



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

JENNIFER COHAN
SECRETARY

November 15, 2019

Mr. D.J. Hughes
Davis, Bowen & Friedel, Inc.
1 Park Avenue
Milford, DE 19963

Dear Mr. Hughes:

The enclosed Traffic Impact Study (TIS) review letter for the proposed **Milford Ponds** (Tax Parcels 130-6.00-108.00, 130-3.00-264.00 & 264.01) 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,

A handwritten signature in black ink, appearing to read "Troy Brestel".

Troy Brestel
Project Engineer

TEB:km

Enclosures

cc with enclosures: Mr. Ring Lardner, Davis, Bowen & Friedel, Inc.
Ms. Wendy Gingerich, Davis, Bowen & Friedel, Inc.
Ms. Constance C. Holland, Office of State Planning Coordination
Mr. Eric Norenberg, City Manager, City of Milford
Mr. Andrew Parker, McCormick Taylor, Inc.
DelDOT Distribution

DelDOT Distribution

Brad Eaby, Deputy Attorney General
Shanté Hastings, Director, Transportation Solutions (DOTS)
Drew Boyce, Director, Planning
Mark Luszcz, Deputy Director, DOTS
Michael Simmons, Assistant Director, Project Development South, DOTS
J. Marc Coté, Assistant Director, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Peter Haag, Chief Traffic Engineer, Traffic, DOTS
Alastair Probert, South District Engineer, South District
Gemez Norwood, South District Public Works Manager, South District
Susanne Laws, Sussex Subdivision Review Coordinator, Development Coordination
David Dooley, Service Development Planner, Delaware Transit Corporation
Mark Galipo, Traffic Engineer, Traffic, DOTS
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
Derek Sapp, Sussex County Subdivision Reviewer, Development Coordination
Claudy Joinville, Project Engineer, Development Coordination



November 6, 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 15A – Milford Ponds

Dear Mr. Brestel:

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the Milford Ponds residential development prepared by Davis, Bowen & Friedel, Inc. (DBF), dated November 2018. DBF prepared the report in a manner generally consistent with DelDOT's Development Coordination Manual.

The TIS evaluates the impacts of the proposed Milford Ponds residential development. The site is located on the east side of US Route 113 (DuPont Boulevard / Sussex Road 113) between Seabury Avenue (Sussex Road 36A) and Johnson Road (Sussex Road 207) in the City of Milford, Sussex County, Delaware.

A TIS was previously completed by DBF in 2004 for a development in this location that went by the name of Central Parke, which was proposed for 722 age-restricted units. Entrance Plans for that development were previously approved in May 2006. The entrances, along with some residential streets, were constructed in 2007-2008 but the homes were not constructed at that time. Within the past year, construction of homes has begun, and one site driveway on US Route 113 is open for motorists to access the site. The current TIS evaluates the proposed development of 459 single-family homes and 241 townhomes/condos (700 total dwelling units).

Two site access driveways are proposed. A right-in/right-out/left-in driveway is located on US Route 113, approximately half-way between Seabury Avenue and Johnson Road. This driveway has already been constructed as per the Entrance Plans previously approved in 2006. A full-access driveway is also proposed on S. Walnut Street (Sussex Road 213), located approximately 1,000-foot north of Swains Private Road. This driveway was previously constructed as a stub, but will need to be modified and extended into the development. Construction of the development will occur in phases, with full buildout anticipated to be complete by 2030.

The subject land consists of three parcels totaling 178 acres. The site is currently split-zoned R1 (Single Family), R2 (Residential) and R3 (Garden Apartments / Townhouses), with a Planned Unit Development (PUD) overlay. The contemplated subdivision approval would reconcile the parcel and zoning lines, thus eliminating the split zoning. The developer does not seek to rezone the land.

Currently, there are no DelDOT capital projects in the study area. While DelDOT’s US 113 North/South Study does extend into the study area of this TIS, no progress has been made in the Milford Area since July 2007 and no work is currently underway in the Milford/Lincoln Area.

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>
US Route 113 and Site Access	Unsignalized	2030 without Milford Ponds summer Saturday (Case 2); 2030 with Milford Ponds summer Saturday (Case 3)
US Route 113 and Clendaniel Road / Haflinger Road	Unsignalized	2017 existing summer Saturday (Case 1); 2030 without Milford Ponds summer Saturday (Case 2); 2030 with Milford Ponds summer Saturday (Case 3)
US Route 113 and Hudson Pond Road	Unsignalized	2030 without Milford Ponds summer Saturday (Case 2); 2030 with Milford Ponds weekday AM (Case 3); 2030 with Milford Ponds summer Saturday (Case 3)
N. Old State Road and Johnson Road	Unsignalized	2030 without Milford Ponds weekday AM & PM (Case 2); 2030 with Milford Ponds weekday AM & PM (Case 3)

US Route 113 and Site Access

This unsignalized site access intersection experiences LOS deficiencies in the 2030 summer Saturday peak hour, both without and with Milford Ponds.

The westbound site driveway right-turn egress movement is expected to operate at LOS E during the 2030 summer Saturday peak hour (with Milford Ponds). The 95th percentile queue length is approximately four vehicles. Installation of a traffic signal or alternative intersection design does not appear to be appropriate at this site access intersection. If westbound motorists at this site driveway come to experience lengthy delays in the summer Saturday peak hour, they can choose to utilize the site driveway on S. Walnut Street instead. Based on these considerations, no mitigation is recommended regarding the westbound right-turn movement.

The northbound U-turn is expected to operate at LOS E during the 2030 summer Saturday peak hour (both without and with Milford Ponds). The Milford Ponds development is not expected to add any volume to the northbound U-Turn movement, and the 95th percentile queue length is less than one vehicle. No mitigation is recommended regarding the northbound u-turn movement.

The southbound U-turn is expected to operate at LOS F during the 2030 summer Saturday peak hour (without Milford Ponds). In this scenario, the southbound U-turn volume is only two vehicles. As per the DelDOT Development Coordination Manual, no mitigation is required for movements with ten vehicles per hour or less. The southbound U-turn/left-turn improves to LOS D during the 2030 summer Saturday peak hour (with Milford Ponds). This LOS improvement is largely due to the addition of 100 left-turns to the U-turn/left-turn lane. Because a left-turn faces less delay than a U-turn, the addition of 100 left-turns results in a lower average delay per vehicle than when the lane served two U-turns. No mitigation is recommended regarding the southbound turning movements.

US Route 113 and Clendaniel Road / Haflinger Road

This unsignalized intersection experiences LOS deficiencies in the summer Saturday peak hour under 2017 existing, 2030 without Milford Ponds, and 2030 with Milford Ponds scenarios.

The eastbound Clendaniel Road approach is expected to operate at LOS F in the 2030 summer Saturday peak hour, both without and with Milford Ponds. However, this approach has less than ten vehicles per hour. Thus, mitigation is not required as per the DelDOT Development Coordination Manual.

The westbound Haflinger Road approach exhibits LOS E in the 2017 existing summer Saturday peak hour. The approach is expected to operate at LOS F in the 2030 summer Saturday peak hour, both without and with Milford Ponds. The 95th percentile queue length is projected to be two vehicles.

The failing LOS occurs even without the Milford Ponds development, and only during the summer Saturday condition, and the resulting queue length is relatively short. Adding a separate turn lane on the westbound approach would not resolve the deficiencies, and installation of a traffic signal is not warranted or desired. For all these reasons, no mitigation is recommended at this intersection.

US Route 113 and Hudson Pond Road

This unsignalized intersection experiences LOS deficiencies in the 2030 weekday AM peak hour with Milford Ponds and in the 2030 summer Saturday peak hour, both without and with Milford Ponds.

The eastbound and westbound Hudson Pond Road approaches are expected to operate at LOS E and F, respectively, in the 2030 summer Saturday peak hour, both without and with Milford Ponds. During these times, both approaches have ten vehicles per hour or less. Thus, mitigation is not required as per the DelDOT Development Coordination Manual.

