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SUMMARY

The Washington State Department of Transportation (WSDOT) is proposing to construct the Interstate 405 (I-405), NE 8th Street to State Route 520 (SR 520) Improvement Project to improve safety and reduce congestion in the vicinity of the I-405 and SR 520 interchange within the City of Bellevue. The I-405 Team evaluated the project's effects on air quality during construction and operation of the project. This discipline report evaluates two alternatives, the Build Alternative and the No Build Alternative for the year of opening (2014) and the design year (2030).

Study Approach

The I-405 Team analyzed the effects on air quality by estimating emissions caused by construction and operation of the project. The I-405 Team qualitatively assessed effects on air quality during project construction. Construction activities that typically result in temporary emissions of air pollutants were addressed.

Local operational effects were quantified in terms of carbon monoxide (CO) concentrations from tailpipe exhaust in the vicinity of intersections affected by the project. CO is the pollutant most associated with the localized effects of motor vehicle emissions. Regional operational effects were considered by comparing project emissions with the National Ambient Air Quality Standards (NAAQS) established by the Environmental Protection Agency (EPA). We also calculated annual Mobile Source Air Toxic (MSAT) emissions for six pollutants identified by EPA as priority MSAT pollutants.

Existing Conditions

Concentrations of the monitored air pollutants in the project vicinity have been below the NAAQS for the last several years. The project is located in a CO maintenance area and requires a quantitative analysis in order to show compliance with the State Implementation Plan (SIP). Seventeen air toxics, including three of the six MSATs, are monitored at the Beacon Hill site. This monitor is located in Seattle, 7 miles from the project site, and it is the closest monitor of air toxics. Currently, no standards establish allowable concentrations of toxic air pollutants (of which MSATs are a subset) in the air.

Project Effects

Construction activities may have short-term effects on air quality. During construction, there is a potential for generation of fugitive dust during excavation, demolition, and any activity that involves the movement or disturbance of soils. Paving of roadways results in emissions from the paving material and the equipment that applies the new pavement. Where asphalt is used, these emissions may result in temporary odors in the vicinity of the project.

Air pollutants are emitted from the exhaust of vehicles traveling to and from the construction site as well as vehicles and construction equipment operating onsite. Emissions also may increase around a construction project as a result of detours and delays to local traffic traveling in the vicinity of construction areas.

The air analysis indicated that the roadway improvements proposed by this project would not result in adverse effects on air quality from air pollutants. This is because the project will have an overall effect of improving traffic flow, thereby reducing idling time when motor vehicle emissions are highest.

Localized concentrations of CO were evaluated in the vicinity of several high-volume signalized intersections, including intersections in the vicinity of Overlake Hospital Medical Center. All of the scenarios analyzed indicated that concentrations are well below applicable ambient air quality standards in future years. For the six analyzed intersections, CO concentrations were predicted to be the same or slightly greater for the Build Alternative than the No Build Alternative in 2014 and 2030.

Measures to Avoid or Minimize Effects

Best management practices are well established for minimizing dust released from construction sites, and include watering or covering exposed soil surfaces.

No measures to avoid or minimize effects of the project will be required because its design and operation are not anticipated to cause any adverse effects.

Unavoidable Adverse Effects

A substantial adverse air quality effect would be a violation of the NAAQS, or any activity that results in a public nuisance through the generation of dust or odors. The I-405, NE 8th Street to SR 520 Improvement Project is not expected to cause any substantial adverse effects on air quality.

ACRONYMS AND ABBREVIATIONS

Term	Meaning
$\mu g/m^3$	microgram(s) per cubic meter
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
LOS	level of service
I-405	Interstate 405
MSAT	mobile source air toxics
NAAQS	National ambient air quality standards
NO_x	oxides of nitrogen
PM	particulate matter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
ppm	part(s) per million
PSCAA	Puget Sound Clean Air Agency
PSRC	Puget Sound Regional Council
RTP	Regional Transportation Plan
SIP	State Implementation Plan
SO_2	sulfur dioxide
SR 520	State Route 520
TIP	Transportation Improvement Plan
VMT	vehicle-miles traveled
VOC	volatile organic compound
vph	vehicles per hour
WAC	Washington Administrative Code
WASIST	Washington State Intersection Screening Tool
WSDOT	Washington State Department of Transportation

