



STATE OF DELAWARE  
**DEPARTMENT OF TRANSPORTATION**  
800 BAY ROAD  
P.O. BOX 778  
DOVER, DELAWARE 19903

JENNIFER COHAN  
SECRETARY

June 3, 2018

Mr. Christopher Duke  
Becker Morgan Group, Inc.  
250 South Main Street, Suite 109  
Newark, DE 19711

Dear Mr. Duke:

The enclosed Traffic Impact Study (TIS) review letter for the **Casapulla Farm** (Tax Parcel 13-026.00-005.00) residential development has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. They have found the TIS to conform to DelDOT's Development Coordination Manual and other accepted practices and procedures for such studies. DelDOT accepts this review letter and concurs with the recommendations. If you have any questions concerning this letter or the enclosed review letter, please contact me at (302) 760-2167.

Sincerely,

Troy Brestel  
Project Engineer

TEB:km

Enclosures

cc with enclosures: Ms. Constance C. Holland, Office of State Planning Coordination  
Mr. Morris Deputy, Town of Middletown  
Mr. Andrew Parker, McCormick Taylor, Inc.  
DelDOT Distribution

## DelDOT Distribution

Brad Eaby, Deputy Attorney General  
Robert McCleary, Director, Transportation Solutions (DOTS)  
Drew Boyce, Director, Planning  
Mark Luszczyk, Chief Traffic Engineer, Traffic, DOTS  
Pamela Steinebach, Assistant Director, Project Development North, DOTS  
J. Marc Coté, Assistant Director, Development Coordination  
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Peter Haag, Traffic Studies Manager, Traffic, DOTS  
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Matthew Vincent, Canal District Public Works Engineer, Canal District  
David Dooley, Service Development Planner, Delaware Transit Corporation  
Sireen Muhtaseb, New Castle Review Coordinator, Development Coordination  
Pao Lin, New Castle Subdivision Manager, Development Coordination  
Mark Galipo, Traffic Engineer, Traffic, DOTS  
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning  
Claudy Joinville, Project Engineer, Development Coordination



June 3, 2019

Mr. Troy E. Brestel  
Project Engineer  
DelDOT Division of Planning  
P.O. Box 778  
Dover, DE 19903

RE: Agreement No. 1773  
Traffic Impact Study Services  
**Task No. 1 Subtask 20A – Casapulla Farm**

Dear Mr. Brestel:

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the Casapulla Farm residential development prepared by Becker Morgan Group, Inc. dated February 2019. Becker Morgan Group prepared the report in a manner generally consistent with DelDOT's Development Coordination Manual.

The TIS evaluates the impacts of the proposed Casapulla Farm residential development. The site is located on the southwest corner of Middle Neck Road (New Castle Road 444) and Warwick Road (Delaware Route 299 / New Castle Road 443A). In 2018, the parcel was annexed into the Town of Middletown, New Castle County, Delaware. The proposed development would consist of 168 detached homes, 24 attached homes, and 240 apartments; all uses are designated as senior-adult housing. Two full-access unsignalized driveways are proposed on Middle Neck Road. "Site Access A" is to be located 2,200 feet west of Warwick Road, and "Site Access B" is to be located 700 feet west of Warwick Road. Construction is anticipated to be completed by 2025.

The subject land consists of one parcel totaling approximately 119 acres. The land is split zoned R-2 (Residential) and R-3 (Multi-family Residential) within the Town of Middletown. No rezoning is needed or sought to permit the proposed development.

Currently, there is one DelDOT project within the study area. The US 301 Mainline is an 11.3-mile, four-lane, limited-access highway that starts approximately ¼ mile west of the Maryland/Delaware state line and ends at Delaware Route 1 approximately ½ mile north of the intersection of US Route 13 and Port Penn Road near the C&D Canal, north of Middletown. The US 301 Mainline was opened to traffic in January 2019. Traffic counts conducted for the Casapulla Farm TIS were completed before the US 301 Mainline was opened, but future volumes used in the study were based in part on DelDOT's Travel Demand Model that accounted for completion of the US 301 Project. Aside from the proposed site driveways, all of the Casapulla Farm study intersections were impacted by the US 301 Project.

Based on our review, we have the following comments and recommendations:

The following intersections exhibit level of service (LOS) deficiencies without the implementation of physical roadway and/or traffic control improvements:

<i>Intersection</i>	<i>Existing Traffic Control</i>	<i>Situations for which deficiencies occur</i>
Levels Road and Middletown-Warwick Road (New Castle Road 443)	Signalized	2025 without Casapulla Farm weekday PM (Case 2); 2025 with Casapulla Farm weekday PM (Case 3)

The signalized intersection of Levels Road and Middletown-Warwick Road experiences LOS deficiencies during existing and future PM peak hour conditions under the current traffic signal timing plan. Based on the existing and projected traffic volumes utilized in this TIS, it appears that signal timing adjustments can be applied to the weekday PM peak hour timing plan to mitigate the unacceptable LOS.