The eastbound Hudson Pond Road approach is also expected to operate at LOS E during the weekday AM peak hour with Milford Ponds. Again, during this time, the approach has ten or less vehicles per hour, and mitigation is not required.

N. Old State Road and Johnson Road

This unsignalized intersection experiences LOS deficiencies in the 2030 weekday AM and PM peak hours, both without and with Milford Ponds.

The stop-controlled northbound N. Old State Road approach is expected to operate at LOS F in the 2030 weekday PM peak hour, both without and with Milford Ponds. Delays and queues increase significantly with the addition of Milford Ponds. Additionally, this approach is expected to operate at LOS E in the 2030 weekday AM peak hour with Milford Ponds.

The stop-controlled southbound N. Old State Road approach is expected to operate at unacceptable LOS E or F in the 2030 weekday AM and PM peak hours, both without and with Milford Ponds. Delays and queues increase significantly with the addition of Milford Ponds, to greater than two minutes per vehicle during the AM peak hour and four minutes per vehicle during the PM peak hour. The 95th percentile queue lengths on this approach in the 2030 with Milford Ponds scenarios are greater than ten vehicles in length.

Based on these findings, the existing traffic control and intersection geometry is not appropriate for future traffic volumes. Subsequent to the submission of the Milford Ponds TIS, an Intersection Control Evaluation was undertaken by McCormick Taylor. This evaluation included new turning movement traffic counts and compared different intersection control options including two-way stop-control, all-way stop-control, signalized, and roundabout. Capacity analysis was performed to assess operations of each option. The evaluation of signalized control included MUTCD warrant analyses. The results of the evaluation were used to identify the appropriate mitigation needed at the intersection of N. Old State Road and Johnson Road, which is the installation of a traffic signal when warranted. As described below in Item No. 4, it is recommended that the Milford Ponds developer enter in a traffic signal agreement with DelDOT for the future installation of a signal at this intersection at a date to be determined by DelDOT. A contribution to the Traffic Signal Revolving Fund may be acceptable in lieu of a traditional traffic signal agreement. A summary of the results of the Intersection Control Evaluation is provided immediately below, with more detail provided in Table 14 on page 33 of this review letter.

As with the analyses conducted for the original TIS and the McCormick Taylor review of the TIS, the Intersection Control Evaluation analyses of the 2030 AM and PM peak hours with Milford Ponds found that two-way stop-control (i.e., the existing configuration) would result in excessive delays and queues on the stop-controlled northbound and southbound approaches. When analyzed as an all-way stop-control intersection, the AM peak hour would operate acceptably but the PM would reach LOS F for the eastbound and westbound approaches and for the overall intersection, with queue lengths greater than 16 vehicles (400 feet) on the eastbound and westbound approaches. When analyzed as a single-lane roundabout or as a two-phase traffic signal, operations would be very good, with all approaches and the overall intersection operating at LOS A or LOS B for both alternatives and in both peak hours. Installation of a traffic signal is not warranted under existing volumes, but is warranted in the 2030 with Milford Ponds volume scenario. Due in part to the potential impacts of the geometric design of a roundabout at this location, installation of a traffic

signal at a date to be determined by DelDOT is the recommended improvement at the intersection of N. Old State Road and Johnson Road.

Should the City of Milford 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 modify the existing full-movement site access on S. Walnut Street. The proposed configuration is shown in the table below.

Approach	Existing Configuration	Proposed Configuration
Eastbound Site Access	One shared left-turn/right-turn lane (stub is currently constructed)	One shared left-turn/right-turn lane
Northbound S. Walnut Street	One shared left-turn/through lane	One left-turn lane and one through lane
Southbound S. Walnut Street	One through lane, one bicycle lane, and one right-turn lane	One through lane, one bicycle lane, and one 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 process.

Approach	Left-Turn Lane	Right-Turn Lane
Eastbound Site Access	N/A	N/A
Northbound S. Walnut Street	95 feet *	N/A
Southbound S. Walnut Street	N/A	100 feet **

* Initial turn-lane length based on DelDOT’s *Auxiliary Lane Worksheet*

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

Existing turn lane exceeds this length and is acceptable to remain, with modifications as needed to accommodate transition for addition of northbound left-turn lane.

2. The developer should improve S. Walnut Street from the beginning of the transition for the northbound left-turn lane (described above in Item No. 1) to the southern edge of tax parcel 1-30-3.00-263 (approximately 1,550 feet north of the site access). The road should be improved as needed to provide eleven-foot travel lanes and five-foot shoulders. Details of the improvement must be coordinated with DelDOT’s Development Coordination Section. The developer should provide a bituminous concrete overlay to the existing travel lanes, at DelDOT’s discretion. DelDOT should analyze the existing lane’s pavement section and recommend an overlay thickness to the developer’s engineer if necessary.

- Prior to issuance of the 227th building permit, the developer shall modify the existing right-in/left-in/right-out site access on US Route 113. The proposed configuration is shown in the table below. Aside from the recommended extension of the right-turn lane on northbound US Route 113, the proposed configuration has already been constructed.

Approach	Existing Configuration	Proposed Configuration
Westbound Site Access	One right-turn lane	One right-turn lane
Northbound US Route 113	One U-turn lane, two through lanes, and one right-turn lane	One U-turn lane, two through lanes and one right-turn lane
Southbound US Route 113	One U-turn/left-turn lane and two through lanes	One U-turn/left-turn lane and two through lanes

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
Westbound Site Access	N/A	N/A
Northbound US Route 113	N/A	380 feet *
Southbound US Route 113	315 feet **	N/A

* Initial turn-lane length based on coordination with DelDOT. Length of the full-width portion of the northbound right-turn lane should be approximately 380 feet (extending to where the existing curb begins and the shoulder width changes), and should have an 80-foot taper.

** Initial turn-lane length based on DelDOT’s *Auxiliary Lane Worksheet*. Existing turn lane exceeds this length and is acceptable to remain.

- The developer should enter into a traffic signal agreement with DelDOT for design and construction of a future traffic signal for the intersection of N. Old State Road and Johnson Road. The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DelDOT’s discretion. The construction schedule of the new traffic signal is yet to be determined by DelDOT. The developer should coordinate with DelDOT on the design details and implementation of the traffic signal. The agreement should provide for installation and activation of the signal at DelDOT’s discretion.

Entering into a Traffic Signal Revolving Fund agreement for this intersection is an option instead of the traditional traffic signal agreement. The developer should coordinate with DelDOT’s Development Coordination Section regarding the appropriate type of agreement needed and details thereof.

5. The following bicycle, pedestrian, and transit improvements should be included:
 - a. Adjacent to the right-turn lane on southbound S. Walnut Street at the site entrance, there is an existing five-foot wide bicycle lane that must be retained as that site entrance intersection is reconstructed in accordance with Item No. 1 above. This bicycle lane must be dedicated and striped with appropriate markings for bicyclists.
 - b. Appropriate bicycle symbols, directional arrows, pavement markings, and signing should be included along bicycle facilities and turn lanes within the project limits.
 - c. Utility covers should be made flush with the pavement.
 - d. If a clubhouse or other community facility is constructed as shown on the provided Master Plan, bike parking should be provided near the building entrances. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.
 - e. A minimum 15-foot wide permanent easement from the edge of the right-of-way should be dedicated to DelDOT within the site frontage along US Route 113.
 - f. A minimum 15-foot wide permanent easement from the edge of the right-of-way should be dedicated to DelDOT along the west side of S. Walnut Street from the beginning of the transition for the northbound left-turn lane (described above in Item No. 1) to the southern edge of tax parcel 1-30-3.00-263 (approximately 1,550 feet north of the site access).
 - g. Within the entire length of the easement along S. Walnut Street (as described above in Item No. 5.f.), 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 the north end of its length, the SUP should connect to the adjacent property. At the south end, the SUP should connect to the shoulder. The developer should coordinate with DelDOT's Development Coordination Section to determine details of the SUP connections at termini.
 - h. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
 - i. 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 existing sidewalk along US Route 113 and the proposed SUP along S. Walnut Street.



