

AIR / NOISE ANALYSIS

301 US 301 Project Development

AIR QUALITY

Macroscale (Region-wide) Air Quality Analysis

Performed by Wilmington Area Planning Council (WILMAPCO)

- State Implementation Plans (SIPs) are developed to define how a region will meet the primary and secondary National Ambient Air Quality Standards (NAAQS).
- The WILMAPCO develops a Constrained Long Range Plan (CLRP) and a Transportation Improvement Plan (TIP).
- A computer model is developed to predict CLRP and TIP impacts on air quality in New Castle County and to check conformity to the SIP.
- Emissions determined in the air quality analysis are summertime Nitrous Oxides (NO_x) and Volatile Organic Compounds (VOC) and wintertime Carbon Monoxide (CO). The NO_x and VOC emissions are precursors for forming Ozone (O₃).
- The US 301 Project is included in the 2005-2010 CLRP.
- The US 301 Project conforms to the SIP since it is included in a conforming CLRP.

Microscale (Project-level) Air Quality Analysis

Performed by DelDOT

- CO hotspot analysis along the US 301 alignments and at 2 signalized intersections within the US 301 project area.
- 25 air quality receptor locations were selected to represent air quality sensitive locations. The sensitive receptor locations were defined as locations on either side of the proposed alignments that would be affected by changes in air quality.
- 2 signalized intersections along the proposed US 301 alignments were analyzed using 40 air quality receptors.
- There are no violations of the State/National Ambient Air Quality Standards (S/NAAQS) for CO.
- The 1-hour S/NAAQS for CO is 35 ppm. The 8-hour S/NAAQS for CO is 9 ppm.
- The 1-hour CO concentrations include a 1.7 ppm background level and the 8-hour average CO concentrations include a 1.2 ppm background level.
- The highest CO concentrations are as follows:

	HIGHEST CONCENTRATIONS							
	2010				2030			
	Sensitive Receptor Sites		Intersections along US 301		Sensitive Receptor Sites		Intersections along US 301	
	1 hr	8 hr	1 hr	8 hr	1 hr	8 hr	1 hr	8 hr
No Build Alternative	4.8	2.7	5.5	3.2	4.0	2.3	4.4	2.7
Yellow Alternative	5.1	2.9	5.1	2.6	4.2	2.5	4.1	2.3
Purple + Spur Alternative	6.1	3.3	4.0	2.6	5.0	2.8	3.5	2.2
Brown Alternative (North + South)	6.3	3.4	5.1	2.6	5.2	2.9	4.1	2.3
Green + Spur Alternative (North + South)	6.3	3.5	4.0	2.6	5.2	2.9	3.5	2.2

NOISE ANALYSIS

Federal Noise Regulations

The Federal Highway Administration (FHWA) has issued guidelines for noise evaluation as established in Title 23 of the Code of Federal Regulations (CFR) Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. Highway traffic noise studies, noise abatement procedures, coordination requirements and design noise levels in CFR Part 772 constitute the noise standards mandated by 23 U.S.C. 109(i). Design noise levels for various types of activity (land use) categories are summarized in the table below.

FHWA Noise Abatement Criteria/Activity Relationships

Activity Category	Design Noise Level (Leq(h))	Description of Activity Category
A	57 dBA (Exterior)	Land on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 dBA (Exterior)	Residences, motels, hotels, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	72 dBA (Exterior)	Developed lands, properties or activities not included in categories A and B above.
D	--	Undeveloped lands.
E	52 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

DelDOT's Noise Abatement Policy

DelDOT considers noise mitigation when either of the following conditions is satisfied:

1. Predicted design-year noise levels approach or exceed the noise abatement criteria levels given above. DelDOT considers a noise impact to occur when the design noise level is approached or exceeded (i.e., predicted exterior noise level for a residence at ground level must approach or equal 67 dBA to qualify as a traffic noise impact).
2. Predicted design-year noise levels substantially exceed existing noise levels (equal to, or greater than, a 10 dBA increase).

Outline of Noise Analysis Procedures

1. Identify Noise-Sensitive Land Uses
2. Determine Existing Noise Levels
3. Compare Computed and Measured Noise Levels
4. Predict Design-Year Noise Levels
5. Project Noise Impacts
6. Assess Mitigation Measures

Common Outdoor Noise Levels	Noise Level dBA	Common Indoor Noise Levels
Jet Flyover at 1,000 ft	110	Rock Band
Gas Lawn Mower at 3 feet	100	Inside Subway Train (NY)
Noisy Urban Daytime	90	Food Blender at 3 feet
Gas Lawn Mower at 100' Commercial Area	80	Garbage Disposal at 3 feet (throwing at 3 feet)
Quiet Urban Daytime	70	Vacuum Cleaner at 10 feet
Quiet Urban Nighttime	60	Normal Speech at 3 feet
Quiet Suburban Nighttime	50	Large Business Office
Quiet Rural Nighttime	40	Dishwasher Next Room (Background)
	30	Small Theater, Large Conference Room (Background)
	20	Library
	10	Bedroom at Night, Concert Hall (Background)
	0	Broadcast & Recording Studio
		Threshold of Hearing

Adapted from Guide on Evaluation and Abatement of Traffic Noise, AASHTO 7814.