Within the site, the concept plan included in the TIS shows a non-motorized path through the DP&L power line easement that would connect the two halves of the development. DelDOT prefers that the internal connection also accommodate motor vehicles. A vehicular interconnection would reduce the number of external trips between the two halves of the development and would provide a secondary emergency access for both parts of the development. DelDOT would like an internal vehicular connection to be constructed, and the feasibility of such a connection will be determined during the site plan review stage.

Should the Town of Middletown choose to approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan by note or illustration. All applicable agreements (i.e. letter agreements for off-site improvements and traffic signal agreements) should be executed prior to entrance plan approval for the proposed development.

1. The developer should improve Middle Neck Road along the site frontage in order to meet DelDOT's local road standards. These standards include, but are not limited to, eleven-foot travel lanes and five-foot shoulders. The developer should provide a bituminous concrete overlay to the existing travel lanes, at DelDOT's discretion. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary. DelDOT should also examine the need to restripe the centerline of Middle Neck Road to reflect the proposed entrance construction and the new US 301 Mainline, which has eliminated what was the south end of the road. The developer should be required to do any restriping needed in the general area of their frontage.

2. The developer should construct the full-movement “Site Access A” on Middle Neck Road, approximately 2,200 feet west of Warwick Road. The proposed configuration is shown in the table below.

Approach	Existing Configuration	Proposed Configuration
Eastbound Site Access A	Approach does not exist	One left-turn lane and one right-turn lane
Northbound Middle Neck Road	One through lane	One through lane and one bypass lane
Southbound Middle Neck Road	One through lane	One shared through/right-turn lane

Initial recommended minimum turn / bypass lane lengths of the separate lanes are listed below. The developer should coordinate with DelDOT’s Development Coordination Section to determine final turn / bypass lane lengths during the site plan review.

Approach	Left-Turn Lane	Bypass Lane	Right-Turn Lane
Eastbound Site Entrance A	N/A	N/A	50 feet *
Northbound Middle Neck Road	N/A	215/110/50 feet **	N/A
Southbound Middle Neck Road	N/A	N/A	N/A

\* Initial turn-lane length based on storage length (excluding taper) per queuing analysis, with 50-foot minimum.

\*\* Lengths shown are approach taper/departure taper/storage length, respectively. Initial bypass lane lengths based on DelDOT’s *Auxiliary Lane Worksheet*.

3. The developer should construct the full-movement “Site Access B” on Middle Neck Road, approximately 700 feet west of Warwick Road. The proposed configuration is shown in the table below.

Approach	Existing Configuration	Proposed Configuration
Eastbound Site Access B	Approach does not exist	One left-turn lane and one right-turn lane
Northbound Middle Neck Road	One through lane	One left-turn lane and one through lane
Southbound Middle Neck Road	One through lane	One shared through/right-turn lane

Initial recommended minimum turn-lane lengths (excluding tapers) of the separate turn lanes are listed below. The developer should coordinate with DelDOT's Development Coordination Section to determine final turn-lane lengths during the site plan review.

Approach	Left-Turn Lane	Right-Turn Lane
Eastbound Site Entrance B	N/A	50 feet *
Northbound Middle Neck Road	185 feet **	N/A
Southbound Middle Neck Road	N/A	N/A

\* Initial turn-lane length based on storage length per queuing analysis, with 50-foot minimum.

\*\* Initial turn-lane length based on DelDOT's *Auxiliary Lane Worksheet*.

4. The developer should improve the intersection of Levels Road and Middletown-Warwick Road by lengthening the existing westbound Middletown-Warwick Road left-turn lane to a length of 700 feet (excluding taper). The developer should coordinate with DelDOT's Development Coordination Section to determine final turn-lane length and design details.
5. The following bicycle and pedestrian improvements should be included:
  - a. Appropriate bicycle symbols, directional arrows, pavement markings, and signing should be included along bicycle facilities and turn lanes within the project limits.
  - b. Utility covers should be made flush with the pavement.
  - c. If clubhouses or other community facilities are constructed as shown on the site plan, bicycle parking should be provided near building entrances. Where building architecture provides for an awning, other overhang, or indoor parking, the bicycle parking should be covered.
  - d. A minimum 15-foot wide permanent easement from the edge of the right-of-way should be dedicated to DelDOT within the site frontages along Middle Neck Road and Warwick Road.
  - e. Within the easement along Middle Neck Road, a minimum of a ten-foot wide shared-use path (SUP) that meets current AASHTO and ADA standards should be constructed along the site frontage. The SUP should have a minimum of a five-foot buffer from the roadway. At both ends of the site frontage, the SUP should connect to the adjacent property or to the shoulder of Middle Neck Road in accordance with DelDOT's *Shared Use Path and/or Sidewalk Termination Reference Guide* dated August 1, 2018. The developer should coordinate with DelDOT's Development Coordination Section to determine details of the SUP connections at the property boundaries.



