

June 27, 2017



Re: Sight Distance Evaluation, Tech Valley Residences, Town of North Greenbush, NY

VHB has conducted an evaluation to assess the potential traffic impacts associated with the proposed Tech Valley Residences in the Town of North Greenbush. The 83.18 acre project site is located between Glenmore Road and US Route 4. The site is currently undeveloped. The proposed development plan consists of the construction of a maximum of 204 townhomes.

Access to the site is proposed via one full access roadway intersecting Glenmore Road and one full access roadway intersecting with US Route 4. The project is anticipated to be constructed in phases; however, the traffic impact assessment was completed for full buildout of the site to provide an evaluation of the impacts of the project after fully constructed and occupied. The project is anticipated to be fully constructed and occupied by 2020.

This letter includes a review of the existing traffic conditions; an estimate of projected traffic volumes for the project; and an evaluation of the available sight distances at the proposed site driveways. A detailed evaluation of the existing and future operations at the US Route 4/Williams Road/Glenmore Road intersection and the anticipated levels of service at the site driveways will be completed in a future letter. As detailed herein, the proposed project is expected to have a minor impact on local traffic operations.

Site Location and Proposed Development

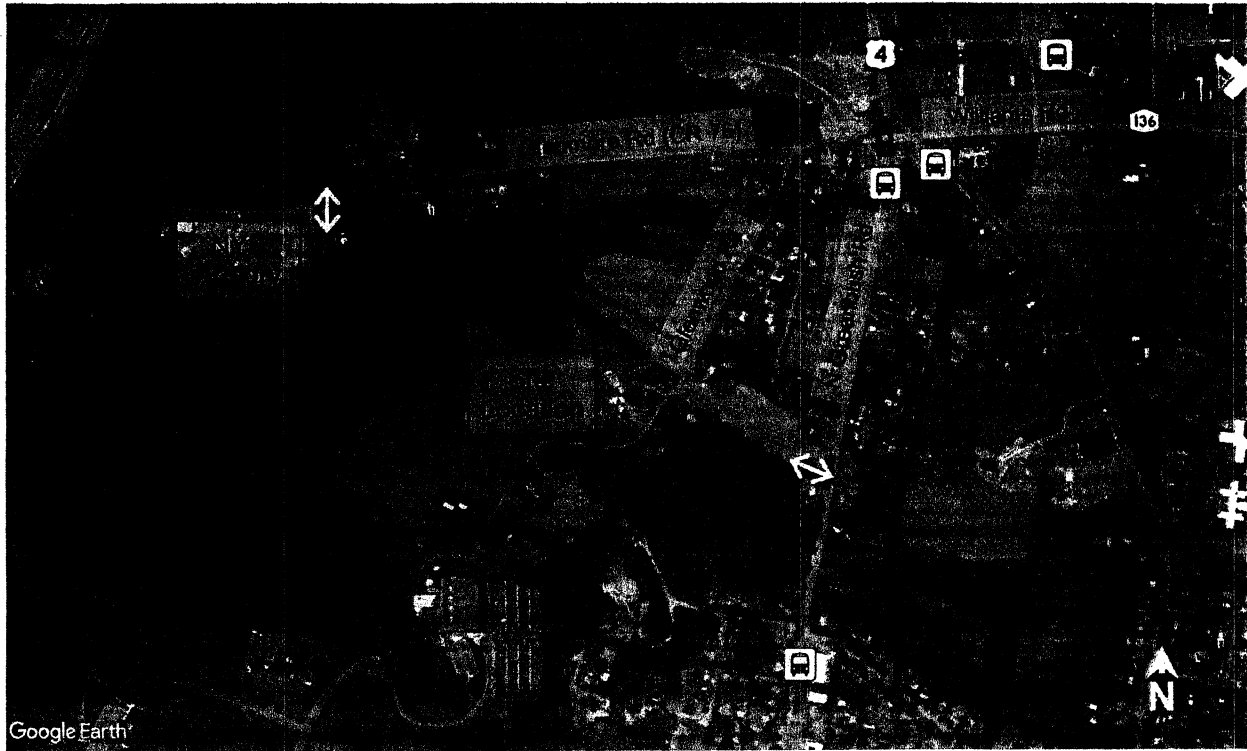
The 83.18 acre project site, as shown in the site location map below, is located to the south and west of the US Route 4/Williams Road (NY Route 136)/Glenmore Road (County Road 76) in the Town of North Greenbush. The development plan includes the construction of a maximum of 204 townhomes with full access to Glenmore Road and US Route 4. The project includes disconnecting Glenwood Road near the site and creating a dead end road to eliminate the potential for site traffic to utilize Glenwood Road when accessing the site. The two houses at the southern end of Glenwood Road will have access to US Route 4

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and Glenmore Road through the proposed project. The site location is shown in the following aerial image.



