Chapter 13 Environmental Health

1 What environmental health issues are being considered?

Environmental health topics include the aspects of human health that are determined by biological, chemical, and social factors. This chapter discusses environmental health as it relates to hazardous materials, as required by the State Environmental Policy Act (SEPA). However, other factors that are important to environmental health and human health are discussed elsewhere in this FEIS.

- Noise is considered a human health issue, with people and communities affected by noise pollution from transportation, industry, and other sources in urban environments (refer to Chapter 7: Noise).
- Air quality is a continuing concern for human health, particularly the relationship to respiratory disease (refer to Chapter 6: Air Quality and Climate Change).
- Water pollution affects ecosystems, wildlife and habitat, and human health, especially with exposure to polluted water or contaminated marine life (refer to Chapter 9: Water Quality and Hydrology).
- Availability and access to green spaces also affect human health. When people have access to natural environments, parks, and open spaces, research has found that they can have more active lifestyles, with better abilities to cope with and recover from stress (refer to Chapter 15: Parks and Recreation).

Which elements of Washington Administrative Code (WAC) 197-11-444 are addressed in this chapter?

This chapter addresses:

- Section (2)(a)(ii) Risk of explosion is not addressed because all alternatives would not have impacts in this category.
- Section (2)(a)(iii) Releases or potential releases to the environment affecting public health, such as toxic or hazardous materials

What is environmental health?

According to the University of Washington, environmental health is "the study of how environmental factors can harm human health and how to identify, prevent, and control these effects" (University of Washington, 2004).

- Safety, including personal safety and mobility-related safety, are important to physical and mental health (automobile, transit use, biking and walking) (refer to Chapter 18: Human Health).
- The availability of sidewalks, bikeways, and pedestrian-friendly development contributes to physical activity and general well-being of the population (refer to Chapter 18: Human Health).

2 How can hazardous materials affect environmental health?

For a risk to exist to human health and the environment, two components must be present:

- Toxicity or hazard, which creates the potential for a substance to cause an adverse health impact (e.g., cancer).
- Exposure, which creates the potential for humans or environmental receptors to come into contact with the hazardous materials.

Examples of potentially hazardous sites in the central Puget Sound region include:

- Underground storage tanks
- Locations that have had a toxic release to the environment
- Industrial sites
- Hazardous waste generators
- Hazardous waste transfer facilities
- Federal (Superfund) cleanup sites
- Sites identified as having hazardous materials
- Sites identified as undergoing remedial actions to help address toxic releases

Sites with chemical releases pose the greatest potential risk to environmental health. The sites, generally known as hazardous waste sites, show exceedances of hazardous chemicals, as defined by the state of Washington (Model Toxics Control Act, as well as provisions for dangerous waste regulations, Chapter 173-303 WAC) and the federal government (Comprehensive

What is the purpose of the Model Toxics Control Act (MTCA)?

The goal of MTCA is to establish administrative processes and standards to identify, investigate, and clean up facilities with hazardous substances. It defines the role of the Washington State Department of Ecology and encourages public involvement in decision-making at these facilities.

Environmental Response, Compensation, and Liability Act, commonly known as Superfund).