- f. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
- g. Internal sidewalks for pedestrian safety and to promote walking as a viable transportation alternative should be constructed within the development. These sidewalks should each be a minimum of five-feet wide (with a minimum of a five-foot buffer from the roadway) and should meet current AASHTO and ADA standards. Internal sidewalks in the development should connect to the shared-use path along Middle Neck Road.
- h. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to prevent vehicular overhang onto the sidewalk.

Improvements in this TIS may be considered “significant” under DelDOT’s *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT’s website at [http://deldot.gov/Publications/manuals/de\\_mutcd/index.shtml](http://deldot.gov/Publications/manuals/de_mutcd/index.shtml).

Please note that this review generally focuses on capacity and level of service issues; additional safety and operational issues will be further addressed through DelDOT’s site plan review process.

Additional details on our review of this TIS are attached. Please contact me at (610) 640-3500 or through e-mail at [ajparker@mccormicktaylor.com](mailto:ajparker@mccormicktaylor.com) if you have any questions concerning this review.

Sincerely,

**McCormick Taylor, Inc.**

A handwritten signature in black ink, appearing to read "Andrew J. Parker", with a long horizontal stroke extending to the right.

Andrew J. Parker, PE, PTOE  
Project Manager

Enclosure

## **General Information**

**Report date:** February 2019

**Prepared by:** Becker Morgan Group, Inc.

**Prepared for:** Eastern States Development Group

**Tax parcel:** 13-026.00-005.00

**Generally consistent with DelDOT's Development Coordination Manual:** Yes

## **Project Description and Background**

**Description:** The proposed Casapulla Farm development consists of 168 detached homes, 24 attached homes, and 240 apartments; all uses are designated as senior-adult housing.

**Location:** The site is located on the southwest corner of Middle Neck Road (New Castle Road 444) & Warwick Road (Delaware Route 299 / New Castle Road 443A). In 2018, the parcel was annexed into the Town of Middletown, New Castle County, Delaware. A site location map is included on Page 7.

**Amount of land to be developed:** Approximately 119 acres

**Land use approval(s) needed:** Subdivision approval. The land is split zoned R-2 (Residential) and R-3 (Multi-family Residential) within the Town of Middletown. No rezoning is needed or sought to permit the proposed development.

**Proposed completion year:** 2025

**Proposed access locations:** Two full-access unsignalized driveways are proposed on Middle Neck Road. "Site Access A" is located 2,200-feet west of Warwick Road, and "Site Access B" is located 700-feet west of Warwick Road.

**Daily Traffic Volumes (per DelDOT Traffic Summary 2017):**

- 2017 Average Annual Daily Traffic on Middle Neck Road: 801 vehicles/day





## **2015 Delaware Strategies for State Policies and Spending**

### **Location with respect to the Strategies for State Policies and Spending Map of Delaware:**

The majority of the proposed Casapulla Farm residential development is located within Investment Level 4. A smaller portion of the development is located in Investment Level 3. Based on the site plan, it appears that most of the land located in Investment Level 3 is reserved for open space and wetland areas.

#### *Investment Level 3*

Investment Level 3 generally falls into two categories. The first category covers lands that are in the long-term growth plans of counties or municipalities, but where development is not necessary to accommodate expected short-term population growth. The second category includes lands that are adjacent to fast-growing Investment Level 1 and 2 areas but are often impacted by environmentally sensitive features, agricultural-preservation issues, or other infrastructure issues. In these instances, development and growth may be appropriate in the near term, but the resources on the site and in the surrounding area should be carefully considered and accommodated by state Agencies and local governments with land-use authority.

Generally, Investment Level 3 areas should not be developed until surrounding Investment Level 1 and 2 areas are substantially built out. From a housing perspective, Investment Level 3 areas are characterized by low density and rural homes. New housing developments in the short term would, in most cases, represent leap-frog development, which is undesirable. Higher density housing in Investment Level 3 areas is more appropriate once Level 2 areas are built out and utilities are available.

#### *Investment Level 4*

Investment Level 4 areas are predominantly rural or agricultural and contain much of Delaware's open space and natural areas. These areas are home to agribusiness activities, farm complexes, and small settlements/unincorporated communities that are often found at historic crossroads. Investment Level 4 areas may also have scattered single-family detached residential homes. Existing transportation facilities and services will be maintained by the state while they continue to manage the transportation system in a manner that will support the preservation of the natural environment and agricultural business. Construction of new homes is discouraged; housing policies will focus on maintenance and rehabilitation of existing homes and communities. In addition, the Department of Education does not support the construction of new educational facilities in Investment Level 4 areas. The educational needs of Investment Level 4 areas would likely need to be met through facilities located in Investment Level 1-3 areas.

