh or brackish marshes, lakes, ponds, swamps, and other bodies of slow-moving water. Most abundant in areas with cattail. Dens in bank burrow or conical house of vegetation in shallow vegetated water (TPWD, 2021a).	Y	Emergent wetlands and ponds were observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021. Wilson Creek, Honey Creek, and East Fork of the Trinity River, and other creeks also occur in the project area.	May impact	Suitable habitat is present in the project area. General Design and Construction BMP, Water Quality BMP, and Vegetation BMP would be implemented.	N
Collin	Mammal	Swamp rabbit	<i>Sylvilagus aquaticus</i>	Inhabits poorly drained river bottoms and coastal marshes (Schmidly and Bradley, 2016). Primarily found in lowland areas near water including: cypress bogs and marshes, floodplains, creeks, and rivers (TPWD, 2021a).	Y	Flooded bottomland forests were observed within the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021.	May impact	Suitable habitat is present in the project area. General Design and Construction BMP would be implemented.	N

Prepared Date: 1/21/2022

## SPECIES ANALYSIS SUMMARY (SGCN)

Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Mammal	Tricolored bat	<i>Perimyotis subflavus</i>	Forest, woodland, and riparian areas are important. Caves are very important to this species (TPWD, 2021a).	Y	Suitable woodland habitat was observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021.	May impact	Suitable habitat is present in the project area. Bat BMP would be implemented.	N
Collin	Mammal	Western hog-nosed skunk	<i>Conepatus leuconotus</i>	Habitats include woodlands, grasslands, and deserts to 7,200 feet; most common in rugged, rocky canyon country (TPWD, 2021a).	Y	This species has been recorded from Collin County (Schmidly and Bradley, 2016) and from the project vicinity (TPWD, 2021b). Wooded areas and grasslands were observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021 and would provide habitat.	May impact	Suitable habitat is present in the project area. General Design and Construction BMP would be implemented.	N
Collin	Reptile	Eastern box turtle	<i>Terrapene carolina</i>	Eastern box turtles inhabit forests, fields, forest-brush, and forest ecotones. In some areas they move seasonally from fields in spring to forest in summer (TPWD, 2021a).	Y	Several records of this species occur in the vicinity of the project (iNaturalist, 2021). Wooded areas and grasslands observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021 would provide habitat.	May impact	Suitable habitat is present in the project area. The Terrestrial Reptile BMP and Vegetation BMP would be implemented.	N

Prepared Date: 1/21/2022



## SPECIES ANALYSIS SUMMARY (SGCN)

Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Reptile	Slender glass lizard	<i>Ophisaurus attenuatus</i>	Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil (TPWD, 2021a).	Y	Grasslands and woodlands were observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021 and may provide habitat; however, the soils may not be sandy enough.	May impact	Suitable habitat is present in the project area. The Terrestrial Reptile BMP and Vegetation BMP would be implemented.	N
Collin	Reptile	Texas garter snake	<i>Thamnophis sirtalis annectens</i>	Terrestrial and aquatic. Habitats include the grasslands and modified open areas in the vicinity of aquatic features, such as ponds, streams, or marshes. Damp soils and debris for cover are thought to be critical (TPWD, 2021a).	Y	Several records of this species occur in the vicinity of the project (iNaturalist, 2021; TPWD, 2021b). Grasslands and aquatic features such as creeks, ponds, and wetlands were observed in and near the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021 and would provide habitat.	May impact	Suitable habitat is present in the project area. The Terrestrial Reptile BMP and Vegetation BMP would be implemented.	N
Collin	Reptile	Timber (canebrake) rattlesnake	<i>Crotalus horridus</i>	Swamps, floodplains, upland pine and deciduous woodland, riparian zones, and abandoned farmland. Limestone bluffs, sandy soil, or black clay. Prefers dense ground cover – e.g., grapevines, palmetto (TPWD, 2021a).	Y	Bottomland and upland hardwood forest, riparian areas, and agricultural lands were observed in and near the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021 and would provide habitat.	May impact	Suitable habitat is present in the project area. The Terrestrial Reptile BMP and Vegetation BMP would be implemented.	N

Prepared Date: 1/21/2022

SPECIES ANALYSIS SUMMARY (SGCN)  
Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
Collin	Reptile	Western box turtle	<i>Terrapene ornata</i>	Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland (TPWD, 2021a).	Y	Pastureland, grassland, and open woodland were observed in and near the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021 and would provide habitat.	May impact	Suitable habitat is present in the project area. The Terrestrial Reptile BMP and Vegetation BMP would be implemented.	N
Collin	Plant	Sutherland hawthorn	<i>Crataegus viridis</i> var. <i>glabriuscula</i>	In mesic soils of woods or on edge of woods, treeline/fenceline, or thicket. Above/near creeks and draws, in river bottoms. Flowering Mar-Apr; fruiting May-Oct (TPWD, 2021a).	Y	Wooded areas and creeks observed in the project area during field visits by Derek Green in August 2020, June/July 2021, and September 2021.	May impact	Suitable habitat is present in the project area. Rare Plant BMP would be implemented.	N

References:

eBird. (2021). *eBird: An online database of bird distribution and abundance*. Web application. Ithaca, New York: Cornell Lab of Ornithology. Retrieved October and November 2021 from <http://www.ebird.org>

iNaturalist. (2021). *Observations*. Retrieved October and November 2021 and January 2022 from [https://www.inaturalist.org/observations?place\\_id=3024](https://www.inaturalist.org/observations?place_id=3024)

Lockwood, M.W. and B. Freeman. (2014). *The TOS handbook of Texas birds* . College Station: Texas A&M University Press.

Schmidly, D.J. and R. D. Bradley. (2016). *The mammals of Texas, 7th edition* . Austin: University of Texas Press.

Texas Parks and Wildlife Department (TPWD). (2021a). Rare, threatened, and endangered species of Texas by county. Updated October 1, 2021. Retrieved November 10, 2021, from <https://tpwd.texas.gov/gis/rtest/>

SPECIES ANALYSIS SUMMARY (SGCN)  
Project Name: US 380

County	Taxon	Common Name	Scientific Name	Habitat	Suitable Habitat Present?	Explanation for determination regarding suitable habitat	Impact Determination for SGCNs	Explanation for Impact Determination	Presence/ Absence survey conducted?
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Texas Parks and Wildlife Department (TPWD). (2021b). *Texas Natural Diversity Database (TXNDD) Rare species, shapefiles, and element of occurrence records* . Received October 12, 2021.

U.S. Fish and Wildlife Service (USFWS). (2021). *IPaC – Information, Planning, and Conservation System* . Retrieved November 11, 2021, from <http://ecos.fws.gov/ipac/>

**Appendix O-2: Species Analysis Form**



# Form Species Analysis

Project Name: **US 380 Improvement McKinney**

CSJ(s): **0135-02-065, 0135-15-002, 0135-03-053**

County(ies): **Collin**

Date Analysis Completed: **01/21/22**

Prepared by: **Derek Green**

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 9, 2019, and executed by FHWA and TxDOT.

## I. Endangered Species Act

Select the appropriate statement below based on the determinations recorded in the completed project-specific species analysis spreadsheet:

- ☒ This project does not require consultation with or authorization from the USFWS under the Endangered Species Act.
- ☐ This project requires consultation with or authorization from the USFWS under the Endangered Species Act.

For a project that requires federal authorization or approval, if the completed project-specific species analysis spreadsheet indicates, "May affect," for any species, then consultation with the USFWS is required under section 7 of the Endangered Species Act and the second checkbox above must be checked.

For more information regarding the Endangered Species Act, see **ENV's Endangered Species Act Handbook**.

## II. TPWD Coordination

Select the appropriate statement below:

- ☒ This project requires an environmental assessment (EA) or environmental impact statement (EIS), and therefore must be coordinated with TPWD under the 2021 TxDOT/TPWD MOU.
- ☐ This project is a categorical exclusion (CE)-level project; therefore coordination with TPWD under the 2021 TxDOT/TPWD MOU is not required; however, it will be coordinated with TPWD under the 2021 TxDOT/TPWD MOU at the TxDOT district's discretion.



- ☐ This project is a categorical exclusion (CE)-level project; therefore coordination with TPWD under the 2021 TxDOT/TPWD MOU is not required and it will not be coordinated with TPWD under 2021 TxDOT/TPWD MOU at the TxDOT district's discretion.

For any project that will be coordinated with TPWD, completed the **Documentation of Texas Parks and Wildlife Department Best Management Practices Form**.

For more information regarding TPWD Coordination, see **ENV's Guidance: TPWD Coordination Under the 2021 Memorandum of Understanding**.

### III. Bald and Golden Eagle Protection Act (BGEPA)

Select the appropriate statement below:

- ☒ This project is not within 660 feet of an active or inactive Bald or Golden Eagle nest. Therefore, no coordination with USFWS is required.
- ☐ This project is within 660 feet of an active or inactive Bald or Golden Eagle nest; however, construction activities within 660 feet will not occur during the nesting season, and the project will adhere to the National Bald Eagle Management Guidelines of 2007. Therefore, no coordination with USFWS is required.
- ☐ This project is within 660 feet of an active or inactive Bald or Golden Eagle nest, and construction within 660 feet will occur during the nesting season or the project will not adhere to the National Bald Eagle Management Guidelines of 2007. Therefore, coordination with USFWS to obtain a Non-Purposeful Take Permit is required.

For more information regarding BGEPA, see Section 7.0 of **ENV's Ecological Resources Handbook**.

### IV. Migratory Bird Protections

This project will comply with applicable provisions of the Migratory Bird Treaty Act (MBTA) and Texas Parks and Wildlife Code Title 5, Subtitle B, Chapter 64, Birds. It is the department's policy to avoid removal and destruction of active bird nests except through federal or state approved options. In addition, it is the department's policy to, where appropriate and practicable:

- use measures to prevent or discourage birds from building nests on man-made structures within portions of the project area planned for construction, and
- schedule construction activities outside the typical nesting season.

For more information regarding migratory bird protections, see **ENV's Guidance: Avoiding Migratory Birds and Handling Potential Violations** and Section 3.0 of **ENV's Ecological Resources Handbook**.

### V. Resources Consulted

Indicate which resources were consulted/actions were taken to make the species analysis determinations recorded in this form (DO NOT ATTACH TO THIS FORM OR UPLOAD TO ECOS ANY RESOURCES CONSULTED – JUST CHECK THE APPROPRIATE BOX(ES)):

- ☒ Aerial Photography    ☒ Topographic Map    ☒ Natural Diversity Database (NDD)



## Species Analysis Form

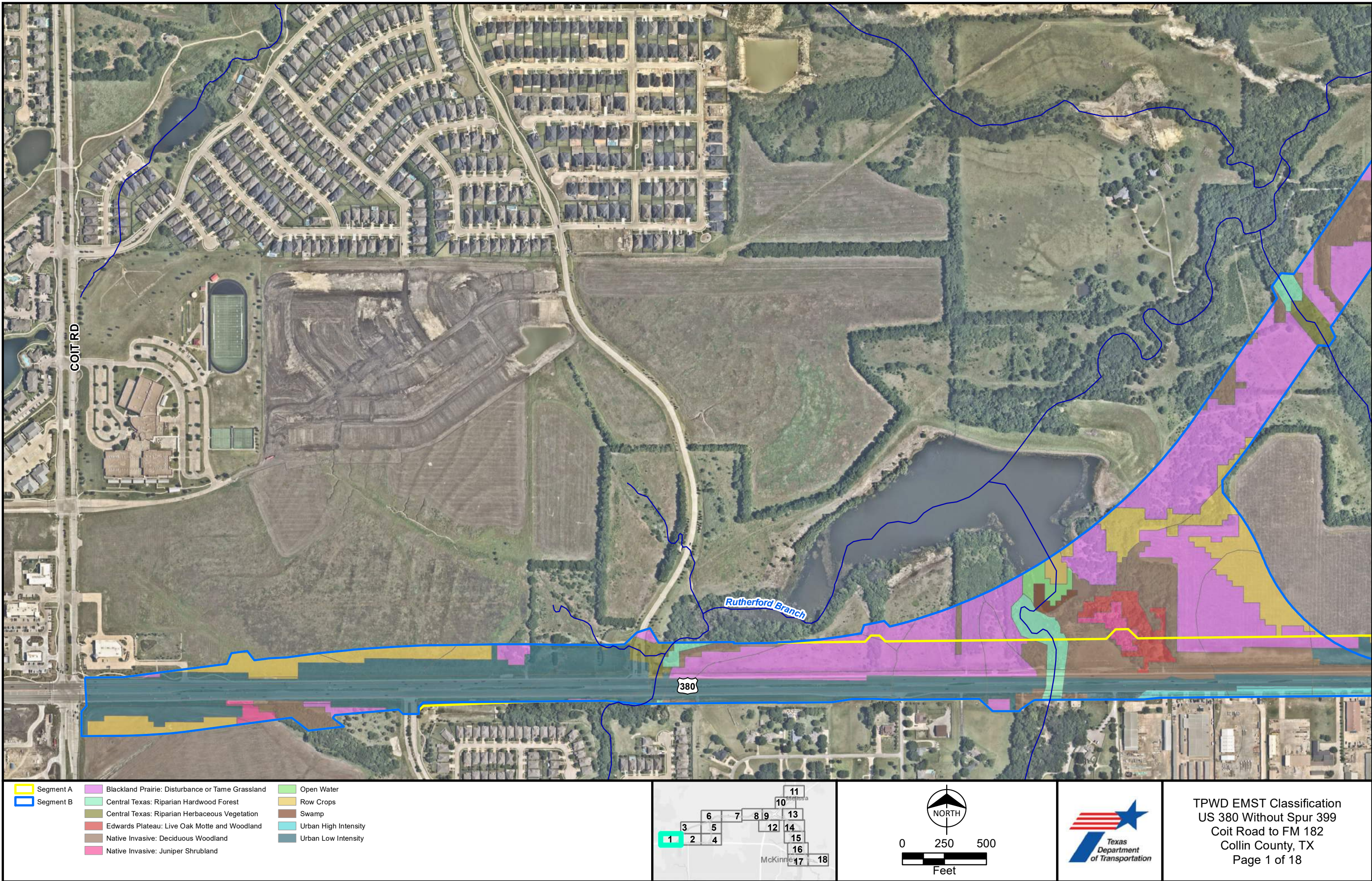
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- ☐ Karst Zone Maps      ☒ Ecological Mapping System of Texas (EMST)  
☒ Site Visit      ☒ Species Expert Consulted      ☒ Species Habitat or Presence/absence Survey  
☐ Other: \_\_\_\_\_

**Appendix O-3: EMST Mapping and Comparison Table (October 2022)**

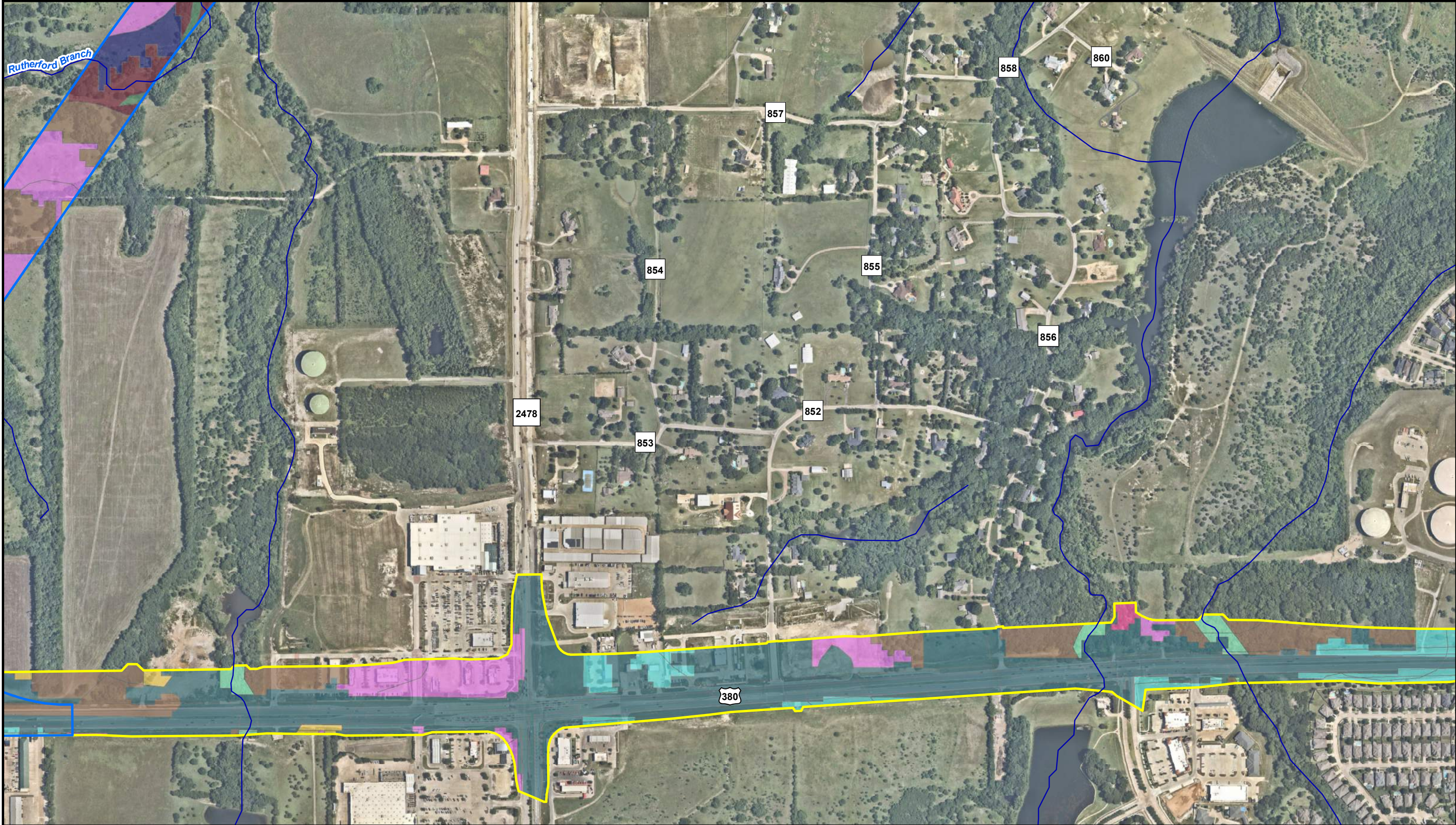


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Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

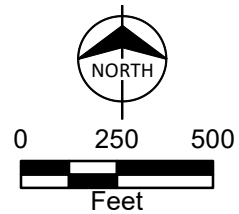
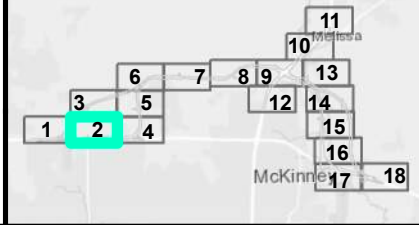




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Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



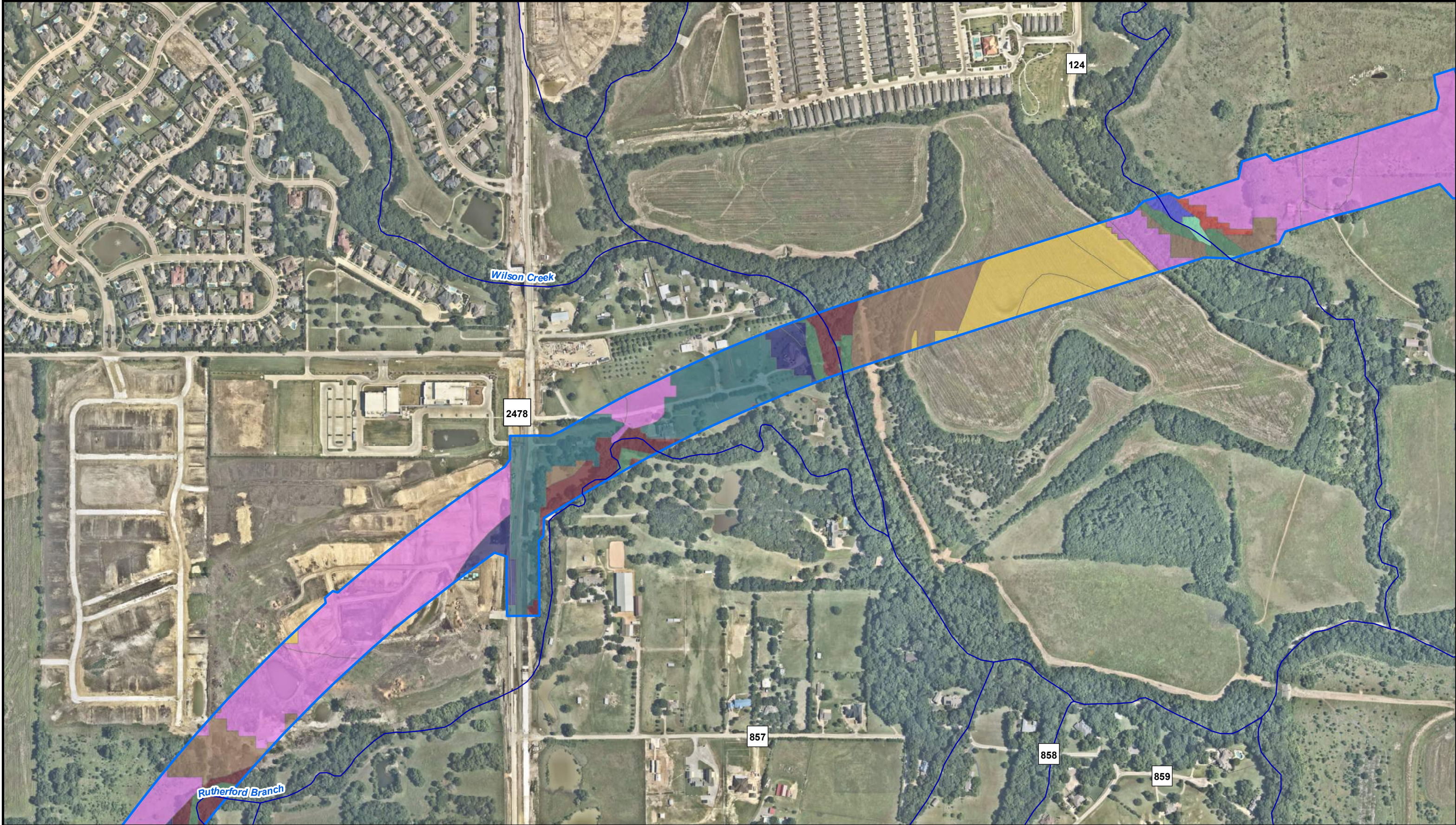
- |           |  |                                     |
|-----------|--|-------------------------------------|
| Segment A | Blackland Prairie: Disturbance or Tame Grassland | Native Invasive: Deciduous Woodland |
| Segment B | Central Texas: Floodplain Hardwood Forest        | Native Invasive: Juniper Shrubland  |
|           | Central Texas: Floodplain Herbaceous Vegetation  | Row Crops                           |
|           | Central Texas: Riparian Hardwood Forest          | Urban High Intensity                |
|           | Edwards Plateau: Oak / Hardwood Slope Forest     | Urban Low Intensity                 |



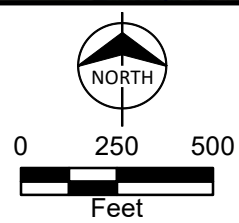
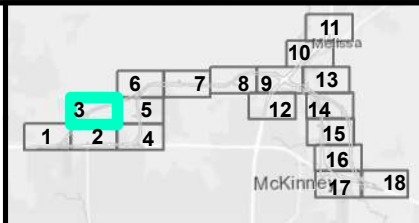
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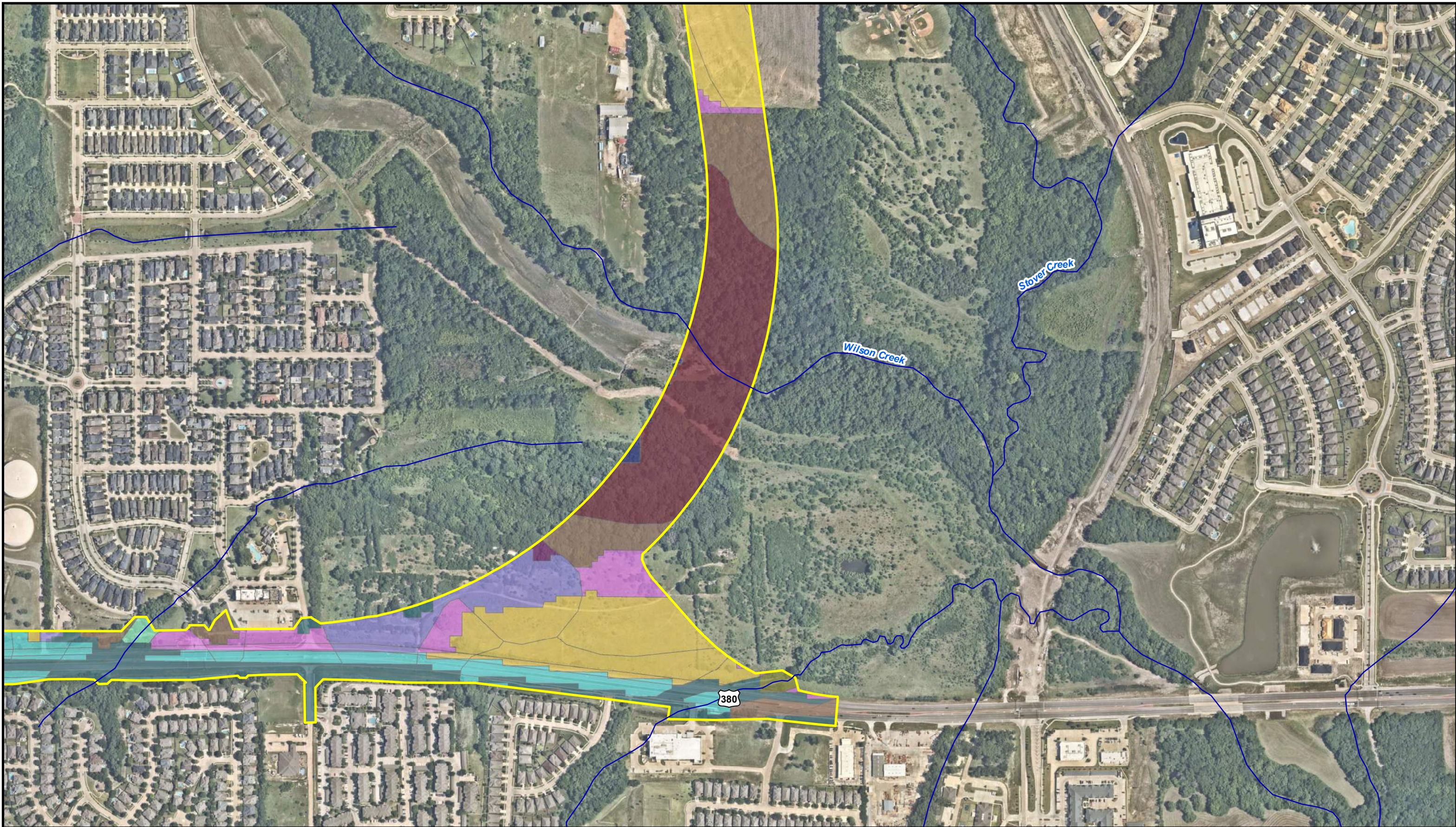


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|---|--|--|
| Segment B                                       | Blackland Prairie: Disturbance or Tame Grassland | Edwards Plateau: Live Oak Motte and Woodland |
| Central Texas: Floodplain Hardwood Forest       | Edwards Plateau: Oak / Hardwood Slope Forest     |  |
| Central Texas: Floodplain Herbaceous Vegetation | Native Invasive: Deciduous Woodland              |  |
| Central Texas: Riparian Hardwood Forest         | Row Crops  |  |
| Central Texas: Riparian Live Oak Forest         | Urban Low Intensity                              |  |

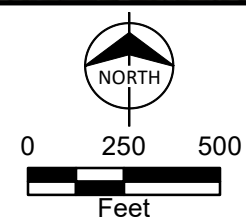
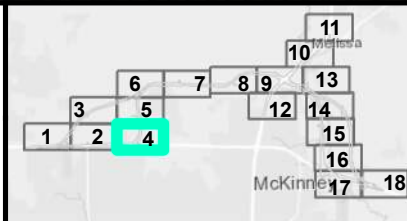


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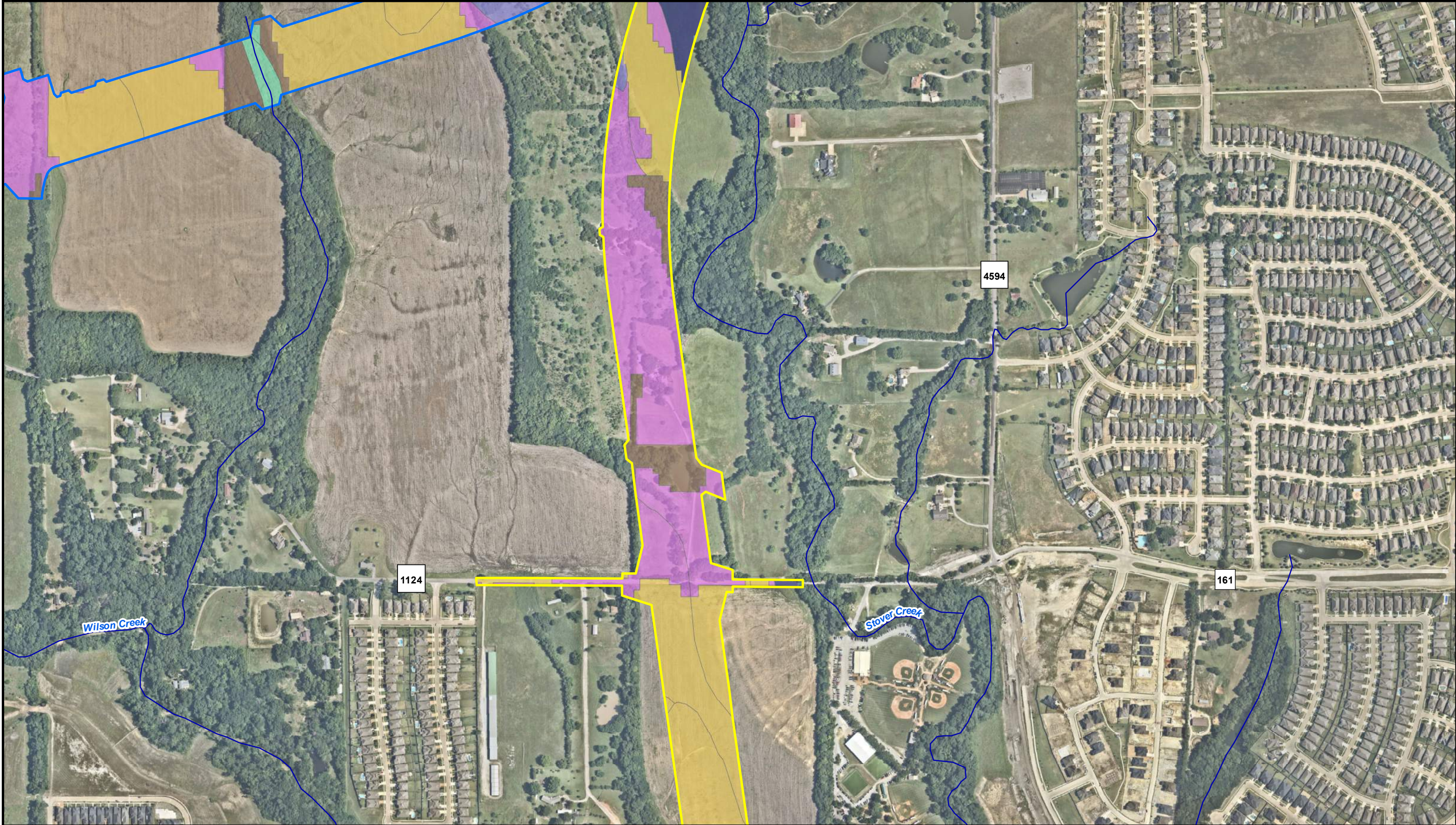


