Seattle 2035

YOUR CITY, YOUR FUTURE

City of Seattle
Department of Planning & Development

DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE SEATTLE COMPREHENSIVE PLAN UPDATE

MAY 4, 2015

City of Seattle
Department of Planning & Development

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

for the

SEATTLE COMPREHENSIVE PLAN

Preparation of this EIS is the responsibility of the City of Seattle. As Lead Agency, the City is responsible for SEPA compliance and based on the scoping process has directed the areas of research and analysis that were undertaken in preparation of this EIS. This Draft EIS is not an authorization for an action, nor does it constitute a decision or a recommendation for an action. In its final form—as a Final EIS—it will accompany the Proposed Action and will be considered in making final decisions concerning proposed options for Comprehensive Plan policy and code amendments.

Date of Draft EIS Issuance:
May 4, 2015

Date of Draft EIS Public Meeting:
May 27, 2015

Please refer to the City's website (www.2035.seattle.gov) or the Fact Sheet of this EIS for the time and location of the meeting.

Date Comments on the Draft EIS are Due:
June 17, 2015

City of Seattle
Edward B. Murray, Mayor

Seattle Department of Planning and Development
Diane M. Sugimura, Director

May 4, 2015

Dear Affected Agencies, Organizations and Interested Parties:

The City of Seattle invites your review of this Draft Environmental Impact Statement (Draft EIS) that examines the potential effects of the City's update of its Comprehensive Plan. The update will consist of text and map amendments to the Comprehensive Plan to influence the location of 70,000 new housing units and 115,000 new jobs in Seattle through 2035. The proposal applies to the entire City of Seattle. The EIS evaluates three action alternatives and one no-action alternative (Alternative 1), each representing different approaches to allocating city-wide growth within the framework of the City's adopted urban village strategy. Alternatives include:

1. Continue Current Growth Distribution Trends (No Action)
2. Guide Growth to Urban Centers
3. Guide Growth to Urban Villages Near Light Rail
4. Guide Growth to Urban Villages Near Transit

This Draft EIS identifies environmental impacts and mitigating strategies for each alternative. Elements of the environment evaluated in this Draft EIS include: earth and water quality, air quality and greenhouse gas emissions, noise, land use, relationship to plans and policies, population/employment/ housing, transportation, public services, and utilities. **The public comment period for this Draft EIS continues through June 17, 2015**. Please see the Fact Sheet and the project website http://2035.seattle.gov for information on options for providing comments. In addition, the City invites your comments at:

Comprehensive Plan Update, Draft EIS Open House and Public Hearing
Monday, May 27, 2015 at 6:00 pm
Seattle City Hall, Bertha Landes Room, 600 Fourth Avenue (enter on 5th Avenue)

Additional information concerning the open house and public hearing is provided in the Fact Sheet and on the City's project website at http://2035.seattle.gov . Following the Draft EIS comment period, a Final EIS will be prepared that addresses comments received during the Draft EIS comment period.

Thank you for your interest in the Comprehensive Plan Update and this Draft EIS. We welcome your comments.

Sincerely,

Diane M. Sugimura
Director

Fact Sheet

Name of Proposal

Seattle Comprehensive Plan Update

Proponent

The proponent is the City of Seattle

Location

The area represented by this Draft EIS is the entire City of Seattle. The City encompasses approximately 83 square miles. The City is bounded on the west by Puget Sound, the east by Lake Washington, the north by the cities of Shoreline and Lake Forest Park and the south by unincorporated King County and the cities of Burien and Tukwila.

Proposed Action

The City is considering text and map amendments to the Seattle Comprehensive Plan that may alter the distribution of projected growth of 70,000 housing units and 115,000 jobs in Seattle through 2035, and that would influence the manner in which the City conducts its operations to promote and achieve other goals such as those related to public health, safety, welfare, efficient service delivery, environmental sustainability and equity.

