



CRP 5498 CANYON ROAD EAST NORTHERLY EXTENSION

PIERCE COUNTY, WASHINGTON

PIERCE COUNTY

TACOMA, WASHINGTON

AIR QUALITY IMPACT AND MITIGATION ANALYSIS DISCIPLINE REPORT

FEDERAL AID NO. STPUL-3170(003)

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Canyon Road East Northerly Extension (CRP 5498)
Puyallup and Fife, Pierce County Washington

Air Quality Impact & Mitigation Analysis

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SUMMARY

This report presents the results of examining the air quality impacts of the Canyon Road East Northerly Extension project and is based upon WSDOT, EPA and FHWA guidance and traffic data from the traffic consultants. The Canyon Road East Northerly Extension project will result in an increase in the emissions of criteria pollutants, GHGs and MSATs due to higher traffic volumes in the area, including a higher percentage of trucks. However, these increases are offset to varying degrees in future years by the continuing improvements in engine technology, fuel efficiency standards and improved emission controls.

Regional restrictions on the burning of any woody debris that might be cleared from the project right-of-way, Pierce County, and WSDOT's dust control requirements will minimize the air quality impacts from the construction phase. Pierce County does not allow open burning by contractors on or off the project footprint as a disposal method on our projects and requires all contracts to include the contractor develop and submit a Fugitive Dust Control. Copies of the contract Special Provisions are available upon request.

Glossary of Acronyms

AADT	Annual Average Daily Traffic
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
GHGs	Greenhouse gases
ICE	Infrastructure Carbon Estimator
MIC	Manufacturing/Industrial Center
MOVES	Motor Vehicle Emission Simulator
MSATs	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
PSCAA	Puget Sound Clean Air Agency
ROD	Record of Decision
VMT	Vehicle Miles Travelled
WSDOT	Washington State Department of Transportation

1. Project Introduction

Pierce County is proposing a transportation improvement project for Canyon Road East near Puyallup in Pierce County. The proposed project is federally funded and requires National Environmental Protection Act (NEPA) compliance due to the FHWA funding. NEPA requires that a determination be made regarding whether the proposed project will have an adverse effect on air quality.

1.1. Summary of Results

Based on the analysis presented here, the Canyon Road East Northerly Extension project will result in an increase in the emissions of criteria pollutants, Greenhouse Gas (GHGs) and Mobile Source Air Toxics (MSATs) due to higher traffic volumes in the area, including a higher percentage of trucks. However, as summarized in the funding application to the Puget Sound Regional Council, these higher volumes include traffic diverted from alternate longer routes and therefore the project will likely reduce the overall vehicle miles traveled and emissions regionally.

2. Project Purpose, Need and Description

The purpose of the proposed Project is to improve regional mobility of the transportation system to serve local and port freight movement and multimodal passenger movement between the Port of Tacoma Regional Manufacturing/Industrial Center (MIC) and the Fredrickson MIC. The Project will provide a direct Truck Freight Economic Corridor (T-1/T-2 freight corridor) link between the MICs to improve the movement of goods. The Project is intended to reduce congestion and improve safety on the arterials and intersections in the Project area. The Project also replaces a functionally obsolete bridge crossing (the Milroy Bridge) over the Puyallup River.

The proposed Project is needed to provide a reliable freight corridor between the Port of Tacoma and Frederickson MICs that is independent of the existing road network (e.g., I-5/SR 512/ SR 167) and the impacts associated with increasing levels of traffic on this network from projected regional growth. Currently, the freight transportation system between the two MICs depends solely on SR 512 to connect with Interstate 5 (I-5). Alternative delivery routes include SR 167 and local roads through Puyallup and Fife, but these options are less efficient. Increased traffic on SR 512 and SR 167 through Puyallup, as well as increased traffic on I-5 through Tacoma and Fife, has resulted in delays to the movement of freight between the two MICs. Forecasted growth within the Pierce County region is expected to increase congestion, resulting in further delays for freight traffic. Pierce County and other local communities have been working toward the construction of a T-1/T-2 freight corridor between Fredrickson and the Port of Tacoma that uses Canyon Road East. Past improvements to the Canyon Road corridor have widened the existing road to a five-lane section to allow for better truck and freight movements in support of the T-

1/T-2 freight corridor. There is a need to provide a direct, regional connection for freight to reduce traffic congestion on the existing roads.