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|-----------|--|-------------------------------------|
| Segment A | Blackland Prairie: Disturbance or Tame Grassland   | Edwards Plateau: Savanna Grassland  |
|           | Central Texas: Floodplain Hardwood Forest          | Native Invasive: Deciduous Woodland |
|           | Central Texas: Floodplain Herbaceous Vegetation    | Row Crops                           |
|           | Central Texas: Riparian Hardwood Forest            | Urban High Intensity                |
|           | Central Texas: Riparian Herbaceous Vegetation      | Urban Low Intensity                 |
|           | Edwards Plateau: Oak / Hardwood Motte and Woodland |                                     |

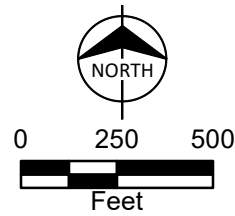
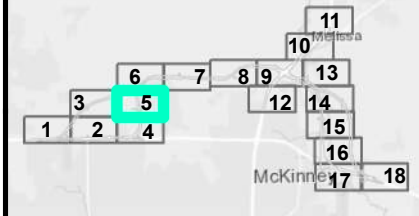


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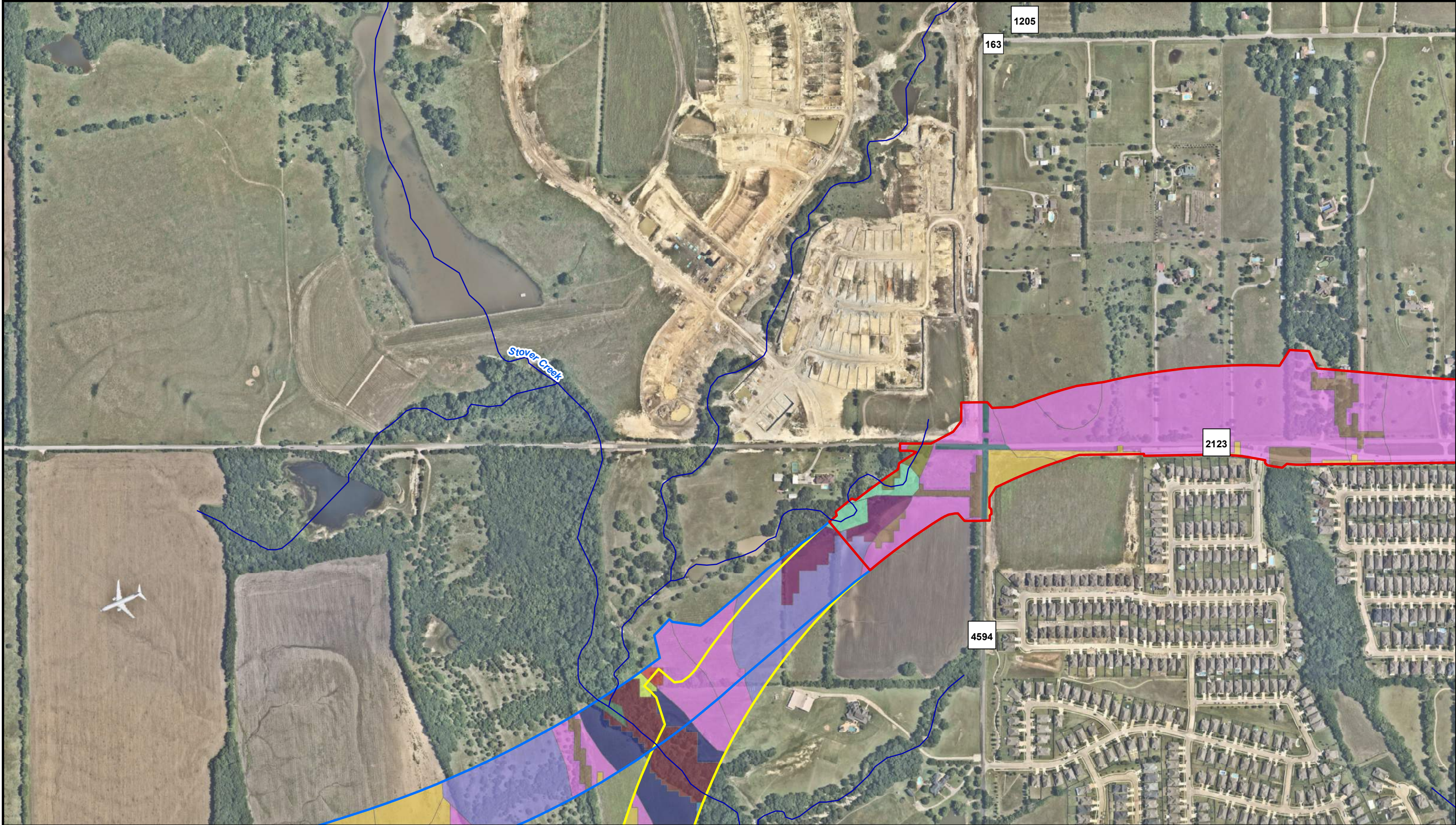


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|-----------|---|-------------------------------------|
| Segment A | Blackland Prairie: Disturbance or Tame Grassland      | Edwards Plateau: Savanna Grassland  |
| Segment B | Central Texas: Floodplain Hardwood / Evergreen Forest | Native Invasive: Deciduous Woodland |
|           | Central Texas: Floodplain Herbaceous Vegetation       | Row Crops                           |
|           | Central Texas: Riparian Hardwood Forest               | Urban Low Intensity                 |

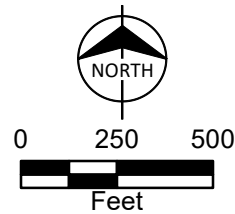
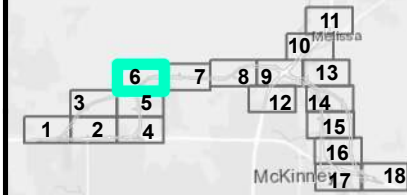


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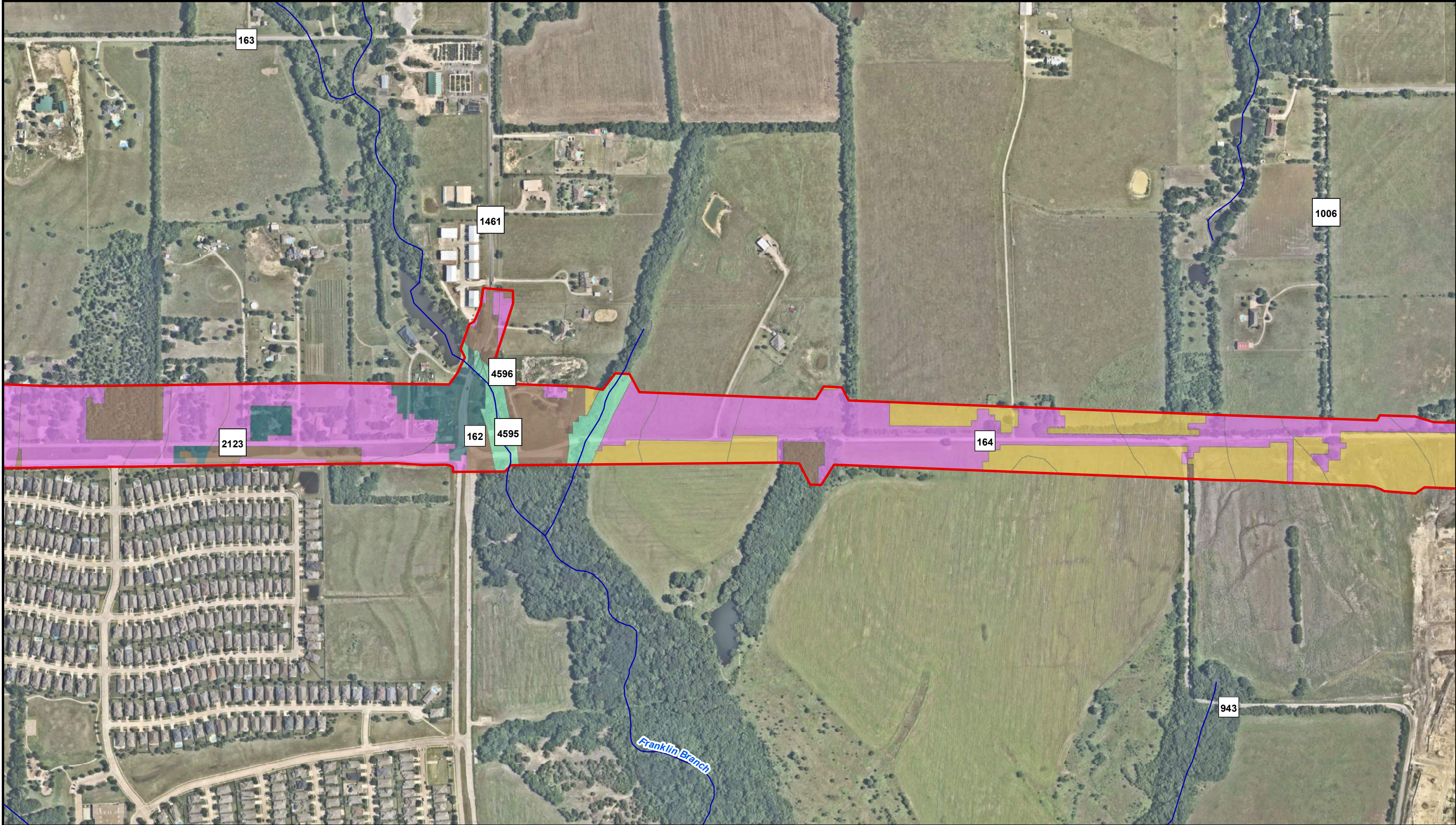
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| Segment A | Blackland Prairie: Disturbance or Tame Grassland      | Edwards Plateau: Live Oak Motte and Woodland       |
| Segment B | Central Texas: Floodplain Hardwood / Evergreen Forest | Edwards Plateau: Oak / Hardwood Motte and Woodland |
| Segment E | Central Texas: Floodplain Hardwood Forest             | Edwards Plateau: Oak / Hardwood Slope Forest       |
|           | Central Texas: Floodplain Herbaceous Vegetation       | Edwards Plateau: Savanna Grassland                 |
|           | Central Texas: Floodplain Live Oak Forest             | Native Invasive: Deciduous Woodland                |
|           | Central Texas: Riparian Hardwood Forest               | Row Crops  |
|           | Central Texas: Riparian Herbaceous Vegetation         | Urban Low Intensity                                |



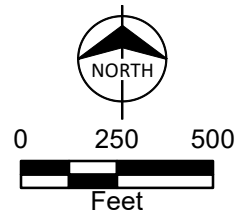
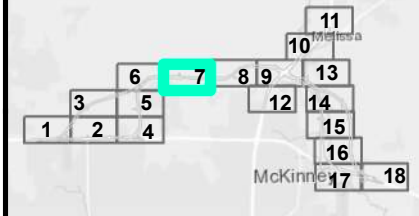
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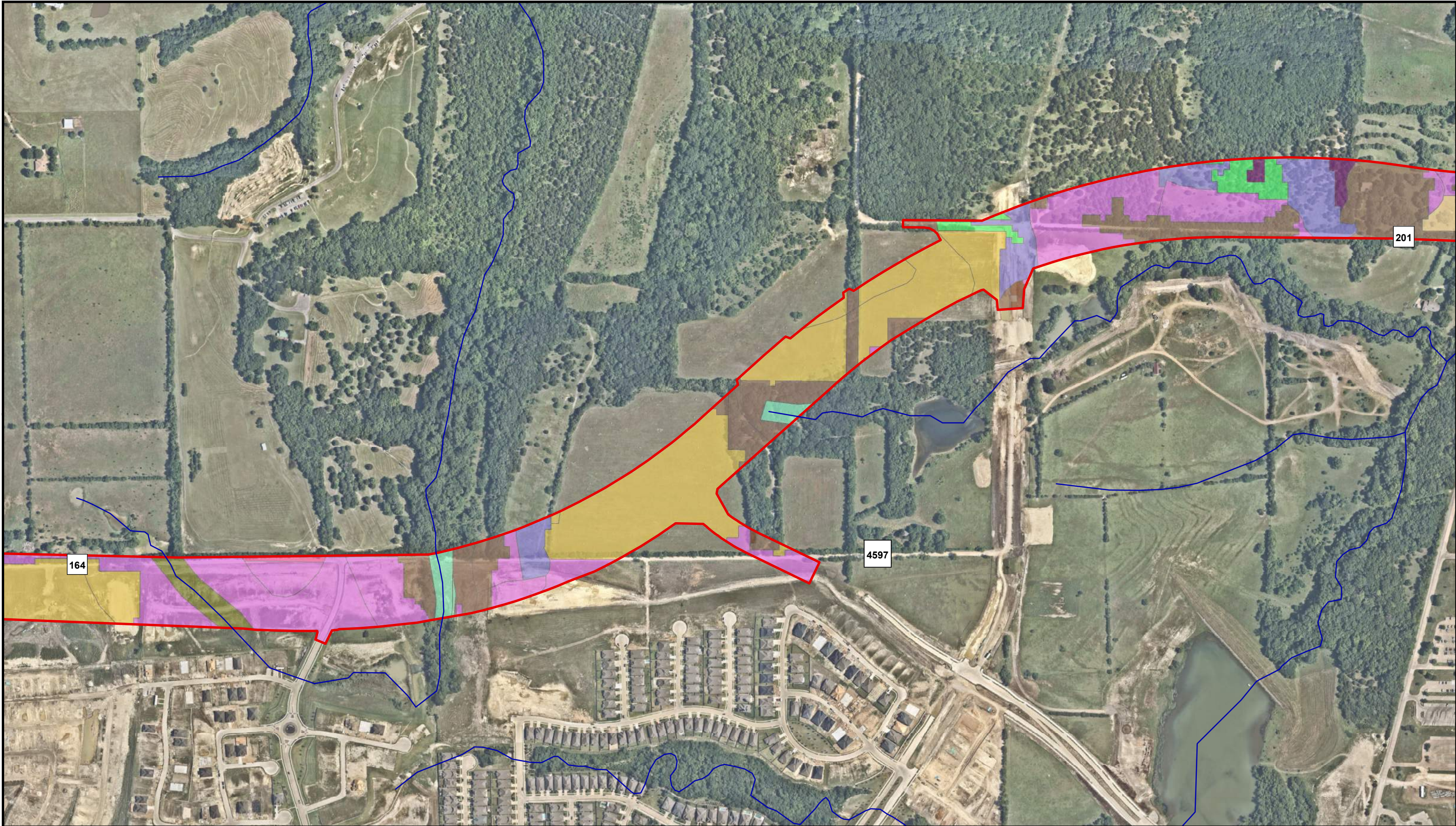
- Segment E
- Blackland Prairie: Disturbance or Tame Grassland
- Row Crops
- Central Texas: Riparian Hardwood Forest
- Urban Low Intensity
- Native Invasive: Deciduous Woodland





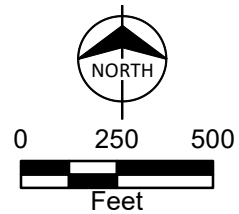
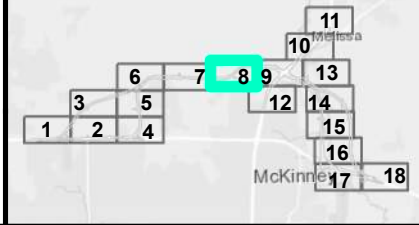
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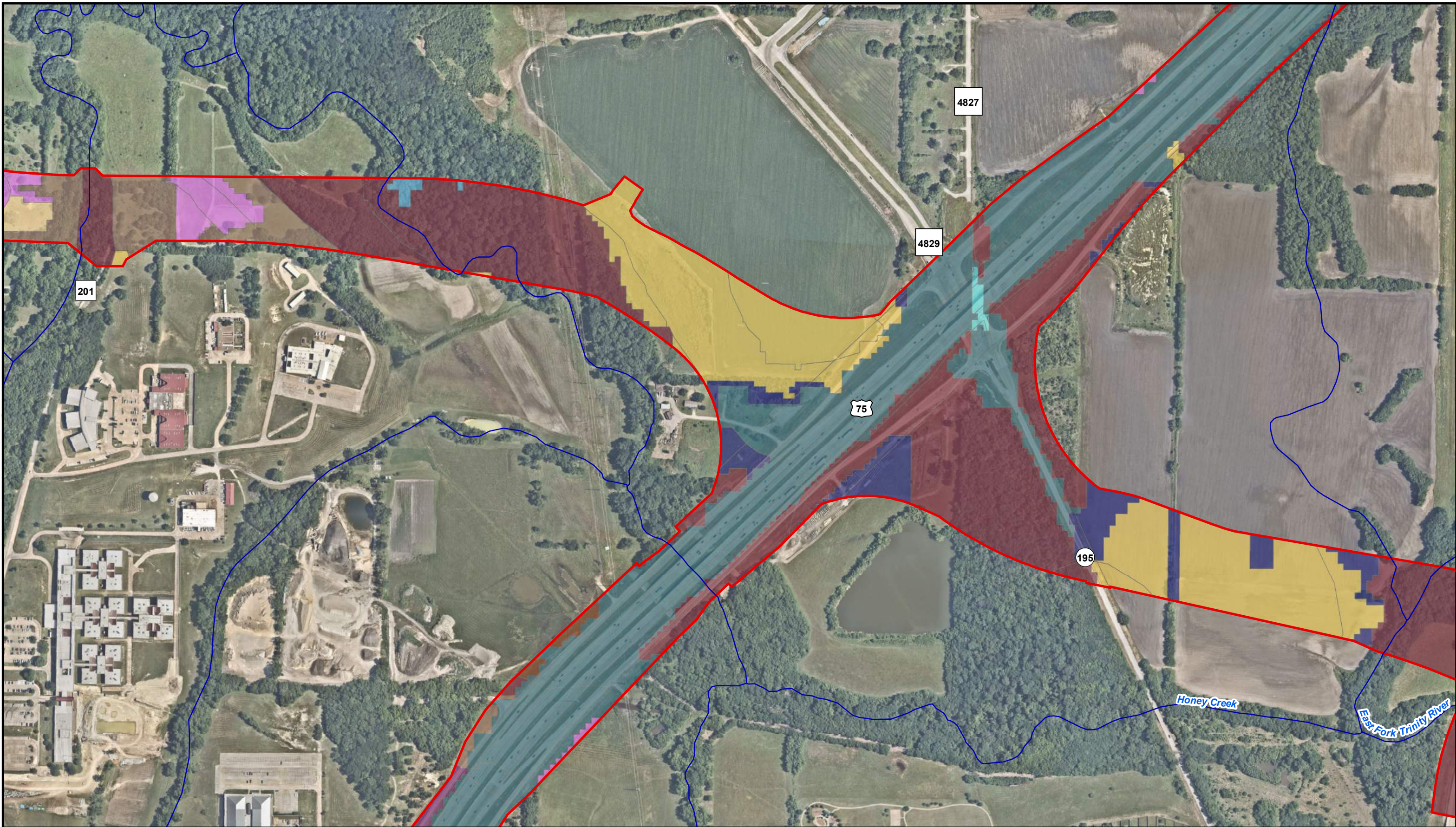
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|---|--|---|
|  Segment E   |  Blackland Prairie: Disturbance or Tame Grassland |  Native Invasive: Deciduous Woodland |
|  Central Texas: Riparian Hardwood Forest                       |  Native Invasive: Juniper Shrubland               |   |
|  Central Texas: Riparian Herbaceous Vegetation                 |  Native Invasive: Mesquite Shrubland              |   |
|  Edwards Plateau: Deciduous Oak / Evergreen Motte and Woodland |  Row Crops  |   |
|  Edwards Plateau: Oak / Hardwood Motte and Woodland            |  Swamp  |   |
|  Edwards Plateau: Savanna Grassland                            |  |   |



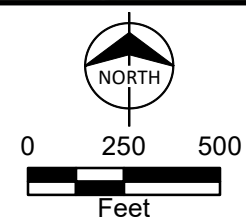
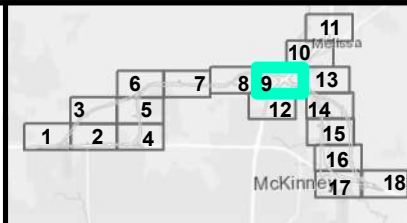
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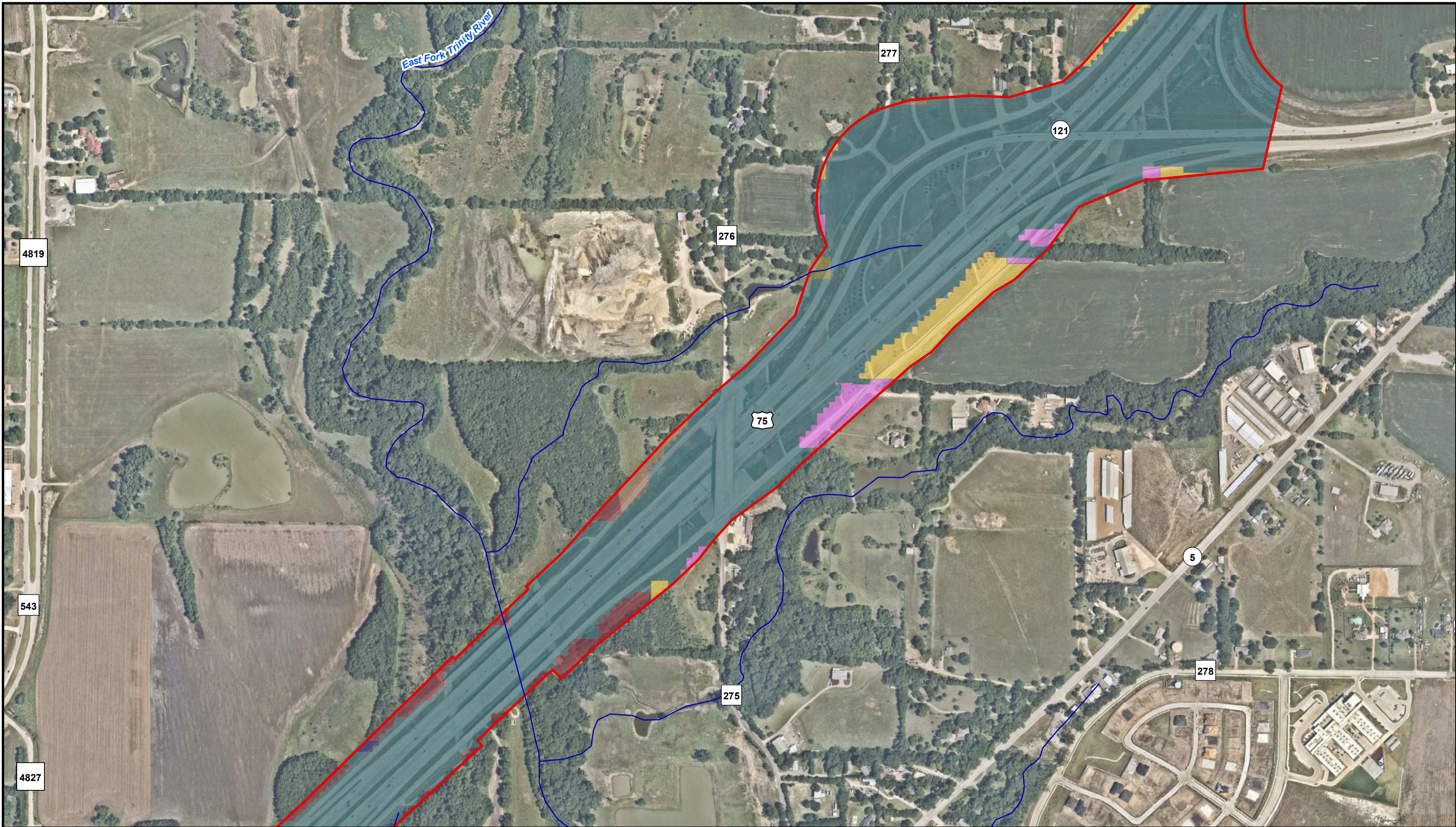
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|---|--|-------------------------------------|
| Segment E   | Blackland Prairie: Disturbance or Tame Grassland | Native Invasive: Mesquite Shrubland |
| Central Texas: Floodplain Hardwood / Evergreen Forest | Row Crops  |                                     |
| Central Texas: Floodplain Hardwood Forest             | Swamp  |                                     |
| Central Texas: Floodplain Herbaceous Vegetation       | Urban High Intensity                             |                                     |
| Edwards Plateau: Oak / Hardwood Motte and Woodland    | Urban Low Intensity                              |                                     |
| Native Invasive: Deciduous Woodland                   |  |                                     |











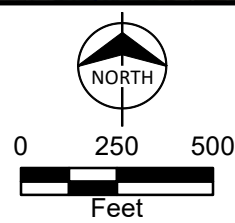
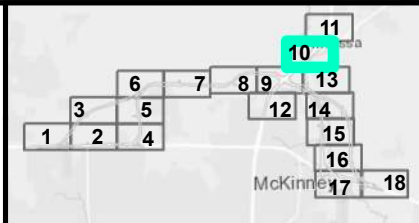
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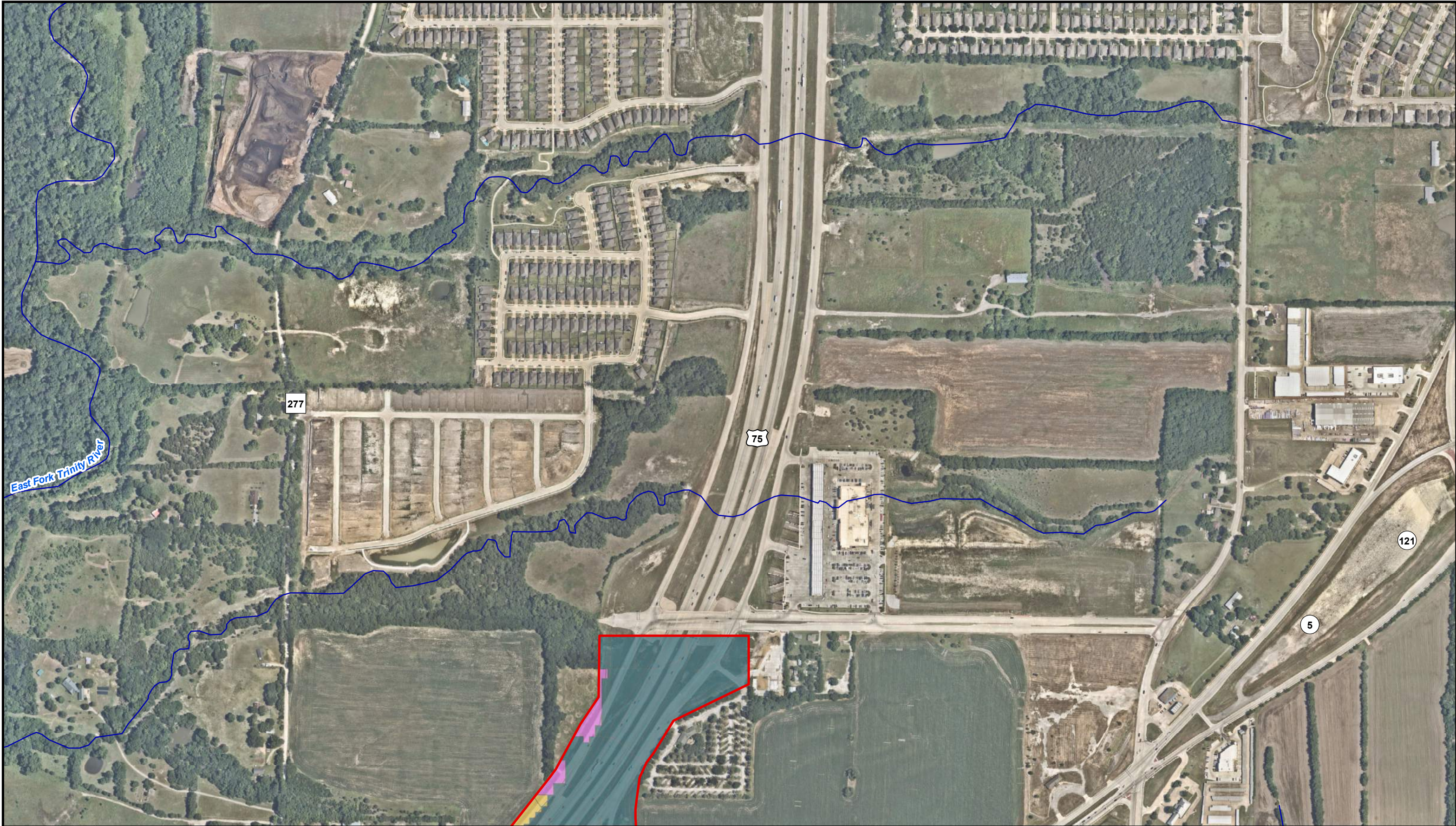
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|  Segment E |  Blackland Prairie: Disturbance or Tame Grassland |  Native Invasive: Deciduous Woodland |
|   |  Central Texas: Floodplain Hardwood Forest        |  Row Crops                           |
|   |  Central Texas: Floodplain Herbaceous Vegetation  |  Urban Low Intensity                 |
|   |  Central Texas: Riparian Herbaceous Vegetation    |   |