AIR & NOISE MONITORING SITES



Preliminary Results of the Noise Analysis

Analysis Procedures and Methodology

This analysis was conducted in accordance with standard FHWA guidelines and current DelDOT procedures and policies. The analysis began with the determination of existing noise levels along the project corridor in order to assess the traffic noise contributions on the neighboring noise sensitive areas. Future proposed design year 2030 alternatives noise calculations and predictions were performed using FHWA-approved methods. The noise predictions were performed with the FHWA Traffic Noise Model (TNM) version 2.5 (FHWA-PD-96-009). The model incorporates vehicle noise emission levels, updated for modern vehicle classification, traffic speed and traffic volume, sound propagation factors from atmospheric absorption, divergence, intervening ground, intervening barriers, intervening rows of buildings and areas of heavy vegetation.

A comparison of predicted existing and future noise levels, including the No-Build Alternative and retained alternatives, has been conducted. Predicted noise levels were calculated to 0.1 dBA and then rounded to the nearest whole integer. The table below summarizes the preliminary finds by alternatives as they relate to the communities located along the corridors of the retained alternatives. The noise analysis is on-going and the results shown below are but one factor in evaluating the retained alternatives.

Yellow Alternative Noise Impact Assessment		
Community Area	Number of Impacts	Type of Impacts
Summit Bridge Farms	14	Predicted Noise Levels of 66 dBA or greater
Crystal Run Farm	6	Predicted Noise Levels of 66 dBA or greater
Chesapeake Corner	2	Predicted Noise Levels of 66 dBA or greater
Grandview Farms	33	Predicted Noise Levels of 66 dBA or greater
Cedar Lane / SR996	4	Predicted Noise Levels of 66 dBA or greater
Penfield Farms	5	Predicted Noise Levels of 66 dBA or greater
Mobile Neck Road	1	Predicted Noise Levels of 66 dBA or greater
Total	71	These mitigation options are currently being assessed and results will be available at the next public workshop

Purple + Spur Alternative Noise Impact Assessment		
Community Area	Number of Impacts	Type of Impacts
Lea Eara Farms	5	Predicted Noise Levels of 66 dBA or greater
Summit Bridge Farms	14	Predicted Noise Levels of 66 dBA or greater
Chesapeake Meadow	10	Less than 66 dBA, but +10 dBA over existing
Post and Rail Farms	2	Predicted Noise Levels of 66 dBA or greater
Midtown Village	15	Less than 66 dBA, but +10 dBA over existing
Hammons Corner	2	Predicted Noise Levels of 66 dBA or greater
Grandview Farms	31	Predicted Noise Levels of 66 dBA or greater
Cedar Lane / SR996	3	Predicted Noise Levels of 66 dBA or greater
Penfield Farms	5	Predicted Noise Levels of 66 dBA or greater
Total	67	These mitigation options are currently being assessed and results will be available at the next public workshop

Brown-North Alternative Noise Impact Assessment		
Community Area	Number of Impacts	Type of Impacts
Lea Eara Farms	5	Predicted Noise Levels of 66 dBA or greater
Summit Bridge Farms	14	Predicted Noise Levels of 66 dBA or greater
Chesapeake Meadow	20	Less than 66 dBA, but +10 dBA over existing
Post and Rail Farms	2	Predicted Noise Levels of 66 dBA or greater
Midtown Village	15	Less than 66 dBA, but +10 dBA over existing
Total	66	These mitigation options are currently being assessed and results will be available at the next public workshop

Brown-South Alternative Noise Impact Assessment		
Community Area	Number of Impacts	Type of Impacts
Lea Eara Farms	5	Predicted Noise Levels of 66 dBA or greater
Summit Bridge Farms	13	Predicted Noise Levels of 66 dBA or greater
Chesapeake Meadow	20	Less than 66 dBA, but +10 dBA over existing
Post and Rail Farms	2	Predicted Noise Levels of 66 dBA or greater
Midtown Village	15	Less than 66 dBA, but +10 dBA over existing
Total	65	These mitigation options are currently being assessed and results will be available at the next public workshop

Green-North + Spur Alternative Noise Impact Assessment		
Community Area	Number of Impacts	Type of Impacts
Lea Eara Farms	14	Predicted Noise Levels of 66 dBA or greater
Summit Bridge Farms	14	Predicted Noise Levels of 66 dBA or greater
Chesapeake Meadow	10	Less than 66 dBA, but +10 dBA over existing
Post and Rail Farms	2	Predicted Noise Levels of 66 dBA or greater
Midtown Village	15	Less than 66 dBA, but +10 dBA over existing
Total	48	These mitigation options are currently being assessed and results will be available at the next public workshop

Green-South + Spur Alternative Noise Impact Assessment		
Community Area	Number of Impacts	Type of Impacts
Lea Eara Farms	14	Predicted Noise Levels of 66 dBA or greater
Summit Bridge Farms	14	Predicted Noise Levels of 66 dBA or greater
Chesapeake Meadow	10	Less than 66 dBA, but +10 dBA over existing
Post and Rail Farms	2	Predicted Noise Levels of 66 dBA or greater
Midtown Village	15	Less than 66 dBA, but +10 dBA over existing
Total	48	These mitigation options are currently being assessed and results will be available at the next public workshop