



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

September 13, 2005

Mr. Mark Davidson
Design Consultants Group, LLC
18072 Davidson Drive
Milton, De 19968

RE: PLUS review – PLUS 2005-08-03; Lankford Jones

Dear Mr. Davidson:

Thank you for meeting with State agency planners on August 24, 2005 to discuss the proposed plans for the Lankford Jones project to be located on the northeast corner of Delaware Route 54 and Old Mill Bridge Road.

According to the information received, you are seeking a rezoning from AR-1 to HR-1 and C-1 for 100 residential units on 17.95 acres located in the Environmentally Sensitive Developing Area.

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 Sussex 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 proposal is located in an Investment Level 3 area according to the Strategies for State Policies and Spending and in the Environmentally Sensitive Developing Area according to the Sussex County Comprehensive Plan. Investment Level 3 areas generally indicate long-term growth areas or growth areas with environmental constraints on or around the site. State policies in these areas support planned growth that is consistent with the local comprehensive plan and is sensitive to natural resources.
- The proposed HR-1 zoning is not consistent with the certified Sussex County Comprehensive Plan.

Street Design and Transportation

- Internal sidewalks and adequate accommodations for bicycles should be provided in the proposed [Lankford Jones] development.
- A pedestrian connection to the neighboring Swann subdivision is suggested. A 5-foot bicycle lane should be included throughout the internal roadways as required of all new developments in the area to accommodate bicycle traffic.
- Right-of-way dedication will be required along the frontage of Old Mill Bridge Road.

Natural and Cultural Resources

- Impacts to wetlands should be avoided and vegetated buffers of no less than 100 feet should be employed from all wetlands and water bodies. Lots should exclude all wetlands and associated buffers.
- Although small impacts are anticipated for the forest, the developer should avoid removing any of the trees on site particularly because this parcel is within the environmentally sensitive developing area.
- Portions of the property are located within the 100-year floodplain. It is recommended that development be kept outside the 100-year floodplain.
- The proposed project area contains potential habitat for Delmarva fox squirrels, a federally endangered species protected by the Endangered Species Act. Requirements for addressing this are included in the “Rare Species” section of the letter.

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

Office of State Planning Coordination – Contact: Ann Marie Townshend 739-3090

This proposal is located in an Investment Level 3 area according to the Strategies for State Policies and Spending and in the Environmentally Sensitive Developing Area according to the Sussex County Comprehensive Plan. Investment Level 3 areas generally indicate long-term growth areas or growth areas with environmental constraints on or around the site. State policies in these areas support planned growth that is consistent with the local comprehensive plan and is sensitive to natural resources.

The Office of State Planning Coordination concurs with statements made by DeIDOT and Sussex County that the proposed HR-1 zoning is not consistent with the Sussex County Comprehensive Plan. Table 12 on page 25 of the plan includes a listing of applicable zoning categories for areas within the plan. The Environmentally Sensitive Developing Area is shown as low to medium density, and HR-1 is not listed in the applicable zoning districts.

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

The Lankford Jones Project area has the potential to impact archeological resources and therefore, the Division of Historical and Cultural Affairs recommends the property owner/developer invest in a cultural resource study of the project area before proceeding. This area has been inhabited for many centuries and burials, both marked and unmarked, are protected by Delaware law. Please refer to the following sections of the Delaware State Code: (1) Title 11 Sub-Chapter 1340, titled “Desecration of Burial Places”; and (2) Title 7 Chapter 54, known as the “Delaware Unmarked Human Remains Act”. For more information about these laws and the implications for the project, contact Craig Lukesic of this office at 302-736-7400. The Division provides a list of qualified consultants on our web site at <http://www.state.de.us/shpo/PDF/Consultants.pdf>.

Department of Transportation – Contact: Bill Brockenbrough 760-2109

- 1) On March 3, 2005, DeIDOT wrote to Sussex County regarding the results of a traffic analysis that they had accepted in lieu of a more detailed traffic impact study. Their letter served primarily to transmit a February 28, 2005, letter report to DeIDOT from their consultant, McCormick Taylor. A copy of that letter report is enclosed. Some significant points from that document follow:
 - a) The proposed development is not consistent with the Sussex County Comprehensive Plan. The proposed development has 120 [now 100] condominiums being built on 17.94 acres of land, over 6 [now 5] dwelling units per acre of land. This parcel of land is designated as “low to medium density” in the Sussex County Comprehensive Plan, which is noted to include densities of 1 to 3 dwelling units per acre.

- b) The site entrance should be a right-in/right-out unsignalized intersection. A median treatment within the site driveway should be provided to physically prohibit the left turns and through movements. A westbound right turn lane on Route 54 into the site should be provided. A minimum of a five-foot shoulder should be maintained through the right-turn lane.
- c) Internal sidewalks and adequate accommodations for bicycles should be provided in the proposed [Lankford Jones] development.
- d) A pedestrian connection to the neighboring Swann subdivision is suggested. A 5-foot bicycle lane should be included throughout the internal roadways as required of all new developments in the area to accommodate bicycle traffic.

DelDOT has since modified their position regarding the site entrance in that they will permit left turns into the site from Route 54. Work being done on Route 54 by the developer of Bayside will provide a raised median to a point near the Lankford Jones property line. DelDOT anticipates requiring PGS Properties to extend the median east past the proposed site entrance to control access there.