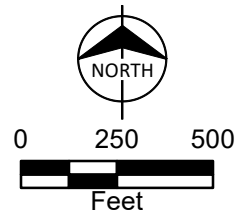
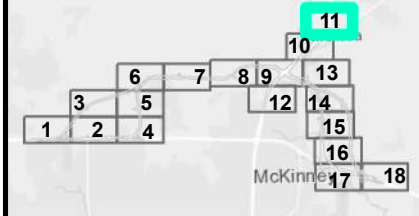
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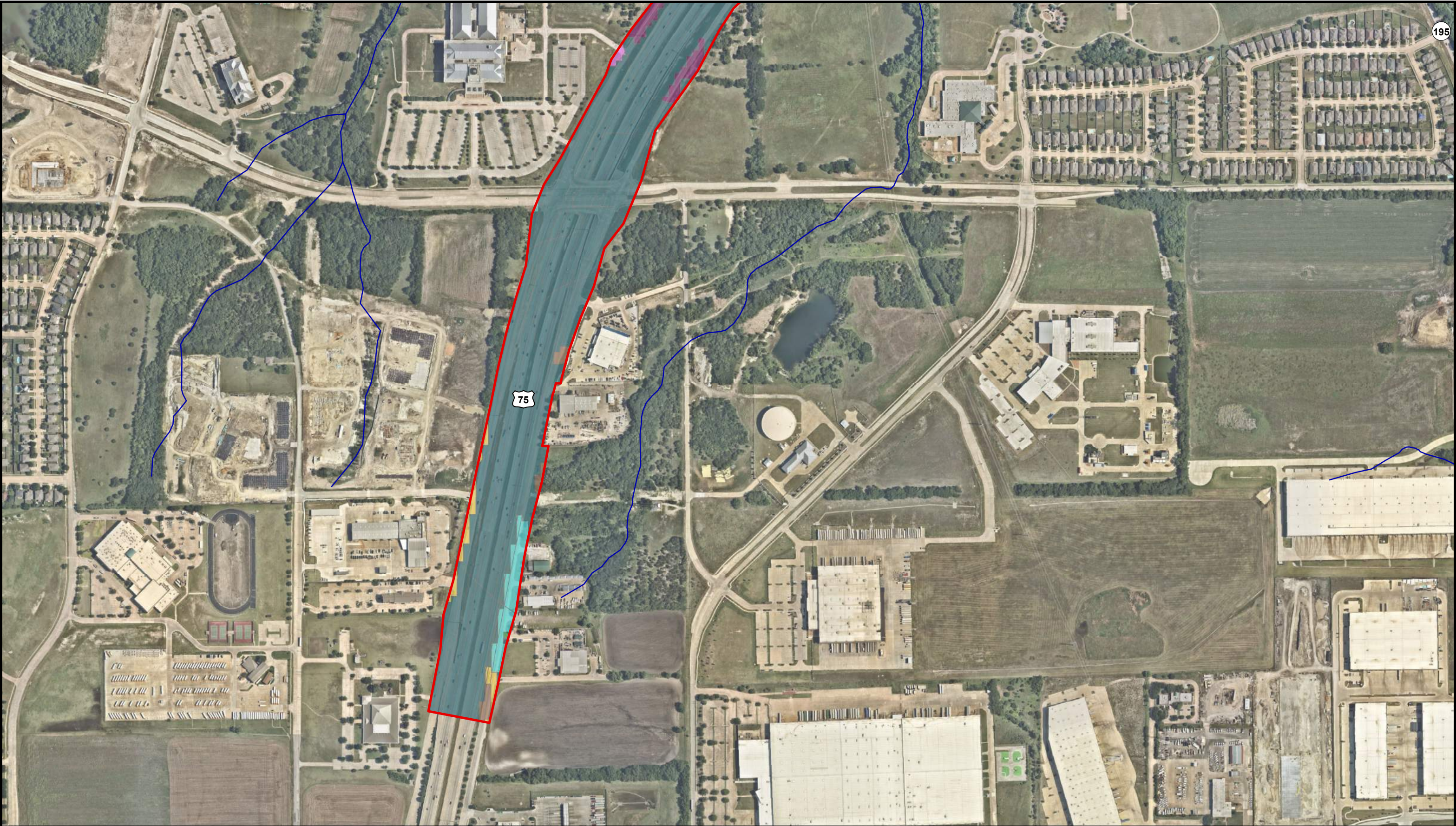
-  Segment E
-  Blackland Prairie: Disturbance or Tame Grassland
-  Urban Low Intensity
-  Row Crops












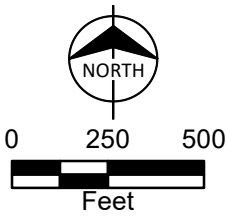
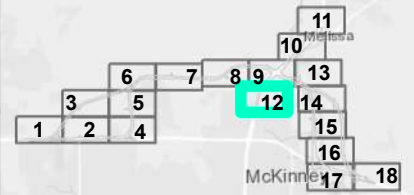
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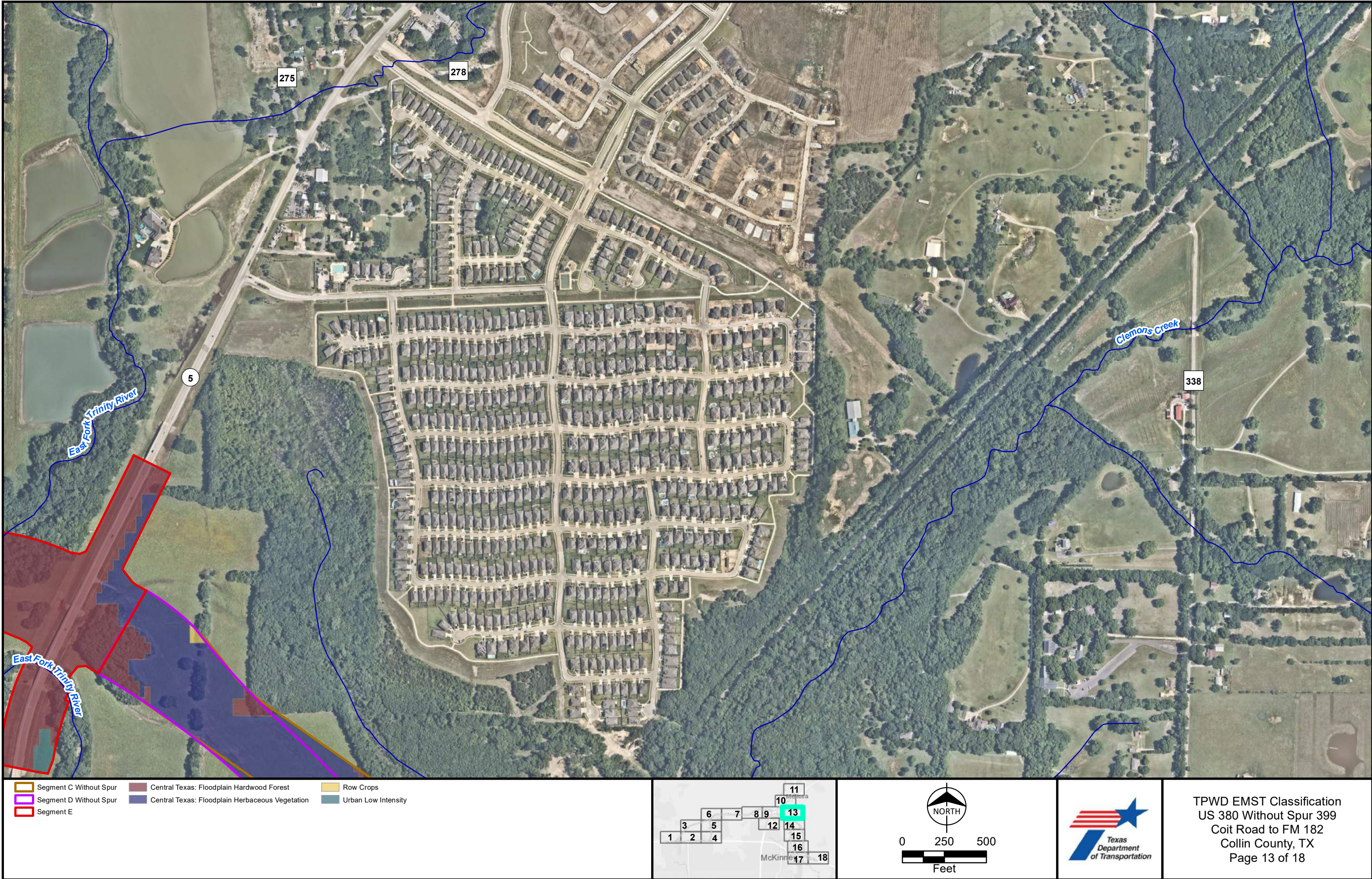
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|  Segment E |  Barren   |  Native Invasive: Deciduous Woodland |
|   |  Blackland Prairie: Disturbance or Tame Grassland   |  Row Crops                           |
|   |  Edwards Plateau: Oak / Hardwood Motte and Woodland |  Urban High Intensity                |
|   |  Edwards Plateau: Savanna Grassland                 |  Urban Low Intensity                 |



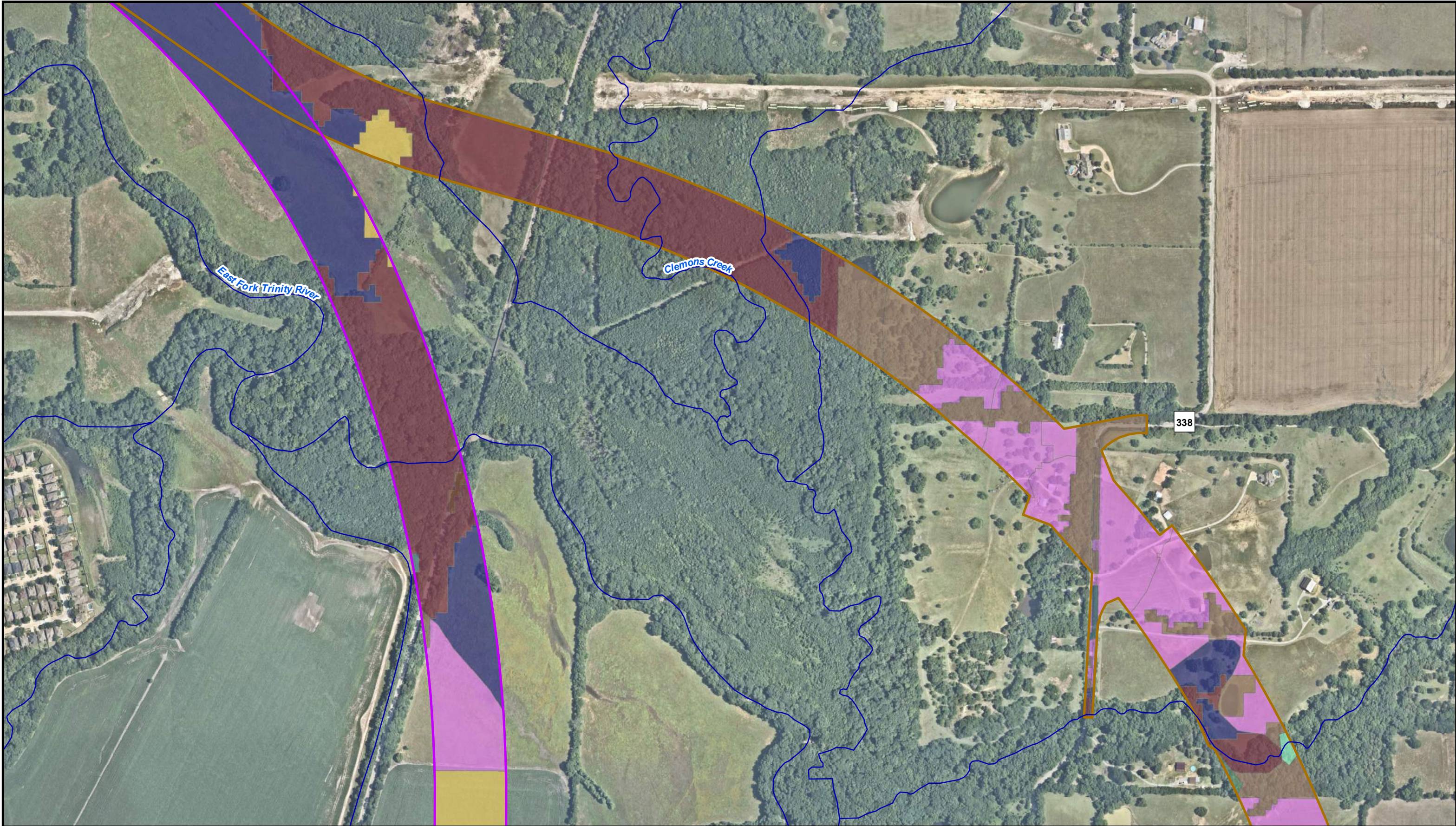
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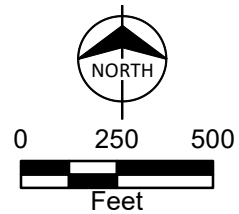
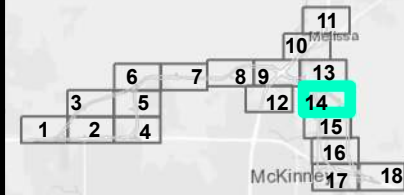
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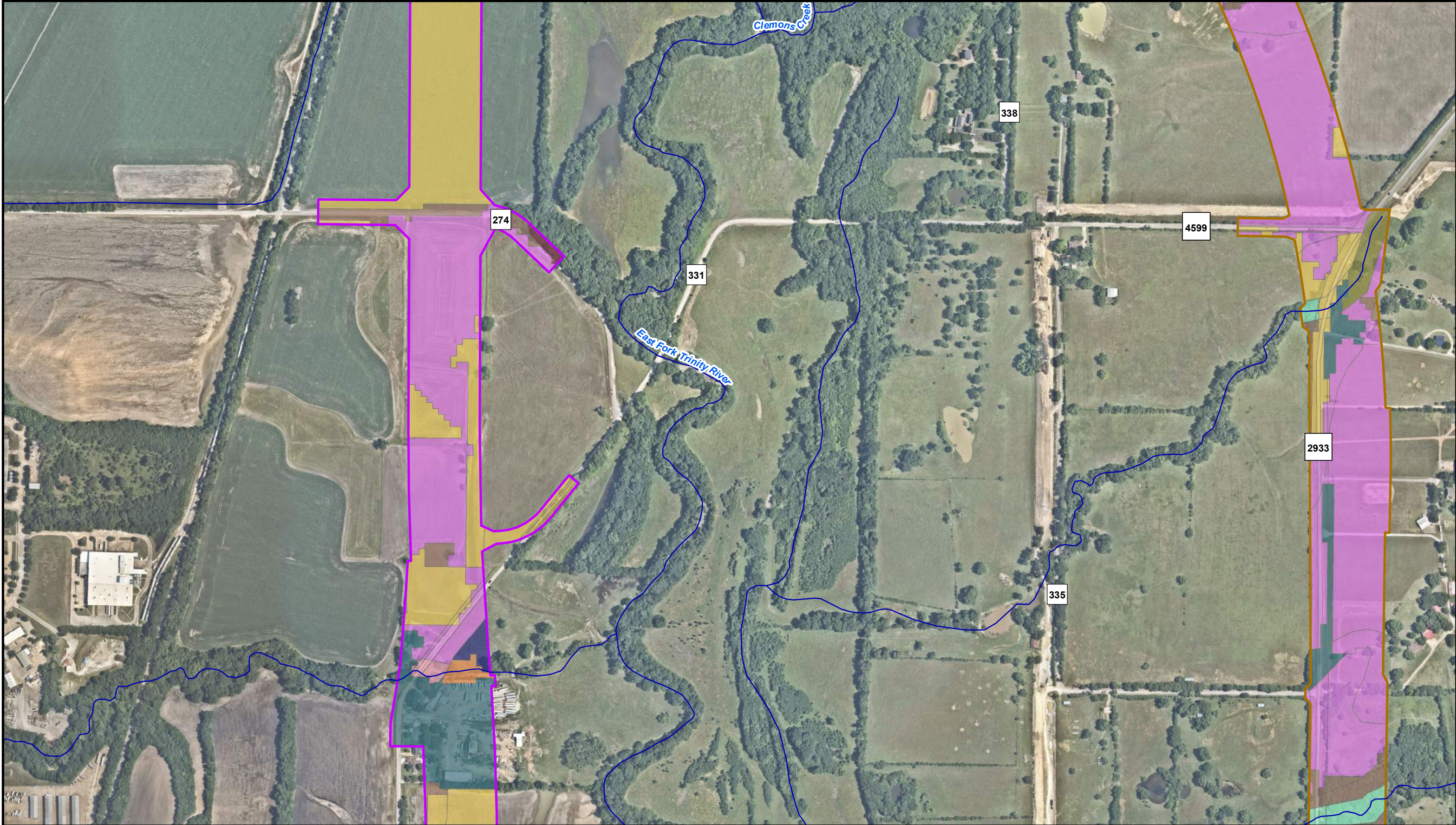
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|------------------------|--|-------------------------------------|
| Segment C Without Spur | Blackland Prairie: Disturbance or Tame Grassland | Native Invasive: Deciduous Woodland |
| Segment D Without Spur | Central Texas: Floodplain Hardwood Forest        | Row Crops                           |
|                        | Central Texas: Floodplain Herbaceous Vegetation  | Swamp                               |
|                        | Central Texas: Riparian Hardwood Forest          | Urban Low Intensity                 |
|                        | Edwards Plateau: Oak / Hardwood Slope Forest     |                                     |



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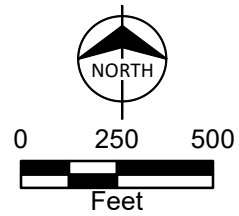
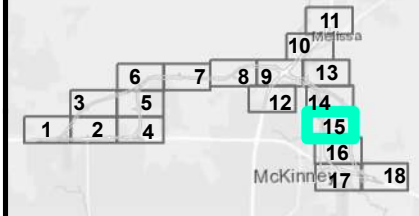
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- Segment C Without Spur
- Segment D Without Spur

- Blackland Prairie: Disturbance or Tame Grassland
- Central Texas: Floodplain Evergreen Shrubland
- Central Texas: Floodplain Hardwood Forest
- Central Texas: Floodplain Herbaceous Vegetation
- Central Texas: Riparian Evergreen Shrubland

- Central Texas: Riparian Hardwood Forest
- Central Texas: Riparian Herbaceous Vegetation
- Native Invasive: Deciduous Woodland
- Row Crops
- Urban Low Intensity
















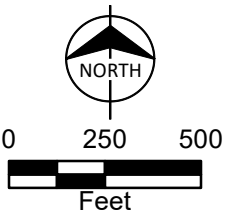
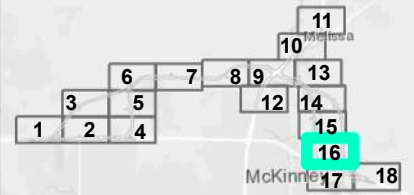
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|--|---|--|
|  Segment C Without Spur |  Blackland Prairie: Disturbance or Tame Grassland      |  Open Water           |
|  Segment D Without Spur |  Central Texas: Floodplain Hardwood / Evergreen Forest |  Row Crops            |
|  |  Central Texas: Floodplain Hardwood Forest             |  Swamp                |
|  |  Central Texas: Floodplain Herbaceous Vegetation       |  Urban High Intensity |
|  |  Central Texas: Riparian Hardwood Forest               |  Urban Low Intensity  |
|  |  Native Invasive: Deciduous Woodland                   |  |



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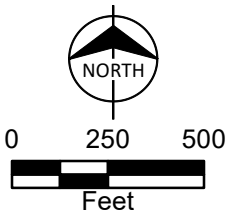
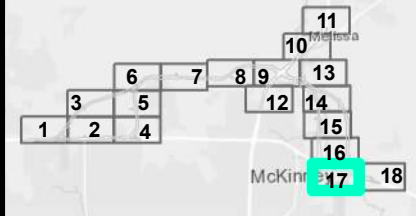
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- Segment C Without Spur
- Segment D Without Spur

- Blackland Prairie: Disturbance or Tame Grassland
- Central Texas: Floodplain Hardwood / Evergreen Forest
- Central Texas: Floodplain Hardwood Forest
- Central Texas: Floodplain Herbaceous Vegetation
- Central Texas: Riparian Hardwood Forest

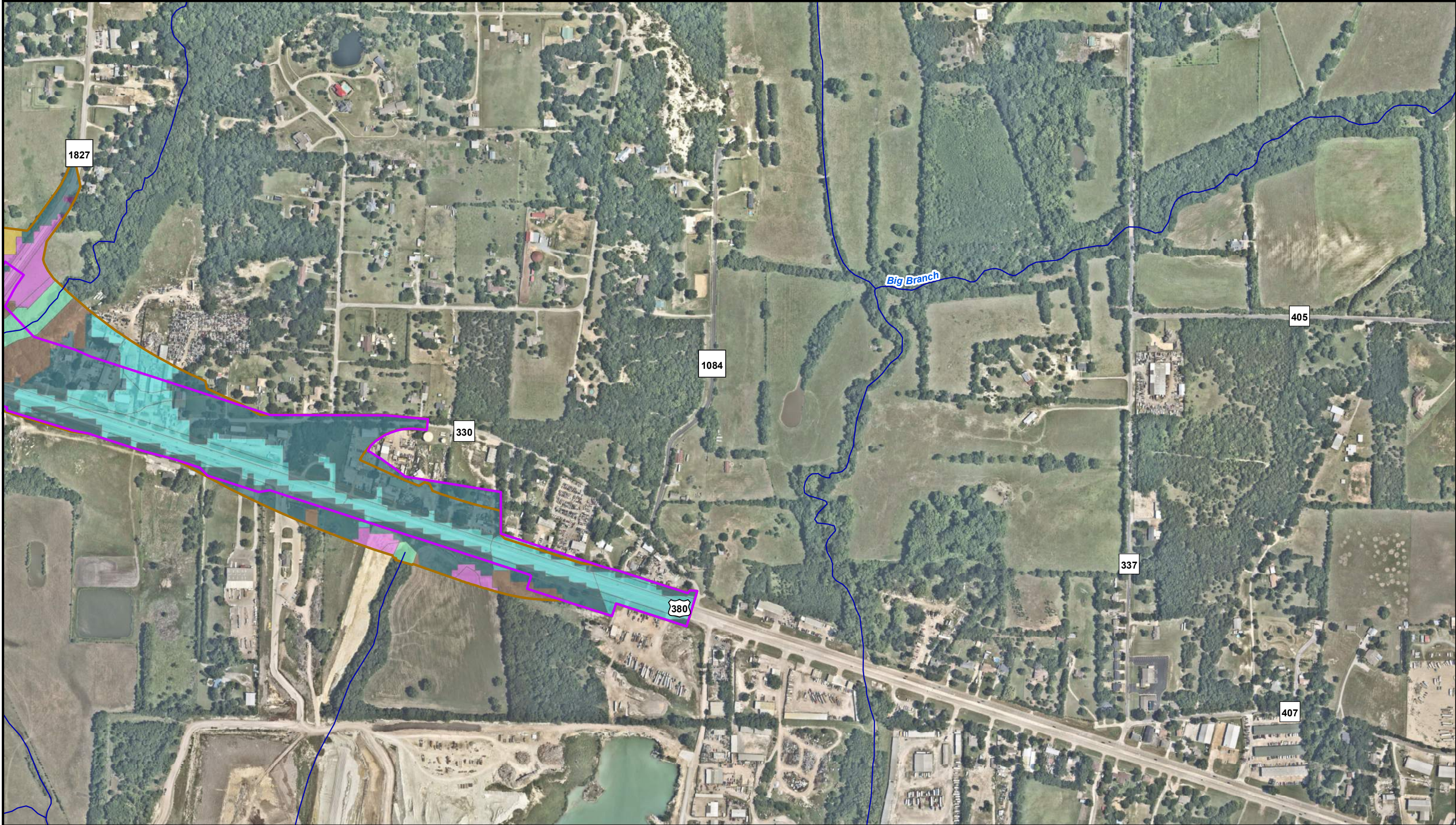
- Central Texas: Riparian Herbaceous Vegetation
- Native Invasive: Deciduous Woodland
- Row Crops
- Urban High Intensity
- Urban Low Intensity












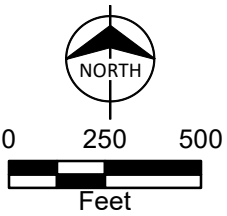
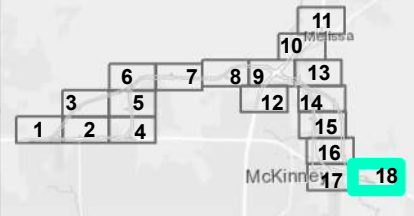
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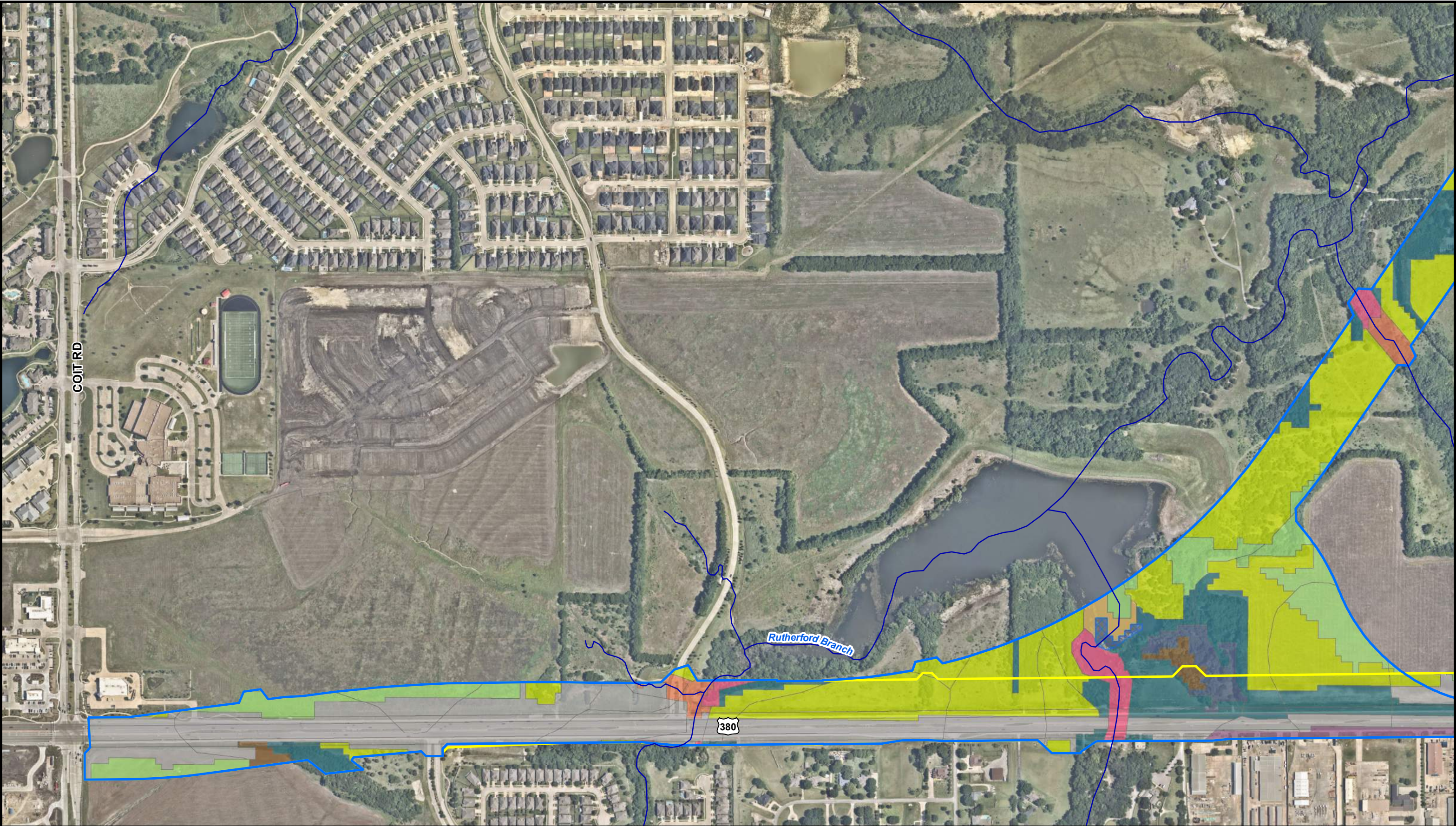















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|  Segment C Without Spur |  Blackland Prairie: Disturbance or Tame Grassland   |  Row Crops            |
|  Segment D Without Spur |  Central Texas: Riparian Hardwood Forest            |  Urban High Intensity |
|  |  Edwards Plateau: Oak / Hardwood Motte and Woodland |  Urban Low Intensity  |
|  |  Native Invasive: Deciduous Woodland                |  |

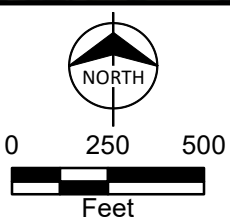
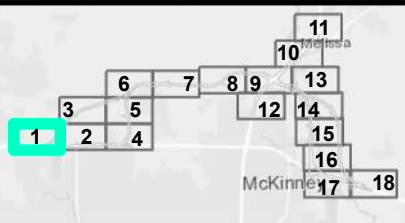