3 Where are hazardous material sites located in the central Puget Sound region?

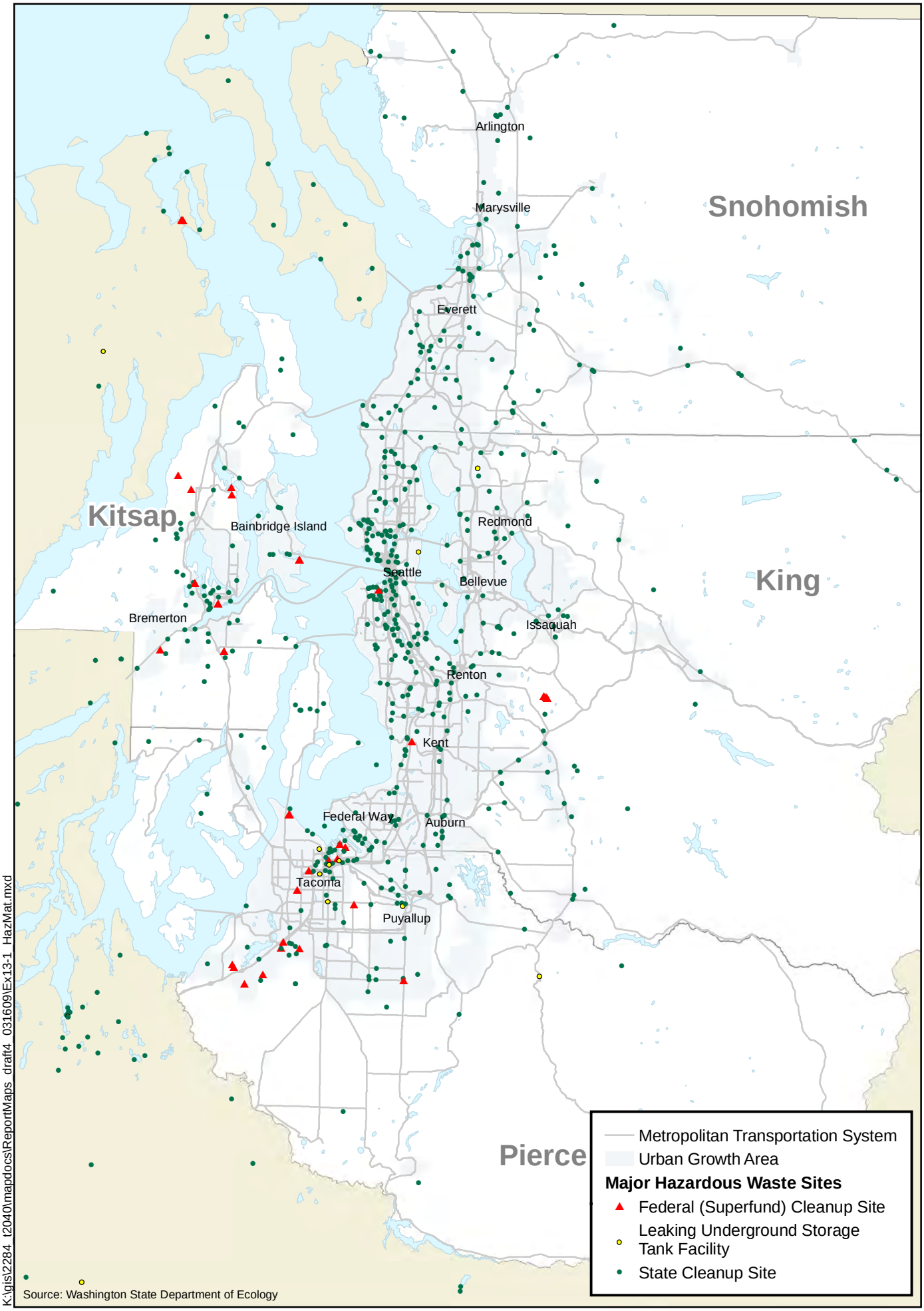
Contaminated sites of particular concern are located in all four counties (King, Kitsap, Pierce, and Snohomish), commonly near shorelines, major transportation corridors, and in industrial and manufacturing areas. Exhibit 13-1 shows the location of potentially significant hazardous material sites in the region, using 2009 data from the Washington State Department of Ecology (Ecology). The following are potential sources of hazardous materials (associated chemicals are shown in parentheses):

- Vehicle-related business, such as gasoline stations, oil-change facilities, and vehicle repair and maintenance facilities (gasoline, diesel fuel, paints, solvents, and oils)
- Other land uses such as dry cleaners (solvents); chemical and photographic labs (solvents, other chemicals); lumber mills (wood preservatives, heavy metals); railroad yards (fuels, oils, solvents); and landfills (methane gas, leachate)
- Light industry, such as machine shops (solvents); storage yards; electrical parts manufacturers (solvents, polychlorinated biphenyls [PCBs]); boat builders and repairers (fuels, oils, solvents, resins); and metal finishers and plasters (heavy metals, solvents)
- Heavy industry and manufacturing, such as fuel and chemical distribution and storage, railroad facilities, and steel mills (fuels, oils, solvents, metals)
- Stormwater and wastewater outfalls and nonpoint source pollutants. Contaminants in water may be discharged into rivers, lakes, and Puget Sound and eventually settle in sediments and along shorelines (refer to Chapter 9: Water Quality and Hydrology for additional information).

What is the purpose of the Superfund Act?

To establish prohibitions and requirements concerning closed and abandoned hazardous waste sites. Provide for liability of persons responsible for releases of hazardous waste at these sites. Establish a trust fund to provide for cleanup when no responsible party can be identified.

Exhibit 13-1. Potential Hazardous Material Sites



4 How are hazardous materials regulated?

A high degree of regulation applies to the release and management of hazardous materials. Projects included in the Transportation 2040 alternatives would likely be subject to Model Toxics Control Act (MTCA) and the Superfund, as well as the following regulations:

- Occupational Safety and Health Act of 1970 (29 United States Code [USC] 651 *et seq*.)