- 2) Also mentioned in the February 28, 2005, letter is a DelDOT project to improve Route 54 from Old Mill Bridge Road to Keenwick Road (Sussex Road 58C). This project would include a two-way center left-turn lane. It is in final design and was then expected to be complete by 2008. Due to the present budget difficulties, its construction has been postponed indefinitely.
- 3) Old Mill Bridge Road is classified as a local road and Route 54 is classified as a major collector road. Local roads in Delaware typically have right-of-way widths ranging from 33 to 50 feet. Collector road rights-of-way also vary but are generally wider. DelDOT's policy is to require dedication of sufficient land to provide a minimum right-of-way width of 30 feet from the centerline on local roads and 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.
- 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. Preliminarily, paths should be provided on both roads.
- 5) The proposed cross-access easement and the proposed roadway associated with it will require further review but two areas are inconsistent with DelDOT's discussions with the developer thus far. One is the proposed access on Route 54, discussed further in Comment 1) above. The other is that the connection to the Swann property (now Swann Cove) to the east is not in a useful place. The

- adjacent land there has already been approved for development, and perhaps developed, in a way that does not permit continuation of the easement as shown. Instead, an easement should be provided for a connection between the proposed townhouses and West Fenwick Boulevard, the collector street in Swann Cove.
- 6) At the west end of the easement just mentioned is a parcel marked as a "Future Possible Road Connection to Old Mill Bridge Road Under Discussion." This land is owned by Sussex County and is used for a sewage pumping station. DelDOT understands that the County's Engineering Office finds the relocation of facilities and equipment, necessary to build the connection as shown, undesirable. However, if the subject development occurs as proposed, this connection will be important to traffic operations in the area. It is recommended that the County work with the developer to find a way for them to build the connection out to Old Mill Bridge Road. They are willing to meet with both parties as necessary to help make that happen. Meanwhile, DelDOT recommends that the County not approve a plan for this project until this issue has been resolved.
 - 7) DelDOT also recommends that the plan be modified to provide the Sharon Martino and Linda Adams Property (Tax Parcel 5-33-12.00-76.03) with a connection to the cross-access easement mentioned above, such that its Route 54 access can be eliminated if it is ever redeveloped.
 - 8) An aspect of the site access that DelDOT did not mention at the PLUS meeting, but should have, is that access to the pad sites on either side of the Route 54 access should be from the portion roadway that parallels Route 54, not from the portion that connects to Route 54. This requirement is provide for an unimpeded flow of traffic entering the site from Route 54.
 - 9) The developer's site engineer should continue to coordinate with the Subdivision Manager for Sussex County, Mr. John Fiori, regarding the DelDOT requirements for access. Mr. Fiori may be reached at (302) 760-2260.

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

Soils

According to the soil survey update, Hammonton, Klej, Asckecksy, Hurlock, and Mullica were mapped on the subject parcel. Hammonton is a moderately well-drained soil of low-lying uplands that has moderate limitations for development. Klej is a somewhat poorly-drained transitional soil that is likely to contain both wetland and upland soil components. Asckecksy and Hurlock are poorly-drained wetland associated hydric soils that have severe limitations for development. Mullica is a very poorly-drained wetland associated hydric soil that has very severe limitations for development. Most of the soils (over 50%) on this parcel are mapped as hydric.

Wetlands

Statewide Wetland Mapping Project (SWMP) maps indicate the presence of palustrine forested wetlands. PLUS application materials indicate that wetlands have been delineated. This delineation should be verified Corps of Engineers through the Jurisdictional Determination process.

Impacts to wetlands should be avoided and vegetated buffers of no less than 100 feet should be employed from all wetlands and water bodies. Lots should exclude all wetlands and associated buffers. 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.

Impacts to Palustrine wetlands are regulated by the Army Corps of Engineers through Section 404 of the Clean Water Act. 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) 739-4691 to schedule a meeting.

ERES Waters

This project is located adjacent to receiving waters of Little Assawoman Bay designated as waters having Exceptional Recreational or Ecological Significance (ERES). ERES waters are recognized as special assets of the State, and shall be protected and/ or restored, to the maximum extent practicable, to their natural condition. Provisions in Section 11.5 of Delaware's "Surface Water Quality Standards" (as amended August 11, 1999), specify that all designated ERES waters and receiving tributaries develop a "pollution control strategy" to reduce non-point sources of nutrient runoff through implementation of Best Management Practices (BMPs). Best Management Practices as defined in subsection 11.5(e) of this section, expressly authorizes the Department to provide standards for controlling the addition of pollutants and reducing them to the greatest degree practicable, or where attainable, a standard requiring no discharge of pollutants.

Impervious Cover

Since residential development significantly increases the amount of impervious cover - leading to large volumes of contaminant-laden runoff which ultimately drain into streams or waterways - the applicant is strongly urged to pursue both natural and constructed Best Management Practices (BMPs) to reduce such impacts. Reducing the amount of impervious surfaces by planting more trees and/or the use of pervious paving surfaces (“pavers”) in lieu of asphalt or concrete, are examples of ways to reduce such impacts. Research has consistently shown that once a watershed exceeds a threshold of 10 percent imperviousness, water and habitat quality irreversibly decline.

TMDLs

Total Maximum Daily Loads (TMDLs) for nitrogen and phosphorus have been promulgated through regulation for the Little Assawoman Bay subwatershed. 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. This project is located in the low reduction area requiring a 40 percent reduction in both nitrogen and phosphorus.

A nutrient budget was conducted on the proposed project using the Nutrient Load Assessment Protocol developed by the Watershed Assessment. The DC Group conceptually designed an environmentally sensitive subdivision that will meet the Total Maximum Daily Load nutrient reductions for nitrogen and phosphorus. The only concern that Watershed Assessment has with the project is the high impervious cover at 48%. Research has consistently shown that once a watershed exceeds a threshold of 10 percent imperviousness, water and habitat quality irreversibly decline. Reducing the amount of impervious surfaces by planting more trees and/or the use of pervious paving surfaces (“pavers”) in lieu of asphalt or concrete are examples of ways to reduce such impacts. However, the project still preserves 88% of the existing forest and does not significantly impact the freshwater wetlands.

Water Supply

The project information sheets state water will be provided to the project by Artesian Water Company via a central water system. DNREC 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 00-CPCN-07.

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.

Sediment and Erosion Control/Stormwater Management

A detailed sediment and stormwater plan will be required prior to any land disturbing activity taking place on the site. The plan review and approval as well as construction inspection will be coordinated through **Sussex Conservation District**. Contact Jessica Watson at (302) 856-7219 for details regarding submittal requirements and fees.

As of April 11, 2005, stormwater best management practices must also consider water quality as well as quantity in impaired water bodies.

Drainage

The Drainage Section requests all existing ditches on the property be checked for function and cleaned if needed prior to the construction of homes. Wetland permits may be required before cleaning ditches.

The Drainage Section requests that all precautions be taken 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 Section strongly recommends any drainage conveyance between two parcels within a subdivision be dedicated as a drainage easement and such easement be designated as passive open space, not owned by individual landowners. The easement should be of sufficient width to allow for future drainage maintenance as described below.