In general, the state will limit its investments in public infrastructure systems; investments should address existing public health, safety, or environmental risks, preserve rural character and natural resources, and discourage further development that is unrelated to the area's needs.

### **Proposed Development's Compatibility with Strategies for State Policies and Spending:**

The proposed Casapulla Farm development consists of 168 detached homes, 24 attached homes, and 240 apartments; all uses are designated as senior-adult housing. The site is located on the

southwest corner of Middle Neck Road & Warwick Road in the Town of Middletown, New Castle County, Delaware. The land to be developed is open space/farmland.

The Casapulla Farm development is located on a parcel that was added to the Town of Middletown Comprehensive Plan as an area of Proposed Annexation (Residential). This amendment to the Comprehensive Plan was reviewed as PLUS application 2016-09-01 and was approved by the Town of Middletown in December 2016 (Ordinance 16-11-05). Subsequently, the parcel was annexed to the Town of Middletown with R-2 (Residential) and R-3 (Multi-family residential) zoning on September 10, 2018 (Ordinance 18-02-03).

Since the parcel has been certified as a new growth or annexation area, it is considered to comply with the Strategies for State Policies and Spending.

### **Comprehensive Plan**

**Town of Middletown Comprehensive Plan:** *(Source: Town of Middletown Comprehensive Plan, November 2012)*

The November 2012 Town of Middletown Comprehensive Plan Future Land Use Map was updated in December 2016 (Ordinance 16-11-05). This update changed the parcel from an “Area of Concern” to “Proposed Annexation (Residential).”

### **Proposed Development’s Compatibility with Comprehensive Plan:**

The proposed Casapulla Farm residential development appears to comply with the Town of Middletown’s Comprehensive Plan as well as the R-2 (Residential) and R-3 (Multi-family residential) zoning.

### **Relevant Projects in the DelDOT Capital Transportation Program**

Currently, there is one DelDOT project within the study area. The US 301 Mainline is an 11.3-mile, four-lane, limited-access highway that starts approximately ¼ mile west of the Maryland/Delaware state line and ends approximately ½ mile north of the intersection of US Route 13 and Port Penn Road near the C&D Canal, north of Middletown. The US 301 Mainline was opened to traffic in January 2019. Traffic counts conducted for the Casapulla Farm TIS were completed before the US 301 Mainline was opened, but future volumes used in the study were based in part on DelDOT’s Travel Demand Model that accounted for completion of the US 301 Project. Aside from the proposed site driveways, all of the Casapulla Farm study intersections were impacted by the US 301 Project.

## **Trip Generation**

Trip generation for the proposed development was computed using comparable land uses and equations contained in Trip Generation, Tenth Edition, published by the Institute of Transportation Engineers (ITE). The following land uses were utilized to estimate the amount of new traffic generated for this development:

- 168 senior-adult detached homes (ITE Land Use Code 251)
- 264 senior-adult attached homes (ITE Land Use Code 252)

Table 1  
CASAPULLA FARM PEAK HOUR TRIP GENERATION

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Total	In	Out	Total
168 senior-adult detached homes	20	41	61	44	28	72
264 senior-adult attached homes	19	34	53	36	30	66
<b>TOTAL TRIPS</b>	<b>39</b>	<b>75</b>	<b>114</b>	<b>80</b>	<b>58</b>	<b>138</b>

Table 2  
CASAPULLA FARM DAILY TRIP GENERATION

Land Use	Weekday Daily		
	In	Out	Total
168 senior-adult detached homes	444	444	888
264 senior-adult attached homes	518	518	1036
<b>TOTAL TRIPS</b>	<b>962</b>	<b>962</b>	<b>1924</b>

## **Overview of TIS**

### **Intersections examined:**

- 1) Site Access A (western) & Middle Neck Road
- 2) Site Access B (eastern) & Middle Neck Road
- 3) Middle Neck Road & Warwick Road
- 4) Warwick Road & Southbound US 301 Ramps
- 5) Levels Road (New Castle Road 10) & Northbound US 301 Ramps
- 6) Levels Road & Middletown-Warwick Road (New Castle Road 443)

### **Conditions examined:**

- 1) 2018 existing (Case 1)
- 2) 2025 without Casapulla Farm (Case 2)
- 3) 2025 with Casapulla Farm (Case 3)

### **Peak hours evaluated:**

- Weekday AM and PM peak hours

### **Committed developments considered:**

- Future no-build (Case 2) volumes are based on DelDOT's Travel Demand Model to account for 2025 volumes that reflect a shift in traffic due to the recently completed US 301 Mainline project.

## **Intersection Descriptions**

The orientations of several study area roadways (North/South versus East/West) are inconsistent in the TIS. In order to avoid further confusion, McCormick Taylor generally used the same roadway orientations that were used in the TIS at each study intersection.

