



**STATE OF DELAWARE  
EXECUTIVE DEPARTMENT  
OFFICE OF MANAGEMENT AND BUDGET  
STATE PLANNING COORDINATION**

January 29, 2006

Marco Boyce  
Morris & Ritchie Associates, Inc.  
18 Boulden Circle, Ste 36  
Wilmington, DE 19720

RE: PLUS review – PLUS 2006-12-05; Steeplechase and Reserve at Steeplechase

Dear Mr. Boyce:

Thank you for meeting with State agency planners on January 3, 2006 to discuss the proposed plans for the Steeplechase and the Reserve at Steeplechase project to be located 1400 feet east of the intersection of Barrett's Chapel and McGinnis Pond Road, north of Frederica.

According to the information received, you are seeking site plan approval for 543 residential units on 177 acres.

We have reviewed a similar project on the same parcel. It was known to us as "The Blessing Property" as PLUS 2006-01-02 on January 25, 2006. The developer was the same in both cases. The Blessing Property proposal contained 458 residential units, both single family detached and townhouses. This PLUS review supersedes our previous comments found in our letter dated February 15, 2006.

Please note that changes to the plan, other than those suggested in this letter, could result in additional comments from the State. Additionally, these comments reflect only issues that are the responsibility of the agencies represented at the meeting. The developers will also need to comply with any Federal, State and local regulations regarding this property. We also note that as Kent County is the governing authority over this land, the developers will need to comply with any and all regulations/restrictions set forth by the County.

### **Executive Summary**

The following section includes some site specific highlights from the agency comments found in this letter. This summary is provided for your convenience and reference. The full text of this letter represents the official state response to this project. ***Our office notes that the applicants are responsible for reading and responding to this letter and all comments contained within it in their entirety.***

### **State Strategies/Project Location**

- This project is located in Investment Level 3 according to the Strategies for State Policies and Spending. This site is also located in the Kent County Growth Zone. Investment Level 3 reflects areas where growth is anticipated by local, county, and state plans in the longer term future, or areas that may have environmental or other constraints to development. State investments will support growth in these areas, but please be advised that the State may have other priorities in the near term future.

### **Street Design and Transportation**

- DelDOT anticipates asking the developer to contribute to one significant road improvement project in the area: the Little Heaven Interchange
- Barratts Chapel Road is classified as a major collector road. DelDOT's policy is to require dedication of sufficient land to provide a minimum right-of-way width of 40 feet from the centerline on collector roads. Therefore we will require right-of-way dedication along the frontage to provide any additional width needed from this project. This is a change from our previous PLUS comments on this project resulting from the reclassification of the road.
- DelDOT will also require that a paved multi-modal path, located in a 15-foot wide permanent easement, be provided across the frontage of the site.
- DelDOT recommends that driveway easements be provided to allow or the future connection of the three outparcels on the north side of Barratts Chapel Road to the proposed subdivision streets.
- The right-of-way for the easterly entrance road should be 60 feet wide all the way to the southerly loop road.

- Several reduced right-of-way streets are proposed in the townhouse section. They appear to be alleys, and as such they would not qualify for State maintenance. If they are to be built for State maintenance, the radii of several horizontal curves will need to be increased to meet DelDOT standards.

### **Natural and Cultural Resources**

- The Division of Historical and Cultural Affairs would like the opportunity to examine the area prior to any ground-disturbing activities, to learn something about the known archaeological site's nature and extent and to see if there are in fact any other archaeological sites on the parcel and to learn something about their location, nature, and extent. They would also like the opportunity to document the existing house prior to any demolition activities.
- Wetlands provide water quality benefits, attenuate flooding and provide important habitat for plants and wildlife. Particularly because of this area and its status as a State Resource Area, lots should be removed in their entirety from both the wetland and the forest surrounding it. Vegetated buffers of no less than 100 feet should be employed from the edge of the wetland complex.
- Large isolated pockets of open space are rarely used by residents. Eliminating these pockets will be beneficial to onsite natural resources by relocating open space areas adjacent to wetland and forest resources. To maximize the existing buffering capacity and wildlife habitat on site, it is recommended that lot lines and other infrastructure (such as storm water management ponds) be pulled out of the forest and that areas of community open space be designated along the forested/riparian areas.
- DNREC has records of *Notropis chalybaeus* (iron color shiner) within Pratt Branch at this site, which is also a State Natural Area. There are also records of rare plants just upstream and they may be within the project site as well. There are freshwater tidal scrub-shrub wetlands bordering the stream and this type of habitat is very significant as it is becoming quite rare in Delaware. The current site plan does not provide adequate buffers to protect water quality, rare species and the integrity of this freshwater wetland system.

The site plan/application states that a 100-foot buffer from the center of the stream will be maintained; however, 100 feet from the center of the stream only extends to the crest of the slope. The lot lines extend to the crest of the slope. The 100-foot buffer should extend from the crest of the slope to the lot line, not the center of the stream to the crest of the slope as it is currently. In addition, the

proposed 50-foot tidal and 25-foot non-tidal wetland buffers are extremely inadequate and should be increased to 100 feet.

- Due to the importance of the forest on this parcel as a riparian and wetland buffer, a greater effort to maintain the existing forest should be made. Omitting some of the lots and infrastructure, especially in the southern part of the plan, would allow for greater forest preservation.
- Current site plans indicate that roughly 19 lots are within the existing Natural Area. The Office of Nature Preserves strongly recommends removal of lots in the forested portion of the site and respectfully requests the applicant consider dedicating the Natural Area as a Nature Preserve through a conservation easement or donation of land to the State.

The following are a complete list of comments received by State agencies:

**Office of State Planning Coordination – Contact: David Edgell 739-3090**

This project is located in Investment Level 3 according to the Strategies for State Policies and Spending. This site is also located in the Kent County Growth Zone. Investment Level 3 reflects areas where growth is anticipated by local, county, and state plans in the longer term future, or areas that may have environmental or other constraints to development. State investments will support growth in these areas, but please be advised that the State may have other priorities in the near term future. We encourage you to design the site with respect for the environmental features which are present. Please pay particular attention to the environmental design comments found later in this letter.

Our office is encouraged that the developer is taking advantage of the Kent County Transfer of Development Rights (TDR) ordinance. We support equity transfer programs such as TDRs which preserve land in our rural areas while concentrating growth in designated growth zones where infrastructure and services will be available to new residents. In addition, Kent County's ordinance contains high standards for subdivision design and architecture in TDR developments, which will assure that the development is unique, attractive, and of a high quality. Our office has no objections to the development of this parcel in accordance with all relevant Kent County codes and ordinances.

As discussed at the PLUS meeting, we encourage the applicant to take advantage of the flexibility in the Kent County TDR ordinance to preserve additional open space and natural features on the site. One way to do this is to implement "big house" style condo units in place of some of the other unit types. These structures can be designed with the same mass and detailing as large single family homes, yet typically contain two or more

condo units. The same unit count desired by the developer can be maintained with a smaller footprint on the site, allowing for more open space, forest preservation, and natural buffers. These units would also diversify the housing offered in the project, and perhaps open a different market segment to the developer.

**Division of Historical and Cultural Affairs – Contact: Alice Guerrant 739-5685**

This parcel contains a historic house (K-2747) and a prehistoric-period archaeological site (K-589). Both of these are within the south half of the development. Beers Atlas of 1868 shows the P. Grumell House within the north half and the R. Williams House within or very near the eastern edge of the north half. There are areas of high potential for other prehistoric-period archaeological sites as well. There are nearby historic houses to the west of the parcel, but they appear to be well screened from this parcel by existing trees. The historic house to the east (K-2744) may be already demolished by planned development there.

Small, rural, family cemeteries often are found in relation to historic farm complexes, such as the Grumell House and the unnamed house now there, usually a good distance behind or to the side of the house. The developer should be aware of Delaware's Unmarked Human Remains Act of 1987, which governs the discovery and disposition of such remains. The unexpected discovery of unmarked human remains during construction can result in significant delays while the process is carried out, and the developer may want to hire an archaeological consultant to check for the possibility of a cemetery here if this development is approved. The Division of Historical and Cultural has indicated that they will be happy to discuss these issues with the developer.

The DHCA would like the opportunity to examine the area prior to any ground-disturbing activities, to learn something about the known archaeological site's nature and extent and to see if there are in fact any other archaeological sites on the parcel and to learn something about their location, nature, and extent. They would also like the opportunity to document the existing house prior to any demolition activities. It is requested that there be sufficient landscaping on the west side of this development to block any noise or visual intrusions on the nearby historic houses.

**Department of Transportation – Contact: Bill Brockenbrough 760-2109**

- 1) A traffic impact study (TIS) has been done for this development. A copy of the October 31, 2006 letter to Kent County commenting on the results of that study is enclosed.

- 2) DelDOT anticipates asking the developer to contribute to one significant road improvement project in the area: the Little Heaven Interchange (construction anticipated to begin in 2009 and end in 2012). Mr. Brad Herb, the project manager for Kent County, may be contacted for more information in this regard. He may be reached at (302) 266-9600. Previously, DelDOT had indicated that the developer would be required to contribute to the widening of Barratts Chapel Road as well. DelDOT has since determined that requiring area developers to fund both the interchange and the Barratts Chapel Road improvements is not reasonable. The developer will be required to make improvements at their site entrances, including the construction of a roundabout at the west entrance, but the widening of Barratts Chapel Road will be done by DelDOT when funds become available.
- 3) Barratts Chapel Road is classified as a major collector road. DelDOT's policy is to require dedication of sufficient land to provide a minimum right-of-way width of 40 feet from the centerline on collector roads. Therefore we will require right-of-way dedication along the frontage to provide any additional width needed from this project. This is a change from our previous PLUS comments on this project resulting from the reclassification of the road.
- 4) DelDOT will also require that a paved multi-modal path, located in a 15-foot wide permanent easement, be provided across the frontage of the site.
- 5) DelDOT commends the developer for providing the proposed stub streets and interconnections, these are very important and will serve the community well.
- 6) DelDOT recommends that driveway easements be provided to allow or the future connection of the three outparcels on the north side of Barratts Chapel Road to the proposed subdivision streets.
- 7) The right-of-way for the easterly entrance road should be 60 feet wide all the way to the southerly loop road.
- 8) Several reduced right-of-way streets are proposed in the townhouse section. They appear to be alleys, and as such they would not qualify for State maintenance. If they are to be built for State maintenance, the radii of several horizontal curves will need to be increased to meet our standards.
- 9) The developer's site engineer should contact Mr. Herb regarding specific requirements for streets and access.

**The Department of Natural Resources and Environmental Control – Contact:  
Kevin Coyle 739-9071**

**General Comment**

Please note that the site plan for this project is very similar to the site plan submitted for PLUS 2006-01-02 Blessing Property. However, now there is an increase of 85 lots, a 7.96 acre reduction in open space, and a reduction of 3.16 acres of stormwater management (stats taken from site plans submitted to PLUS). According to the applicant, the current project will result in only 0.9 acres of forest loss as opposed to 6.58 acres for the Blessing Property. DNREC is unsure how this was accomplished given the increase in lots and decrease of open space and recommend the applicant recalculate forest loss. The site plan changes that they recommended for PLUS 2006-01-02 Blessing Property do not appear to have been implemented.

**Green Infrastructure**

Portions or all of the lands associated with this proposal are within the Livable Delaware Green Infrastructure area established under Governor Minner's Executive Order #61 that represents a network of ecologically important natural resource lands of special state conservation interest.

Green infrastructure is defined as Delaware's natural life support system of parks and preserves, woodlands and wildlife areas, wetlands and waterways, productive agricultural and forest land, greenways, cultural, historic and recreational sites and other natural areas all with conservation value. Preserving Delaware's Green Infrastructure network will support and enhance biodiversity and functional ecosystems, protect native plant and animal species, improve air and water quality, prevent flooding, lessen the disruption to natural landscapes, provide opportunities for profitable farming and forestry enterprises, limit invasive species, and foster ecotourism.

Voluntary stewardship by private landowners is essential to green infrastructure conservation in Delaware, since approximately 80 percent of the State's land base is in private hands. It is in that spirit of stewardship that the Department appeals to the landowner and development team to protect sensitive resources through an appropriate site design.

**Soils**

Based on the Kent County soil survey update, Sassafras, Downer, Fort Mott, Hambrook, Woodtown, Zekiah, Puckum, and Lenape were mapped in the immediate vicinity of the

proposed construction. Sassafras, Downer, Fort Mott, and Hambrook are well-drained upland soils that, generally, have few limitations for development. Woodstown is a moderately well-drained soil of low-lying uplands that has moderate limitations for development. Zekiah, Puckum, and Lenape are very poorly-drained (hydric) floodplain soils associated with the existing wetlands, and have severe limitations for development.

## **Wetlands**

According to the Statewide Wetland Mapping Project (SWMP) mapping, nontidal palustrine forested and tidally-influenced palustrine forested/riverine unconsolidated bottom headwater wetlands are immediately adjacent and bound an unnamed (or name unknown) headwater stream tributary and a headwater tributary known as Spring Creek. The wetlands and streams border the entire southern and southwestern boundaries of subject parcel.

These wetlands provide water quality benefits, attenuate flooding and provide important habitat for plants and wildlife. Particularly because of this area and its status as a State Resource Area, lots should be removed in their entirety from both the wetland and the forest surrounding it. Vegetated buffers of no less than 100 feet should be employed from the edge of the wetland complex. The developer should note that both DNREC and Army Corps of Engineers discourage allowing lot lines to contain wetlands to minimize potential cumulative impacts resulting from unauthorized and/or illegal activities and disturbances that can be caused by homeowners.

Headwater riparian wetlands are important for the protection of water quality and the maintenance/integrity of the ecological functions throughout the length of the stream, including the floodplain system and/or water bodies further downstream. Since such streams are a major avenue for nutrient-laden stormwater and sediment runoff their protection deserves the highest priority. In recognition of this concern, the Watershed Assessment Section strongly recommends the applicant preserve the existing forested buffer adjacent to the headwater wetlands and associated stream headwater stream tributaries of Spring Creek - in its entirety. Otherwise, a buffer width of at least 100-foot is the recommended minimum. In the situation where the natural buffer vegetation has been removed or reduced by past development or farming activities, the developer is encouraged to restore/establish to said buffer width or greater with native herbaceous and/or woody vegetation. A literature review of past research by Castelle et al. (1994), documents consensus among researchers that an upland buffer width of at least 100-foot is necessary to protect water/habitat quality of streams and wetlands from development and its associated impacts.

