Traffic & Route Evaluation Study

Wolf Hills Solar

Washington County, Virginia

May 2024

Prepared For:

Catalyst Energy

TIMMONS GROUP
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Washington County, Virginia

Prepared For:

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1 PROJECT OVERVIEW

Timmons Group, at the request of Catalyst Energy, completed a transportation assessment for the proposed Wolf Hills Solar Project, located in Washington County, Virginia. This work has been prepared to identify potential transportation issues associated with the construction and operation phases of the proposed project. The tasks associated with this assessment included:

- Review of data and documents provided by the Client relative to the project;
- Coordination with the Client on access, schedule, and other parameters that are reflected in the traffic assessment;
- Obtaining available geometric (roadway widths, intersection control, etc.) and speed limit data that is readily available via a review of available aerial imagery through Google Earth, Bing, or County GIS systems as well as field imagery obtained in May of 2024;
- Obtaining available VDOT traffic data for those roads adjacent to the site;
- Preparing a five-year crash analysis along the potential traffic routes using available VDOT data; and
- Preparing a narrative summarizing existing intersection conditions, traffic along the adjacent roadway network, and anticipated impacts associated with the site traffic along with potential mitigation measures.

2 EXISTING CONDITIONS

Timmons Group compiled roadway characteristics, existing structures (bridges and culverts), and publicly available crash data for facilities adjacent to the proposed Wolf Hills Solar Project in Washington County, Virginia.

The project location along with the site entrances and proposed haul route can be found in Figure 1 (all figures are located at the end of the report) and the project location with the study intersections can be found in Figure 2. A preliminary site layout can be found in Figure 3.

ADJACENT ROADWAYS

US Route 19 (Lee Highway) is a three-lane facility that consists of two (2) travel lanes and a center two-way left-turn lane (TWLTL). It is an undivided highway with a functional classification of minor arterial with a limit of 55 MPH. According to 2022 VDOT AADT data, US Route 19 services approximately 7,900 vehicles per day between the Bristol City Line and Industrial Park Road and approximately 7,200 vehicles per day between Industrial Park Road and Astor Road.

Industrial Park Road (Route 1717) is a two-lane, undivided facility with a functional classification of major collector and a posted speed limit of 35 MPH. According to 2022 VDOT AADT data, Industrial Park Road services approximately 2,000 vehicles per day on average between US Route 19 and Wallace Pike.

Bordwine Road (Route 625) is a two-lane, undivided facility with a functional classification of minor collector and a posted speed limit of 35 MPH. According to 2022 VDOT AADT data, Bordwine Road services approximately 1,500 vehicles per day between Wallace Pike and US Route 19.

Wallace Pike (Route 645) is a two-lane, undivided facility with a functional classification of major collector and a posted speed limit of 40 MPH. According to 2022 VDOT AADT data, Wallace Pike services approximately 2,400 vehicles per day.

Wyndale Road (Route 848) is a two-lane, undivided facility with a functional classification of minor collector and a posted speed limit of 55 MPH. According to 2022 VDOT AADT data, Wyndale Road services 1,500 vehicles per day.

Reedy Creek Road (Route 657) is a two-lane, undivided facility with a functional classification of minor collector and a posted speed limit of 45 MPH. According to 2022 VDOT AADT data, Reedy Creek Road services approximately 500 vehicles per day in the vicinity of the site.

Black Hollow Road (Route 633) is a two-lane, undivided facility with a functional classification of major collector with a posted speed limit of 35 MPH. According to 2022 VDOT AADT data, Black Hollow Road services approximately 1,000 vehicles per day between Wallace Pike and Reedy Creek Road.

Childress Hollow Road (Route 614) is a two-lane, undivided, local road with a posted speed limit of 35 mph. According to 2022 VDOT AADT data, Childress Hollow Road services approximately 100 vehicles per day between Black Hollow Road and Spring Valley Road.

EXISTING STRUCTURES AND RAILROAD CROSSING

There is one (1) at-grade railroad crossing adjacent to the Wallace Pike/Bordwine Road intersection as shown in Figure 4. The crossing is outfitted with gates and warning signals along with pavement markings (centerline and stop bars) on each approach; no signage is posted alerting drivers to approach grades or limited clearance. The pavement over the railroad crossing is 24' wide. Photos of the railroad crossing can be found in Figure 5.

There are five (5) existing structures in the vicinity of the proposed site – two (2) bridges and three (3) culverts – as shown in Figure 4.

The first bridge (Structure 1) is located on Wallace Pike approximately 0.3 miles from its intersection with Industrial Park Boulevard. According to the VDOT-maintained Bridge and Culvert Database, the bridge is in fair condition. A photo of the bridge can be found in Figure 6.

The second bridge (Structure 4) is located on Wallace Pike is located immediately adjacent to its northern intersection with Acorn Lane. The bridge has a posted weight limit of 27 tons for two (2) axle vehicles and 40 tons for three (3) axle vehicles. According to the VDOT-maintained Bridge and Culvert Database, the bridge is in fair condition. A photo of the bridge can be found in Figure 7.

The culvert on Industrial Park Road (Structure 2) is located 0.17 miles to the west of its intersection with County Route 1721. According to the VDOT-maintained Bridge and Culvert Database, the culvert is in fair condition. A photo of the culvert can be found in Figure 7.

The culvert on Bordwine Road (Structure 3) is located 0.28 miles to the west of its intersection with Queens Lace Drive. According to the VDOT-maintained Bridge and Culvert Database, the culvert is rated as good. A photo of the bridge can be found in Figure 9.

The culvert located on Wallace Pike (Structure 5) is located 415' north of its intersection with Black Hollow Road. According to the VDOT-maintained Bridge and Culvert Database, the culvert is in fair condition. A photo of the culvert can be found in Figure 10.

INTERSECTION CONTROL

Seven (7) key intersections/locations were identified within the study area along the anticipated haul route:

1. US Route 19 and Bordwine Road;
2. Wallace Pike and Bordwine Road;
3. Wallace Pike and Industrial Park Road;
4. Wallace Pike/Wyndale Road and Black Hollow Road;
5. Reedy Creek Road and Black Hollow Road;
6. Black Hollow Road and Childress Hollow Road; and
7. US Route 19 and Industrial Park Road.

US Route 19 and Bordwine Road

At the unsignalized intersection of US Route 19 and Bordwine Road, Bordwine Road is the stop-controlled approach. The northern leg (Bordwine Road) is 20' wide and consist or one (1) approach lane and (1) departure lane; centerline pavement markings are present. The eastbound and westbound approaches of US Route 19 consist of one (1) travel lane in each direction and a center two-way left tun lane (TWLTL) to accommodate eastbound left turns; the pavement that is 33' wide.

Photos of the intersection of US Route 19/Bordwine Road can be found in Figure 11.

Wallace Pike and Bordwine Road (Route 625)

At the three-legged unsignalized intersection of Wallace Pike and Bordwine Road, Bordwine Road is the strop-controlled approach. The pavement along Wallace Pike (eastbound and westbound) is approximately 24' wide. The pavement along Bordwine Road is approximately 20' wide. Centerline pavement markings are present on both facilities. There is minimal separation between the intersection and the adjacent at-grade railroad crossing.

Photos of the Wallace Pike/Bordwine Road intersection can be found in Figure 12.