Proposed Alternatives

The EIS considers four alternatives, including a No Action Alternative. All alternatives are based on the same growth assumptions, but vary in the approach to how that growth is distributed. Each alternative is briefly described below.

ALTERNATIVE 1. CONTINUE CURRENT TRENDS (NO ACTION)

Growth will generally follow current market trends. Residential growth will continue in the urban center and urban village neighborhoods that have experienced significant growth in the past 20 years, with a relatively low level of change in other urban villages. New job growth is projected to occur predominantly in Downtown and South Lake Union.

ALTERNATIVE 2. GUIDE GROWTH TO URBAN CENTERS

Urban centers will become magnets that more strongly attract new residents and jobs, faster than over the last 20 years. This change may lead to a significant rise in the number of people walking or biking to work, and a corresponding decline in driving and car ownership. Alternative 2 represents a significantly more concentrated pattern of new growth in the urban centers compared to past trends.

ALTERNATIVE 3: GUIDE GROWTH TO URBAN VILLAGES NEAR LIGHT RAIL

Alternative 3 places an emphasis on growth in urban centers, but also in urban villages near the light rail stations. It also considers boundary adjustments to urban villages with light rail stations to encompass a 10-minute walk to the station. A new urban village could be designated at NE 130th St/Interstate 5, and adjustments in designations and boundaries of other existing urban villages near existing and planned future light rail stations could be made.

ALTERNATIVE 4: GUIDE GROWTH TO URBAN VILLAGES NEAR TRANSIT

Alternative 4 would establish the greatest number of transit-oriented places— served by either bus or rail—that are preferred for growth. In addition to areas covered in Alternative 3, more growth would also be encouraged in other urban villages that currently have very good bus service, including Ballard, West Seattle Junction and Crown Hill. Relatively more urban villages would be subject to increased growth and change.

Lead Agency

City of Seattle Department of Planning and Development

SEPA Responsible Official

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Final Action

Adoption of an updated Comprehensive Plan.

Required Approvals and/or Permits

The following actions would be required for adoption of Comprehensive Plan amendments:

- Identification of a preferred alternative;
- Finalized maps and policy language.

Authors and Principal Contributors to this EIS

This **Comprehensive Plan Update** EIS has been prepared under the direction of the City of Seattle Department of Planning and Development. Research and analysis associated with this EIS were provided by the following consulting firms:

- **3 Square Blocks LLP**—lead EIS consultant; document preparation; environmental analysis
- **BERK**—Land use, population, employment, housing
- **ESA**—Public services, air quality, noise
- **Fehr & Peers**—transportation, circulation, parking; greenhouse gas emissions
- **SvR**—Utilities
- **Weinman Consulting**—Plans and policies

Location of Background Data

CITY OF SEATTLE, DEPARTMENT OF PLANNING AND DEVELOPMENT

Attn: Gordon Clowers
700 Fifth Ave, Suite 1900
P.O. Box 34019
Seattle, WA 98124-4019

Telephone: 206-684-8375

Date of Issuance of this Draft EIS

May 4, 2015

Date Draft EIS Comments Are Due

June 17, 2015

Written comments are to be submitted to:

Seattle Department of Planning and Development
Attn: Gordon Clowers, Senior Planner
700 Fifth Ave, Suite 1900
P.O. Box 34019
Seattle, WA 98124-4019
or via e-mail: Gordon.Clowers@seattle.gov

Date of Draft EIS Open House and Public Hearing

May 27, 2015
Bertha Landes room, Seattle City Hall
600 4th Ave, 2nd Floor
Seattle, WA 98104

This meeting will include the following schedule:

- **6:00 pm–6:30 pm** Open House;
- **6:30 pm–6:35 pm** Introductions;
- **6:35 pm–6:50 pm** Draft EIS overview
- **6:50 pm–7:00 pm** Overview of the EIS Process;
- **7:00 pm** Public Comments Regarding the Draft EIS; and
- Concluding Remarks Following Public Comments.

