

- Floating Slabs.** Floating slabs consist of thick concrete slabs supported by resilient pads on a concrete foundation; the tracks are mounted on top of the floating slab. Most successful floating slab installations are in subways, and their use for at-grade track is rare. Although floating slabs are designed to provide vibration reduction at lower frequencies than ballast mats, they are extremely expensive.
- Property Acquisitions or Easements.** Additional options for avoiding noise and vibration impacts are for the transit agency to purchase residences likely to be impacted by train operations or to acquire easements for such residences by paying the homeowners to accept the future train vibration conditions. These approaches are usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.

Vibration impacts that exceed FTA criteria are considered to be significant and to warrant mitigation, if reasonable and feasible. **Table 3-12** indicates the locations along the proposed DART Rail to Rowlett Corridor where mitigation has been recommended to reduce the vibration levels. At a minimum, mitigation would require the installation of ballast mats or TDA. However, more extensive mitigation may be required to adequately reduce the vibration levels to below the FTA vibration impact criterion. Vibration mitigation will be addressed in more detail during final design. The vibration mitigation locations in **Table 3-11** are preliminary only, and will be refined based on a more complete vibration analysis with more detailed engineering information.

Table 3-12: Vibration Mitigation Locations

Location	Impacts	Civil Station	Length (ft)
Parker Circle	13	994-1004	1,000
Total			1,000

Source: HMMH, 2006

Mitigation Treatments

Vibration Impacts would be mitigated between Civil Station 994 and 1004 to include 1,000 ft. of treatments to be developed during final design.

3.10 Air Quality

This section describes the air quality assessment for the proposed DART Rail to Rowlett. The purpose of this assessment is to identify potential air quality impacts for the proposed DART Rail to Rowlett as compared to the No-Build Alternative and to identify any mitigation treatments that may be required to reduce impacts to a level less than significant.

3.10.1 Air Quality

Impact Assessment

The potential for air quality impacts was evaluated by using an existing regional air quality emissions analysis, dispersion modeling, and evaluating any mitigation treatments determined

DART RAIL TO ROWLETT | Connecting Communities



for air quality impacts for the proposed DART Rail to Rowlett. Discussions with NCTCOG indicated that the proposed DART Rail to Rowlett would likely not have adverse significant impacts on regional air quality. The NCTCOG’s *Transportation Metropolitan Mobility Plan* (TMMP) outlines a regional analysis and is identified below. The DFW Metropolitan Area has not had any CO exceedances in the last ten years. The hot-spot CO analysis was performed to show potential CO impacts for the proposed DART Rail to Rowlett and No-Build Alternatives.

DART policies regarding air quality are to reduce motor vehicle emissions burden in rail corridors and to ensure that projects do not create local traffic congestion that results in the exceedance of the NAAQS. Potential air quality impacts for the proposed DART Rail to Rowlett are related to:

- Vehicular delay and congestion at LRT at-grade crossings
- Increased delays and congestion due to vehicular trips accessing station locations
- Reduction in vehicular traffic due to mode shifts

According to a study for the Transportation Research Board (sponsored by FTA and Transit Development Corp.), an average single-passenger automobile produces an estimated 2.09 grams per passenger mile of hydrocarbons, while bus transit produces approximately 0.20 grams per passenger mile, and rail transit only 0.01 grams per passenger mile. Moving individuals from single-occupancy vehicles to LRT provides a quantifiable reduction in pollutant emissions and an improvement in air quality.

Regional (Mesoscale) Analysis

A regional analysis of the area was performed and is outlined in the TMMP that quantifies transportation needs (including rail transit) by using an index that measures mobility for the DFW Metropolitan Area. An air quality index was developed using emission rates developed by the Texas Transportation Institute. It combines VOCs and NOx into a single rate and applies a travel model derived VMT to calculate the air quality emission index. **Table 3-13** shows the results of the TMMP air quality analysis.