- j. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to prevent vehicular overhang onto the sidewalk.
- k. The developer should coordinate with the Delaware Transit Corporation (DTC) regarding the possibility of including bus stop(s) to be located near one or both of the site entrances on US Route 113 and S. Walnut Street.

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.

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 if you have any questions concerning this review.

Sincerely,

McCormick Taylor, Inc.

A handwritten signature in black ink, appearing to read "Andrew J. Parker".

Andrew J. Parker, P.E., PTOE
Project Manager

Enclosure

General Information

Report date: November 2018

Prepared by: Davis, Bowen & Friedel, Inc. (DBF)

Prepared for: Milford Ponds, LLC

Tax parcel: 1-30-6.00-108.00; 1-30-3.00-264 & 264.01

Generally consistent with DelDOT's Development Coordination Manual: Yes

Project Description and Background

Description: The proposed Milford Ponds development would consist of 459 single-family homes and 241 townhomes/condos (700 total dwelling units).

Location: The site is located on the east side of US Route 113 (DuPont Boulevard / Sussex Road 113) between Seabury Avenue (Sussex Road 36A) and Johnson Road (Sussex Road 207) in the City of Milford, Sussex County, Delaware. A site location map is included on page 10.

Amount of land to be developed: Approximately 178 acres

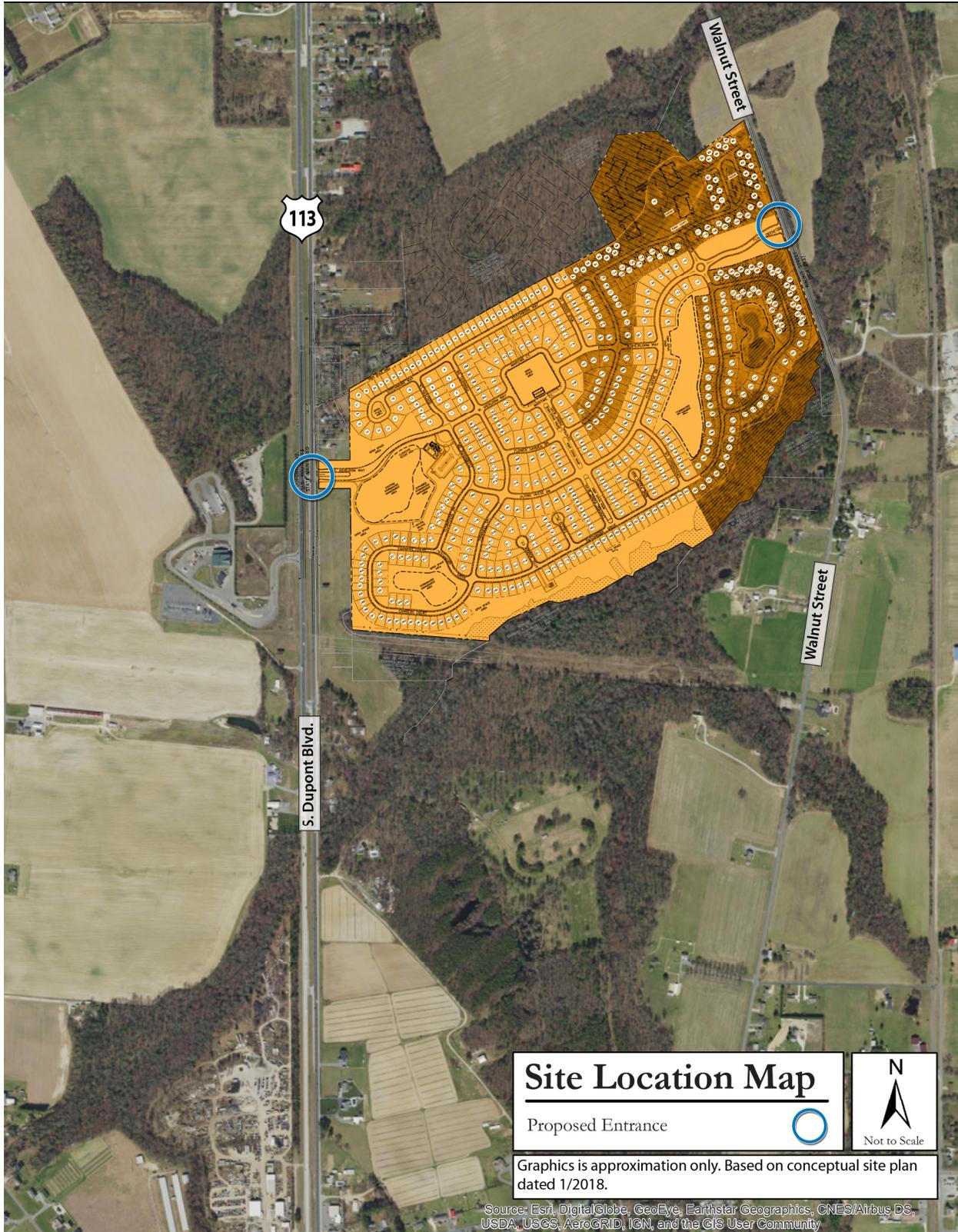
Land use approval(s) needed: Subdivision approval. According to the TIS narrative, the site is currently zoned R-3 (garden apartment and townhouse) with a Planned Unit Development (PUD) overlay, and the developer will not modify the existing zoning. However, based on data shown on the Master Plan (TIS Figure 3), the site is split zoned R-1 (single-family), R-2 (residential), and R-3 (garden apartment and townhouse). The split zoning was confirmed with the City of Milford electronic zoning map (accessed January 2019).

Proposed completion year: The site will be developed in three phases. Full buildout is expected in 2030.

Proposed access locations: Two site access driveways are proposed. A right-in/right-out/left-in driveway is proposed on US Route 113, located approximately half-way between Seabury Avenue and Johnson Road. This driveway has already been constructed as per the Entrance Plans previously approved in 2006. A full-access driveway is also proposed on S. Walnut Street (Sussex Road 213), located approximately 1,000-feet north of Swains Private Road. This driveway on S. Walnut Street was previously constructed, but will need to be modified.

Daily Traffic Volumes (per DelDOT Traffic Summary 2017):

- 2017 Average Annual Daily Traffic on US Route 113: 20,018 vehicles/day
- 2017 Average Annual Daily Traffic on S. Walnut Street: 2,216 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 proposed Milford Ponds residential development is located primarily within Investment Level 1 and Investment Level 2 areas. Negligible portions of the site are located within Investment Level 3 areas.

Investment Level 1

Areas of the state designated as Investment Level 1 are most prepared for growth and are where the state can make cost-effective infrastructure investments in schools, roads, and public safety. In these areas, state investments and policies should support and encourage a wide range of uses and densities, promote a variety of transportation options, foster efficient use of existing public and private investments, and enhance community identity and integrity. Investment Level 1 areas are often municipalities, towns, or urban/urbanizing places. Density is generally higher than in the surrounding areas. Overall, it is the state's intent to use its spending and management tools to maintain and enhance community character, to promote well-designed and efficient new growth, and to facilitate redevelopment in Investment Level 1 Areas.

Investment Level 2

Investment Level 2 has many diverse characteristics. These areas can be composed of less developed areas within municipalities, rapidly growing areas in the counties that have or will have public water and wastewater services and utilities, areas that are generally adjacent to or near Investment Level 1 Areas, smaller towns and rural villages that should grow consistently with their historic character, and suburban areas with public water, wastewater, and utility services. These areas have been shown to be the most active portion of Delaware's developed landscape. They serve as transition areas between Level 1 and the state's more open, less populated areas. They generally contain a limited variety of housing types, predominantly detached single-family dwellings.

In Investment Level 2 Areas, like Investment Level 1 Areas, state investments and policies should support and encourage a wide range of uses and densities, promote other transportation options, foster efficient use of existing public and private investments, and enhance community identity and integrity.