GLOSSARY

Term	Meaning
Air emissions	Pollutants emitted into the air, such as carbon monoxide, nitrogen oxide, nitrogen dioxide, sulfur dioxide, and others.
Air pollutant	Any substance in air that could, in high enough concentration, harm people, animals, vegetation, or materials. They may be in the form of solid particles, liquid droplets, gases, or a combination thereof. Generally, they fall into two main groups: (1) those emitted directly from identifiable sources and (2) those produced in the air by interaction between two or more primary pollutants, or by reaction with normal atmospheric elements.
Air quality standards	The level of pollutants prescribed by regulations that may not be exceeded during a given time in a defined area.
Air toxics	Air toxics are air pollutants known or suspected to cause health problems. Potential health effects include cancer, birth defects, lung damage, immune system damage, and nerve damage.
attainment area	An area considered to have air quality as good as or better than the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants designated in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.
carbon monoxide (CO)	A colorless, odorless, toxic gas produced by incomplete combustion.
criteria pollutants	The six pollutants for which the U.S. Environmental Protection Agency (EPA) has identified and set standards to protect human health under the Clean Air Act: ozone, carbon monoxide, total suspended particulates, sulfur dioxide, lead, and nitrogen oxide.
emission	Pollution discharged into the atmosphere from smokestacks, other vents, surface, vehicles, and other sources.
emission factor	A representative value that relates the quantity of a pollutant released to the atmosphere with the activity that is associated with the release.
hazardous air pollutants	Air pollutants that are not covered by ambient air quality standards but which, as defined in the Clean Air Act, may reasonably be expected to cause or contribute to irreversible illness or death.
level of service (LOS)	A measure of how well a freeway or local signalized

Term	Meaning
	intersection operates. For freeways, LOS is a measure of traffic congestion typically based on volume-to-capacity ratios. For local intersections, LOS is based on how long it takes a typical vehicle to clear the intersection. Other criteria also may be used to gauge the operating performance of transit, non-motorized, and other transportation modes.
maintenance area	Area that has met the NAAQS for the criteria pollutants designated in the Clean Air Act and is being managed to continue to meet the NAAQS.
mobile source air toxics	Air toxics that are emitted from highway vehicles and non-road equipment.
National Ambient Air Quality Standards (NAAQS)	Standards established by the EPA under the Clean Air Act for pollutant concentrations in outside air throughout the country. See also “criteria pollutants.”
nitrogen oxides (NOx)	A product of combustion from transportation and stationary sources resulting from nitric oxide combining with oxygen in the atmosphere; a contributor to the formation of ozone, which is a major component of photochemical smog. This includes NO (nitric oxide) and NO_2 (nitrogen dioxide).
non-attainment area	An area that does not meet one or more of the NAAQS for the criteria pollutants designated in the Clean Air Act.
ozone (O_3)	Upper atmosphere ozone protects the earth from harmful radiation, but ground-level ozone (commonly known as smog) is unhealthy. Ozone can seriously impair the respiratory system and is one of the most widespread of all the criteria pollutants regulated under the Clean Air Act. Ground-level ozone is produced through complex chemical reactions of nitrogen oxides, which are among the primary pollutants emitted by combustion sources: hydrocarbons released into the atmosphere through the combustion, handling and processing of petroleum products, and sunlight.
particulates	Sources of particulate matter include sea salt, pollen, smoke from forest fires and wood stoves, road dust, industrial emissions, and agricultural dust. Some particles may be small enough to be drawn deep into the respiratory system where they can contribute to infection and reduced resistance to disease.
part(s) per million (ppm)	A measure of concentration based on weight or volume.
$PM_{2.5}$	A standard for measuring the amount of solid or liquid matter suspended in the atmosphere, specifically, particulate matter less than 2.5 microns in diameter. Very small $PM_{2.5}$ particles can penetrate deeper into the

Term	Meaning
	lungs than PM_{10}, increasing their potential for health risks.
PM_{10}	A standard for measuring the amount of solid or liquid matter suspended in the atmosphere, specifically, particulate matter less than 10 microns in diameter. Smaller PM_{10} particles can penetrate to the deeper portions of the lung, affecting sensitive population groups such as individuals with respiratory ailments and children.
State Implementation Plan	Plan developed by state government to attain and maintain compliance with the NAAQS.
Transportation Improvement Program	The Regional Transportation Improvement Program (TIP) provides a list of current transportation projects within King, Kitsap, Pierce, and Snohomish counties. These projects are funded with federal, state, or local funds, including federal grants awarded and managed through the Puget Sound Regional Council's biennial project selection process.