The following documentation outlines the assumptions for the proposed development associated with the Benns Church Master Plan located in Isle of Wight County, Virginia.

The proposed developments of the master plan consist of the following and are illustrated in **Figure 1**:

- **Turner North**
  - Parcel 1: 3,000 square foot (SF) sit-down restaurant
  - Parcel 2: 3,000 SF quick service restaurant
  - Parcel 3: 3,000 SF quick service restaurant
  - Parcel 4: Drive-in bank with 4 lanes
- **Turner South**
  - Parcel 5: 6,049 SF convenience market with 16 fueling positions
  - Parcel 6: 3,000 SF quick service restaurant
  - Parcel 7: 7,680 SF tire store
  - Parcel 8: 3,235 SF quick service restaurant
  - Parcel 9: 3,000 SF quick service restaurant
  - Parcel 10: 28,000 SF of retail space
  - Parcel 11: 21,500 SF of medical office space
  - Parcel 12: 108,000 SF of climate controlled self-storage space

The known proposed developments are located on the west side of Benns Church Boulevard (U.S. Route 258/State Route 10) between Cypress Run Drive and Red Oak Drive.

Study Area

The study area consists of the following existing intersections, as shown in **Figure 2**:

1. Benns Church Boulevard (U.S. Route 258/State Route 10) at Cypress Run Drive *(Signalized)*
2. Benns Church Boulevard at Tractor Supply Entrance *(Unsignalized – Right-In/Right-Out)*
3. Benns Church Boulevard at Turner Drive (State Route 644) *(Signalized)*
4. Benns Church Boulevard at Red Oak Drive *(Unsignalized – Full Movement)*

The following proposed development driveways are also included in the study area as shown in **Figure 2**. The appropriate intersection access and control will be identified as part of the traffic analysis scenarios.

5. Benns Church Boulevard at Site Driveway #1
6. Benns Church Boulevard at Site Driveway #2
7. Benns Church Boulevard at Site Driveway #3
8. Tractor Supply Entrance at Site Driveway #4
9. Turner Drive at Site Driveway #5
10. Tractor Supply Entrance at Site Driveway #6

Data Collection

Kimley-Horn requests that Isle of Wight County and/or VDOT provide any recent intersection or roadway traffic count data from studies previously completed within the study area. Kimley-Horn will use the turning movement count (TMC) data, collected in August 2021, as part of the *Wawa Convenience Market Development Traffic Impact Analysis*, completed April 2022 for the following two (2) intersections:

- Benns Church Boulevard at Turner Drive *(Signalized)*
- Benns Church Boulevard at Cypress Run Dr *(Signalized)*

Kimley-Horn will use the existing traffic volumes adjusted for COVID-19 impacts consistent with the *Wawa Convenience Market Development Traffic Impact Analysis*.

In addition, Kimley-Horn will use the June 2022 traffic volumes collected by Isle of Wight County at the intersection of Benns Church Boulevard at Red Oak Drive. Recent traffic volume counts are not available for the Tractor Supply Entrance intersection; therefore, Kimley-Horn will determine the intersection traffic volumes by using calculated trip generation for the existing land uses.

Current traffic signal timing and phasing data will be provided by VDOT for all signalized intersections in the study area.

The AM (7:15 AM – 8:15 AM) and the PM (4:15 PM – 5:15 PM) peak hours, identified as part of the *Wawa Convenience Market Development Traffic Impact Analysis,* will be used for this TIA.

Volume Development

It is proposed that a growth rate of 1.5% per year (applied exponentially) be used for adjusting the projected background traffic volumes for all turning movements. This growth rate was determined by reviewing the County average growth rate from VDOT as well as input from Isle of Wight County.

In addition, the following additional developments will be included in the future projected traffic volumes, as shown in **Figure 3**:

- Town of Smithfield Development:
  - Benns Church Retail North – retail commercial
  - Canteberry – retail commercial
  - Cypress Run North – low density and attached residential and retail commercial
  - Cypress Run South – low density residential
  - Gwaltney Pointe – low density and multi-family residential and retail commercial
- Smithfield Intermediate School – approximate 400 pupil school
- Sweetgrass
  - 390 single-family detached housing dwelling units
  - 225 multi-family housing dwelling units
  - 35,000 square foot shopping center

Kimley-Horn will use the following completed or on-going studies for the trip generation, distribution, and assignment of these developments:

- *Town of Smithfield Intersection Improvement Alternatives Analysis* (February 2019)
- *Yeoman's Tract Traffic Impact Study (Sweetgrass)* (On-going)

Proposed Land Use

A conceptual master plan is included with these assumptions in **Figure 1.** Kimley-Horn will use *ITE Trip Generation 10th Edition* (2017) Trip Generation Rates and Land Uses for the proposed developments. Trip generation calculations for the proposed developments are shown in **Table 1**.