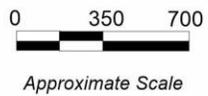
A primary need along the T-1/T-2 freight corridor is a new bridge crossing over the Puyallup River to allow uninterrupted movement of freight. The Puget Sound Regional Council identifies this crossing as an important improvement in the corridor. Existing crossing options are limited to either the SR 512 and I-5 bridges, which are both located far from the corridor, or the functionally obsolete Milroy Bridge. There is a need to provide a new bridge crossing over the Puyallup River that is appropriately sized and aligned to maximize the efficiency of freight and passenger vehicles travelling in the region.

2.1. Project Description

The proposed Project includes the following elements that are designed to improve freight mobility in the T-1/T-2 freight corridor between the Port of Tacoma and Frederickson MICs. The project area is shown in Figure 1 and the list below summarizes the proposed project elements.

- Construct a new four-lane road (two lanes in each direction) section to enhance the regional freight corridor. The proposed roadway section includes curb and gutter and sidewalk improvements.
- Construct a new Puyallup River crossing, designed for freight mobility, that is grade separated from River Road East (SR-167) and North Levee Road East.
- New signalization at select intersections to improve local travel flow.
- Connect to 70th Avenue East in the City of Fife.
- Provide enhanced levels of stormwater treatment on new and replaced impervious surfaces within the Project limits.
- Improve local access connections to North Levee Road East and River Road East (SR-167) for businesses and residents accessing the grade separation.

Figure 1. Project Area




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Figure 1: Project Area

New and Upgraded Project Roadways



The proposed changes are expected to increase traffic volumes on adjacent streets not directly altered by the project.

In order to address these impacts and to determine the need for further analysis, the AADT of the project area is used in the analysis of project related emissions. Following Guidance on Addressing Air Quality, Greenhouse Gas Emissions, and Energy for WSDOT Projects (WSDOT April 2020), hourly traffic data (DKS 2020) in the corridor is converted to a 24-hour period and used to approximate the emissions sources in the corridor. A comparison of modeled AADT and VMT for the air quality analysis by year and scenario is shown in Table 1.

Table 1. Project Area AADT and DAILY VMT					
	2020 Existing	2027 No Build	2027 Build	2040 No Build	2040 Build
AADT	105,500	120,200	213,400	131,500	241,950
VMT	30,703	34,974	84,558	38,403	103,593

3. Affected Environment

Air quality in the study area is regulated by three agencies: The Environmental Protection Agency (EPA); the Washington State Department of Ecology (DOE); and the Puget Sound Clean Air Agency (PSCAA). The latter agency and DOE work together to monitor air quality within the Puget Sound region. The EPA sets national air quality standards and has oversight authority over PSCAA and DOE.

The EPA has developed National Ambient Air Quality Standards (NAAQS) for six criteria pollutants to protect the public health and welfare. The NAAQS specify maximum concentrations for carbon monoxide (CO), particulate matter less than 2.5 microns in diameter (PM2.5), particulate matter less than 10 microns in diameter (PM10), ozone (O3), sulfur dioxide (SO2), lead, and nitrogen dioxide (NO2). These standards shall not be exceeded by ambient pollutant concentrations that are averaged over a defined time interval, ranging from one-hour to three-year averages. DOE and PSCAA have authority to adopt more stringent standards. Current state and local standards are equivalent to the federal standards, except for a stricter SO2 standard. Table 2 provides a listing of established federal, state, and local ambient air quality standards.

DOE and PSCAA operate air quality monitoring stations to obtain data on actual ambient air quality concentrations. Information from these stations determines whether the region meets the NAAQS and assists in providing background level concentrations in the project vicinity.