### **Wetland Permitting Information**

PLUS application materials indicate that wetlands have been delineated (presumably a field delineation). This delineation should be verified by the Army Corps of Engineers through the Jurisdictional Determination process. Please note that impacts to palustrine wetlands are regulated by the Army Corps of Engineers through Section 404 of the Clean Water Act. In situations where the applicant believes that the delineated wetlands on their parcel are nonjurisdictional isolated wetlands, the Corps must be contacted to make the final jurisdictional assessment. They can be reached by phone at 736-9763. Certain drainage ditches may also be jurisdictional either under the U.S. Army Corps of Engineers Program or through the DNREC Wetland and Subaqueous Lands program.

In addition, individual 404 permits and certain Nationwide Permits from the Army Corps of Engineers also require 401 Water Quality Certification from the DNREC Wetland and Subaqueous Land Section and Coastal Zone Federal Consistency Certification from the DNREC Division of Soil and Water Conservation, Delaware Coastal Programs Section. Each of these certifications represents a separate permitting process.

To find out more about permitting requirements, the applicant is encouraged to attend a Joint Permit Process Meeting. These meetings are held monthly and are attended by federal and state resource agencies responsible for wetland permitting. Contact Denise Rawding at (302) 739-9943 to schedule a meeting.

### **Impervious Cover**

Based on a review of the PLUS application, post-development surface imperviousness is estimated to be about 29 percent. However, given the scope and density of this project, this estimate is **clearly an underestimate**. The applicant's apparent use of natural areas (wetlands or buffers) and areas of functional utility (stormwater management areas) for meeting the County's open space requirements artificially lowers the amount of this project's post-development projection of surface imperviousness, ultimately underestimating its environmental impacts. Furthermore, the applicant should also realize that all created forms of constructed surface imperviousness (i.e., rooftops, sidewalks, and roads) and their extent should be comprehensively accounted for when calculating surface imperviousness. It is strongly recommended that the applicant address all of the above-mentioned concerns in the finalized calculation for surface imperviousness.

Studies have shown a strong relationship between increases in impervious cover to decreases in a watershed's overall water quality. It is strongly recommended that the

applicant implement best management practices (BMPs) that reduce or mitigate some of its most likely adverse impacts. Reducing the amount of surface imperviousness through the use of pervious paving materials (“pervious pavers”) in lieu of asphalt or concrete in conjunction with an increase in forest cover preservation or additional tree plantings are some examples of practical BMPs that could easily be implemented to help reduce surface imperviousness.

### **TMDLs**

Total Maximum Daily Loads (TMDLs) for nitrogen and phosphorus have been promulgated through regulation for the Murderkill watershed. A TMDL is the maximum level of pollution allowed for a given pollutant below which a “water quality limited water body” can assimilate and still meet water quality standards to the extent necessary to support use goals such as, swimming, fishing, drinking water and shell fish harvesting. Although TMDLs are required by federal law, states are charged with developing and implementing standards to support these desired use goals. In the Murderkill watershed, a post-development TMDL reduction level of 50 and 30 percent will be required for nitrogen and phosphorus, respectively.

### **TMDL Compliance through the Pollution Control Strategy (PCS)**

As stated above Total Maximum Daily loads (TMDLs) for nitrogen and phosphorus have been promulgated through regulation for the Murderkill Watershed. The TMDL calls for a 50% reduction for nitrogen and 30% for phosphorus from baseline conditions. The Department developed an assessment tool to evaluate how your proposed development may reduce nutrients to meet the TMDL requirements. Additional reductions may be possible through the implementation of Best Management Practices such as wider vegetated buffers along watercourses, increasing passive, wooded open space, connection to a central sewer (if available), and the use of stormwater management treatment trains. Contact Lyle Jones at 302-739-9939 for more information on the assessment tool.

### **Water Supply**

The project information sheets state water will be provided to the project by Artesian Water Company via a central water system. Our records indicate that the project is located within the public water service area granted to Artesian Water Company under Certificate of Public Convenience and Necessity 03-CPCN-10.

Should dewatering points be needed during any phase of construction, a dewatering well construction permit must be obtained from the Water Supply Section prior to construction

of the well points. In addition, a water allocation permit will be needed if the pumping rate will exceed 50,000 gallons per day at any time during operation.

All well permit applications must be prepared and signed by licensed water well contractors, and only licensed well drillers may construct the wells. Please factor in the necessary time for processing the well permit applications into the construction schedule. Dewatering well permit applications typically take approximately four weeks to process, which allows the necessary time for technical review and advertising.

Should you have any questions concerning these comments, please contact Rick Rios at 302-739-9944.

### **Water Resource Protection Areas**

The Water Supply Section has determined that the northwest corner of site falls within an excellent ground-water recharge area.

Excellent Ground-Water Recharge Areas are those areas mapped by the Delaware Geological Survey where the first 20 feet of subsurface soils and geologic materials are exceptionally sandy. These soils are able to transmit water very quickly from the land surface to the water table. This map category is an “indicator of how fast contaminants will move and how much water may become contaminated” (Andres, 2004, pg 1). Land use activities or impervious cover on areas of excellent groundwater recharge potential may adversely affect ground water in these areas.

The site plan shows a T-intersection connecting to the development on the northern border. This intersection is in the recharge area. Eliminating this egress would protect the underlying groundwater from this potential source of petroleum hydrocarbons, metals, organic and inorganic compounds associated with this land use.

Andres, A. Scott, 2004, Ground-Water Recharge Potential Mapping in Kent and Sussex Counties, Delaware: Delaware Geological Survey Report of Investigations No. 66, p. 14.

<http://www.udel.edu/dgs/Publications/pubform.html#nvestigations>

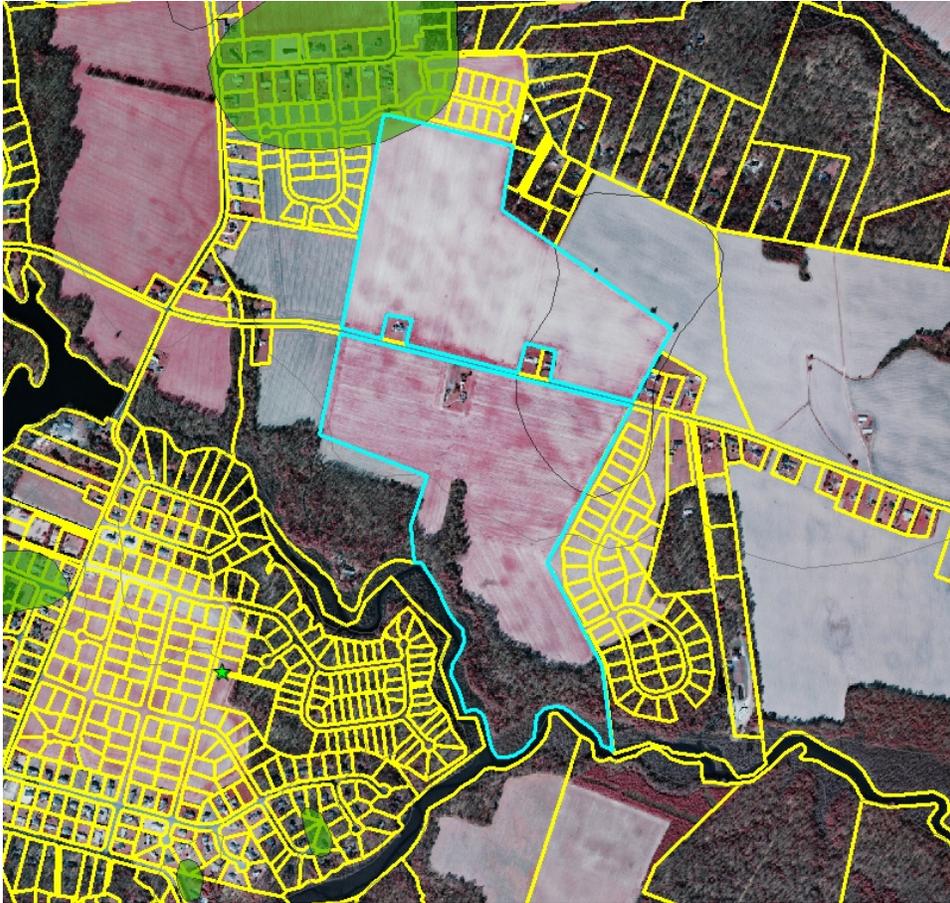
Delaware Department of Natural Resources and Environmental Control (2005): *Source Water Protection Guidance Manual for the Local Governments of Delaware*: Dover, DE., 144 p.

[http://www.wr.udel.edu/publications/SWAPP/swapp\\_manual\\_final/swapp\\_guidance\\_manual\\_final.pdf](http://www.wr.udel.edu/publications/SWAPP/swapp_manual_final/swapp_guidance_manual_final.pdf)

Kauffman, G.J., Wozniak, S.L., and Vonck, K.J., 2005, Delaware Ground-Water Recharge Design Manual: Newark, DE, Water Resources Agency, University of Delaware, p. 31.

<http://www.wr.udel.edu/swaphome/Publications/SWPguidancemanual.html>

**Steeplechase and Reserve at Steeplechase (PLUS 2006-12-05) as it impacts excellent groundwater recharge potential protection area.** The green area shows the excellent groundwater recharge potential protection area with affected parcel in light blue.



### **Sediment and Erosion Control/Stormwater Management**

#### Requirements

1. Land disturbing activities in excess of 5,000 square feet are regulated under the Delaware Sediment and Stormwater Regulations. A detailed sediment and

- stormwater management plan must be reviewed and approved by our office prior to any land disturbing activity (i.e. clearing, grubbing, filling, grading, etc.) taking place.
2. The review fee and a completed Application for a Detailed Plan are due at the time of plan submittal to our office. Construction inspection fees based on developed area and stormwater facility maintenance inspection fees based on the number of stormwater facilities are due prior to the start of construction. Please refer to the fee schedule for those amounts.
  3. The following notes must appear on the record plan:
    - The Kent Conservation District reserves the right to enter private property for purposes of periodic site inspection.
    - The Kent Conservation District reserves the right to add, modify, or delete any erosion or sediment control measure, as it deems necessary.
    - A clear statement of defined maintenance responsibility for stormwater management facilities must be provided on the Record Plan.
  4. Ease of maintenance must be considered as a site design component and a maintenance set aside area for disposal of sediments removed from the basins during the course of regular maintenance must be shown on the Record Plan for the subdivision.
  5. All drainage ways and storm drains should be contained within drainage easements and clearly shown on the plan to be recorded by Kent County.
  6. A soils investigation supporting the stormwater management facility design is required to determine impacts of the seasonal high groundwater level and soils for any basin design.

Comments:

1. It appears that a portion of site may be eligible for a quantity waiver due to the close proximity to the Pratt Branch, however quality must be addressed.
2. If drainage improvements which cross the property lines are necessary to provide the site with an adequate outfalls, those drainage easement(s) must be obtained prior to approval of the Sediment and Stormwater plan.

3. A clear statement of defined maintenance responsibility for stormwater management facilities must be provided on the Record Plan especially if this facility is to be shared by two different homeowners associations.
4. All drainage ways and storm drains should be contained within drainage easements and clearly shown on the plan to be recorded by Kent County.
5. It is recommended that the stormwater management areas be incorporated into the overall landscape plan to enhance water quality and to make the stormwater facility an attractive community amendment.
6. The following notes must appear on the record plan:
  - The Kent Conservation District reserves the right to enter private property for purposes of periodic site inspection.
7. A letter of no objection to recordation will be provided once the detailed Sediment and Stormwater Management plan has been approved.
8. Proper drainage of developed lots and active open space should be considered in the development of the grading plan for this subdivision.
9. Based on the site characteristics, a pre-application meeting is suggested to discuss stormwater management and drainage for this site.

## **Drainage**

The Drainage Program requests that the engineer take precautions to ensure the project does not hinder any off site drainage upstream of the project or create any off site drainage problems downstream by the release of on site storm water.

The Drainage Program encourages the elevation of rear yards to direct water towards the streets where storm drains are accessible for maintenance. However, the Drainage Program recognizes the need for catch basins in yards in certain cases. Therefore, catch basins placed in rear and side yards will need to be clear of obstructions and be accessible for maintenance. Decks, sheds, fences, pools, and kennels can hinder drainage patterns as well as future maintenance to the storm drains or catch basin. Deed restrictions, along with drainage easements recorded on deeds, should ensure adequate future maintenance access.

Increase the side yard setback to 15 feet on all properties with a drainage easement on the side. The increase will allow room for equipment to utilize the entire easement and maneuver free of obstructions if the drainage conveyance requires periodic maintenance or future re-construction. The side yard setback would only increase on the side with the drainage easement.

All catch basins in rear or side yards should have a 10-foot drainage easement around them on all sides. Place restrictions on fences, sheds, and other structures within the easement to prevent obstructions from being placed next to the catch basin. Record the easement on the deed.

Have all drainage easements recorded on deeds and place restrictions on obstructions within the easements to ensure access for periodic maintenance or future re-construction. Future property owners may not be aware of a drainage easement on their property if the easement is only on the record plan. However, by recording the drainage easement on the deed, the second owner, and any subsequent owner of the property, will be fully aware of the drainage easement on their property.

This project is within the Murderkill River Watershed, a designated critical area, with a promulgated Total Maximum Daily Load (TMDL). Preserve existing riparian buffers to aid in the reduction of nutrients, sediment, and other pollutants. For the further enhancement of water quality in the Murderkill watershed, the Drainage Program encourages additional widths of vegetated buffers and other water quality measures on this project. Please explore the use of a created wetland to filter excess nutrients in stormwater runoff from this site before releasing stormwater into Hudson Branch and Spring Creek.

### **Floodplains**

Portions of this parcel lie within the 100-year floodplain.

### **Open Space**

Large isolated pockets of open space are rarely used by residents. Eliminating these pockets will be beneficial to onsite natural resources by relocating open space areas adjacent to wetland and forest resources. To maximize the existing buffering capacity and wildlife habitat on site, it is recommended that lot lines and other infrastructure (such as storm water management ponds) be pulled out of the forest and that areas of community open space be designated along the forested/riparian areas. Doing so will accomplish two things: it will preserve and expand the existing riparian buffers on site and its value for

birds and wildlife and it will create recreational opportunities for residents by allowing them access to and views of the forest and stream.

In areas set aside for passive open space, the developer is encouraged to consider establishment of additional forested areas or meadow-type grasses. Doing so will provide habitat for wildlife and it will create recreational opportunities for residents. Once established, these ecosystems provide increased water infiltration into groundwater, decreased run-off into surface water, air quality improvements, and require much less maintenance than traditional turf grass, an important consideration if a homeowners association will take over responsibility for maintenance of community open spaces. Natural habitat implementation efforts should be targeted to open space areas adjacent to forests and wetlands. The developer is encouraged to review "Community Spaces, Natural Places: A guide to restoration, management, and maintenance of community open space". This document provides a reference of practical and successful open space management techniques that emphasize natural landscape alternatives. The guidebook is available online at: <http://www.dnrec.state.de.us/dnrec2000/Divisions/Soil/dcmp/>.