Existing Conditions

The scope of the proposed development was based on a review of the proposed site development plan and the study area as well as our understanding of the Town's concerns. As noted, a detailed evaluation of the US Route 4/Williams Road/Glenmore Road intersection will be completed as a separate letter using available traffic data and information provided by Town staff. The following sections provide a description of the existing study area roadways.

Study Area Roadways

The following roadways are included in the project study area and are described in detail below:

US Route 4 (North Greenbush Road)

US Route 4 is classified as an urban principal arterial other providing north-south travel from US Route 9 through Rensselaer County. At the project site, US Route 4 is a two-lane roadway with 12-foot travel lanes and seven to eight-foot paved shoulders and a posted speed limit of 45-mph. There are no sidewalks near the project site on US Route 4. Data collected for the proposed project from May 17



through May 19, 2017 shows that this roadway served approximately 12,325 vehicles a day near the project site. Land uses in the project vicinity are a mix of commercial and residential.

Glenmore Road (CR 76)

Glenmore Road (CR 76) is a county road providing east-west travel between the NY State Armory and US Route 4. At the project site, Glenmore Road is a two-lane roadway with 11-foot wide travel lanes and no shoulders and a posted area speed limit of 35-mph. There are no sidewalks near the project site on Glenmore Road. Data collected for the proposed project from May 17 through May 19, 2017 shows that this roadway serves approximately 315 vehicles a day. Land use near the site is primarily residential with the NY State Armory located adjacent to the site to the west.

Traffic Volumes

To assess the existing operational conditions at the site, automatic traffic recorders (ATRs) were installed on US Route 4 and Glenmore Road from May 17 through May 19, 2017. The 2017 existing traffic volume data are included in Attachment B and summarized in Table 1.

Table 1 Existing Traffic Volume Summary

Location	Weekday Daily	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	Volume ^a	Vol ^b	K Factor ^c	Dir. Dist.	Volume	K Factor	Dir. Dist.
US Route 4	12,325	850	6.9%	63% SB	1,140	9.2%	59% NB
Glenmore Rd	315	40	12.7%	76% WB	30	9.5%	93% EB

Source Traffic volume data collected in May 2017.

- a Daily traffic expressed in vehicles per day.
- b Peak hour volumes expressed in vehicles per hour.
- c Percent of daily traffic, which occurs during the peak hour.

As shown in Table 1, US Route 4 currently carries approximately 12,325 vehicles per day on a typical weekday, with 6.9% of the daily traffic occurring during the weekday morning peak hour and 9.2% occurring during the evening peak hour. US Route 4 traffic is heavier in the southbound direction during the morning peak hour and heavier in the northbound direction during the evening peak hour. Glenmore Road current carries 315 vehicles per day on a typical weekday, with 12.7% of the daily traffic occurring during the morning peak hour and 9.5% occurring during the evening peak hour. Glenmore Road traffic is heavier in the westbound direction during the morning peak and heavier in the eastbound direction during the evening peak.

Transit and Pedestrian Accommodations

Transit service in the region is provided by the Capital District Transportation Authority (CDTA). According to the CDTA online system map, Route 214 – Rensselaer 3rd Street/Amtrak travels past the project site and provides service to LaSalle Institute on weekdays during school arrival and dismissal when school is in session. At all other times of the day and on weekends the bus does not travel past the project site.



CDTA Route 85 – Waterford/Troy has a bus stop at the US Route 4/Williams Road/Glenmore Road intersection. Buses run every 20 to 45 minutes on weekdays from 5:35 AM to 12:30 AM, every 30 to 45 minutes on Saturdays from 6:15 AM to 12:35 AM, and every 45 minutes on Sundays from 8:00 AM to 9:30 PM. Route 224 – Albany-Troy via Route 4 is a weekday service travelling along US Route 4 every 15 to 60 minutes from 6:20 AM to 10:50 PM.

