



level set by the proposed Five Percent Increment of Progress plan MVEBs for both VOC and NO<sub>x</sub> and as such, the conformity requirements for the proposed project are satisfied.

**TABLE 5-6  
CONFORMITY ANALYSIS FINDINGS (9-COUNTY NONATTAINMENT AREA)  
VEHICLE EMISSION SUMMARY**

Year	VOC <sup>1</sup> (tons/day)		MoSERS <sup>2</sup> Benefits effect (tons/day)	NOx <sup>1</sup> (tons/day)		MoSERS <sup>2</sup> Benefits effect (tons/day)
	Modeled Emissions	Final Emissions including MoSERS		Modeled Emissions	Final Emissions including MoSERS	
2007	<b>104.14</b>	101.21	2.93	<b>201.32</b>	198.18	2.14
2010	84.22	83.97	0.25	14.13	147.98	0.15
2025	45.30	45.30	<0.01	37.90	37.90	<0.01

<sup>1</sup> Motor Vehicle Emission Budgets (MVEB) for the nine-county nonattainment area, are the 2007 modeled emissions (based on the proposed 5% increment of progress demonstration MVEB) .

<sup>2</sup> MoSERS are transportation programs/projects identified as emission reduction benefits. These include: transportation control measures (TCM), voluntary mobile emissions programs (VMEP), or transportation emission reduction measures (TERM). Including in the TERM category are the programs such as intersection improvements, extension of HOV facilities, new rail transit routes, and park-and-ride facilities.

Source: *Transportation Conformity, Mobility 2025: The Metropolitan Transportation Plan*, Amended April 2005, and 2006-2008 *Transportation Improvement Program*, Section 5.

In a letter dated March 18, 2008, the North Central Texas Council of Governments (NCTCOG) concluded that the build alternative is consistent with NCTCOG's **2006-2008 Transportation Program (TIP)**, as well as the 2008-2011 TIP.

### 5.3.3 Air Quality Mitigation

Since no air quality violations are anticipated and overall build project CO emissions are expected to be similar to future No-Build alternative CO emissions, no additional mitigation measures are required.

### 5.4 NOISE

This section presents the analysis of potential noise impacts due to the operation of the proposed project and discusses mitigation measures to minimize adverse impacts.

#### 5.4.1 Noise Impact Assessment

##### Noise Impact Assessment Methodology

Noise levels were projected based on the DART LRT vehicle noise specification, the proposed project's Operating Plan and the prediction model specified in the FTA guidance manual. Significant factors are summarized below:

- Based on the DART vehicle noise specification, the predictions assume that a single vehicle operating at 40 mph on ballast and tie track with continuous welded rail (CWR) generates a maximum noise level of 76 dBA at a distance of 50 feet from the track centerline.
- The operating times of the line would be between 5:30 AM and 12:30 AM. The operating plan for LRT service specifies a peak-hour headway of ten minutes, an off-peak base period headway of 15 minutes and an evening headway of 20 minutes. Two-car trains would operate most of the day, with some three-car trains in peak periods and single-car trains in the evenings.



- Peak hour operations would occur between 6:00 AM and 9:00 AM and between 3:00 PM and 6:00 PM. Evening operations would occur between 8:30 PM and 12:30 AM, and base service would occur during all other time periods. The average number of cars per train would be 2.5 cars during peak hours, two cars during base service, and one car during evening service.
- Vehicle operating speeds are based on the Train Performance Calculation (TPC) Simulations for the project. The speed limits range from 10 mph to 65 mph along the corridor.
- The projections near grade crossings include noise from train whistles and crossing bells. Based on DART audible warning signal equipment and policy, the estimates assume that the whistles generate a noise level of 78 dBA at 50 feet from the track for a five second period as trains approach each crossing. The bells are estimated to generate a noise level of 72 dBA at 50 feet for twenty seconds prior to and ten seconds following each train. These operating parameters are consistent with current DART practice and were designed to minimize community noise exposure to the greatest extent possible within the constraints of safe operations.