In addition, a detailed open space management plan should be recorded on the record plan. This plan should outline how to manage each open space area, as well as invasive species. Open space containing forest and/or wetlands should be placed into a permanent conservation easement or other permanent protection mechanism. Conservation areas should also be demarked to avoid infringement by homeowners.

### **Rare Species and Wetland Buffers**

DNREC has records of *Notropis chalybaeus* (iron color shiner) within Pratt Branch at this site, which is also a State Natural Area. There are also records of rare plants just upstream and they may be within the project site as well. There are freshwater tidal scrub-shrub wetlands bordering the stream and this type of habitat is very significant as it is becoming quite rare in Delaware. The current site plan does not provide adequate buffers to protect water quality, rare species and the integrity of this freshwater wetland system.

The site plan/application states that a 100-foot buffer from the center of the stream will be maintained; however, 100 feet from the center of the stream only extends to the crest of the slope. The lot lines extend to the crest of the slope. The 100-foot buffer should extend from the crest of the slope to the lot line, not the center of the stream to the crest of the slope as it is currently. In addition, the proposed 50-foot tidal and 25-foot non-tidal wetland buffers are extremely inadequate and should be increased to 100 feet.

### **State Natural Heritage Site**

Because of the presence of the species mentioned above and the existence of a State Natural Area, this project lies within a State Natural Heritage Site. This is one of the criteria used to determine the presence of Critical Resource Waters. The final decision regarding Critical Resource Waters, if this is an issue, will be made by the U.S. Army Corps of Engineers (USACE). The information above will aid the Corps in their determination.

### **Forest Preservation**

Due to the importance of the forest on this parcel as a riparian and wetland buffer, a greater effort to maintain the existing forest should be made. Omitting some of the lots and infrastructure, especially in the southern part of the plan, would allow for greater forest preservation. This area could then be preserved as a larger area of open space which is more beneficial to wildlife. Forest fragmentation separates wildlife populations, increases road mortality, and increases “edge effects” that leave many forest dwelling species vulnerable to predation and allows the infiltration of invasive species.

A larger area of open space could be more beneficial to residents as well, as it would be accessible to all residents. Small, fragmented areas of open space behind lots, on corners, and in other irregular places become underutilized, can become a maintenance problem, and are often only accessible to adjacent residents. The current proposed fragmented open spaces could be used for stormwater management, infrastructure and lots relocated from the forested portion of the site. To reduce impacts to nesting birds and other wildlife species that utilize forests for breeding, we recommend that if tree clearing occurs, it not occur April 1st to July 31st.

### **Nuisance Waterfowl**

Stormwater management ponds may attract waterfowl like resident Canada geese and mute swans. High concentrations of waterfowl in ponds create water-quality problems, leave droppings on lawn and paved areas and can become aggressive during the nesting season. Short manicured grasses around ponds provide an attractive habitat for these species. We recommend native plantings of tall grasses, wildflowers, shrubs, and trees at the edge and within a buffer area around the perimeter. Waterfowl do not feel safe when they can not see the surrounding area for possible predators. These plantings should be completed as soon as possible as it is easier to deter geese when there are only a few than it is to remove them once they become plentiful. The Division of Fish and Wildlife does not provide goose control services, and if problems arise, property managers or owners will have to accept the burden of dealing with these species (e.g., permit applications,

costs, securing services of certified wildlife professionals). Solutions can be costly and labor intensive; however, with proper landscaping, monitoring, and other techniques, geese problems can be minimized.

### **State Resource Areas/Natural Areas**

Both State designated Natural Areas and State Resource Areas are located on the site. Natural Areas contain lands of statewide significance identified by the Natural Area Advisory Council as the highest quality and most important natural lands remaining in Delaware. State Resource Areas are comprised of lands that contain a variety of natural, cultural and open space resources significant to the state. The forested area located in the southern portion of the property is a part of the Murderkill River Natural Area and the Upper Murderkill State Resource Area.

Current site plans indicate that roughly 19 lots are within the existing Natural Area. The Office of Nature Preserves strongly recommends removal of lots in the forested portion of the site and respectfully requests the applicant consider dedicating the Natural Area as a Nature Preserve through a conservation easement or donation of land to the State.

Nature Preserve status provides the highest level of protection to the resource.

The Natural Area should be viewed as a community asset and managed appropriately. That said stormwater discharge from the stormwater management facilities should be directed away from the Natural Area. Rather, conservation design techniques should be utilized to minimize runoff to the Natural Area.

In summary, the developer is strongly encouraged to preserve, and where possible, enhance forested resources on site. This includes removing lot lines and infrastructure (such as storm water management ponds) from the Natural Area.

### **Solid Waste**

Each Delaware household generates approximately 3,600 pounds of solid waste per year. On average, each new house constructed generates an additional 10,000 pounds of construction waste. Due to Delaware's present rate of growth and the impact that growth will have on the state's existing landfill capacity, the applicant is requested to be aware of the impact this project will have on the State's limited landfill resources and, to the extent possible, take steps to minimize the amount of construction waste associated with this development.

## Air Quality

Once complete, vehicle emissions associated with this project are estimated to be 41.7 tons (83,344.8 pounds) per year of VOC (volatile organic compounds), 34.5 tons (69,003.9 pounds) per year of NO<sub>x</sub> (nitrogen oxides), 25.5 tons (50,912.3 pounds) per year of SO<sub>2</sub> (sulfur dioxide), 2.3 ton (4,532.1 pounds) per year of fine particulates and 3,485.8 tons (6,971,689.1 pounds) per year of CO<sub>2</sub> (carbon dioxide).

Emissions from area sources associated with this project are estimated to be 16.8 tons (33,616.8 pounds) per year of VOC (volatile organic compounds), 1.8 ton (3,698.9 pounds) per year of NO<sub>x</sub> (nitrogen oxides), 1.5 ton (3,069.5 pounds) per year of SO<sub>2</sub> (sulfur dioxide), 2.0 ton (3,961.1 pounds) per year of fine particulates and 68.1 tons (136,274.8 pounds) per year of CO<sub>2</sub> (carbon dioxide).

Emissions from electrical power generation associated with this project are estimated to be 6.7 tons (13,323.3 pounds) per year of NO<sub>x</sub> (nitrogen oxides), 23.2 tons (46,341.8 pounds) per year of SO<sub>2</sub> (sulfur dioxide) and 3,417.7 tons (6,835,414.3 pounds) per year of CO<sub>2</sub> (carbon dioxide).

	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Mobile	41.7	34.5	25.5	2.3	3485.8
Residential	16.8	1.8	1.5	2.0	68.1
Electrical Power		6.7	23.2		3417.7
TOTAL	58.5	43.0	50.2	4.3	6971.6

For this project the electrical usage via electric power plant generation alone totaled to produce an additional 6.7 tons of nitrogen oxides per year and 23.2 tons of sulfur dioxide per year.

A significant method to mitigate this impact would be to require the builder to construct Energy Star qualified homes. Every percentage of increased energy efficiency translates into a percent reduction in pollution. Quoting from their webpage, <http://www.energystar.gov/>:

“ENERGY STAR qualified homes are independently verified to be at least 30% more energy efficient than homes built to the 1993 national Model Energy Code or 15% more efficient than state energy code, whichever is more rigorous. These savings are based on heating, cooling, and hot water energy use and are typically achieved through a combination of:

building envelope upgrades,  
high performance windows,  
controlled air infiltration,  
upgraded heating and air conditioning systems,  
tight duct systems and  
upgraded water-heating equipment.”

The Energy office in DNREC is in the process of training builders in making their structures more energy efficient. The Energy Star Program is excellent way to save on energy costs and reduce air pollution. They highly recommend this project development and other residential proposals increase the energy efficiency of their homes.

They also recommend that the home builders offer geothermal and photo voltaic energy options. Applicable vehicles should use retrofitted diesel engines during construction. The development should provide tie-ins to the nearest bike paths, links to mass transit, and fund a lawnmower exchange program for their new occupants.

**State Fire Marshal’s Office – Contact: John Rudd 739-4394**

These comments are intended for informational use only and do not constitute any type of approval from the Delaware State Fire Marshal’s Office. At the time of formal submittal, the applicant shall provide; completed application, fee, and three sets of plans depicting the following in accordance with the Delaware State Fire Prevention Regulation (DSFPR):

- a. **Fire Protection Water Requirements:**
  - Water distribution system capable of delivering at least 1000 gpm for 1-hour duration, at 20-psi residual pressure is required. Fire hydrants with 800 feet spacing on centers. (Assembly and Townhouses)
  - Where a water distribution system is proposed for single family dwellings it shall be capable of delivering at least 500 gpm for 1-hour duration, at 20-psi residual pressure. Fire hydrants with 1000 feet spacing on centers are required. (One & Two- Family Dwelling)
  - Where a water distribution system is proposed for the site, the infrastructure for fire protection water shall be provided, including the size of water mains for fire hydrants and sprinkler systems.
  
- b. **Fire Protection Features:**
  - For townhouse buildings, provide a section / detail and the UL design number of the 2-hour fire rated separation wall on the Site plan.

c. **Accessibility**

- The access road to the subdivision from the main roads must be constructed so fire department apparatus may negotiate it.
- Fire department access shall be provided in such a manner so that fire apparatus will be able to locate within 100 ft. of the front door.
- Any dead end road more than 300 feet in length shall be provided with a turn-around or cul-de-sac arranged such that fire apparatus will be able to turn around by making not more than one backing maneuver. The minimum paved radius of the cul-de-sac shall be 38 feet. The dimensions of the cul-de-sac or turn-around shall be shown on the final plans. Also, please be advised that parking is prohibited in the cul-de-sac or turn around.
- The use of speed bumps or other methods of traffic speed reduction must be in accordance with Department of Transportation requirements.
- The local Fire Chief, prior to any submission to our Agency, shall approve in writing the use of gates that limit fire department access into and out of the development or property.

d. **Gas Piping and System Information:**

- Provide type of fuel proposed, and show locations of bulk containers on plan.

e. **Required Notes:**

- Provide a note on the final plans submitted for review to read “ All fire lanes, fire hydrants, and fire department connections shall be marked in accordance with the Delaware State Fire Prevention Regulations”
- Proposed Use
- Alpha or Numerical Labels for each building/unit for sites with multiple buildings/units
- Square footage of each structure (Total of all Floors)
- National Fire Protection Association (NFPA) Construction Type
- Maximum Height of Buildings (including number of stories)
- Townhouse 2-hr separation wall details shall be shown on site plans
- Note indicating if building(s) is/are to be sprinklered
- Name of Water Provider
- Letter from Water Provider approving the system layout
- Provide Lock Box Note (as detailed in DSFPR) if Building is to be sprinklered
- Provide Road Names, even for County Roads

Preliminary meetings with Fire Protection Specialists are encouraged prior to formal submittal. Please call for appointment. Applications and brochures can be downloaded from our website: [www.delawarestatefiremarshal.com](http://www.delawarestatefiremarshal.com), technical services link, plan review, applications or brochures.

**Department of Agriculture - Contact: Scott Blaier 698-4500**

The Delaware Department of Agriculture has no objections to the proposed application the *Strategies for State Policies and Spending* encourages environmentally responsible development in Investment Level 2 and 3 areas.

This site overlaps with the State's Green Infrastructure Investment Strategy Plan. The Natural Areas layer is present on the site. This designation indicates the land has valuable environmental characteristics and functions which are discussed in Governor Minner's Executive Order Number 61. They should be preserved as such, and not developed for residential or other incompatible uses.

*Right Tree for the Right Place*

The Delaware Department of Agriculture Forest Service encourages the developer to use the "Right Tree for the Right Place" for any design considerations. This concept allows for the proper placement of trees to increase property values in upwards of 25% of appraised value and will reduce heating and cooling costs on average by 20 to 35 dollars per month. In addition, a landscape design that encompasses this approach will avoid future maintenance cost to the property owner and ensure a lasting forest resource.

*Native Landscapes*

The Delaware Department of Agriculture and the Delaware Forest Service encourages the developer to use native trees and shrubs to buffer the property from the adjacent land-use activities near this site. A properly designed forested buffer can create wildlife habitat corridors and improve air quality to the area by removing six to eight tons of carbon dioxide annually and will clean our rivers and creeks of storm-water run-off pollutants. To learn more about acceptable native trees and how to avoid plants considered invasive to our local landscapes, please contact the Delaware Department of Agriculture Plant Industry Section at (302) 698-4500.

*Tree Mitigation*

The Delaware Forest Service encourages the developer to implement a tree mitigation program to replace trees at a 1:1 ratio within the site and throughout the community. This

will help to meet the community's forestry goals and objectives and reduce the environmental impacts to the surrounding natural resources. To learn more, please contact our offices at (302) 349-5754.

**Public Service Commission - Contact: Andrea Maucher 739-4247**

Any expansion of natural gas or installation of a closed propane system must fall within Pipeline Safety guidelines. Contact: Malak Michael at (302) 739-4247.

**Delaware State Housing Authority – Contact Vicki Walsh 739-4263**

This proposal is for a site plan review for 543 residential units on 177 acres located on both sides of Barrett's Chapel Road, east of McGinnis Pond Rd., northwest of Frederica, and adjacent to the confluence of Hudson Branch and Spring Creek. According to the *State Strategies Map*, the proposal is located in an Investment Level 3 area and inside the growth zone. As a general planning practice, DSHA encourages residential development inside growth zones, where residents will have proximity to services, markets, and employment opportunities. Furthermore, the proposal targets units for first time homebuyers. According to the most recent real estate data collected by DSHA, the average home price in Kent County is \$225,000. However, families earning respectively 100% of Kent County's median income only qualify for mortgages of \$180,115, thus creating an affordability gap of \$44,885. The provision of units within reach of families earning at least 100% of Kent County's median income will ensure housing that is affordable for first time homebuyers. In addition, during the January 3<sup>rd</sup> PLUS meeting, the idea of Big House Design was mentioned by the Office of State Planning. DSHA can provide examples of how the Big House Design has been successfully done. Please contact Victoria Walsh, Management Analyst at (302) 739-4263 ext. 219 or via email at [vicky@destatehousing.com](mailto:vicky@destatehousing.com).

**Department of Education – Contact: John Marinucci 739-4658**

This proposed development is within the Lake Forest School District boundaries.

DOE offers the following comments on behalf of the Lake Forest School District.

1. Using the DOE standard formula, this development will generate an estimated 272 students.
2. DOE records indicate that the Lake Forest School Districts' *elementary schools are at or beyond 100% of current capacity* based on September 30, 2006 elementary enrollment.