Table 1: Proposed Trip Generation for the Proposed Developments

Parcel ID	ITE Code	ITE Description	Density	Unit	Daily	AM Peak Hour			PM Peak Hour		
						Total	In	Out	Total	In	Out
NORTH											
1	932	High-Turnover (Sit-Down) Restaurant	3,000	SF	337	30	17	13	29	18	11
2	934	Fast Food Restaurant with Drive-Through Window	3,000	SF	1,413	121	62	59	98	51	47
3	934	Fast Food Restaurant with Drive-Through Window	3,000	SF	1,413	121	62	59	98	51	47
4	912	Drive-In Bank	4	Lanes	499	35	21	14	109	53	56
New External Site Trips					*3,662*	*307*	*162*	*145*	*334*	*173*	*161*
Parcel 1: Code 932 Pass-by (43% PM)					*0*	*0*	*0*	*0*	*(12)*	*(8)*	*(4)*
Parcel 2: Code 934 Pass-by (49% AM, 50% PM)					*0*	*(59)*	*(30)*	*(29)*	*(49)*	*(26)*	*(23)*
Parcel 3: Code 934 Pass-by (49% AM, 50% PM)					*0*	*(59)*	*(30)*	*(29)*	*(49)*	*(26)*	*(23)*
Parcel 4: Code 912 Pass-by (29% AM, 35% PM)					*0*	*(8)*	*(5)*	*(3)*	*(21)*	*(11)*	*(10)*
New Driveway Trips					3,662	181	97	84	203	102	101
SOUTH											
5	960	Super Convenience Market/Gas Station	Average		4,378	508	254	254	393	197	196
6	934	Fast Food Restaurant with Drive-Through Window	3,000	SF	1,413	121	62	59	98	51	47
7	848	Tire Store	7,680	SF	219	21	13	8	31	13	18
8	934	Fast Food Restaurant with Drive-Through Window	3,235	SF	1,524	130	66	64	106	55	51
9	934	Fast Food Restaurant with Drive-Through Window	3,000	SF	1,413	121	62	59	98	51	47
10	822	Strip Retail Plaza (Less than 40,000 SF)*	28,000	SF	1,411	66	40	26	162	81	81
11	720	Medical-Dental Office Building	21,500	SF	738	57	44	13	75	21	54
12	151	Mini-Warehouse	108,000	SF	163	11	7	4	18	8	10
New Site Trips					11,259	1,035	548	487	981	477	504
Internal Capture (25%)					*(1,680)*	*(129)*	*(72)*	*(57)*	*(143)*	*(68)*	*(75)*
New External Site Trips					*9,579*	*906*	*476*	*430*	*838*	*409*	429
Parcel 5: Code 960 Pass-by (63% AM, 66% PM)					*0*	*(320)*	*(160)*	*(160)*	*(259)*	*(130)*	*(129)*
Parcel 6: Code 934 Pass-By (49% AM, 50% PM)					*0*	*(59)*	*(30)*	*(29)*	*(49)*	*(26)*	*(23)*
Parcel 7: Code 848 Pass-By (28% PM)					*0*	*0*	*0*	*0*	*(9)*	*(4)*	*(5)*
Parcel 8: Code 934 Pass-By (49% AM, 50% PM)					*0*	*(64)*	*(31)*	*(31)*	*(53)*	*(28)*	*(25)*
Parcel 9: Code 934 Pass-By (49% AM, 50% PM)					*0*	*(59)*	*(30)*	*(29)*	*(49)*	*(26)*	*(23)*
Parcel 10: Code 822 Pass-By (40% PM)					*0*	*0*	*0*	*0*	*(65)*	*(32)*	*(33)*
New Driveway Trips					9,579	404	225	181	354	163	191
TOTAL New Driveway Site Trips					13,241	585	322	265	557	265	292

Source: ITE Trip Generation Manual, 10th Edition, (2017)
Pass-by percentages using ITE Trip Generation Handbook, 3rd Edition (2017)
**Strip Retail Plaza trips estimated using the ITE Trip Generation Manual, 11th Edition, (2021)*

Analysis Years

The proposed development is anticipated to be completed in 2026. Therefore, the following analysis scenarios for the AM and PM peak hours will be studied as part of this master plan. **Figure 4** through **Figure 6** graphically depict the Build traffic analysis scenarios and associated components (e.g., site driveways and roadway connections).

- **Scenario 1 – Existing (2022) traffic conditions**
- **Scenario 2 – Interim Year (2025) No-Build conditions**
  - Interim year traffic conditions with a future growth rate applied to approved base year traffic volumes but without traffic volumes generated by the proposed developments
- **Scenario 3 – Interim Year (2025) Build conditions (Figure 4)**
  - Interim year traffic conditions with a future growth rate applied to approved base year traffic volumes with traffic volumes generated by the following proposed developments.
    - Turner North – Parcels 2 and 4
    - Turner South – Parcels 5 and 12
    - Full build-out of public road
    - 30% of Smithfield Development traffic
    - Smithfield Intermediate School traffic
    - Smithfield High School roadway connection
    - Cypress Run South connection
- **Scenario 4 – Future Year (2026) Build conditions (Figure 5)**
  - Future year traffic conditions with a future growth rate applied to approved base year traffic volumes with traffic volumes generated by the following proposed developments.
    - Full build-out of Turner North – Parcels 1 and 3
    - Full build-out of Turner South – Parcels 6, 7, 8, 9, 10, and 11
    - Full build-out of Sweetgrass with proposed roadway and intersection improvements (e.g., traffic signal)
- **Scenario 5 – Horizon Year (2045) Build conditions (Figure 6)**
  - Future year traffic conditions with a future growth rate applied to approved base year traffic volumes with traffic volumes generated by the following proposed developments.
    - Full build-out of Smithfield Development traffic

Site Trip Distributions

Site trip distributions from the *Wawa Convenience Market Development Traffic Impact Analysis* will be used for this TIA which were determined from available traffic data, anticipated routes for vehicles entering and exiting the proposed development site, and a general familiarity of the study area. Proposed regional trip distributions determined for the proposed development are listed below. **Figure 7** and **Figure 8** display the trip distribution and assignment for the proposed development.

- To/from the west on Turner Drive – **20%**
- To/from the north on Benns Church Boulevard – **40%**
- To/from the south on Benns Church Boulevard – **40%**

Kimley-Horn will use the aforementioned studies for the trip distribution and assignment of the additional developments.

Recommendations

General recommendations for necessary capacity and operational improvements will be developed for the study area intersections, roadways, and site access driveways. Kimley-horn will then determine the need for more specific laneage or traffic control improvements (e.g., turn lanes, storage lane lengths, roundabouts, traffic signals, traffic signal timing modifications, etc.) at study intersections directly impacted by the proposed development.