Areas of the country exceeding the NAAQS for a given pollutant are classified as “non-attainment” areas. In 1991, the western portions of Snohomish, King and Pierce Counties were designated non-attainment areas for carbon monoxide, and nearly all of the three counties were declared non-attainment areas for ozone. Portions of the industrial areas of Everett, Seattle, Kent, and Tacoma were declared to be PM10 non-attainment areas. Based upon monitoring results, which have shown no exceedances for several years, the EPA in 1996 re-designated the Puget Sound area as a “maintenance” area for carbon monoxide and ozone. Former non-attainment areas that have been re-designated as maintenance areas are required to continue to maintain air quality by adhering to a “maintenance plan” developed as part of the re-designation process. Transportation projects must demonstrate “conformity” with the control measures specified in the Washington State Implementation Plan (SIP) adopted as part of this re-designation process. This project is included in the 2018 Regional Transportation Plan which was found to be in air quality conformity.

The Puget Sound region is in attainment for all the priority pollutants except for PM2.5 and PM10. The project site is within the PM2.5 and PM10 maintenance areas. It is located approximately 5.5 miles from monitoring stations operated by the PSCAA at Tacoma South L and Puyallup South Hill. In the most recent published data from 2018, with neither site showing exceedances of the NAAQS, with a 3-year average daily concentration of 30-35 ug/m3.

Table 2. Ambient Air Quality Standards				
Pollutant	National		Washington State	Puget Sound Region
	Primary	Secondary		
Inhalable Particulate Matter (PM10) (mg/m3)				
Annual Arithmetic Mean (mg/m3)	50	50	50	NS
24-hour Average (mg/m3)	150	150	150	150
Particulate Matter (PM2.5) (mg/m3)				
Annual Arithmetic Mean (mg/m3)	12	12	12	12
24-hour Average (mg/m3)	35	35	35	25
Carbon Monoxide (CO)				
8-hour Average (ppm)	9	9	9	9
1-hour Average (ppm)	35	35	35	35
Sulfur Dioxide				
1-hour Average (ppm)	0.075	NS	0.075	0.075
3-hour Average (ppm)	NS	0.0005	NS	NS
Ozone (O3)				
8-hour Average (ppm)	0.070	0.070	0.070	0.070
1-hour Average (ppm)	0.12	0.12	0.12	NS
Nitrogen Dioxide (NO2)				
Annual Average (ppm)	0.053	0.053	0.053	0.053
1-hour (ppm)	0.1	0.1	0.1	0.1
Lead (Pb)				
Rolling 3 Month Average (mg/m3)	0.15	0.15	0.15	0.15
Source: PSCAA 2018 Air Quality Data Summary and Washington State Dept. of Ecology. NS=No standard established or standard revoked; (mg/m3) = micrograms per cubic meter; PPM= parts per million				

4. Operational Impacts and Project Conformity Status

The Canyon Road East Northerly Extension project is located within the Puget Sound and PM10 maintenance areas and within the Tacoma-Puyallup PM2.5 non-attainment area. Based upon the build scenarios analyzed, the project will increase vehicle capacity in the study area. It will receive federal funding and is subject to the federal transportation conformity requirements of 40 CFR Part 93.

Because the project area is now in attainment a new conformity analysis is not required, however per NEPA an emissions burden analysis of the priority pollutants was conducted to determine how the Canyon Road Northerly Extension project would contribute to regional emissions of criteria pollutants. The assessment was performed using the EPA's Motor Vehicle Emission Simulator (MOVES3) model for the Existing 2020, No-Build (2027 and 2040) and Build (2027 and 2040) scenarios.

