Appendix G

New Bus Facility Noise Assessment

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TO: Nancy Skinner (PB Environmental Project Manager)

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RE: Albany GA Transit System New Bus Facility – Noise Assessment

A noise assessment was performed to evaluate potential community noise impacts associated with the construction and operation of a new bus facility by the Albany Transit System (ATS) in Albany, Georgia. The noise assessment was conducted in accordance with procedures, criteria and prediction algorithms contained in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (2006).

In summary, project-generated noise levels are expected to mildly exceed FTA's "moderate" noise impact criteria limit by 1 to 3 decibels for several residential receptors south and southwest of the project site. However, project noise is not expected to exceed FTA's "severe" noise impact criteria limit at any receptor location. Consequently, whereas this area is already a developed neighborhood with exposure to similar bus activity noise, and whereas ATS buses are not expected to operate throughout the night, noise mitigation measures are therefore not recommended for this project.

Project Description

The Albany Transit System (ATS) intends to build and operate a new bus facility in downtown Albany, Georgia on an approximate 3-acre parcel of land bounded by S. Jackson Street to the east, Highway 91 to the west, W. Oglethorpe Blvd to the north and W. Highland Avenue to the south. The site is currently occupied by the Albany Transportation Center which houses Greyhound buses, ATS bus route transfers, and storage of vehicles. There are also vacant buildings on the site which will be demolished, and the Ritz Theater which will remain in place.

Once completed, ATS will operate nine bus routes from the new facility using seven buses between the hours of approximately 5 AM to 9 PM. Bus access to/from the site will be from W. Oglethorpe Blvd and W. Highland Avenue. The facility will have twelve ATS bus bay positions, two Greyhound bus bays, and a circular drive from S. Jackson Street for passenger drop-off and pick-up. A new two-story bus station building will be built on the site at the corner of W. Oglethorpe Blvd and S. Jackson Street.

The community proximal to the project site consists primarily of non-noise-sensitive commercial retail businesses and undeveloped space. There are no residential receptors affected by the project towards the north or west of the project site; however there are a few single-family houses along W. Whitney Avenue towards the south of the project site,

and multifamily apartments (Ashley Riverside Apartments) along S. Jackson Street and W. Highland Avenue towards the southwest.

Operational Noise

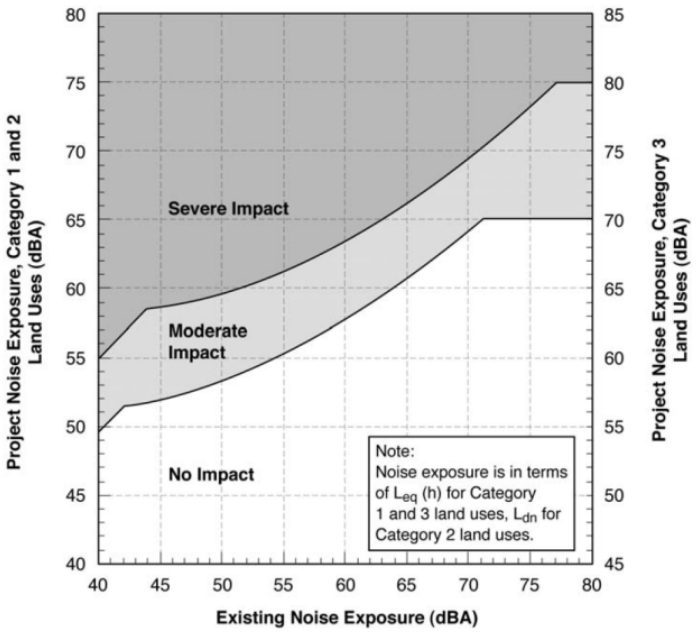
The operational noise assessment for this project was conducted in accordance with procedures, criteria and prediction algorithms contained in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (2006). The intent of the manual is to establish technically defendable standards to define and determine if noise levels associated with a transit project adversely affect (impact) a community or not. If a project is expected to generate excessive noise levels then mitigation measures must be developed for further consideration.

Noise Criteria

In this case, the FTA's "project noise" criterion is the preferred approach to evaluate potential noise impacts from this project. It is based on sensitive land-use categories and relative changes in noise exposure *caused by the project*. FTA noise criteria limits incorporate both absolute criteria, which consider activity interference caused by the bus project alone, and relative criteria, which consider annoyance due to the potential change in the noise environment.