### **1) Site Access A & Middle Neck Road**

**Type of Control:** proposed one-way stop (T-intersection)

**Eastbound Approach:** (Site Access A) proposed one shared left-turn/right-turn lane, stop control

**Northbound Approach:** (Middle Neck Road) proposed one shared left-turn/through lane and one bypass lane

**Southbound Approach:** (Middle Neck Road) proposed one shared through/right-turn lane

### **2) Site Access B & Middle Neck Road**

**Type of Control:** proposed one-way stop (T-intersection)

**Eastbound Approach:** (Site Access B) proposed one shared left-turn/right-turn lane, stop control

**Northbound Approach:** (Middle Neck Road) proposed one left-turn lane and one through lane

**Southbound Approach:** (Middle Neck Road) proposed one shared through/right-turn lane

**3) Middle Neck Road & Warwick Road**

**Type of Control:** one-way stop (T-intersection)

**Eastbound Approach:** (Middle Neck Road) one shared left-turn/right-turn lane, stop control

**Northbound Approach:** (Warwick Road) one shared left-turn/through lane

**Southbound Approach:** (Warwick Road) one shared through/right-turn lane

**4) Warwick Road & Southbound US 301 Ramps**

**Type of Control:** signalized (diamond interchange ramp terminal)

**Eastbound Approach:** (Warwick Road) one through lane, one bicycle lane, and one channelized right-turn lane

**Westbound Approach:** (Levels Road) one left-turn lane and one through lane

**Southbound Approach:** (US 301 Southbound Off-Ramp) one left-turn lane, one shared left-turn/through lane, and one channelized right-turn lane

*Note: The US 301 Ramps were not open to traffic during the turning movement counts.*

**5) Levels Road & Northbound US 301 Ramps**

**Type of Control:** one-way stop (diamond interchange ramp terminal)

**Eastbound Approach:** (Levels Road) one left-turn lane and two through lanes

**Westbound Approach:** (Levels Road) one through lane, one bicycle lane, and one channelized right-turn lane

**Northbound Approach:** (US 301 Northbound Off-Ramp) one shared left-turn/through lane and one channelized right-turn lane, stop control

*Note: The US 301 Ramps were not open to traffic during the turning movement counts.*

**6) Levels Road & Middletown-Warwick Road**

**Type of Control:** signalized

**Eastbound Approach:** (Middletown-Warwick Road) one left-turn lane, two through lanes, and one right-turn lane

**Westbound Approach:** (Middletown-Warwick Road) one left-turn lane, two through lanes, one bicycle lane, and one channelized right-turn lane

**Northbound Approach:** (Levels Road) one left-turn lane, one through lane, one bicycle lane, and one channelized right-turn lane

**Southbound Approach:** (Levels Road) two left-turn lanes, one through lane, one bicycle lane, and one channelized right-turn lane

## **Safety Evaluation**

**Crash Data:** At the intersection of Middle Neck Road & Warwick Road, the Delaware Crash Analysis Reporting System (CARS) data in the TIS covers November 7, 2015 – November 7, 2018. At the intersection of Levels Road & Middletown-Warwick Road, the CARS data covers November 9, 2015 – November 9, 2018. The data includes crashes within a 0.10-mile radius of each study intersection.

Crash data was not provided for the proposed site driveways. Additionally, crash data was not provided for the US 301 Ramps intersections along Warwick Road/Levels Road as the intersections were being constructed during the crash data study period.

The crash data includes incidents that occurred before the study area intersections were reconfigured as part of the US 301 Mainline project. Therefore, the crash data included in the TIS may not be representative of safety issues that may be present at this time.

During the study period, there were:

- 47 total reportable crashes
  - 1 fatal crash
  - 19 personal injury crashes
  - 27 property damage only crashes
- 1 pedestrian crash (roadway construction worker)
- 0 pedalcycle crashes
- 1 crash involving alcohol or driving under the influence (DUI)

Intersection crash summaries are provided below. Each intersection was also evaluated to determine the extent to which they meet relevant DelDOT, AASHTO, and MUTCD standards for geometry and traffic control devices.

### **1) Middle Neck Road & Warwick Road**

Within the three-year study period, two crashes occurred at this unsignalized intersection.

The first crash involved a vehicle that struck a roadway construction worker while the driver traveled through a one-lane, flagger controlled work zone on Middle Neck Road. The crash resulted in personal injuries. It appears that the driver's actions were not a primary contributing circumstance in the crash. This incident occurred on dry pavement under cloudy weather conditions. Lighting conditions were reported as daylight.

The second incident was a sideswipe (same direction) crash that involved a disabled vehicle on the shoulder of Warwick Road that was struck by a passing driver. The crash resulted in property damage only. The primary contributing circumstance was driver inattention/distraction/fatigue. This incident occurred on dry pavement under clear weather conditions. Lighting conditions were dark – not lighted.