Purpose: To encourage employers and employees in their efforts to reduce the occupational safety and health hazards at their places of employment, and to stimulate employers and employees to perfect existing programs and institute new ones for providing safe and healthful working conditions.

- Washington Industrial Safety and Health Act (Chapter 49.17 Revised Code of Washington [RCW])

Purpose: To create, maintain, continue, and enhance the industrial safety and health program of the state, which shall equal or exceed the standards prescribed by the Occupational Safety and Health Act of 1970 (Public Law 91-596, 84 Stat. 1590).

- Dangerous Waste Regulations (Chapter 173-303 WAC)

Purpose: To designate solid wastes which are dangerous or extremely hazardous to public health and the environment, and provide surveillance and monitoring of dangerous and extremely hazardous wastes until they are detoxified, reclaimed, neutralized, or disposed of safely.

For more information on other environmental regulations related to air quality, refer to Chapter 6: Air Quality and Climate Change.

Hazardous material sites are carefully managed to avoid contamination.

Source: Parametrix, Inc.

5 What hazardous material risks are common to all alternatives?

Specific hazardous material analyses would be conducted during the project-level environmental review for the projects

included in the Transportation 2040 alternatives. A sampling of possible effects is discussed below.

Long-term Effects

The development of new or improved transportation facilities can require property acquisition for rights of way. During project-level planning and design, most project owners research the potential for encountering contaminated materials as part of their project. This allows them to better understand the financial risks and potential environmental cleanup or management actions that may need to be taken. These issues can affect a project's cost or an existing property owner's costs, particularly for a major release that had not previously been identified. However, overall the environmental consequences are considered positive because contaminated sites would be managed to minimize exposure to people or the environment consistent with applicable regulations.

Operation and maintenance of the region's transportation system will involve materials that can affect environmental health and human health. Oil-based lubricants, vehicle batteries, parts-cleaning fluids, paints, solvents, and fuels are among the products typically used in the maintenance and operation of transportation vehicles. All vehicles are subject to fluid leaks. Because the region's transportation system includes aviation, surface, and marine transportation, releases to the environment could affect a range of environmental media, including soils, groundwater, surface water, and sediments.

Construction effects

For all construction projects identified in the plan alternatives, persons involved in construction excavating, trenching, or moving soil may be affected by hazardous waste release sites. Persons living or working near such sites may also be exposed through skin contact, ingestion, or inhalation of soil particles, dust, or vapors. If safe work practices are followed in site preparation and development, the impact risk would be low.

Construction activity that may cross or include railroad tracks, railroad yards, and other industrial and commercial sites could

What is the difference between plan-level and project-level environmental review?

This FEIS is a plan-level (rather than a project-level) EIS. Accordingly, alternatives are defined and environmental effects are evaluated at a relatively broad level. More detailed project-specific environmental review will be developed as appropriate in the future for projects identified in the Transportation 2040 plan that are selected for implementation by their sponsors: WSDOT, Sound Transit, etc.

How is a property researched?

The American Society of Testing and Materials establishes standards for identifying the presence or likely presence of hazardous materials in connection with a specific property.

For further information, go to www.astm.org/Standards/E1527.htm.

During construction, care must be taken to avoid release of contaminated soil particles.

Source: Parametrix, Inc.

encounter sites contaminated with fuels, oils, and materials that have leaked from railroad cars. Contaminants are likely to have entered the soil and groundwater because rail beds are typically built with gravel, which promotes rapid vertical drainage.

Hazardous materials can travel in groundwater hundreds of feet beyond the boundaries of the properties from which they originated, thereby contaminating groundwater beneath properties purchased for rights of way. Similarly, groundwater pumped out during excavation or construction may be contaminated and require special treatment or disposal.

6 Which alternatives would be likely to cause the greatest number of effects on environmental health?

The types of effects described in the response to Question 5 could occur under any of the proposed Transportation 2040 alternatives, including the Baseline Alternative. This question does not seek to identify specific effects to environmental health. Instead, it uses the amount of new transportation infrastructure contained in each alternative to compare the possible total environmental health effect in the region.

As noted in the sidebar, this plan-level FEIS will not list the specific individual effects that could result from all of the projects contained in each Transportation 2040 alternative. In addition, it is not practicable to conduct a regionwide evaluation of the collective effect on the region's environmental health from all projects. Therefore, this plan-level FEIS does not contain a regionwide analysis of environmental health.

However, it is possible to provide an approximation of which alternatives could result in the greatest number of effects on environmental health. The Transportation 2040 alternatives contain varying levels of new transportation infrastructure (Exhibit 13-2), and it is likely that the alternatives with the most new infrastructure would result in the greatest number of environmental health effects.

