Expressway Corridor Environmental Health Study

Study Report

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Executive Summary

Introduction

The city of Plano has grown significantly over the past 50 years, and during that time the city's long range planning policies have focused on limiting residential development in expressway corridors for the dual purposes of preserving land for economic development and maintaining quality of life. Previously residential development within 1,200 feet of expressway centerlines was restricted in order to buffer the negative quality of life impacts of expressways on residents. As a continuation of the prior comprehensive plan philosophy related to expressway corridor setbacks, the following action statement was adopted within the Comprehensive Plan:

Redevelopment of Regional Transportation Corridors Action Statement RTC4 - Develop design guidelines for residential development adjacent to expressways that reduce noise and provide for proper filtering, ventilation, and exhaust of vehicle air emissions.

This study was proposed to examine the science and best practices of the quality of life issues; the results will provide the City Council and Planning & Zoning Commission more solid, defensible data for making decisions on where and how to be accommodating regarding residential setback goals. The goal of this study is to provide more precise, accurate, and flexible tools to aid in determining reasonable development outcomes while preserving quality of life goals.

Health Impacts

Since passage of the Clean Air Act in 1963 and the Noise Control Act of 1972 research has been undertaken to understand the impact of automobile exhaust and noise on people's health. Based on studies in the U.S. and Europe, a body of evidence has been established that identifies several adverse health effects related to proximity to high volume and high speed roadways. Higher levels of air pollution often related to living in close proximity to highways have been demonstrated to result in increased rates of asthma, heart and circulatory diseases, and poor health conditions in newborns and children. In addition, high levels of highway noise have been found to increase sleep disturbance and the associated adverse health impacts such as increased rates of heart disease, hypertension, and diabetes.

Noise Exposure

Noise is most commonly measured using the logarithmic decibel (dB) scale and corrected using an "A" weighting that correlates best to human noise perception. Since noise exposure changes over time, there are many ways to measure noise, ranging from measuring the loudest noise, background noise, ambient noise, and total noise exposure. Most studies evaluating the health impacts of noise consider the 24 hour average noise level; these studies include an adjustment for nighttime noise to account for the significant impact of sleep disturbance. This measure, called the Day Night Average Sound Level (or L_{dn}), has been used throughout the country by both state and federal agencies to determine acceptable noise levels.

As it relates to acceptable levels of noise in a residential environment, the United States Department of Housing and Urban Development (HUD) has identified standards for acceptable noise levels. They have identified that locations with 75 dBA L_{dn} are typically unacceptable for residential development. Locations

that are between 65 and 75 dBA L_{dn} are considered normally unacceptable but can be permissible with certain levels of mitigation. Locations that are 65 dBA L_{dn} and below are considered acceptable for residential development. In addition, HUD identified a goal for interior noise levels from outside noise sources be no greater than 45 dBA L_{dn}. Since the HUD standards are most appropriate for residential development and are consistent with acceptable levels identified in health research it is recommended that the City of Plano utilize these same standards in development of residential development guidelines.

To determine existing and future noise levels in the city, a noise model was developed for the areas surrounding Plano's expressways. The model takes into account the effects of terrain features including elevations of noise sources, receivers, and intervening objects (buildings, hills, and trees), and ground effects due to areas of hard ground (pavement and water) and soft ground (grass, field, and forest). The model was developed with data from the Plano GIS system, DART train schedules, and traffic data from the Texas Department of Transportation and the North Texas Tollway Authority. The model was calibrated with noise data collected at 19 locations across Plano (both short- and long-term monitors).

Environmental Health Maps were created based on the model data which identify noise levels in the areas adjacent to the expressways (See Appendix D). The maps include two noise contours which identify the areas with noise levels:

- Between 65 dBA Ldn and 75 dBA Ldn.
- Above 75 dBA Ldn.

Air Pollution Exposure

Air pollution is generally a regional issue because air pollutants can travel far distances before dispersion. Concentrations of air pollutants are highly variable and can change dramatically due to weather, wind, time of day, topography, and micro-climates, and therefore cannot be reliably modeled and mapped at the local or parcel level. However, increased levels of some pollutants are found in close proximity to expressways and are a cause for concern. Studies have shown that concentrations of some air pollutants are generally higher within 300 to 500 feet of the edge of the roadway and although highly variable, represent a condition that may be effectively mitigated.

Recommendations for Land Use

After review of approaches that other communities used to control or guide residential and other sensitive land uses adjacent to expressways, the recommended approach to account for the potential impacts of noise and air quality adjacent to expressways in Plano include the following:

- Integrate into the site design process the review of noise and air quality conditions for Planning & Zoning Commission consideration in the overall evaluation of the development.
- Each new residential and other sensitive land use constructed or expanded in the city should be reviewed for compliance with the noise exposure standards established by the Department of Housing and Urban Development as they relate to residential development.
- Mitigation for noise and air quality impacts should be considered for each applicable land use located in an area where mitigation may be appropriate.

Mitigation options to minimize the effects of noise and air pollution should include:

- Increased distance between the expressway and the building;

- Installation of sound barriers, which could include noise walls, earthen berms, or other buildings;
- Develop the site design to locate bedrooms, balconies, and open spaces away from the expressways;
- Enhanced building design using improved window, door, and wall materials and/or designs to achieve interior noise level goals (noise mitigation only);
- Locating air intake vents on buildings to face away from expressways and as far away from the expressway as practical (air pollution mitigation only); and
- Providing indoor air quality filtration system that reduces at least 90% of particulate matter emissions (air pollution only).