## **2) Warwick Road & Southbound US 301 Ramps**

Crash data was not provided by DelDOT. This intersection was being constructed during the crash data study period.

## **3) Levels Road & Northbound US 301 Ramps**

Crash data was not provided by DelDOT. This intersection was being constructed during the crash data study period.

## **4) Levels Road & Middletown-Warwick Road**

Within the three-year study period, 45 crashes occurred at this signalized intersection.

Of the 45 total crashes, one resulted in a fatality (2%) and 18 resulted in personal injury (40%). There were no crashes involving a pedestrian or a pedalcyclist. There was one alcohol related crash.

Based on a Delaware Online news article (updated 9/4/2017), the fatal crash occurred on Sunday September 3, 2017 at approximately 5:30pm. An SUV was traveling southbound on Middletown-Warwick Road and failed to stop at a red traffic signal. The southbound SUV collided with two vehicles that were both making eastbound left-turns from Warwick Road to northbound Middletown-Warwick Road. The driver of one of the turning vehicles sustained fatal injuries in the crash.

The collision types included 28 rear-end crashes (62%), ten angle crashes (22%), four sideswipe (same direction) crashes (9%), two single-vehicle crashes (4%), and one head-on crash (2%). Of the two single-vehicle crashes, one involved an impact attenuator/crash cushion and one involved a traffic sign support.

The primary contributing circumstances included 18 cases of driver inattention/distraction/fatigue (40%), ten cases of following too close (22%), seven cases of disregard traffic signal (16%), three cases of improper lane change (7%), two cases of failure to yield right-of-way (4%), two cases of made improper turn (4%), two cases of other primary contributing circumstance (4%), and one case of speeding (2%).

The majority of the crashes occurred on dry pavement (93%). One crash occurred on wet pavement (2%), one crash occurred on snow (2%), and one crash occurred on unknown pavement conditions (2%).

The majority of the collisions occurred under daylight conditions (71%). Nine crashes occurred under dark – lighted conditions (20%), two crashes occurred under dark – not lighted conditions (4%), one crash occurred at dusk (2%), and one crash had unknown lighting conditions (2%). Based on a field view conducted in April 2019, there is overhead roadway lighting installed in the area of this intersection.

The majority of the crashes occurred under clear or cloudy weather conditions (89%). Two crashes occurred during fog/smog/smoke (4%), one crash occurred during rain (2%), one crash occurred during snow (2%), and one crash occurred during unknown weather conditions (2%).



**Sight Distance:** No significant sight distance issues were noted during an April 2019 field investigation. The designer must verify that adequate sight distance will be provided for both ingress and egress movements at the proposed site driveways. The remaining study intersections were recently constructed or modified as part of the US 301 Mainline project.

### **Transit, Pedestrian, and Bicycle Facilities**

**Existing transit service:** Based on the DART Bus Stop Map, the Delaware Transit Corporation (DTC) does not currently operate any fixed-route transit bus service in the immediate area of the proposed Casapulla Farm residential development. While routes 43, 47, and 302 do operate in the general vicinity, the closest existing fixed-route transit stop is located approximately two miles from the proposed development.

**Planned transit service:** No evidence of correspondence with DTC was found in the TIS. McCormick Taylor attempted to contact a DTC representative to confirm future transit needs; DTC did not respond or provide any comments.

**Existing bicycle and pedestrian facilities:** Several study area roadways are identified as “Bicycling Routes” on the *New Castle County Bicycle Map* published by DelDOT. It is noted that the bicycle map does not appear to be updated since the completion of the US 301 Mainline project. Bicycle lane pavement markings have been added to the shoulders on Warwick Road near Middle Neck Road. Bicycle lanes are also provided along Warwick Road/Levels Road through the US 301 Northbound and Southbound ramps intersections. Designated Bicycling Routes noted below:

- Middletown-Warwick Road
  - Connector bicycle route with bikeway (over 10,000 vehicles daily)
- Levels Road
  - Connector bicycle route with bikeway

There are no existing sidewalks or exclusive pedestrian facilities in the immediate areas of the proposed site entrances on Middle Neck Road.

The Town of Middletown Comprehensive Plan includes an “Overall Community Goal” of “Enable the safe and efficient flow of bicycle, pedestrian, and vehicle traffic throughout town.”

**Planned bicycle and pedestrian facilities:** No evidence of correspondence with DelDOT’s Statewide and Regional Planning Section was found in the TIS. McCormick Taylor contacted a representative of DelDOT’s Local Systems Planning Section to determine pedestrian and bicycle accommodations for the proposed development. John Fiori requested a 10’ shared-use path along Middle Neck Road. He requested that entrance improvements incorporate bicycle and pedestrian facilities. He also indicated that easements would be required along the frontages.

### **Previous Comments**

In a review letter dated November 30, 2018, DelDOT indicated that the traffic count submission was acceptable as submitted.

