

CHAPTER 7 – MESOSCALE AIR QUALITY ANALYSIS

7.1 Introduction

This chapter describes the mesoscale emission screening analysis that was performed for the 23 conceptual alternatives. The purpose of the mesoscale screening analysis is to evaluate the potential impact of traffic-related air emissions (called the pollutant burden) associated with the conceptual alternatives at a regional or county-wide basis. The mesoscale screening covers a larger geographic area than the immediate project area, to include all roadways that may be affected by the project. More detailed intersection-level air quality analyses will be conducted for the short-listed alternatives at the DEIS stage of the EIS process.

7.2 Methodology

The mesoscale screening utilizes data output from the Chittenden County Travel Demand Model, which is described in Chapter 4. The transportation data required for the screening includes vehicle miles traveled (VMT), vehicle hours traveled (VHT), roadway speeds, typical hot/cold starts, and vehicle classifications. The screening includes mesoscale emission analysis of the following traffic-related criteria pollutants: carbon monoxide (CO), ozone precursors (volatile organic compounds [VOC] and nitrogen oxides [NOx]), and particulate matter (PM₁₀ and PM_{2.5}). The results of the analysis include a total estimate of the pollutant burden associated with the project, and the impact or beneficial effect resulting from the project alternatives. The procedure and methodology include the following:

- Using the estimated or posted speeds and thermal states for the build year of 2025 to determine emission factors for various vehicle types from the U.S. EPA MOBILE6.2 mobile source model.
- For each of the conceptual alternatives, including the No Build alternative, the emissions burden was then calculated by multiplying the emission factor determined above by the VMT on roadway systems. The emission factor for each vehicle type is then multiplied by the vehicle mix percentage and summed to determine a total emission burden on the roadways.
- The emission burden under each conceptual alternative was then compared to the emission burden under the No Build condition to determine the possible impact or beneficial effect on regional air emissions.

Since the project area is in attainment for all criteria pollutants, the Federal transportation conformity criteria do not apply to the project. A typical federal threshold for a moderate non-attainment criteria pollutant is 100 tons/year.

7.3 Findings

The mesoscale emission screening results are summarized in Tables 7-1 and 7-2 for the criteria pollutants described above. Table 7-1 shows the total emission burden and Table 7-2 shows the estimated impacts or beneficial effects. The screening analysis indicates that emission decreases and beneficial effects are predicted for Alternatives 1, 2, 4, 5, 8, and 21. There would be minor or negligible increases in emissions for the other alternatives. The maximum emission increases are predicted for Alternatives 9, 11 and 16, with an increase of 0.05 ton of CO, 0.001 ton of VOC and NOx, 0.0002 ton of PM₁₀, and 0.0001 ton of PM_{2.5}.

**Table 7-1
Mesoscale Emission Estimates (Year 2025)
Total Emission Burden**

Conceptual Alternative	VMT	Total Emission Generated (Tons)				
		CO	VOC	NOx	PM ₁₀	PM _{2.5}
No Build Alternative	611,059	5.617	0.102	0.147	0.017	0.008
1 Bus Lanes on VT 2A (Transit Improvement)	610,807	5.614	0.102	0.147	0.017	0.008
2 VT 2A Corridor Improvements with Traditional TSM	610,873	5.615	0.102	0.147	0.017	0.008
3 VT 2A Corridor Improvements with Roundabouts	611,279	5.619	0.102	0.147	0.017	0.008
4 VT 117 Corridor Improvements	610,794	5.614	0.102	0.147	0.017	0.008
5 North Williston Road Corridor Improvements	610,683	5.613	0.102	0.147	0.017	0.008
6 Multi-Corridor Improvements with Traditional TSM	611,528	5.621	0.102	0.147	0.017	0.008
7 Multi-Corridor Improvements with Roundabouts	611,528	5.621	0.102	0.147	0.017	0.008
8 Brownell Road Corridor Improvements	610,681	5.613	0.102	0.147	0.017	0.008
9 Circ A/B Limited Access Highway	616,987	5.671	0.103	0.149	0.017	0.008
10 Circ A/B Boulevard	615,875	5.661	0.103	0.148	0.017	0.008
11 Circ Limited Access Highway (East Alignment)	616,987	5.671	0.103	0.149	0.017	0.008
12 Circ Boulevard (East Alignment)	615,875	5.661	0.103	0.148	0.017	0.008
13 Circ A Partial (Circ Street)	613,647	5.640	0.103	0.148	0.017	0.008
14 Circ B Limited Access Highway	613,011	5.635	0.102	0.148	0.017	0.008
15 Mountain View Road Connector	613,011	5.635	0.102	0.148	0.017	0.008
16 Circ A/B Limited Access Highway with Spot Improvements on VT 2A	616,987	5.671	0.103	0.149	0.017	0.008
17 Circ A/B Boulevard with Improvements on VT 2A	615,875	5.661	0.103	0.148	0.017	0.008
18 VT 2A Corridor Improvements with Traditional TSM and Circ A Partial (Circ Street)	611,716	5.623	0.102	0.147	0.017	0.008
19 VT 2A Corridor Improvements with Roundabouts and Circ A Partial (Circ Street)	611,716	5.623	0.102	0.147	0.017	0.008
20 North Williston Road Improvements with Circ B Connector and VT Spot Improvements	611,771	5.624	0.102	0.147	0.017	0.008
21 Brownell Road Corridor Improvements with Mountain View Road Connector and VT 2A Spot Improvements	610,729	5.614	0.102	0.147	0.017	0.008
22 VT 2A – Williston Improvements with Roundabouts at Five Corners	613,022	5.635	0.102	0.148	0.017	0.008
23 VT 2A – Williston Improvements with Roundabouts at Five Corners plus Circ A Partial (Circ Street)	613,763	5.641	0.103	0.149	0.017	0.008