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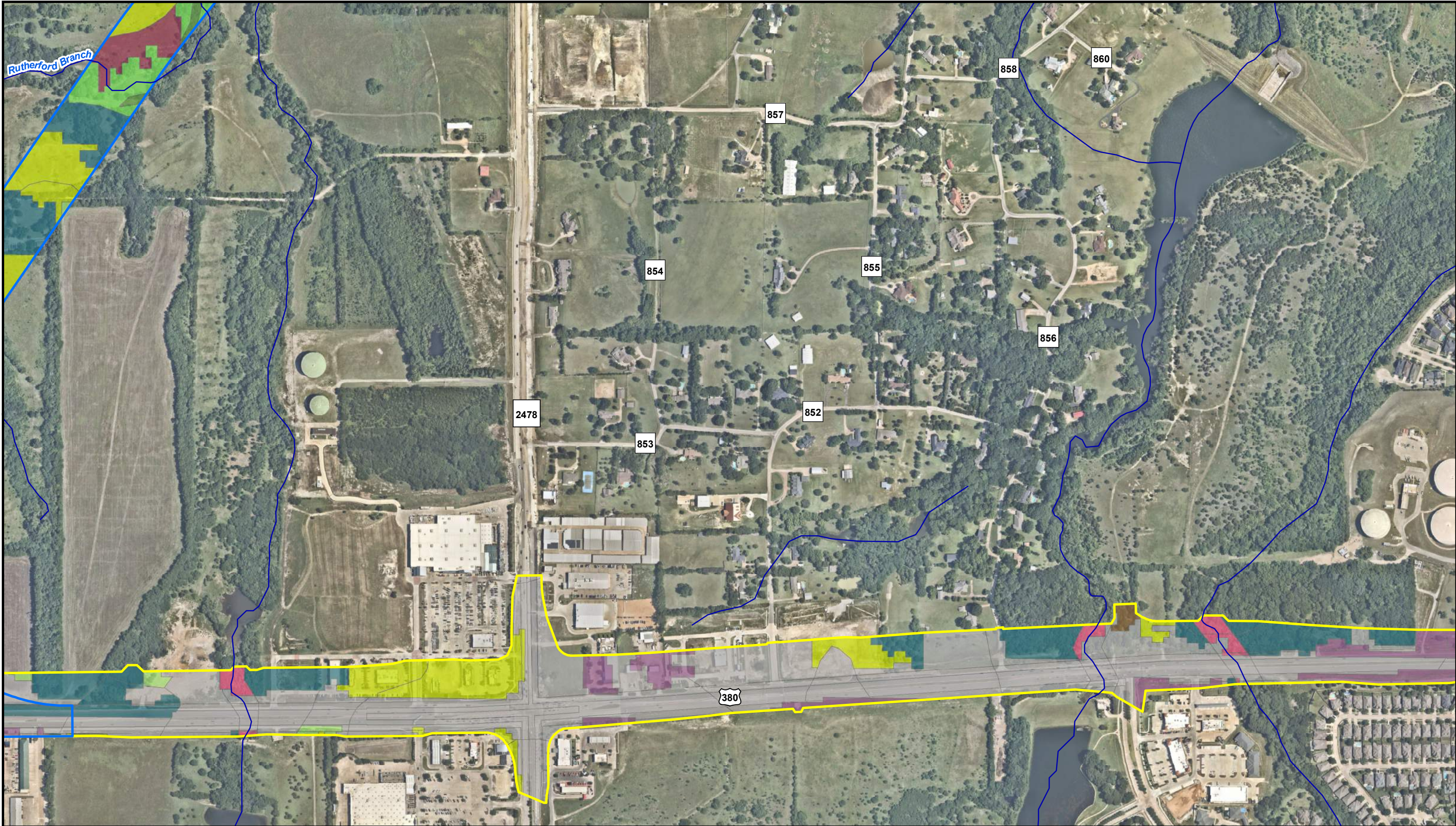
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|---|--|--|
|  Segment A |  Blackland Prairie: Disturbance or Tame Grassland |  Open Water           |
|  Segment B |  Central Texas: Riparian Hardwood Forest          |  Row Crops            |
|   |  Central Texas: Riparian Herbaceous Vegetation    |  Swamp                |
|   |  Edwards Plateau: Live Oak Motte and Woodland     |  Urban High Intensity |
|   |  Native Invasive: Deciduous Woodland              |  Urban Low Intensity  |
|   |  Native Invasive: Juniper Shrubland               |  |



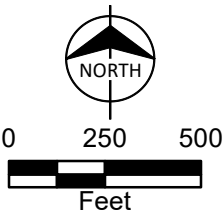
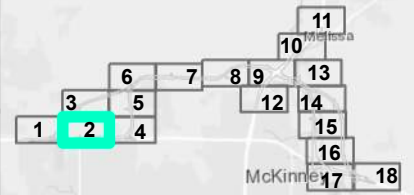
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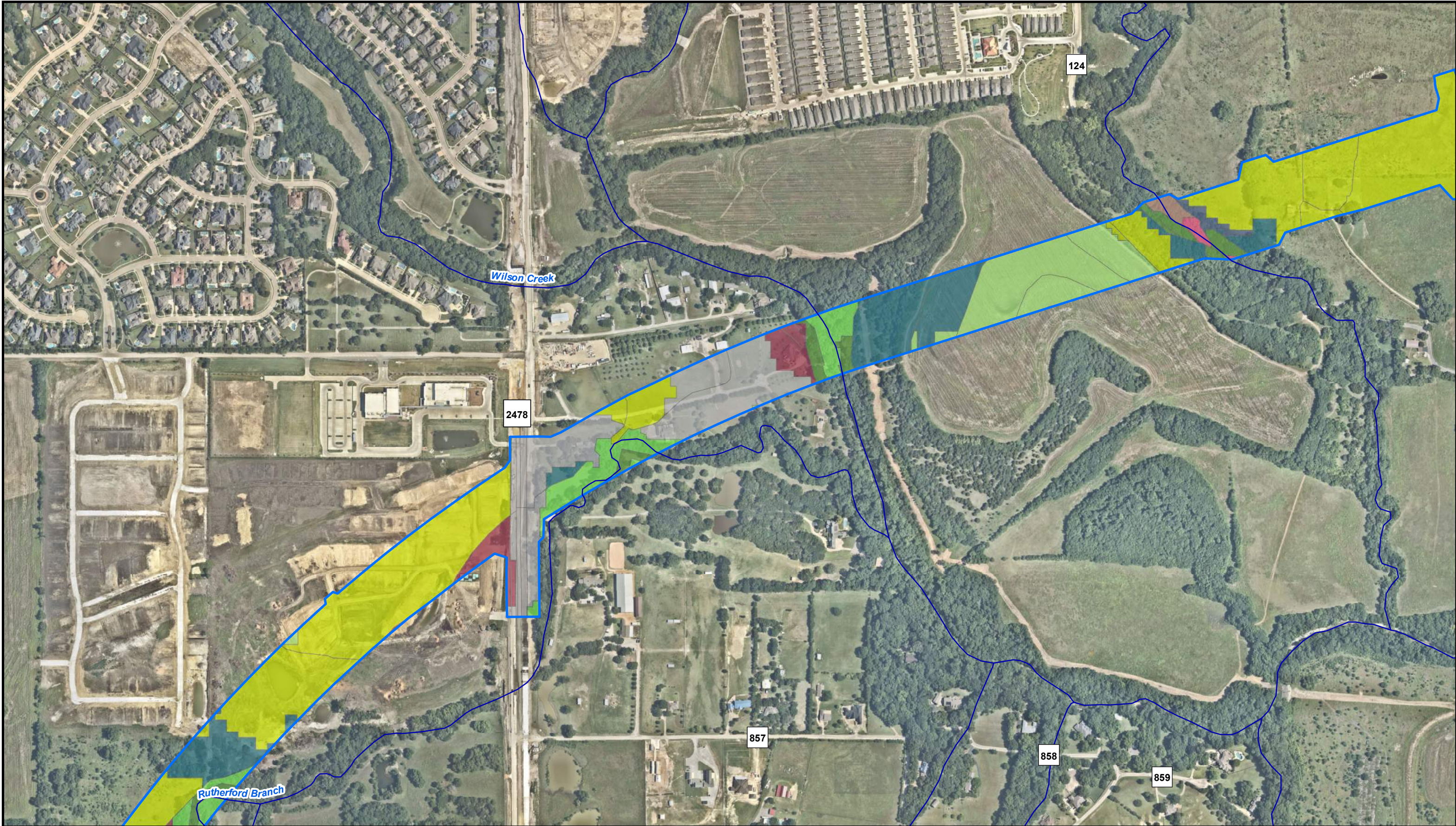
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| Segment A | Blackland Prairie: Disturbance or Tame Grassland | Native Invasive: Deciduous Woodland |
| Segment B | Central Texas: Floodplain Hardwood Forest        | Native Invasive: Juniper Shrubland  |
|           | Central Texas: Floodplain Herbaceous Vegetation  | Row Crops                           |
|           | Central Texas: Riparian Hardwood Forest          | Urban High Intensity                |
|           | Edwards Plateau: Oak / Hardwood Slope Forest     | Urban Low Intensity                 |



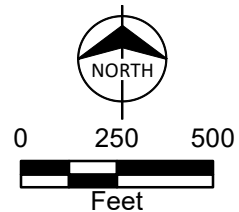
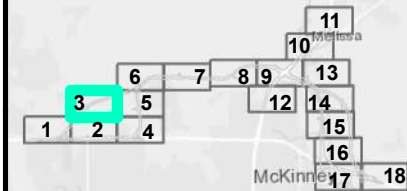
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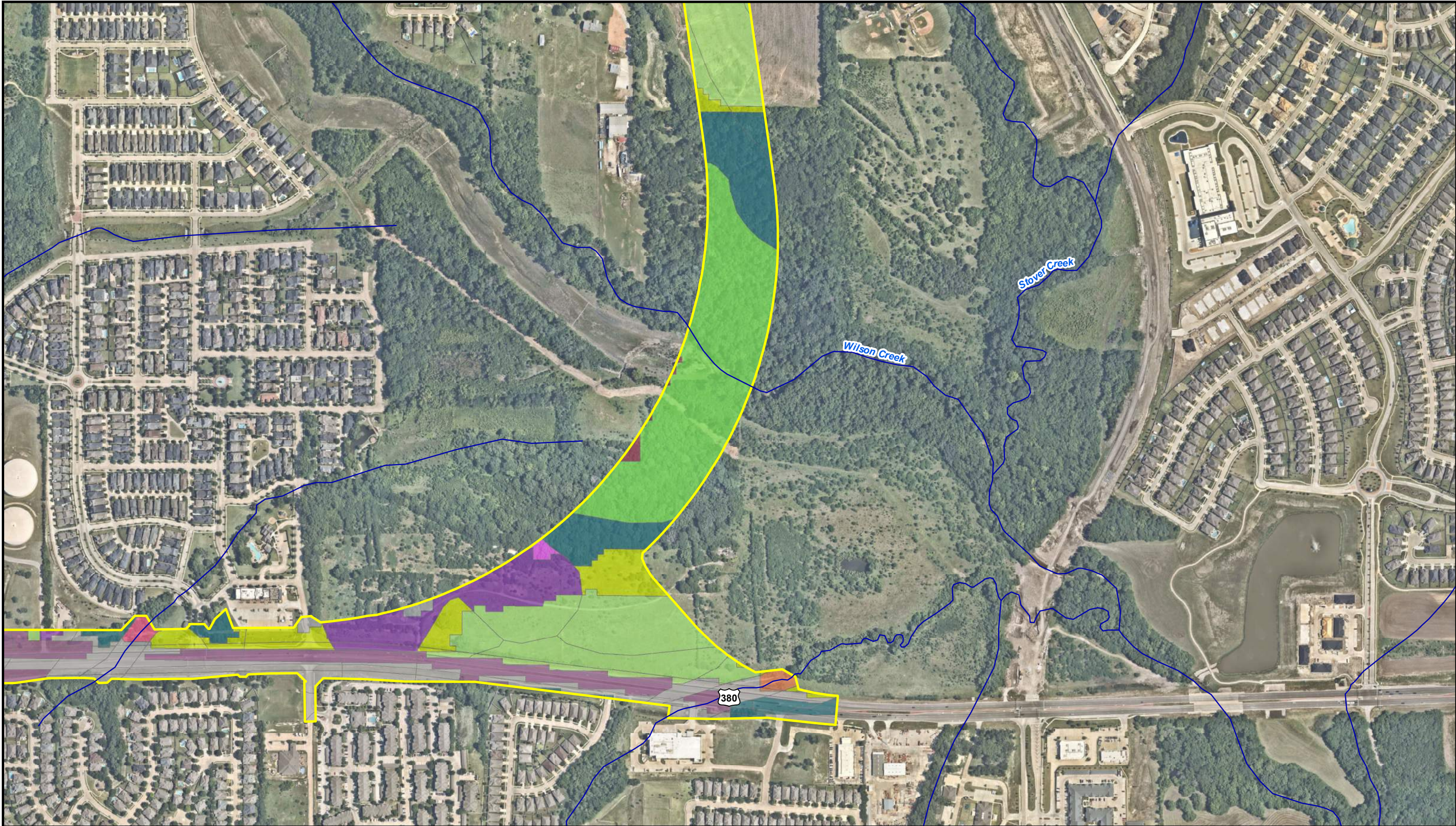


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|---|--|--|
| Segment B                                       | Blackland Prairie: Disturbance or Tame Grassland | Edwards Plateau: Live Oak Motte and Woodland |
| Central Texas: Floodplain Hardwood Forest       | Edwards Plateau: Oak / Hardwood Slope Forest     | Native Invasive: Deciduous Woodland          |
| Central Texas: Floodplain Herbaceous Vegetation | Row Crops  | Urban Low Intensity                          |
| Central Texas: Riparian Hardwood Forest         |  |  |
| Central Texas: Riparian Live Oak Forest         |  |  |

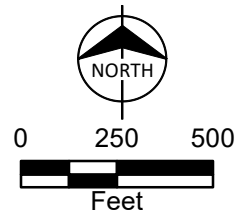
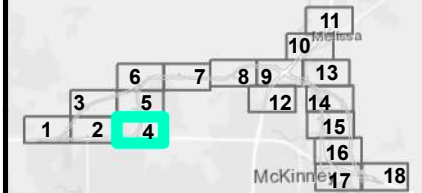


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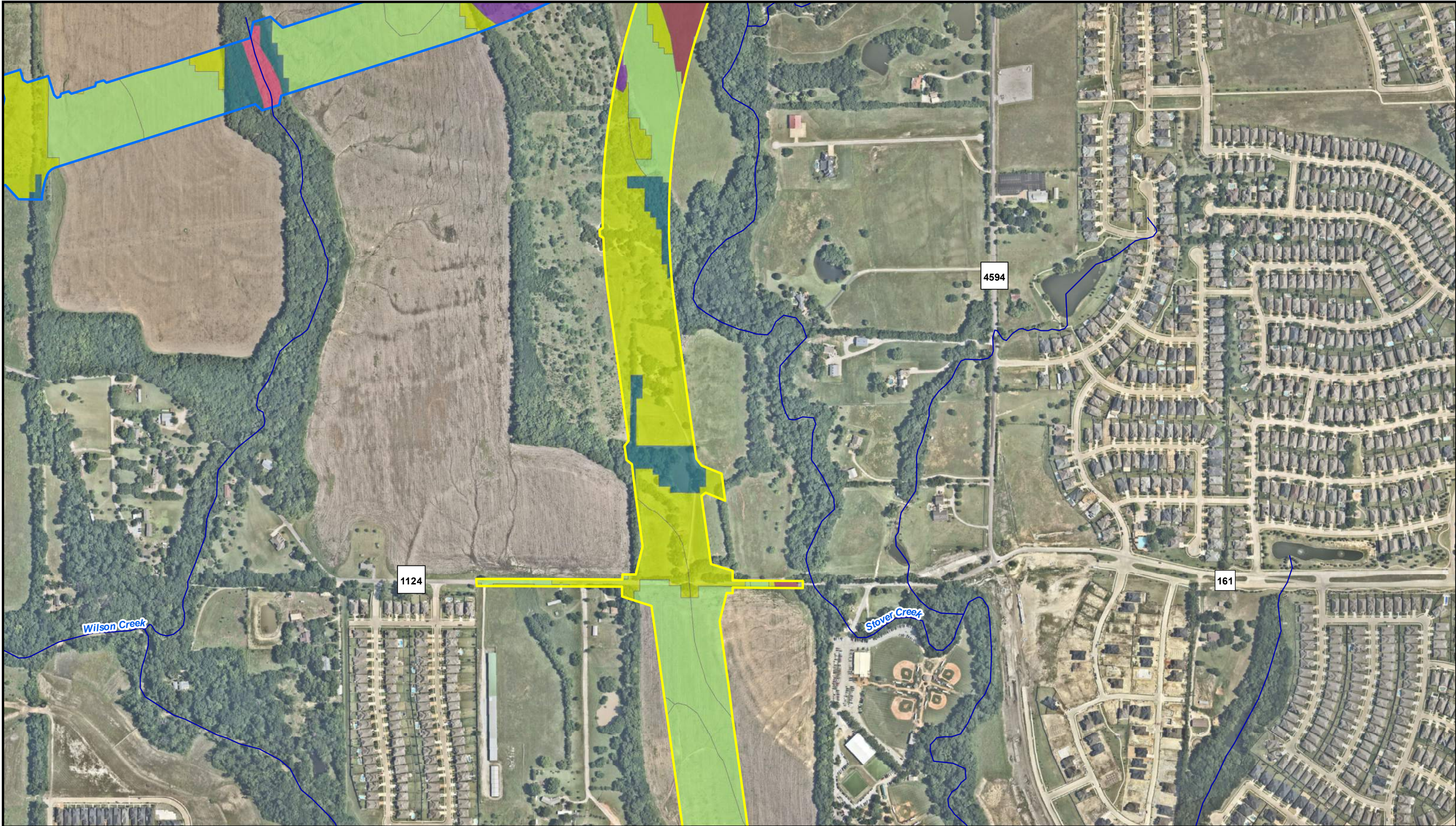
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|-----------|--|-------------------------------------|
| Segment A | Blackland Prairie: Disturbance or Tame Grassland   | Edwards Plateau: Savanna Grassland  |
|           | Central Texas: Floodplain Hardwood Forest          | Native Invasive: Deciduous Woodland |
|           | Central Texas: Floodplain Herbaceous Vegetation    | Row Crops                           |
|           | Central Texas: Riparian Hardwood Forest            | Urban High Intensity                |
|           | Central Texas: Riparian Herbaceous Vegetation      | Urban Low Intensity                 |
|           | Edwards Plateau: Oak / Hardwood Motte and Woodland |                                     |













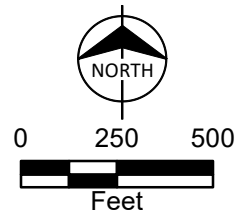
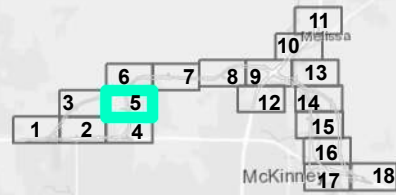
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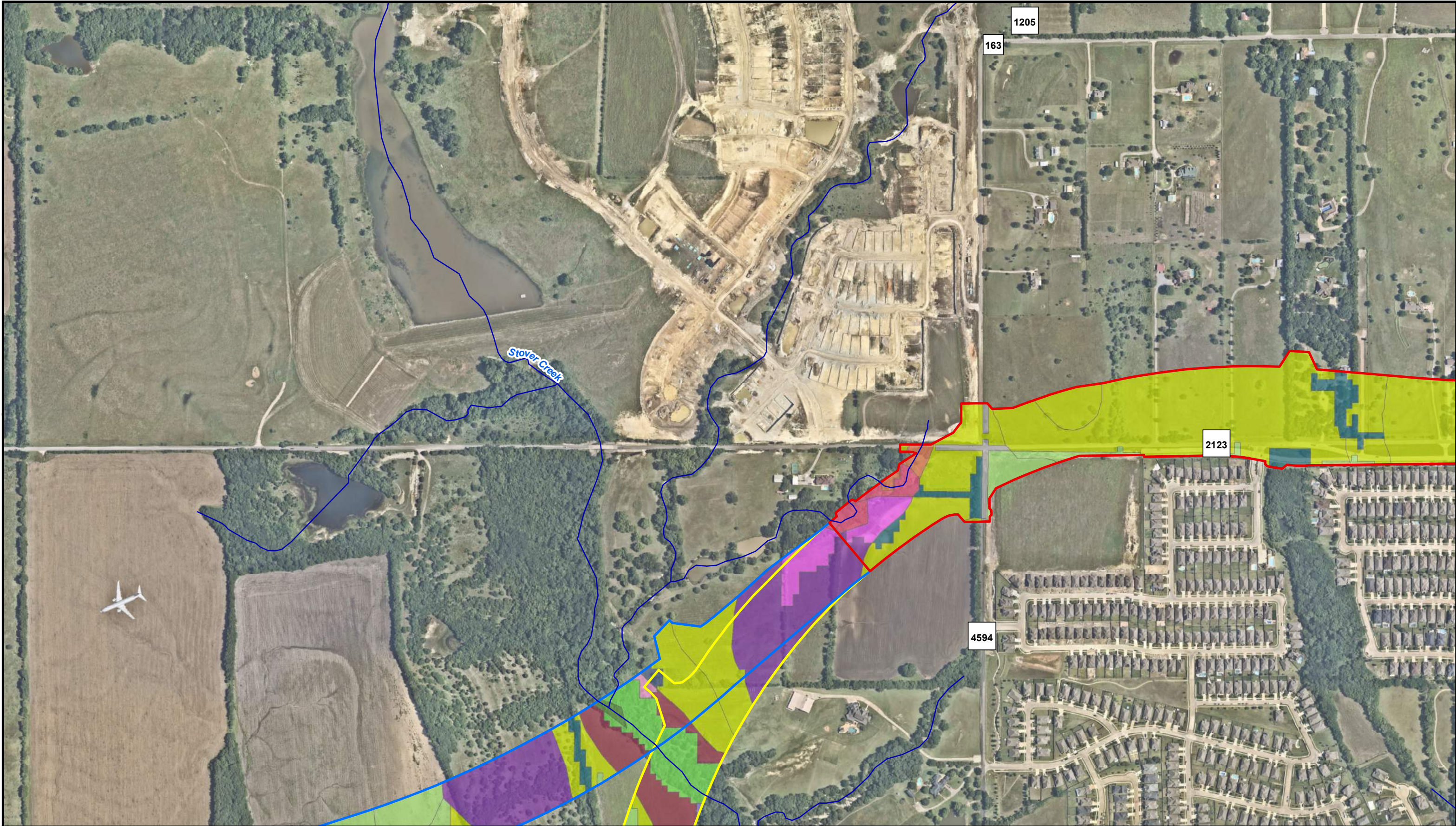


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|---|---|---|
|  Segment A |  Blackland Prairie: Disturbance or Tame Grassland      |  Edwards Plateau: Savanna Grassland  |
|  Segment B |  Central Texas: Floodplain Hardwood / Evergreen Forest |  Native Invasive: Deciduous Woodland |
|   |  Central Texas: Floodplain Herbaceous Vegetation       |  Row Crops                           |
|   |  Central Texas: Riparian Hardwood Forest               |  Urban Low Intensity                 |

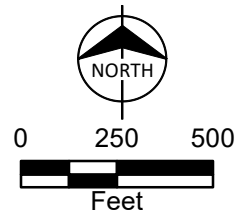
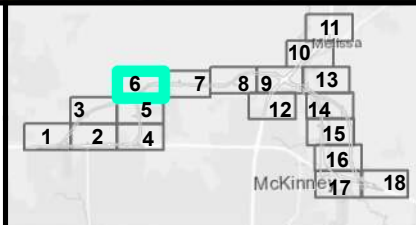


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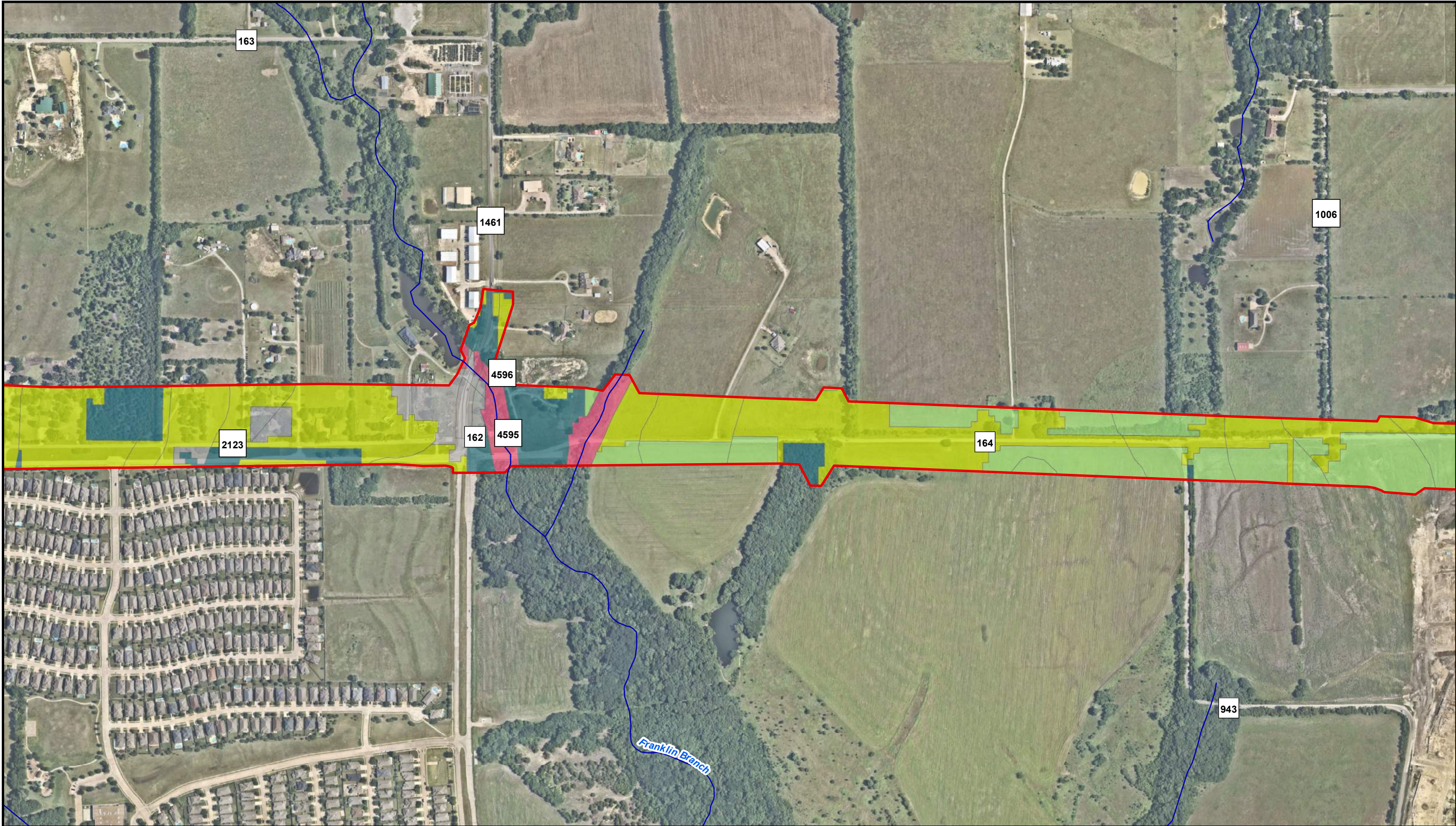
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| Segment A | Blackland Prairie: Disturbance or Tame Grassland      | Edwards Plateau: Live Oak Motte and Woodland       |
| Segment B | Central Texas: Floodplain Hardwood / Evergreen Forest | Edwards Plateau: Oak / Hardwood Motte and Woodland |
| Segment E | Central Texas: Floodplain Hardwood Forest             | Edwards Plateau: Oak / Hardwood Slope Forest       |
|           | Central Texas: Floodplain Herbaceous Vegetation       | Edwards Plateau: Savanna Grassland                 |
|           | Central Texas: Floodplain Live Oak Forest             | Native Invasive: Deciduous Woodland                |
|           | Central Texas: Riparian Hardwood Forest               | Row Crops  |
|           | Central Texas: Riparian Herbaceous Vegetation         | Urban Low Intensity                                |









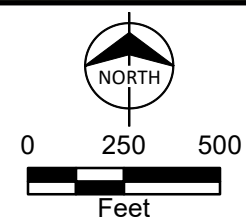
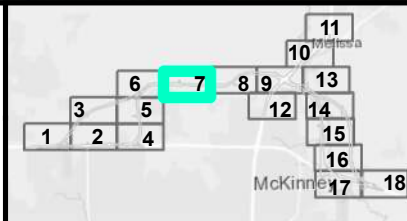
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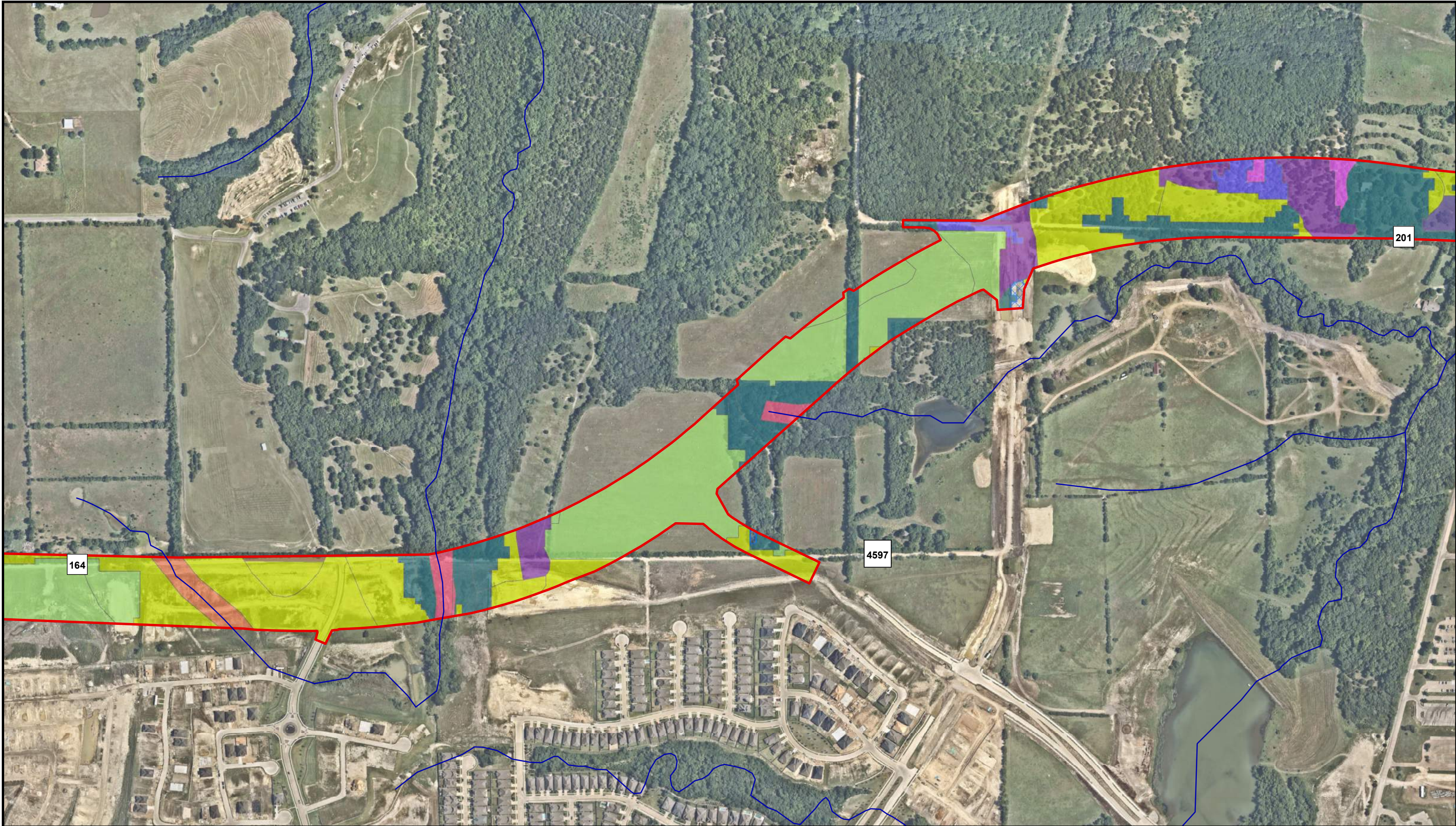
-  Segment E
-  Blackland Prairie: Disturbance or Tame Grassland
-  Row Crops
-  Central Texas: Riparian Hardwood Forest
-  Native Invasive: Deciduous Woodland
-  Urban Low Intensity