3. DOE records indicate that the Lake Forest School Districts' *secondary schools are very close to 100% of current capacity* based on September 30, 2006 secondary enrollment.
4. The Superintendent of Lake Forest School District has communicated to the DOE the district's lack of capacity given the number of planned and recorded residential sub divisions within district boundaries.
5. This development will create additional elementary and secondary student population growth which will further compound the existing shortage of space.
6. The developer is strongly encouraged to contact the Lake Forest School District Administration to address the issue of school over-crowding that this development will exacerbate.
7. DOE requests developer work with the Lake Forest School District transportation department to establish developer supplied bus stop shelter ROW and shelter structures, interspersed throughout the development as determined and recommended by the local school district.

Following receipt of this letter and upon filing of an application with the local jurisdiction, the applicant shall provide to the local jurisdiction and the Office of State Planning Coordination a written response to comments received as a result of the pre-application process, noting whether comments were incorporated into the project design or not and the reason therefore.

Thank you for the opportunity to review this project. If you have any questions, please contact me at 302-739-3090.

Sincerely,

A handwritten signature in cursive script that reads "Constance C. Holland".

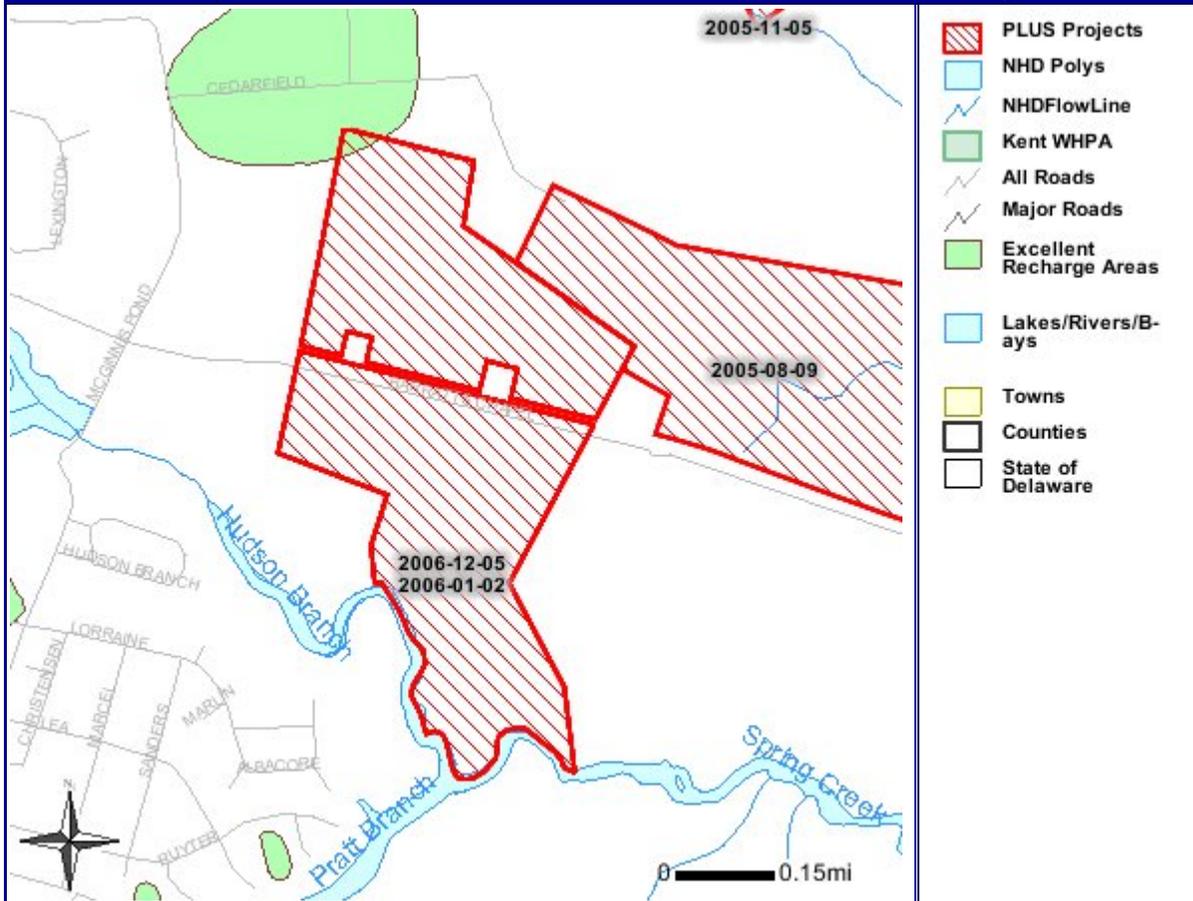
Constance C. Holland, AICP  
Director

CC: Kent County



# Steeplechase and Reserve at Steeplechase

2006-12-05



This map was produced by the Delaware  
Department of Natural Resources and Environmental Control.





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

CAROLANN WICKS, P.E.  
SECRETARY

October 31, 2006

Mr. Michael J. Petit de Mange  
Director of Planning  
Department of Planning Services  
Kent County Administrative Complex  
555 Bay Road  
Dover, DE 19901

Dear Mr. Petit de Mange:

The attached Traffic Impact Study (TIS) review letter for the **Blessing Property** subdivision 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 Rules and Regulations for Subdivision Streets and other accepted practices and procedures for such studies. DelDOT accepts this TIS review and concurs with the recommendations. We are providing it to you in fulfillment of our joint agreement regarding the review of TIS. If you have any questions concerning this letter or the attached review letter, please contact me at (302) 760-2134.

Sincerely,

Todd J. Sammons  
Project Engineer

TJS:km

Enclosures

cc with enclosures: Ms. Constance C. Holland, Office of State Planning Coordination  
Mr. Carl Wilson, The Traffic Group, Inc.  
Mr. Scott Diehl, McCormick Taylor  
Mr. Brad Herb, Johnson, Mirmiran & Thompson  
DelDOT Distribution

## DeIDOT Distribution

Frederick H. Schranck, Deputy Attorney General  
Darrel Cole, Chief of Community Relations, Public Relations  
Robert Taylor, Director, Transportation Solutions (DOTS)  
Ralph A. Reeb, Director, Division of Planning  
Kathy English, Director, Finance  
Michael H. Simmons, Assistant Director, Project Development South, DOTS  
Donald D. Weber, Assistant Director, Traffic, DOTS  
Joseph Cantalupo, Assistant Director, Statewide & Regional Planning  
Theodore G. Bishop, Assistant Director, Development Coordination  
Thomas E. Meyer, Traffic Studies Manager, Traffic, DOTS  
Thomas Greve, District Engineer, Central District  
Jennifer Pinkerton, Pavement Management Engineer, South District  
William J. Dryden, Transportation Planner, Project Development South, DOTS  
Wayne M. Henderson, Service Development Planner, Delaware Transit Corporation  
Marc Cote, Subdivision Engineer, Development Coordination  
T. William Brockenbrough, Jr., County Coordinator, Development Coordination  
Troy Brestel, Project Engineer, Development Coordination

October 27, 2006

Mr. Todd J. Sammons  
Project Engineer  
DelDOT Division of Planning  
P.O. Box 778  
Dover, DE 19903

RE: Agreement No. 1294  
Traffic Impact Study Review Services  
**Task No. 116 – Blessing Property (aka Steeplechase Subdivision)**

Dear Mr. Sammons,

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the Blessing Property prepared by The Traffic Group, Inc. (Traffic Group) dated May 30, 2006. This review was assigned as Task Number 116. Traffic Group prepared the report in a manner generally consistent with DelDOT's *Rules and Regulations for Subdivision Streets*.

The TIS evaluates the impacts of Blessing Property, a proposed residential development consisting of 380 single-family detached houses on a 176.90-acre parcel in Kent County, Delaware. The development is proposed to be located on the north side of Barratts Chapel Road (Kent Road 371) between McGinnis Pond Road (Kent Road 378) and Spring Creek, approximately one mile west of Delaware Route 1. Two access points are proposed on Barratts Chapel Road. The land is currently zoned AC (Agricultural Conservation) and the developer seeks to develop it under the existing zoning with a PUD (Planned Unit Development) overlay. Construction of this project is anticipated to be complete by 2012.

DelDOT currently has one proposed project in the study area: the Delaware Route 1 Little Heaven Interchange Project (DelDOT Contract No. 24-122-02). A grade separated interchange would be constructed at the existing intersection of Delaware Route 1 and Bowers Beach Road (Kent Road 18). The project would also include separate eastern and western service roads parallel to Delaware Route 1. The service roads would connect several existing state roads and proposed development access points to the proposed interchange and Delaware Route 1, thereby eliminating several existing intersections with Delaware Route 1. The improvements are proposed to enhance safety and preserve traffic capacity along the Delaware Route 1 corridor. The project is currently in design, but is not funded for right of way or construction. The schedule of this project is not currently known.

DelDOT has recently developed a new plan to address developer impacts to the transportation system in this area, as well as DelDOT's current funding shortfall for the Little Heaven Interchange project. Rather than have developers implement expensive, short-term improvements that will be removed once the Little Heaven Interchange project is under construction, DelDOT would like to enter into an agreement with the developers in this area to have them fund an equitable portion of the local matching funds required for the Little Heaven

Interchange Project. With this agreement in place, many of the other improvements that might otherwise be required of developers can be waived.

The analysis performed by The Traffic Group in the TIS assumed that this project would be constructed by the time the Blessing Property was fully developed. Due to the expected delay in construction, McCormick Taylor analyzed the impact of the Blessing Property traffic on the surrounding intersections both with and without the proposed Little Heaven Interchange.

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

Significant level of service deficiencies are expected at the unsignalized intersection of Delaware Route 1 and Barratts Chapel Road (Kent Road 371), and signal warrants are expected to be met. However, because Delaware Route 1 is part of the Corridor Capacity Preservation Program (CCPP), signalization is not acceptable. Without the interchange project or the possibility of signalization, achieving acceptable levels of service is not possible. However, the specific improvements listed on pages 3 through 6 are at least expected to allow for adequate storage space for queued vehicles.

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

<i>Intersection</i>	<i>Situation For Which Deficiency Occurs</i>
<i>With or Without Proposed Little Heaven Interchange:</i>	
Barratts Chapel Road / Plymouth Road (Kent Road 371) and Delaware Route 15	2012 PM without proposed development, 2012 AM and PM with proposed development
Barratts Chapel Road and Buffalo Road (Kent Road 376) / Strayley Property Entrance	2012 PM without proposed development, 2012 PM with proposed development
<i>Without Proposed Little Heaven Interchange:</i>	
US Route 113A and Buffalo Road	2012 AM and PM without proposed development, 2012 AM and PM with proposed development
US Route 113A and Mulberrie Point Road (Kent Road 373) / High Point Trailer Park Entrance	2012 AM and PM without proposed development, 2012 AM and PM with proposed development
Delaware Route 1 and Mulberrie Point Road	2012 AM and PM without proposed development, 2012 AM and PM with proposed development
Delaware Route 1 and US Route 113A / Skeeter Neck Road (North) (Kent Road 372)	2012 PM without proposed development, 2012 PM with proposed development
Delaware Route 1 and Bowers Beach Road (Kent Road 18)	2012 AM and PM without proposed development, 2012 AM and PM with proposed development
Delaware Route 1 and Skeeter Neck Road (South)	2012 AM and PM without proposed development, 2012 AM and PM with proposed development
Delaware Route 1 and Barratts Chapel Road	Existing AM and PM, 2012 AM and PM without proposed development, 2012 AM and PM with proposed development

<i>Intersection</i>	<i>Situation For Which Deficiency Occurs</i>
<i>With Proposed Little Heaven Interchange:</i>	
Barratts Chapel Road / Connector Road and Chapel Farm Entrance	2012 AM without proposed development, 2012 AM and PM with proposed development
Connector Road and Western Delaware Route 1 Service Road	2012 AM and PM without proposed development, 2012 AM and PM with proposed development

Although the intersections of Barratts Chapel Road and Buffalo Road/Cattail Creek (aka Strayley Property) Site Entrance and Barratts Chapel Road/Connector Road and Chapel Farm Site Entrance exhibit Level of Service deficiencies in the above tables, no improvements were recommended. The intersection of Barratts Chapel Road and Buffalo Road/Cattail Creek Site Entrance will be improved as part of the Cattail Creek development. This intersection will be improved to either a single-lane roundabout or a signalized intersection depending on the feasibility of a roundabout. The Barratts Chapel Road/Connector Road and Chapel Farm Site Entrance intersection exhibits Level of Service deficiencies only on the Chapel Farm Site Entrance approach, which can be mitigated with the addition of a separate left-turn lane on the Chapel Farm approach.

Should the County choose to approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan. 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 enter into an agreement with DelDOT to fund an equitable portion of the local matching funds required for the Little Heaven Interchange Project (DelDOT Contract No. 24-122-02). Items 2 through 13 (inclusive) on the following pages are for information only and will be waived once the developer enters into this agreement. At this time, it is expected that this agreement (or improvements similar to items 2 through 13) will be required of at least six other developments in this area. DelDOT expects to determine the cost sharing based on each development’s projected daily traffic volume, compared to the total new development projected daily traffic volume.
  
2. The developer should enter into an agreement with DelDOT to fund an equitable portion of improvements required at the intersection of Delaware Route 1 and US Route 113A. These improvements should include:
  - Northbound Delaware Route 1: additional left-turn lane (and additional westbound receiving lane on US Route 113A)
  - Southbound Delaware Route 1: additional through lane

3. The developer should enter into an agreement with DelDOT to fund an equitable portion of the improvements required at the intersection of Delaware Route 1 and Bowers Beach Road. These improvements include:
  - Northbound Delaware Route 1: an additional through lane and two left-turn lanes
  - Southbound Delaware Route 1: an additional through lane and exclusive right turn lane
  - Westbound Bowers Beach Road: convert the existing left and right-turn lanes into a separate left-turn lane, a shared left/through lane, and a separate right-turn lane
4. The developer should install raised islands at the intersection of Delaware Route 1 and Mulberrie Point Road to limit traffic from Mulberrie Point Road to right-turns only (left-turns and through traffic restricted). Left-turning traffic from both directions on Delaware Route 1 to Mulberrie Point Road should still be allowed.
5. The developer should install raised islands at the intersection of Delaware Route 1 and Skeeter Neck Road (South) to limit traffic from Skeeter Neck Road to right-turns only (left-turn traffic restricted). Left-turning traffic from southbound Delaware Route 1 to Skeeter Neck Road should still be allowed.
6. The developer should enter into a traffic signal agreement with DelDOT for the intersection of Delaware Route 1 and US Route 113A. This agreement will cover the signal adjustments required by the physical improvements noted in Item No. 2. The agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion.
7. The developer should enter into a signal agreement with DelDOT for the intersection of Delaware Route 1 and Bowers Beach Road. This agreement will cover the signal adjustments required by the physical improvements noted in Item No. 3. The agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion.
8. The developer should enter into a traffic signal agreement with DelDOT for the intersection of US Route 113A and Mulberrie Point Road. The agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion.
9. The developer should enter into a signal agreement with DelDOT for the intersection of Western Service Road and Bowers Beach Road. The agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion.
10. The developer should enter into a signal agreement with DelDOT for the intersection of Eastern Service Road and Bowers Beach Road. The agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion.