The purpose of the open house and public hearing is to provide an opportunity for agencies, organizations and individuals to review information concerning the Draft EIS and to present oral comments on the Draft EIS—in addition to submittal of written comments.

Availability of this Draft EIS

Copies of this Draft EIS have been distributed to agencies, organizations and individuals as established in SMC 25.05. Notice of Availability of the Draft EIS has been provided to organizations and individuals that requested to become parties of record.

The Draft EIS can be reviewed at the following public libraries:

- **Seattle Public Library—Central Library** (1000 Fourth Avenue)
- **Ballard Branch** (5614 22nd Avenue NW)
- **Beacon Hill Branch** (2821 Beacon Avenue S)
- **Capitol Hill Branch** (425 Harvard Avenue E)
- **Columbia Branch** (4721 Rainier Avenue S)
- **Douglass-Truth** (2300 E Yesler Way)
- **Greenwood Branch** (8016 Greenwood Avenue N)
- **High Point Branch** (3411 SW Raymond Street)
- **Lake City Branch** (12501 28th Avenue NE)
- **Queen Anne Branch** (400 W Garfield Street)
- **Rainier Beach Branch** (9125 Rainier Avenue S)
- **South Park Branch** (8604 8th Avenue S, at S Cloverdale Street)
- **University Branch** (5009 Roosevelt Way NE)

A limited number of complimentary copies of this Draft EIS are available—while the supply lasts—either as a CD or hardcopy from the Seattle Department of Planning and Development Public Resource Center, which is located in Suite 2000, 700 Fifth Avenue, in Downtown Seattle. Additional copies may be purchased at the Public Resource Center for the cost of reproduction.

This Draft EIS and the appendices are also available online at:
http://2035.seattle.gov/

Contents

Figures

Tables

Acronyms

ACS	American Community Survey
ALS	Advanced Life Support
AMI	Area Median Income
BLS	Basic Life Support
CAP	Climate Action Plan
CIP	Capital Improvement Program
CSO	Combined Sewer Overflow
CPP	King County Countywide Planning Policy
CPTED	Crime Prevention Through Environmental Design
CTR	Commute Trip Reduction
dBA	A-weighted Decibels
DPD	Department of Planning & Development
EIS	Environmental Impact Statement
ECA	Environmentally Critical Area
ESD	Washington Employment Security Department
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
FAR	Floor Area Ratio
FLUM	Future Land Use Map
FTA	Federal Transportation Administration
GHG	Greenhouse Gas
GMA	Growth Management Act
GSI	Green Stormwater Infrastructure
GTEC	Growth & Transportation Efficiency Center
HALA	Housing Affordability & Livability Agenda
HCT	High Capacity Transit
HOV	High Occupancy Vehicle
HUD	U.S. Department of Housing & Urban Development
I-5	Interstate 5
KCM	King County Metro
LEED	Leadership in Energy & Environmental Design
LOS	Level of Service
MFTE	Multi-family Tax Exempt
MIC	Manufacturing/Industrial Center
MPP	Multicounty Planning Policy
$MMTCO_2e$	Million Metric Tons of CO_2 Equivalent
NAAQS	National Ambient Air Quality Standards
NHTSA	National Highway Traffic Safety Administration
OFM	Washington Office of Financial Management
PARC	Parking Revenue Control System
PMP	Pedestrian Master Plan
PSCAA	Puget Sound Clean Air Agency
PSRC	Puget Sound Regional Council
RPZ	Restricted Parking Zone
SCL	Seattle City Light
SDOT	Seattle Department of Transportation
SEPA	State Environmental Policy Act
SMC	Seattle Municipal Code
SMP	Shoreline Master Program
SOV	Single Occupancy Vehicle
SPD	Seattle Police Department
SPS	Seattle Public Schools
SPU	Seattle Public Utilities
SR	State Route
ST	Sound Transit
TAP	Toxic Air Pollutant
TMP	Transit Master Plan
TOD	Transit Oriented Development
TSP	Transportation Strategic Plan
VMT	Vehicles Miles Traveled
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation
WWTP	Wastewater Treatment Plant
UFSP	Urban Forest Stewardship Plan
U.S. EPA	U.S. Environmental Protection Agency
v/c	Volume-to-Capacity