Why does this FEIS not list the specific environmental effects caused by each alternative?

Each of the Transportation 2040 alternatives contains hundreds of individual projects. If constructed in the future, these projects could affect the region's built and natural environments.

For some environmental disciplines, such as transportation or air quality, these projects could affect the environment in the vicinity of the project and also could collectively affect the regional environment. For these disciplines, this FEIS contains an analysis to evaluate the potential regional effects of these projects. The localized effects for these environmental disciplines will be identified in a future project-level environmental review.

For other environmental disciplines, such as environmental health, individual projects could result in environmental health effects in their vicinity, but would not result in environmental health effects elsewhere in the region. Therefore, this EIS does not contain a regionwide analysis for these disciplines. Future project-level environmental review will identify the specific localized effects on these environmental areas.

Exhibit 13-2[1]

Miles of New Infrastructure Included in Each Alternative

Facility Type	Base Year 2006	Baseline Alt	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Preferred Alt
Systemwide freeway and arterial lane miles	12,806	13,153	13,352	14,013	13,540	13,489	13,329	13,764
New freeway and arterial lane miles	-	348	546	1,208	735	683	523	958
Portion of new lane miles in new corridors	-	30	40	240	218	159	40	248
Light rail miles	2	55	55	82	55	82	82	86
New light rail miles		53	53	80	53	80	80	84
Commuter rail miles	74	82	82	82	82	82	128	128
New commuter rail miles	-	8	8	8	8	8	54	54
Total new miles of road and rail	-	409	607	1296	796	771	657	1096
Percent increase from 2006	-	3%	4%	9%	6%	5%	4%	7%
Nonmotorized facility miles	570	600	747	745	740	745	1058	1123
New nonmotorized facility miles	-	30	177	175	170	175	488	553

As shown in Exhibit 13-2, all of the alternatives contain similar amounts of new infrastructure, measured as a percentage of the total system (3 to 9 percent). Alternative 2 contains the greatest number of new miles of road and rail, while the Baseline Alternative contains the fewest. Of the action alternatives, Alternative 1 contains the fewest new miles of roads and rail. Therefore, Alternative 2 would likely result in the highest number of effects on environmental health and the Baseline Alternative would likely result in the lowest number. Among the action alternatives, Alternative 1 would likely result in the lowest number of effects on environmental health. The number of effects resulting from Alternatives 3, 4, and 5 would likely fall between the overall number of effects expected for Alternatives 1 and 2.

[1] This exhibit has changed since the Draft EIS (DEIS).

The Preferred Alternative includes the second-greatest number of new miles of roads and rail. Therefore, the Preferred Alternative would likely result in the second-greatest number of effects on environmental health. However, most of the new miles of roads and rail would be built along existing transportation corridors. New transportation facilities constructed in existing transportation corridors are less likely to negatively affect environmental health than those built in new corridors. Conversely, the Preferred Alternative adds the most miles of new freeway and arterial lane miles (248) in new corridors. Therefore, environmental health effects from the Preferred Alternative in new corridors would likely be higher than other alternatives.

The Preferred Alternative includes the greatest number of miles of nonmotorized facilities, which include bicycle and recreation trails. Projects that expand and enhance nonmotorized travel often result in positive environmental health effects by encouraging less-polluting travel alternatives.

The comparisons presented above are intended to approximate the number of effects expected from each alternative and do not identify specific effects to environmental health. Future project-level environmental review will identify these effects.

Potential Proximity Effects

Exhibit 13-3 shows the number of projects included in each Transportation 2040 alternative that are located within 100 feet of a hazardous waste site. This analysis was conducted using Geographic Information System (GIS) data of new project locations compared to identified hazardous waste sites. The presence of a hazardous materials site in the proximity of a planned transportation project does not necessarily increase the risk for negative environmental health effects. In many cases, the construction of new transportation projects includes remediation of nearby hazardous materials sites.

The GIS data shown in Exhibit 13-3 indicate that the Preferred Alternative would likely result in the highest number of effects on environmental health, and the Baseline Alternative would likely result in the lowest number. Among the action

Changes to the Proximity Analysis

The method used to assess proximity impacts to hazardous materials sites in the FEIS has been modified from that used in the DEIS. The DEIS listed the number of resources within 100 feet of projects whereas the FEIS lists the number of projects within 100 feet of a hazardous materials site. This change was made to be consistent with the method used to assess proximity impacts in Chapter 10: Ecosystems and Endangered Species Act Issues.

alternatives, Alternative 1 would likely result in the fewest effects on environmental health. Depending on the type of construction required, nonmotorized projects could have effects on environmental health, although not likely to the extent of transit and roadway projects.