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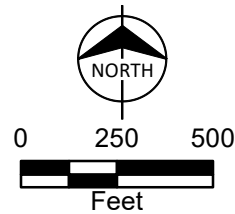
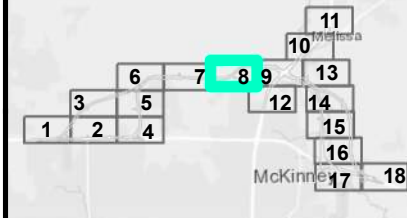


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-  Segment E
-  Blackland Prairie: Disturbance or Tame Grassland
  -  Central Texas: Riparian Hardwood Forest
  -  Central Texas: Riparian Herbaceous Vegetation
  -  Edwards Plateau: Deciduous Oak / Evergreen Motte and Woodland
  -  Edwards Plateau: Oak / Hardwood Motte and Woodland
  -  Edwards Plateau: Savanna Grassland

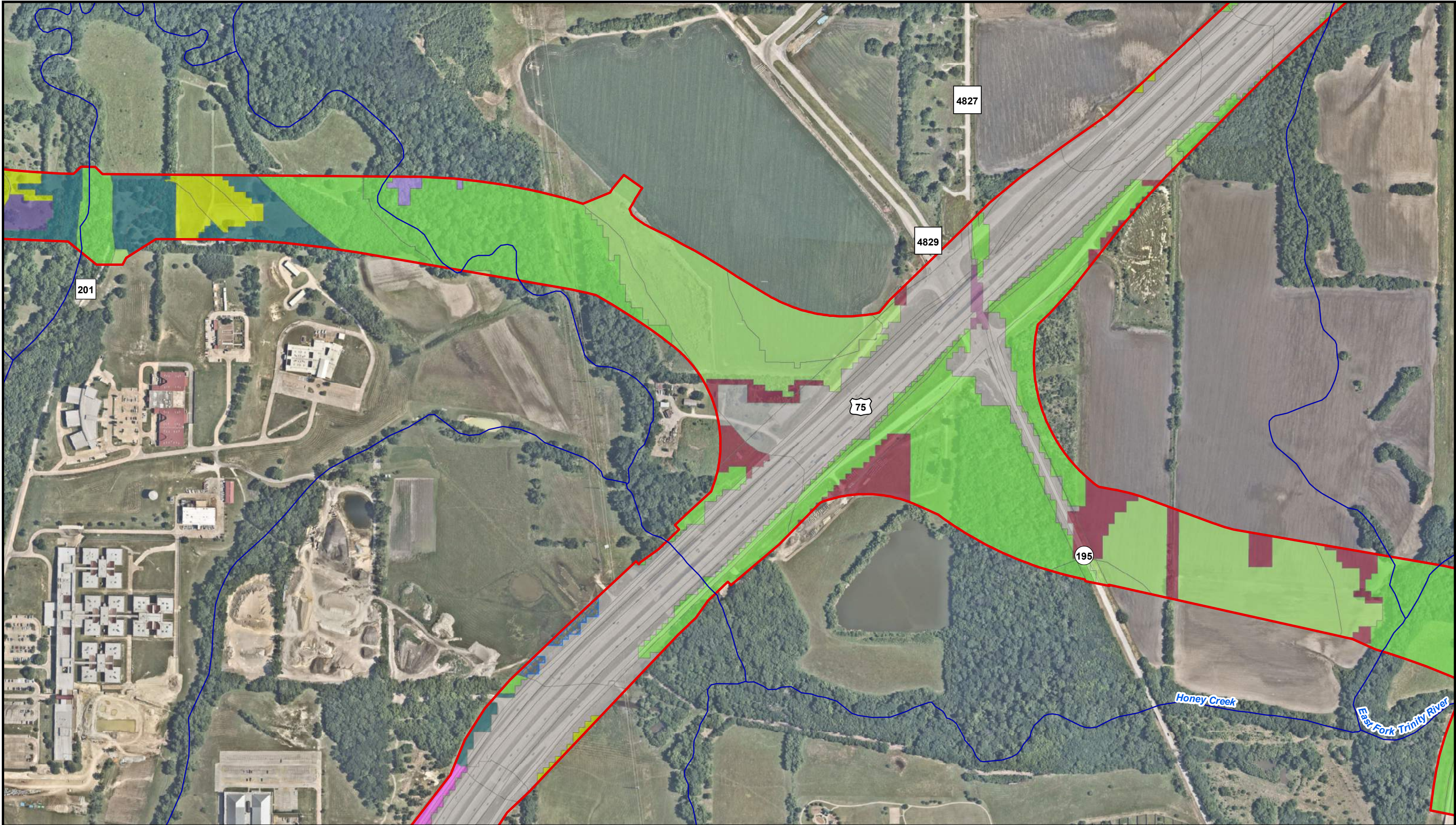
-  Native Invasive: Deciduous Woodland
-  Native Invasive: Juniper Shrubland
-  Row Crops
-  Swamp
-  Native Invasive: Mesquite Shrubland



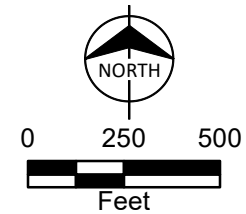
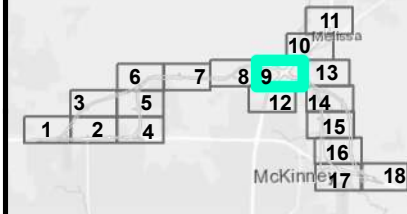
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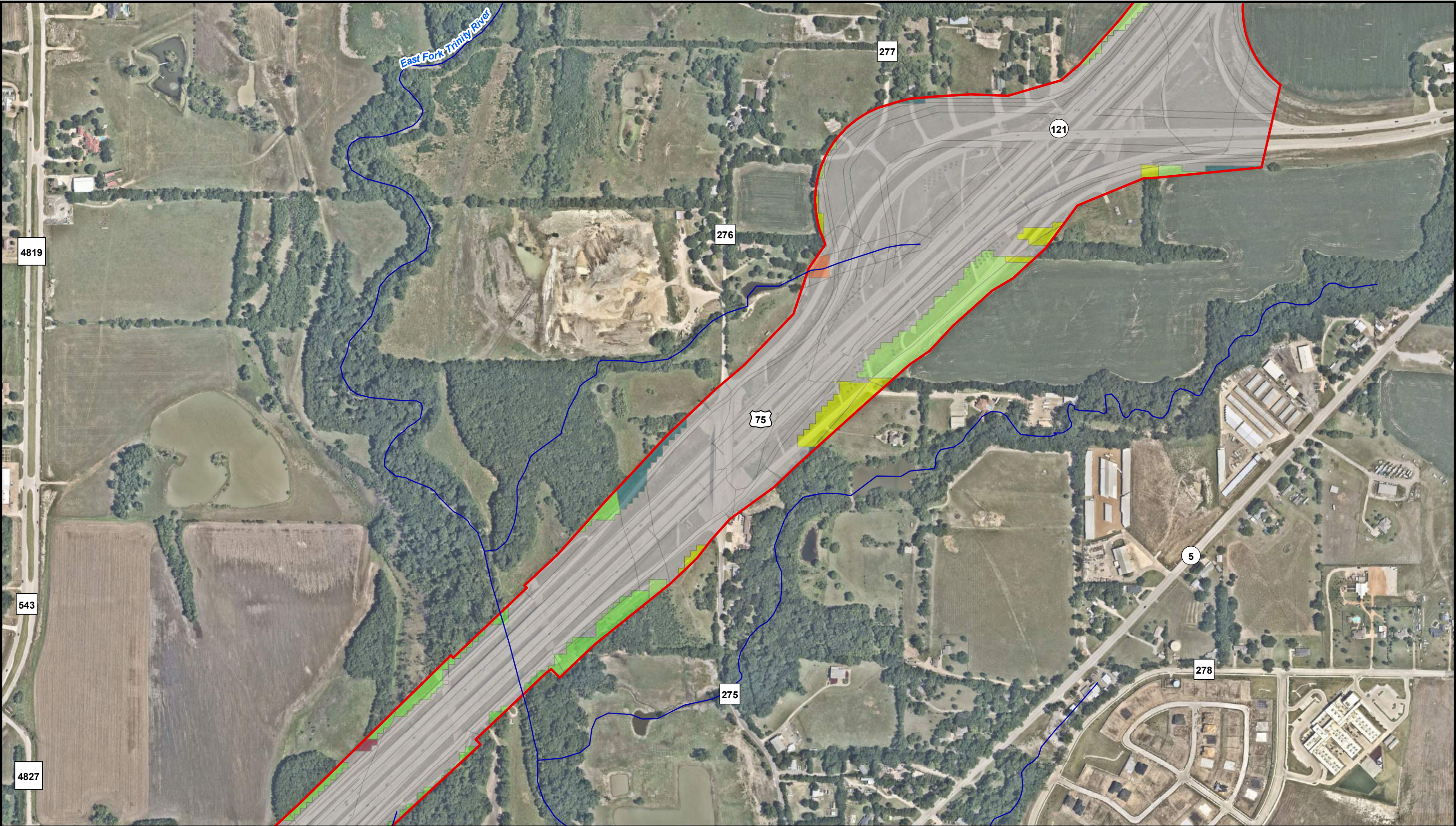
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|---|--|-------------------------------------|
| Segment E   | Blackland Prairie: Disturbance or Tame Grassland | Native Invasive: Mesquite Shrubland |
| Central Texas: Floodplain Hardwood / Evergreen Forest | Row Crops  |                                     |
| Central Texas: Floodplain Hardwood Forest             | Swamp  |                                     |
| Central Texas: Floodplain Herbaceous Vegetation       | Urban High Intensity                             |                                     |
| Edwards Plateau: Oak / Hardwood Motte and Woodland    | Urban Low Intensity                              |                                     |
| Native Invasive: Deciduous Woodland                   |  |                                     |



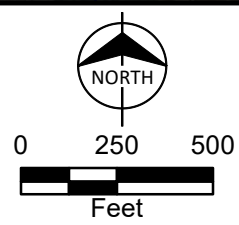
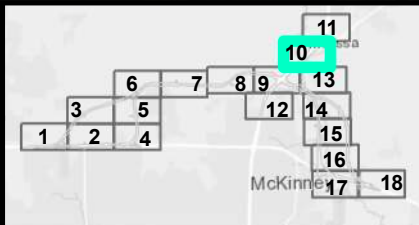
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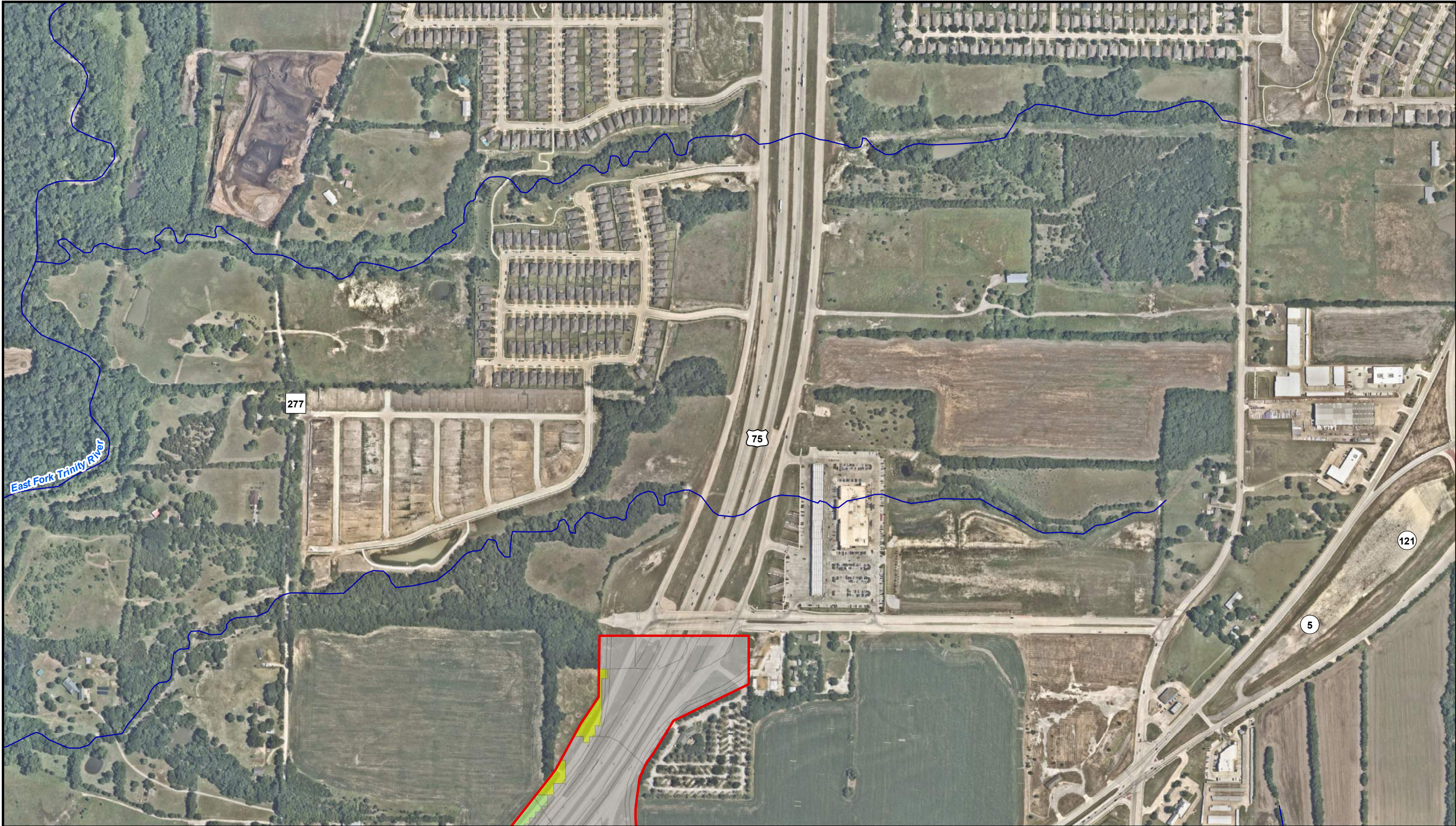
- Segment E
- Blackland Prairie: Disturbance or Tame Grassland
- Central Texas: Floodplain Hardwood Forest
- Central Texas: Floodplain Herbaceous Vegetation
- Central Texas: Riparian Herbaceous Vegetation
- Native Invasive: Deciduous Woodland
- Row Crops
- Urban Low Intensity



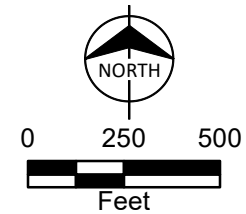
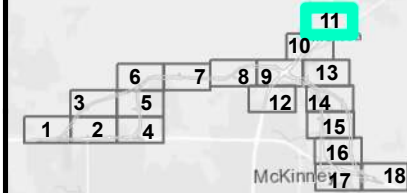
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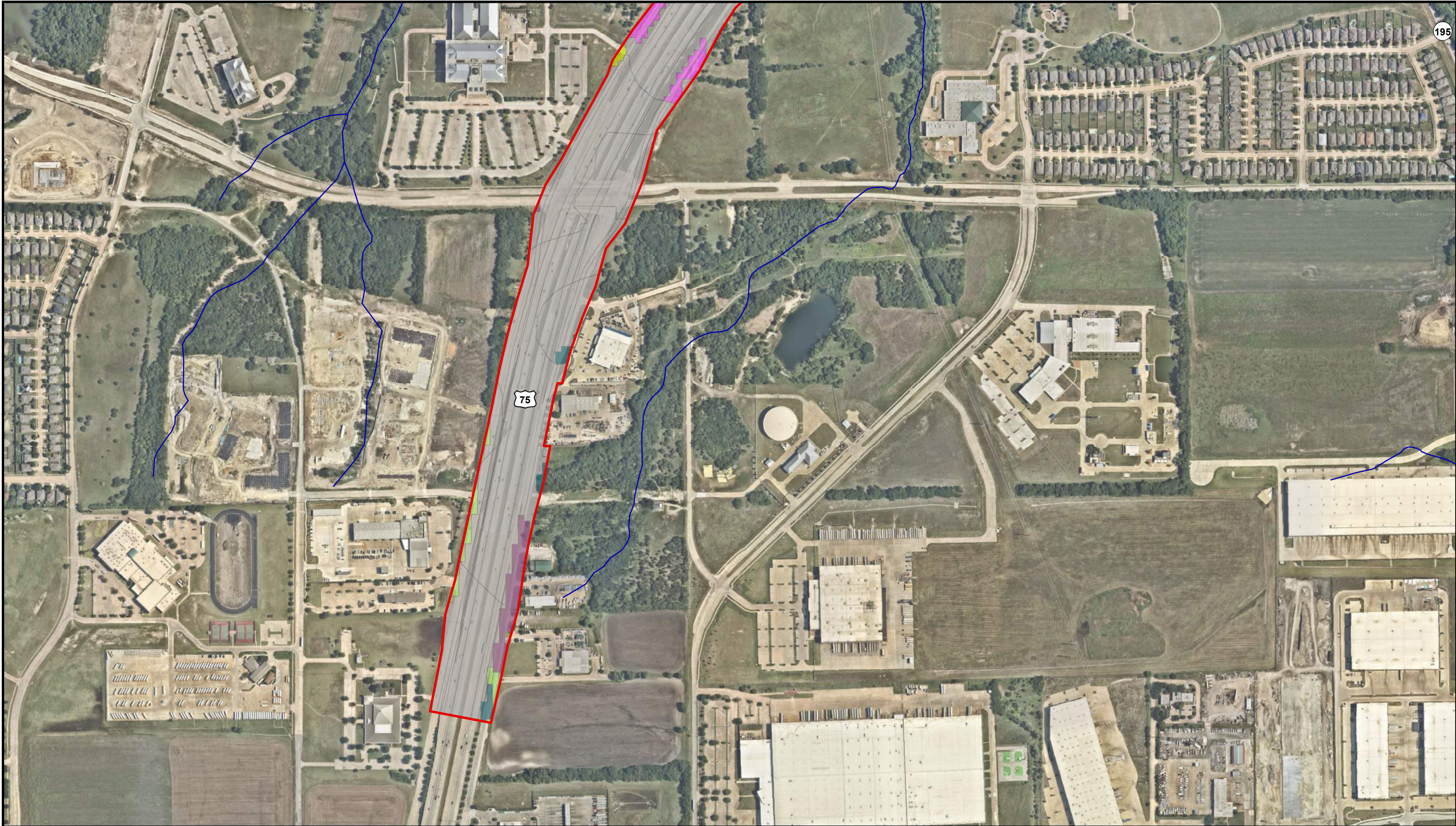
- Segment E    Blackland Prairie: Disturbance or Tame Grassland    Urban Low Intensity  
 Row Crops












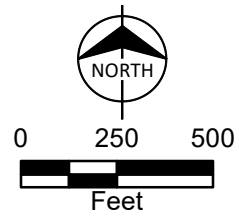
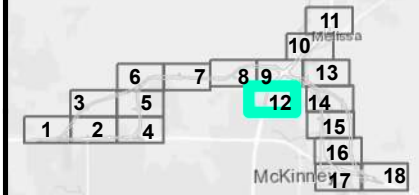
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- |  |  |   |
|--|--|---|
|  Segment E  |  Barren               |  Native Invasive: Deciduous Woodland |
|  Blackland Prairie: Disturbance or Tame Grassland   |  Row Crops            |   |
|  Edwards Plateau: Oak / Hardwood Motte and Woodland |  Urban High Intensity |   |
|  Edwards Plateau: Savanna Grassland                 |  Urban Low Intensity  |   |

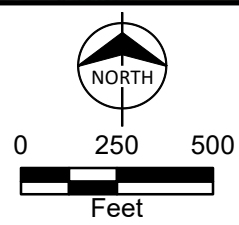
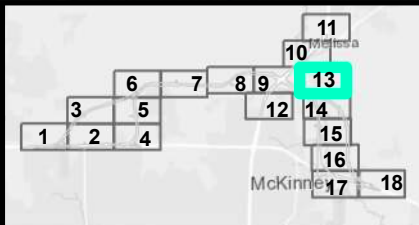


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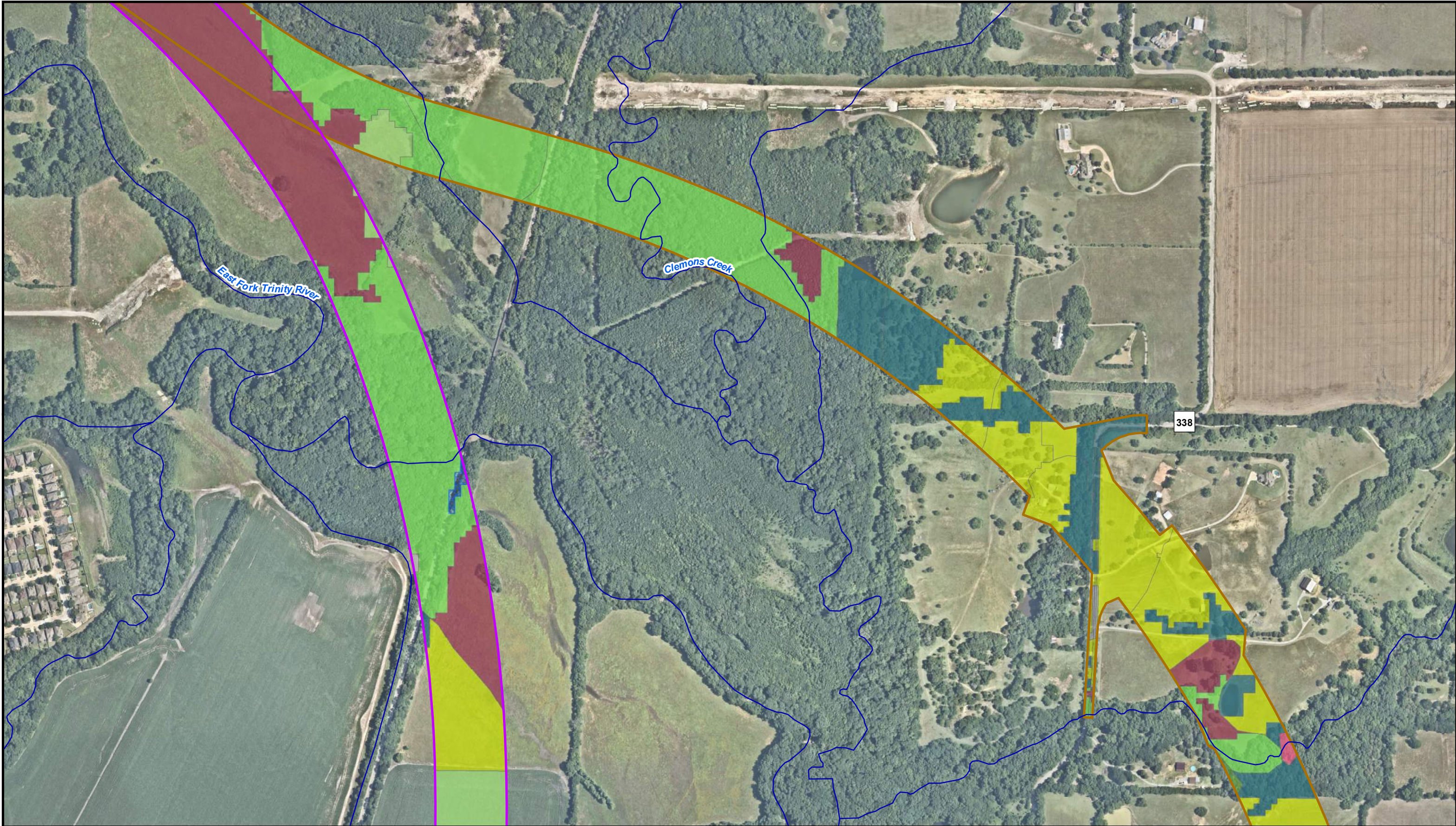
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|---------------------|---|---------------------|
| Segment C With Spur | Central Texas: Floodplain Hardwood Forest       | Row Crops           |
| Segment D With Spur | Central Texas: Floodplain Herbaceous Vegetation | Urban Low Intensity |
| Segment E           |   |                     |














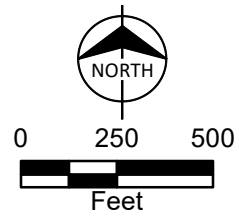
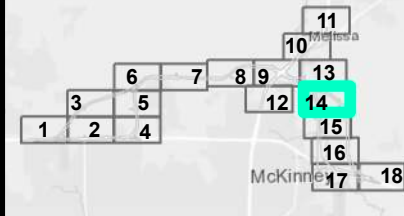
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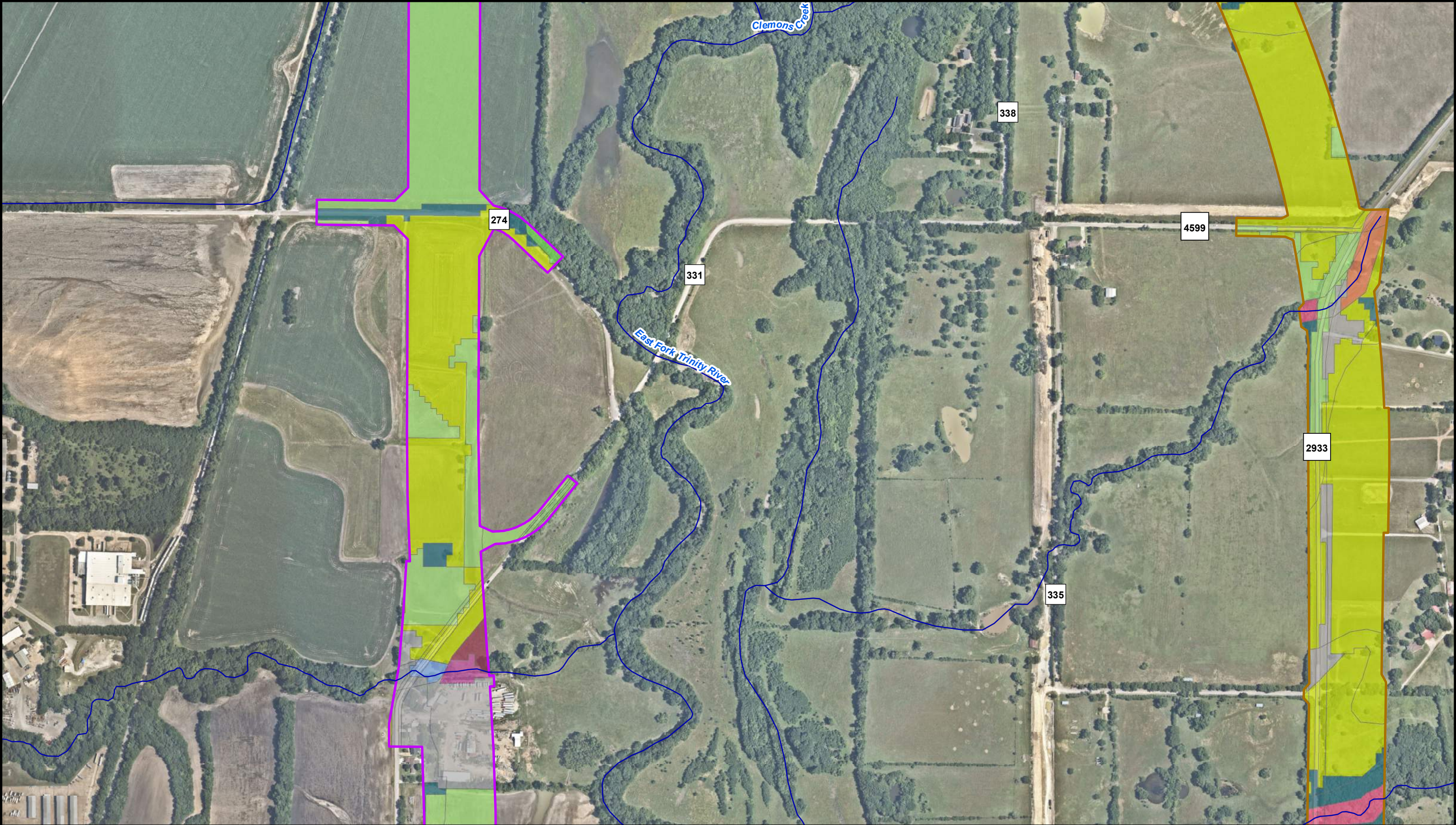
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|---|--|---|
|  Segment C With Spur |  Blackland Prairie: Disturbance or Tame Grassland |  Native Invasive: Deciduous Woodland |
|  Segment D With Spur |  Central Texas: Floodplain Hardwood Forest        |  Row Crops                           |
|   |  Central Texas: Floodplain Herbaceous Vegetation  |  Swamp                               |
|   |  Central Texas: Riparian Hardwood Forest          |  Urban Low Intensity                 |
|   |  Edwards Plateau: Oak / Hardwood Slope Forest     |   |



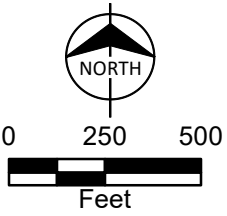
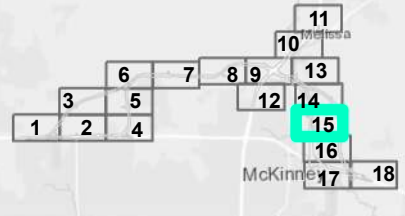
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|---------------------|--|---|
| Segment C With Spur | Blackland Prairie: Disturbance or Tame Grassland | Central Texas: Riparian Hardwood Forest       |
| Segment D With Spur | Central Texas: Floodplain Evergreen Shrubland    | Central Texas: Riparian Herbaceous Vegetation |
|                     | Central Texas: Floodplain Hardwood Forest        | Native Invasive: Deciduous Woodland           |
|                     | Central Texas: Floodplain Herbaceous Vegetation  | Row Crops                                     |
|                     | Central Texas: Riparian Evergreen Shrubland      | Urban Low Intensity                           |



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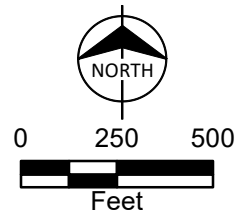
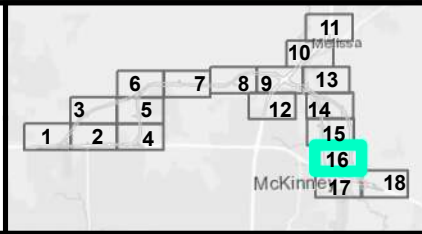
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Segment C With Spur  
Segment D With Spur

Blackland Prairie: Disturbance or Tame Grassland  
Central Texas: Floodplain Hardwood / Evergreen Forest  
Central Texas: Floodplain Hardwood Forest  
Central Texas: Floodplain Herbaceous Vegetation  
Central Texas: Riparian Hardwood Forest  
Native Invasive: Deciduous Woodland