As shown in **Figure 1**, FTA's project noise criteria define two threshold levels of impact, *moderate impact* and *severe impact*, based on a receptor's existing noise exposure and land-use category. Project-generated noise in the severe range can be expected to cause a significant percentage of people to be highly annoyed by the new noise and represents the most compelling need for mitigation; whereas noise levels in the moderate range may change the cumulative noise level noticeable to most people but may not be sufficient to cause strong, adverse reactions from the community. In this transitional moderate region, other project-specific factors must be considered to determine the need for mitigation.

Figure 1. FTA "Project Noise" Criteria



Noise impact criteria are also dependent on the land-use category of the receptor. Category 1 land-use includes tracts of land where quiet is an essential element in their intended purpose, such as outdoor concert pavilions, recording studios, concert halls, and historical sites with significant outdoor use. Category 2 land-use includes residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where nighttime sensitivity to noise is assumed to be of utmost importance. Category 3 land-use includes institutional properties with primarily daytime and evening use, such as medical offices, churches, schools, libraries, and theaters. Most general purpose businesses and commercial buildings are not included in any category.

The relevant noise metric when evaluating Category 2 residential receptors is the Day Night Sound Level (Ldn). The Ldn is an energy-averaged 24-hour noise metric in which a penalty has been applied to noise sources operating at night (10 PM to 7 AM) due to people's greater sensitivity to noise intrusion at night. Category 1 and 3 receptors are analyzed using the energy-averaged Equivalent Sound Level (Leq) for the loudest hour of project activity during hours of noise sensitivity. All noise levels measured or predicted using the FTA procedure are expressed in A-weighted decibels (dBA) and are evaluated on the exterior of the receptor at a position closest to or facing the project.

The community's existing noise exposure, or ambient noise level, for this project was determined using an estimation process contained in the FTA manual based on the population density of a community. US Census data from 2012 indicate a population of 77,431 for Albany, Georgia, and a land area of 55.13 square miles, which would equate to a population density of approximately 1,400 people/square mile. Based on FTA procedures this would result in an existing noise exposure of 50 dBA Ldn. Consequently, the thresholds for noise impact from **Figure 1** for Category 2 residential receptors would be 53 dBA Ldn and 60 dBA Ldn for moderate and severe impacts, respectively.