1.0 Summary

This chapter summarizes the findings of this Environmental Impact Statement (EIS) with respect to environmental impacts, mitigation strategies and significant unavoidable adverse impacts for the four Seattle Comprehensive Plan alternatives. This summary provides a brief overview of the information considered in this EIS. The reader should consult Chapter 2 for more information on the alternatives and Chapter 3 for more information on the affected environment, environmental impacts and mitigation strategies for each alternative and element of the environment.

1.1 Proposal

The City is considering text and map amendments to the Seattle Comprehensive Plan that would influence the manner and distribution of projected growth of 70,000 housing units and 115,000 jobs in Seattle through 2035, and that would influence the manner in which the City conducts its operations to promote and achieve other goals such as those related to public health, safety, welfare, service delivery, environmental sustainability and equity.

All Comprehensive Plan elements will be reviewed and updated as part of the proposal. In many cases, proposed policy amendments reflect changes to state and regional guidance, incorporate language and editorial changes to policies to increase readability, clarify direction and remove redundancies; and add new or updated information since adoption of the current Comprehensive Plan. Other policy changes are intended to reflect evolving city policy.

The proposal applies to the entire City of Seattle.

Figure 1–1
City of Seattle (planning area)

City of Seattle

Surrounding Area

1.2 Objectives of the Proposal

The City's objectives for this proposal include:

- Retaining the urban village strategy and achieving a development pattern in line with it

- Leverage growth to create housing choices and to promote healthy, complete communities
- Create jobs and economic opportunity for all City residents
- Build on regional transportation investments and balance transportation investments
- Support strategic public investment that addresses areas of need and maximizes public benefit
- Become a more climate-friendly city
- Distribute the benefits of growth more equitably

1.3 Alternatives

The City has identified four alternatives for consideration in this EIS. The alternatives assume the same level of total growth, but evaluate differing levels of growth emphases that may occur in various areas of the city, and with differing levels of resulting land use intensities. Each alternative emphasizes different patterns of projected future growth amount and intensity among the urban centers, urban villages and transit-related areas.

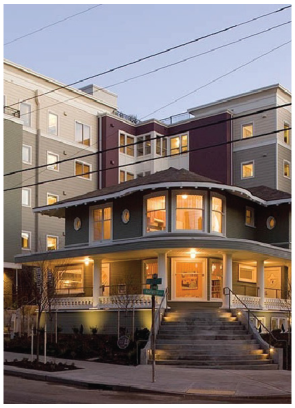
- **Alternative 1, Continue Current Trends (No Action)**, would plan for a continuation of current growth policies associated with the Urban Village Strategy along with a continuation of assumed trends that distribute growth among all of the urban centers and urban villages.
- **Alternative 2, Guide Growth to Urban Centers**, prioritizes greater growth concentrations into the six existing urban centers—Downtown, First/Capitol Hill, University District, Northgate, South Lake Union and Uptown.

The emphasis in alternatives 3 and 4 is on providing opportunity for more housing and employment growth in areas closest to existing and planned transit service. Specifically:

- **Alternative 3, Guide Growth to Urban Villages near Light Rail**, prioritizes greater growth concentrations around existing and planned light rail transit stations.
- **Alternative 4, Guide Growth to Urban Villages near Transit**, prioritizes greater growth concentrations around light rail stations and in specific areas along priority bus transit routes.

The boundaries of the existing urban villages would remain unchanged under both alternatives 1 and 2. alternatives 3 and 4 would result in expansions to some urban village boundaries and the designation of one new urban village (at NE 130th Street/Interstate 5) in order to encompass a 10-minute walkshed around existing/planned future light rail stations and priority transit routes.