For the purposes of this study, the following intersection control conditions will be held constant in support of the proposed development:

- Study Intersection 3: Benns Church Boulevard at Turner Drive
  - Maintain signalization at this intersection
- Study Intersection 6: Benns Church Boulevard at Site Driveway #2
  - Proposed right-in/right-out access
- Study Intersection 9: Turner Drive and Site Driveway #5
  - Proposed unsignalized, full-access intersection or single-lane roundabout

Traffic Signal Warrant Analysis

Kimley-Horn will use the *Manual of Uniform Traffic Control Devices (MUTCD)*, to analyze the signal warrants at up to two applicable study intersections.

To evaluate the need for signalized intersection operations, we will use the traffic volume data along with the projected traffic volumes. The traffic signal warrant analyses will adhere to *MUTCD* signal warrant guidelines.

Turn-Lane Warrant Analysis

Kimley-Horn will utilize the volume data collected along with the projected traffic to perform a turn-lane warrant analyses at up to five applicable study intersections with methodologies shown in Appendix C of the VDOT *Road Design Manual* as well as guidelines provided in Appendix F of the *VDOT Access Management Design Standards for Entrances and Intersections*. Should the turn-lane(s) be warranted, recommendations for storage length and taper length will be provided.

Traffic Operations Analysis

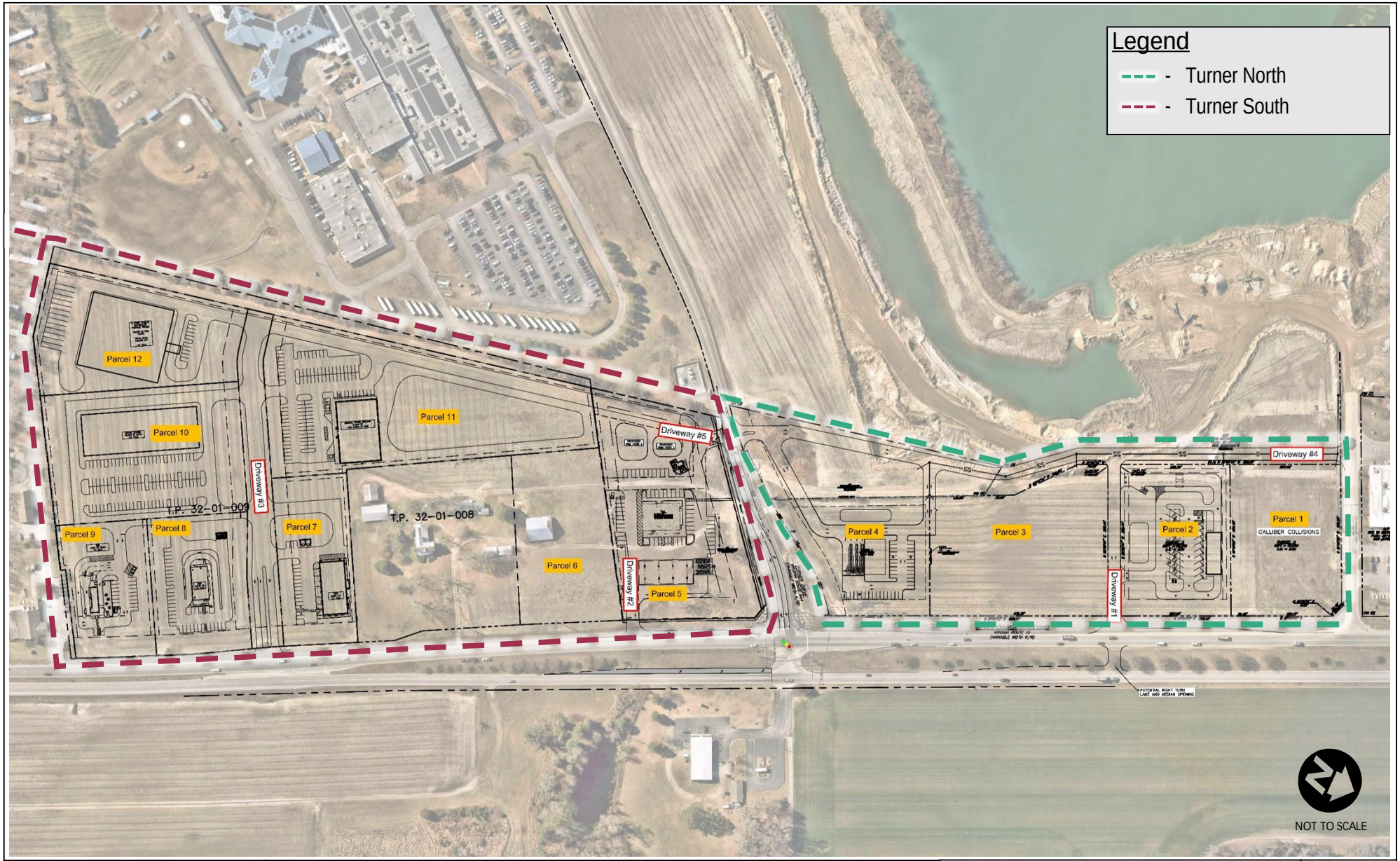
Based on discussions with VDOT, operational analyses for the study area intersections will be conducted using traffic analysis tools (e.g., *Synchro 11.1 Professional*, SimTraffic 11.1) and Highway Capacity Manual (HCM) methodologies. The future conditions analyses will confirm the need and define the geometric configurations necessary for the proposed roadway and intersection operational or capacity improvements (e.g., signal timing adjustments, exclusive turn-lane storage and taper, etc.).

Measures of effectiveness that will be reported for each scenario will consist of delay per vehicle, level of service (LOS), and maximum queue lengths. These measures of effectiveness will be presented in tables and figures. Vehicle delay and LOS will be summarized by movement, approach, and overall intersection, while maximum queue lengths will be summarized for each movement.