Investments should encourage departure from the typical single-family-dwelling developments and promote a broader mix of housing types and commercial sites encouraging compact, mixed-use development where applicable. Overall, the State's intent is to use its spending and management tools to promote well-designed development in these areas. Such development provides for a variety of housing types, user-friendly transportation systems, and provides essential open spaces and recreational facilities, other public facilities, and services to promote a sense of community. Level 2 Areas would be a prime location for designating "pre-permitted areas."

Proposed Development’s Compatibility with Strategies for State Policies and Spending:

The proposed Milford Ponds development includes 459 single-family homes and 241 townhomes/condos. The proposed development is located along US Route 113, just south of the City of Milford downtown area. Several other existing, expanding, or proposed residential and commercial developments are located nearby. The project will provide sidewalks along its frontages, which will help provide pedestrian connectivity to the City of Milford downtown area as other adjacent properties are also developed in the future. The project will also provide for future internal connections to the planned Simpson Crossing development to the north. Although only residential uses are proposed, the project provides a mix of housing types and is located near existing transportation facilities and other public services. As such, the proposed development generally appears to comply with the guidelines of Investment Level 1 and Investment Level 2 areas.

Comprehensive Plan

Sussex County Comprehensive Plan:

(Source: Sussex County Comprehensive Plan Update, June 2008)

The Sussex County Comprehensive Plan Future Land Use Map indicates that the proposed Milford Ponds development is in the City of Milford, a municipality. Sussex County strongly favors directing development to municipalities that desire it. The specific permitted uses and densities governing new construction within an incorporated municipality will continue to be governed by the zoning ordinance for that municipality, its public water and sewer capacities, and its comprehensive planning policies.

City of Milford Comprehensive Plan:

(Source: City of Milford Comprehensive Plan, adopted January 2018 and certified May 2018)

The City of Milford Comprehensive Plan Future Land Use Map indicates that the site is planned for Moderate-Density Residential land use. The Plan states “The Moderate Density Residential District represents typical single-family detached dwellings, attached single-family dwelling units, patio homes, duplexes, triplexes, quadplexes, townhomes/row houses, condominiums, apartments, and loft-style units.”

Inspection of the City of Milford online zoning map (accessed January 2019) shows that the proposed development is located on lands currently zoned R-1 (single-family residential), R-2 (residential), and R-3 (garden apartment and townhouse). Based on the City of Milford Code of Ordinances (Part II, Chapter 230), the proposed residential land uses appear to be appropriate within the existing zoning. It is noted that the TIS narrative indicates that the land is entirely zoned R-3, but R-1, R-2, and R-3 are listed on the site Master Plan. The TIS indicates that the land is within a Planned Unit Development (PUD) overlay.

Proposed Development’s Compatibility with Comprehensive Plan:

The proposed Milford Ponds residential development appears to comply with the City of Milford Comprehensive Plan. The proposed residential development generally aligns with both the Future

Land Use Map and the existing zoning. However, the existing residential zoning should be verified, as there appears to be conflicting information between various sources.

Relevant Projects in the DelDOT Capital Transportation Program

Currently, there are no DelDOT capital projects in the study area. While DelDOT’s US 113 North/South Study does extend into the study area of this TIS, no progress has been made in the Milford Area since July 2007 and no work is currently underway in the Milford/Lincoln Area.

Trip Generation

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

- 459 single-family detached homes (ITE Land Use Code 210)
- 241 residential townhomes/condos (ITE Land Use Code 230)

Table 1
Milford Ponds Peak Hour Trip Generation

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Mid-Day Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
459 Single-Family Homes	83	248	331	261	153	414	225	192	417
241 Townhomes/Condos	18	86	104	83	41	124	61	52	113
TOTAL TRIPS	101	334	435	344	194	538	286	244	530

Table 2
Milford Ponds Daily Trip Generation

Land Use	Weekday Daily			Saturday Daily		
	In	Out	Total	In	Out	Total
459 Single-Family Homes	2134	2134	4267	2094	2094	4188
241 Townhomes/Condos	691	691	1383	650	650	1299
TOTAL TRIPS	2825	2825	5650	2744	2744	5487

Overview of TIS

Intersections examined:

- 1) US Route 113 (Sussex Road 113) & Site Access
- 2) S. Walnut Street (Sussex Road 213) & Site Access
- 3) US Route 113 & Fitzgeralds Road / Johnson Road (Sussex Road 207)
- 4) US Route 113 & Clendaniel Road / Haflinger Road (Sussex Road 625)
- 5) US Route 113 & Hudson Pond Road (Sussex Road 623)
- 6) US Route 113 & Shawnee Road / Lakeview Avenue (Delaware Route 36, Sussex Road 036)
- 7) US Route 113 & Old Shawnee Road (Sussex Road 619)
- 8) US Route 113 & Cypress Hall Boulevard
- 9) S. Walnut Street & McCoy Street (Sussex Road 211)
- 10) S. Walnut Street & SE 2nd Street (Sussex Road 095)
- 11) N. Old State Road (Sussex Road 213) & Johnson Road (Sussex Road 207)
- 12) Johnson Road & Marshall Street / Third Street (Sussex Road 225)
- 13) Johnson Road & Wilkins Road (Sussex Road 206)

Conditions examined:

- 1) 2017 Existing (Case 1)
- 2) 2030 without Milford Ponds (Case 2)
- 3) 2030 with Milford Ponds (Case 3)

Peak hours evaluated:

- Weekday AM and PM peak hours (all intersections)
- Summer Saturday midday peak hour (intersections 1 – 7)

Committed developments considered:

- 1) Cypress Hall (546-unit Planned Unit Development, 246,914 square-foot shopping center)
- 2) Simpson's Crossing (450 single-family detached houses, 573 townhomes)
- 3) Bayhealth Milford Campus (350,000 square-foot hospital and ambulatory care facility, 385 employees)
- 4) Nemours – Bayhealth (85,000 square-foot Medical/Dental office)
- 5) Hearthstone Manor I (total: 178 single-family detached houses, 952 condominiums; unbuilt: 94 single-family detached houses, 536 condominiums)
- 6) Hearthstone Manor II (1,015 condominiums, 118 single-family detached houses)
- 7) West Shores at New Milford (112 single-family detached houses)
- 8) Watergate (317 townhomes)
- 9) Cabbage Pond Estates (97 single-family detached houses)
- 10) Cypress Creek Estates (78 single-family detached houses)
- 11) Mission Estates (25 single-family detached houses)
- 12) Wickersham (200 townhomes)

Intersection Descriptions

- 1) **US Route 113 & Site Access**
Type of Control: one-way stop (T-intersection)
Westbound approach: (Site Access) one right-turn lane, stop control
Northbound approach: (US Route 113) one U-turn lane, two through lanes, and one right-turn lane
Southbound approach: (US Route 113) one left-turn lane and two through lanes

- 2) **S. Walnut Street & Site Access**
Type of Control: one-way stop (T-intersection)
Eastbound Approach: (Site Access) one shared left-turn/right-turn lane, stop control
Northbound Approach: (S. Walnut Street) existing one shared left-turn/through lane; proposed one left-turn lane and one through lane
Southbound Approach: (S. Walnut Street) one through lane, one bicycle lane, and one right-turn lane

- 3) **US Route 113 & Fitzgeralds Road / Johnson Road**
Type of Control: signalized
Eastbound Approach: (Fitzgeralds Road) one shared left-turn/through lane and one channelized right-turn lane
Westbound Approach: (Johnson Road) one shared left-turn/through lane and one channelized right-turn lane
Northbound Approach: (US Route 113) one left-turn lane, two through lanes, and one channelized right-turn lane
Southbound Approach: (US Route 113) one left-turn lane, two through lanes, and one channelized right-turn lane

- 4) **US Route 113 & Clendaniel Road / Haflinger Road**
Type of Control: two-way stop
Eastbound Approach: (Clendaniel Road) one shared left-turn/through/channelized right-turn lane, stop control
Westbound Approach: (Haflinger Road) one shared left-turn/through/channelized right-turn lane, stop control
Northbound Approach: (US Route 113) one left-turn lane, two through lanes, and one right-turn lane
Southbound Approach: (US Route 113) one left-turn lane, two through lanes, and one right-turn lane