- Along an open ditch or swale, the Drainage Section recommends a maintenance equipment zone of 25 feet measured from the top of bank on the maintenance side, and a 10-foot setback zone measured from top of bank on the non-maintenance side. These zones should be maintained as buffers to aid in the reduction of sediment and nutrients entering into the drainage conveyance. Grasses, forbs and sedges planted within these zones should be native species, selected for their height, ease of maintenance, erosion control, and nutrient uptake

capabilities. Trees and shrubs planted within the maintenance zone should be native species spaced to allow for drainage maintenance at maturity. Trees should not be planted within 5 feet of the top of ditch to avoid future blockages from roots.

- Along a stormwater pipe the Drainage Section recommends a maintenance equipment zone of 15 feet on each side of the pipe as measured from the pipe centerline. This zone should be maintained as buffers to aid in the reduction of sediment and nutrients entering into the drainage conveyance. Grasses, forbs and sedges planted within these zones should be native species selected for their height, ease of maintenance, erosion control, and nutrient uptake capabilities. Trees and shrubs planted within the maintenance zone should be spaced to allow for drainage maintenance at maturity.

The Drainage Section recommends any drainage/utility easement owned by an individual landowner should not have structures, decks, buildings, sheds, kennels, fences or trees within the drainage easement to allow for future drainage maintenance.

Floodplains

Portions of the property are located within the 100-year floodplain. It is recommended that development be kept outside the 100-year floodplain. Mandatory flood insurance purchase requirements will apply to any buildings which are located in the floodplain.

Forests

Although small impacts are anticipated for the forest, the developer should avoid removing any of the trees on site particularly because this parcel is within the environmentally sensitive developing area. Fragmenting the edge of the forest opens the habitat for invasive species, such as multiflora rose or honeysuckle, which can quickly invade the forest and make it undesirable for some wildlife. Therefore, 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 forested areas. The forested areas on-site should be viewed as a community asset and managed appropriately.

Forested areas on-site set aside for conservation purposes should be placed into a permanent conservation easement or other binding protection. These areas should be clearly marked and delineated so that residents understand their importance and so that homeowner activities do not infringe upon these areas.

That said, the Department commends the developer and DCC Group for preserving 88% of the forest on the parcel.

Open Space

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 preserve and expand the existing 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.

In areas set aside for passive open space, the developer is encouraged to consider establishment of additional forested areas or meadow-type grasses rather than planting turf grass. 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.

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

The proposed project lies within three miles of a known Delmarva fox squirrel (*Sciurus niger cinereus*) population at the Assawoman Wildlife Area. Delmarva fox squirrels were listed as federally endangered in 1967 and are protected by the Endangered Species Act. They generally inhabit mature forests with open understories and wet woodlands, but can be opportunistic in their habitat choice. The proposed project area contains potential habitat for Delmarva fox squirrels and the following is required prior to beginning work:

1. Completely avoid all direct and indirect impacts to the habitat, in consultation with the U.S. Fish and Wildlife Service (Trevor Clark , 410-573-4527) and Delaware Division of Fish and Wildlife, Nongame and Endangered Species Program (Holly Niederriter, 302-653-2880);

OR

2. Have surveys conducted to determine if Delmarva fox squirrels are present. In accordance with Delaware's fox squirrel site survey procedures, surveys must be conducted by a State approved fox squirrel surveyor two times between September and May: once in the fall, and again between March 15 and May 30. A list of qualified surveyors is available upon request. Please note that surveys may confirm the presence of fox squirrels but cannot confirm absence.

Recreation

DNREC recommends that sidewalks be built fronting at least one side of residential streets and stub streets. A complete system of sidewalks will: 1) fulfill the recreation need for walking and biking facilities, 2) provide opportunities for neighbors to interact in the community, and 3) facilitate safe, convenient off-road access to neighboring communities, parks, public mass transit stops, schools, stores, work, etc.

The Division of Parks and Recreation conducted a telephone survey of Delaware residents to gather information on outdoor recreation patterns and preferences as well as other information on their landscape perception. These findings are the foundation of the 2003-2008 Statewide Comprehensive Outdoor Recreation Plan (SCORP) providing guidance for investments in needed outdoor recreation facilities. The high facility needs in Eastern Sussex County are Walking and Jogging, Bike Paths and Fishing Areas. The moderate facility needs are Picnic Areas, Skate Facilities, Canoe/Kayak Access, Hiking Trails, Swimming Pools, Playgrounds, Soccer Fields, Tennis Courts, Power Boat Access and Baseball/Softball Fields. Consideration should be given to incorporate some of these recreation opportunities into the project. For additional information about the outdoor recreation priorities, contact Bob Ehemann at 739-9235.

Underground Storage Tanks

There is one inactive LUST site(s) located near the proposed project:

Sussex County Pump Station # 30, Facility # 5-000433, Project # S9211261

No environmental impact is expected from the above inactive/active LUST site(s). However, should any underground storage tank or petroleum contaminated soil be discovered during construction, the Tank Management Branch must be notified as soon as possible. It is not anticipated that any construction specifications would be need to be changed due to petroleum contamination. However, should any unanticipated contamination be encountered and PVC pipe is being utilized, it will need to be changed to ductile steel in the contaminated areas.

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 7.7 tons (15,349.0 pounds) per year of VOC (volatile organic compounds), 6.4 tons (12,707.9 pounds) per year of NO_x (nitrogen oxides), 4.7 tons (9,376.1 pounds) per year of SO₂ (sulfur dioxide), 0.4 ton (834.6 pounds) per year of fine particulates and 642.0 tons (1,283,920.7 pounds) per year of CO₂ (carbon dioxide).

Emissions from area sources associated with this project are estimated to be 3.1 tons (6,190.9 pounds) per year of VOC (volatile organic compounds), 0.3 ton (681.2 pounds) per year of NO_x (nitrogen oxides), 0.3 ton (565.3 pounds) per year of SO₂ (sulfur dioxide), 0.4 ton (729.5 pounds) per year of fine particulates and 12.5 tons (25,096.7 pounds) per year of CO₂ (carbon dioxide).