Wallace Pike and Industrial Park Road

At the three-legged unsignalized intersection of Wallace Pike and Industrial Park Road, Industrial Park Road is the stop-controlled approach. The pavement along Wallace Pike is approximately 24' wide and accommodates a single travel lane in each direction; centerline pavement markings are present. The pavement on Industrial Park Road is approximately 22' wide and accommodates a single travel lane in each direction; center- and edgeline pavement markings are present.

Please note that intersection sight distance to the right appears to be obscured by the adjacent tree line.

Photos of the Wallace Pike/Industrial Park Road intersection can be found in Figure 13.

Wallace Pike/Wyndale Road and Black Hollow Road

At the three-legged unsignalized intersection of Wallace Pike/Wyndale Road and Black Hollow Road, Black Hollow Road is the stop-controlled approach. The pavement on Wallace Pike/Wyndale Road is 23' wide and the pavement on Black Hollow Road is 26' in the vicinity of the intersection. Each leg consists of a single approach lane and a single departure lane. Centerline pavement markings are present on all approaches and edgeline markings are present along Wyndale Road to the east of the intersection.

Photos of the Wyndale Road/Black Hollow Road intersection can be found in Figure 14.

Reedy Creek Road and Black Hollow Road

At the unsignalized intersection of Reedy Creek Road and Black Hollow Road, the northbound Black Hollow Road approach is stop-controlled. The pavement on both Reedy Creek Road and Black Hollow Road is approximately 20' wide and no pavement marking are present in the vicinity of the intersection.

It should be noted that corrugated galvanized pipe were noted immediately adjacent to this intersection that accommodate stream. The structural integrity of this crossing is unknown.

Photos of the Reedy Creek Road/Black Hollow Road intersection can be found in Figure 15.

Black Hollow Road and Childress Creek Road

At the unsignalized intersection of Black Hollow Road and Childress Creek Road, Childress Creek Road is the stop-controlled approach. The pavement on Black Hollow Road is 20' wide and the pavement on Childress Hollow Road is 18' wide. No pavement markings are present in the vicinity of the intersection.

Please note that intersection sight distance to the right appears to be limited the curvature of the road and adjacent slope/grade.

Photos of the Black Hollow Road/Childress Creek Road intersection can be found in Figure 16.

US Route 19 and Industrial Park Road

The three-legged intersection of US Route 19 and Industrial Park Road is signalized. The pavement along the US Route 19 is approximately 36' wide. The eastbound approach consists of consisting of one (1) through lane and one (1) left turn lane while the westbound approach consists of one (1) through lane and one (1) right turn lane; a center TWLTL is present along the corridor. The pavement along Industrial Park Road is generally 24' wide but increases at the intersection to 36' to accommodate an auxiliary turn lane. Both center- and edgeline pavement markings present.

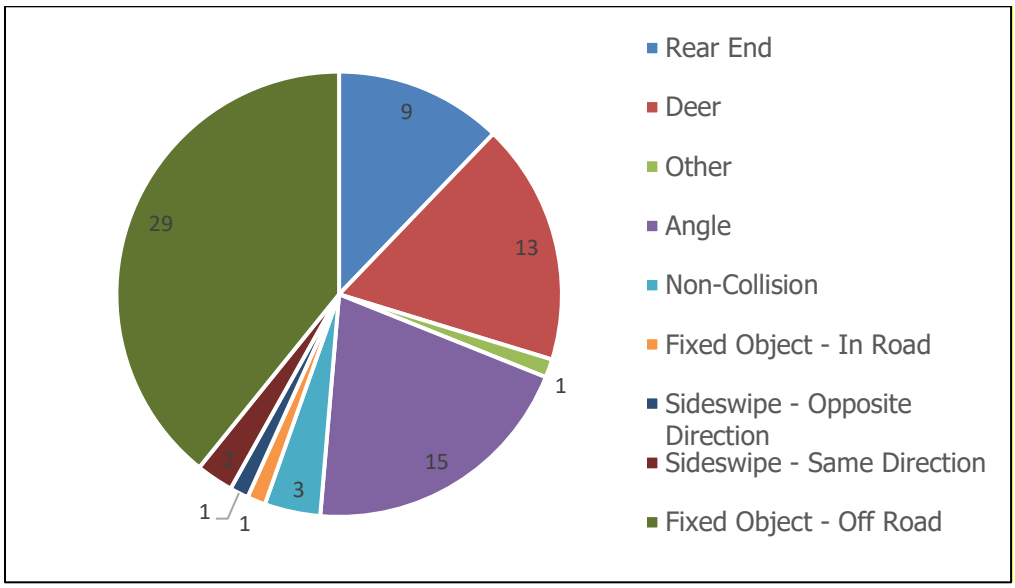
Photos of the US Route 19/Industrial Park Road intersection can be found on Figure 17.

CRASH ANALYSIS

A crash analysis was completed using data from the past five (5) years (2019-2023) along the anticipated haul route. A map of the crashes showing their location, collision type, and severity can be found in Figures 18 and 19.

Over the past five (5) years there has been a total of 74 crashes along the proposed haul route – nine (9) severe injury crashes, 10 visible injury crashes, one (1) non-visible injury crash and 54 property damage only crashes. The most common type of crashes were fixed object, off road (29), angle crashes (15) and deer related crashes (13). A comprehensive summary of all the crashes by collision type is shown below:

Summary of Crashes by Collision Type



The crash patterns in terms of type, severity, and location are typical of the roadways along the proposed haul route and no "hot spots" are present. Overall, 73% of crashes were property damage only.

3 SITE ACCESS

Access to the site will be provided via 16 entrances as shown in Figure 1.

Site Entrance 1 is located on Bordwine Road and is not currently constructed. The pavement on Bordwine Road in the vicinity of the site entrance is 20' wide. Photos of the entrance can be found in Figure 20.

Site Entrance 2 is located on Industrial Park Road and is an existing unpaved access road that is approximately 15' wide. The pavement on Industrial Park Road is 18' wide in the vicinity of the entrance. Photos of the entrance can be found in Figure 21.

Site Entrance 3 is located on Wallace Pike and is an existing access road that is approximately 15' wide. The pavement on Wallace Pike is 20' wide in the vicinity of the entrance. Photos of the entrance can be found in Figure 22.

Site Entrances 4 and 5 are located on either side of Wallace Pike and are not yet constructed. The pavement on Wallace Pike in the vicinity of the entrances is 20' wide. Photos of the entrances can be found in Figure 23.

Site Entrance 6 is the existing Acorn Lane on Wallace Pike. Acorn Lane is 12' wide. The pavement on Wallace Pike is 20' wide in the vicinity of the entrance. Photos of the entrance can be found in Figure 24.

Site Entrance 7 is located on Wallace Pike and is not currently constructed. The pavement on Wallace Pike in the vicinity of the site entrance is 20' wide. Photos of the entrance can be found in Figure 25.

Site Entrance 8 is located on Wyndale Road and is not currently constructed. The pavement on Wyndale Road in the vicinity of the site entrance is 20' wide. Photos of the entrance can be found in Figure 26.

Entrance 9 is located on Industrial Park Road and is not currently constructed. The pavement on Industrial Park Road in the vicinity of the site entrance is 24' wide. Photos of the entrance can be found in Figure 27.

Entrance 10 is located on Industrial Park Road and is not currently constructed. The pavement on Industrial Park Road in the vicinity of the site entrance is 22' wide. Photos of the entrance can be found in Figure 28.

Entrance 11 is located on Reedy Creek Road and is not currently constructed. The pavement on Reedy Creek Road is 20' in the vicinity of the site entrance. Photos of the entrance can be found in Figure 29.

