Blacksburg TOWN OF VIRGINIA

DEPARTMENT OF
ENGINEERING AND GIS

engineeringandgis@blacksburg.gov

MEMORANDUM

TO: Kinsey O'Shea, Town Planner/Current Development

FROM: Shawn Veltman, Town Engineer

DATE: January 10, 2023

SUBJECT: RZN 22-0004-Glade Spring Crossing- 1006 Glade Road- Sanitary Sewer Memo

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This memo addresses the applicant's preliminary concept plans for a conventional gravity sanitary sewer system and non-clog pump station to service the proposed development.

The applicant has submitted a Variance Request to remove the two parcels proposed for development from the "Tom's Creek Basin Unsewered Area" and utilize conventional gravity sewers and a non-clog pump station to service the parcels in the proposed development. While Town Staff support the use of conventional gravity sewers rather than STEP/STEG in this instance (see Variance Request comment letter), we have identified several issues that will need to be addressed with the proposed conventional sewer system plan. These include:

1) **Design Flows** - Because the gravity sanitary sewers that will be utilized by this development are not operating under pressure and thus subject to infiltration and inflow, the design values contained in Section 1.24 the Town of Blacksburg Sanitary Sewer System Standards & Specifications will apply. It appears that the applicant has utilized these standards to develop a peak flow estimate for the project of 247,780 GPD (Page 53 of the Rezoning Application, date of November 30, 2022) , or 172 GPM.

2) **Connection to Town Forcemain** - By virtue of the design of the non-clog pump stations that are required by the Town of Blacksburg Sanitary Sewer System Standards & Specifications Town's standards (Section 2.05), and the design flow reuirement above, the applicants proposed pump station will have a nominal flow capacity in the range of 175-250 GPM. The applicant has proposed to discharge the flow from this pump station into the existing 6" sanitary sewer forcemain serving the Town's Karr Heights Pump Station near the intersection of Glade Road and Oriole Drive. The combined flow must then transit approximately 450 LF of 6" forcemain which crosses over US Route 460 via the Glade Road overpass before discharging to a sanitary sewer manhole on the east side of US 460. Our calculations indicate that the added friction loss generated by the combined flow will reduce the flow from the already limited Karr Heights Pump Station by 20 to 35 gpm (14.3 to 25%) when the two pump stations are operating together, and this is unacceptable. The applicant may consider either replacing the pumps in the Karr Heights Pump Station with new pumps having a higher discharge head and larger drivers, replacing the 450 LF section of common forcemain with a larger diameter pipe, or installing a dedicated parallel forcemain to serve just the applicant's project.

3) **Downstream Sewer Capacity Analysis** - Notwithstanding the issue presented above, the Town's evaluation of the sewers downstream of the proposed connection indicates that they are currently at capacity. Specifically, the 8" sanitary sewer along University City Boulevard operates at a full pipe when both the Sturbridge pump station and the Karr Heights pump station

operate together. To address this issue the applicant may consider replacement of the 8" sewers along University Boulevard with larger diameter pipe, or redirecting the discharge from the Karr Heights forcemain (if utilized), or, alternatively the applicants own forcemain, to the 15" sewer on Old Glade Road (a distance of approximately 1,400 LF). Consideration should also be given to the use of gravity sewers versus a pressure fiorcemain on Old Glade Road.

4) **Power Supply** – Given the site topography, length of forcemain proposed, and the required design pumping rate, the proposed pump station will require relatively large drivers. The application should address the provision of this power, including the possible extension of three phase power to the site.

5) **General Requirements for Town Pump Stations** - The proposed sanitary sewer pump station is shown to be located in the Town's Creek Valley Overlay and Special Flood zone and access will be provided over a trail. Notwithstanding comments on this proposal related to stormwater management, the applicant must insure that the applicable requirements of the Town of Blacksburg Sanitary Sewer System Standards & Specifications (Sections 2.00 through 2.07) and the Virginia Sewage Collection and Treatment Regulations are satisfied including but not limited to:
    a. The applicant will be responsible for the preparation of a Preliminary Engineering Report for the proposed sanitary sewer system in accordance with the requirements of 9VAC25-790-110;
    b. Access to and around the pump station must be sufficient to allow service trucks to enter the site and service the equipment and the trail section serving the site must be designed to accommodate this traffic;
    c. The pump station must be designed to remain fully operational during a 25 year flood event and be protected from physical damage during the 100-year flood, and;
    d. Standby power must be provided.