Emissions from electrical power generation associated with this project are estimated to be 1.2 tons (2,453.6 pounds) per year of NO_x (nitrogen oxides), 4.3 tons (8,534.4 pounds) per year of SO₂ (sulfur dioxide) and 629.4 tons (1,258,824.0 pounds) per year of CO₂ (carbon dioxide).

	VOC	NO _x	SO ₂	PM _{2.5}	CO ₂
Mobile	7.7	6.4	4.7	0.4	642.0
Residential	3.1	0.3	0.3	0.4	12.5
Electrical Power		1.2	4.3		629.4
TOTAL	10.8	7.9	9.3	0.8	1283.9

For this project the electrical usage via electric power plant generation alone totaled to produce an additional 1.2 tons of nitrogen oxides per year and 4.3 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. We highly recommend this project development and other residential proposals increase the energy efficiency of their homes.

DNREC also recommends 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 and links to mass transport system, and fund a lawnmower exchange program for their new occupants.

State Fire Marshal’s Office – Contact: Duane Fox 856-5298

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:**
 - All structures over 10,000 Sq. Ft. aggregate will require automatic sprinkler protection installed.
 - Buildings greater than 10,000 sq.ft., 3-stories or more or over 35 feet, or classified as High Hazard, are required to meet fire lane marking requirements.

- Show Fire Department Connection location (Must be within 300 feet of fire hydrant), and detail as shown in the DSFPR.
- Show Fire Lanes and Sign Detail as shown in DSFPR
- 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**

- All premises which the fire department may be called upon to protect in case of fire, and which are not readily accessible from public roads, shall be provided with suitable gates and access roads, and fire lanes so that all buildings on the premises are accessible to fire apparatus. This means that the access road to the subdivision from Lighthouse Road 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 is 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, technical services link, plan review, applications or brochures.

Department of Agriculture - Contact: Milton Melendez 698-4500

Neither the Delaware Department of Agriculture nor the Delaware Forest Service opposes the Lankford Jones application. The site is located on a designated controlled development area. The *Strategies for State Policies and Spending* encourages responsible development in areas within an Investment Level 3 area. The Delaware Department of Agriculture and the Delaware Forest Service supports an environmentally sensitive design, as well as the preservation of the unique historical features of this site. In addition, the Delaware Forest Service would ask the Developer to consider the following recommendations when developing this parcel to lessen impact to the water resources adjacent to this site.

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 minimum 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.

Department of Education – Contact: Nick Vacirca 739-4658

The total number of units will determine the estimated number of additional students for the Indian River School District. Sussex County does not have school concurrence legislation at this time. It is recommended that the developer submit a package to the school district for informational purposes.

If the development is approved and built, please use the following information for school transportation planning. If there are homes more than 1/2 mile from the nearest public road (outside the development), developers should plan wide enough streets so that large school buses can access and turn around (without backing) from the furthest areas within the development while picking up and dropping off students. Should there not be any sites more than 1/2 mile from the nearest public road, provisions for appropriate pick-up and drop-off at the development entrance should be included. The developer should work closely with the school district transportation supervisor.

Sussex County - Contact: Richard Kautz 855-7878

The current Sussex County Comprehensive Plan does not anticipate HR-1 Zoning in the Environmentally Sensitive Developing Area.

The proposed project is within the Fenwick Island Sanitary Sewer District Boundary. The total EDU allocation as stated in the South Coastal Area Planning Study, Update 2004 is 73.45 EDUs. This is based on the current zoning of AR-1. Recent upgrades at Pump Station 30 are complete. Increased allocation was not provided for during the upgrades. See the attached letter from Mr. Russell W. Archut, Assistant County Engineer to Mr. Randy B. Duplechain, P.E. dated July 27, 2005.

The Swann Cove Development will provide the connection point for parcel 76.00. There is currently no service to the other parcels in the project. The Sussex County Engineer will identify the connection point for the other parcels.

A sanitary sewer concept plan must be submitted and approved prior to any construction plan review. Also, please note system connection charges will be due prior to receiving any building permits. The Sussex County Engineering Department has not agreed to the proposed future possible connection road to Old Mill Bridge Road.

For questions regarding these comments, contact Chris Calio, Sussex County Engineering Department at (302) 855-7839.

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: Sussex County

February 8, 2005

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. 15 – Route 54 Synchro Analysis for the Route 54 (Jones/Lankford)
Property**

Dear Mr. Sammons,

McCormick Taylor has completed its review of the Route 54 Synchro Analysis for the Jones/Lankford Property prepared by Davis, Bowen & Friedel, Inc. (DBF) dated March 2004. This review was assigned to us as Task Number 15. As agreed to by DelDOT, this analysis was submitted in lieu of a Traffic Impact Study.

The analysis evaluated the traffic impacts of the Jones/Lankford Property, consisting of 120 townhouses, 2 fast-food restaurants with drive-thru windows and 1 high turnover sit-down restaurant, to the progression on Delaware Route 54 in Sussex County, Delaware. Access to the development would be provided from Route 54 and through the Swann Property onto Old Mill Bridge Road (Sussex Road 381). The Route 54 access will align with existing Bluewater Run. The Route 54 site entrance was analyzed as both an “English T” style signalized intersection and a right-in/right-out unsignalized intersection. Analysis to determine the affects of the construction of this development on the progression on Route 54 was performed during 2025 to be consistent with the Traffic Signal Location study performed by Whitman Requardt and Associates in November 2002. This signal location study had determined the ideal locations of signalized intersections along Route 54 to promote progression along the corridor. This study did not recommend a signal at the intersection of Bluewater Run.

DelDOT is currently working on a project with the developers of the Bayside Property at the intersection of Route 20 and Route 54 to realign the intersection, add additional lanes to the existing legs and add a northbound leg. A DelDOT project to widen Route 54 between Old Mill Bridge Road and Keenwick Road (Sussex Road 58C) to include a two-way center left-turn lane is in final design and is expected to complete by 2008.

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

Using the same methodology used in the November 2002 Traffic Signal Location Study, as well as considering the time-space diagrams which take into account the flow along the corridor, McCormick Taylor determined that a signal installed at the Jones/Lankford entrance on Route 54

will inhibit progression on Route 54, and therefore a signal is not recommended. The proposed development is not consistent with the Sussex County Comprehensive Plan. The proposed development has 120 condominiums being built on 17.94 acres of land, over 6 dwelling units per acre of land. This parcel of land is designated as “low to medium density” in the Sussex County Comprehensive Plan, which is noted to include densities of 1 to 3 dwelling units per acre.