Entrance 12 is located on Black Hollow Road and is not currently constructed. The pavement on Black Hollow Road is 20' wide in the vicinity of the site entrance. Photos of the entrance can be found in Figure 30.

Entrance 13 is located on Black Hollow Road and is not currently constructed. The pavement on Black Hollow Road is 19' wide in the vicinity of the site entrance. Photos of the entrance can be found in Figure 31.

Entrance 14 is located on Childress Hollow Road and is not currently constructed. The pavement on Childress Hollow Road is 18' wide in the vicinity of the site entrance. The aerial of the entrance can be found in Figure 32.

Entrance 15 is located on Childress Hollow Road and is not currently constructed. The pavement on Childress Hollow Road is 18' wide in the vicinity of the site entrance. The aerial of the entrance can be found in Figure 33.

Entrance 16 is located on Wyndale Road and is not currently constructed. The pavement on Wyndale Road is 20' wide in the vicinity of the site entrance. Photos of the entrance can be found in Figure 34.

Please note that the proposed entrance locations are preliminary and have been identified primarily through available road frontage along adjacent state-maintained roadways. It is recognized that entrances will be reviewed and approved by both the locality and Virginia Department of Transportation (VDOT) through the site plan approval process. This approval process will take into account both the final location and planned design of the respective entrances.

TRAFFIC MITIGATION

Throughout construction of the site, Catalyst Energy will coordinate with the representatives from Washington County and VDOT to determine appropriate transportation management procedures.

Based on the existing roadway conditions, the location of the proposed access point, and the available average daily traffic numbers for the proposed access roads, the anticipated construction traffic volumes should not significantly impact traffic operations. During operations and maintenance, the facility will not generate a significant volume of traffic with the anticipation of only a few pickup trucks each day.

Construction-related traffic will access the Wolf Hills Solar Project via state-maintained roadways. Given the existing posted speeds and anticipated slower entering/exiting traffic, temporary traffic control (TTC) measures may be necessary. Pertinent signage should be installed prior to the site preparation work and removed when mechanical/electrical work/inspections begin. It is not anticipated that daily vehicular traffic following construction will disrupt local traffic flows during normal peak hours.

Outside of the previously noted mitigation efforts, should a traffic issue arise during construction, Catalyst Energy will work the County and VDOT to appropriately address the specific concern.

4 CONCLUSIONS

Based on our review of available data relating to the site, the adjacent roadways, and anticipated traffic associated with the construction of the site, the following is offered:

- The proposed Wolf Hills Solar Project is located in Washington County, Virginia near the town of Abington (see Figure 1).

- Potential access corridors include US Route 19, Bordwine Road, Wallace Pike, Wyndale Road, Industrial Park Road, Reedy Creek Road, and Black Hollow Road.

- Based on the available traffic data, the aforementioned access corridors have the available capacity to accommodate site-generated traffic during both construction and operations/maintenance.

- A review of available crash data indicated crashes are spread throughout the network with a majority of them (73%) being property damage only. No unusual patterns or hot spots were readily identified by the available crash data.

- It is not anticipated that roadway improvements will be necessary to accommodate site-generated traffic. However, it is recommended that temporary traffic control measures be considered during the site preparation/construction phase during specific times within areas where construction traffic will be most concentrated.

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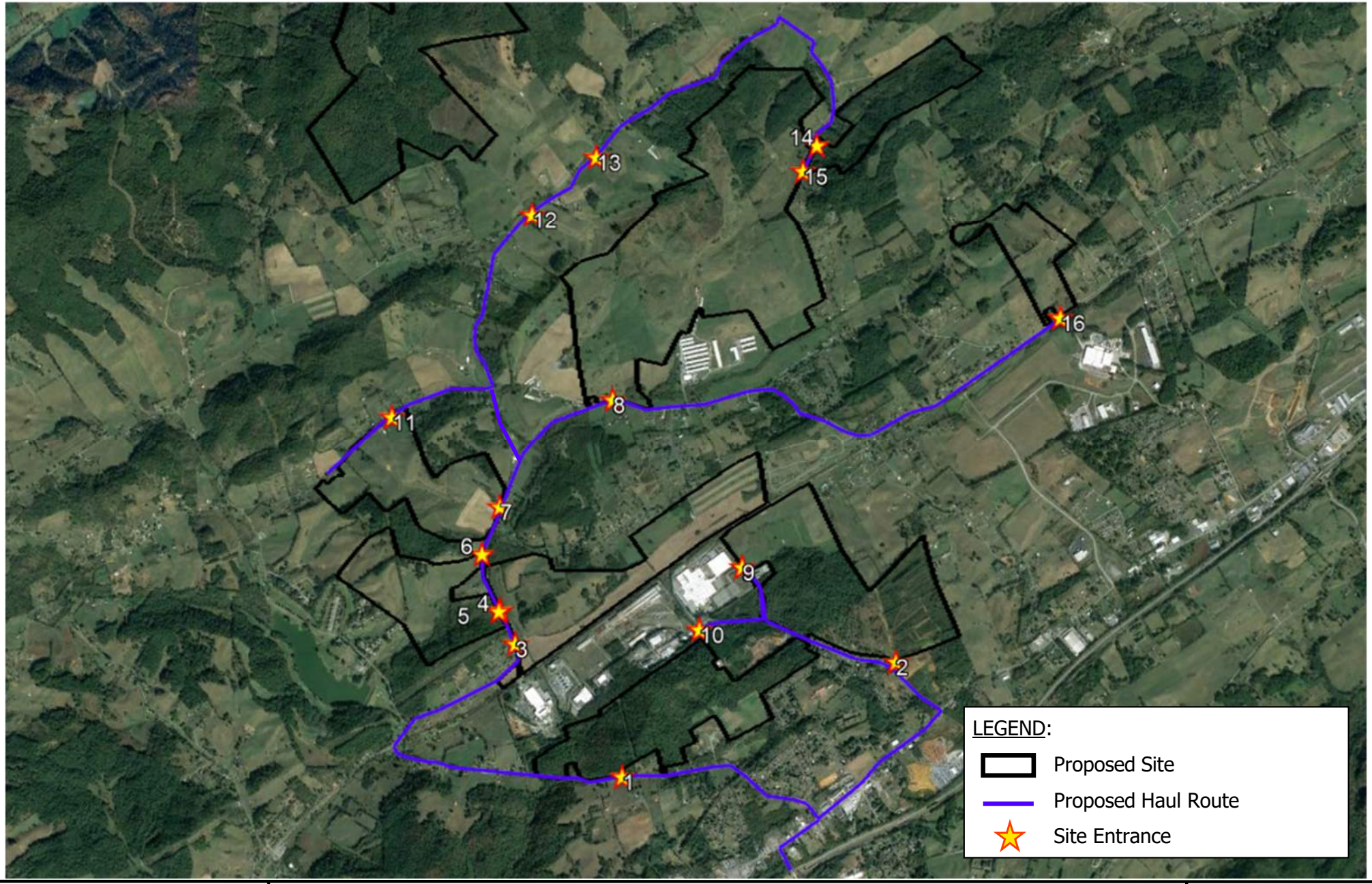