### Projected Sound Levels

The No-Build Alternative is not expected to result in any noise impacts.

For the proposed LRT alignment, detailed comparisons of the existing and future noise levels are presented in **Table 5-7** and **Table 5-8**. **Table 5-7** includes results for the Category 2 receptors along the alignment with both daytime and nighttime sensitivity to noise (e.g. residences, hotels, and hospitals). **Table 5-8** is a listing of all Category 3 receptors along the alignment, consisting of institutional sites that are not sensitive to noise at night (e.g. schools, churches, parks and medical offices). In addition to the civil station, distance to the near track and proposed LRT speed, each table includes the existing noise level, the projected noise level from LRT operations and the impact criteria for each receptor or receptor group. Based on a comparison of the predicted project noise level with the impact criteria, the impact category is listed, along with the predicted total noise level and projected noise increase due to the introduction of LRT service. **Table 5-7** also includes an inventory of the number of moderate and severe impacts at each residential location.

The results in **Table 5-7** identify moderate noise impacts for a total of 216 residences. No residences are projected to have severe impact. The FTA definitions of severe impact and moderate impact are found in Section 3.5.1. The following are brief discussions of each impacted Category 2 land use area:

Lofts at Las Colinas and Delano - A Las Colinas Residence (Lake Carolyn Parkway): These multi-family apartment buildings located north of O'Connor Boulevard, on Lake Carolyn Parkway are projected to experience moderate noise impact. There are 3 buildings comprised of 44 units at the Lofts and one building at Delano with an estimated 40 units at this location. The projected noise impacts are due to the grade crossings nearby and the proximity of the buildings to the alignment.

Archstone at MacArthur (1100 Hidden Ridge Drive): These multi-family apartment buildings are located on Hidden Ridge Drive, between MacArthur Boulevard and Brangus Drive. Moderate noise impact is projected at 132 of these residential units due to the proximity to the proposed alignment. Not all of the units directly adjacent to the proposed alignment will experience moderate noise impact because of the slow train speeds associated with the station located here.

Similar to the Category 2 analysis, an assessment of noise impact for Category 3 receptors was also conducted. This assessment was based on a comparison of the existing ambient noise level with the predicted project noise levels in terms of the peak transit hour Leq. As indicated in **Table 5-8**, no impact is predicted at any of these locations.



**TABLE 5-7  
NOISE IMPACTS FOR LAND USE  
WITH BOTH DAYTIME AND NIGHTTIME SENSITIVITY (CATEGORY 2)**

Location	Civil Station	Dist to Near Track (ft)	Speed (mph)		Exist. Noise Level <sup>1</sup>	Project Noise Level <sup>1</sup>			Impact Category	Total Noise Level <sup>1</sup>	Noise Level Increase <sup>1</sup>	# of Res. Impacts	
			EB	WB		Predicted (rounded to nearest decibel)	Impact Criteria					Mod Imp	Sev Imp
							Mod Imp	Sev Imp					
Cistercian Abbey Living Quarters	188	260	40	45	68	57	62	68	N/A	68	0.3	0	0
Mandalay on the Lake Apartments	236	60	43	38	63	58	60	65	N/A	64	1.0	0	0
Lofts at Las Colinas and Delano	272	60	45	39	63	60	60	65	Moderate	65	1.8	84	0
Candlewood Suites Hotel	344	230	38	47	64	53	60	66	N/A	65	0.3	0	0
Fairfield Inn Hotel	345	620	35	42	64	45	60	66	N/A	64	0.1	0	0
Las Colinas Studio Plus Hotel	347	220	27	32	64	52	60	66	N/A	64	0.2	0	0
Extended Stay Deluxe Hotel	347	400	27	32	64	48	60	66	N/A	64	0.1	0	0
Villas at Beaver Creek	358	130	25	25	56	46	56	62	N/A	57	0.4	0	0
Archstone at MacArthur Apartments	391	60	45	45	58	57	56	62	Moderate	60	2.6	132	0
Mandalay Place	408	80	52	36	58	56	56	62	N/A	60	2.3	0	0
<b>Total</b>												<b>216</b>	<b>0</b>

<sup>1</sup> Noise levels are based on Ldn and are measured in dBA.