Table 3. Daily Emissions of Criteria Pollutants (grams)							
Pollutant (grams)	2020 Existing	2027 No Build	2027 Build	2040 No Build	2040 Build	% Change 2020 to 2040 No Build	% Change 2020 to 2040 Build
Daily VMT	30,703	34,974	84,558	38,403	103,593	25%	170%
Total Hydrocarbons	4,358	2,579	9,139	1,521	6,954	-65%	60%
CO	127,803	102,490	286,223	60,780	186,317	-52%	46%
PM2.5	512	425	2,114	263	1,405	-49%	174%
PM10	1,427	1,736	9,736	1,510	9,146	6%	541%
SO2	70	69	193	63	202	-10%	189%
NOX	16,726	8,594	31,973	2,536	16,296	-85%	-3%
VOC	3,691	1,997	6,685	1,031	3,527	-72%	-4%
Source: EPA MOVES3							

4.1. Greenhouse Gases

The MOVES3 model was used to quantify operational GHG emissions from the Canyon Road East Northerly Extension project in 2027 and 2040. Table 3 shows the emissions of criteria pollutants contributed by the project. Table 4 shows the estimated emissions in terms of CO₂ equivalence (CO₂eq), which reflects the emissions of gases like methane (CH₄) and nitrous oxide (N₂O) in addition to carbon dioxide (CO₂). Although local delays and congestion are expected to be reduced, emissions for the 2027 and 2040 Build scenarios increase due to the increase in traffic volume under Build conditions. Table 4 also shows the associated fuel cycle emissions: the emissions from fuel extraction, refining, and transportation to the end user. As per WSDOT guidance, fuel cycle emissions are calculated by multiplying operational emissions by 0.27.

Table 4. Daily GHG Emissions (metric tons CO ₂ eq)							
	2020 Existing	2027 No Build	2027 Build	2040 No Build	2040 Build	% Change 2020 to 2040 No Build	% Change 2020 to 2040 Build
Daily VMT	30,703	34,974	84,558	38,403	103,593	25%	170%
Operational	11.2	11.2	32.2	10.1	34.1	-10%	205%
Fuel Cycle	3.0	3.0	8.7	2.7	9.2	-10%	205%
Source: EPA MOVES3, WSDOT Guidance – Project-Level Greenhouse Gas Evaluations under NEPA and SEPA							

To quantify the GHG emissions associated with the construction and maintenance of the project, the FHWA Infrastructure Carbon Estimator (ICE) tool was used. The results are shown in Table 5. Upstream emissions reflect the fuel used in the extraction, transportation and production of the raw materials used, while direct emissions reflect the fuel used in the transportation of the materials to the site and that used by construction and maintenance equipment.

Table 5. Annual GHG emissions per year over a 3-year Construction Period (metric tons CO ₂ eq)				
	Upstream Emissions	Direct Emissions		Total
		Construction	Maintenance	
CO₂eq	205	74	2	281
Source: FHWA Infrastructure Carbon Estimator				

4.2. Mobile Source Air Toxics

As per the FHWA Interim Guidance on MSATs (2016), projects where area AADT exceeds 140,000 vehicles require a Quantitative MSATS analysis. Table 1 above displays data for the Canyon Road East Northerly Extension project, showing that in the 2027 Build scenario AADT is greater than 140,000. A MSATs analysis is therefore required. Table 6 summarizes the tailpipe emissions for toxic air pollutants in the project area.

Table 6. MSAT Emissions (grams/day)							
MSATS	2020 Existing	2027 No Build	2027 Build	2040 No Build	2040 Build	% Change 2020 to 2040 No Build	% Change 2020 to 2040 Build
VMT	30,703	34,974	84,558	38,403	103,593	25%	237%
Diesel PM	514	281	1523	16	140	-97%	-73%
1-3-Butadiene	13	4	14	0	0	-100%	-100%
Acrolein	6	3	13	1	3	-85%	-41%
Acetaldehyde	54	28	111	11	50	-80%	-7%
Benzene	133	79	242	49	157	-63%	17%
Ethyl Benzene	60	31	97	17	56	-72%	-7%
Naphthalene	11	6	23	2	7	-82%	-41%
PAH	5	2	9	1	3	-81%	-40%
Formaldehyde	89	51	203	20	80	-78%	-10%
Source: EPA MOVES3							

Because of the AADT increases under the Build scenario, the project will increase emissions of MSATs relative to the No Build scenarios. However, emissions will be lower under 2040 Build conditions than under existing conditions for all MSATs except for benzene. This is a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent between 2010 and 2050. 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 VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

5. Impacts from Construction

The project would consist of soil-disturbing activities, heavy-duty equipment, commuting construction workers, and the laying of asphalt that would generate emissions that can temporarily affect air quality. The total emissions and the timing of the emissions from these sources would vary depending on the construction phasing of the project. Table 7 summarizes the tasks involved in the construction phase and their emissions. Estimates of GHG emissions from this phase are provided in Table 5 above.