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Surrounding Roadway Network and Site Location
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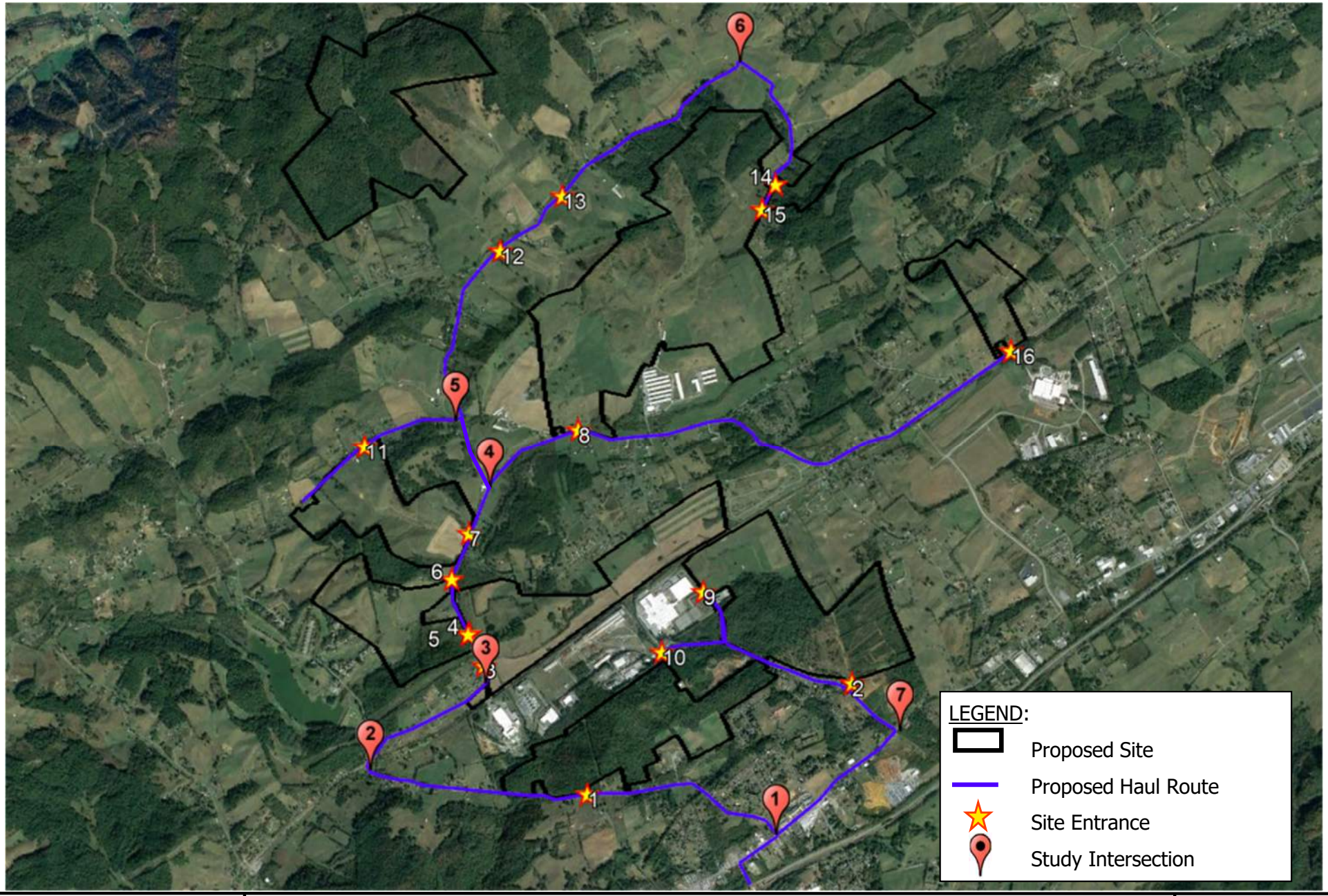
Washington County, Virginia

Figure 1



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Site Location and Study Intersections
Wolf Hills Solar
Washington County, Virginia

Figure
2

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Preliminary Site Layout
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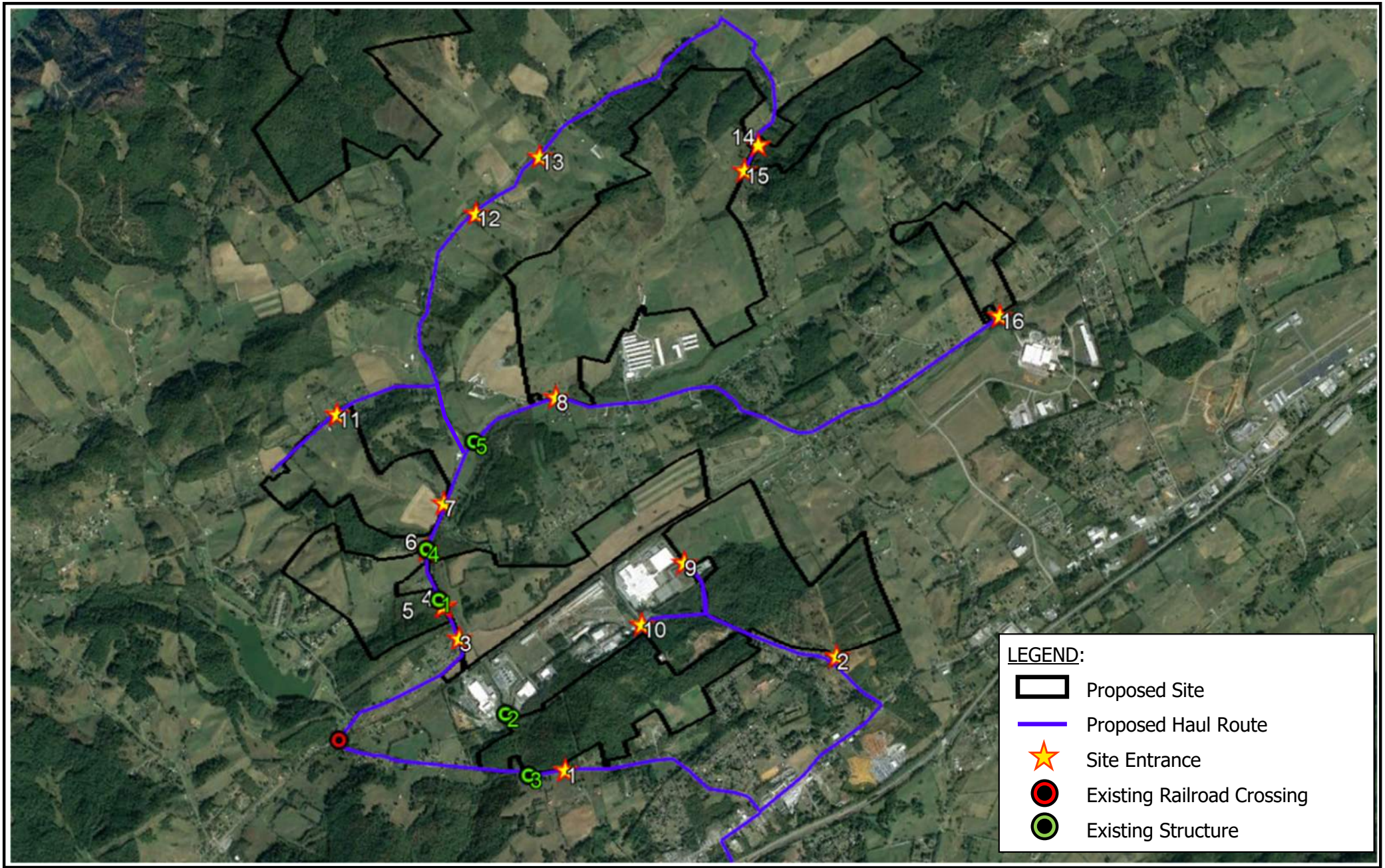
Washington County, Virginia