Table 3-13: Regional Air Quality Emissions

Alternatives	VOC and NOx emissions (tons/day)
1999 Baseline	175
2025 MTP	20
2025 TMMP	18

Source: TMMP, 2004

Table 3-13 shows that VOCs and NOx emissions would be substantially reduced as a result of transportation improvements including rail transit.

Microscale CO Analysis

The potential for local air quality impacts on a microscale level was evaluated based on intersections/crossings within the proposed DART Rail to Rowlett Corridor. EPA guidance states

DART RAIL TO ROWLETT | Connecting Communities



intersections that are currently operating or would operate at LOS D or worse should be considered for air quality analysis. In identifying LOS for the intersections/crossings impacted by the proposed DART Rail to Rowlett, an analysis was performed to identify grade separations.

Vehicular Delay and Congestion at street-level LRT crossings

A grade separation and warrant transportation analysis for major rail crossings was completed for the proposed DART Rail to Rowlett (the transportation facilities section goes into detail about the analysis). Street crossings analyzed for the air quality analysis include First Street and Walnut Road and SH 66 and Rowlett Road. **Table 3-14** shows ADT and existing and future 2025 LOS ratings for these crossings.

Table 3-14: Existing and Future LOS for LRT Alternative Intersection/Crossings

Intersection Crossing	ADT 1999/2004	Existing LOS		Future LOS (2025)		Future LOS w/LRT Preemption		Unacceptable Queues
		AM	PM	AM	PM	AM	PM	
First Street and Walnut Road	7,939/13,371	C	C	C	C	C	D	YES
SH 66 and Rowlett Road	21,393/32,000	B	B	D	B	C	D	YES

Source: Parsons, 2006

Increased Delays and Congestion Due to Vehicular Trips Accessing Station Locations

LRT operations at the First Street crossing, as well as, the Rowlett Road crossing would downgrade existing LOS ratings as a result of the proposed DART Rail to Rowlett (Parsons 2006). Grade separated crossings have been recommended for these intersections. All other crossings are projected to have acceptable LOS ratings.

A hotspot CO analysis was conducted for First Street and Walnut Road, as well as, SH 66 and Rowlett Road intersections. These intersections/crossings were modeled because of their ADT and/or future LOS rating.

The EPA Cal3QHC dispersion model was used. This model calculates the hourly CO concentration for each receptor for multiple wind directions. CO concentrations for the proposed DART Rail to Rowlett were modeled using the worst-case scenario (adverse meteorological conditions and sensitive receptors and the ROW line). Only the 8-hour NAAQS was modeled because historic monitoring data shows that the 8-hour NAAQS of 9.0 parts per million is more likely to be exceeded than the 35 parts per million 1-hour NAAQS.

MOBILE6 Emissions rates for arterial roadways in grams/VMT) were obtained from TxDOT and used in the calculations. **Table 3-15** shows the results of the analysis:



Table 3-15: 2025 Microscale CO Analysis

Intersection	Existing (2006) (ppm)	No-Build (2025) (ppm)	LRT (2025) (ppm)
First Street and Walnut Rd.	5.1	6.0	4.8
SH 66 and Rowlett Rd.	5.5	6.7	4.9

Source: LOPEZGARCIA GROUP, 2006

Note: ppm = parts per million

The results of the analysis show that the maximum predicted 8-hour concentration would occur with the No-Build Alternative. The proposed DART Rail to Rowlett would be lower than existing concentrations. All scenarios are below the NAAQS of 9.0 parts per million.

Reduction in Vehicular Traffic Due to Mode Shifts

NCTCOG's *Mobility 2025—Metropolitan Transportation Plan, Amended April 2005* shows 1999 baseline VMT for Dallas County as 61.8 million with a projected 2025 increase to 94.9 million; an increase of 34 percent. The proposed DART Rail to Rowlett would allow for a reduction in vehicular traffic and would result in fewer emissions.

The results of the regional and microscale analysis show that the LRT Alternative would have a positive impact on air quality in the region and locally. Studies and analyses for regional emissions including transit emissions show that emissions decline when decreasing vehicle miles. The microscale analysis shows a decrease in CO emissions for the proposed DART Rail to Rowlett compared to existing (baseline) conditions and the No-Build Alternative.