Table 7. Pollutants Generated by Construction Activities		
Construction Task	Source of Emissions	Emissions
Clearing right-of-way	Track /wheel loaders, bulldozer, haul trucks	CO, PM10, PM2.5, NOx, SO2, fugitive dust, Mobile Source Air Toxics (MSATS)
Removing existing concrete & paved surfaces	Track /wheel loaders, bulldozer, haul trucks	Same as above
Removing of concrete debris	Haul trucks, dump trucks	Same as above
Re-grading of roadbed, laying the aggregate base	Track /wheel loaders, bulldozer, grader	Same as above
Trenching for new utilities	Backhoe, gravel trucks	Same as above
Building grade separation including drilling shafts and installation foundations and abutments	Track /wheel loaders, drill, haul trucks, concrete trucks and pumps, grader, and compactors	Same as above
Paving roadway	Concrete trucks, asphalt trucks, asphalt rollers	CO, PM10, PM2.5, NOx, SO2, MSATS
Painting lane markers	Paint spray equipment	Odorous compounds, MSATS

5.1. Construction Mitigation Measures

The mitigation measures that were imposed under the 2003 Record of Decision that remain relevant to the Canyon Road East Northerly Extension project are listed below.

- Mitigation measures to control PM10, deposition of particulate matter, and emissions of CO and NOX will be implemented during construction per the Associated General Contractors of Washington guidelines and Puget Sound Clean Air Agency regulations.
- Project construction staging will be managed to reduce overall system congestion and delays, which will reduce regional emissions of pollutants, to the greatest extent practicable

In addition to the measures above and in accordance with WSDOT's Environmental Manual M31-11, Pierce County will comply with the procedures outlined in the October 1999 Memorandum of Agreement entered into by WSDOT and the Puget Sound Clean Air Agency for controlling fugitive dust emissions, which may require the following actions:

- Spray exposed soil with water or other dust suppressant to reduce emissions of particulate matter less than 10 microns in diameter (PM10) by increasing deposition of particulate matter.
- Use phased development to keep disturbed areas to a minimum.
- Use wind fencing to reduce wind disturbance of soils.

- Minimize dust emissions during transport of excavated or fill materials by wetting down loads or ensuring adequate freeboard (space from the top of the material to the top of the truck bed) on trucks.
- Promptly clean up spills of transported material on public roads.
- Schedule work tasks to minimize disruption of the existing vehicle traffic on streets.
- Restrict traffic onsite to reduce soil upheaval and tracking material onto roadways.
- Provide wheel washers to decrease deposition of particulate matter on area roadways by removing particulate matter that would otherwise be carried offsite by vehicles.
- Locate construction equipment and truck staging areas away from sensitive receptors as practical and in consideration of potential effects on other resources.
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris.

6. Conclusion

The Canyon Road East Northerly Extension project will result in a localized increase in the emissions of criteria pollutants, GHGs and MSATs due to higher traffic volumes in the area, including a higher percentage of trucks. However, these increases will be offset by to varying degrees by the continuing improvements in engine technology and fuel efficiency standards and improved emission controls in the future. They will be further offset by a reduction in local and regional VMT by the diversion of vehicle trips from lengthier alternate routes such as I-5/SR 512 and SR 167/SR 512.

Regional restrictions on the burning of any woody debris that might be cleared from the project right-of-way and WSDOT's dust control requirements will minimize any air quality impacts from the construction phase. No additional air quality mitigation measures are required for this project.

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