Figure 3



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Location of Existing Structures
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Washington County, Virginia

Figure
4

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Railroad Crossing on Bordwine Road
Wolf Hills Solar
Washington County, Virginia

Figure
5

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Structure 1: Bridge on Wallace Pike
Wolf Hills Solar
Washington County, Virginia

Figure
6

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Structure 4: Bridge on Wallace Pike
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Washington County, Virginia

Figure
7

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Structure 2: Culvert on Industrial Park Road
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Washington County, Virginia

Figure
8

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Structure 3: Culvert on Bordwine Road
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Washington County, Virginia

Figure
9

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Structure 5: Culvert on Wallace Pike
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Washington County, Virginia

Figure
10

North along Bordwine Road

East along US Route 19

West along US Route 19

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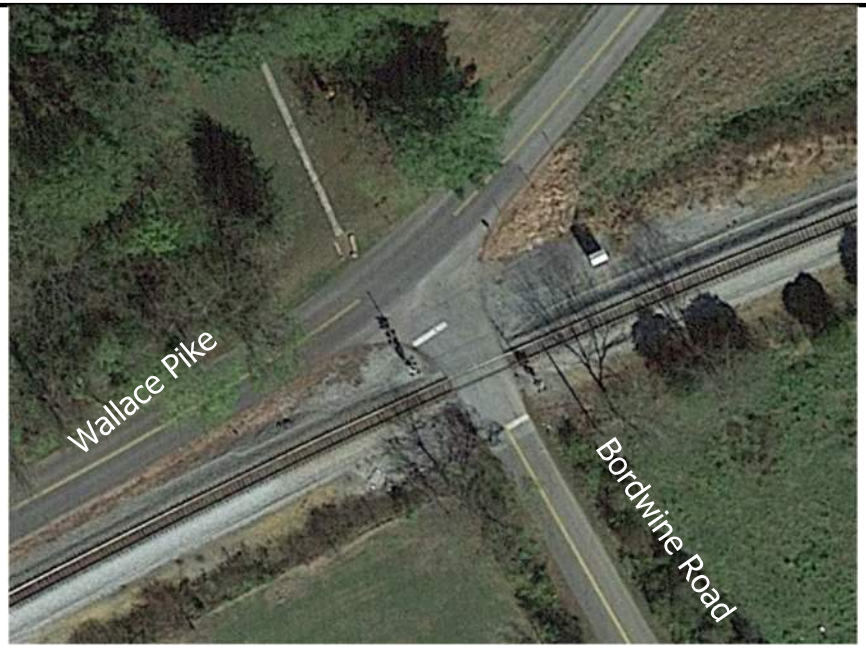
Intersection of US Route 19 and Bordwine Road
Wolf Hills Solar
Washington County, Virginia

Figure
11

South along Bordwine Road



East along Wallace Pike

West along Wallace Pike

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Intersection of Wallace Pike and Bordwine Road
Wolf Hills Solar
Washington County, Virginia

Figure
12

South along Industrial Park Road

East along Wallace Pike

West along Wallace Pike

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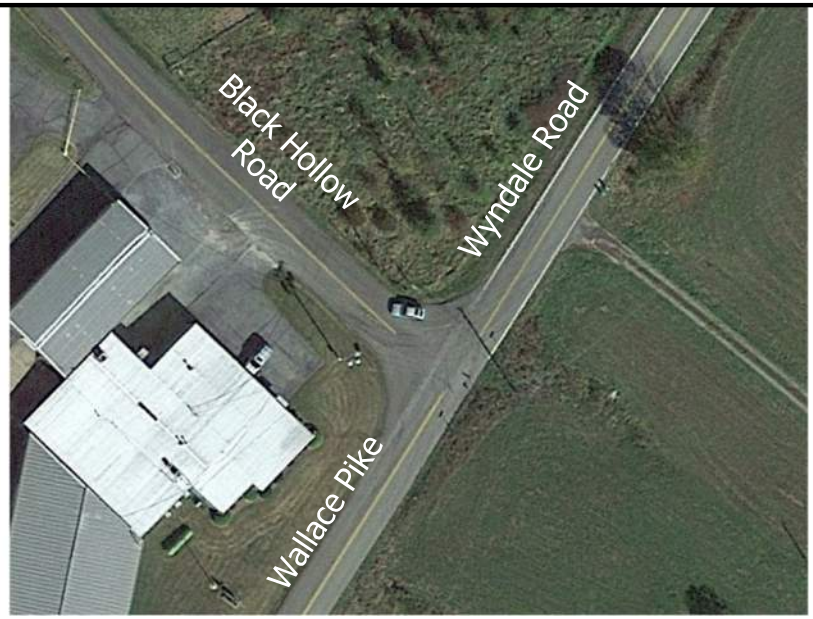
Intersection of Wallace Pike and Industrial Park Road
Wolf Hills Solar
Washington County, Virginia

Figure
13

North along Black Hollow Road



East along Wyndale Road

West along Wallace Pike

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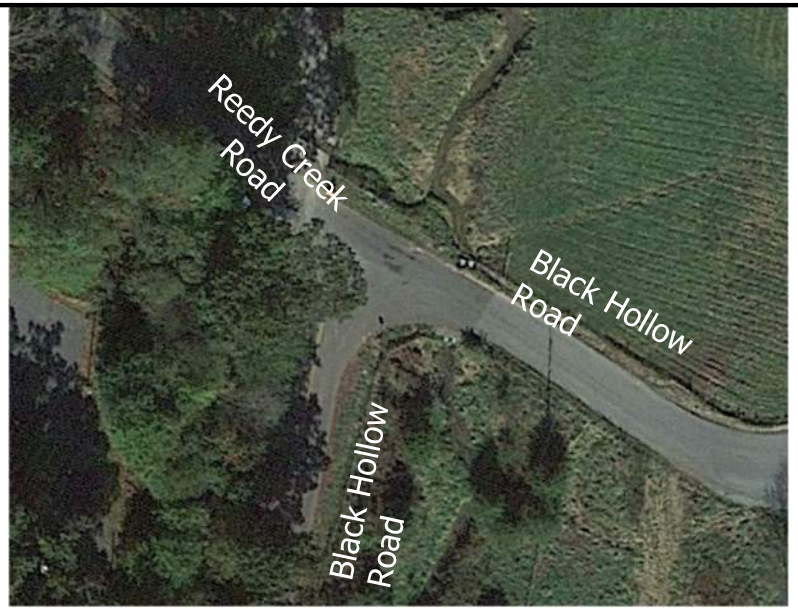
Intersection of Wyndale Road and Black Hollow Road
Wolf Hills Solar
Washington County, Virginia

Figure
14

South along Black Hollow Road



East along Black Hollow Road

West along Reedy Creek Road

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Intersection of Reedy Creek Road and Black Hollow Road
Wolf Hills Solar
Washington County, Virginia