Source: HMMH, 2006

**TABLE 5-8  
NOISE IMPACTS FOR INSTITUTIONAL LAND USE  
WITH NO NIGHTTIME SENSITIVITY (CATEGORY 1 AND 3)**

Location	Civil Station	Dist. to near track (ft)	Speed (mph)		Exist. Noise Level <sup>1</sup>	Project Noise Level <sup>1</sup>			Impact Category	Total Noise Level <sup>1</sup>	Noise Level Increase <sup>1</sup>
			EB	WB		Predicted <sup>2</sup> (rounded to nearest decibel)	Impact Criteria				
							Mod Imp	Sev Imp			
Cistercian Abbey Church	189	400	37	41	56	53	61	67	N/A	58	1.8
Miss Bloomingdale's Academy	219	180	25	25	60	52	62	68	N/A	60	0.7

<sup>1</sup> Noise levels are based on Peak Hour Leq and are measured in dBA.

Source: HMMH, 2005

#### 5.4.2 Noise Impact Mitigation

As discussed in Section 3.5.1, FTA states that in implementing noise impact criteria, severe impacts should be mitigated unless there are no practical means to do so. At the moderate impact level, more discretion should be used, and other project-specific factors should be included in the consideration of mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-to-indoor sound insulation and the cost-effectiveness of mitigating noise to more acceptable levels. On previous DART rail corridors, DART's noise mitigation policy was to provide mitigation for all severe noise impacts and for moderate noise impacts at locations where a noise exposure increase of 3 dB or more was projected. The 3 dB increase was generally considered the range in which incremental noise would be noticeable. New guidance from FTA supersedes this policy and



requires consideration and adoption of mitigation measures for moderate impacts when it is considered reasonable. Proposed mitigation must represent a reasonable public expenditure after considering the impacts of the action and the benefits of the proposed mitigation measures.

### **Recommended Mitigation Locations**

For the proposed action no severe noise impacts were identified. Moderate noise impacts were identified at three properties (Lofts at Las Colinas, Delano and Archstone Apartments) in two locations, with average noise level increases between 1.8 and 2.6 dB over the existing noise levels. The DEIS was made available to the public and these two moderate impact noise locations were discussed in public meetings and at the DEIS public hearing. No community members from these three apartment developments expressed any concern about noise impacts, and no written or verbal comments on the DEIS about noise were received.

Based on FTA guidance, noise mitigation has been considered at these two moderate impact locations. The following details the consideration for mitigation.

**Lofts at Las Colinas and Delano - A Las Colinas Residence:** These two apartment complexes are located in the Las Colinas Urban Center along Lake Carolyn Parkway. These buildings are four-story, urban, luxury apartments, built to the property line along Lake Carolyn Parkway. The existing noise level at this location is 63 decibels. The projected increase of 1.8 decibels is due to the grade crossings nearby and the proximity of the buildings to the alignment.

The Las Colinas Urban Center is a master-planned community designed to be pedestrian, vehicle and transit-friendly. Their location in the Urban Center is a very urban setting and they were built with the understanding that LRT would be placed down the extra-wide median of the street which was built for this purpose. The APT system operates in the Urban Center, and the LRT will replace what was envisioned as an extension of the APT system. The energy efficient buildings in the Urban Center were built using double-paned windows and have an interior Sound Transmission Class (STC) rating of 50. In addition, there are few to no outdoor activity areas at these apartments facing the street and LRT alignment, reducing the noise sensitivity of these sites.