- 5) **US Route 113 & Hudson Pond Road**
Type of Control: two-way stop
Eastbound Approach: (Hudson Pond Road) one shared left-turn/through/channelized right-turn lane, stop control
Westbound Approach: (Hudson Pond Road) one shared left-turn/through/channelized right-turn lane, stop control
Northbound Approach: (US Route 113) one left-turn lane, two through lanes, and one right-turn lane
Southbound Approach: (US Route 113) one left-turn lane, two through lanes, and one right-turn lane

- 6) **US Route 113 & Shawnee Road / Lakeview Avenue**
Type of Control: signalized
Eastbound Approach: (Shawnee Road) existing one left-turn lane and one shared through/channelized right-turn lane; future one left-turn lane, one through lane, and one right-turn lane (*anticipated to be constructed by Cypress Hall developer*)
Westbound Approach: (Lakeview Avenue) one left-turn lane and one shared through/channelized right-turn lane
Northbound Approach: (US Route 113) one left-turn lane, two through lanes, and one right-turn lane
Southbound Approach: (US Route 113) one left-turn lane, two through lanes, and one right-turn lane

- 7) **US Route 113 & Old Shawnee Road**
Type of Control: signalized
Eastbound Approach: (Old Shawnee Road) one left turn lane and one shared left-turn/through/channelized right-turn lane
Westbound Approach: (Old Shawnee Road) one left-turn lane and one through lane
Northbound Approach: (US Route 113) one left-turn lane, two through lanes, and one right-turn lane
Southbound Approach: (US Route 113) two through lanes and one right-turn lane

- 8) **US Route 113 & Cypress Hall Boulevard**
Type of Control: signalized
Eastbound Approach: (Cypress Hall Boulevard) two left-turn lanes and one channelized right-turn lane
Westbound Approach: (Simpson's Crossing) future one left-turn lane, one through lane, and one right-turn lane (*anticipated to be constructed by Simpson's Hall developer*)
Northbound Approach: (US Route 113) one left-turn lane and two through lanes
Southbound Approach: (US Route 113) one U-turn lane, two through lanes, and one channelized right-turn lane

- 9) **S. Walnut Street & McCoy Street**
Type of Control: one-way stop (T-intersection)
Westbound Approach: (McCoy Street) one shared left-turn/right-turn lane, stop control
Northbound Approach: (S. Walnut Street) one shared through/right-turn lane
Southbound Approach: (S. Walnut Street) one shared left-turn/through lane
- 10) **S. Walnut Street & SE 2nd Street**
Type of Control: one-way stop (T-intersection)
Westbound Approach: (SE 2nd Street) one shared left-turn/right-turn lane, stop control
Northbound Approach: (S. Walnut Street) one shared through/right-turn lane
Southbound Approach: (S. Walnut Street) one shared left-turn/through lane
- 11) **N. Old State Road & Johnson Road**
Type of Control: two-way stop
Eastbound Approach: (Johnson Road) one shared left-turn/through/right-turn lane and one bicycle lane
Westbound Approach: (Johnson Road) one shared left-turn/through/right-turn lane and one bicycle lane
Northbound Approach: (N. Old State Road) one shared left-turn/through/right-turn lane, stop control
Southbound Approach: (N. Old State Road) one shared left-turn/through/right-turn lane, stop control
- 12) **Johnson Road & Marshall Street / Third Street**
Type of Control: signalized
Eastbound Approach: (Johnson Road) one shared left-turn/through/right-turn lane and one bicycle lane
Westbound Approach: (Johnson Road) one shared left-turn/through/right-turn lane and one bicycle lane
Northbound Approach: (Third Street) one shared left-turn/through/right-turn lane and one bicycle lane
Southbound Approach: (Marshall Street) one shared left-turn/through/right-turn lane and one bicycle lane
- 13) **Johnson Road & Wilkins Road**
Type of Control: one-way stop (T-intersection)
Eastbound Approach: (Johnson Road) one shared left-turn/through lane and one bicycle lane
Westbound Approach: (Johnson Road) one shared through/right-turn lane and one bicycle lane
Southbound Approach: (Wilkins Road) one shared left-turn/right-turn lane, stop control

Safety Evaluation

Crash Data: Per current DelDOT policy, review of crash data was not conducted at this time.

Sight Distance: McCormick Taylor concurs with the sight distance analysis included in the TIS. At S. Walnut Street & McCoy Street, the existing trees along S. Walnut Street should be monitored and/or trimmed on a regular basis to maintain adequate sight distance.

No significant sight distance issues are anticipated at the entrances to Milford Ponds on US Route 113 and S. Walnut Street.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: The Delaware Transit Corporation (DTC) currently operates one bus route along the site frontages of the proposed Milford Ponds residential development. DART Route 303 (Intercounty Dover – Georgetown) completes eight round trips each weekday from approximately 5 AM to 9 PM. No service is provided on weekends. DART Route 303 provides connections between Dover, Milford, and Georgetown. The regular service route runs along the S. Walnut Street site frontage, while “limited stop” service is provided along the US Route 113 site frontage. The closest existing fixed-route stops for Route 303 and are located at US 113 & Johnson Road and S. Walnut Street & Mispillion Apartments. The existing stops near US Route 113 & Johnson Road do not have transit amenities (e.g. bus pad, bench, shelter). There is a bus shelter and bench provided along the site entrance roadway to Mispillion Apartments just off S. Walnut Street.

DART Route 210 (Milford Circulator) also provides service in the study area, but does not run along the site frontages. This route completes 13 round trips each weekday from approximately 6 AM to 10 PM. No service is provided on weekends. DART Route 210 provides connections within Milford between the Boys & Girls Club and the Bayhealth Sussex Campus. Near the study area, the route runs along Walnut Street, McCoy Street, and Wilkins Road. The closest existing fixed-route stops for Route 210 are located at S. Walnut Street & Seabury Avenue. These stops do not have transit amenities (e.g. bus pad, bench, shelter).

Planned transit service: Both DBF and McCormick Taylor recently attempted to contact a representative of the Delaware Transit Corporation (DTC) for input on planned transit service and facilities within the project area; neither consultant received comments back from DTC.

In 2004, DART requested that a bus stop be installed along the US Route 113 site frontage to serve the development. Since no updated comments have been received, the applicant appears to be moving forward with the 2004 recommendation. However, based on current DART service maps, Route 303 only has “limited stop” service on US Route 113; regular service is provided along the S. Walnut Street site frontage. It appears that if a transit stop is installed at the development, it should be located on the S. Walnut Street frontage. Before constructing a transit stop, the developer should continue to coordinate with DelDOT and DTC to determine the appropriate location for transit amenities.

Existing bicycle and pedestrian facilities: Several study area roadways are identified as “Bicycling Routes” on the *Sussex County Bicycle Map* published by DelDOT.

- US Route 113
 - Although not shown as bicycle route, US Route 113 has a bikeway. The roadway sees over 5,000 vehicles per day. Towards the northern end of the study area, the roadway is highlighted as challenging for cyclists.
- S. Walnut Street
 - Statewide bicycle route without bikeway
 - Portions with over 5,000 vehicles per day
- Johnson Road
 - Statewide bicycle route
 - Portions with a bikeway
 - Portions with over 5,000 vehicles per day
 - Part of Delaware Bicycle Route 1
- Wilkins Road and SE 2nd Street
 - Connector bicycle routes without bikeways
- Marshall Street
 - Connector bicycle route with bikeway
- Shawnee Road and Lakeview Avenue
 - Connector bicycle routes with bikeways

Based on the City of Milford Bicycle & Pedestrian Master Plan, “The majority of existing pedestrian facilities...are found in the older part of town. This includes the area roughly from Tenth Street on the north, Rehoboth Boulevard on the east, Seabury Avenue and McCoy Streets on the south, and DuPont Boulevard on the west. There may be some [existing] sidewalks or walking trails outside of this area but they would be very limited.”