It appears that all substantive comments from DelDOT's TIS Scoping Memorandum, Traffic Count Review, and other correspondence were addressed in the Final TIS submission. No evidence of correspondence with DTC or DelDOT's Statewide and Regional Planning Section was found in the TIS. As such, coordination is still needed with the appropriate agencies regarding transit, bicycle, and pedestrian facilities.

### **General HCS Analysis Comments**

*(see table footnotes on the following pages for specific comments)*

- 1) Both Becker Morgan and McCormick Taylor utilized Highway Capacity Software (HCS) version 7 to complete the traffic analyses. McCormick Taylor used the most up-to-date release of the software available at the time of the review (version 7.8). Becker Morgan used version 7.4.
- 2) As per DelDOT's Development Coordination Manual section 2.2.8.5.C, if an existing turning movement volume was less than 100 vehicles per hour, McCormick Taylor assumed an existing heavy vehicle percentage of 5%. It appears that Becker Morgan did not follow this methodology.
- 3) As per HCM methodologies, Becker Morgan and McCormick Taylor applied percent heavy vehicles (HV) by movement at two-way stop control intersections and HV by lane group at signalized intersections. In general, existing HV were applied to future conditions as well. For new intersections, 3% was assumed as per the DelDOT Development Coordination Manual section 2.2.8.11.6.H.
- 4) For existing conditions, the TIS and McCormick Taylor determined overall intersection peak hour factors (PHF) for each intersection. As per the DelDOT Development Coordination Manual, existing PHFs are generally applied to future conditions as well. Deviations are recorded in the detailed footnotes.
- 5) For analyses of signalized intersections, Becker Morgan and McCormick Taylor used a base saturation flow rate of 1,750 pc/hr/ln per DelDOT's Development Coordination Manual section 2.2.8.11.6.I.
- 6) The TIS and McCormick Taylor used different signal timings when analyzing the signalized intersections in some cases.
- 7) McCormick Taylor used field-measured roadway grades in all analyses. It appears that Becker Morgan assumed 0% roadway grades throughout the study area.

Table 3  
Peak Hour Levels of Service (LOS)  
Based on Casapulla Farm Traffic Impact Study - February 2019  
Prepared by Becker Morgan Group, Inc.

Unsignalized Intersection <sup>1</sup> One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Site Access A & Middle Neck Road <sup>2</sup>				
2025 with Casapulla Farm (Case 3)				
Eastbound Site Access A	A (8.8)	A (8.9)	A (8.9)	A (9.0)
Northbound Middle Neck – Left <sup>3</sup>	A (7.4)	A (7.5)	A (7.4)	A (7.5)

<sup>1</sup> For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

<sup>2</sup> The TIS used the HCS default PHF of 0.92. McCormick Taylor determined the PHF based on total intersection volume and guidance contained in the DelDOT Development Coordination Manual.

<sup>3</sup> The TIS recommends that the northbound approach be constructed with one shared left-turn/through lane and one bypass lane. The HCS analysis in the TIS does not account for the potential delay reduction due to the proposed bypass lane. Since this is a conservative analysis, McCormick Taylor used the same intersection geometry in the HCS analyses as the TIS (one shared left-turn/thru lane).

Table 4  
Peak Hour Levels of Service (LOS)  
Based on Casapulla Farm Traffic Impact Study - February 2019  
Prepared by Becker Morgan Group, Inc.

Unsignalized Intersection <sup>4</sup> One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
Site Access B (eastern) & Middle Neck Road <sup>5</sup>	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2025 with Casapulla Farm (Case 3)				
Eastbound Site Access B	A (9.1)	A (9.2)	A (9.3)	A (9.4)
Northbound Middle Neck - Left	A (7.5)	A (7.5)	A (7.5)	A (7.6)

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<sup>4</sup> For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

<sup>5</sup> The TIS used the HCS default PHF of 0.92. McCormick Taylor determined the PHF based on total intersection volume and guidance contained in the DelDOT Development Coordination Manual.

Table 5  
Peak Hour Levels of Service (LOS)  
*Based on Casapulla Farm Traffic Impact Study - February 2019*  
*Prepared by Becker Morgan Group, Inc.*

<b>Unsignalized Intersection <sup>6</sup> One-Way Stop (T-Intersection)</b>	<b>LOS per TIS</b>		<b>LOS per McCormick Taylor</b>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Middle Neck Road &amp; Warwick Road</b>				
2018 Existing (Case 1)				
Eastbound Middle Neck	A (9.8)	B (10.1)	A (9.9)	B (10.3)
Northbound Warwick – Left	A (7.4)	A (7.5)	A (7.5)	A (7.6)
2025 without Casapulla Farm (Case 2)				
Eastbound Middle Neck	B (10.1)	B (10.8)	B (10.2)	B (10.9)
Northbound Warwick – Left	A (7.6)	A (7.7)	A (7.6)	A (7.7)
2025 with Casapulla Farm (Case 3)				
Eastbound Middle Neck	B (11.1)	B (11.9)	B (11.3)	B (12.1)
Northbound Warwick – Left	A (7.7)	A (7.9)	A (7.7)	A (7.9)

<sup>6</sup> For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 6  
Peak Hour Levels of Service (LOS)  
Based on Casapulla Farm Traffic Impact Study - February 2019  
Prepared by Becker Morgan Group, Inc.