Additional description of each alternative and supporting maps are provided on the following pages.

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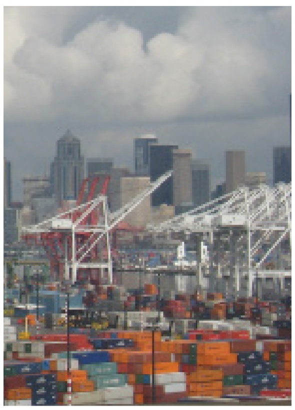



RECYCLE


PUBLIC MARKET
FARM

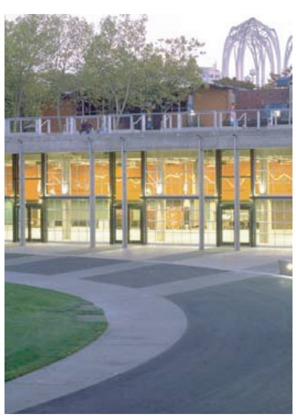
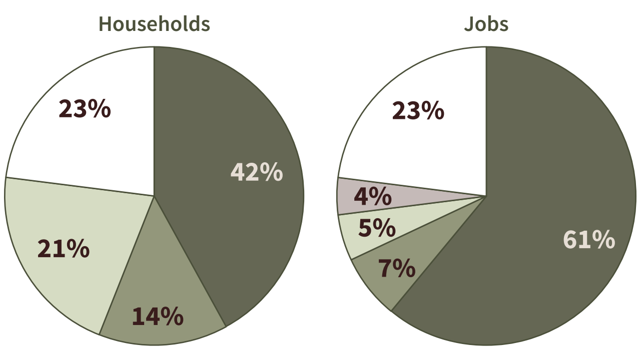


Figure 1–2 Summary of alternatives

Alternative 1
Continue Current Trends (No Action)

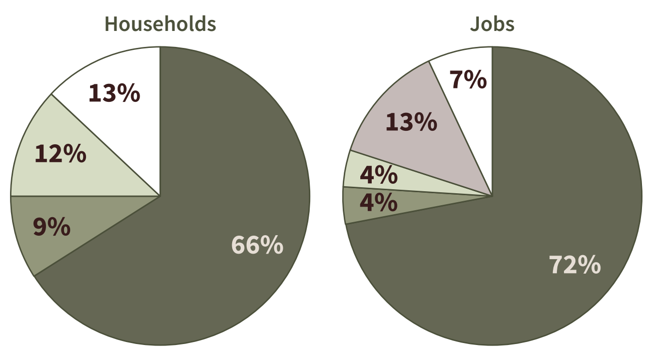
Growth will generally follow current market trends. Residential growth will continue in the urban village neighborhoods that have experienced significant growth in the past 20 years, with a relatively low level of change in other urban villages. New jobs would occur primarily in Downtown and South Lake Union.



- No change in the number, designation or size of urban villages.
- Greater residential growth emphasis in hub urban villages, in selected residential urban villages and more growth outside of urban villages.
  - Hub urban village emphases: Ballard, Bitter Lake, Lake City and West Seattle Junction.
  - Residential urban village emphases: 23rd & Union-Jackson, Aurora-Licton Springs, Columbia City, Madison-Miller and Othello.
  - Nearly 1/4 of residential growth (16,000 units) to occur outside of urban villages.
- Comparatively, urban centers would have a smaller role in accommodating residential growth and a continued focus on job growth.

Alternative 2
Guide Growth to Urban Centers

Urban centers will become magnets that more strongly attract new residents and jobs, faster than over the last 20 years. This change may lead to a significant rise in the number of people walking or biking to work, and a corresponding decline in driving and car ownership. Alternative 2 represents a significantly more concentrated pattern of new growth in the urban centers compared to past trends.