Mitigation Treatments

No significant air quality impacts are expected, therefore, no mitigation would be required.

3.10.2 Conformity Statement

According to the Transportation Conformity Rule, a Conformity Determination is required by the following (DOT FHWA 2006):

- One year after the effective date of a nonattainment designation in an area that is designated nonattainment for the first time
- Prior to approval of new transportation plans/TIPS or plan TIP amendments
- Prior to federal approval or funding of projects

The proposed DART Rail to Rowlett is consistent with the area's financially constrained long-range, MTP known as *Mobility 2025—Metropolitan Transportation Plan, Amended April 2005* and the 2006-2008 Statewide TIP. The October 31, 2005 DOT TIP finding was based on the conformity determination issued by DOT for the 2025 MTP on June 16, 2005. Additionally, the project comes from an operational CMS that meets all requirements of 23 CFR Highways, Parts 450 and 500.

DART RAIL TO ROWLETT | Connecting Communities



A conformity analysis was conducted using years 2007, 2010, 2015, and 2025. The Transportation Conformity document for the DFW nonattainment area identifies this process. **Table 3-16** shows the results of the analysis:

Table 3-16: 2005 Conformity Determination for the DFW Nine-County Nonattainment Area

Year/Pollutant	VOC	NO _x
Motor Vehicle Emission Budgets	104.14	201.32
2007 (5% increment option plan)	101.21	198.18
2010 (8-hour O ₃ NAAQS attainment)	83.97	147.98
2015 (Analysis to meet 10-year requirement)	61.18	74.02
2025 (MTP)	45.30	37.90

Source: NCTCOG, 2005

3.10.3 Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the CAA. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead Federal Agency for administering the CAA and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources 66 FR 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the CAA. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent. As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.



Unavailable Information for Project Specific MSAT Impact Analysis

The DART Rail to Rowlett LEA includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the proposed DART Rail to Rowlett. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

Evaluating the environmental and health impacts from MSATs on a proposed transit project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of the proposed DART Rail to Rowlett.

- **Emissions.** The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of transit projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model--emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE 6.2 as an obstacle to quantitative analysis. These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.
- **Dispersion.** The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of CO to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific transit project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This

DART RAIL TO ROWLETT | Connecting Communities



**DART Rail to Rowlett
Final Local Environmental Assessment**

work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

- **Exposure Levels and Health Effects.** Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at <http://www.epa.gov/iris>. The following toxicity information for the six prioritized MSATs was taken from the IRIS database *Weight of Evidence Characterization* summaries. This information is taken verbatim from EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

DART RAIL TO ROWLETT | Connecting Communities



- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Diesel exhaust** (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- **Diesel exhaust** also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes -- particularly respiratory problems¹. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

¹ South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 Studies on the relationship between health and air quality; NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.



The following paragraphs of this document provide a qualitative analysis of MSAT emissions relative to the proposed DART Rail to Rowlett. The concentrations and duration of any project-related exposures to MSAT emissions are uncertain, however, and because of this uncertainty, the health effects from these emissions cannot be estimated.

Qualitative Comparison of Alternatives

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of the proposed DART Rail to Rowlett. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the proposed DART Rail to Rowlett. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm

For the proposed DART Rail to Rowlett, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the proposed DART Rail to Rowlett is lower than that for the No Build Alternative, because implementation of the proposed DART Rail to Rowlett would remove drivers from roadways. This decrease in VMT would lead to lower MSAT emissions for the proposed DART Rail to Rowlett. Additionally, removing drivers from roadways increases the roadways' capacity, potentially reducing vehicular emissions further. According to EPA's MOBILE 6 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases.

Regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great, even after accounting for any VMT growth, that MSAT emissions in the proposed DART Rail to Rowlett Corridor are likely to be lower in the future in nearly all cases.

DART RAIL TO ROWLETT | Connecting Communities