Noise Model

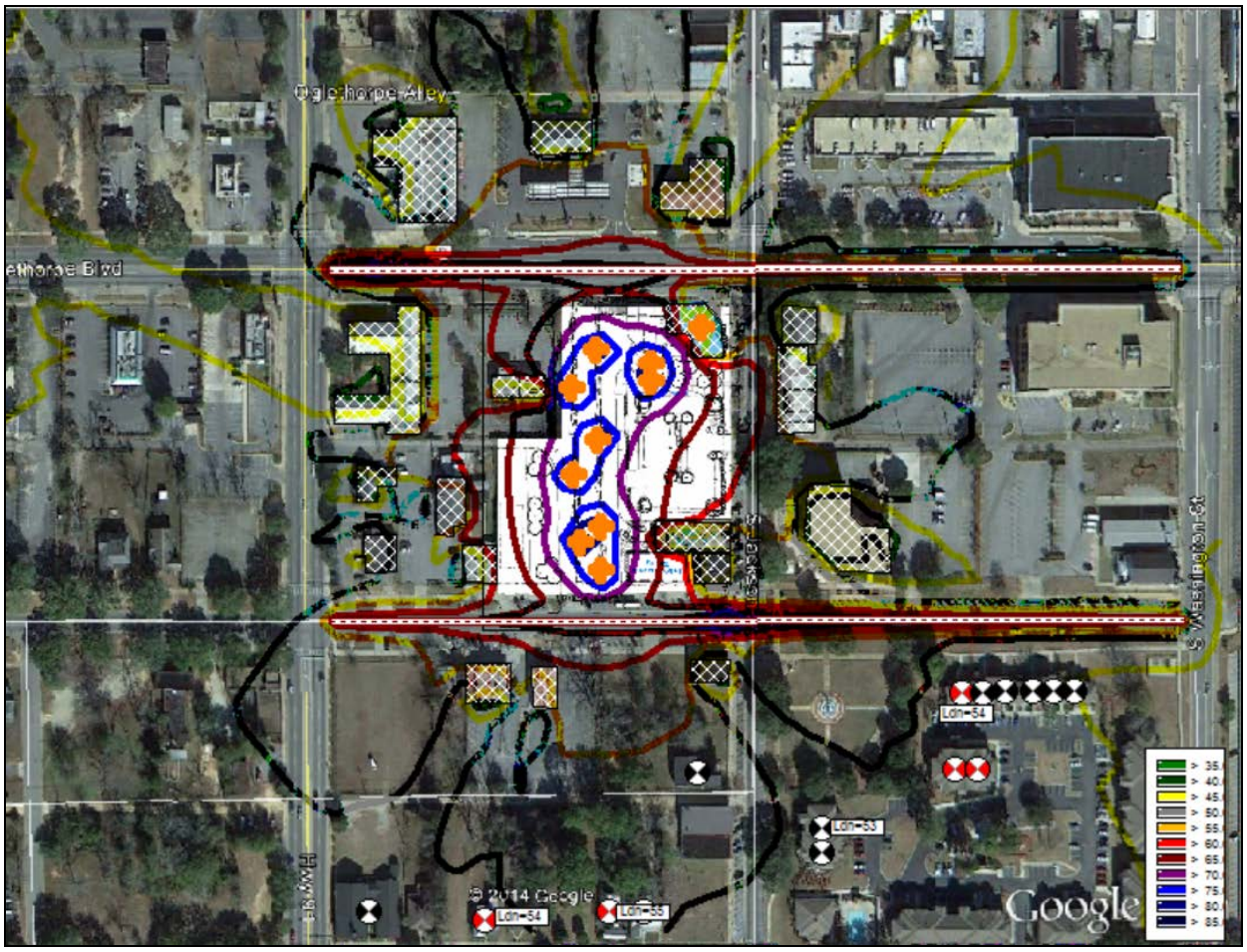
The Cadna-A® noise model, developed by DataKustik GmbH, was used for predicting bus facility operational noise levels in the community surrounding the proposed bus facility site. The Cadna-A model is a ray-tracing, three-dimensional model that implements Internationally-accepted methods for the propagation and prediction of outdoor noise levels in accordance with ISO Standard 9613. The Cadna-A model contains modules that mimic the Federal Transit Administration's "Detailed" noise prediction algorithm for stationary noise sources as well as the Federal Highway Administration's "Traffic Noise Model" for mobile vehicle noise sources.

In this case, the noise model began with a base map imported from GoogleEarth® with a scale drawing of the project superimposed on top of it. In this manner the locations of noise sources and community receptors could be identified with great accuracy. Because the ground in the area is primarily lawn and paved surfaces, it was modeled as being moderately acoustically absorptive. However, to be conservative no additional shielding or absorption was assumed for leaf-bearing trees. Physical structures, such as homes, business offices, and buildings were also entered in the Cadna-A model in their three-dimensional sizes to account for the propagation of sound around and over such obstacles.

The model was then populated with noise sources and receptors in a manner to yield realistic worst-case (i.e. loudest) noise results. Stationary noise sources were entered as acoustical point sources, and mobile sources were entered as roadway line sources. It was assumed that up to seven ATS buses and two Greyhound buses could be idling at the new facility under worst-case conditions. The facility's operating hours were assumed to be from 5 AM to 9 PM, thus occurring during two nighttime hours and 14 daytime hours for the purpose of calculating Ldn noise levels. ATS buses coming and going on their routes were modeled along W. Highland Avenue and W. Oglethorpe Avenue at an average speed of 20 mph. Lastly, a 10-ton rooftop HVAC unit was assumed to operate on top of the new station building.

With the model fully configured it was allowed to run and compute the Ldn noise levels expected at the various receptor locations. The Cadna-A model can also compute isopleths (i.e. contour lines) of equal loudness. The results are shown in **Figure 2** where the receptors are identified with target systems towards the south and southwest of the project site, and the isopleths are shown in 5-decibel increments radiating from the noise sources.

Figure 2. Cadna-A Noise Model Results



Construction Noise

Albeit typically short in duration, construction noise from a project has the potential to annoy or disturb surrounding neighborhood residences and businesses, particularly if loud construction activities occur at night. However, there are well-proven means to assess and mitigate construction noise in a manner that provides the peace and quiet that neighborhoods require yet still allows the project to be completed on time and on budget.

