



MD 355 BRT Corridor Planning Study

Phase 2

Noise Technical Memo

DRAFT

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1 Introduction

Segments of BRT alternatives where roadway widening is proposed (Alternatives B and C) and noise-generating vehicular traffic (either BRT operations or relocation of existing general purpose traffic lanes) may ultimately be located closer to roadside land uses were evaluated using the FTA General Assessment process for potential noise impacts. The FTA General Assessment process allows for the comparison of alternatives and provides noise predictions commensurate with the level of design of alternatives in the early stages of project planning. The process uses estimates of the existing noise environment based on distances between noise sensitive receptors and distance from major transportation noise sources such as interstates, other roadways, and railroads. The objective of this assessment was to identify corridor segments which may realize noise effects from the proposed improvements and should be considered for future detailed study.

This general assessment does not include detailed modeling or field measurement of ambient noise levels or consideration of terrain and building features; such a detailed analysis of noise effects would be completed as part of subsequent FTA New Starts and NEPA compliance activities and to address community and stakeholder concerns.

2 Assumptions

Existing noise levels (dBA) were conservatively estimated based on FTA criteria and distance from the existing roadway noise source. Typically, existing noise levels were assumed to be 65 dBA throughout the corridor except in areas with low density development, greater setbacks, or especially sensitive receptors for which an existing noise level of 60dBA was used.

In areas of proposed roadway widening, adjacent noise receptors were classified into land use categories consistent with FTA guidance (Table 1). Category 2 uses are most prevalent throughout the corridor and noise effects are evaluated using day-night sound level (L_{dn}) which is an estimated noise level calculated over a 24-hour period. Category 1 and 3 land categories are more specific to activities which are most susceptible to noise affecting their purpose or human use of those facilities, and evaluation is more focused on the sound level occurring during the most active time-period of the day.

Table 1: FTA Land Use Categories and Metrics for Transit Noise Impact Criteria

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor $L_{eq}(h)^*$	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq}(h)^*$	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

Note: * L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity

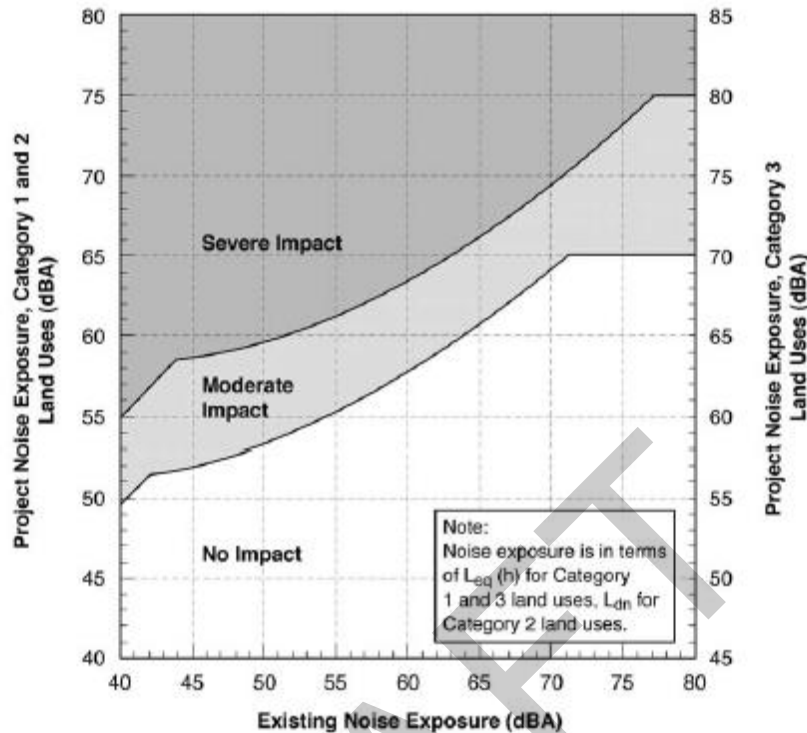
Based on FTA guidance, noise criteria do not apply to most commercial or industrial uses because, in general, the activities within these buildings are compatible with higher noise levels and such uses are not typically considered to be noise sensitive. However, noise screening within commercial areas along MD 355 where widening is proposed were evaluated for potential noise increases using residential criteria to fully consider potential effects of the proposed project.

BRT activity was assumed to involve five peak hourly trips (day) and four off-peak hourly trips (night) as representative of the busiest operation. BRT vehicles were assumed to be traveling at a maximum speed of 45 mph to estimate the highest potential noise contribution from operations, although actual vehicle speeds would vary considerably along the route dependent on location between stations. BRT vehicles were input as diesel-powered buses. Distances to receptors associated with the proposed improvements were generally averaged along the studied segments (e.g. some receptors in each segment may be closer than the distance used in the model).