Consistent with site entrance plans approved in 2006, the Milford Ponds developer has recently constructed a five-foot wide sidewalk along the US Route 113 site frontage with curb ramps and a marked crosswalk across the site entrance driveway. There is a ten-foot wide shared-use path along the US Route 113 site frontage of the Cypress Hall development, along with a signalized crosswalk across this site entrance. There are discontinuous portions of sidewalk along S. Walnut Street north of the Mispillion Apartments.

Planned bicycle and pedestrian facilities: Based on correspondence with the DelDOT bicycle coordinator, all entrance and roadway improvements shall incorporate bicycle and pedestrian facilities. If a right turn lane is warranted, a five-foot bicycle lane shall be incorporated along the right turn lane. If a left turn lane is required, any roadway improvements shall include a shoulder matching the roadway classification.

The site entrance along US Route 113 should be modified to include a five-foot bicycle lane between the northbound through and right-turn lanes. The TIS indicates that a bicycle lane is not proposed due to high speeds, volumes, and significant heavy vehicles on US Route 113. However, as indicated by the DelDOT Bicycle Coordinator, bicycles are legally allowed to use any non-

interstate/limited access highway/roadway within the State and the bicycle lane should be added to provide a safe refuge for bicyclists traveling through past the site entrance.

The TIS indicates that the existing bicycle lane will be maintained at the S. Walnut Street site entrance, and a shoulder will be added along the proposed left-turn lane to accommodate bicycle traffic.

As per correspondence with the DelDOT bicycle coordinator, a ten-foot wide shared-use path was requested along the US Route 113 and S. Walnut Street site frontages. The developer has already constructed a five-foot wide sidewalk along the US Route 113 site frontage, consistent with entrance plans approved in 2006. The developer proposes to construct similar pedestrian facilities along the S. Walnut Street site frontage.

Previous Comments

In a review letter dated September 25, 2018, DelDOT indicated that the Preliminary TIS was acceptable as submitted.

It appears that nearly all substantive comments from DelDOT's Scoping Letter, Traffic Count Review, Preliminary TIS Review, and other correspondence were addressed in the Final TIS submission. One exception was that the traffic counts did not include a separate count of right-turn-on-red volumes.

General HCS Analysis Comments

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

- 1) For unsignalized intersections, DBF and McCormick Taylor applied percent heavy vehicles (HV) by movement using existing data. For signalized intersections, DBF and McCormick Taylor applied HV by lane group using existing data. As per the DelDOT Development Coordination Manual, if an existing turning movement had less than 100 vehicles per hour, a 5% HV was assumed in existing conditions. For future years, DBF used 3% HV if existing traffic counts were a poor indicator of future traffic conditions, i.e. if future volume increases were significant. DBF did not specify what guidelines they used to determine if a volume increase was significant. Where neither existing HV nor 3% was deemed to be reasonable, DBF calculated future HV through a process of calculating the existing number of heavy vehicles, the number of heavy vehicles added by committed development traffic, and then calculating a new resultant HV. For future years, McCormick Taylor compared volumes for existing versus without Milford Ponds versus with Milford Ponds scenarios. If volumes increased by more than 25% from existing, the higher of the existing or 3% HV was used. Since the HCS signalized intersection reports in the TIS do not show HV, McCormick Taylor was unable to determine DBF's specific HV values used for future analyses at each intersection. It is likely that some HV values differ between the DBF analysis and the McCormick Taylor analysis.
- 2) For existing conditions, the TIS and McCormick Taylor determined and utilized overall intersection peak hour factors (PHF). For future conditions, the TIS and McCormick Taylor

used PHF of 0.80 (intersection volume 500 vph or less), 0.88 (intersection volume 500 vph – 1,000 vph), or 0.92 (intersection volume over 1,000 vph). If the existing PHF was higher than the PHF value based on intersection volume, the existing PHF was also used for the future condition.

- 3) For weekday analyses of signalized intersections, DBF and McCormick Taylor used a base saturation flow rate of 1,750 pc/hr/ln per DelDOT's Development Coordination Manual. Due to heavy volumes in the study area during the Summer Saturday peak hour, the DBF and McCormick Taylor used a base saturation flow rate of 1,900 pc/hr/ln for all Summer Saturday peak hour analyses.
- 4) The TIS and McCormick Taylor used different signal timings when analyzing the signalized intersections in some cases.
- 5) Because existing Right-Turn-on-Red (RTOR) volumes were not collected during the traffic counts, DBF and McCormick Taylor conservatively input no RTOR volumes for existing and future conditions analyses, but did analyze right-turn movements as overlapping protected left-turn phases.
- 6) McCormick Taylor used field-measured roadway grades in all analyses. It appears that DBF assumed 0% roadway grades throughout the study area.

Table 3
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ¹ One-Way Stop Control (T-Intersection)	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer SAT	Weekday AM	Weekday PM	Summer SAT
US Route 113 & Site Access						
2017 Existing (Case 1)						
Westbound Site Access – Right	N/A	N/A	N/A	N/A	N/A	N/A
Northbound US Route 113 – U-Turn	B (12.6)	B (12.9)	C (21.7)	B (12.6)	B (12.9)	C (21.7)
Southbound US Route 113 – U-Turn	B (11.6)	B (12.7)	D (29.4)	B (11.6)	B (12.7)	D (29.4)
2030 without Milford Ponds (Case 2)						
Westbound Site Access – Right	N/A	N/A	N/A	N/A	N/A	N/A
Northbound US Route 113 – U-Turn	C (17.1)	C (16.8)	E (38.1)	C (17.1)	C (16.8)	E (38.1)
Southbound US Route 113 – U-Turn	B (13.4)	C (17.9)	F (54.5)	B (13.4)	C (17.9)	F (54.4)
2030 with Milford Ponds (Case 3)						
Westbound Site Access – Right	B (14.3)	B (14.9)	E (39.6)	B (14.6)	C (15.3)	E (44.1) ²
Northbound US Route 113 – U-Turn	C (18.7)	C (17.6)	E (41.8)	C (18.7)	C (17.6)	E (41.8) ³
Southbound US Route 113 – U-Turn/Left	B (10.3)	B (13.0)	D (33.1)	B (10.3)	B (13.0)	D (33.8) ⁴

¹ 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.

² 95th percentile queue length is anticipated to be approximately 4 vehicles (100 feet) long.

³ 95th percentile queue length is anticipated to be less than 1 vehicle length.

⁴ 95th percentile queue length is anticipated to be approximately 2 vehicles (50 feet) long.

Table 4
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ⁵ One-Way Stop Control (T-Intersection)	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer SAT	Weekday AM	Weekday PM	Summer SAT
S. Walnut Street & Site Access						
2030 with Milford Ponds (Case 3)						
Eastbound Site Access – Left/Right	B (11.2)	B (11.4)	B (11.3)	B (12.3)	B (12.0)	B (11.8)
Northbound S. Walnut - Left	A (7.7)	A (7.9)	A (7.8)	A (7.8)	A (7.9)	A (7.8)

⁵ 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 5
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Signalized Intersection ⁶	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer SAT	Weekday AM	Weekday PM	Summer SAT
US Route 113 & Fitzgeralds Road / Johnson Road ⁷						
2017 Existing (Case 1)	C (29.0)	C (25.6)	C (29.4)	C (26.1)	C (23.4)	C (21.7)
2030 without Milford Ponds (Case 2) ⁸	D (43.0)	D (36.7)	D (44.5)	D (42.1)	D (36.7)	D (44.9)
2030 with Milford Ponds (Case 3) ⁸	D (47.4)	D (39.7)	D (51.5)	D (46.3)	D (40.6)	D (53.5)

⁶ 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.

⁷ Both the TIS and McCormick Taylor considered the westbound right-turn as an unsignalized movement with 0 seconds of delay due to the approximately 250-foot merge lane provided on US Route 113.

⁸ With HCS optimized splits, while maintaining all other existing timing parameters.