Reporting

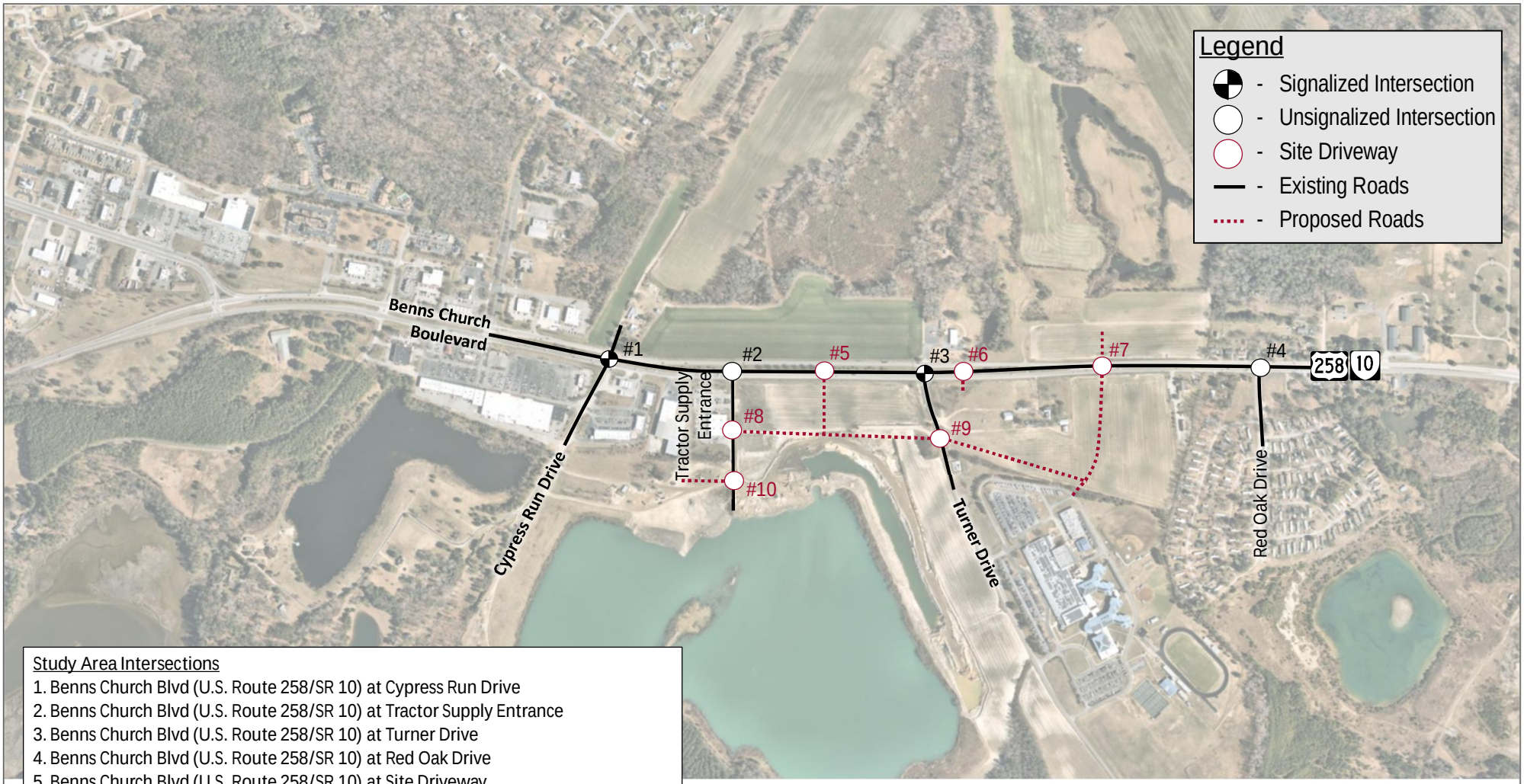
A TIA report with an accompanying technical appendix (including all analysis files) will be prepared that summarizes the analysis methodology and results. There will be two (2) electronic submittals of the technical report – DRAFT and FINAL (including supporting analytical files). Two rounds of comprehensive comments will be addressed with each report submittal through conference call. This study assumes that all deliverables will be electronic submittals (PDF report and all supporting analytical files).

Supporting Figures



Kimley»Horn	Benns Church Master Plan Isle of Wight, Virginia	Conceptual Master Plan	Figure 1

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Study Area Intersections

1. Benns Church Blvd (U.S. Route 258/SR 10) at Cypress Run Drive
2. Benns Church Blvd (U.S. Route 258/SR 10) at Tractor Supply Entrance
3. Benns Church Blvd (U.S. Route 258/SR 10) at Turner Drive
4. Benns Church Blvd (U.S. Route 258/SR 10) at Red Oak Drive
5. Benns Church Blvd (U.S. Route 258/SR 10) at Site Driveway
6. Benns Church Blvd (U.S. Route 258/SR 10) at Site Driveway
7. Benns Church Blvd (U.S. Route 258/SR 10) at Site Driveway/Sweetgrass Driveway
8. Tractor Supply Entrance at Site Driveway
9. Turner Drive at Site Driveway
10. Tractor Supply Entrance at Site Driveway