Should the County choose to approve the project, the following items should be incorporated into the site design and reflected on the record plan:

1. The site entrance should be a right-in/right-out unsignalized intersection. A median treatment within the site driveway should be provided to physically prohibit the left turns and through movements. A westbound right turn lane on Route 54 into the site should be provided. A minimum of a five-foot shoulder should be maintained through the right-turn lane.
2. The developer should dedicate/reserve the land within 40 feet of the Route 54 roadway centerline, in accordance with DelDOT’s *Rules and Regulations for Subdivision Streets*. This will accommodate DelDOT’s planned improvements to Route 54, including widening to accommodate the two-way center-turn lane, buffer, and sidewalk.
3. Internal sidewalks and adequate accommodations for bicycles should be provided in the proposed Jones/Lankford development.
4. A pedestrian connection to the neighboring Swann subdivision is suggested.
5. A 5-foot bicycle lane should be included throughout the internal roadways as required of all new developments in the area to accommodate bicycle traffic.

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

Sincerely,
McCormick Taylor, Inc.

Mark Luszcz, P.E., PTOE, AICP
Associate

Enclosures

General Information

Report date: March 2004

Prepared by: Davis, Bowen & Friedel, Inc.

Prepared for: PGS Properties, LLC

Tax Parcels: 5-33-12.00-75.00, 5-33-12.00-76.04 and 5-33-12.00-76.05

Generally consistent with DelDOT's Rules and Regulations for Subdivision Streets: No. This report does not follow DelDOT's typical requirements for a Traffic Impact Study. However, DelDOT has agreed to accept this report in lieu of a typical TIS.

Project Description and Background

Description: 120 residential condominiums, 2 fast food restaurants with drive through window (10,000 ft²) and 1 high turnover sit-down restaurant (8,000 ft²)

Location: parcel is located on the northeast corner of Delaware Route 54 and Old Mill Bridge Road (Road 381) across from the Keenwick Sound development and Bluewater Run.

Amount of land to be developed: 17.94 acres

Land use approval(s) needed: General Commercial

Proposed completion date: 2008

Proposed access locations: two points of ingress/egress - one is located on Route 54 across from Bluewater Run and the second is through the Swann Property Development onto Old Mill Bridge 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 proposed location of the Route 54 (Jones/Lankford) Property is located within Investment Level 3 and an Environmentally Sensitive Area.

Description of Investment Level:

Investment Level 3

These areas are portions of the county designated for growth, development districts, or long-term annexation. In Sussex County, these areas normally reflect environmentally sensitive areas not served by water or sewer infrastructure. 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. 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: The Route 54 (Jones/Lankford) Development is in the northeast corner of Route 54 and Old Mill Bridge Road, east of the intersection of Route 54 and Route 20. This area is adjacent to the fast growing area of the Delaware Beaches on Fenwick Island (Investment Level 1). Roadway improvements are not encouraged in this area and as such this study is focused on determining the expected effects of the development on the progression the major roadway, Route 54. The development must occur so that additional improvements on Route 54 are not required, and that progression on Route 54 is maintained. Therefore, with an unsignalized site entrance, it is concluded that the Jones/Lankford development generally adheres to the policies stated in the 2004 update of the Livable Delaware "Strategies for State Policies and Spending."

Comprehensive Plans

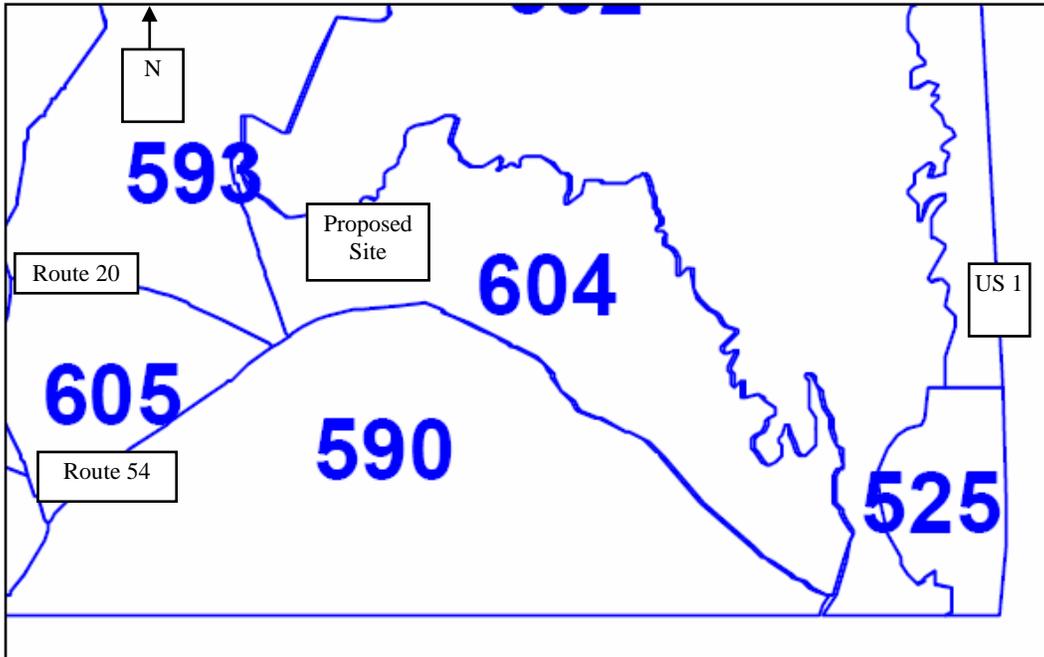
The proposed development is located within Sussex County boundaries.

Sussex County Comprehensive Plan: (*Source: Sussex County Comprehensive Plan Development Update, January 1, 2003*) this plan indicates that the proposed development is located in an area designated as an environmentally sensitive area of "low to medium density" (1-3 dwelling units/acre) future land use. In addition, the location of the proposed development is located near Selbyville an "area of concern". According to the Public Wastewater Systems Map from the Sussex County Comprehensive Plan, the proposed development is located within an "existing wastewater district".