Figure
15

East along Childress Hollow Road

North along Black Hollow Road

South along Black Hollow Road

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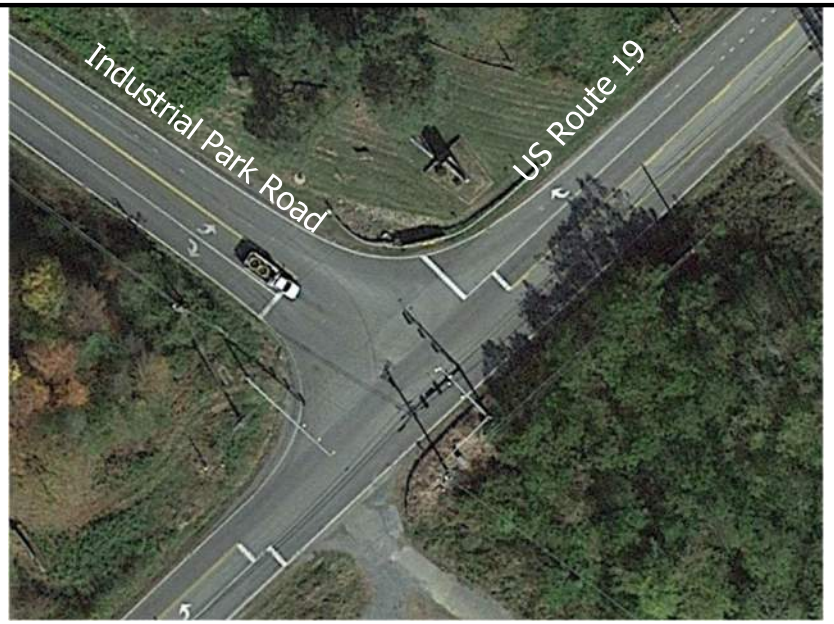
Intersection of Black Hollow Road and Childress Hollow Road
Wolf Hills Solar
Washington County, Virginia

Figure
16

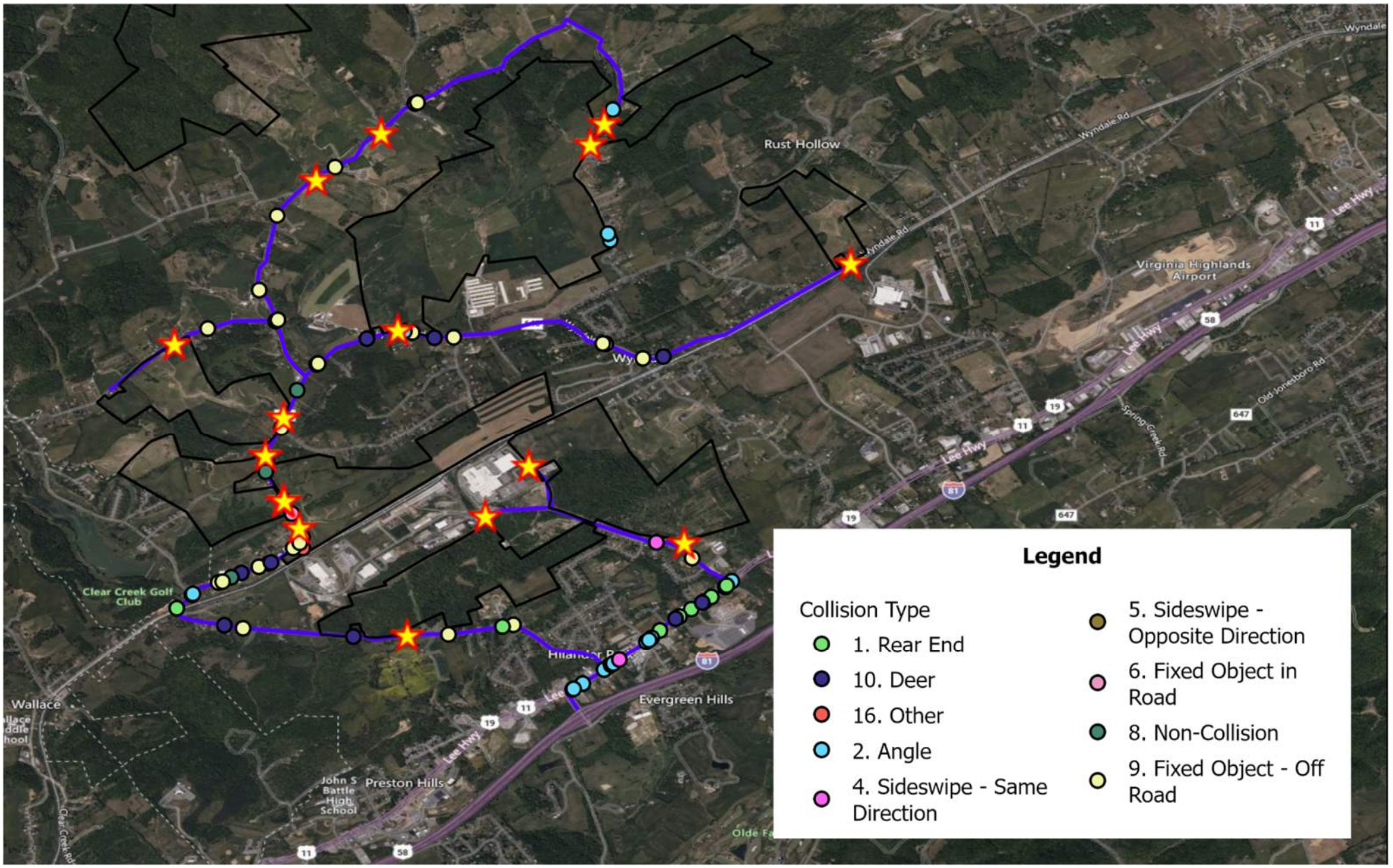
North along Industrial Park Road



East along US Route 19

West along US Route 19

TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Intersection of US Route 19 and Industrial Park Road Wolf Hills Solar Washington County, Virginia	Figure 17