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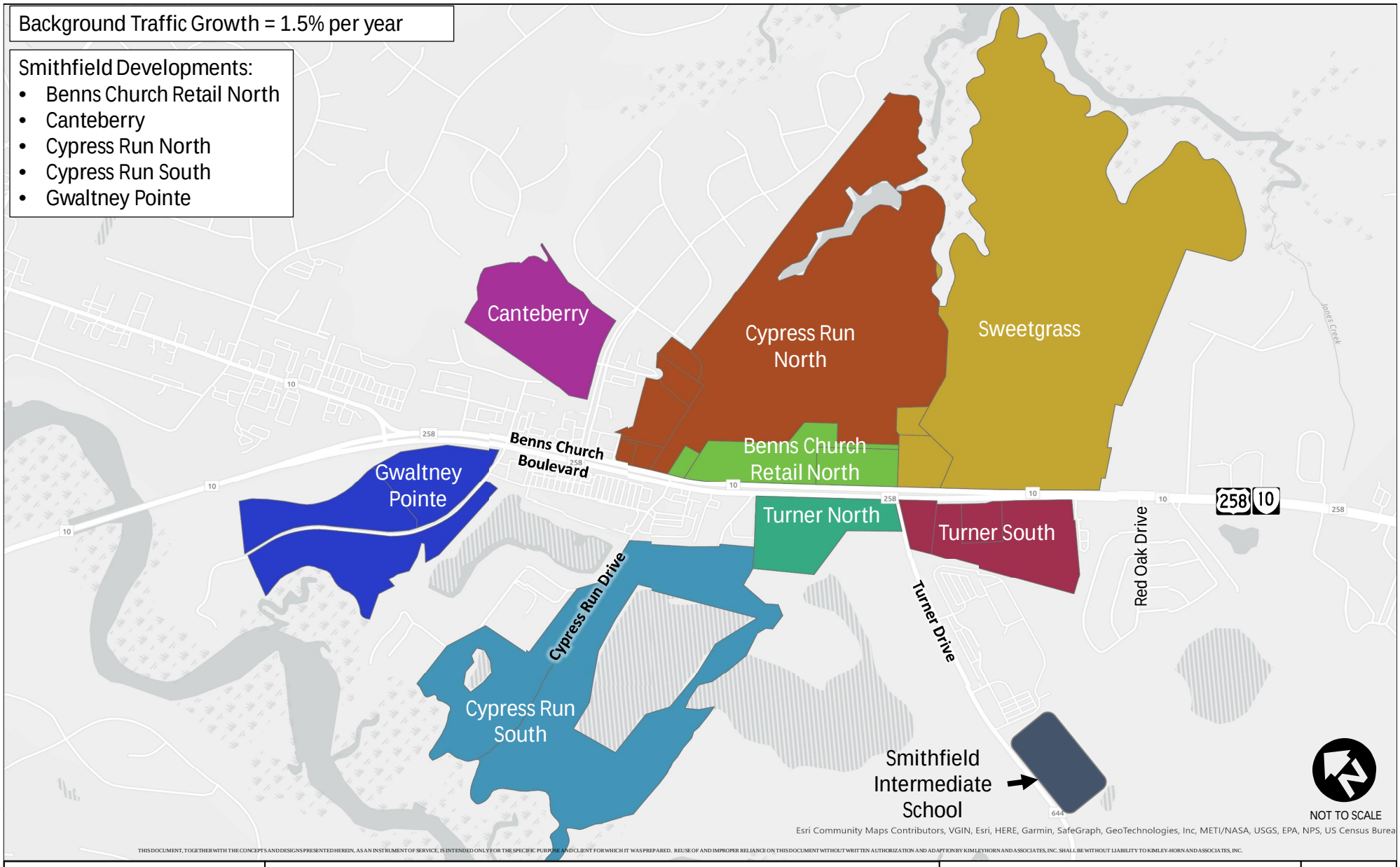
Kimley»Horn	Benns Church Master Plan Isle of Wight, Virginia	Study Area	Figure 2

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Background Traffic Growth = 1.5% per year

Smithfield Developments:

- Benns Church Retail North
- Canteberry
- Cypress Run North
- Cypress Run South
- Gwaltney Pointe