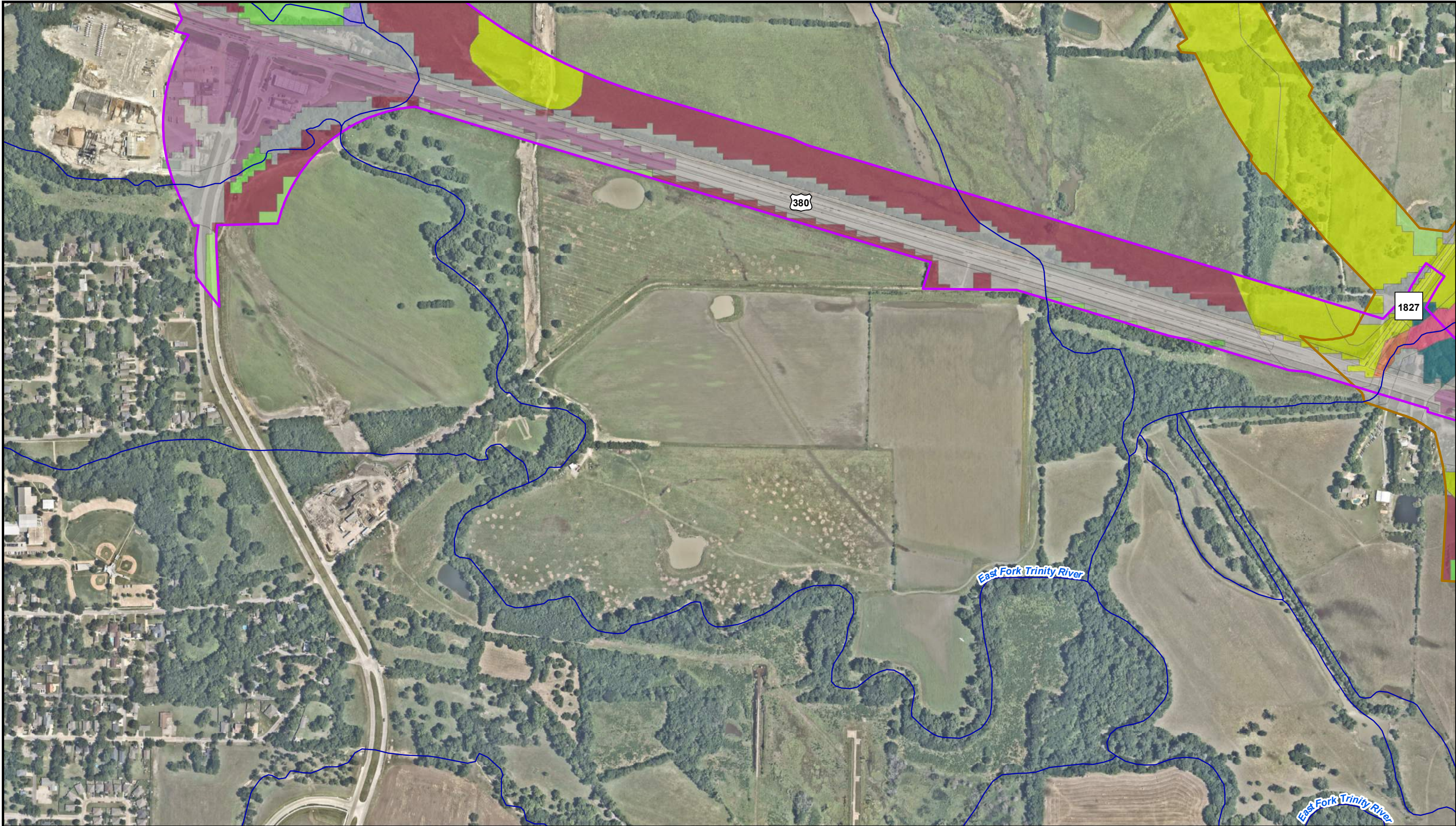
Open Water  
Row Crops  
Swamp  
Urban High Intensity  
Urban Low Intensity



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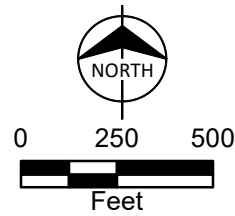
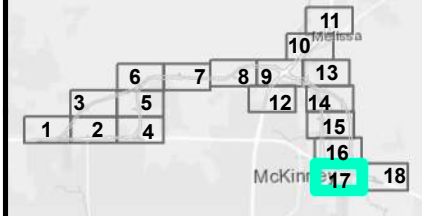
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Segment C With Spur  
Segment D With Spur

Blackland Prairie: Disturbance or Tame Grassland  
Central Texas: Floodplain Hardwood / Evergreen Forest  
Central Texas: Floodplain Hardwood Forest  
Central Texas: Floodplain Herbaceous Vegetation  
Central Texas: Riparian Hardwood Forest

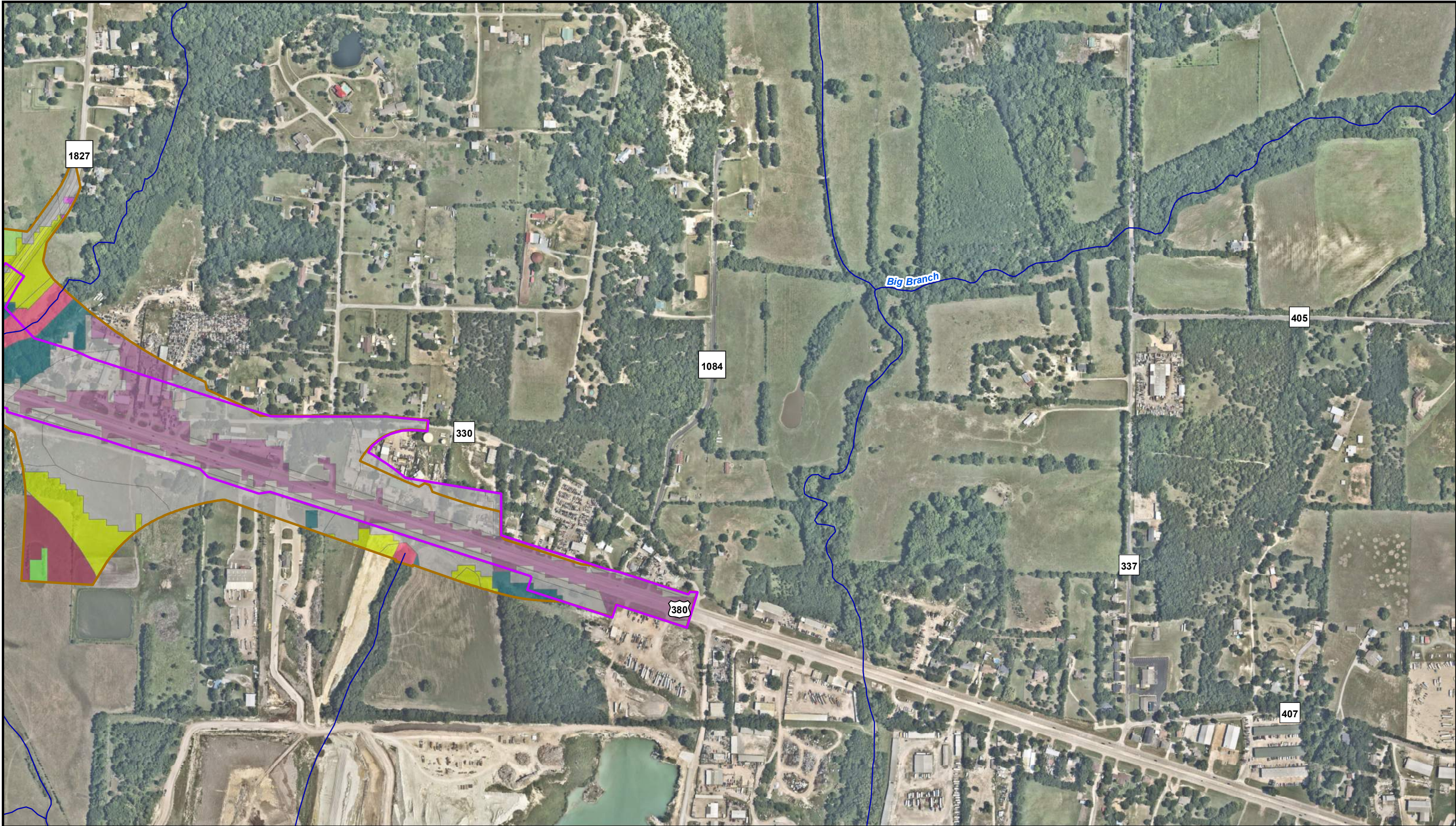
Central Texas: Riparian Herbaceous Vegetation  
Native Invasive: Deciduous Woodland  
Row Crops  
Urban High Intensity  
Urban Low Intensity



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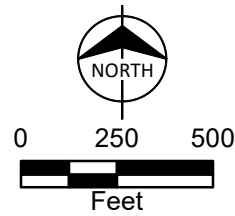
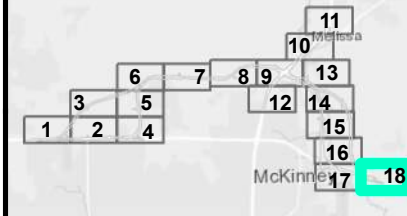
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Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



Segment C With Spur  
Segment D With Spur

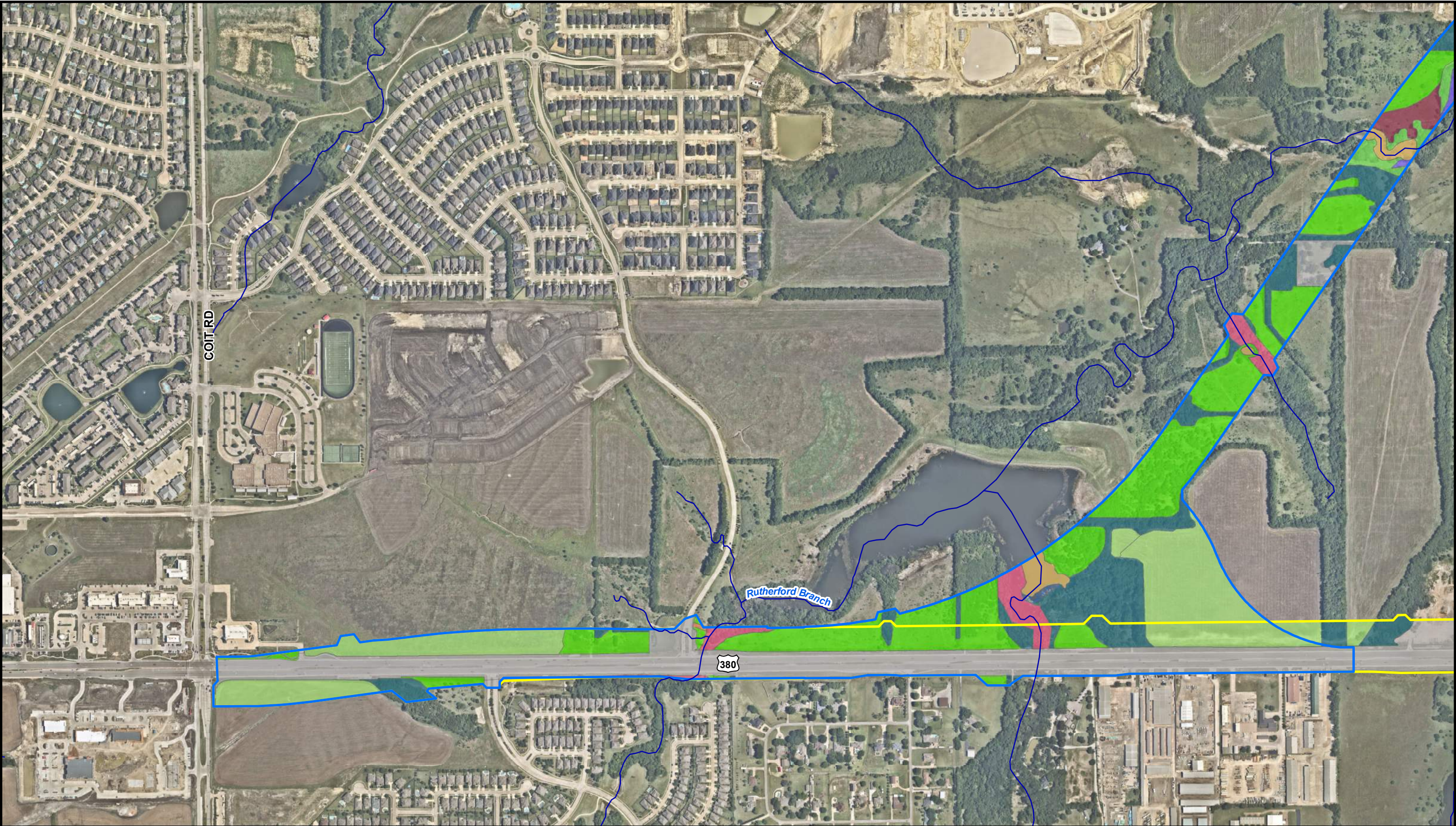
Blackland Prairie: Disturbance or Tame Grassland  
Central Texas: Floodplain Hardwood Forest  
Central Texas: Floodplain Herbaceous Vegetation  
Central Texas: Riparian Hardwood Forest  
Edwards Plateau: Oak / Hardwood Motte and Woodland

Native Invasive: Deciduous Woodland  
Row Crops  
Urban High Intensity  
Urban Low Intensity

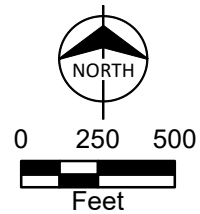
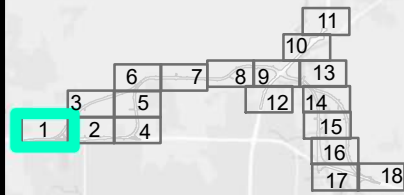


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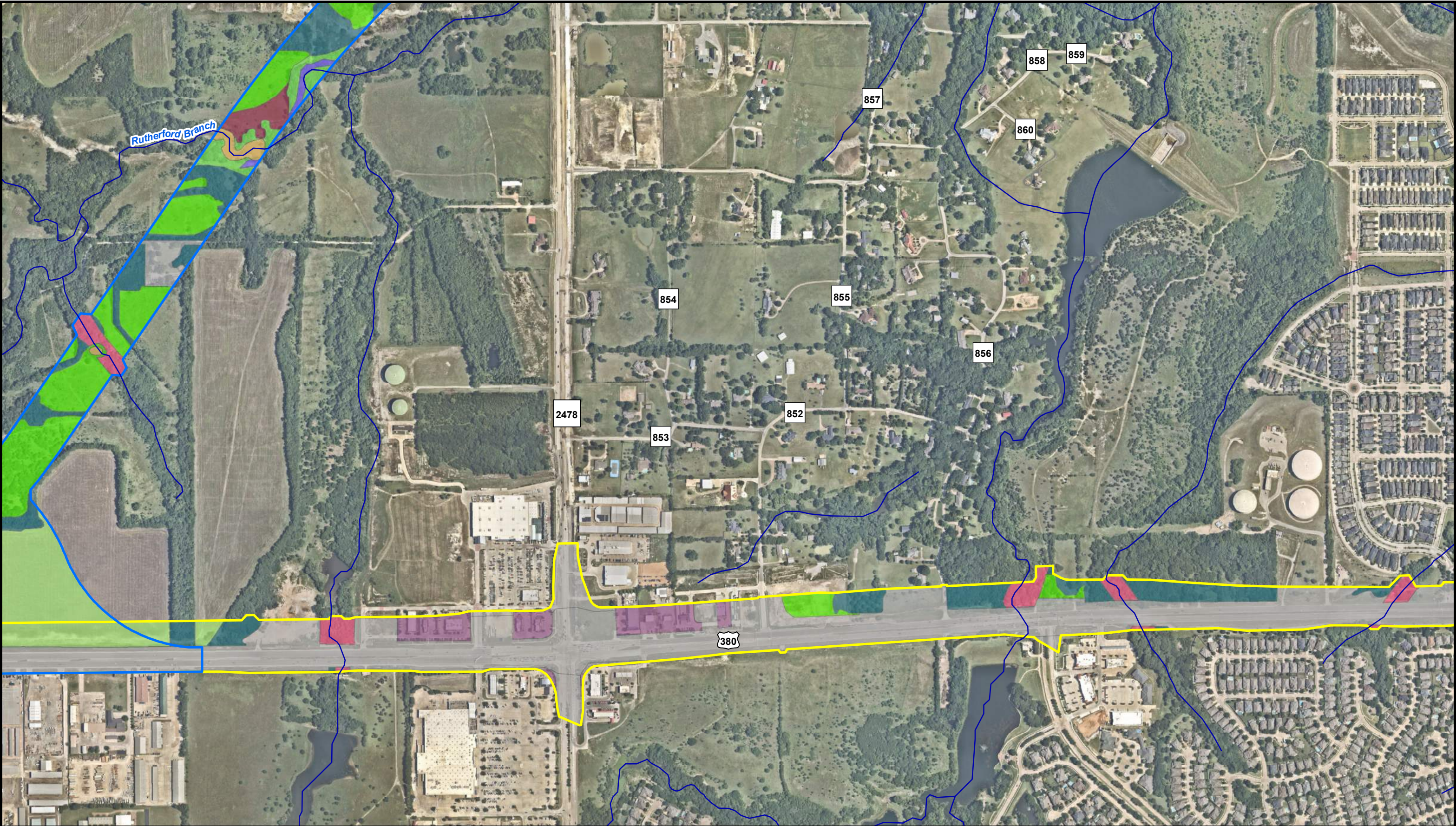


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|-----------|--|-------------------------------------|
| Segment A | Blackland Prairie: Disturbance or Tame Grassland | Native Invasive: Deciduous Woodland |
| Segment B | Central Texas: Floodplain Hardwood Forest        | Open Water                          |
|           | Central Texas: Floodplain Herbaceous Vegetation  | Row Crops                           |
|           | Central Texas: Riparian Hardwood Forest          | Swamp                               |
|           | Central Texas: Riparian Herbaceous Vegetation    | Urban Low Intensity                 |
|           | Edwards Plateau: Oak - Hardwood Slope Forest     |                                     |

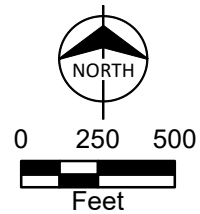
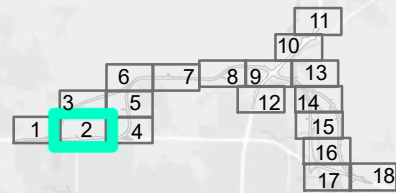


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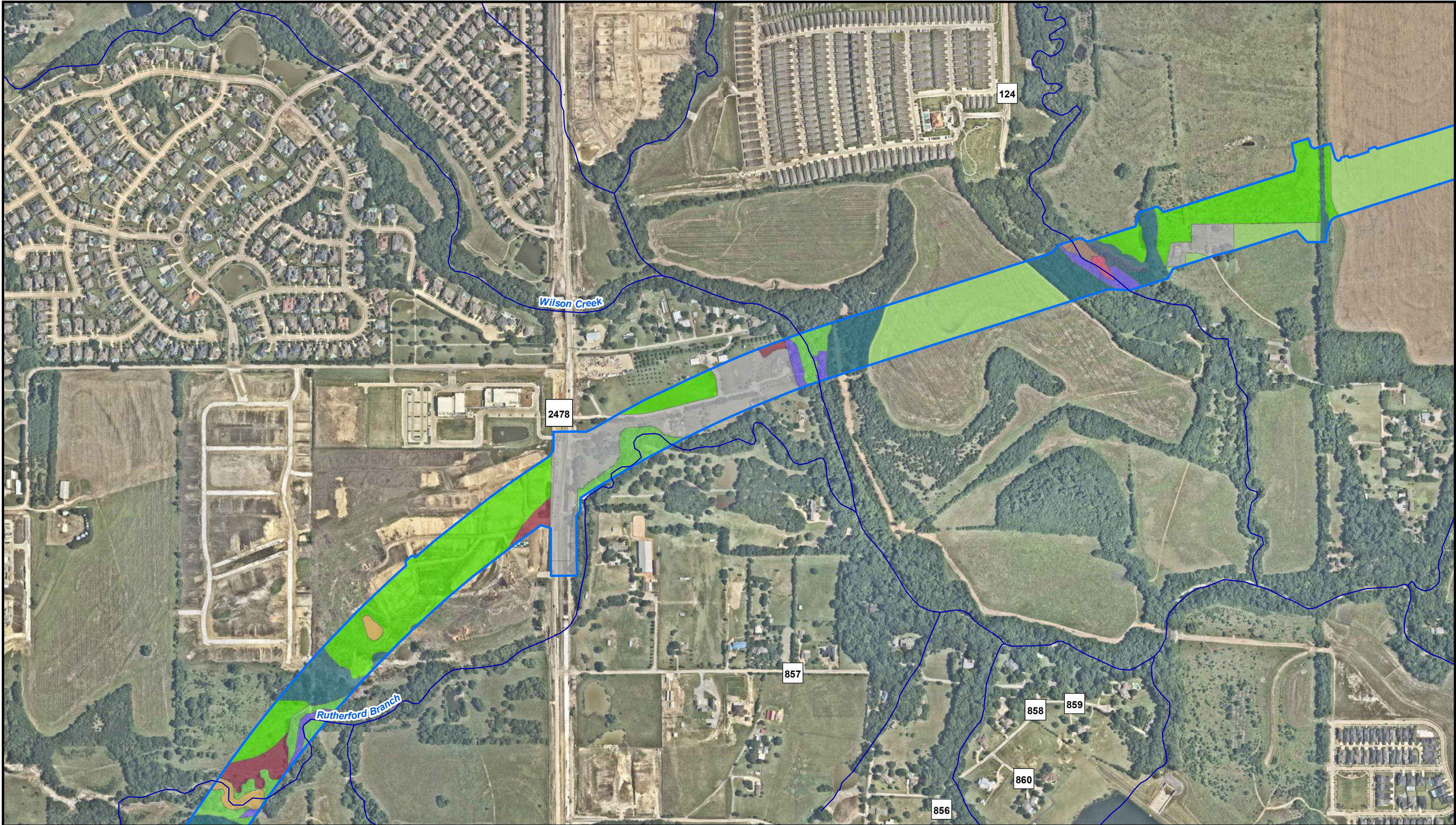
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|-----------|--|-------------------------------------|
| Segment A | Blackland Prairie: Disturbance or Tame Grassland | Native Invasive: Deciduous Woodland |
| Segment B | Central Texas: Floodplain Hardwood Forest        | Open Water                          |
|           | Central Texas: Floodplain Herbaceous Vegetation  | Row Crops                           |
|           | Central Texas: Riparian Hardwood Forest          | Urban High Intensity                |
|           | Edwards Plateau: Oak - Hardwood Slope Forest     | Urban Low Intensity                 |



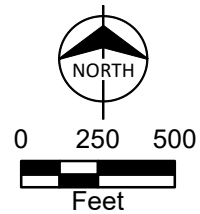
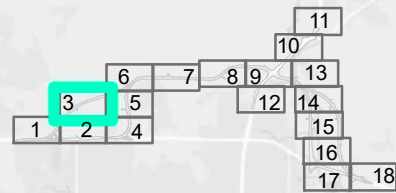
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Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

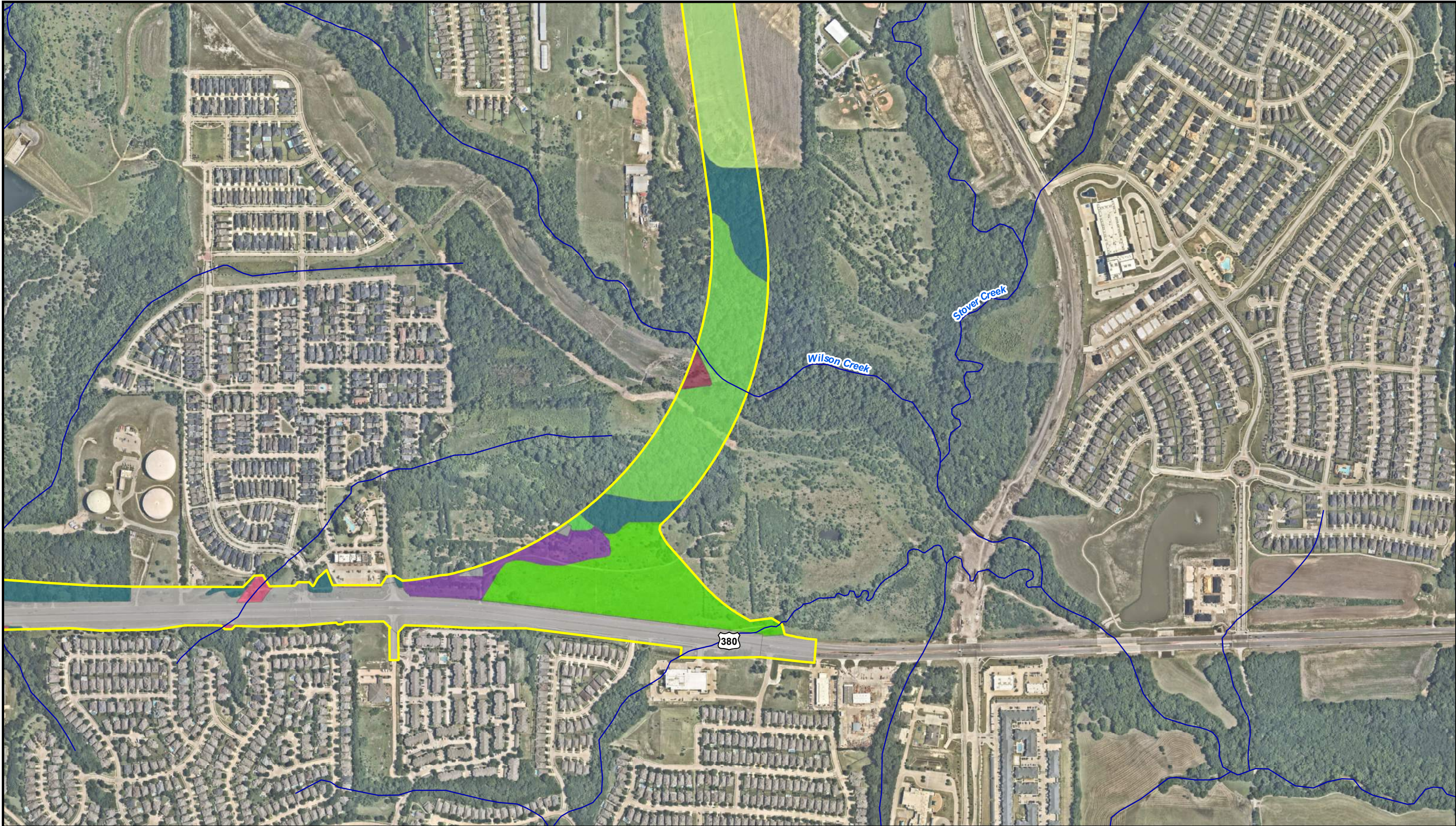


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|--|--|--|
| Segment B                                    | Blackland Prairie: Disturbance or Tame Grassland | Edwards Plateau: Oak - Hardwood Slope Forest |
| Central Texas: Floodplain Hardwood Forest    | Central Texas: Floodplain Herbaceous Vegetation  | Native Invasive: Deciduous Woodland          |
| Central Texas: Riparian Hardwood Forest      | Central Texas: Riparian Live Oak Forest          | Open Water                                   |
| Edwards Plateau: Live Oak Motte and Woodland | Row Crops  | Urban Low Intensity                          |

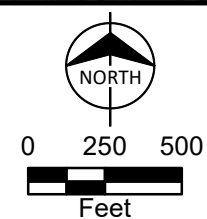
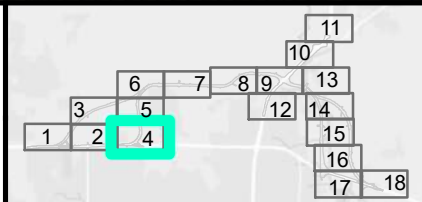


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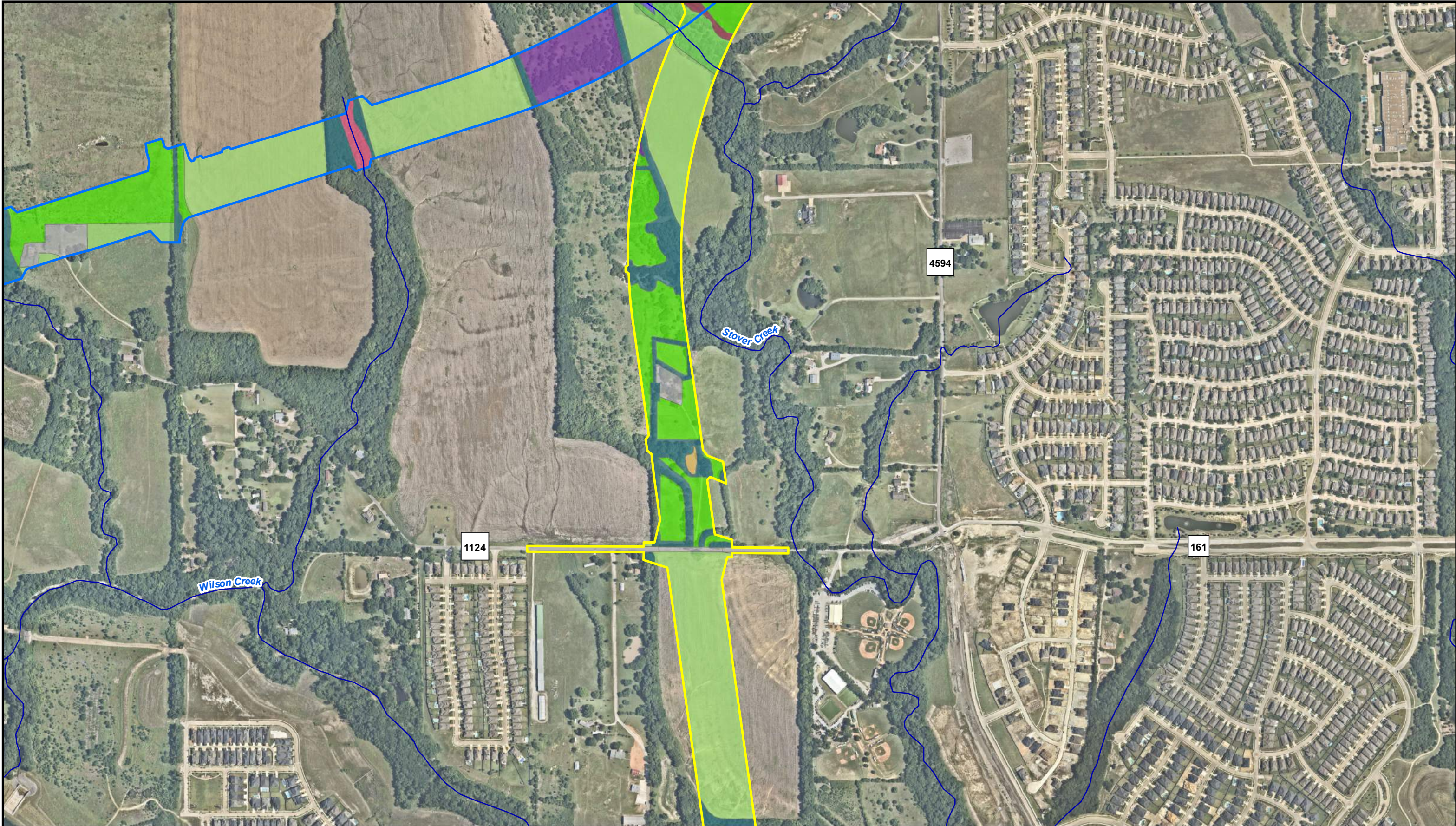