11. The developer should enter into an agreement with DelDOT to fund an equitable portion of improvements required at the intersection of the Western Service Road and the Connector Road (proposed future connection of Barratts Chapel Road to the Western Service Road). The agreement should include a separate right-turn lane on the eastbound Connector Road approach.
12. The developer should enter into an agreement with DelDOT to improve the northbound approach on US Route 113A at Buffalo Road from a through lane with a bypass lane to a through lane with a separate left-turn lane, maintaining a minimum five-foot shoulder in both directions. The implementation of this improvement may not be required until a traffic signal is warranted at the intersection.
13. The developer should enter into a traffic signal agreement with DelDOT for the intersection of US Route 113A and Buffalo Road. The agreement should include pedestrian signals, crosswalks, roadway striping, and interconnection at DelDOT's discretion.
14. The developer should improve Barratts Chapel Road from Delaware Route 1 to McGinnis Pond Road to meet DelDOT's local road standards. These standards include two eleven-foot lanes and two five-foot shoulders. The developer should provide a bituminous concrete overlay to the existing travel lanes, at DelDOT's discretion. DelDOT should analyze the through travel lanes' pavement section and recommend an overlay thickness to the developer's engineer. At this time, it is expected that at least six other developers are responsible for part of these improvements as well. The developer should coordinate with DelDOT on the implementation and equitable cost sharing of these improvements.
15. The developer should install raised islands at the intersection of Delaware Route 1 and Barratts Chapel Road to limit traffic on Barratts Chapel Road to right-turns only (left-turns and through traffic restricted). Left-turning traffic from both directions on Delaware Route 1 to Barratts Chapel Road should still be allowed. The northbound left-turn lane should be extended to a minimum length of 1,100 feet (not including taper). The exact length of the northbound left-turn lane should be at DelDOT's discretion and may be increased if other developments in the area are approved. At this time, it is expected that this will be a requirement of at least three other developments in this area.
16. The developer should extend the southbound u-turn lane at the crossover on Delaware Route 1 immediately south of Barratts Chapel Road to a minimum of 1,000 feet in length (not including taper). The exact length of the southbound u-turn lane should be at DelDOT's discretion and may be increased if other developments in the area are approved. At this time, it is expected that this will be a requirement of at least three other developments in this area.

17. The developer should enter into a traffic signal agreement with DelDOT for the intersection of Barratts Chapel Road / Plymouth Road and Delaware Route 15. The agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion.
18. The following bicycle and pedestrian improvements should be completed:
  - a. A minimum of a five-foot bicycle lane (in addition to any required auxiliary lanes) should be striped along the site frontage on Barratts Chapel Road in order to facilitate safe and unimpeded bicycle travel.
  - b. Share the road signs (MUTCD W11-1 with W16-1) should be added along the bicycle lane in order to alert motorists to the presence of bicycle traffic. Right turn yield to bikes sign (MUTCD R4-4) should be added at the start of any right-turn lane.
  - c. The entrance proposed on the north side of Barratts Chapel Road should align with one of the proposed south entrances. At this location, a pedestrian crossing with appropriate warning signage should be included.
  - d. Utility covers should be moved outside of the designated bicycle lane or be flush with the pavement.
  - e. A minimum of a ten-foot multi-modal path (with a minimum of a ten-foot buffer from the roadway) that meets current AASHTO and ADA standards should be included along the site frontage on Barratts Chapel Road.
  - f. ADA compliant curb ramp and crosswalk should be considered at the site entrance.
  - g. Internal sidewalks to promote walking as a viable transportation alternative should be installed, including sidewalks connecting this development to adjacent residential developments.

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 subdivision review process.

Additional details on our review of this TIS are attached. Please contact me at (302) 738-0203 or through e-mail at [sjdiehl@mtmail.biz](mailto:sjdiehl@mtmail.biz) if you have any questions concerning this review.

Sincerely,  
**McCormick Taylor, Inc.**



Scott J. Diehl, P.E., PTOE  
Project Manager

Enclosure

## **General Information**

**Report date:** May 30, 2006

**Prepared by:** The Traffic Group

**Prepared for:** Tamari Properties, LLC

**Tax parcel:** SM-00-121.00-01-57.01

**Generally consistent with DelDOT's *Rules and Regulations for Subdivision Streets*:** Yes

## **Project Description and Background**

**Description:** Residential development consisting of 380 single-family detached houses

**Location:** The development is located on the north side of Barratts Chapel Road (Kent Road 371) between McGinnis Pond Road (Kent Road 378) and Spring Creek in Kent County, Delaware.

**Amount of land to be developed:** 176.90 acres

**Land use approval(s) needed:** Subdivision approval, Planned Unit Development (PUD) overlay

**Proposed completion date:** 2012

**Proposed access locations:** Two access points are proposed on Barratts Chapel Road.

## **Livable Delaware**

*(Source: Delaware Strategies for State Policies and Spending, July 2004)*

**Location with respect to the Strategies for State Policies and Spending Map of Delaware:**  
The Blessing Property is located within Investment Level 2 and Level 3.

## **Investment Level 2:**

These areas, generally adjacent to Investment Level 1 Areas, include less developed areas within municipalities, rapidly growing areas that have or will have public water and wastewater services, and may include smaller towns, rural villages, and suburban areas. These areas typically include single-family detached housing developments, commercial and office uses serving primarily local residents, and a limited range of entertainment, parks and recreation, cultural and institutional facilities.

In Investment Level 2 Areas, state investments and policies should be based on available infrastructure to accommodate orderly growth, encourage departure from the typical single-family-dwelling developments, promote a broader mix of housing types and commercial sites, and encourage development that is consistent with the character of the area. Transportation projects should expand or provide roadways, public transportation, pedestrian walkways, bicycle paths, and other transportation modes that manage flow, support economic development efforts, and encourage connections between communities and the use of local streets for local trips.

### **Investment Level 3:**

These areas are portions of the county designated for growth, development districts, or long-term annexation. In New Castle County, these areas normally reflect phases 2 and 3 of the county's adopted wastewater facility plan. Areas classified as an Investment Level 3 will be considered for state investing after the Level 1 and 2 areas are substantially built out or when the facilities are logical extensions of existing systems and deemed appropriate to serve a particular area. Many of the areas within the Investment Level 3 designation include important farmland and natural resources along with portions of roadways that are designated for corridor capacity protection. Therefore the character pattern and timing of growth along with federally mandated air and water quality goals should be considered on a case-by-case basis for areas within this designation.

In Investment Level 3 Areas, the state will continue to invest in the regional roadway network and roadway safety while continuing to protect the capacity of major transportation corridors, such as Route 13. Roadway improvements to support new development are not encouraged in Investment Level 3 and funds will not be allocated for these types of improvements until they have been allocated to Level 1 and 2 areas.

### **Proposed Development's Compatibility with Livable Delaware:**

Blessing Property falls within Investment Level 2, which encourages developments with a broad mix of housing and Investment Level 3, which typically does not encourage residential developments. Although majority of Blessing Property falls within Investment Level 3 area, Blessing Property can be considered a logical extension of existing development area along McGinnis Pond Road and Barratts Chapel Road. The development proposed in the Blessing Property TIS generally adheres to the policies stated in the 2004 update of the Livable Delaware "Strategies for State Policies and Spending."

### **Comprehensive Plan**

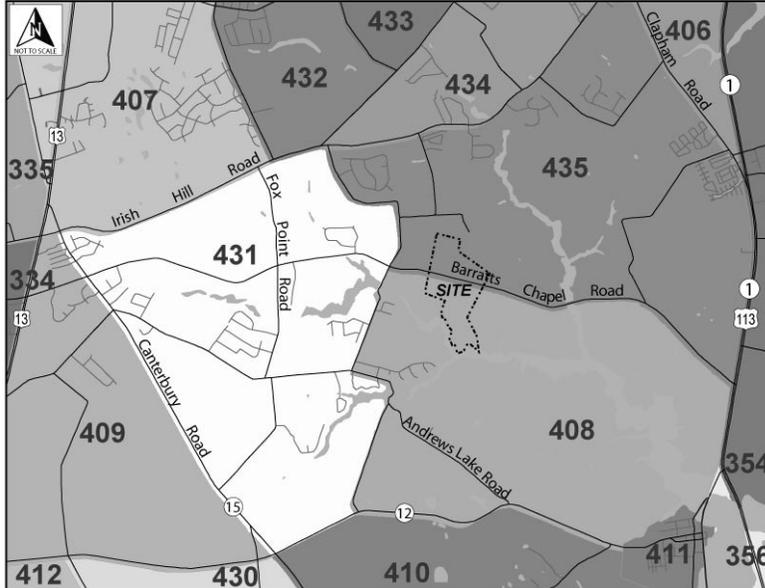
**Kent County Comprehensive Plan:** *(Source: Kent County Comprehensive Plan)* This parcel is located within an area that is zoned Low Density (1 to 2.9 dwelling units per acre).

**Proposed Development's Compatibility with Comprehensive Plans:** The proposed development is generally consistent with the Kent County Comprehensive Plan with a proposed density of 2.1 dwelling units per acre.

## Transportation Analysis Zones (TAZ)

**Transportation Analysis Zones (TAZ) where development would be located:**  
408 and 435 (Peninsula Code Designation)

### **TAZ Boundaries:**



**Current employment estimate for TAZ:**

106 in 2000

**Future employment estimate for TAZ:**

136 in 2030

**Current population estimate for TAZ:**

2,757 in 2000

**Future population estimate for TAZ:**

3,771 in 2030

**Current household estimate for TAZ:**

1,056 in 2000

**Future household estimate for TAZ:**

1,435 in 2030

**Relevant committed developments in TAZ:** Otter Run, Barker's Landing, Chapel Farm, Webb Farm, Webb Properties, Skeeter Neck Land Company Property, Thornberry Crossings, Estates of Double Run Creek, Shearwater, and Strayley Property

**Would the addition of committed developments to current estimates exceed future projections:** Yes.

**Would the addition of committed developments and the proposed development to current estimates exceed future projections:** Yes.

### Relevant Projects in the DelDOT Capital Transportation Program (2006-2011)

DelDOT currently has one proposed project in the study area: the Delaware Route 1 Little Heaven Interchange Project (DelDOT Contract No. 24-122-02). A grade separated interchange would be constructed at the existing intersection of Delaware Route 1 and Bowers Beach Road (Kent Road 18). The project would also include separate eastern and western service roads parallel to Delaware Route 1. The service roads would connect several existing state roads and proposed development access points to the proposed interchange and Delaware Route 1, thereby eliminating several existing intersections with Delaware Route 1. The improvements are proposed to enhance safety and preserve traffic capacity along the Delaware Route 1 corridor. The project is currently in design, but is not funded for right of way or construction. The schedule of this project is not currently known.

## **Trip Generation**

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

- 380 single-family detached houses (ITE land use code 210)

**Table 1. Blessing Property**

Land Use	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
380 single-family detached houses	69	206	275	111	65	176
<b>Total</b>	<b>69</b>	<b>206</b>	<b>275</b>	<b>111</b>	<b>65</b>	<b>176</b>

## **Overview of TIS**

### **Intersections examined:**

- 1) Barratts Chapel Road & West Site Entrance
- 2) Barratts Chapel Road & East Site Entrance
- 3) Barratts Chapel Road / Connector Road & Proposed Chapel Farm Entrance
- 4) Connector Road & Western Delaware Route 1 Service Road
- 5) Barratts Chapel Road & Buffalo Road / Proposed Strayley Property Entrance
- 6) Buffalo Road & Proposed Delaware Route 1 Southbound Ramps & US Route 113A
- 7) Barratts Chapel Road / Plymouth Road & Delaware Route 15
- 8) Barratts Chapel Road & Fox Chase Road
- 9) Barratts Chapel Road & McGinnis Pond Road
- 10) Western Delaware Route 1 Service Road & Bowers Beach Road / Proposed Skeeter Neck Land Company Entrance
- 11) Eastern Delaware Route 1 Service Road & Bowers Beach Road
- 12) US Route 113A & Mulberrie Point Road / High Point Trailer Park Entrance
- 13) Delaware Route 1 & Mulberrie Point Road
- 14) Delaware Route 1 & US Route 113A / Skeeter Neck Road (North)
- 15) Delaware Route 1 & Bowers Beach Road / Proposed Skeeter Neck Land Company Entrance
- 16) Delaware Route 1 & Skeeter Neck Road (South)
- 17) Delaware Route 1 & Barratts Chapel Road / Private Driveway

### **Conditions examined:**

- 1) Case 1: 2004 existing conditions
- 2) Case 2: 2012 with committed developments
- 3) Case 3: 2012 with committed developments and Blessing Property

**Peak hours evaluated:** Weekday morning and evening peak hours

**Committed developments considered:**

- Otter Run (53 single-family detached houses)
- Bower's Landing (202 single-family detached houses)
- Baker's Landing (237 manufactured housing community, 122 unoccupied)
- Chapel Farm (326 single-family detached houses and 233 townhouses )
- Webb Farm (168 single-family detached houses)
- Webb Properties (508 single-family detached houses and a 10,000 square foot library)
- Skeeter Neck Land Company Property (123 single-family detached houses, 86 duplexes, 55 townhouses, a 90,000 square foot commercial)
- Thornberry Crossings (56 single-family detached houses)
- Estates of Double Run Creek (31 single-family detached houses)
- Shearwater (27 single-family detached houses and 101 townhouses)
- Strayley Property (121 single-family detached houses and 154 townhouses)
- Caulk Property (192 single-family detached houses)

**Intersection Descriptions**

**1) Barratts Chapel Road & West Site Entrance**

**Type of Control:** proposed two-way stop-controlled intersection, stop-controlled on the northbound and southbound approaches

**Eastbound approach:** (Barratts Chapel Road) one shared left/through/right lane

**Westbound approach:** (Barratts Chapel Road) one shared left/through/right lane

**Northbound approach:** (Proposed West Site Entrance) one shared left/through/right lane

**Southbound approach:** (Proposed West Site Entrance) one shared left/through/right lane

**2) Barratts Chapel Road & East Site Entrance**

**Type of Control:** proposed stop-controlled T intersection, stop-controlled on northbound approach

**Eastbound approach:** (Barratts Chapel Road) one shared through/right lane

**Westbound approach:** (Barratts Chapel Road) one shared left/through lane

**Northbound approach:** (Proposed East Site Entrance) one shared left/right lane

**3) Barratts Chapel Road / Connector Road & Proposed Chapel Farm Entrance**

**Type of Control:** proposed stop-controlled T intersection, stop-controlled on the northbound approach

**Eastbound approach:** (Barratts Chapel Road) one shared through/right lane

**Westbound approach:** (Connector Road) one shared left/through lane

**Northbound approach:** (Proposed Chapel Farm Entrance) one shared left/right lane

- 4) **Connector Road & Western Delaware Route 1 Service Road**  
**Type of Control:** proposed stop-controlled T intersection, stop-controlled on eastbound approach  
**Eastbound approach:** (Connector Road) one shared left/right lane  
**Northbound approach:** (Western Delaware Route 1 Service Road) one through lane and one right-turn lane

**Note:** Above intersection description is the current DelDOT design for the Little Heaven Interchange in September 2006.