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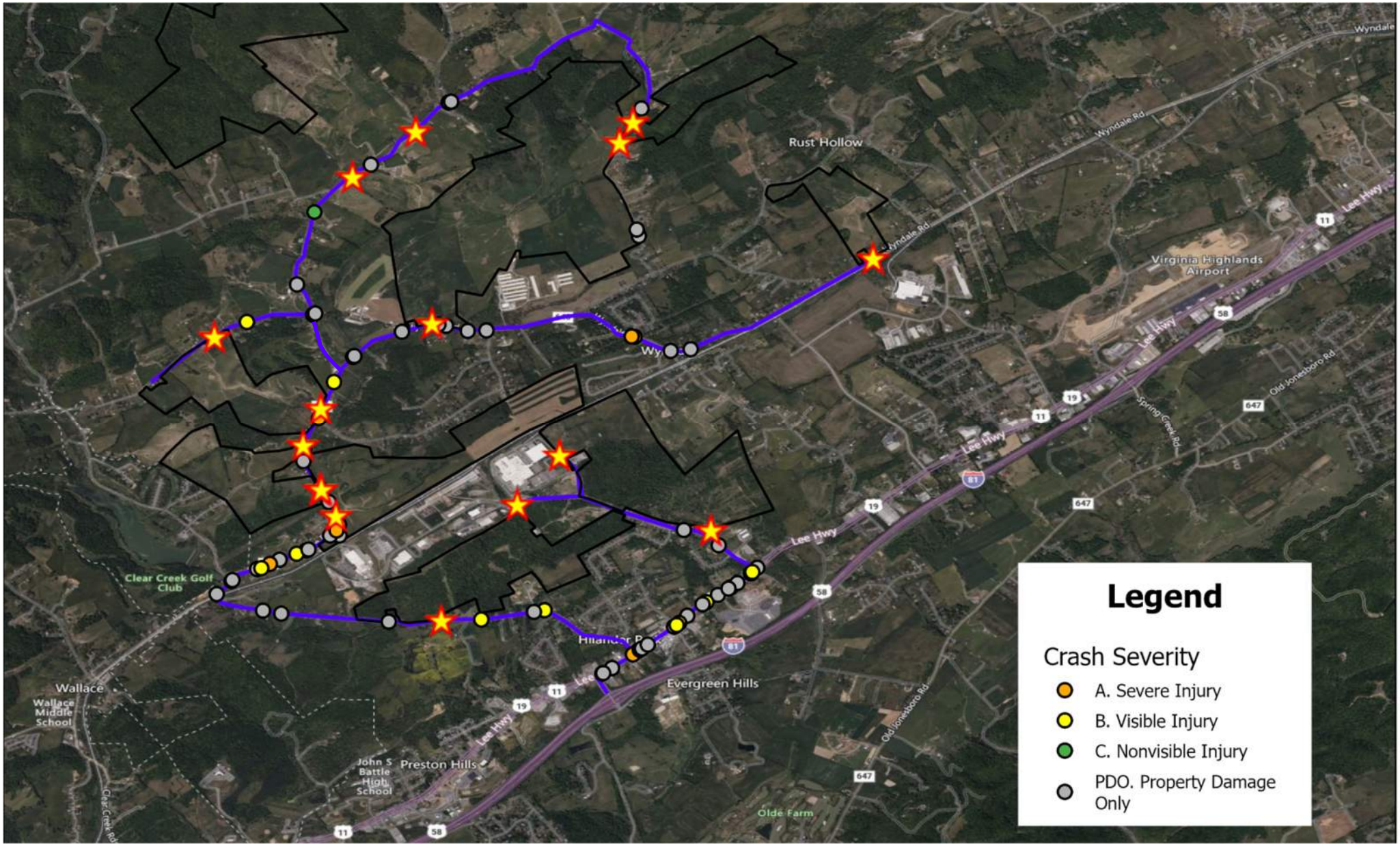
Crashes by Type
Wolf Hills Solar
Washington County, Virginia

Figure
18



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Crashes by Severity
Wolf Hills Solar
Washington County, Virginia

Figure
19

North along Site Entrance

East along Bordwine Road

West along Bordwine Road

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Entrance 1 on Bordwine Road
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Washington County, Virginia

Figure
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North along Site Entrance 2

East along Industrial Park Road

West along Industrial Park Road

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Entrance 2 on Industrial Park Road
Wolf Hills Solar
Washington County, Virginia

Figure
21

East along Site Entrance 3

North along Wallace Pike

South along Wallace Pike

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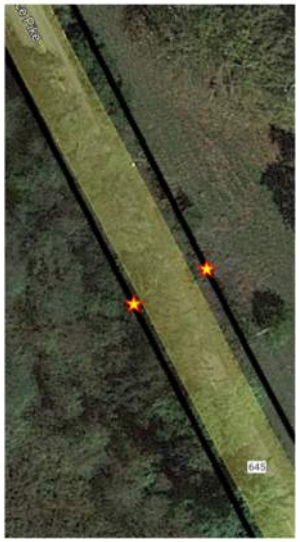
Entrance 3 on Wallace Pike
Wolf Hills Solar
Washington County, Virginia

Figure
22

West along Site Entrance 4



East along Site Entrance 5

North along Wallace Pike

South along Wallace Pike

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Entrances 4 and 5 on Wallace Pike
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Washington County, Virginia

Figure
23

East along Site Entrance 6

North along Wallace Pike

South along Wallace Pike

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Entrance 6 on Wallace Pike
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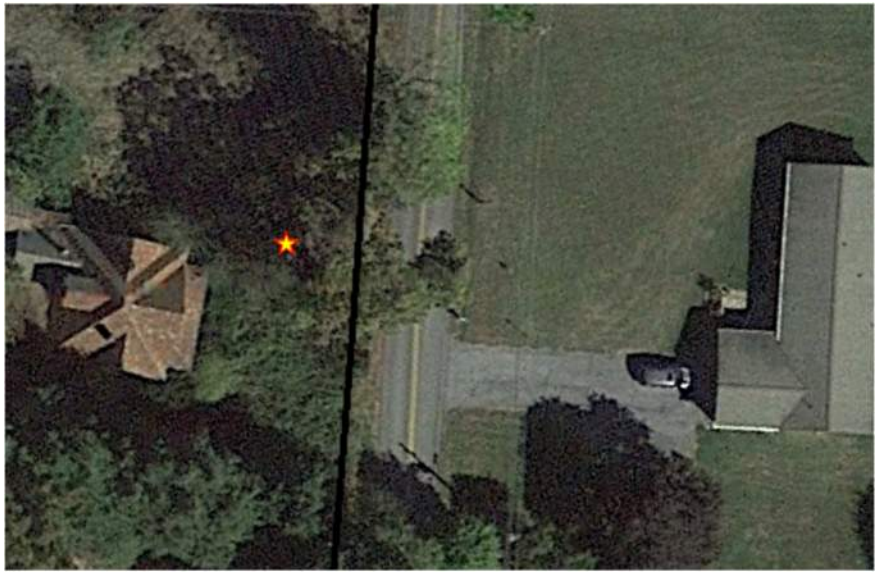
Washington County, Virginia

Figure
24

West along Site Entrance 7



North along Wallace Pike

South along Wallace Pike

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Entrance 7 on Wallace Pike
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Washington County, Virginia

Figure
25

North along Site Entrance 8

East along Wyndale Road

West along Wyndale Road

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Entrance 8 on Wyndale Road
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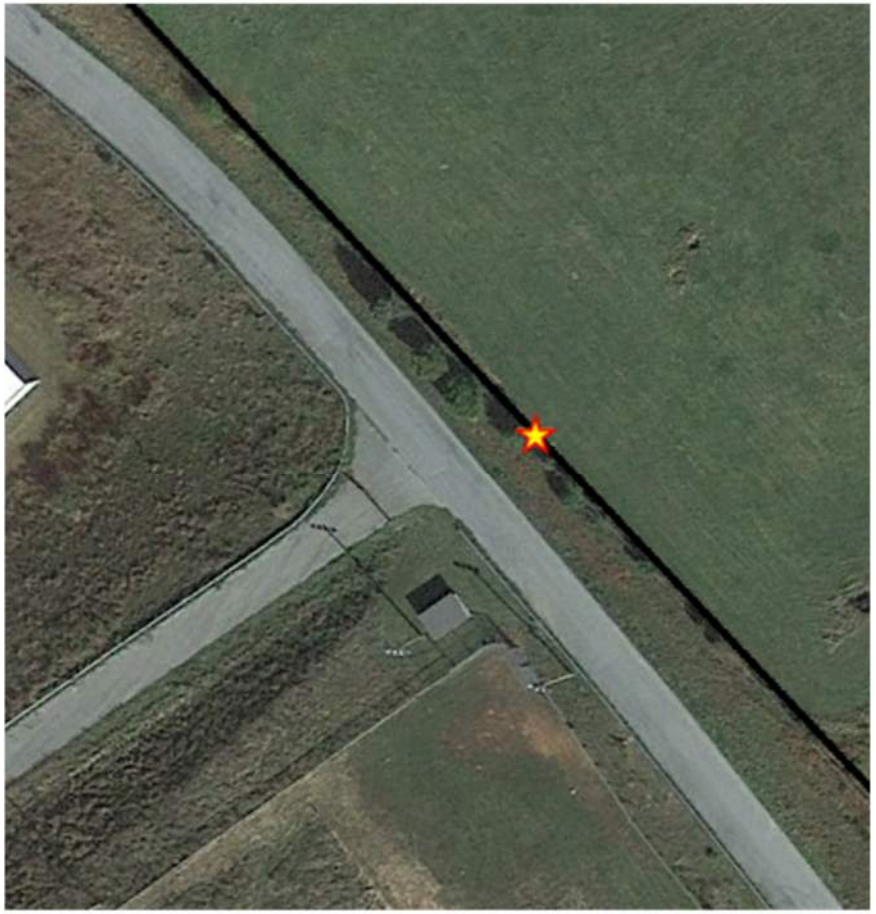
Washington County, Virginia