In this case, the project will require site preparation and clearing involving demolition of an abandoned building, construction of a new two-story bus station building, and finish work involving paving and landscaping. This may require the use of excavators, dozers, small cranes, dump trucks, graders and pavers. Particularly loud construction equipment, such as pile drivers and hoe rams, are not expected to be necessary for this project.

Construction noise is addressed in the FTA manual. FTA's recommended construction noise limits are shown in **Table 1** and are based on the receptor's land-use and time of day or night. The relevant noise metric is the energy-averaged Leq level measured and evaluated over an 8-hour timeframe on the exterior of the receptor. Construction noise is also addressed in the City of Albany Noise Ordinance 10-137. Section 36-194(2) of the ordinance exempts construction noise from restrictions during the daytime (7 AM to 7 PM), however any work done at night (7 PM to 7 AM) is subject to the noise limits contained in Section 36-192, which are also shown here in **Table 1**.

Table 1. Construction Noise Criteria

Receptor Land-Use	FTA Noise Limit dBA Leq (8-hr)		City of Albany Noise Limit dBA Lmax	
	Daytime	Nighttime	Daytime	Nighttime
Residential	80	70	None	55
Commercial	85	85	None	60
Industrial	90	90	None	70

Methods to mitigate and control construction noise could include: (1) time and equipment restrictions, (2) use of alternative quieter equipment and techniques, (3) proper maintenance of equipment and mufflers, (4) selective use of noise barriers and enclosures, (5) development of a construction noise mitigation plan, (6) laborer training and awareness, (7) communications with the affected community to keep them informed, and (8) implementing a construction noise monitoring program. To this end, the noise limits, time and equipment restrictions, noise monitoring requirements and enforcement actions to be taken are typically included in a project's Construction Noise Control Specification.

Findings and Conclusions

As described above, an operational noise assessment was performed for the proposed new ATS bus facility in Albany, Georgia. The assessment was conducted in accordance with procedures, criteria and prediction algorithms contained in the Federal Transit

Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (2006). Existing community noise levels were estimated based on population density, project-generated noise levels were predicted using the Cadna-A noise model, and the results were evaluated for compliance against FTA noise limits for moderate and severe impacts.

The results are summarized in **Table 2** at residential receptors identified for this project. As can be seen, project-generated noise levels are expected to mildly exceed FTA's moderate noise impact criteria limit by 1 to 3 decibels for several residential receptors south and southwest of the project site. However, project noise is not expected to exceed FTA's severe noise impact criteria limit at any receptor location.

Consequently, whereas this area is already a developed neighborhood with exposure to similar bus activity noise, and whereas ATS buses are not expected to operate throughout the night, noise mitigation measures are therefore not recommended for this project.

Table 2. Operational Noise Impact Summary

Noise Receptor Location	Existing Noise Exposure dBA Ldn	FTA Impact Criteria dBA Ldn		Predicted Project Noise dBA Ldn	Exceedance or Compliance
		Moderate	Severe		
Single-family residence on W. Whitney Ave.	50	53	60	56	Exceeds Moderate by 3 decibels
Single-family residence on W. Whitney Ave.	50	53	60	56	Exceeds Moderate by 3 decibels
Single-family residence on W. Whitney Ave.	50	53	60	54	Exceeds Moderate by 1 decibel
Multifamily residence at Ashley Riverside Apts.	50	53	60	54	Exceeds Moderate by 1 decibel
Multifamily residence at Ashley Riverside Apts.	50	53	60	54	Exceeds Moderate by 1 decibel
Multifamily residence at Ashley Riverside Apts.	50	53	60	54	Exceeds Moderate by 1 decibel
Multifamily residence at Ashley Riverside Apts.	50	53	60	53	Complies
Multifamily residence at Ashley Riverside Apts.	50	53	60	53	Complies
Multifamily residence at Ashley Riverside Apts.	50	53	60	53	Complies
Multifamily residence at Ashley Riverside Apts.	50	53	60	52	Complies
Multifamily residence at Ashley Riverside Apts.	50	53	60	51	Complies
Multifamily residence at Ashley Riverside Apts.	50	53	60	51	Complies
Multifamily residence at Ashley Riverside Apts.	50	53	60	50	Complies

Note: All noise levels rounded to nearest full decibel per FTA procedures.