- 5) **Barratts Chapel Road & Buffalo Road / Proposed Strayley Property Entrance**  
**Type of Control:** two-way stop-controlled intersection, stop-controlled on northbound and southbound approaches  
**Eastbound approach:** (Barratts Chapel Road) one shared left/through/right lane  
**Westbound approach:** (Barratts Chapel Road) one shared left/through/right lane  
**Northbound approach:** (Private Driveway, Proposed Strayley Property Entrance) one shared left/through/right lane  
**Southbound approach:** (Buffalo Road) one shared left/through/right lane

- 6) **Buffalo Road / Proposed Delaware Route 1 Southbound Ramps & US Route 113A**  
**Type of Control:** stop-controlled T intersection, stop-controlled on eastbound approach, proposed signalized four-leg intersection  
**Eastbound approach:** (Buffalo Road) one shared left/right-turn lane, proposed one shared left/through lane and one right-turn lane  
**Westbound approach:** (Proposed Delaware Route 1 Southbound Ramps) proposed one left-turn lane, one shared left/through lane, and one right-turn lane  
**Northbound approach:** (US Route 113A) one left/through lane and one bypass through lane, proposed one left-turn lane, one through lane, and one shared through/right lane  
**Southbound approach:** (US Route 113A) one through lane and one right-turn lane, proposed two left-turn lanes and one shared through/right lane

**Note:** Above intersection description is the current DelDOT design for the Little Heaven Interchange in September 2006.

- 7) **Barratts Chapel Road / Plymouth Road & Delaware Route 15**  
**Type of Control:** two-way stop-controlled intersection, stop-controlled on the eastbound and westbound approaches  
**Eastbound approach:** (Plymouth Road) one shared left/through/right lane  
**Westbound approach:** (Barratts Chapel Road) one shared left/through/right lane  
**Northbound approach:** (Delaware Route 15) one shared left/through/right lane  
**Southbound approach:** (Delaware Route 15) one shared left/through/right lane

- 8) **Barratts Chapel Road & Fox Chase Road**  
**Type of Control:** two-way stop-controlled intersection, stop-controlled on the northbound and southbound approaches  
**Eastbound approach:** (Barratts Chapel Road) one shared left/through/right lane

**Westbound approach:** (Barratts Chapel Road) one shared left/through/right lane

**Northbound approach:** (Fox Chase Road) one shared left/through/right lane

**Southbound approach:** (Fox Chase Road) one shared left/through/right lane

9) **Barratts Chapel Road & McGinnis Pond Road**

**Type of Control:** two-way stop-controlled intersection, stop-controlled on the northbound and southbound approaches

**Eastbound approach:** (Barratts Chapel Road) one shared left/through/right lane

**Westbound approach:** (Barratts Chapel Road) one shared left/through/right lane

**Northbound approach:** (McGinnis Pond Road) one shared left/through/right lane

**Southbound approach:** (McGinnis Pond Road) one shared left/through/right lane

10) **Western Delaware Route 1 Service Road & Bowers Beach Road / Proposed Skeeter Neck Land Company Entrance**

**Type of Control:** proposed signalized four-leg intersection

**Eastbound approach:** (Proposed Skeeter Neck Land Company Entrance) one left-turn lane, one through lane, and one right-turn lane

**Westbound approach:** (Bowers Beach Road) one left-turn lane, one through lane, and one right-turn lane

**Northbound approach:** (Western Delaware Route 1 Service Road) one left-turn lane, one through lane, and one right-turn lane

**Southbound approach:** (Western Delaware Route 1 Service Road) one left-turn lane, one through lane, and one right-turn lane

**Note:** Above intersection description is the current DelDOT design for the Little Heaven Interchange in September 2006.

11) **Eastern Delaware Route 1 Service Road & Bowers Beach Road**

**Type of Control:** proposed signalized four-leg intersection

**Eastbound approach:** (Bowers Beach Road) two left-turn lanes and one shared through/right lane

**Westbound approach:** (Bowers Beach Road) one left-turn lane, one through lane, and one right-turn lane

**Northbound approach:** (Eastern Delaware Route 1 Service Road) one left-turn lane, one through lane, and one right-turn lane

**Southbound approach:** (Eastern Delaware Route 1 Service Road) one left-turn lane and one shared through/right lane

**Note:** Above intersection description is the current DelDOT design for the Little Heaven Interchange in September 2006.

12) **US Route 113A & Mulberrie Point Road / High Point Trailer Park Entrance**

**Type of Control:** two-way stop-controlled intersection, stop-controlled on the eastbound and westbound approaches

- Eastbound approach:** (High Point Trailer Park Entrance) one shared left/through/right lane  
**Westbound approach:** (Mulberrie Point Road) one shared left/through/right lane  
**Northbound approach:** (US Route 113A) one left/through lane and one right-turn lane  
**Southbound approach:** (US Route 113A) one shared left/through/right lane
- 13) **Delaware Route 1 & Mulberrie Point Road / High Point Trailer Park Entrance**  
**Type of Control:** two-way stop-controlled intersection, stop-controlled on the eastbound and westbound approaches  
**Eastbound approach:** (Mulberrie Point Road) one shared left/through/right lane  
**Westbound approach:** (Mulberrie Point Road) one shared left/through/right lane  
**Northbound approach:** (Delaware Route 1) one left-turn lane, two through lanes, and one right-turn lane  
**Southbound approach:** (Delaware Route 1) one left-turn lane, two through lanes, and one right-turn lane
- 14) **Delaware Route 1 & US Route 113A / Skeeter Neck Road (North)**  
**Type of Control:** signalized intersection for the northbound left-turn and southbound through movements, stop-controlled on the westbound approach  
**Eastbound approach:** (US Route 113A) one through lane  
**Westbound approach:** (Skeeter Neck Road) one right-turn lane  
**Northbound approach:** (Delaware Route 1) one left-turn lane, one through lane, and one shared through/right lane  
**Southbound approach:** (Delaware Route 1) one left-turn lane and two through lanes
- 15) **Delaware Route 1 & Bowers Beach Road / Proposed Skeeter Neck Land Company Entrance**  
**Type of Control:** signalized three-leg intersection, proposed signalized four-leg intersection  
**Eastbound approach:** (Proposed Skeeter Neck Land Company Entrance) proposed one left turn lane, one through lane and one right-turn lane  
**Westbound approach:** (Bowers Beach Road) one left-turn lane and one right-turn lane, proposed one left-turn lane, one through lane, and one right-turn lane  
**Northbound approach:** (Delaware Route 1) two through lanes and one right-turn lane, proposed one left-turn lane, two through lanes, and one right-turn lane  
**Southbound approach:** (Delaware Route 1) one left-turn lane and two through lanes, proposed one left-turn lane, two through lanes, and one right-turn lane
- 16) **Delaware Route 1 & Skeeter Neck Road (South)**  
**Type of Control:** stop-controlled intersection, stop-controlled on westbound approach  
**Westbound approach:** (Skeeter Neck Road) one shared left/right lane  
**Northbound approach:** (Delaware Route 1) one u-turn lane, two through lanes, and one right-turn lane  
**Southbound approach:** (Delaware Route 1) one left-turn lane and two through lanes

**17) Delaware Route 1 & Barratts Chapel Road / Private Driveway**

**Type of Control:** two-way stop-controlled intersection, stop-controlled on the eastbound and westbound approaches

**Eastbound approach:** (Barratts Chapel Road) one shared left/through/right lane

**Westbound approach:** (Private Driveway) one shared left/through/right lane

**Northbound approach:** (Delaware Route 1) one left-turn lane, one through lane, and one shared through/right lane

**Southbound approach:** (Delaware Route 1) one left-turn lane and two through lanes

**Transit, Pedestrian, and Bicycle Facilities**

**Existing transit service:** According to DTC's DART First State website, the Route 303 transit line operates along Route 1 within the study area. It serves Dover, Magnolia, Little Heaven, Milford, Houston, and Harrington. Currently, there is an existing stop at Route 1 and Mulberrie Point Road (Kent Road 373).

**Planned transit service:** Currently DTC has no plans to extend transit services in this area.

**Existing bicycle and pedestrian facilities:** The *Delaware Kent and Sussex Counties Bicycle Touring Map* designates Barratts Chapel Road, Buffalo Road, Fox Chase Road, and McGinnis Pond Road as having above average cycling conditions with low vehicular volumes (less than 2,000 vehicles per day). US Route 113A is designated as having above average cycling conditions with moderate traffic volumes (between 2,000 and 10,000 vehicles per day). Delaware Route 15 is designated as average cycling condition with moderate traffic volumes. Delaware Route 1 is designated as above average cycling condition with high traffic volumes (more than 10,000 vehicles per day).

**Planned bicycle and pedestrian facilities:** DelDOT had recommended the following improvements:

- a. A minimum of a five-foot bicycle lane (in addition to any required auxiliary lanes) should be striped along the site frontage on Barratts Chapel Road in order to facilitate safe and unimpeded bicycle travel.
- b. The entrance proposed on the north side of Barratts Chapel Road should align with one of the proposed south entrances. At this location, a pedestrian crossing with appropriate warning signage should be included.
- c. Share the road signs (MUTCD W11-1 with W16-1) should be added along the bicycle lane in order to alert motorists to the presence of bicycle traffic. Right turn yield to bikes sign (MUTCD R4-4) should be added at the start of any right-turn lane.
- d. A minimum of a five-foot sidewalk (with a minimum of a three-foot setback from the roadway) that meets current ADA standards should be included along the site frontages on Barratts Chapel Road.
- e. ADA compliant curb ramp and crosswalk should be considered at the site entrance.
- f. Internal sidewalks to promote walking as a viable transportation alternative should be installed, including sidewalks connecting to the frontage sidewalks.

**Previous Comments**

All comments from DeIDOT's Scoping Letter were addressed in the Final TIS submission.

**General HCS Analysis Comments**

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

- 1) For the future cases, McCormick Taylor assumed a minimum PHF of 0.92 for the Livable Delaware Investment Level 1 and 2 Areas, Delaware Route 1, US Route 113A, and the future Little Heaven Interchange area, and assumed a minimum of 0.88 for the Livable Delaware Investment Level 3 and 4 Areas.

Table 2  
PEAK HOUR LEVELS OF SERVICE (LOS)  
*based on Traffic Impact Study for Blessing Property*  
*Report dated May 30, 2006*  
Prepared by The Traffic Group

Unsignalized Intersection <sup>1</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road &amp; West Site Entrance</b>				
2012 with Blessing Property (Case 3)				
Eastbound Barratts Chapel Road – Left	A (8.0)	A (8.1)	A (8.0)	A (8.1)
Westbound Barratts Chapel Road – Left	A (7.7)	A (8.1)	A (7.7)	A (8.1)
Northbound West Site Entrance	B (11.7)	B (13.8)	B (11.7)	B (13.8)
Southbound West Site Entrance	C (16.6)	C (21.0)	C (16.6)	C (21.0)

<sup>1</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 3  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>2</sup> Two-Way Stop Control (T Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road &amp; East Site Entrance</b>				
2012 with Blessing Property (Case 3)				
Westbound Barratts Chapel Road – Left	A (8.0)	A (8.3)	A (8.0)	A (8.3)
Northbound East Site Entrance	B (11.6)	B (12.5)	B (11.6)	B (12.5)

<sup>2</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 4  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>3</sup> Two-Way Stop Control (T Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road / Connector Road &amp; Chapel Farm Entrance</b>				
2012 without Blessing Property (Case 2)				
Westbound Connector Road – Left	A (9.1)	A (9.0)	A (9.1)	A (9.0)
Northbound Chapel Farm Entrance	E (41.9)	D (32.8)	E (41.9)	D (32.8)
2012 without Blessing Property (Case 2) <i>With Improvement Option</i> <sup>4</sup>				
Westbound Connector Road – Left	N/A	N/A	A (9.1)	A (9.0)
Northbound Chapel Farm Entrance	N/A	N/A	C (20.7)	C (22.7)
2012 with Blessing Property (Case 3)				
Westbound Connector Road – Left	A (9.7)	A (9.4)	A (9.7)	A (9.4)
Northbound Chapel Farm Entrance	F (79.5)	F (55.4)	F (79.5)	F (55.4)
2012 with Blessing Property (Case 3) <i>With Improvement Option</i> <sup>4</sup>				
Westbound Connector Road – Left	N/A	N/A	A (9.7)	A (9.4)
Northbound Chapel Farm Entrance	N/A	N/A	D (27.1)	D (31.8)

<sup>3</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>4</sup> The Improvement Option includes a separate left-turn lane on the northbound approach.

Table 5  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>5</sup> Two-Way Stop Control (T Intersection)	LOS per TIS		LOS per McCormick Taylor <sup>6</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Connector Road &amp; Western Delaware Route 1 Service Road</b>				
2012 without Blessing Property (Case 2) <sup>7</sup>				
Eastbound Connector Road	F (131.9)	F (55.9)	F (116.4)	F (50.6)
2012 without Blessing Property (Case 2) With updated Little Heaven Interchange configuration <sup>8</sup>				
Eastbound Connector Road	N/A	N/A	F (153.8)	D (25.1)
2012 without Blessing Property (Case 2) With updated Little Heaven Interchange configuration <i>With Improvement-Option</i> <sup>8,9</sup>				
Eastbound Connector Road	N/A	N/A	C (21.9)	B (14.6)
2012 with Blessing Property (Case 3) <sup>7</sup>				
Eastbound Connector Road	F (190.5)	F (81.3)	F (169.7)	F (72.2)
2012 with Blessing Property (Case 3) With updated Little Heaven Interchange configuration <sup>8</sup>				
Eastbound Connector Road	N/A	N/A	F (234.2)	E (36.0)
2012 with Blessing Property (Case 3) With updated Little Heaven Interchange configuration <i>With Improvement Option</i> <sup>8,9</sup>				
Eastbound Connector Road	N/A	N/A	D (28.4)	C (15.7)

<sup>5</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>6</sup> McCormick Taylor applied PHF 0.92 or higher for the future cases while the TIS applied 0.88 or higher.

<sup>7</sup> The future lane configuration was assumed one left-turn lane and one right-turn lane on the eastbound approach and one through lane and one right-turn lane on the southbound approach.