**Table 7-2
Estimated Impacts or Beneficial Effects**

Conceptual Alternative	VMT Change*	Estimated Emission Change (Build vs. No-Build), Tons*				
		CO	VOC	NOx	PM ₁₀	PM _{2.5}
1 Bus Lanes on VT 2A (Transit Improvement)	-252	-0.00231	-0.00004	-0.00006	-0.00001	0.00000
2 VT 2A Corridor Improvements with Traditional TSM	-186	-0.00171	-0.00003	-0.00004	-0.00001	0.00000
3 VT 2A Corridor Improvements with Roundabouts	220	0.00203	0.00004	0.00005	0.00001	0.00000
4 VT 117 Corridor Improvements	-265	-0.00243	-0.00004	-0.00006	-0.00001	0.00000
5 North Williston Road Corridor Improvements	-376	-0.00345	-0.00006	-0.00009	-0.00001	0.00000
6 Multi-Corridor Improvements with Traditional TSM	469	0.00432	0.00008	0.00011	0.00001	0.00001
7 Multi-Corridor Improvements with Roundabouts	469	0.00432	0.00008	0.00011	0.00001	0.00001
8 Brownell Road Corridor Improvements	-378	-0.00347	-0.00006	-0.00009	-0.00001	0.00000
9 Circ A/B Limited Access Highway	5,928	0.05449	0.00099	0.00143	0.00017	0.00008
10 Circ A/B Boulevard	4,816	0.04427	0.00081	0.00116	0.00013	0.00006
11 Circ Limited Access Highway (East Alignment)	5,928	0.05449	0.00099	0.00143	0.00017	0.00008
12 Circ Boulevard (East Alignment)	4,816	0.04427	0.00081	0.00116	0.00013	0.00006
13 Circ A Partial (Circ Street)	2,588	0.02379	0.00043	0.00062	0.00007	0.00003
14 Circ B Limited Access Highway	1,952	0.01795	0.00033	0.00047	0.00005	0.00003
15 Mountain View Road Connector	1,952	0.01795	0.00033	0.00047	0.00005	0.00003
16 Circ A/B Limited Access Highway with Spot Improvements on VT 2A	5,928	0.05449	0.00099	0.00143	0.00017	0.00008
17 Circ A/B Boulevard with Improvements on VT 2A	4,816	0.04427	0.00081	0.00116	0.00013	0.00006
18 VT 2A Corridor Improvements with Traditional TSM and Circ Partial (Circ Street)	657	0.00604	0.00011	0.00016	0.00002	0.00001
19 VT 2A Corridor Improvements with Roundabouts and Circ A Partial (Circ Street)	657	0.00604	0.00011	0.00016	0.00002	0.00001
20 North Williston Road Improvements with Circ B Connector and VT 2A Spot Improvements	712	0.00655	0.00012	0.00017	-0.00001	0.00001
21 Brownell Road Corridor Improvements with Mountain View Road Connector and VT 2A Spot Improvements	-330	-0.00303	-0.00006	-0.00008	0.00001	0.00000
22 VT 2A – Williston Improvements with Roundabouts at Five Corners	1,963	0.01815	0.00033	0.00047	0.00005	0.00003
23 VT 2A – Williston Improvements with Roundabouts at Five Corners and Circ A Partial (Circ Street)	2,704	0.02486	0.00045	0.00065	0.00008	0.00003

* Note: amount decrease (-) and increase (+) are shown