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|--|--|------------------------------------|
| Segment A  | Blackland Prairie: Disturbance or Tame Grassland | Edwards Plateau: Savanna Grassland |
| Central Texas: Floodplain Hardwood Forest          | Native Invasive: Deciduous Woodland              |                                    |
| Central Texas: Floodplain Herbaceous Vegetation    | Row Crops  |                                    |
| Central Texas: Riparian Hardwood Forest            | Urban High Intensity                             |                                    |
| Edwards Plateau: Oak - Hardwood Motte and Woodland | Urban Low Intensity                              |                                    |

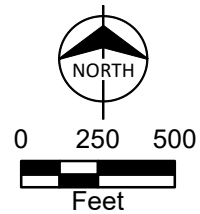
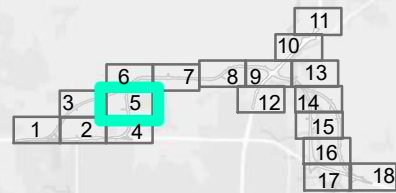


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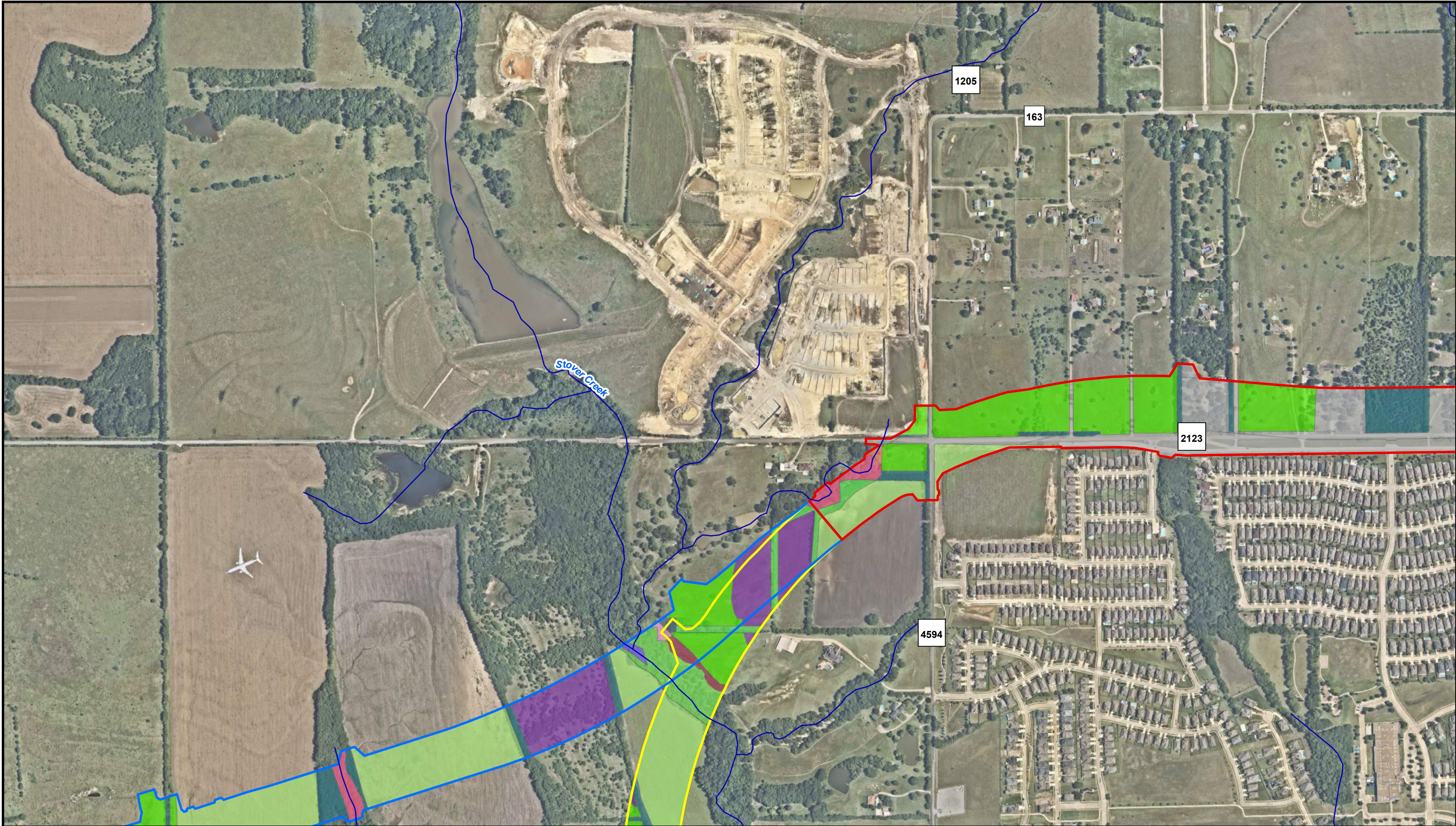


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|---|--|---|
|  Segment A |  Blackland Prairie: Disturbance or Tame Grassland |  Edwards Plateau: Savanna Grassland  |
|  Segment B |  Central Texas: Floodplain Hardwood Forest        |  Native Invasive: Deciduous Woodland |
|   |  Central Texas: Floodplain Herbaceous Vegetation  |  Open Water                          |
|   |  Central Texas: Riparian Hardwood Forest          |  Row Crops                           |
|   |  Edwards Plateau: Oak - Hardwood Slope Forest     |  Urban Low Intensity                 |

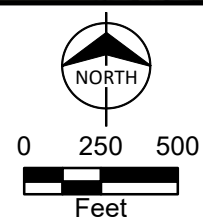
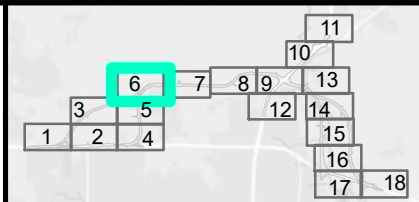


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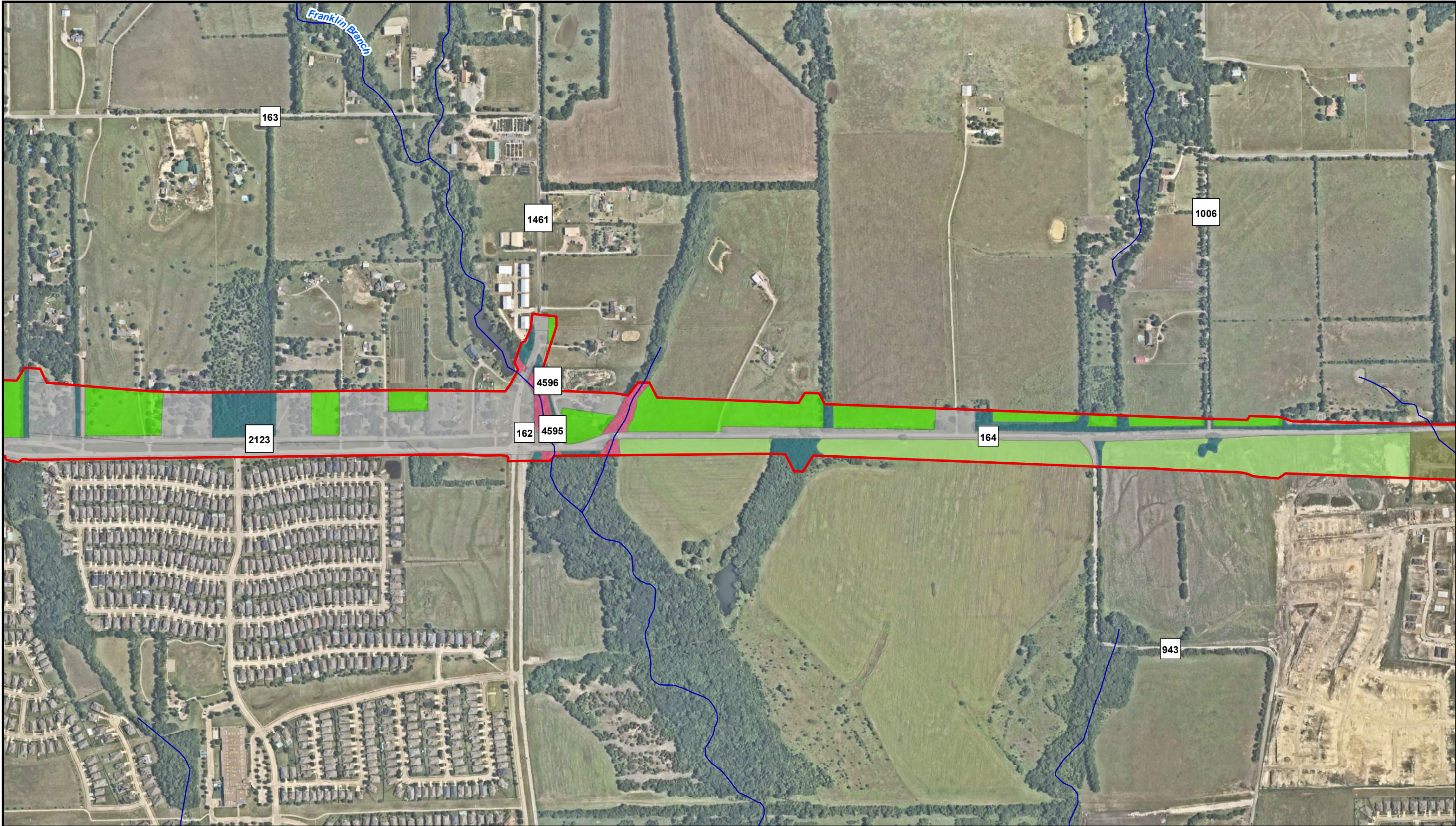
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| <div>Segment A</div> | <div>Blackland Prairie: Disturbance or Tame Grassland</div> | <div>Edwards Plateau: Oak - Hardwood Motte and Woodland</div> |
| <div>Segment B</div> | <div>Central Texas: Floodplain Hardwood Forest</div>        | <div>Edwards Plateau: Oak - Hardwood Slope Forest</div>       |
| <div>Segment E</div> | <div>Central Texas: Floodplain Herbaceous Vegetation</div>  | <div>Edwards Plateau: Savanna Grassland</div>                 |
|                      | <div>Central Texas: Floodplain Live Oak Forest</div>        | <div>Native Invasive: Deciduous Woodland</div>                |
|                      | <div>Central Texas: Riparian Hardwood Forest</div>          | <div>Row Crops</div>  |
|                      | <div>Central Texas: Riparian Herbaceous Vegetation</div>    | <div>Urban Low Intensity</div>                                |
|                      | <div>Edwards Plateau: Live Oak Motte and Woodland</div>     |   |










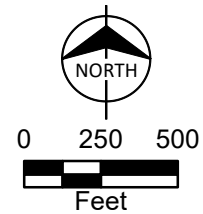
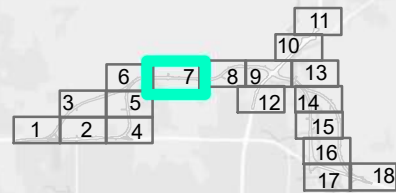
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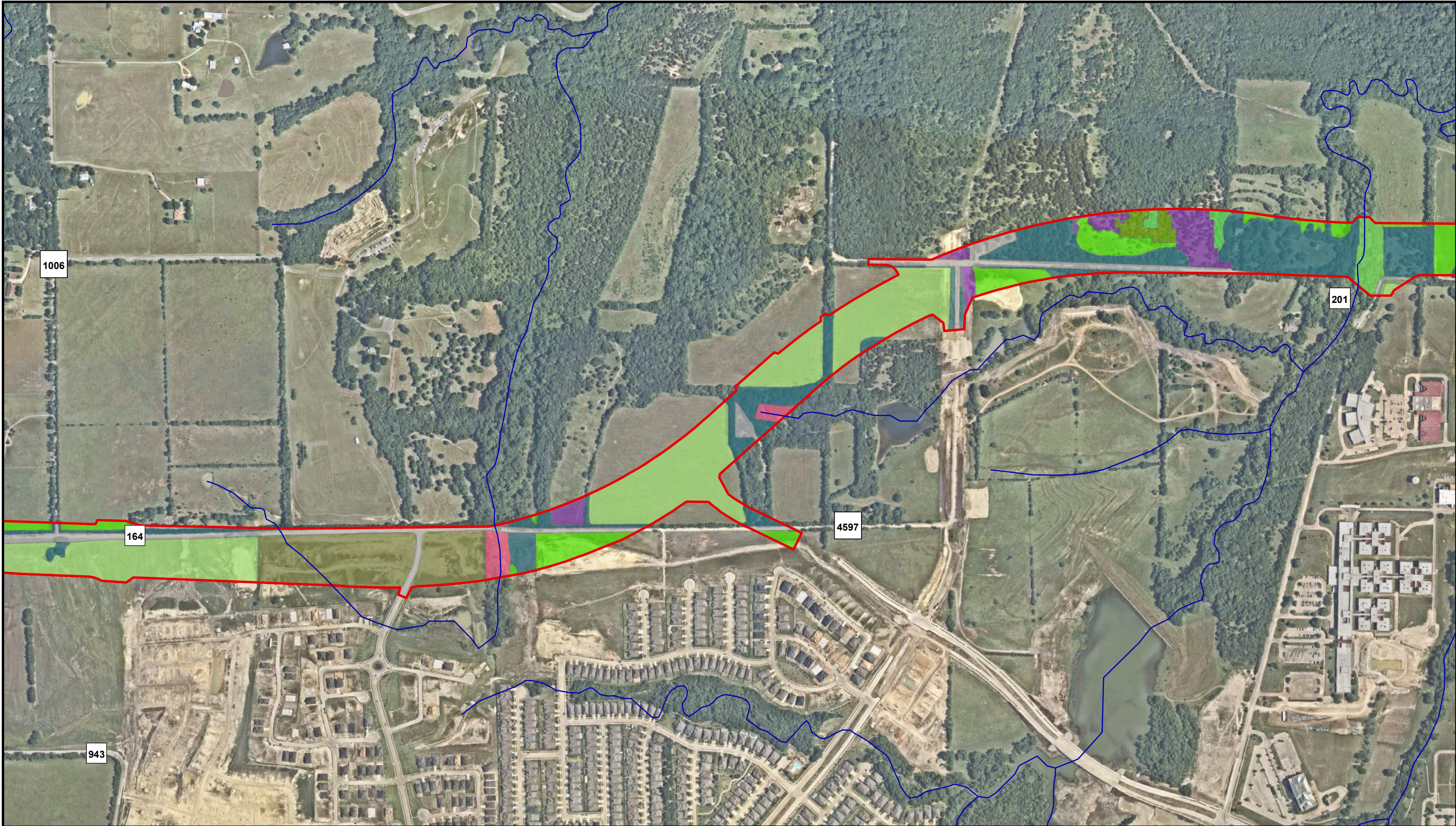
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|--|---|---|
|  Segment E  |  Barren              |  Native Invasive: Deciduous Woodland |
|  Blackland Prairie: Disturbance or Tame Grassland |  Row Crops           |   |
|  Central Texas: Riparian Hardwood Forest          |  Urban Low Intensity |   |



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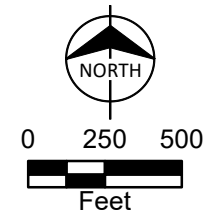
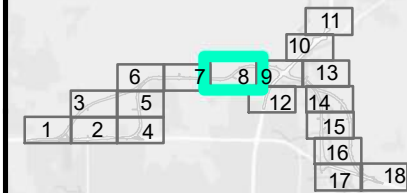
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Segment E

- Barren
- Blackland Prairie: Disturbance or Tame Grassland
- Central Texas: Floodplain Hardwood Forest
- Central Texas: Riparian Hardwood Forest
- Edwards Plateau: Deciduous Oak - Evergreen Motte and Woodland

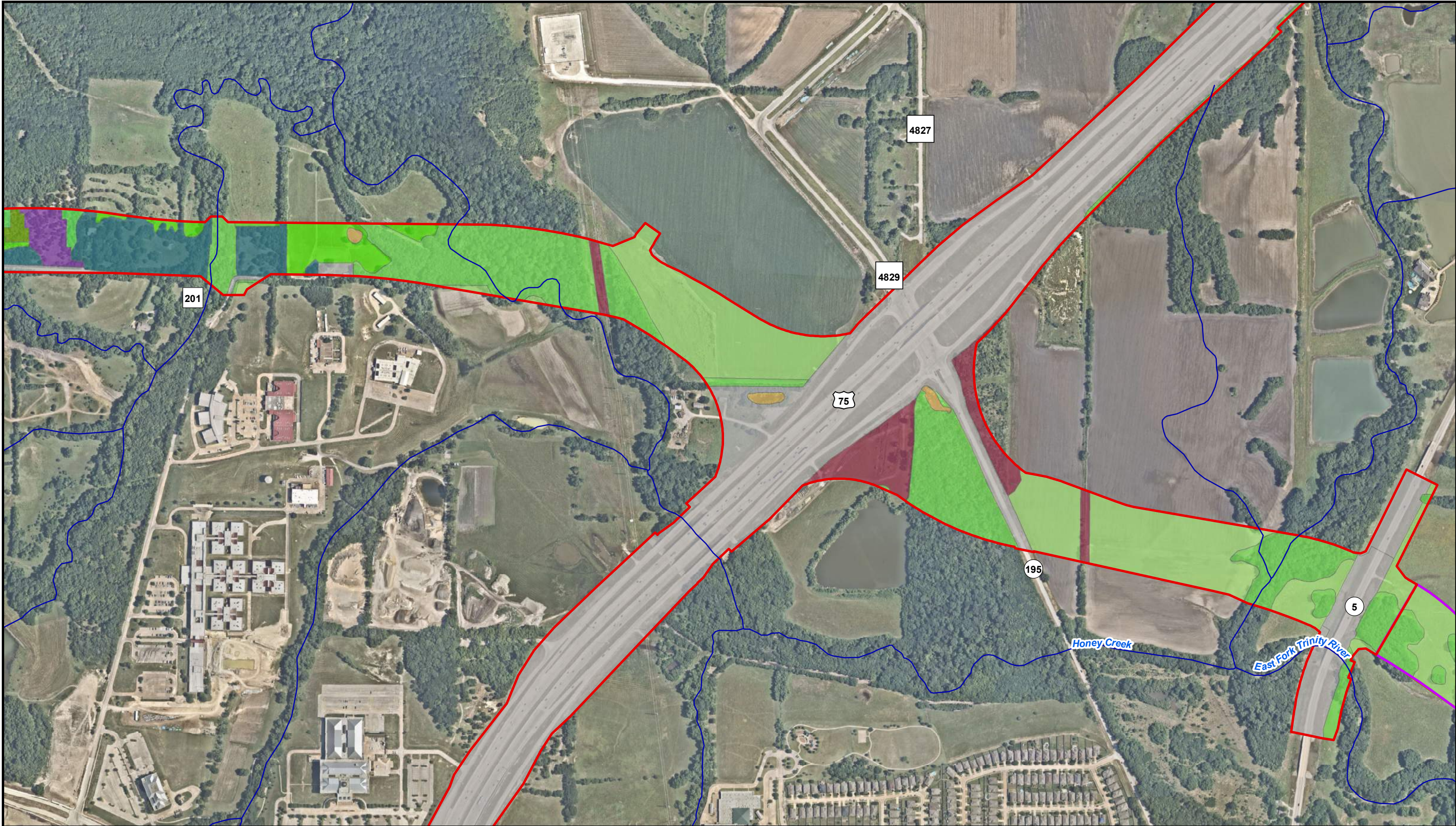
- Edwards Plateau: Oak - Hardwood Motte and Woodland
- Edwards Plateau: Savanna Grassland
- Native Invasive: Deciduous Woodland
- Row Crops
- Urban Low Intensity



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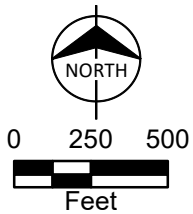
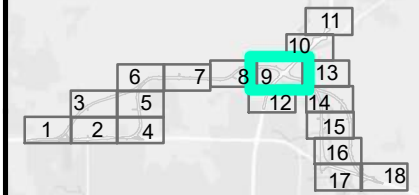
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- Segment C Without Spur
- Segment D Without Spur
- Segment E

- Blackland Prairie: Disturbance or Tame Grassland
- Central Texas: Floodplain Hardwood Forest
- Central Texas: Floodplain Herbaceous Vegetation
- Edwards Plateau: Deciduous Oak - Evergreen Motte and Woodland
- Edwards Plateau: Oak - Hardwood Motte and Woodland

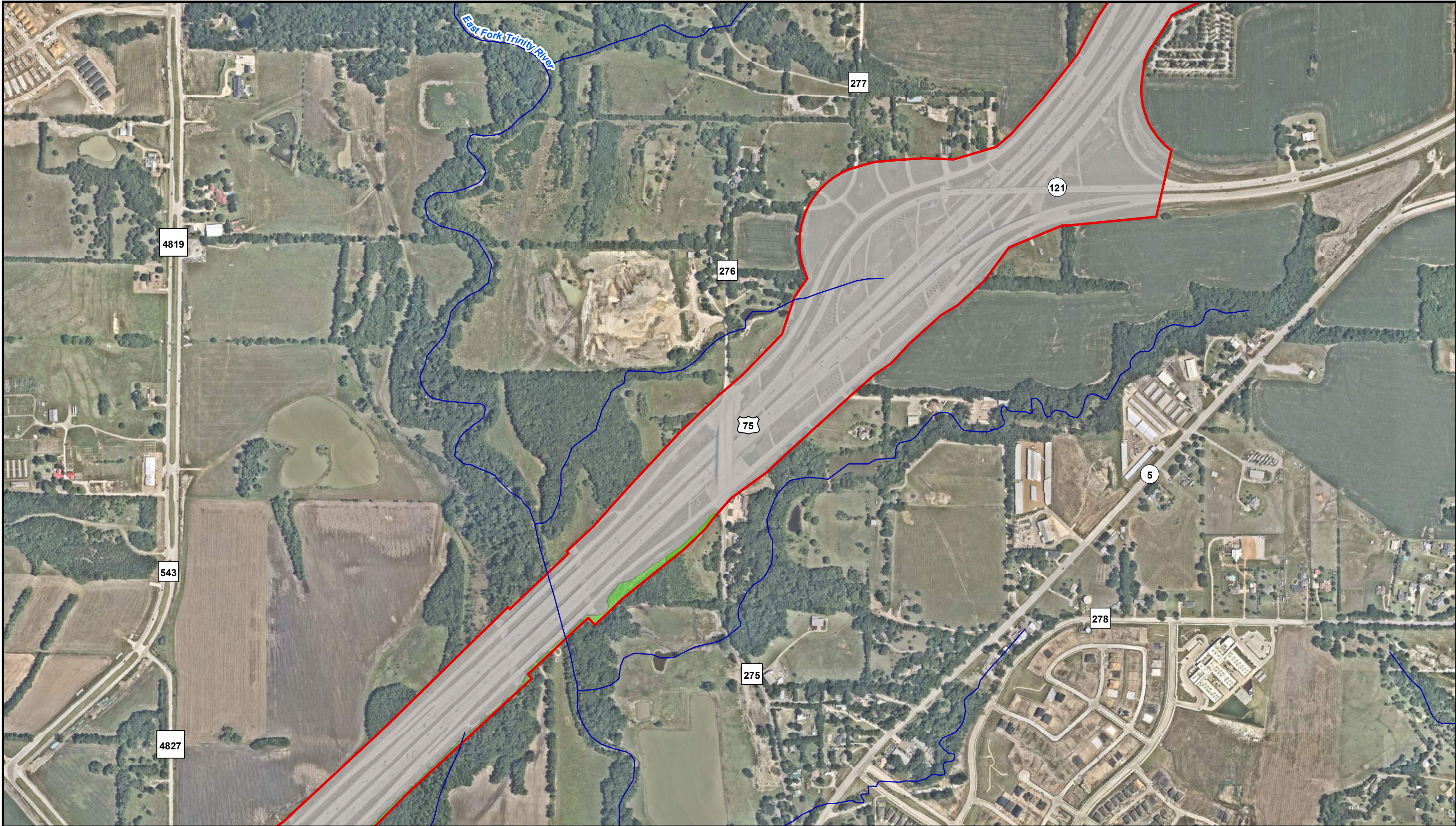
- Edwards Plateau: Savanna Grassland
- Native Invasive: Deciduous Woodland
- Open Water
- Row Crops
- Urban Low Intensity







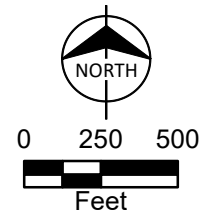
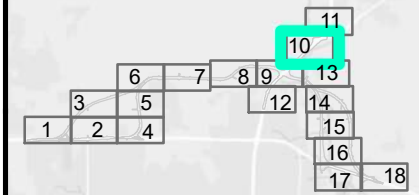
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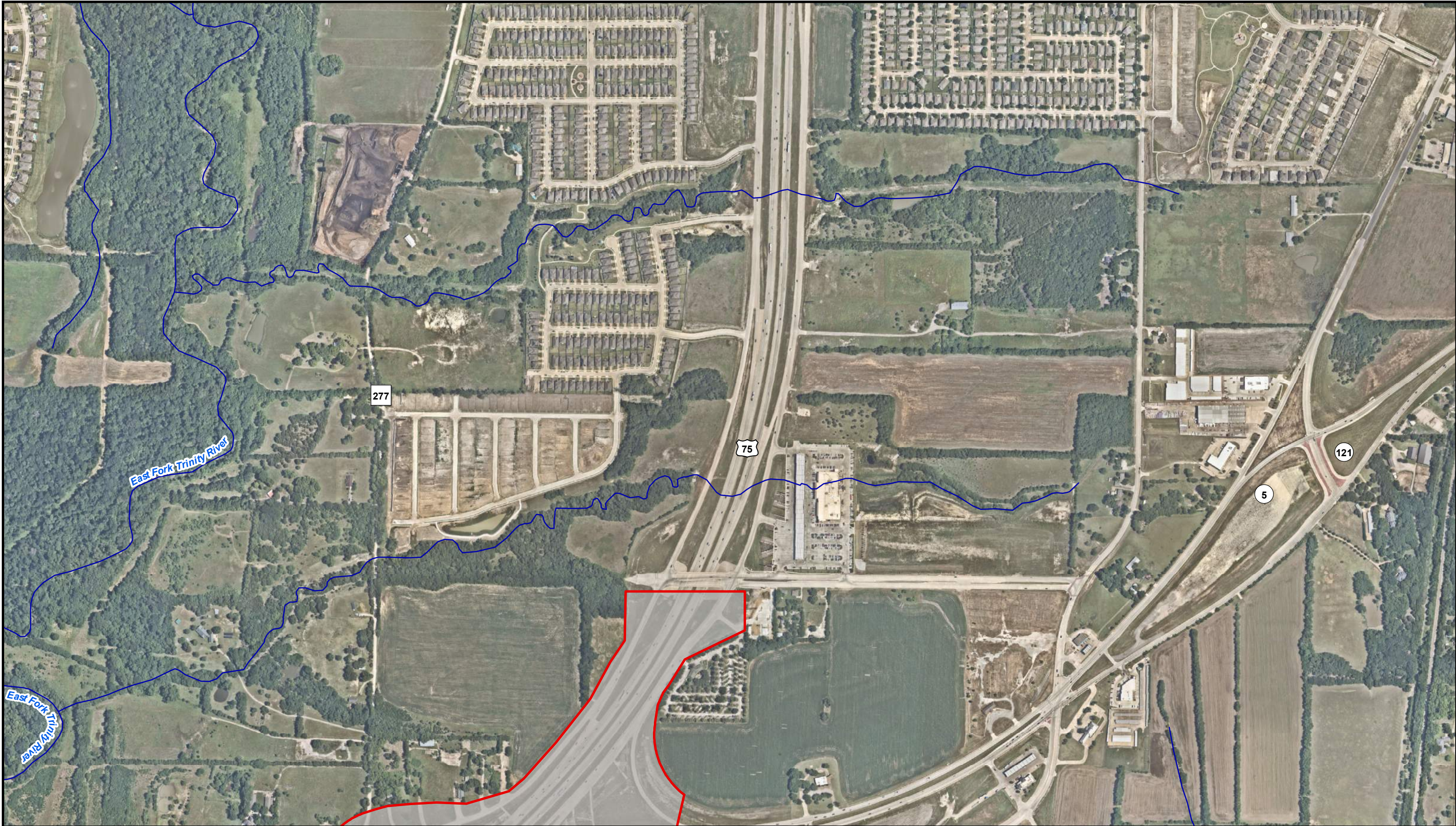
-  Segment E
-  Blackland Prairie: Disturbance or Tame Grassland
-  Central Texas: Floodplain Hardwood Forest
-  Urban Low Intensity