<sup>8</sup> The future lane configuration was assumed one shared left/right lane on the eastbound approach and one through and one right-turn lane on the southbound approach.

<sup>9</sup> The Improvement Option includes a separate right-turn lane on the eastbound approach.

Table 5 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Signalized Intersection <sup>10</sup>	LOS per TIS		LOS per McCormick Taylor <sup>11</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Connector Road &amp; Western Delaware Route 1 Service Road</b>				
2012 without Blessing Property (Case 2) <sup>12</sup>	N/A	N/A	C (0.76)	B (0.72)
2012 with Blessing Property (Case 3) <sup>12</sup>	C (0.91)	B (0.85)	C (0.81)	C (0.74)

<sup>10</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>11</sup> McCormick Taylor applied PHF 0.92 or higher for the future cases while the TIS applied 0.88 or higher

<sup>12</sup> The future lane configuration was assumed one left-turn lane and one right-turn lane on the eastbound approach and one through lane and one right-turn lane on the southbound approach.

Table 6  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>13</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>14, 15</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road &amp; Buffalo Road / Strayley Property Entrance</b>				
2004 Existing (Case 1)				
Eastbound Barratts Chapel Road – Left	A (7.3)	A (7.5)	A (7.3)	A (7.5)
Westbound Barratts Chapel Road – Left	A (7.5)	A (7.3)	A (7.4)	A (7.3)
Northbound Private Driveway	A (9.6)	A (9.7)	A (9.6)	A (9.7)
Southbound Buffalo Road	A (8.8)	A (9.0)	A (8.8)	A (9.0)
2012 without Blessing Property (Case 2)				
Eastbound Barratts Chapel Road – Left	A (7.8)	A (8.4)	A (7.8)	A (8.3)
Westbound Barratts Chapel Road – Left	A (8.1)	A (8.1)	A (8.0)	A (8.0)
Northbound Strayley Property Entrance	C (18.1)	D (25.5)	C (17.8)	D (25.2)
Southbound Buffalo Road	C (16.7)	D (26.4)	C (17.9)	E (40.4)
2012 with Blessing Property (Case 3)				
Eastbound Barratts Chapel Road – Left	A (8.0)	A (8.8)	A (8.0)	A (8.8)
Westbound Barratts Chapel Road – Left	A (8.4)	A (8.3)	A (8.4)	A (8.3)
Northbound Strayley Property Entrance	D (30.7)	F (73.4)	D (30.0)	F (68.2)
Southbound Buffalo Road	C (23.6)	E (48.9)	D (27.4)	F (157.2)

Signalized Intersection <sup>13</sup>	LOS per TIS		LOS per McCormick Taylor <sup>14</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road &amp; Buffalo Road / Strayley Property Entrance</b>				
2012 without Blessing Property (Case 2)	N/A	N/A	C (0.51)	C (0.59)
2012 with Blessing Property (Case 3)	N/A	N/A	C (0.68)	C (0.74)

<sup>13</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>14</sup> McCormick Taylor applied 2% truck percentage on all the approaches while the TIS applied 5%.

<sup>15</sup> McCormick Taylor did not apply the flared approach on the southbound approach while the TIS applied it.

Table 6  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Roundabout Intersection <sup>16</sup>	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road &amp; Buffalo Road / Strayley Property Entrance</b>				
2012 without Blessing Property (Case 2)				
Eastbound Barratts Chapel Road	N/A	N/A	A (9.2)	B (10.0)
Westbound Barratts Chapel Road	N/A	N/A	A (9.1)	A (9.2)
Northbound Strayley Property Entrance	N/A	N/A	A (8.3)	A (7.7)
Southbound Buffalo Road	N/A	N/A	B (11.7)	B (12.4)
2012 with Blessing Property (Case 3)				
Eastbound Barratts Chapel Road	N/A	N/A	A (9.5)	B (10.2)
Westbound Barratts Chapel Road	N/A	N/A	A (9.4)	A (9.4)
Northbound Strayley Property Entrance	N/A	N/A	A (9.7)	A (8.4)
Southbound Buffalo Road	N/A	N/A	B (11.6)	B (14.0)

<sup>16</sup> McCormick Taylor analyzed the roundabout using aaSIDRA. The numbers in parentheses following levels of service are average delay per vehicle, measured in seconds, calculated with the aaSIDRA model. The analysis assumed an environment factor of 1.2.

Table 7  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>17</sup> Two-Way Stop Control (T Intersection)	LOS per TIS		LOS per McCormick Taylor <sup>18</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Buffalo Road / Proposed Delaware Route 1 Southbound Ramps &amp; US Route 113A</b>				
2004 Existing (Case 1)				
Eastbound Buffalo Road	B (12.9)	B (12.1)	B (12.9)	B (12.1)
Northbound US Route 113A – Left	A (8.0)	A (8.2)	A (8.0)	A (8.2)
2012 without Blessing Property (Case 2)				
Eastbound Buffalo Road	F (433.3)	F (691.0)	F (394.1)	F (630.1)
Northbound US Route 113A – Left	A (9.3)	B (12.2)	A (9.3)	B (12.1)
2012 with Blessing Property (Case 3)				
Eastbound Buffalo Road	F (638.4)	F (1169)	F (590.5)	F (1024)
Northbound US Route 113A – Left	A (9.4)	B (13.1)	A (9.4)	B (12.9)

<sup>17</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>18</sup> McCormick Taylor applied PHF 0.92 or higher for all turning movements for the future cases while the TIS applied the minimum of 0.92 for through movements on the northbound and southbound approaches and 0.88 for the other movements.

Table 7 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Signalized Intersection <sup>19</sup>	LOS per TIS		LOS per McCormick Taylor <sup>20</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Buffalo Road / Proposed Delaware Route 1 Southbound Ramps &amp; US Route 113A</b>				
2012 without Blessing Property (Case 2) <sup>21</sup>	N/A	N/A	B (0.65)	B (0.71)
2012 without Blessing Property (Case 2) With updated Little Heaven Interchange configuration <sup>22, 23</sup>	N/A	N/A	D (0.65)	D (0.84)
2012 with Blessing Property (Case 3) <sup>21</sup>	B (0.75)	B (0.76)	B (0.68)	B (0.73)
2012 with Blessing Property (Case 3) With updated Little Heaven Interchange configuration <sup>22, 23</sup>	N/A	N/A	D (0.69)	D (0.85)

<sup>19</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>20</sup> McCormick Taylor applied PHF 0.92 or higher for all turning movements for the future cases while the TIS applied the minimum of 0.92 for through movements on the northbound and southbound approaches and 0.88 for the other movements.

<sup>21</sup> The lane configuration on the northbound approach was assumed one left-turn lane and one through lane converted from the existing one through lane with one bypass lane.

<sup>22</sup> Delaware Route 1 southbound off-ramp and on-ramp will be connected to this intersection as forming the fourth leg according to the updated concept plan for the Little Heaven Interchange Project.

<sup>23</sup> The future lane configuration was assumed one shared left/through lane and right-turn lane on the eastbound approach, one left-turn lane, one shared left/through lane, and one right-turn lane on the westbound approach, one left-turn lane, one through lane, and one through/right lane on the northbound approach, and two left-turn lanes and one shared through/right lane on the southbound approach.

Table 8  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>24</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>25</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road / Plymouth Road &amp; Delaware Route 15</b>				
2004 Existing (Case 1)				
Eastbound Plymouth Road	C (17.1)	C (20.7)	C (17.1)	C (20.7)
Westbound Barratts Chapel Road	C (15.7)	B (14.6)	C (15.7)	B (14.6)
Northbound Delaware Route 15 – Left	A (7.8)	A (8.4)	A (7.8)	A (8.4)
Southbound Delaware Route 15 – Left	A (8.6)	A (8.2)	A (8.6)	A (8.2)
2012 without Blessing Property (Case 2)				
Eastbound Plymouth Road	C (24.0)	E (45.5)	C (22.9)	E (39.4)
Westbound Barratts Chapel Road	D (32.9)	E (42.7)	D (28.7)	E (44.2)
Northbound Delaware Route 15 – Left	A (8.0)	A (8.7)	A (8.0)	A (8.7)
Southbound Delaware Route 15 – Left	A (8.9)	A (8.9)	A (8.9)	A (8.8)
2012 with Blessing Property (Case 3)				
Eastbound Plymouth Road	D (25.8)	F (53.5)	C (24.5)	F (52.3)
Westbound Barratts Chapel Road	E (44.1)	F (74.7)	E (36.9)	F (66.0)
Northbound Delaware Route 15 – Left	A (8.0)	A (8.7)	A (8.0)	A (8.7)
Southbound Delaware Route 15 – Left	A (9.0)	A (9.0)	A (8.9)	A (9.0)

Signalized Intersection <sup>24</sup>	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road / Plymouth Road &amp; Delaware Route 15</b>				
2012 without Blessing Property (Case 2)	N/A	N/A	B (0.53)	B (0.72)
2012 with Blessing Property (Case 3)	N/A	N/A	B (0.56)	B (0.77)

<sup>24</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>25</sup> McCormick Taylor applied PHF 0.92 or higher for the future cases while the TIS applied 0.88 or higher.

Table 9  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>26</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>27</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road &amp; Fox Chase Road</b>				
2004 Existing (Case 1)				
Eastbound Barratts Chapel Road – Left	A (7.5)	A (7.5)	A (7.5)	A (7.5)
Westbound Barratts Chapel Road – Left	A (7.4)	A (7.4)	A (7.4)	A (7.4)
Northbound Fox Chase Road	B (11.2)	B (10.5)	B (11.2)	B (10.5)
Southbound Fox Chase Road	B (10.9)	B (10.6)	B (10.9)	B (10.6)
2012 without Blessing Property (Case 2)				
Eastbound Barratts Chapel Road – Left	A (7.9)	A (7.8)	A (7.9)	A (7.8)
Westbound Barratts Chapel Road – Left	A (7.5)	A (7.7)	A (7.4)	A (7.7)
Northbound Fox Chase Road	B (13.5)	B (12.7)	B (13.1)	B (12.5)
Southbound Fox Chase Road	B (13.8)	B (14.8)	B (13.4)	B (14.3)
2012 with Blessing Property (Case 3)				
Eastbound Barratts Chapel Road – Left	A (8.0)	A (7.9)	A (8.0)	A (7.9)
Westbound Barratts Chapel Road – Left	A (7.5)	A (7.8)	A (7.5)	A (7.8)
Northbound Fox Chase Road	B (14.3)	B (13.5)	B (13.8)	B (13.2)
Southbound Fox Chase Road	B (14.8)	C (16.7)	B (14.3)	C (16.0)

<sup>26</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>27</sup> McCormick Taylor applied PHF 0.92 or higher for the future cases while the TIS applied 0.88 or higher.

Table 10  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>28</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>29</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Barratts Chapel Road &amp; McGinnis Pond Road</b>				
2004 Existing (Case 1)				
Eastbound Barratts Chapel Road – Left	A (7.5)	A (7.5)	A (7.5)	A (7.5)
Westbound Barratts Chapel Road – Left	A (7.5)	A (7.4)	A (7.5)	A (7.4)
Northbound McGinnis Pond Road	B (10.5)	B (10.6)	B (10.5)	B (10.6)
Southbound McGinnis Pond Road	B (10.8)	B (10.6)	B (10.8)	B (10.6)
2012 without Blessing Property (Case 2)				
Eastbound Barratts Chapel Road – Left	A (8.0)	A (7.9)	A (8.0)	A (7.9)
Westbound Barratts Chapel Road – Left	A (7.6)	A (7.8)	A (7.6)	A (7.8)
Northbound McGinnis Pond Road	B (12.6)	B (14.6)	B (12.3)	B (14.2)
Southbound McGinnis Pond Road	B (14.4)	C (17.3)	B (13.9)	C (16.4)
2012 with Blessing Property (Case 3)				
Eastbound Barratts Chapel Road – Left	A (8.2)	A (8.0)	A (8.1)	A (8.0)
Westbound Barratts Chapel Road – Left	A (7.6)	A (7.9)	A (7.6)	A (7.9)
Northbound McGinnis Pond Road	B (13.4)	C (16.1)	B (13.0)	C (15.5)
Southbound McGinnis Pond Road	C (15.7)	C (20.7)	C (15.1)	C (19.3)

<sup>28</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>29</sup> McCormick Taylor applied PHF 0.92 or higher for the future cases while the TIS applied 0.88 or higher.

Table 11  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Signalized Intersection <sup>30</sup>	LOS per TIS <sup>31</sup>		LOS per McCormick Taylor <sup>32, 33</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Western Delaware Route 1 Service Road &amp; Bowers Beach Road / Proposed Skeeter Neck Land Company Entrance</b>				
2012 without Blessing Property (Case 2)	C (0.63)	F (1.01)	C (0.67)	F (1.05)
2012 without Blessing Property (Case 2) <i>With Improvement Option</i> <sup>34</sup>	N/A	N/A	C (0.54)	D (0.79)
2012 without Blessing Property (Case 2) With updated Little Heaven Interchange configuration	N/A	N/A	C (0.54)	D (0.72)
2012 with Blessing Property (Case 3)	C (0.68)	F (1.11)	C (0.69)	F (1.12)
2012 with Blessing Property (Case 3) <i>With Improvement Option</i> <sup>34</sup>	D (0.85)	D (0.80)	C (0.54)	D (0.85)
2012 with Blessing Property (Case 3) With updated Little Heaven Interchange configuration	N/A	N/A	C (0.54)	D (0.83)

<sup>30</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>31</sup> The TIS had incorrect volumes in the future cases. McCormick Taylor used correct volumes.

<sup>32</sup> McCormick Taylor assumed 0.92 PHF on the eastbound approach while the TIS assumed 0.88 on this approach.

<sup>33</sup> McCormick Taylor used protect/permissive lefts on the northbound and the southbound approaches and used split phase on the eastbound and the westbound approach.

<sup>34</sup> The Improvement Option includes converting the southbound right-turn lane to through/right-turn lane and having the second receiving on the southbound.

Table 12  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Signalized Intersection <sup>35</sup>	LOS per TIS <sup>36</sup>		LOS per McCormick Taylor <sup>37, 38</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Eastern Delaware Route 1 Service Road &amp; Bowers Beach Road</b>				
2012 without Blessing Property (Case 2)	D (0.84)	D (0.90) <sup>39</sup>	D (0.71)	D (0.90)
2012 with Blessing Property (Case 3)	D (0.86)	D (0.93) <sup>39</sup>	D (0.76)	D (0.95)

<sup>35</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>36</sup> The TIS assumed the future lane configuration as one left-turn lane and one shared through/right lane on the eastbound approach, one shared left/through and one right-turn lane on the westbound approach, one left-turn lane, one through lane, and one right-turn lane on the northbound approach, and one shared left/through lane and one right-turn lane on the southbound approach.