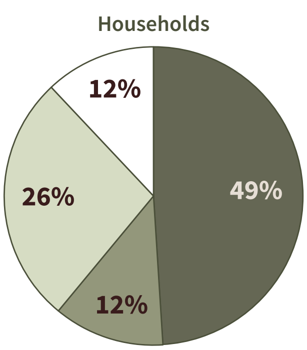
- No change in the number, designation or size of urban villages.
- More growth in urban centers, especially in Downtown, First/Capitol Hill and Northgate and South Lake Union.
- Less growth outside urban centers, including the least emphasis on hub urban village growth.
- More mid- and high-rise housing is likely to occur than under other alternatives, given the more concentrated growth patterns.
- A higher concentration of jobs in urban centers, especially Downtown, Northgate and South Lake Union.

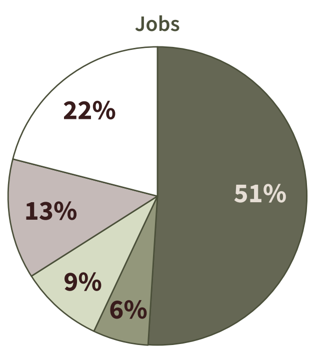
Figure 1–1 Summary of alternatives (cont.)

Alternative 3

Guide Growth to Urban Villages near Light Rail

An emphasis on growth in urban centers, but also in urban villages near the light rail stations. Would include boundary adjustments to urban villages with light rail stations to encompass a 10-minute walk to the station. A new village could be designated at 130th St/I-5 and possible reconfiguration of the Mount Baker and 23rd & Union-Jackson urban villages near the I-90 East Link Station would occur.



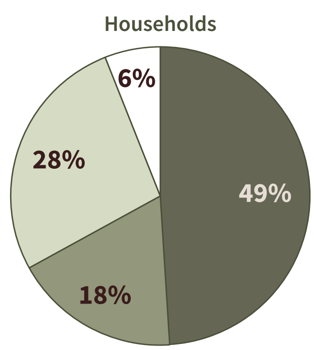


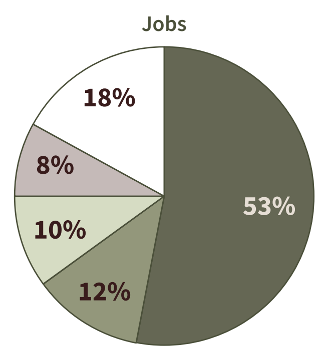
- Larger share of growth and expanded urban village boundaries near light rail stations (Mount Baker, Columbia City, North Beacon Hill, Othello, Rainier Beach, Roosevelt).
- Possible new residential urban village around the North Link 130th Street Station and possible reconfiguration of the Mount Baker and 23rd & Union-Jackson urban villages near the I-90 East Link station.
- An intermediate level of growth in urban centers that is less concentrated than assumed for Alternative 2.
- A relatively smaller share of growth in urban villages without light rail, comparable to Alternative 2.

Alternative 4

Guide Growth to Urban Villages near Transit

The greatest number of transit-oriented places—served by either bus or rail—that are preferred for growth. In addition to areas covered in Alternative 3, more growth would also be concentrated in other urban villages that currently have very good bus service. Relatively more urban villages would be subject to increased growth and possible boundary changes.





- Includes the higher-growth assumptions and expanded urban village boundaries of Alternative 3 (to capture 10-minute walksheds), and the addition of other selected areas that have very good bus service. These include areas are located in the western half of the city (Ballard, Fremont, West Seattle Junction and Crown Hill).
- Three of the four added areas are hub urban villages, which defines this alternative as having the greatest emphasis on growth in the hub urban villages.
- This assumes a smaller share of residential growth would occur outside centers and villages than all of the other alternatives.