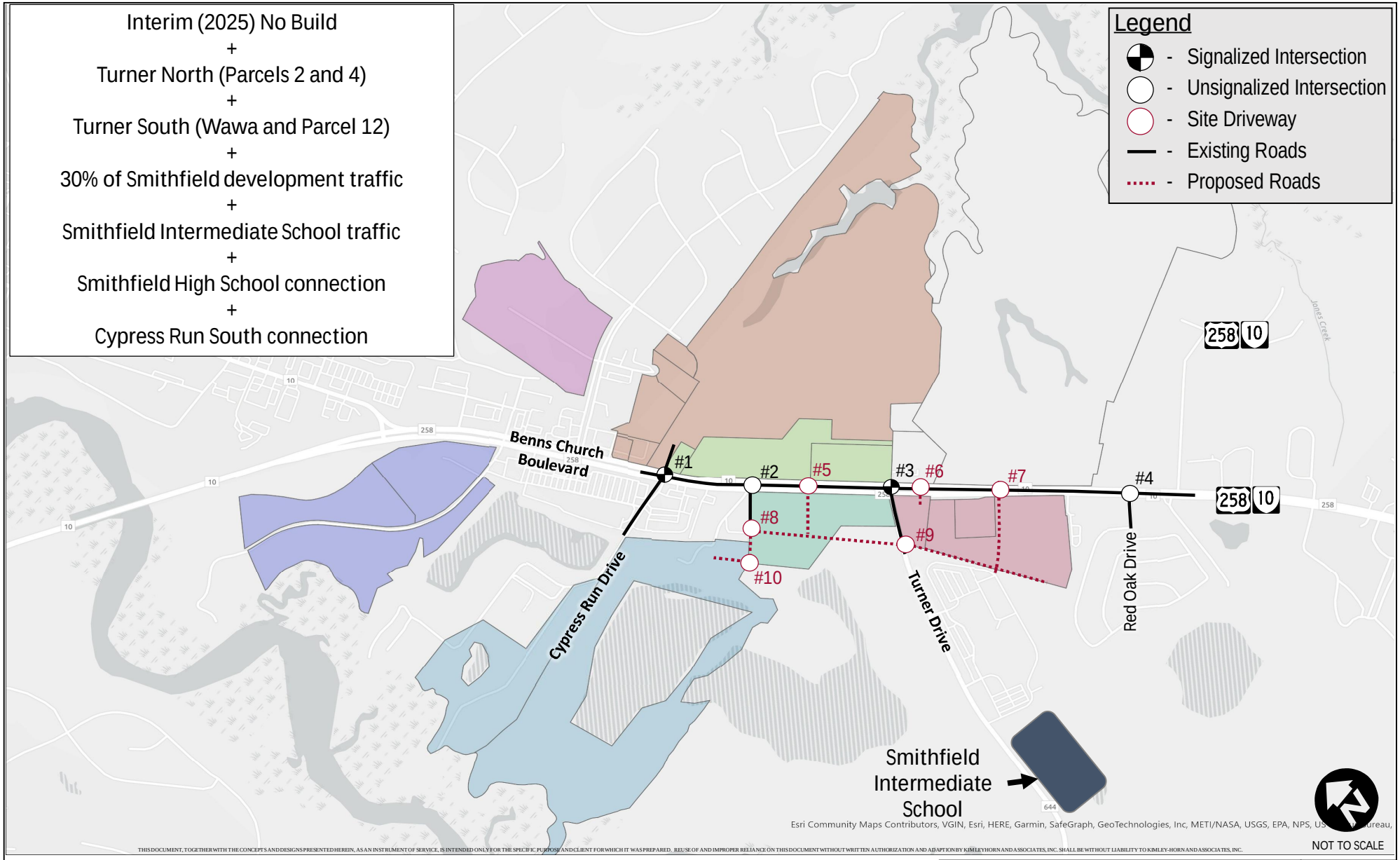


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Kimley»Horn	Benns Church Master Plan Isle of Wight, Virginia	Projected Traffic Volumes	Figure 3

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Interim (2025) No Build
+
Turner North (Parcels 2 and 4)
+
Turner South (Wawa and Parcel 12)
+
30% of Smithfield development traffic
+
Smithfield Intermediate School traffic
+
Smithfield High School connection
+
Cypress Run South connection

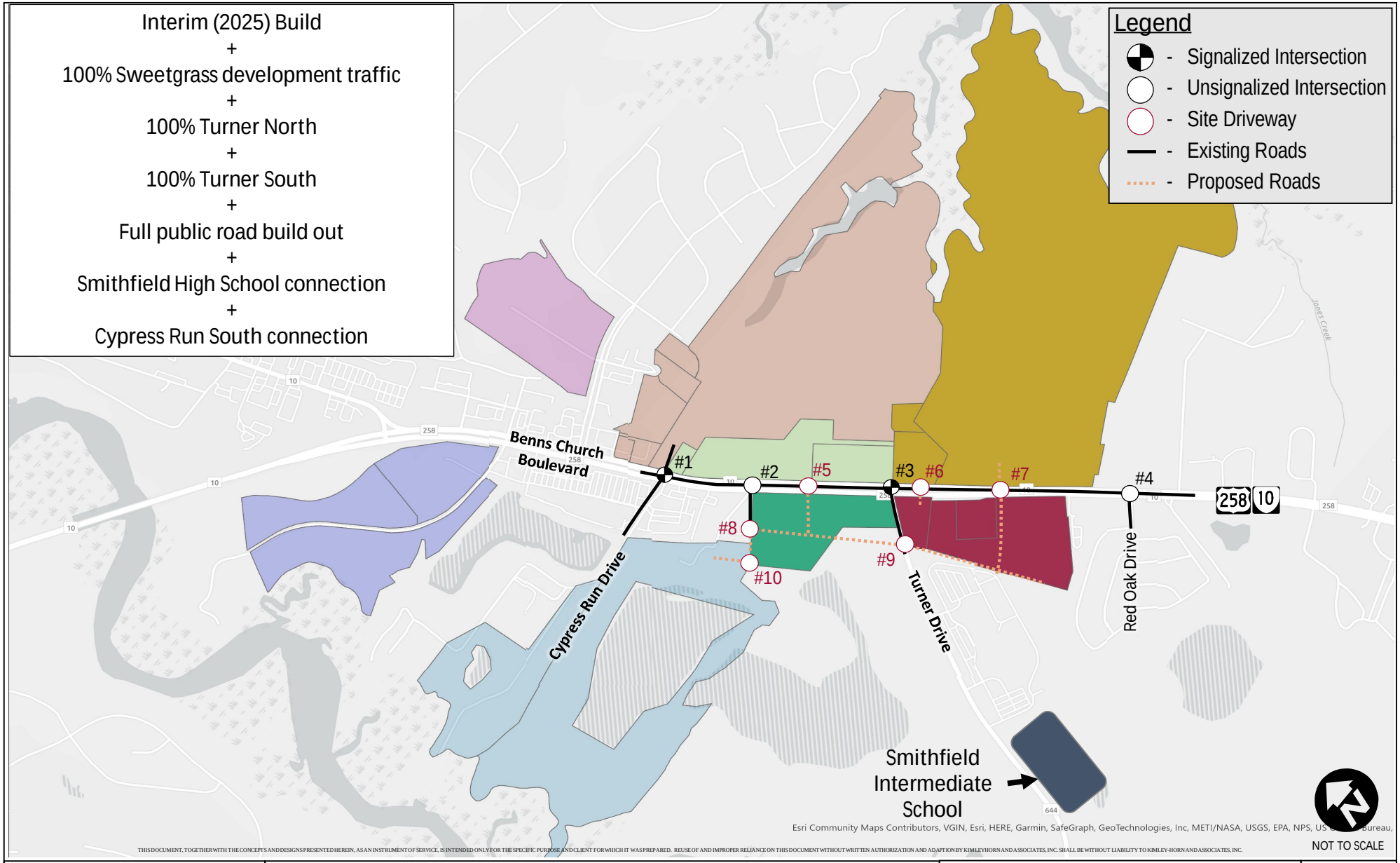


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Kimley»Horn	Benns Church Master Plan Isle of Wight, Virginia	Interim (2025) Build Conditions	Figure 4