Table 6
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ⁹ Two-Way Stop Control	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer SAT	Weekday AM	Weekday PM	Summer SAT
US Route 113 & Clendaniel Road / Haflinger Road						
2017 Existing (Case 1)						
Eastbound Clendaniel – Left/Through/Right	B (10.8)	B (12.6)	D (28.5)	B (10.9)	B (13.4)	D (32.4)
Westbound Haflinger – Left/Through/Right	B (14.3)	B (15.0)	E (39.5)	B (14.6)	C (15.4)	E (42.7)
Northbound US Route 113 – Left	A (9.1)	A (9.8)	B (11.8)	A (9.3)	A (9.8)	B (11.8)
Southbound US Route 113 - Left	A (8.5)	A (9.1)	B (14.0)	A (8.6)	A (9.1)	B (14.0)
2030 without Milford Ponds (Case 2)						
Eastbound Clendaniel – Left/Through/Right	B (13.3)	C (18.6)	F (52.6)	B (13.6)	C (20.7)	F (64.1)
Westbound Haflinger – Left/Through/Right	C (21.3)	D (26.8)	F (105.2)	C (22.2)	D (28.4)	F (122.0)
Northbound US Route 113 – Left	B (11.5)	B (11.9)	C (15.2)	B (11.5)	B (11.9)	C (15.2)
Southbound US Route 113 - Left	A (9.4)	B (11.2)	C (20.7)	A (9.4)	B (11.2)	C (20.7)
2030 with Milford Ponds (Case 3)						
Eastbound Clendaniel – Left/Through/Right	B (13.9)	C (19.9)	F (57.2)	B (14.2)	C (22.3)	F (70.5) ¹⁰
Westbound Haflinger – Left/Through/Right	C (22.5)	D (29.5)	F (120.5)	C (23.5)	D (31.5)	F (141.1) ¹¹
Northbound US Route 113 – Left	B (12.0)	B (12.3)	C (15.7)	B (12.0)	B (12.3)	C (15.7)
Southbound US Route 113 - Left	A (9.5)	B (11.6)	C (22.0)	A (9.5)	B (11.6)	C (22.0)

⁹ 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.

¹⁰ Approach has less than ten vehicles per hour. Mitigation is not required as per the DelDOT Development Coordination Manual.

¹¹ 95th percentile queue length is anticipated to be approximately 2 vehicles (50 feet) long.

Table 7
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ¹² Two-Way Stop Control	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer SAT	Weekday AM	Weekday PM	Summer SAT
US Route 113 & Hudson Pond Road						
2017 Existing (Case 1)						
Eastbound Hudson Pond – Left/Through/Right	C (17.9)	A (0.0)	C (21.6)	C (18.4)	A (0.0)	C (22.9)
Westbound Hudson Pond – Left/Through/Right	B (10.9)	B (12.4)	D (28.0)	B (10.7)	B (12.1)	D (26.2)
Northbound US Route 113 – Left	A (9.2)	A (9.0)	C (19.9)	A (9.3)	A (9.0)	C (18.2)
Southbound US Route 113 – Left	A (8.4)	B (10.9)	C (17.3)	A (8.6)	B (10.4)	C (17.3)
2030 without Milford Ponds (Case 2)						
Eastbound Hudson Pond – Left/Through/Right	D (30.0)	A (0.0)	E (38.6)	D (31.7)	A (0.0)	E (41.9)
Westbound Hudson Pond – Left/Through/Right	B (14.4)	C (19.2)	F (58.1)	B (13.9)	C (18.3)	F (52.0)
Northbound US Route 113 – Left	B (11.3)	B (10.4)	E (35.1)	B (11.7)	B (10.4)	D (30.9)
Southbound US Route 113 – Left	A (9.2)	C (15.9)	D (29.8)	A (9.3)	B (14.7)	D (29.9)
2030 with Milford Ponds (Case 3)						
Eastbound Hudson Pond – Left/Through/Right	D (32.9)	A (0.0)	E (41.7)	E (35.0) ¹³	A (0.0)	E (45.5) ¹³
Westbound Hudson Pond – Left/Through/Right	C (15.1)	C (20.8)	F (64.6)	B (14.5)	C (19.8)	F (57.3) ¹³
Northbound US Route 113 – Left	B (11.8)	B (10.6)	E (38.0)	B (12.2)	B (10.6)	D (33.3)
Southbound US Route 113 – Left	A (9.3)	C (17.1)	D (32.3)	A (9.4)	C (15.8)	D (32.3)

¹² 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.

¹³ 95th percentile queue length is anticipated to be less than 1 vehicle (25 feet) long. In addition, volumes on these approaches in these scenarios are 10 or less vehicles per hour.

Table 8
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Signalized Intersection ¹⁴	LOS per TIS ^{15, 16, 17}			LOS per McCormick Taylor ¹⁸		
	Weekday AM	Weekday PM	Summer SAT ¹⁹	Weekday AM	Weekday PM	Summer SAT
US Route 113 & Shawnee Road / Lakeview Avenue 2017 Existing (Case 1)	C (31.4)	C (32.5)	E (58.6)	C (28.8)	C (29.1)	C (27.3)
2030 without Milford Ponds (Case 2)	C (28.9)	D (36.7)	D (43.6)	C (27.7)	C (34.4)	D (39.6)
2030 with Milford Ponds (Case 3)	D (35.6)	D (39.2)	D (45.5)	C (28.2)	D (38.3)	D (47.7)

¹⁴ 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.

¹⁵ Case 2 – Modeled in weekday AM and PM peak periods and Summer Saturday peak period with HCS optimization while maintaining cycle length per DelDOT signal timing plans. Saturday Summer peak periods also assume construction of EB right-turn lane, consistent with Cypress Hall requirements.

¹⁶ Case 3 – Modeled in weekday AM and PM peak periods and Summer Saturday peak period with HCS optimization while maintaining cycle length per DelDOT signal timing plans. Summer Saturday peak periods also assume construction of EB right-turn lane, consistent with Cypress Hall requirements. WB Lakeview Ave splits were increased to reduce v/c ratios less than 1.00 in the Saturday Summer peak period.

¹⁷ It appears that the TIS may have treated this intersection as a pretimed signal in their HCS analysis in some scenarios. McCormick Taylor treated the intersection as actuated, which is how it operates under existing conditions.

¹⁸ McCormick Taylor assumed construction of the eastbound right-turn lane (by the Cypress Hall developer) in all future year scenarios (Cases 2 and 3).

¹⁹ It appears that the TIS may have used a base saturation flow rate of 1,750 pc/hr/ln for Summer Saturday analyses at this signalized intersection. However, the TIS narrative states that a base saturation flow rate of 1,900 pc/hr/ln would be used for Summer Saturday analyses of signalized intersections. McCormick Taylor used 1,900 pc/hr/ln.

Table 9
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Signalized Intersection ²⁰	LOS per TIS ²¹			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer SAT	Weekday AM	Weekday PM	Summer SAT
US Route 113 & Old Shawnee Road ²²						
2017 Existing (Case 1)	C (28.8)	C (22.4)	C (27.6)	C (30.8)	B (18.9)	B (17.7)
2030 without Milford Ponds (Case 2)	C (28.3)	B (19.7)	C (24.9)	C (30.9)	C (20.3)	C (24.1)
2030 with Milford Ponds (Case 3)	C (28.8)	C (20.2)	C (27.2)	C (30.7)	C (20.8)	C (26.5)

²⁰ 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.

²¹ Modeled using HCS optimization while maintaining cycle length per DelDOT signal timing plans in Case 2 and 3.

²² McCormick Taylor matched DBF's assumption of 26% of eastbound left turns using the shared lane.

Table 10
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Signalized Intersection ^{23, 24}	LOS per TIS ²⁵		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
US Route 113 & Cypress Hall Boulevard				
2017 Existing (Case 1)	B (10.2)	B (11.5)	A (4.0)	B (11.2)
2030 without Milford Ponds (Case 2)	C (21.1)	C (25.1)	C (23.2)	C (26.3)
2030 with Milford Ponds (Case 3)	C (21.2)	C (25.4)	C (23.2)	C (26.3)

²³ 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.