Exhibit 13-3[2]
Projects within 100 feet of a Hazardous Materials Site

Project Type	Baseline Alt	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Preferred Alt
Transit, roadway, and ferry related projects	24	38	56	41	48	48	80
Nonmotorized projects	1	13	8	8	9	21	15*

*Alternative 5 included many small bike concepts in urban centers throughout the region. During review of the DEIS alternatives, it was discovered that many of these concepts were already built, others were unable to find a sponsor, and others were deleted for other reasons. Concurrently, a smaller number of long nonmotorized projects were added to the Preferred Alternative that weren't in Alternative 5. This explains why the total nonmotorized mileage increased for the Preferred Alternative relative to Alternative 5, but the number of project proximity impacts decreased.

7 What cumulative effects could occur if the Transportation 2040 actions coincide with other planned actions?

The existing hazardous material sites in the central Puget Sound region reflect past and present actions from a wide range of activities. Many of the sites of concern throughout the region are a result of past practices that have since been addressed by more stringent environmental regulations for the management of hazardous materials. In addition, the cleanup and potential future redevelopment of contaminated properties is expected to occur as the region continues to absorb additional people and jobs through 2040, especially because growth is primarily focused within previously developed urban areas. The development of the transportation improvements in the Transportation 2040 alternatives could also help to accelerate the cleanup of existing properties with contamination, either directly through project development, or through projects that improve transportation conditions in areas

What are the limitations of the proximity analysis?

The purpose of the proximity analysis was to identify relative potential for impacts among alternatives, not to identify absolute numbers of potential impacts. As these projects are implemented, the actual number of impacts would be far less than shown, since the projects would be designed to avoid these impacts.

[2] This exhibit has changed since the DEIS.

targeted for redevelopment. These overall cumulative effects would be beneficial.

Future cumulative effects on environmental health could be affected by other regional plans and actions. Local jurisdictions throughout the region may revise their existing land use plans to be consistent with VISION 2040 and complement the Transportation 2040 Preferred Alternative. New development resulting from these plans could have both positive and negative effects on the environment.

PSRC has performed an analysis of the development pattern changes that could result from the transportation alternatives (refer to Chapter 5: Land Use, Population, Employment, and Housing) and has concluded that none of the Transportation 2040 alternatives would induce future land use and development pattern changes that are substantively different than the Baseline Alternative. In addition, all of the Transportation 2040 alternatives are consistent with the adopted VISION 2040 Regional Growth Strategy. Therefore, none of the Transportation 2040 alternatives would result in additional cumulative effects on environmental health.

What are cumulative effects?

Cumulative effects address the impact on the environment that results from the incremental impact of the action being considered when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

8 How can the hazardous material effects be mitigated?

Evaluation of individual project impacts and the need for mitigation measures would occur during future project-level planning and environmental review.

Hazardous material effects at the site-specific level could be mitigated in the following ways:

- Meet health, safety, and hazardous waste regulations for operation and maintenance of transportation facilities and systems, as well as during project construction.
- Segregate hazardous wastes.
- Protect employee health through ventilation, fire protection, and other measures.
- Treat contaminated runoff with oil/water separators and stormwater detention facilities.

- Use nontoxic substances, when feasible and prudent.
- Encourage the use of alternative modes and strategies that reduce automobile trips.

Potential options for mitigating contaminated properties include:

- Rerouting the project alignments
- Investigating and remediating the properties
- Monitoring health and safety measures

Actions at the system level to help minimize the level of exposure to pollution and contaminants in the environment and in populated areas include the following:

- Seek alternatives to petroleum-based fuels for heating, transportation, and manufacturing.
- Discourage uses or practices involving chemicals and hazardous materials, including fuels, gasoline, oils, and solvents, from occurring in areas that are high priority conservation areas, or where large numbers of people live and work.
- Emphasize alternatives to driving, such as walking, cycling, and using transit.
- Use new technologies that are less polluting.

9 Are there any significant unavoidable adverse hazardous material impacts?

No significant unavoidable adverse impacts from hazardous materials are expected for any of the Transportation 2040 alternatives. However, mitigation measures are likely to be necessary in site-specific locations. These mitigation measures would also provide a regionwide benefit. Future project-level environmental review would determine if applicable hazardous material impacts are encountered at specific locations. Where this occurs, potential mitigation for such impacts would be evaluated and implemented as appropriate to address the impact.