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MEMORANDUM

TO: Kinsey O'Shea, Development Administrator

FROM: Joshua Middleton, Town Engineer

DATE: January 6, 2023

SUBJECT: Glade Spring Crossing – Transportation Comments

Overview

As indicated by the traffic impact analysis, the proposed development will add a significant amount of vehicular traffic to the existing road network. The trip generation data indicates the total number of vehicle trips generated by the site to be 1734 trips per day, with AM Peak Hour volumes of 127 trips and PM Peak Hour volumes of 173 trips. The bulk of the additional traffic would be directed to Glade Road, which currently operates at approximately 2,000 ADT (average daily traffic). The proposed development traffic represents approximately a 74% increase in traffic volumes. As expected, the additional trips will have varying degrees of impacts on the adjacent road network and intersections.

Traffic Impact Analysis

The analysis was developed in conformance with the recommendations of the Engineering Department, which analyzed the impact at the following seven existing intersections:

- Prices Fork Road / University City Boulevard
- Prices Fork Road / Old Glade Road
- University City Boulevard / Glade Road
- Old Glade Road / Glade Road
- Glade Road / Shadow Lake Road
- Toms Creek Road / Redbud Road
- Toms Creek Road / Honeysuckle Drive

Two (2) day, 12-hour existing traffic counts were obtained at these locations to establish the current volumes and movement distributions.

The analysis applied the trip generation impact of 180 single-family units as determined by the ITE trip generation manual, 11th edition. Eighty-five (85) percent of the site trip generation was distributed to Glade Road, via the proposed connection. The remaining fifteen (15) percent was distributed through the proposed connection to Village Way South.

In order to represent an accurate background traffic volume, it was necessary for the analysis to consider approved but not yet constructed, or occupied, development traffic volumes. Traffic counts were collected in April 2022 and two develops were under construction but not occupied and one development had been approved through the rezoning process. Therefore, the following development traffic volumes were included:

- Berewick – located on Toms Creek Road – 76 single-family units
- Sturbridge / The Union – located on UCB – 1038 beds, off-campus student housing

- The Farm – located on Glade Road – 8 single-family units and 90 beds of off-campus student housing.

The general method utilized for trip distribution and directional splits within the analysis are reasonable given the existing data and nature of the development and surrounding communities. Further, the Synchro traffic modeling files appear to be correct and complete and should reasonably illustrate trip generation impacts for the proposed development. However, necessary revisions have been identified regarding the results as presented in the analysis. The revisions are listed in the Summary of Findings provided by Whitman, Requardt & Associated, LLP, dated 12-20-2022 (see Memorandum).

Turn Lane Warrant Analysis:

A turn lane warrant analysis was included for the proposed site access location on Glade Road. The analysis confirmed that a full right turn lane is warranted. The proposed master plan layout appears to include all necessary provisions to construct the required turn lane.

Intersection Analysis:

A Level of Service Analysis was performed for the seven study intersections identified previously. As currently presented, the traffic impact analysis does not include, or recommend, any mitigation measures at the study intersections. Required revisions are expected to slightly alter the analysis results but are unlikely to change the conclusions and recommendations for most intersections. However, impacts at the Old Glade / Glade Road intersection warrant additional consideration.

At full build-out, the proposed development has a dramatic impact on the northbound left (NBL) movement from Old Glade onto Glade Road. During the PM Peak Hour, the level of delay is expected to increase from 37 seconds to 133 seconds, which represents an increase of over 350%. Additionally, lane queues would be expected to increase to as much as 378-ft which would affect vehicles ability to make the northbound right (NBR) movement from Old Glade onto Glade Road.

A signal warrant analysis was performed for the intersection as part of the analysis; however, a signal was not warranted or recommended. This is likely due to the drastic but relatively brief spike in traffic that occurs during the PM Peak Hour. Alternate solutions should be analyzed, which could include an all-way stop or other appropriate configurations, which would improve vehicle operation and pedestrian safety.

__Note:__ See Memorandum from Whitman, Requardt & Associated, LLP, dated 12-20-2022 (bullets 5), regarding the Old Glade / Glade Road intersection and recommendations.

Recommendations:

- Revise Traffic Impact Analysis per comments provided in the Summary of Findings provided by Whitman, Requardt & Associated, LLP, dated 12-20-2022 (bullets 1, 2 & 3).
- Provide additional engineering study for the intersection of Old Glade Rd at Glade Rd to determine the feasibility and potential impacts related to a change in traffic control.

Whitman, Requardt & Associates, LLP
Engineers · Architects · Environmental Planners Est. 1915

MEMORANDUM

Date: December 20, 2022

To: Joshua Middleton, PE
From: John Holst, PE
Subject: Glade Heights TIA – Second Review
CC: Randy Formica, PE

Work Order Number: 45892-010
Contract Number: P.O Number 330372
Project: Traffic Impact Analysis Review

As requested by the Town of Blacksburg, WRA has performed a review of the revised Traffic Impact Analysis report and related Synchro analysis files for the residential development project known as Glade Heights. This memorandum contains the findings of this review.