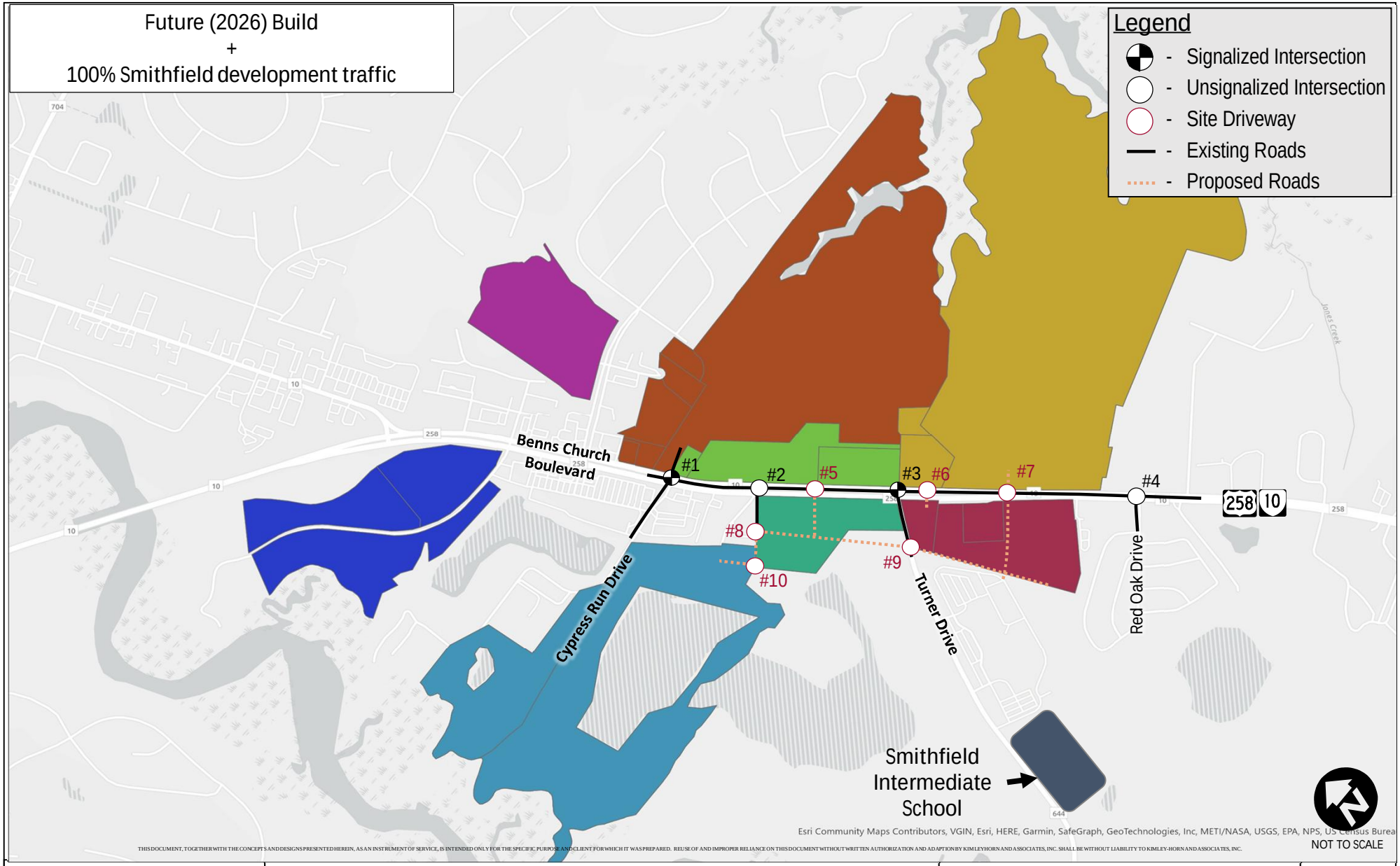
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Kimley»Horn	Benns Church Master Plan Isle of Wight, Virginia	Future (2026) Build Conditions	Figure 5

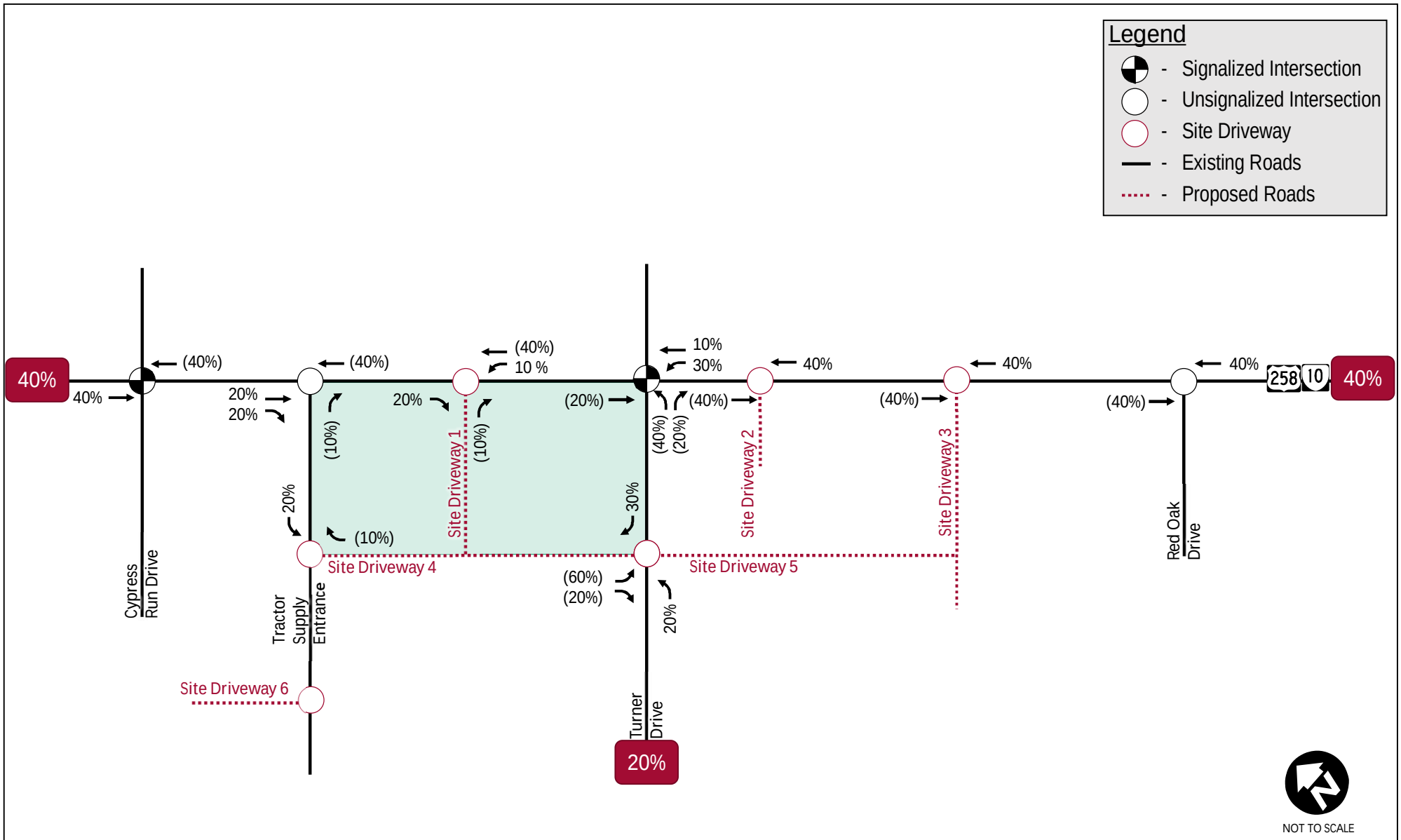
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Kimley»Horn	Benns Church Master Plan Isle of Wight, Virginia	Horizon (2045) Build Conditions	Figure 6