Providing mitigation at this location for moderate impacts with small increases in noise levels would be very cost prohibitive and challenging from an engineering feasibility standpoint. Because these sites are multi-story apartment buildings, noise walls would need to provide shielding for the upper stories, which would result in barriers at least 15 feet high. Also, sound walls are an impractical and inadequate means of mitigating noise generated by the grade crossing signals. Given the high quality of the construction of the apartments, additional soundproofing is also impractical. The minimal reduction in sound would not justify the expense. The existing interior STC rating is as high a quality as would be recommended to minimize sound transmission. DART has avoided placing special trackwork, which would generate more noise, in this sensitive area. Noise is further reduced in this area due to the slower trains speeds associated with the median running alignment.

**Archstone at MacArthur (1100 Hidden Ridge Drive):** This large suburban apartment complex consists of three-story buildings with few to no outdoor activity areas facing the LRT alignment, reducing the noise sensitivity of this site. The projected noise level increase in this area is due to the proximity of the complex to the rail. There are no grade crossings in the immediate vicinity. Despite having a projected moderate noise increase of 2.6 decibels the resultant noise level will only be 60 decibels which is quieter than the existing noise level of most tested locations along the corridor. In a June 13, 2008 meeting, Archstone Apartment Management expressed their belief that a less than 3-decibel increase in noise would be insignificant.

Providing noise mitigation at this location is also challenging. The multi-story buildings would again require very high noise walls to provide shielding for the upper stories. The placement of such a structure would be perceived as an adverse visual effect. As acknowledged in Section 5.6 of this



FEIS, a significant visual impact has been identified at Archstone Apartments. Recent discussions with complex management have reconfirmed the importance of maintaining the existing views and the visual mitigation described in Section 5.6.3. During the public comment period, North Lake College commented “visual aesthetics should not be sacrificed” in this area (See **Table 7-3**, Comment W-8H). Considering the low ambient conditions, soundproofing at this location is not a practical or economical solution. The cost of soundproofing a large number of apartment units does not justify the public expenditure. DART has avoided placing special trackwork, which would generate more noise, in this sensitive area. Noise is further reduced in this area due to the slower trains speeds associated with entering and exiting the station.

In summary, DART does not propose to implement any noise mitigation for the two moderate impact locations. The less than three decibel increase approaches the noticeable range but the community has not expressed any concerns regarding noise impacts. In these areas, sound walls and their associated visual impacts would be impractical or ineffective. The incremental reduction in noise associated with soundproofing does not appear to represent a reasonable public expenditure. DART is operating at slower speeds in these areas and has avoided the placement of special trackwork.

DART has committed to reevaluate noise impacts at these locations during final design to determine if projected noise levels would warrant mitigation. Additionally, DART will continue to examine feasible and cost-effective methods to reduce noise levels at these locations during final design. Considerations may include directional at-grade warning devices, track crossover relocations, and limited noise reductions that may be achieved by visual impact mitigations to be considered in some areas, or elimination of signal bells.

## 5.5 VIBRATION

### 5.5.1 Ground Vibration Impact Assessment

#### Vibration Impact Assessment Methodology

The potential vibration impact from LRT operation was assessed on an absolute basis using the FTA criteria. The same representative sensitive receptors identified in Section 3.6.2, Existing Vibration Conditions, were considered for the vibration impact assessment. The following factors were used in determining potential vibration impacts along the project corridor:

- No ambient vibration measurements were conducted along the proposed alignment because there are no significant sources of existing vibration along the corridor.
- Vibration propagation tests were conducted at three sites along the corridor near sensitive receptors. These tests measured the response of the ground to an input force. The results of these tests were combined with available vibration source level data for the DART vehicle to project vibration levels from vehicles operating on the project corridor.
- Vehicle operating speeds are based on the TPC Simulations for the project corridor. The speed limits range from 10 mph to 65 mph along the corridor.

#### Projected Vibration Levels

The No-Build Alternative is not expected to result in any ground-borne vibration impacts. Traffic, even heavy trucks and buses, rarely creates perceptible ground-borne vibration unless vehicles are operating very close to buildings or there are irregularities, such as potholes or expansion joints, in the roadway. The pneumatic tires and suspensions systems of normal automobiles, trucks and buses are sufficient to minimize most ground-borne vibration forces.