Figure
26

East along Site Entrance 9

North along Industrial Park Road



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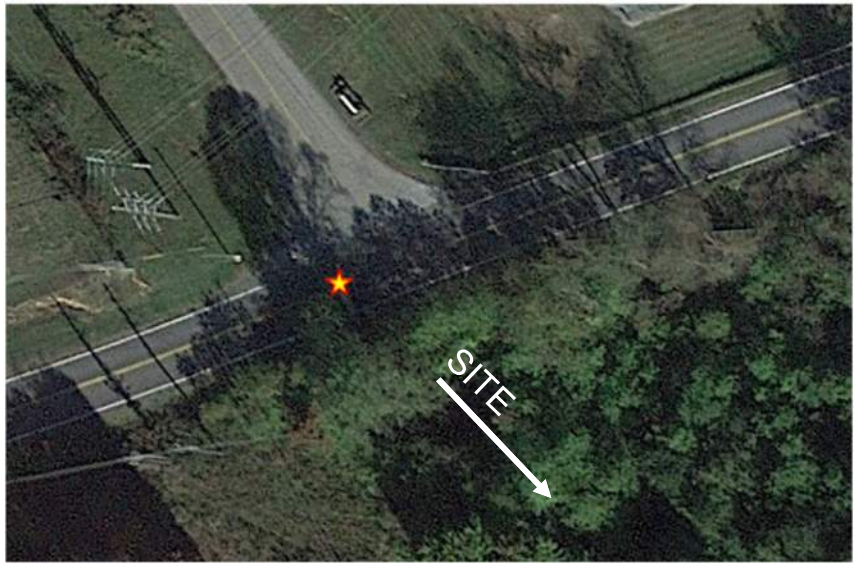
Entrance 9 on Industrial Park Road
Wolf Hills Solar
Washington County, Virginia

Figure
27

South along Site Entrance 10



East along Industrial Park Road

West along Industrial Park Road

NOT TO SCALE

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Entrance 10 on Industrial Park Road
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Washington County, Virginia

Figure
28

South along Site Entrance 11

East along Reedy Creek Road

West along Reedy Creek Road

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Entrance 11 on Reedy Creek Road
Wolf Hills Solar
Washington County, Virginia

Figure
29

South along Site Entrance 12

East along Black Hollow Road

West along Black Hollow Road

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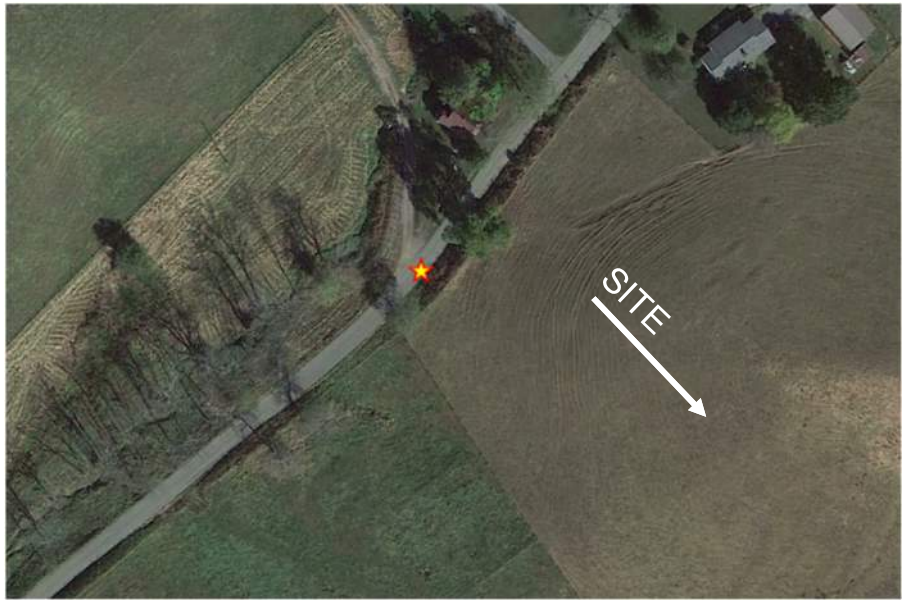
Entrance 12 on Black Hollow Road
Wolf Hills Solar
Washington County, Virginia

Figure
30

South along Site Entrance 13



East along Black Hollow Road

West along Black Hollow Road

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Entrance 13 on Black Hollow Road
Wolf Hills Solar
Washington County, Virginia

Figure
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TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Site Entrance 14 on Childress Hollow Road
Wolf Hills Solar
Washington County, Virginia

Figure
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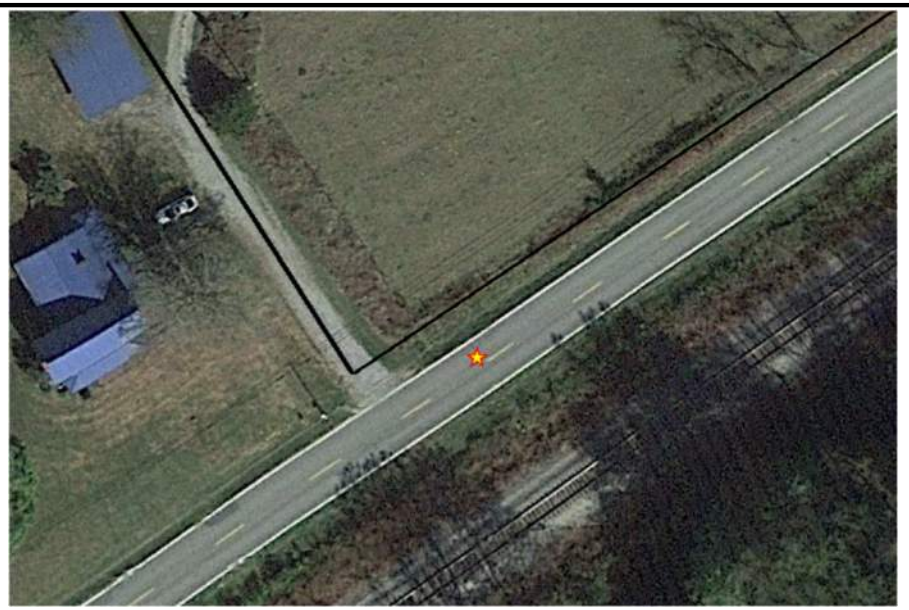
TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Site Entrance 15 on Childress Hollow Road
Wolf Hills Solar
Washington County, Virginia

Figure
33

North along Site Entrance 16



East along Wyndale Road

West along Wyndale Road

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Entrance 16 on Wyndale Road
Wolf Hills Solar
Washington County, Virginia

Figure
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