3 Alternatives Evaluation

The FTA general assessment spreadsheet identifies potential impact as a range measure of the cumulative noise environment (not a strictly additive basis), accounting for the combination of existing noise and noise attributable to the proposed transit improvement (**Table 2**).

Table 2: FTA Noise Impact Criteria for Transit Projects



Where general assessment results note a Moderate Impact, the change in the cumulative noise level is noticeable to most people, but may not be sufficient to cause strong, adverse reactions from the community. Other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation, such as the existing level, predicted level of increase over existing noise levels and the types and numbers of noise-sensitive land uses affected.

4 Results

Results of the general noise assessment anticipate only minor potential impacts associated with implementation of either Alternative B or Alternative C. Results of the segment analyses are provided in the appendix to this memo.

Only one specific area of potential impact was identified through the assessment. Under Alternative B, a moderate impact along the commercial corridor between Gude Drive and Shady Grove Road, especially on the northbound side where existing facilities are located less than 50 feet from the roadway, may be realized. However, as previously noted, commercial facilities are generally not considered to be noise-sensitive land uses and a moderate impact using the assessment does not indicate a noise impact above FTA threshold criteria.

While not specifically identified through the general assessment, the following locations have sensitive receptors and the noise environment at these locations is anticipated to be affected by roadway widening. Future detailed analysis is therefore warranted for:

- Segment 4 West Deer Park to Education Boulevard: Bohrer Park (Gaithersburg) and Caring Matters (a hospice center) are adjacent to southbound MD 355. Careful consideration of noise effects at this location should carefully consider the appropriate land use category (either 1 or 3) to accurately address noise impacts.
- Segment 4 Ridgemont Road to Shady Grove Road: The King Farm Homestead and Community Garden is located along the southbound lanes of MD 355. Potential effects on the setting of this historic resource should be evaluated in future project phases.
- Segment 5 Summit Avenue to Fulks Corner Avenue: The St. Martin of Tours Church is located at 201 South Frederick Avenue in Gaithersburg and this community resource is approximately 25 feet from the edge of northbound MD 355.

As noted, this general assessment provides a broad evaluation of potential noise effects. Assumptions used were conservative and distances to receptors were averaged over specific roadway segments. Individual land uses may experience higher or lower noise effects than noted for applicable study segments.

No field measurements or detailed modeling was performed and parameters regarding proposed system design are preliminary. A detailed noise assessment should be completed once engineering design has progressed to more precisely characterize noise impacts and evaluate the feasibility and effectiveness of minimization and mitigation options.

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APPENDIX

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Alternative B: Segment General Assessments

Project: Alt B Segment 2: Tuckerman Ln to Edison Ln (Residential)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	43 ft	60.6 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		61 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt B Segment 2: Halpine Rd to Dodge St (Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	55 ft	59.0 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		59 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt B Segment 3: Dodge St to Manatee St (Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	64 ft	58.0 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		58 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt B Segment 3: Mannakee St to College Pkwy (Institutional)
Receiver: Receiver 1

Source	Distance	Project Leqh	Existing Leqh	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	54.0 dBA	60 dBA	63 dBA	68 dBA	None
2 --	50 ft		60 dBA	63 dBA	68 dBA	
3 --	ft		60 dBA	63 dBA	68 dBA	
4 --	ft		60 dBA	63 dBA	68 dBA	
5 --	ft		60 dBA	63 dBA	68 dBA	
6 --	ft		60 dBA	63 dBA	68 dBA	
Combined Sources		54 dBA	60 dBA	63 dBA	68 dBA	None

Project: Alt B Segment 4: Gude Dr to Shady Grove Rd (Commercial) Northside
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	30 ft	62.9 dBA	65 dBA	61 dBA	66 dBA	Moderate Impact
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		63 dBA	65 dBA	61 dBA	66 dBA	Moderate Impact

Project: Alt B Segment 4: Shady Grove Rd to Westland Dr (Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	59.6 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt B Segment 4: W Deer Park to Education Blvd (Outdoor - Park and Hospice Center)
Receiver: Receiver 1

Source	Distance	Project Leqh	Existing Leqh	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	30 ft	57.3 dBA	60 dBA	58 dBA	63 dBA	None
2 --	50 ft		60 dBA	58 dBA	63 dBA	
3 --	ft		60 dBA	58 dBA	63 dBA	
4 --	ft		60 dBA	58 dBA	63 dBA	
5 --	ft		60 dBA	58 dBA	63 dBA	
6 --	ft		60 dBA	58 dBA	63 dBA	
Combined Sources		57 dBA	60 dBA	58 dBA	63 dBA	None