As noted, sidewalks are not provided on US Route 4 or Glenmore Road in the study area. Traffic volumes on Glenmore Road are very low and pedestrians and cyclists share the road with vehicles. The shoulders on US Route 4 are wide providing space for pedestrians and cyclists away from motor vehicles.

Future Conditions

Trip Generation

To estimate the site-generated traffic, the Institute of Transportation Engineers' (ITE) publication *Trip Generation, 9th Edition*¹ was utilized. The number of vehicle trips generated by the proposed project were estimated based on ITE land use code (LUC) 230 – Residential Condominium/Townhouse. As noted, with construction of the project, two existing homes will have access to US Route 4 and Glenmore Road through the project site and will no longer have access to Glenwood Road. Trips associated with these two single family homes were estimated using LUC 210 – Single-Family Detached Housing. The trip generation estimated is summarized in Table 2.

Table 2 Trip Generation Summary

Weekday Time Period	Movement	Townhome ^a	Single-Family Home ^b	Net New Trips
Morning	Enter	15	1	16
Peak Hour	Exit	76	1	77
	Total	91	2	93
Evening	Enter	72	1	73
Peak Hour	Exit	36	1	37
	Total	108	2	110

a Trip generation estimate based on ITE LUC 220 (Residential Condominium/Townhouse) for 204 units

b Trip generation estimate based on ITE LUC 210 (Single-Family Detached Housing) for 2 units

Based on the projections outlined above, the proposed project is expected to generate 93 new vehicle trips during the AM peak hour (16 entering and 77 exiting) and 110 new vehicle trips during the PM peak hour (73 entering and 37 exiting). When distributed onto the adjacent roadway network, the site generated trips will result in less than 100 trips on any one approach to an adjacent intersection which is

¹ Trip Generation Manual, 9th Edition, Institute of Transportation Engineers, Washington D.C., 2012.



the NYSDOT and ITE threshold for determining the need for off-site intersection analysis. These agency thresholds were developed as a tool to identify locations where the magnitude of traffic generated has the potential to impact operations at off-site intersection and screen out locations that do not meet the threshold and are therefore unlikely to require mitigation. Although the threshold of 100 site generated vehicles on any one intersection approach is not met, a detailed evaluation of the US Route 4/Williams Road/Glenmore Road intersection will be completed for the PM peak hour using available traffic volume data and information provided by the Town. This evaluation will be completed as a separate letter.

Trip Distribution

The directional distribution of traffic approaching and departing the site is a function of several variables including population densities, existing travel patterns, and the efficiency of the roadways leading to and from the site. Based on a review of the site layout, existing travel patterns, and population centers in the area it is estimated that 40% of the site traffic will enter and exit the site via Glenmore Road and 60% will use the US Route 4 access. Regionally, it's expected that 35% of the site traffic will travel to and from the north, 55% will travel to and from the south, and the remaining 10% will travel to and from the east. The distribution of traffic will result in an increase of 36 trips on Glenmore Road and 67 trips on US Route 4 during the AM peak hour and an increase of 44 trips on Glenmore Road and 77 trips on US Route 4 during the PM peak hour.

Sight Distance

Sight distance analysis, in conformance with guidelines of the American Association of State Highway and Transportation Officials (AASHTO)² was performed at the proposed site access intersections with Glenmore Road and US Route 4. Both stopping sight distance (SSD) for traffic approaching the site driveways and intersection sight distance (ISD) at the site driveways were measured. The posted speed limit on Glenmore Road is 35-mph and the recorded 85th percentile travel speed is 38-mph in the eastbound direction and 41-mph in the westbound direction. The posted speed limit on US Route 4 is 45-mph and the recorded 85th percentile travel speed is 51-mph in the northbound direction and 49-mph in the southbound direction. The measured sight distances were compared to a 40-mph operating speed on Glenmore Road and a 50-mph operating speed on US Route 4.

SSD is the distance along the roadway for a vehicle approaching an intersection from either direction to perceive, react and come to a complete stop before colliding with an object in the road, in this case a vehicle exiting from a driveway or a vehicle waiting on Glenmore Road or US Route 4 to turn into the site. Table 3 summarizes the stopping sight distance evaluation.