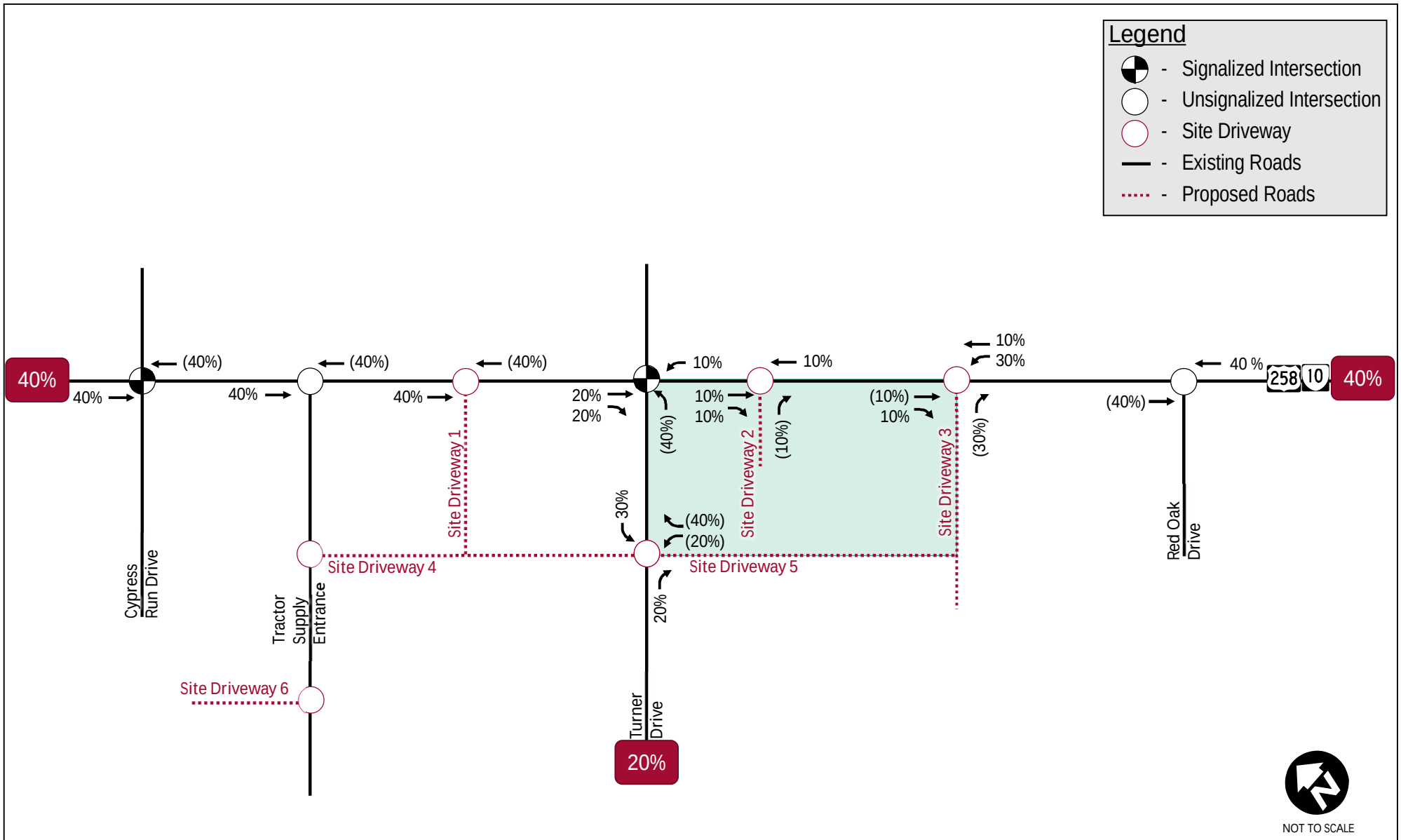
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Kimley»Horn	Benns Church Master Plan Isle of Wight, Virginia	Build Trip Distribution and Assignment – Turner North	Figure 7

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Kimley»Horn	Benns Church Master Plan Isle of Wight, Virginia	Build Trip Distribution and Assignment – Turner South	Figure 8

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