Project: Alt B Segment 5: Summit Av to Fulks Corner Ave (Institutional - Church)
Receiver: Receiver 1

Source	Distance	Project Leqh	Existing Leqh	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	25 ft	58.5 dBA	60 dBA	63 dBA	68 dBA	None
2 --	50 ft		60 dBA	63 dBA	68 dBA	
3 --	ft		60 dBA	63 dBA	68 dBA	
4 --	ft		60 dBA	63 dBA	68 dBA	
5 --	ft		60 dBA	63 dBA	68 dBA	
6 --	ft		60 dBA	63 dBA	68 dBA	
Combined Sources		59 dBA	60 dBA	63 dBA	68 dBA	None

Project: Alt B Segment 5: Fulks Corner Ave to Lakeforest Dr (Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	59.6 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt B Segment 6: Christopher Ave to High Point Drive (Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	64 ft	58.0 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		58 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt B Segment 6: High Point Dr to Gunnars Branch Rd (Residential)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	59.6 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None

Alternative C: Segment General Assessments

Project: Alt C Segment 2: Tuckerman Lane to Strathmore Ave (Residential)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	100 ft	55.1 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		55 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt C Segment 2; Strathmore Ave to Flanders Ave/Wickshire Way (Residential)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	55 ft	59.0 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		59 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt C Segment 2: Stathmore to Dodge St (Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	59.6 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt C Segment 2: Halpine Rd to First Street (Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	59.6 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt C Segment 3: N of Church St to College Parkway (Commerical)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	59.6 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt C Segment 4: College Pkwy to Redland Rd (Residential)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	80 ft	56.5 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		57 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt C Segment 4: Ridgemont Rd to Shady Grove Blvd (Institutional - King Farm)
Receiver: Receiver 1

Source	Distance	Project Leqh	Existing Leqh	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	100 ft	49.5 dBA	60 dBA	63 dBA	68 dBA	None
2 --	50 ft		60 dBA	63 dBA	68 dBA	
3 --	ft		60 dBA	63 dBA	68 dBA	
4 --	ft		60 dBA	63 dBA	68 dBA	
5 --	ft		60 dBA	63 dBA	68 dBA	
6 --	ft		60 dBA	63 dBA	68 dBA	
Combined Sources		49 dBA	60 dBA	63 dBA	68 dBA	None

Project: Alt C Segment 4: Westland Dr to Education Blvd (Institutional - Church)
Receiver: Receiver 1

Source	Distance	Project Leqh	Existing Leqh	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	54.0 dBA	60 dBA	63 dBA	68 dBA	None
2 --	50 ft		60 dBA	63 dBA	68 dBA	
3 --	ft		60 dBA	63 dBA	68 dBA	
4 --	ft		60 dBA	63 dBA	68 dBA	
5 --	ft		60 dBA	63 dBA	68 dBA	
6 --	ft		60 dBA	63 dBA	68 dBA	
Combined Sources		54 dBA	60 dBA	63 dBA	68 dBA	None

Project: Alt C Segment 4: W Deer Park to Education Blvd (Outdoor - Park and Hospice Center)
Receiver: Receiver 1

Source	Distance	Project Leqh	Existing Leqh	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	50 ft	54.0 dBA	60 dBA	58 dBA	63 dBA	None
2 --	50 ft		60 dBA	58 dBA	63 dBA	
3 --	ft		60 dBA	58 dBA	63 dBA	
4 --	ft		60 dBA	58 dBA	63 dBA	
5 --	ft		60 dBA	58 dBA	63 dBA	
6 --	ft		60 dBA	58 dBA	63 dBA	
Combined Sources		54 dBA	60 dBA	58 dBA	63 dBA	None

Project: Alt C Segment 6: Christopher Ave to Great Seneca Creek Bridge (Residential and Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	61 ft	58.3 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		58 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt C Segment 6: Plummer Dr to Gunnar Branch Rd (Residential)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	44 ft	60.4 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None

Project: Alt C Segment 6: Gunnar Branch Rd to Middlebrook Road (Commercial)
Receiver: Receiver 1

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Buses (diesel-powered)	44 ft	60.4 dBA	65 dBA	61 dBA	66 dBA	None
2 --	50 ft		65 dBA	61 dBA	66 dBA	
3 --	ft		65 dBA	61 dBA	66 dBA	
4 --	ft		65 dBA	61 dBA	66 dBA	
5 --	ft		65 dBA	61 dBA	66 dBA	
6 --	ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None