ISD is based on the time required for perception, reaction, and completion of the desired turning maneuver into or out of the site driveway. Calculation of the ISD includes the time to (1) turn and clear the intersection without conflicting with approaching vehicles; and (2) upon turning, to accelerate to the

² A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2013



operating speed on the roadway without causing approaching vehicles on the main road to unduly reduce their speed. Table 4 summarizes the intersection sight distance analysis.

Table 4 Stopping Sight Distance

Location	Traveling	Guideline (feet) ^a	Measured (feet) ^b
Glenmore Road at Site Access	EB	305	500+
	WB	305	500+
US Route 4 at Site Access	NB	425	600+
	SB	425	600+

a Based on standards established in A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2013 for a 40 and 50-mph operating speed.

b Based on field measurements taken by VHB.

Table 5 Intersection Sight Distance

Location	Field Measurement		AASHTO Guideline (feet) ^b		
	View	Distance (feet) ^a	Left-turn Out	Right-turn Out	Left-turn In
Glenmore Road at Site Access	Looking Left	365 (500+)	445	385	NA
	Looking Right	500+	445	NA	NA
	Looking Straight	500+	NA	NA	325
US Route 4 at Site Access	Looking Left	600+	555	480	NA
	Looking Right	600+	555	NA	NA
	Looking Straight	600+	NA	NA	405

a Based on standards established in A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2013 for a 40 and 50-mph operating speed.

b Based on field measurements taken by VHB.

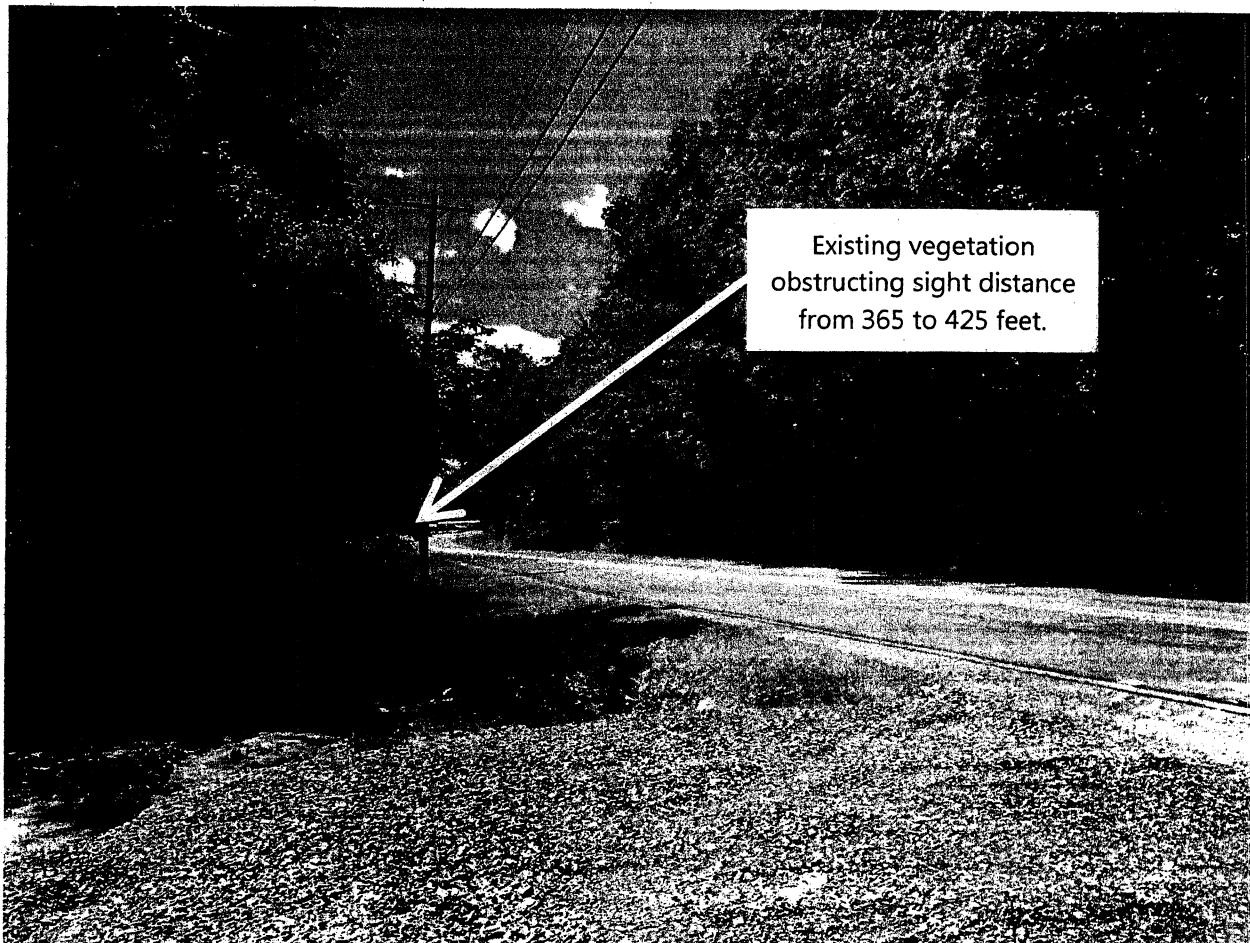
XXX (XXX) Field measurement (with mitigation)