SUMMARY OF FINDINGS

Glade Heights Traffic Impact Analysis – November 25, 2022

Comments based on this TIA report review are as follows:

- On Page 2, last paragraph under Existing Traffic Volumes, since no COVID adjustments were performed, the 2022 existing volumes should not be inflated, just balanced as necessary. Please revise wording in the report for clarity.
- On Page 4, the report indicates that results are based on Highway Capacity Manual 6th Edition. However, signalized analysis results presented in Table 2 are based on the Synchro analysis methodology, instead of the HCM. Further, the signalized intersection of Prices Fork Rd at UCB/VT Inn cannot be analyzed using HCM 6th Edition methodology due to the phasing configuration being incompatible with HCM 6th Edition methodology. HCM 2000 analysis results should be presented. Generally, delays are underestimated using Synchro analysis methodologies.
- Signalized analysis results presented in Table 4 for the intersection of University City Blvd at Glade Rd/Starbucks are based on the Synchro analysis methodology, instead of the HCM 6th Edition. HCM 6th Edition analysis results should be presented. Generally, delays are underestimated using Synchro analysis methodologies.
- Analysis results for the intersection of Old Glade Rd at Prices Fork Rd show a significant increase in delays and queues for southbound Old Glade Rd right turns to Prices Fork Rd, particularly in the PM peak hour under proposed Build conditions. However, given the configuration of this intersection and its proximity to the signalized intersection at University City Blvd, we agree with the report findings that additional improvements at this intersection are impractical, and that the adjacent traffic signal will likely provide traffic gaps that will allow the southbound movement to operate with delays lower than those indicated in the analysis results.
- Analysis results for the intersection of Old Glade Rd at Glade Rd show a significant increase in delays and queues for northbound Old Glade Rd left turns to Glade Rd, particularly in the PM peak hour under proposed Build conditions. While a traffic signal is not warranted, converting the intersection to an all-way stop would significantly improve the operation of this movement and increase safety for pedestrians crossing Glade Road. Future traffic volumes appear to meet minimum volume requirements for an all-way stop. It is recommended that an engineering study be conducted for the intersection of Old Glade Rd at Glade Rd to determine the feasibility and potential impacts related to a change in traffic control.
- We concur with the recommendation to provide a right-turn lane into the site from Glade Road.
- We concur with the findings at the other study intersections that no improvements are warranted based on the additional traffic related to the Glade Heights development.

- While the analysis results will be slightly different when utilizing the HCM methodologies based on the previous comments, we do not believe the revised analysis results will materially change the overall study results or recommended improvements.

Glade Heights Synchro Files

Comments based on a review of these files are as follows:

- Revised Synchro analysis files have incorporated all previous comments and appear to be correct and complete.

If there are any questions regarding the findings compiled in this memorandum, please do not hesitate to contact us.

Blacksburg TOWN OF VIRGINIA

DEPARTMENT OF
ENGINEERING AND GIS

engineeringandgis@blacksburg.gov

January 13, 2023

Eden and Associates
Attn: Meredith Jones
1700 Kraft Drive, Suite 2350
Blacksburg, VA 24060

RE: RZN22-0004 Glade Spring Crossing – 1006 Glade Road – Stormwater Concept Plan – Letter of Approval

Dear Ms. Jones:

The Engineering Department has completed the review of the Glade Spring Crossing Stormwater Concept Plan submitted on November 28, 2022. The SWM Concept Plan is **approved** at this time. The purpose of this project is to develop a residential subdivision off Glade Road. This approximately 41-acre site sits just west of the 460 bypass between Glade Road and Village Way South. Components of this subdivision include 5 new public roads and the public infrastructure needed to support a 176 dwelling units. These units will be a mix of attached and single family detached homes. This site also is proposing to install a network of three stormwater facilities that are to provide a regional stormwater quality and quantity reduction benefit. The Town is evaluating entering into a partnership with this developer to support this regional stormwater benefit.

This site is proposing to construct one new dry detention pond, a new wet detention pond and retro-fit an existing Town-maintained detention pond located on this site to provide regional stormwater benefits. A fourth small stormwater facility is proposed to be installed to address water quality along the Shadow Lake side of the subdivision. An individual analysis of the facilities has not been provided, but below is a table illustrating their cumulative stormwater benefit:

Preliminary Stormwater Improvement Summary*

Water Quantity

Point of Analysis		Allowable peak flow rate (Q_{allow})	Postdev. Actual peak flow rate (Q_{post})	Regulations met?
A	1-year peak flow rate	75.45 cfs	24.83 cfs	$Q_{post}<Q_{allow}$ ∴ Yes
	10-year peak flow rate	175.77 cfs	90.38 cfs	$Q_{post}<Q_{allow}$ ∴ Yes
B	1-year peak flow rate	1.43 cfs	1.08 cfs	$Q_{post}<Q_{allow}$ ∴ Yes
	10-year peak flow rate	5.66 cfs	4.30 cfs	$Q_{post}<Q_{allow}$ ∴ Yes