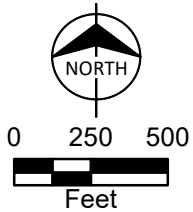
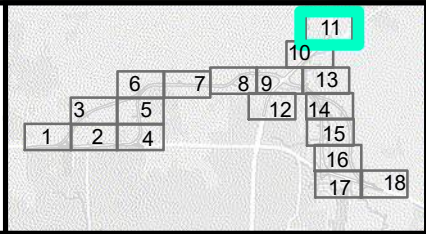
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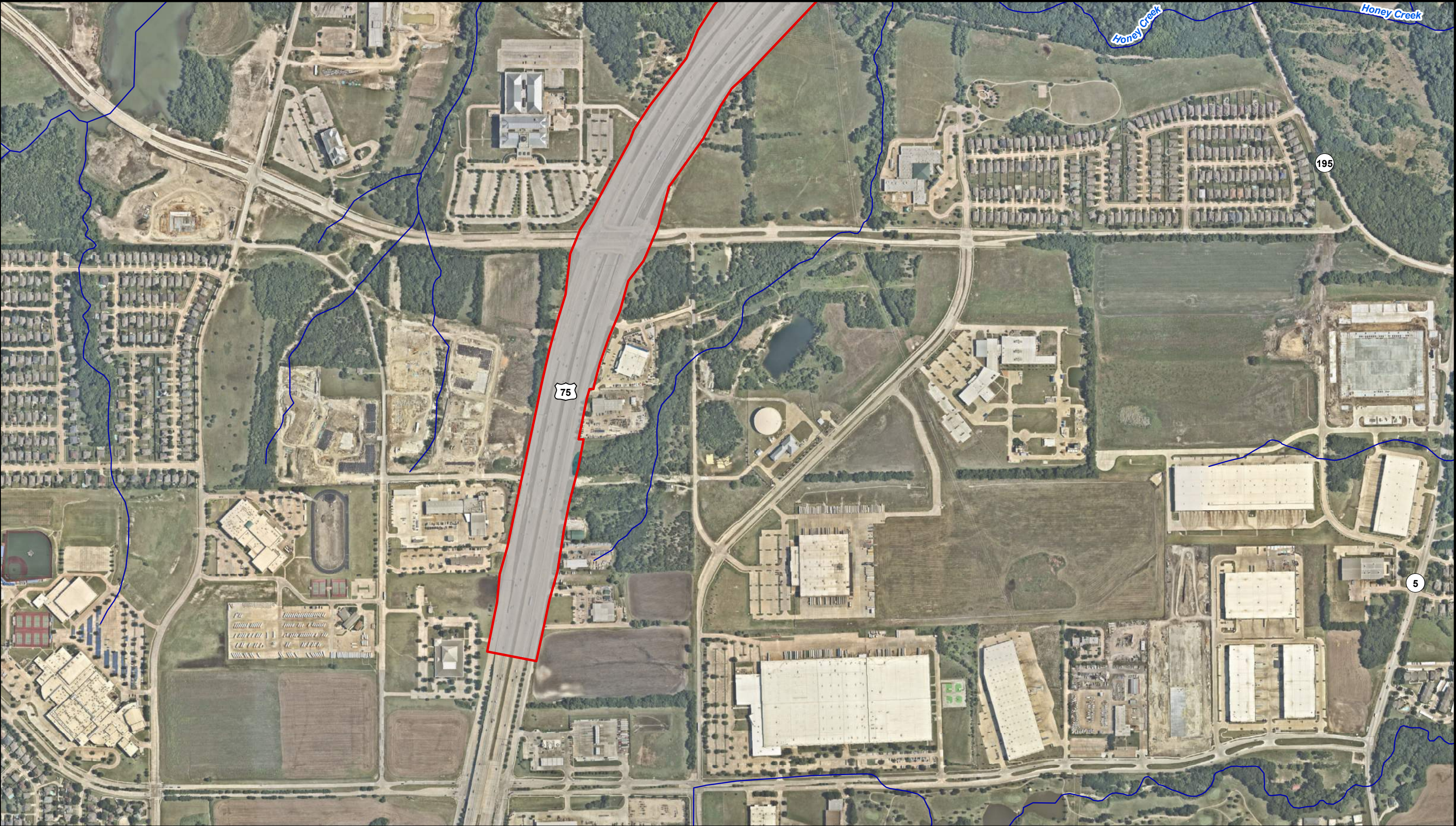
Segment E Urban Low Intensity



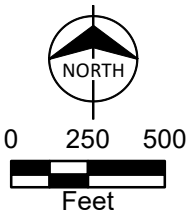
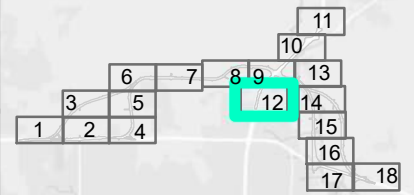
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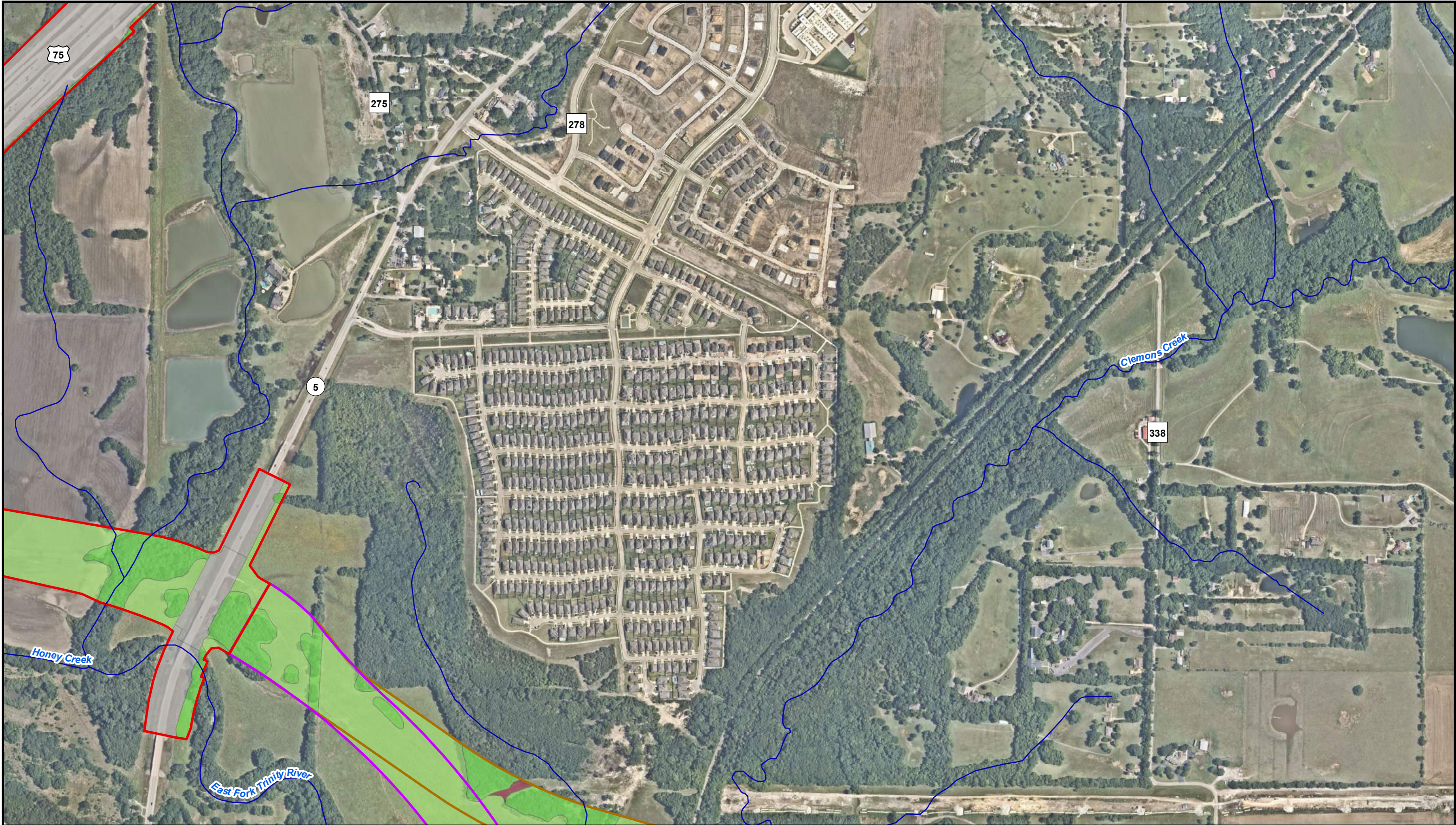
Segment E Native Invasive: Deciduous Woodland Urban Low Intensity










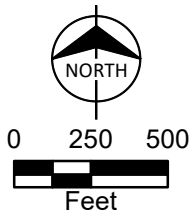
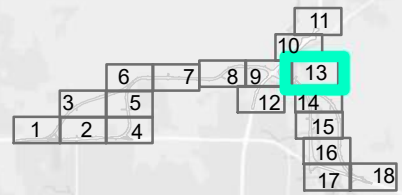
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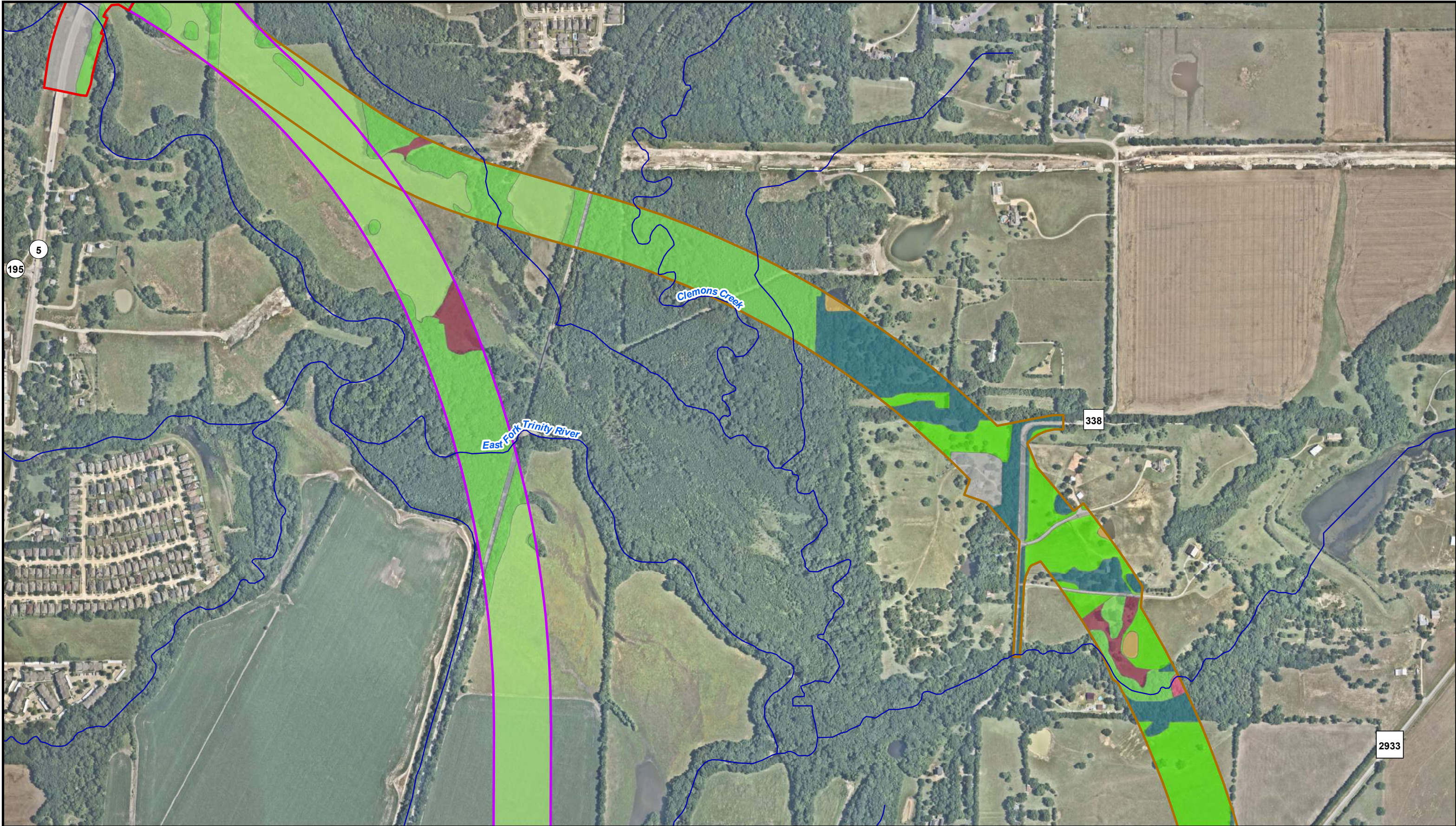
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|--|---|---|
|  Segment C Without Spur |  Central Texas: Floodplain Hardwood Forest       |  Row Crops           |
|  Segment D Without Spur |  Central Texas: Floodplain Herbaceous Vegetation |  Urban Low Intensity |
|  Segment E              |   |   |














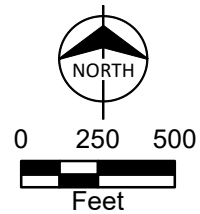
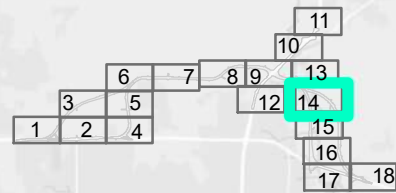
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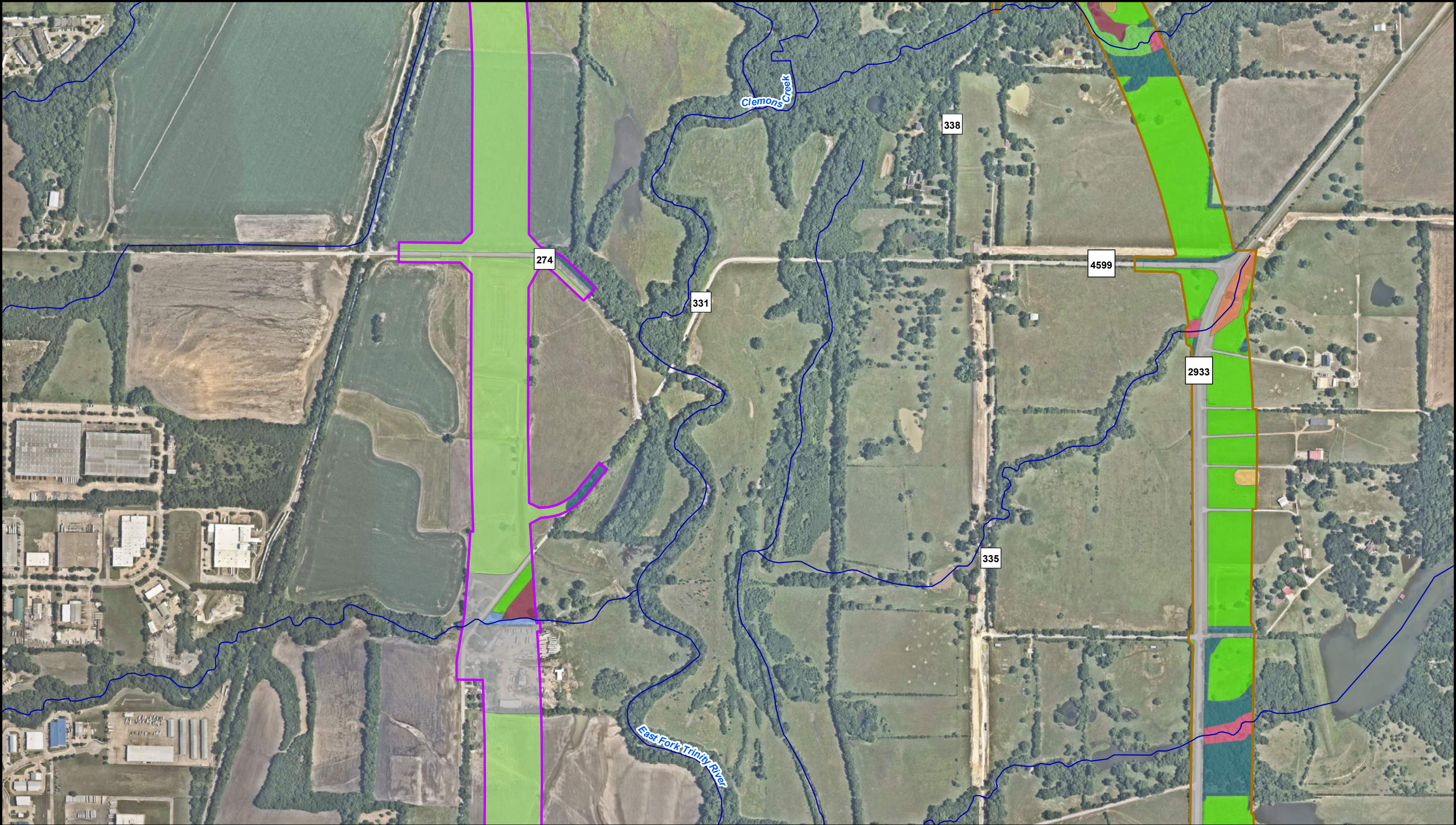
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|  Segment C Without Spur |  Blackland Prairie: Disturbance or Tame Grassland |  Native Invasive: Deciduous Woodland |
|  Segment D Without Spur |  Central Texas: Floodplain Hardwood Forest        |  Open Water                          |
|  Segment E              |  Central Texas: Floodplain Herbaceous Vegetation  |  Row Crops                           |
|  |  Central Texas: Riparian Hardwood Forest          |  Urban Low Intensity                 |



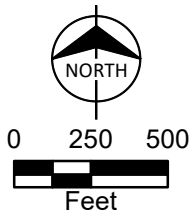
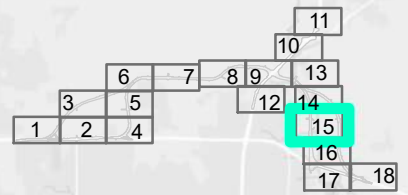
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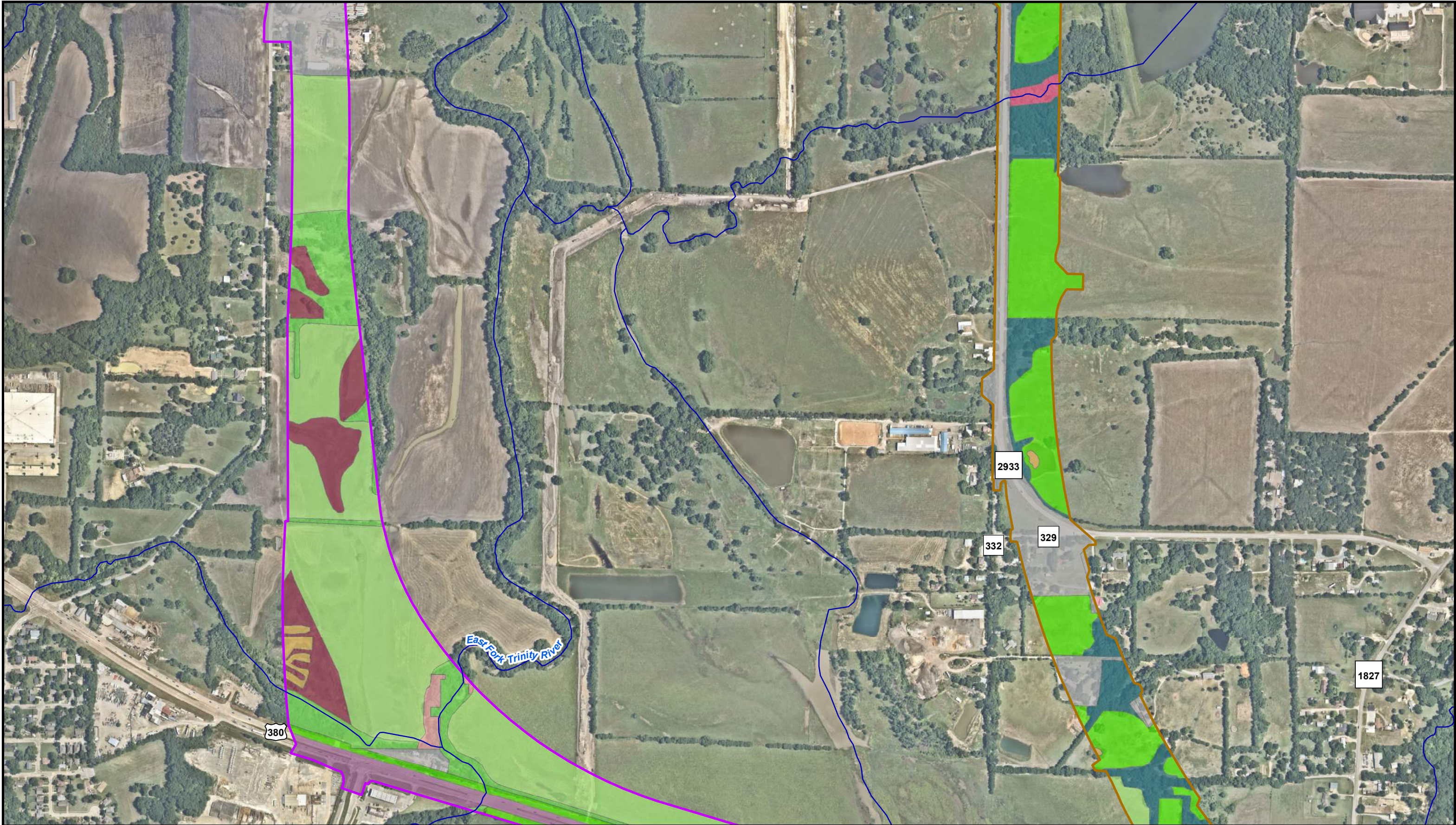


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|------------------------|--|---|
| Segment C Without Spur | Blackland Prairie: Disturbance or Tame Grassland | Central Texas: Riparian Herbaceous Vegetation |
| Segment D Without Spur | Central Texas: Floodplain Hardwood Forest        | Native Invasive: Deciduous Woodland           |
|                        | Central Texas: Floodplain Herbaceous Vegetation  | Open Water                                    |
|                        | Central Texas: Riparian Evergreen Shrubland      | Row Crops                                     |
|                        | Central Texas: Riparian Hardwood Forest          | Urban Low Intensity                           |



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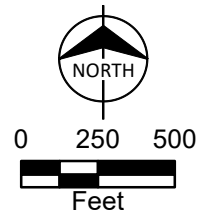
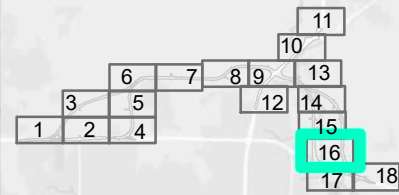




Segment C Without Spur  
Segment D Without Spur

Blackland Prairie: Disturbance or Tame Grassland  
Central Texas: Floodplain Hardwood - Evergreen Forest  
Central Texas: Floodplain Hardwood Forest  
Central Texas: Floodplain Herbaceous Vegetation  
Central Texas: Riparian Hardwood Forest

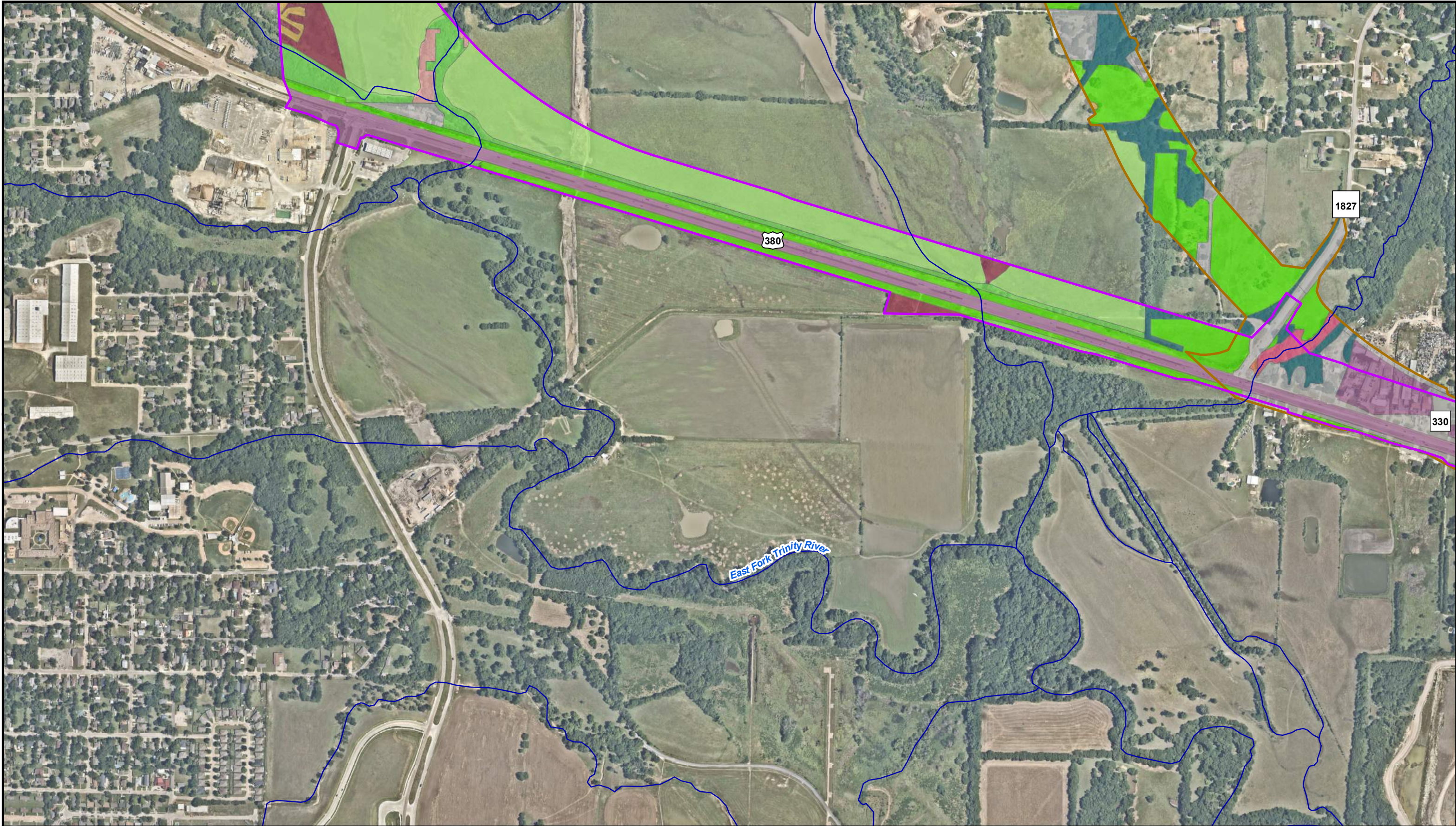
Native Invasive: Deciduous Woodland  
Open Water  
Row Crops  
Urban High Intensity  
Urban Low Intensity



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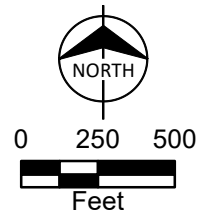
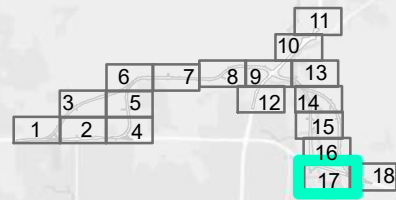
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Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



- Segment C Without Spur
- Segment D Without Spur

- Blackland Prairie: Disturbance or Tame Grassland
- Central Texas: Floodplain Hardwood - Evergreen Forest
- Central Texas: Floodplain Hardwood Forest
- Central Texas: Floodplain Herbaceous Vegetation
- Central Texas: Riparian Hardwood Forest
- Central Texas: Riparian Herbaceous Vegetation

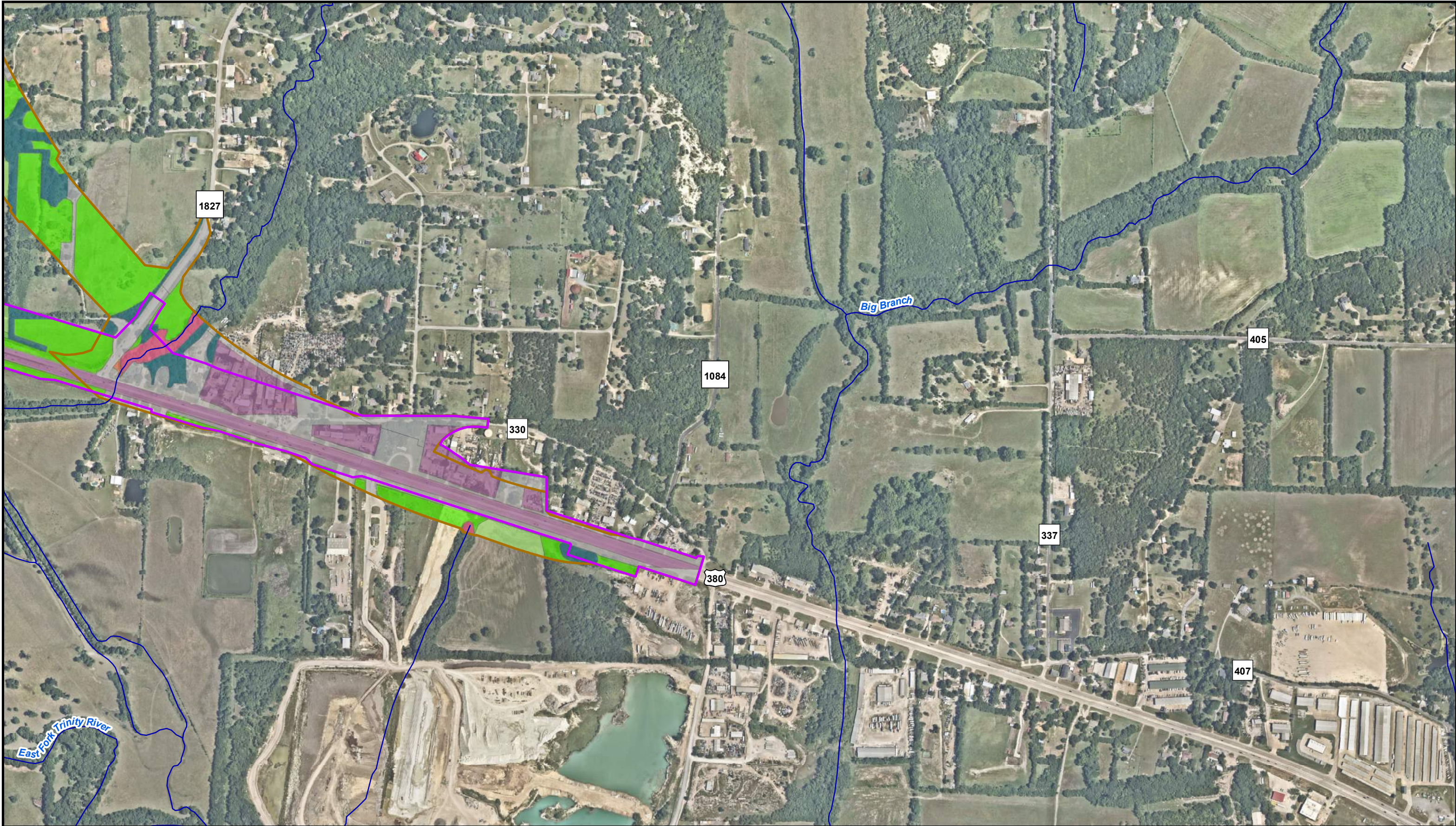
- Native Invasive: Deciduous Woodland
- Open Water
- Row Crops
- Urban High Intensity
- Urban Low Intensity













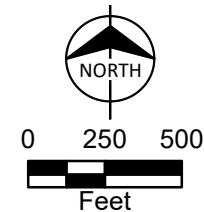
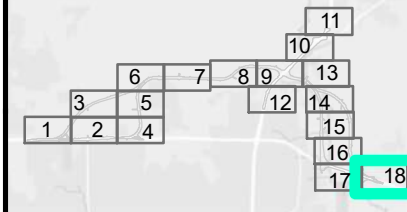
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- |  |  |   |
|--|--|---|
|  Segment C Without Spur |  Blackland Prairie: Disturbance or Tame Grassland |  Native Invasive: Deciduous Woodland |
|  Segment D Without Spur |  Central Texas: Floodplain Hardwood Forest        |  Row Crops                           |
|  |  Central Texas: Riparian Hardwood Forest          |  Urban High Intensity                |
|  |  Central Texas: Riparian Herbaceous Vegetation    |  Urban Low Intensity                 |



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