Proposed Development's Compatibility with Comprehensive Plans: The proposed development is not consistent with the Sussex Comprehensive plan as the dwelling unit/acre ratio will be approximately $120 \text{ condominiums} / 17.94 \text{ acres} = 6.69$, not within the designation of "low to medium density" future land use (1-3 dwelling units/acre).

Transportation Analysis Zones (TAZ) where development would be located: 604 (Peninsula Code designation)

TAZ Boundaries:



Current employment estimate for TAZs: 522 jobs in 2000.

Future employment estimate for TAZs: 828 jobs in 2025.

Current population estimate for TAZs: 1130 in 2000.

Future population estimate for TAZs: 1474 in 2025.

Current household estimate for TAZs: 605 in 2000.

Future household estimate for TAZs: 701 in 2025.

Relevant committed developments in the TAZs: Swann Property and the Refuge at Dirickson.

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 (2004-2009)

DelDOT is currently working on a project with the developers of the Americana Bayside Property at the intersection of Route 20 and Route 54 to realign the intersection, add additional lanes to the existing legs and add a northbound leg. A DelDOT project to widen Route 54 between Old Mill Bridge Road and Keenwick Road for a two-way center-turn lane is in final design and is expected to complete by 2008.

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). Where applicable, internal trip capture and pass-by trip procedures were based on the *ITE Trip Generation Handbook*. Land Use Code 230 (Residential

Condominiums), Land Use Code 934 (Fast Food Restaurant with Drive-Through) and Land Use Code 932 (High Turnover Sit-Down Restaurant) were utilized in the Synchro Analysis to estimate the amount of new traffic generated by the development.

**Table 1. Trip Generation:
120 Residential Condominiums (ITE land use code 230)**

Saturday, Peak Hour of Generator			
T=0.29*(X)+42.63			
% Entering: 54		% Exiting: 46	
Dwelling Units	Trip Ends	Entering	Exiting
120	77	42	35
Internal Capture	32	13	19
Net Ext. Trips	45	29	16

**Table 2. Trip Generation:
10,000 ft² Fast Food Restaurant w/Drive-Through (Land Use Code - 934)**

Saturday, Peak Hour of Generator			
T=59.2*(X)			
% Entering: 51		% Exiting: 49	
SF GFA	Trip Ends	Entering	Exiting
10,000	592	302	290
Internal Capture	25	14	11
Net Ext. Trips	567	288	279
Pass-by: 49%	278	141	137
Primary: 51%	289	147	142

**Table 3. Trip Generation:
8,000 ft² High-Turnover (Sit-Down) Restaurant (Land Use Code - 932)**

Saturday, Peak Hour of Generator			
T=20.00*(X)			
% Entering: 63		% Exiting: 37	
SF GFA	Trip Ends	Entering	Exiting
8,000	160	101	59
Internal Capture	7	5	2
Net Ext. Trips	153	96	57
Pass-by: 43%	66	41	25
Primary: 57%	87	55	32

Table 4. Total Trip Generation

	Trip Ends	Entering	Exiting
Total Trips	829	445	384
Internal Capture	64	32	32
Net Ext. Trips	765	413	352
Pass-by:	344	182	162
Primary:	421	231	190

Overview of Synchro Analysis

Intersections examined for Progression Analysis:

- 29 intersections (11 signalized and 18 unsignalized) along Route 54

Conditions examined:

- 1) 2025 Base Conditions
- 2) 2025 Build with Unsignalized Site Entrance
- 3) 2025 Build with Signalized Site Entrance

Peak hour evaluated: Saturday peak hour

Committed developments considered: The volumes used in this study were taken from the Route 54 Traffic Signal Location Study performed by Whitman Requardt and Associates, which assumed that the following developments would be constructed by the design year of 2025.

- Bayside (1,700 houses of various types, golf course, commercial units)
- Refuge at Dirickson (350 single-family detached houses)
- Swann Property (350 single-family detached houses and a shopping center)
- Bayview Acres (180 single-family detached houses)

It is important to note that since that study there is updated information on those developments, namely, that they will not be as big as initially projected. For example, the Bayside development has reduced in the number of units. However, for the purpose of determining if adding a signal at the site entrance will disrupt the progression along Route 54, it was assumed that the volumes used by Whitman Requardt and Associates would be used for the base volumes in this analysis. The assumption was made that other developments, not considered at the time of the initial study, would be constructed to account for the difference in volume that might exist by the year 2025.

Site Entrance Intersection Descriptions

Route 54 & Bluewater Run

2025 Base Scenario

Type of Control: stop-controlled T-intersection.

Northbound approach: (Bluewater Run) stop controlled shared northbound left and right turn lane.

Eastbound approach: (Route 54) separate right turn lane and through lane.

Westbound approach: (Route 54) separate left turn lane and through lane.

Route 54 & Bluewater Run / Jones/Lankford

2025 Unsignalized Scenario

Type of Control: two-way stop-controlled intersection with right-in/right-out movements permitted.

Northbound approach: (Bluewater Run) stop controlled right turn lane.

Southbound approach: (Jones/Lankford) stop controlled channelized right turn lane.

Eastbound approach: (Route 54) separate channelized right turn lane and through lane.

Westbound approach: (Route 54) separate channelized right turn lane and through lane.

2025 Signalized Scenario

Type of Control: English T style signalized intersection where SB lefts and NB movements occur at one location and where EB lefts and SB rights occur separately at another intersection nearby. (See diagram)

Northbound approach: separate left and right turn lanes. Through movement prohibited.

Southbound approach: separate left and right turn lanes.

Eastbound approach: (Route 54) separate left turn lane and through lane.

Westbound approach: (Route 54) separate right turn and through lane.

Figure 1. English T Intersection Configuration



Route 54 & Route 20:

Type of Control: signalized intersection.

Northbound approach: (Route 20) separate left-turn lane, two through lanes and a channelized right-turn lane.

Southbound approach: (Route 20) separate dual left-turn lanes, two through lanes and a channelized right-turn lane.

Eastbound approach: (Route 54) separate left-turn lane, two through lanes and a channelized right-turn lane.

Westbound approach: (Route 54) separate left-turn lane, two through lanes and a channelized right-turn lane.