Water Quality

Target TP load reduction	TP load reduction achieved (after SWM improvements)	Excess TP load reduction relative to target
26.53 lb/yr	39.02 lb/yr	+12.49 lb/yr

***Note: All numbers are preliminary and subject to change during preliminary plat and site plan engineering design.**

As shown in the table above, this network will reduce the stormwater flows far below the regulatory requirement for both the 1-year, Channel Protection requirement, and for the 10-year Flood Protection requirement. Additionally, the water quality benefit provided far exceeds the regulatory requirement.

General Items to be addressed at Site Plan Approval:

Below are items that cannot be resolved at this time due to the preliminary nature of the stormwater plan.

1. Drainage from the Farm discharges directly to residential lots on this site near the Glade Road end of the project. This off-site drainage must be conveyed safely past home sites in this project.
2. Drainage from The Village of Toms Creek (Village Way S) discharges directly to residential lots on this site. Any sheet or channelized flow must be conveyed safely past potential home sites in this project.
3. Creek Valley Overlay, Floodplain Hazard Overlays and delineated wetlands must be represented on all future plans and site plans. These layers must also be present on building permits if buildable lots fall within these areas.
4. A Virginia Stormwater Management Permit (VSMP) coverage will be required for this site.
5. Construction of stormwater management facilities or modifications to channels shall comply with all applicable laws and regulations. Evidence of approval of all necessary permits, such as US Army Corps of Engineers and VA DEQ Wetland Permits, VA DEQ VPDES Permits, etc., shall be presented prior to approval.

Please feel free to contact Kafi Howard with the Engineering Department at (540) 443-1354 or via email khoward@blacksburg.gov, if you have questions or concern regarding this review.

Sincerely,

Kafi Howard, Town Engineer
Town of Blacksburg
400 S Main St
Blacksburg, VA 24060
khoward@blacksburg.gov
(540) 443-1354

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DEPARTMENT OF
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MEMORANDUM

TO: Kinsey O'Shea, Town Planner/Current Development

FROM: Kafi Howard, Town Engineer

DATE: January 12, 2023

SUBJECT: RZN 22-0004-Glade Spring Crossing - 1006 Glade Road – Preliminary Floodplain Study

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This memo addresses the applicant's Floodplain Calculations for a establishing the 100-year floodplain across this proposed subdivision parcel. Per Division 24 of the Zoning Ordinance Section §3243(b), any tributary with a drainage area of 100 acres or more must have the 100-year floodplain area determined, as these areas are not already mapped by FEMA. The primary basis for delineation of these areas shall be submitted by the applicant, as established by a professional engineer using acceptable methods of study. This memo summarizes Staff's review of the submitted floodplain study.

1) **Methodology for Calculations** - Staff has reviewed the methodology for calculations and has some concerns regarding the process used to establish this preliminary floodplain. The pre-development to post development analysis performed shows a 29% reduction in flow for the 100-year flow entirely based upon the proposed detention performed by the regional stormwater ponds. Conversely, language in the Rezoning Application claims that the ponds are not aiming to reduce the one-hundred year flows, but a 17% reduction is achievable (page 56). This language is not consistent with claims in the Floodplain Study. Due to the preliminary nature of the stormwater reduction claims, **this cannot be resolved at this time.**

2) **Evaluation of Impacts of the Subdivision** - Part of the methodology of a floodplain study is to confirm that this proposed project can be constructed in compliance with Division 24 of the Zoning Ordinance Section §3247 which states, "*no encroachments, including fill, new construction, substantial improvements, or other development shall be permitted unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in the 100-year flood elevation*."

   a. Proposed improvements that are critical components of the masterplan of this project (public trail and public sanitary sewer pump station) are shown to be located within the 100-year floodplain as represented on page 26 of the Rezoning Application and page 8 of the Stormwater Concept Plan. **These items are not reflected in the Preliminary Floodplain Study and compliance cannot be confirmed at this time.**
   b. Fill has been illustrated within the 100-year floodplain as represented on page 11 of the Stormwater Concept Plan and page 15 of the Preliminary Floodplain study. This fill has not been reflected in the post-development condition within the floodplain study. **Compliance cannot be confirmed at this time.**

3) **General Requirements of future Infrastructure within 100-year Floodplain** - Notwithstanding the missing analysis action items presented above, all prosed trails, grading and public sanitary sewer pump station must comply with all articles of the Floodplain Hazard Overlay, in addition to any more stringent requirements for the pump station that would be referenced in Building Code or the Virginia Scat Regulations.