NA- not applicable

Review of Tables 3 and 4 show that with the exception of the sight distance looking left at the Glenmore Road site access, the stopping sight distances and intersection sight distances meet the AASHTO guidelines for the recorded 85th percentile operating speed. Photograph 1 shows that the sight distance looking left is limited by existing vegetation adjacent to the project site looking left at Glenmore Road. The vegetation obstructs sight distance looking left from 365 to 425 feet. At 425-feet, the sight distance is clear again to greater than 500 feet. Review of Figure 2C-101 in the NYS Supplement to the MUTCD³ shows that the available sight distance is less than desirable but is not critically limited; however, the Applicant should coordinate with the adjacent landowner to clear the existing vegetation to eliminate the

³ New York State Supplement to the Manual on Uniform Traffic Control Devices for Streets and Highways (2009 Edition), Effective March 16, 2011, NYS DOT

sight distance restriction from 365 feet to 425 feet. It is noted that traffic volumes approaching the site from the west are very low (approximately 150 vehicles on a typical weekday) since Glenmore Road is a dead end street and only the NY State Armory is located west of the site; therefore, it is likely that drivers utilizing Glenmore Road will often not encounter any conflicting vehicles on Glenmore Road.



Photograph 1- Sight distance looking left from Site Access at Glenmore Rd

Conclusions

VHB has conducted a traffic evaluation to identify the trip generation and driveway sight distances associated with the proposed Tech Valley Residences in the Town of North Greenbush. Access to the site is proposed via a full access intersection with Glenmore Road and a full access intersection with US Route 4. The project includes the construction of a maximum of 204 townhome units expected to fully occupied in 2020. The project also includes disconnecting Glenwood Road and creating a dead end near the project road to eliminate the potential for site traffic to utilize Glenwood Road when accessing the site.

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The two houses at the southern end of Glenwood Road will have access to US Route 4 and Glenmore Road through the proposed project.

The proposed project is expected to generate 93 vehicles trips during the AM peak hour and 110 vehicle trips during the PM peak hour; including trips associated with the two single-family homes with changed access. This is less than the NYSDOT and ITE threshold of 100 vehicle trips on any one intersection approach which determines the need for evaluation of off-site intersections. It is noted that operations at the US Route 4/Williams Road/Glenmore Road intersection and the site driveway intersections will be evaluated in detail using available traffic volume data and information provided by the Town of North Greenbush and summarized in a supplemental letter.

The sight distance evaluation shows that the available sight distances at the site access intersection with US Route 4 meet the guidelines for a 50-mph operating speed. The sight distance looking left at the Glenmore Road site access intersection is obstructed for 60 feet (from 365 to 425 feet) by existing vegetation and is then clear to greater than 500 feet. The Applicant should coordinate with the adjacent property owner to clear the sight distance obstruction and create a clear line of sight looking to the left from the site access on Glenmore Road. If the obstruction can't be cleared, it's noted that the available sight distance is less than desirable but not critically limited so no intersection warning sign is recommended. The traffic volume approaching the site is very low (approximately 150 vehicles per day) so vehicles exiting the site to Glenmore Road will rarely encounter vehicles approaching the site from the west.

Sincerely,

VHB Engineering, Surveying and Landscape Architecture, P.C.