Route 54 & Old Mill Bridge Road:

Type of Control: stop controlled T-intersection.

Southbound approach: (Old Mill Bridge Road) stop controlled separate southbound right turn lane.

Eastbound approach: (Route 54) separate left-turn lane, one through lane

Westbound approach: (Route 54) separate channelized right-turn lane and through lane.

Route 54 & Swann Property:

Type of Control: signalized T-intersection.

Southbound approach: (Swann Property) separate southbound left-turn lane and right-turn lane.

Eastbound approach: (Route 54) separate left-turn lane and through lane.

Westbound approach: (Route 54) separate right-turn lane and through lane.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Currently, Delaware Transit Corporation (DTC) does not provide local bus transit service along Route 54. DTC, does, however, maintain a bus route along Route 1 on Saturdays during the summer months with seven round trips per day provided.

Planned transit service: As part of the second phase of the Sussex County Expansion Proposals, the DTC plans to provide a North-South connection between Route 54 and the Millsboro/Dagsboro area either via Route 20 or US 113.

Existing bicycle and pedestrian facilities: The *Kent and Sussex Counties Bicycling Map* designates Route 54 as having average cycling conditions. Route 54 is designated as a low traffic volume roadway. There are currently no sidewalks within the vicinity of the proposed development and limited shoulders available for bicyclist use.

Planned bicycle and pedestrian facilities: Anthony Aglio, DelDOT's Assistant Bicycle and Pedestrian Planner was contacted regarding planned bicycle and pedestrian facilities in the area of the proposed development. In order to remain consistent with Sussex County objectives, the following is recommended as development occurs:

- Sidewalks should eventually be in place along the entire frontage of the Jones/Lankford development with a three-foot buffer between the road and the sidewalk. Because there are no existing sidewalks near the site frontage on Route 54, and sidewalks will be added as part of the Route 54 Project by DelDOT, the developer should not install the sidewalks, but instead reserve the area required to accommodate sidewalks.
- Internal sidewalks and adequate accommodations for bicycles should be provided in the proposed Jones/Lankford development.
- A pedestrian connection to the neighboring Swann subdivision is suggested.
- A 5-foot bicycle lane should be added along the frontage of the development on Route 54 and throughout the internal roadways as required of all new developments in the area to accommodate bicycle traffic.

The developer suggested that if a signal were installed, that a diagonal crosswalk should be included to provide access for pedestrians. After talking to DelDOT's Assistant Bicycle and Pedestrian Planner, it was determined that a diagonal crosswalk would not be encouraged or approved. A diagonal crosswalk would require a diagonal ramp, which are discouraged in Delaware because they are not safe for mobility and visually impaired pedestrians who use the edge of the ramp to determine the placement of the sidewalk. Ramps are recommended to be perpendicular to traffic in the same direction as the crosswalk to provide consistent expectations for all pedestrians. Additionally, diagonal crosswalks require a greater crossing time and risk leaving pedestrians stranded in the middle of the road when the light changes.

Previous Comments

All comments from DelDOT's preliminary TIS review letter were addressed in this submission. The following comments have been updated with more recent comments as a result of McCormick Taylor's Synchro Analysis.

Southbound Left Exiting the Site

DelDOT expressed concern about the extensive queues seen on the southbound left turn movement. DBF subsequently reduced the size of the development in order to mitigate this and reduce the queuing on this approach (resulting 95th percentile queue is 288 feet with a LOS E for this movement). McCormick Taylor's Synchro Analysis was revised to have a similar cycle length (120 seconds) with the surrounding intersections; and included a more appropriate phase timing to improve the operation and reduce the queue length.

Site Traffic Impacts for Traffic Operations at Other Intersections on Route 54

The site traffic in the Synchro Analysis performed by DBF was distributed in the signalized scenario, but not in the unsignalized scenario. The site traffic for the analysis performed by McCormick Taylor was distributed through the rest of the intersections on Route 54 in both the unsignalized and signalized cases. Additionally, signals at Route 54 & Sand Cove Road, Route 54 & Swann Property and Route 54 & Lincoln Drive were added to the Synchro network in all scenarios as these signals were recommended by the Signal Location Study and approved by DelDOT. It should be noted that the intersection of Route 54 & Lincoln Drive is in the field today.

McCormick Taylor distributed the site traffic throughout the entire network for the signalized scenario based on the original DBF Synchro analysis distribution. For the unsignalized scenario, additional distribution is necessary as the left turns are prohibited at the Route 54 site entrance. The eastbound Route 54 left turns were redistributed between the eastbound left turn at the Route 20 signal and an eastbound U-turn movement at the Swann Property signal. The left turn vehicles exiting the site were redistributed between the access roadway through the Swann development (to become southbound left turns at the Route 20 signal) and a westbound U-turn movement at the Route 20 signal. The northbound left turn and the westbound left turn at Bluewater Run were redistributed similarly.

Synchro Analysis Comments

General

- 1) The original Synchro Analysis performed by DBF used Synchro Version 5; McCormick Taylor used Synchro Version 6. The new version allows for curvature in the road and channelization for right turns, which was adjusted for this analysis. Additionally, Version 6 does a better job of accounting for queuing delays.
- 2) DelDOT as part of the Traffic Signal Location Study approved signals at Route 54 & Sand Cove Road, Route 54 & Swann Property and Route 54 & Lincoln Drive. The intersection of Route 54 & Lincoln Drive exists in the field today according to our field study. These intersections did not have signals in the DBF analysis until the signalized scenario. In the analysis performed by McCormick Taylor, the signals were present in all scenarios.
- 3) McCormick Taylor used a minimum heavy vehicle percentage of two percent per DelDOT's standard study methodology.
- 4) Signal cycle lengths and timings were developed based on DelDOT signal plans.
- 5) A 120 second cycle length was used for all intersection along Route 54, except for the intersection at Route 1, to be consistent with DelDOT's traffic signal plans.
- 6) Coordinated signal were offset to the beginning of yellow instead of the beginning of green, to conform to DelDOT's preferences.
- 7) Offsets were adjusted as necessary to account for changes when the new development is added to the network.
- 8) Minor calibration was done at certain locations as needed to more accurately model how the vehicles would act during the simulation. For example, channelized right turns were added, a short left turn bay was added if there was ample room for a vehicle to pass around the turning vehicle, lane utilization at the dual left turn lane on Route 20 and extending turn lanes past the previous intersection.