²⁴ Cases 2 and 3 are modeled assuming the construction of the Simpson Crossing WB approach (eastern leg).

²⁵ Cases 2 and 3 are modeled with HCS optimization while maintaining cycle length per DelDOT signal timing plans.

Table 11
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ²⁶ One-Way Stop Control (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
S. Walnut Street & McCoy Street				
2017 Existing (Case 1)				
Westbound McCoy – Left/Right	A (9.6)	A (9.9)	A (9.6)	A (9.9)
Southbound S. Walnut - Left	A (7.5)	B (14.6)	A (7.6)	A (7.7)
2030 without Milford Ponds (Case 2)				
Westbound McCoy – Left/Right	B (14.7)	C (18.0)	B (14.7)	C (18.4)
Southbound S. Walnut - Left	A (8.2)	A (8.3)	A (8.2)	A (8.3)
2030 with Milford Ponds (Case 3)				
Westbound McCoy – Left/Right	C (16.9)	C (23.5)	C (17.0)	C (24.5)
Southbound S. Walnut - Left	A (8.4)	A (8.3)	A (8.4)	A (8.4)

²⁶ 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 12
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ²⁷ One-Way Stop Control (T-Intersection)	LOS per TIS		LOS per McCormick Taylor ²⁸	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
S. Walnut Street & SE 2nd Street				
2017 Existing (Case 1)				
Westbound SE 2 nd – Left/Right	C (15.2)	B (13.3)	B (14.9)	B (13.3)
Southbound S. Walnut - Left	A (8.0)	A (8.0)	A (8.0)	A (8.1)
2030 without Milford Ponds (Case 2)				
Westbound SE 2 nd – Left/Right	D (30.4)	C (24.8)	D (28.3)	C (23.8)
Southbound S. Walnut - Left	A (8.9)	A (8.8)	A (8.9)	A (8.8)
2030 with Milford Ponds (Case 3)				
Westbound SE 2 nd – Left/Right	E (37.8)	D (29.6)	D (34.5)	D (28.1)
Southbound S. Walnut - Left	A (9.2)	A (8.8)	A (9.2)	A (8.9)

²⁷ 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.

²⁸ Differences between McCormick Taylor analysis and TIS analysis are primarily due to McCormick Taylor use of field-measured grades (whereas the TIS used 0% grade for all approaches).

Table 13
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ²⁹ Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
N. Old State Road & Johnson Road				
2017 Existing (Case 1)				
Eastbound Johnson – Left	A (7.8)	A (7.6)	A (7.8)	A (7.6)
Westbound Johnson - Left	A (7.6)	A (7.8)	A (7.6)	A (7.8)
Northbound N. Old State – Left/Through/Right	B (13.4)	B (14.1)	B (13.4)	B (14.1)
Southbound N. Old State – Left/Through/Right	B (11.8)	B (12.8)	B (11.8)	B (12.8)
2030 without Milford Ponds (Case 2)				
Eastbound Johnson – Left	A (8.6)	A (8.4)	A (8.6)	A (8.4)
Westbound Johnson - Left	A (7.9)	A (8.5)	A (7.9)	A (8.5)
Northbound N. Old State – Left/Through/Right	D (29.5)	F (59.3)	D (29.7)	F (60.1)
Southbound N. Old State – Left/Through/Right	E (39.9)	F (63.5)	E (40.7)	F (65.2)
2030 with Milford Ponds (Case 3)				
Eastbound Johnson – Left	A (8.7)	A (8.7)	A (8.7)	A (8.7)
Westbound Johnson - Left	A (7.9)	A (8.5)	A (7.9)	A (8.5)
Northbound N. Old State – Left/Through/Right	D (34.9)	F (114.2)	E (35.1) ³⁰	F (116.5) ³¹
Southbound N. Old State – Left/Through/Right	F (122.5)	F (242.3)	F (126.2) ³²	F (249.8) ³³

²⁹ 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.

³⁰ 95th percentile queue length is anticipated to be approximately 2 vehicles (50 feet) long.

³¹ 95th percentile queue length is anticipated to be approximately 6 vehicles (150 feet) long.

³² 95th percentile queue length is anticipated to be approximately 12 vehicles (300 feet) long.

³³ 95th percentile queue length is anticipated to be approximately 13 vehicles (325 feet) long.

Table 14

Intersection Control Evaluation Analyses by McCormick Taylor, Inc.
Peak Hour Levels of Service (LOS)

*Based on February 7, 2019 Traffic Counts, with Future Additional Traffic per
Milford Ponds Traffic Impact Study – Nov. 2018 (Prepared by Davis, Bowen & Friedel, Inc.)*

N. Old State Road & Johnson Road ³⁴	Weekday AM	Weekday PM
2030 with Milford Ponds – Two-Way Stop-Control		
Eastbound Johnson – Left	A (8.4)	A (9.1)
Westbound Johnson - Left	A (8.1)	A (8.5)
Northbound N. Old State – Left/Through/Right	D (31.0)	F (153.5)
Southbound N. Old State – Left/Through/Right	F (141.7)	F (311.1)
2030 with Milford Ponds – All-Way Stop-Control		
Eastbound Johnson – Left/Through/Right	D (26.9)	F (83.4) ³⁵
Westbound Johnson – Left/Through/Right	D (29.7)	F (68.2) ³⁶
Northbound N. Old State – Left/Through/Right	B (12.6)	B (13.4)
Southbound N. Old State – Left/Through/Right	C (19.6)	C (16.1)
Overall Intersection	D (25.0+)	F (63.8)
2030 with Milford Ponds – Single-Lane Roundabout		
Eastbound Johnson – Left/Through/Right	A (7.8)	A (10.0-)
Westbound Johnson – Left/Through/Right	A (7.1)	B (10.3)
Northbound N. Old State – Left/Through/Right	A (6.3)	A (7.2)
Southbound N. Old State – Left/Through/Right	A (8.6)	A (7.8)
Overall Intersection	A (7.6)	A (9.6)
2030 with Milford Ponds – Signalized Intersection		
	B (11.6)	B (11.1)

³⁴ 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.

³⁵ 95th percentile queue length is anticipated to be approximately 18 vehicles (450 feet) long.

³⁶ 95th percentile queue length is anticipated to be approximately 16 vehicles (400 feet) long.

Table 15
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Signalized Intersection ³⁷	LOS per TIS ³⁸		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Johnson Road & Marshall Street / Third Street				
2017 Existing (Case 1)	B (14.2)	B (14.0)	B (16.5)	B (15.8)
2030 without Milford Ponds (Case 2)	A (8.8)	A (8.9)	B (15.6)	B (13.7)
2030 with Milford Ponds (Case 3)	A (8.9)	A (9.0)	B (14.9)	B (13.3)

³⁷ 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.

³⁸ Cases 2 and 3 are modeled with HCS optimization while maintaining minimum green times, yellow, and all-red timings per DelDOT signal timing plans.

Table 16
Peak Hour Levels of Service (LOS)
Based on Milford Ponds Traffic Impact Study - November 2018
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ³⁹ One-Way Stop Control (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Johnson Road & Wilkins Road				
2017 Existing (Case 1)				
Eastbound Johnson – Left	A (7.6)	A (7.5)	A (7.6)	A (7.5)
Southbound Wilkins – Left/Right	A (9.3)	A (8.9)	A (9.3)	A (8.9)
2030 without Milford Ponds (Case 2)				
Eastbound Johnson – Left	A (8.0)	A (8.0)	A (8.0)	A (8.0)
Southbound Wilkins – Left/Right	B (10.5)	B (10.4)	B (10.6)	B (10.5)
2030 with Milford Ponds (Case 3)				
Eastbound Johnson – Left	A (8.1)	A (8.2)	A (8.1)	A (8.2)
Southbound Wilkins – Left/Right	B (10.7)	B (10.9)	B (10.8)	B (11.0)

³⁹ 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.