Signalized Intersection <sup>7</sup> (Diamond Interchange Ramp Terminal)	LOS per TIS		LOS per McCormick Taylor	
Warwick Road & Southbound US 301 Ramps <sup>8</sup>	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2025 without Casapulla Farm (Case 2)	C (22.8)	D (53.1)	C (23.1)	D (54.3)
2025 with Casapulla Farm (Case 3)	B (19.5)	E (57.2)	C (20.2)	D (52.5)
2025 with Casapulla Farm (Case 3) <i>With TIS Improvements</i> <sup>9</sup>	C (21.7)	C (30.3)	-	-

<sup>7</sup> For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

<sup>8</sup> The US 301 Ramps were not open to traffic during the traffic counts in October 2018. Therefore, no Case 1 analyses were completed.

<sup>9</sup> The TIS recommends traffic signal timing changes. These include changing from a 100-second cycle length to a 120-second cycle length. McCormick Taylor did not identify any LOS deficiencies; mitigation does not appear to be required.

Table 7  
Peak Hour Levels of Service (LOS)  
Based on Casapulla Farm Traffic Impact Study - February 2019  
Prepared by Becker Morgan Group, Inc.

Unsignalized Intersection <sup>10</sup> One-Way Stop (Diamond Interchange Ramp Terminal)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Levels Road &amp; Northbound US 301 Ramps</b> <sup>11, 12</sup>				
2025 without Casapulla Farm (Case 2)				
Eastbound Levels – Left	A (7.6)	A (8.0)	A (7.7)	A (8.0)
Northbound US 301 Ramp – Left/Thru	B (13.8)	C (20.0)	C (16.9)	D (26.1)
Northbound US 301 Ramp - Right	A (9.7)	B (10.5)	A (9.9)	B (10.6)
2025 with Casapulla Farm (Case 3)				
Eastbound Levels – Left	A (7.8)	A (8.1)	A (7.8)	A (8.1)
Northbound US 301 Ramp – Left/Thru	C (15.7)	C (23.4)	C (20.8)	D (33.1)
Northbound US 301 Ramp - Right	A (9.9)	B (10.6)	B (10.0)	B (10.7)

<sup>10</sup> For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

<sup>11</sup> The US 301 Ramps were not open to traffic during the traffic counts in October 2018. Therefore, no Case 1 analyses were completed.

<sup>12</sup> The TIS used the HCS default PHF of 0.92. McCormick Taylor determined the PHF based on total intersection volume and guidance contained in the DelDOT Development Coordination Manual.

Table 8  
Peak Hour Levels of Service (LOS)  
Based on Casapulla Farm Traffic Impact Study - February 2019  
Prepared by Becker Morgan Group, Inc.

Signalized Intersection <sup>13</sup>	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Levels Road &amp; Middletown-Warwick Road</b> <sup>14</sup>				
2018 Existing (Case 1)	D (36.0)	C (33.7)	D (35.5)	C (32.2)
2025 without Casapulla Farm (Case 2)	D (49.3)	F (102.2)	D (48.6)	F (82.3)
2025 with Casapulla Farm (Case 3)	D (49.3)	F (109.4)	D (48.7)	F (88.0)
2025 with Casapulla Farm (Case 3) <i>With TIS Improvements</i> <sup>15</sup>	D (35.8)	D (54.9)	-	-
2025 with Casapulla Farm (Case 3) <i>With Improvement Option 2</i> <sup>16</sup>	-	-	D (44.8)	D (47.3)

<sup>13</sup> For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

<sup>14</sup> The TIS applied a PHF of 0.92 for the PM peak hour analyses (all cases). Based on traffic count data, McCormick Taylor applied a PHF of 0.97 to PM peak hour analyses (all cases).

<sup>15</sup> The TIS recommends traffic signal timing changes. These include changing from a 120-second cycle length to a 150-second cycle length. The TIS also recommends extending the westbound Middletown-Warwick Road left-turn lane from approximately 500-feet to approximately 700-feet (excluding taper).

<sup>16</sup> In *Improvement Option 2*, McCormick Taylor recommends optimizing the traffic signal splits within the existing 120-second cycle length. A longer cycle length does not appear to be needed. McCormick Taylor recommends extending the westbound Middletown-Warwick Road left-turn lane as described in the TIS.