<sup>37</sup> McCormick Taylor assumed 2% truck on the westbound approach while the TIS assumed 5% on this approach.

<sup>38</sup> McCormick Taylor assumed different future lane configuration based on the updated concept plan for the Little Heaven Interchange Project. McCormick Taylor assumed two left-turn lanes and on shared through/right lane on the eastbound approach, one left-turn lane, one through lane, and one right-turn lane on the westbound approach, one left-turn lane, one through lane, and one right-turn lane on the northbound approach, and one left-turn lane and one shared through/right lane on the southbound approach.

<sup>39</sup> The TIS had incorrect volumes for the northbound left-turn movement in the future cases. McCormick Taylor used correct volumes for this turning movement.

Table 13  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>40</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>41</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>US Route 113A &amp; Mulberrie Point Road / High Point Trailer Park Entrance</b>				
2012 without Blessing Property (Case 2)				
Eastbound High Point Trailer Park Entrance	N/A	N/A	F (128.2)	F (827.5)
Westbound Mulberrie Road	N/A	N/A	D (30.6)	F (1345)
Northbound US 113A – Left	N/A	N/A	A (9.1)	B (10.3)
Southbound US 113A – Left	N/A	N/A	A (9.8)	B (10.1)
2012 with Blessing Property (Case 3)				
Eastbound High Point Trailer Park Entrance	N/A	N/A	F (134.4)	F (969.3)
Westbound Mulberrie Road	N/A	N/A	D (30.3)	F (1357)
Northbound US 113A – Left	N/A	N/A	A (9.1)	B (10.3)
Southbound US 113A – Left	N/A	N/A	A (9.8)	B (10.1)

Signalized Intersection <sup>40</sup>	LOS per TIS		LOS per McCormick Taylor <sup>41</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>US Route 113A &amp; Mulberrie Point Road / High Point Trailer Park Entrance</b>				
2012 without Blessing Property (Case 2)	N/A	N/A	B (0.64)	C (0.83)
2012 with Blessing Property (Case 3)	N/A	N/A	B (0.65)	C (0.85)

<sup>40</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>41</sup> McCormick Taylor applied PHF 0.88 or higher to Mulberrie Road and High Point Trailer Park Entrance and 0.92 or higher to US Route 113A in the future cases.

Table 14  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>42</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>43</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 &amp; Mulberrie Point Road</b>				
2012 without Blessing Property (Case 2)				
Eastbound Mulberrie Point Road	N/A	N/A	F (1886)	F (1169)
Westbound Mulberrie Point Road	N/A	N/A	F (375.6)	F (324.2)
Northbound Route 1 – Left	N/A	N/A	B (11.2)	D (32.5)
Southbound Route 1 – Left	N/A	N/A	D (30.5)	C (15.4)
2012 without Blessing Property (Case 2) <i>With Improvement Option</i> <sup>44</sup>				
Eastbound Mulberrie Point Road	N/A	N/A	C (15.6)	E (44.0)
Westbound Mulberrie Point Road	N/A	N/A	F (66.6)	C (19.5)
Northbound Route 1 – Left	N/A	N/A	B (11.4)	D (33.3)
Southbound Route 1 – Left	N/A	N/A	D (33.6)	C (16.0)
2012 with Blessing Property (Case 3)				
Eastbound Mulberrie Point Road	N/A	N/A	F (2461)	F (1309)
Westbound Mulberrie Point Road	N/A	N/A	F (429.8)	F (391.6)
Northbound Route 1 – Left	N/A	N/A	B (11.4)	D (34.5)
Southbound Route 1 – Left	N/A	N/A	D (32.1)	C (15.8)
2012 with Blessing Property (Case 3) <i>With Improvement Option</i> <sup>44</sup>				
Eastbound Mulberrie Point Road	N/A	N/A	C (15.7)	E (46.6)
Westbound Mulberrie Point Road	N/A	N/A	F (72.8)	C (20.2)
Northbound Route 1 – Left	N/A	N/A	B (11.6)	E (35.5)
Southbound Route 1 – Left	N/A	N/A	E (35.5)	C (16.5)

<sup>42</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>43</sup> McCormick Taylor applied PHF 0.88 or higher to Mulberrie Road and 0.92 or higher to Delaware Route 1 in the future cases.

<sup>44</sup> The improvement option includes installing raised islands to limit traffic from the eastbound and westbound approaches to right-turns only. The through and left-turn volumes are diverted to surrounding intersections.

Table 14 - Continued  
PEAK HOUR LEVELS OF SERVICE (LOS)  
*based on Traffic Impact Study for Blessing Property*  
*Report dated May 30, 2006*  
Prepared by The Traffic Group

Unsignalized Intersection <sup>45</sup>	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 &amp; First Crossover North of Mulberrie Point Road</b>				
2012 without Blessing Property (Case 2) <i>Right-Turns Only from Mulberrie Point Road at Delaware Route 1</i>				
Northbound Delaware Route 1 – U-Turn	N/A	N/A	B (11.5)	E (39.1)
2012 with Blessing Property (Case 3) <i>Right-Turns Only from Mulberrie Point Road at Delaware Route 1</i>				
Northbound Delaware Route 1 – U-Turn	N/A	N/A	B (11.6)	E (42.3)

<sup>45</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 15  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Signalized Intersection <sup>46</sup>	LOS per TIS		LOS per McCormick Taylor <sup>47</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 &amp; US Route 113A / Skeeter Neck Road (North)</b>				
2012 without Blessing Property (Case 2)	N/A	N/A	C (0.90)	F (1.31)
2012 without Blessing Property (Case 2) <i>With Improvement Option</i> <sup>48</sup>	N/A	N/A	C (0.52)	C (0.88)
2012 with Blessing Property (Case 3)	N/A	N/A	C (0.90)	F (1.33)
2012 with Blessing Property (Case 3) <i>With Improvement Option</i> <sup>48</sup>	N/A	N/A	C (0.52)	C (0.89)

Ramp Junction <sup>49</sup>	LOS per TIS		LOS per McCormick Taylor <sup>47</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 Southbound &amp; US Route 113A Southbound</b>				
2012 without Blessing Property (Case 2)	N/A	N/A	B (17.0)	D (30.8)
2012 with Blessing Property (Case 3)	N/A	N/A	B (17.2)	D (31.2)

<sup>46</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>47</sup> McCormick Taylor applied PHF 0.92 or higher to Delaware Route 1 and US Route 113A approaches in the future cases.

<sup>48</sup> The improvement option includes one additional left-turn lane on the northbound approach and one additional through lane (3 total through lanes) on the southbound Delaware Route 1 approach.

<sup>49</sup> For ramp junction analyses, the numbers in parentheses following levels of service is the density of the merge influence area measured in passenger cars per minute per lane.

Table 15 - Continued  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>50</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>51</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 &amp; US Route 113A / Skeeter Neck Road (North)</b>				
2012 without Blessing Property (Case 2)				
Westbound Skeeter Neck Road	N/A	N/A	D (27.6)	B (14.7)
Southbound Delaware Route 1 – Left	N/A	N/A	D (30.0)	B (14.9)
2012 without Blessing Property (Case 2) <i>Right-Turns Only from Mulberrie Point Road at Delaware Route 1</i>				
Westbound Skeeter Neck Road	N/A	N/A	D (27.6)	B (14.7)
Southbound Delaware Route 1 – Left	N/A	N/A	F (98.6)	C (17.0)
2012 with Blessing Property (Case 3)				
Westbound Skeeter Neck Road	N/A	N/A	D (29.0)	C (15.0)
Southbound Delaware Route 1 – Left	N/A	N/A	D (31.7)	C (15.3)
2012 with Blessing Property (Case 3) <i>Right-Turns Only from Mulberrie Point Road at Delaware Route 1</i>				
Westbound Skeeter Neck Road	N/A	N/A	D (29.0)	C (15.0)
Southbound Delaware Route 1 – Left	N/A	N/A	F (115.3)	C (17.6)

<sup>50</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>51</sup> McCormick Taylor applied PHF 0.88 or higher to Skeeter Neck Road and 0.92 or higher to Delaware Route 1 in the future cases.

Table 16  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Signalized Intersection <sup>52</sup>	LOS per TIS		LOS per McCormick Taylor <sup>53</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 &amp; Bowers Beach Road / Proposed Skeeter Neck Land Company Entrance</b>				
2004 Existing (Case 1)	N/A	N/A	B (0.80)	A (0.77)
2012 without Blessing Property (Case 2) <sup>54</sup>	N/A	N/A	F (1.26)	F (1.39)
2012 without Blessing Property (Case 2) With Improvement Option <sup>55</sup>	N/A	N/A	C (0.90)	D (0.91)
2012 with Blessing Property (Case 3) <sup>54</sup>	N/A	N/A	F (1.28)	F (1.41)
2012 with Blessing Property (Case 3) With Improvement Option <sup>55</sup>	N/A	N/A	C (0.91)	D (0.92)

<sup>52</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>53</sup> McCormick Taylor applied PHF 0.88 or higher to Bowers Beach Road and Proposed Skeeter Neck Land Company Entrance and 0.92 or higher to Delaware Route 1 in the future cases.

<sup>54</sup> Geometry for both these cases includes one left-turn lane, two through lanes and one right-turn lane for both northbound and southbound Delaware Route 1; and one left-turn lane, one through lane and one right turn lane for both eastbound Proposed Skeeter Neck Land Company Entrance and westbound Bowers Beach Road.

<sup>55</sup> The Improvement Option includes one additional left-turn lane and one additional through lane (3 total through lanes) on the northbound Delaware Route 1, one additional through lane (3 total through lanes) on the southbound Delaware Route 1 approach, and realigning the eastbound Proposed Skeeter Neck Land Company Entrance and the westbound Bowers Beach Road approaches to include: one left-turn lane, one shared left/through lane, and one right-turn lane.

Table 17  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>56</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>57</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 &amp; Skeeter Neck Road (South)</b>				
2012 without Blessing Property (Case 2)				
Westbound Skeeter Neck Road	N/A	N/A	F (196.4)	F (71.3)
Southbound Delaware Route 1 – Left	N/A	N/A	E (43.3)	C (24.9)
2012 without Blessing Property (Case 2) <i>With Improvement Option</i> <sup>58</sup>				
Westbound Skeeter Neck Road	N/A	N/A	E (49.2)	D (26.4)
Southbound Delaware Route 1 – Left	N/A	N/A	E (43.3)	C (24.9)
2012 with Blessing Property (Case 3)				
Westbound Skeeter Neck Road	N/A	N/A	F (234.9)	F (75.2)
Southbound Delaware Route 1 – Left	N/A	N/A	E (45.9)	D (25.7)
2012 with Blessing Property (Case 3) <i>With Improvement Option</i> <sup>58</sup>				
Westbound Skeeter Neck Road	N/A	N/A	F (52.1)	D (27.2)
Southbound Delaware Route 1 – Left	N/A	N/A	F (45.9)	D (25.7)

<sup>56</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>57</sup> McCormick Taylor applied PHF 0.88 or higher to Skeeter Neck Road and 0.92 or higher to Delaware Route 1 in the future cases.

<sup>58</sup> The improvement option includes installing a raised island to limit traffic from the westbound approach to right-turns only. The through and left-turn volumes are diverted to surrounding intersections.

Table 18  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>59</sup> Two-Way Stop Control	LOS per TIS		LOS per McCormick Taylor <sup>60</sup>	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 &amp; Barratts Chapel Road / Private Driveway</b>				
2004 Existing (Case 1)				
Eastbound Barratts Chapel Road	N/A	N/A	F (124.4)	F (*)
Westbound Private Driveway	N/A	N/A	F (74.2)	F (*)
Northbound Delaware Route 1 – Left	N/A	N/A	B (13.3)	D (32.8)
Southbound Delaware Route 1 – Left	N/A	N/A	C (19.8)	B (14.0)
2012 without Blessing Property (Case 2)				
Eastbound Barratts Chapel Road	N/A	N/A	F (*)	F (*)
Westbound Private Driveway	N/A	N/A	F (*)	F (*)
Northbound Delaware Route 1 – Left	N/A	N/A	D (28.7)	F (1396)
Southbound Delaware Route 1 – Left	N/A	N/A	D (32.7)	C (21.5)
2012 without Blessing Property (Case 2) <i>With Improvement Option</i> <sup>61</sup>				
Eastbound Barratts Chapel Road	N/A	N/A	F (930.4)	F (1676)
Westbound Private Driveway	N/A	N/A	F (44.6)	D (26.2)
Northbound Delaware Route 1 – Left	N/A	N/A	D (28.7)	F (1396)
Southbound Delaware Route 1 – Left	N/A	N/A	E (45.4)	D (25.7)
2012 with Blessing Property (Case 3)				
Eastbound Barratts Chapel Road	N/A	N/A	F (*)	F (*)
Westbound Private Driveway	N/A	N/A	F (*)	F (*)
Northbound Delaware Route 1 – Left	N/A	N/A	D (31.6)	F (1692)
Southbound Delaware Route 1 – Left	N/A	N/A	D (32.7)	C (21.5)
2012 with Blessing Property (Case 3) <i>With Improvement Option</i> <sup>61</sup>				
Eastbound Barratts Chapel Road	N/A	N/A	F (1152)	F (2051)
Westbound Private Driveway	N/A	N/A	F (46.8)	D (26.8)
Northbound Delaware Route 1 – Left	N/A	N/A	D (31.6)	F (1692)
Southbound Delaware Route 1 – Left	N/A	N/A	E (47.9)	D (26.6)

<sup>59</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>60</sup> McCormick Taylor applied PHF 0.88 or higher to Barratts Chapel Road and Private Driveway and 0.92 or higher to Delaware Route 1 in the future cases.

<sup>61</sup> The improvement option includes installing raised islands to limit traffic from the eastbound and westbound approaches to right-turns only. The through and left-turn volumes are diverted to surrounding intersections.

Table 18 - Continued  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Blessing Property  
Report dated May 30, 2006  
Prepared by The Traffic Group

Unsignalized Intersection <sup>62</sup>	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Delaware Route 1 &amp; First Crossover South of Barratts Chapel Road</b>				
2012 without Blessing Property (Case 2) <i>Right-Turns Only from Barratts Chapel Road at Delaware Route 1</i>				
Northbound Delaware Route 1 – U-Turn	N/A	N/A	C (21.7)	F (51.8)
Southbound Delaware Route 1 – U-Turn	N/A	N/A	F (1199)	F (287.6)
2012 with Blessing Property (Case 3) <i>Right-Turns Only from Barratts Chapel Road at Delaware Route 1</i>				
Northbound Delaware Route 1 – U-Turn	N/A	N/A	C (22.6)	F (53.0)
Southbound Delaware Route 1 – U-Turn	N/A	N/A	F (1515)	F (445.4)

<sup>62</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.