Route 20 & Route 54

- 9) Our analysis included dual SB left-turn lanes on Route 20. These may not be installed in the original construction, but space is allowed to easily add the second left-turn lane in the future. This is consistent with the assumptions of the 2002 Signal Location Study. The signal timing was optimized at this intersection, since the signal is going to be improved and new signal plans have not been developed yet.

Old Mill Bridge Road & Route 54

10) No additional comments.

West Site Entrance & Route 54

11) No additional comments.

East Site Entrance/Bluewater Run & Route 54

- 12) The eastbound right turn lane in the original Synchro Analysis was 300 feet, but the link length is only 294 feet causing awkward merging in the simulation. A separate right turn lane that extends to the next node in the base condition and to the next intersection in the unsignalized and signalized conditions were added to correct for this.
- 13) The signal phasing was corrected to include an exclusive phase for the northbound right turning vehicles.
- 14) The phases were adjusted so that each phase had at least 6 seconds of green time.
- 15) The clearance phase in DBF's analysis was deleted due to a distance between the intersections that allows for queuing and the desire to promote progression along the corridor.

Route 54 & Swann Properties

16) No additional comments.

The following tables summarize the LOS results for the two site entrances and the nearby intersections on Route 54.

Table 5. Signalized HCM Intersection Results
PEAK HOUR LEVELS OF SERVICE (LOS)
based on McCormick Taylor's Synchro Analysis

Unsignalized 2025 Scenario	X Critical Value	LOS	Delay (sec/veh)
Route 54 and Route 20	0.79	C	32.7
Route 54 and Swann Property	1.11	F	53.2

Table 6. Unsignalized HCM Intersection Results
PEAK HOUR LEVELS OF SERVICE (LOS)
based on McCormick Taylor's Synchro Analysis

Route 54 and Old Mill Bridge Road	LOS	Delay (sec/veh)
Southbound Old Mill Bridge Road Right	E	46.9

Table 7. Unsignalized HCM Intersection Results
PEAK HOUR LEVELS OF SERVICE (LOS)
based on McCormick Taylor’s Synchro Analysis

Jones/Lankford East and Bluewater Run and Route 54	LOS	Delay (sec/veh)
Northbound Bluewater Run Right	F	72.6
Southbound Jones/Lankford Right	F	496.6

Progression Analysis

McCormick Taylor utilized the same methodology from the November 2002 Traffic Signal Location Study to determine the effects of the proposed signal on the Route 54 progression. Five runs of SimTraffic were completed for both the unsignalized and signalized options for the Jones/Lankford Route 54 site access. For the side roads, the cumulative delay per vehicle and the total hours of delay were used as performance rankings. For the Route 54 through movement, the performance rankings were delay per vehicle and stops per vehicle. In addition, for the entire network (29 intersections), the total hours of delay were compared. The Route 54 through movement rankings carried twice the weight due to the importance of maintaining progression along Route 54. The unsignalized results have a higher score indicating an overall better alternative for the entire network.

The following table shows the results and a higher score indicates more favorable operations for Route 54 through traffic.

Table 8. Progression Analysis Results

Alternatives	Side-Road Performance Rankings			Through-Movement Performance Rankings			Network Performance	Total Score
	Delay per Vehicle	Total Hours of Delay	Total	Delay per Vehicle	Stops per Vehicle	Total x 2	Total Hours of Delay	
Unsignalized	1	2	3	1.5	1.5	6	2	11
Signalized	2	1	3	1.5	1.5	6	1	10

The following figures show the time-space diagrams for the signalized and unsignalized scenario. It is important to note that flow lines with a horizontal section indicate that vehicles are stopping at that intersection and therefore inhibiting progression. In the unsignalized intersection scenario you see vehicles being stopped at the intersection of Route 54 with Route 20 and then progressing through the surrounding intersections. Those in the signalized scenario stop at both the signal at Route 54 and Route 20 and the signal at Route 54 and the site entrance.

Figure 2. Time-Space Diagram for Unsignalized Intersection Scenario.

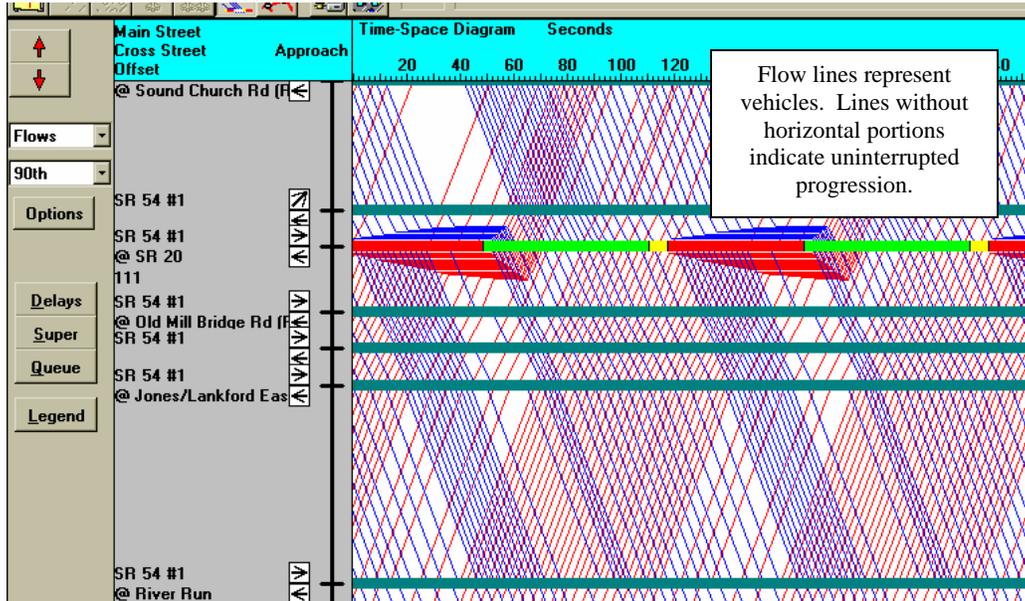


Figure 3. Time-Space Diagram for Signalized Intersection Scenario.