Urban Centers
Hub Urban Villages
Residential Urban Villages
Mfg/Industrial Centers
Outside Centers & Villages

Figure 1–3 Urban village boundaries under alternatives 1 and 2

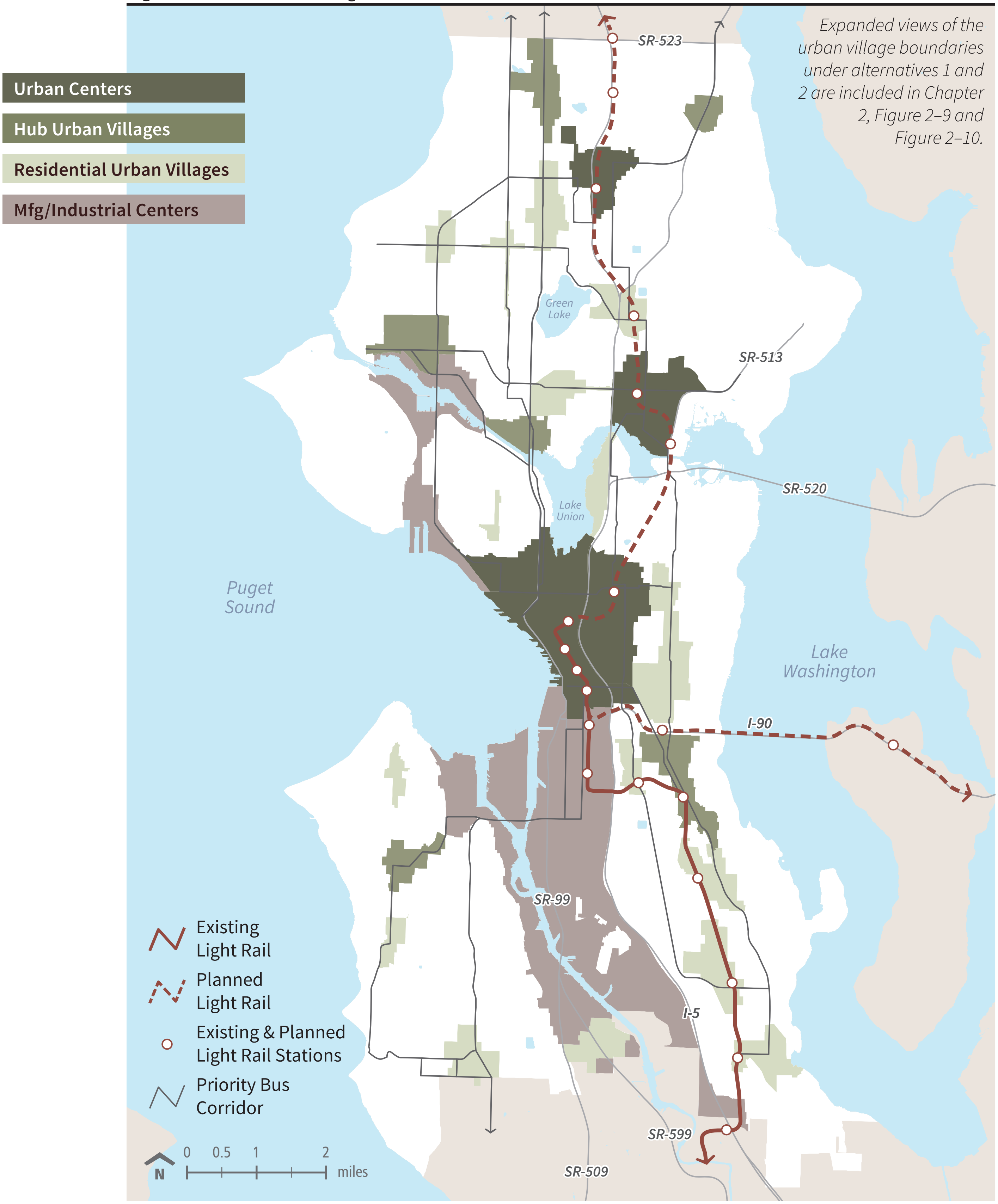


Figure 1–4 Urban village boundaries under Alternative 3

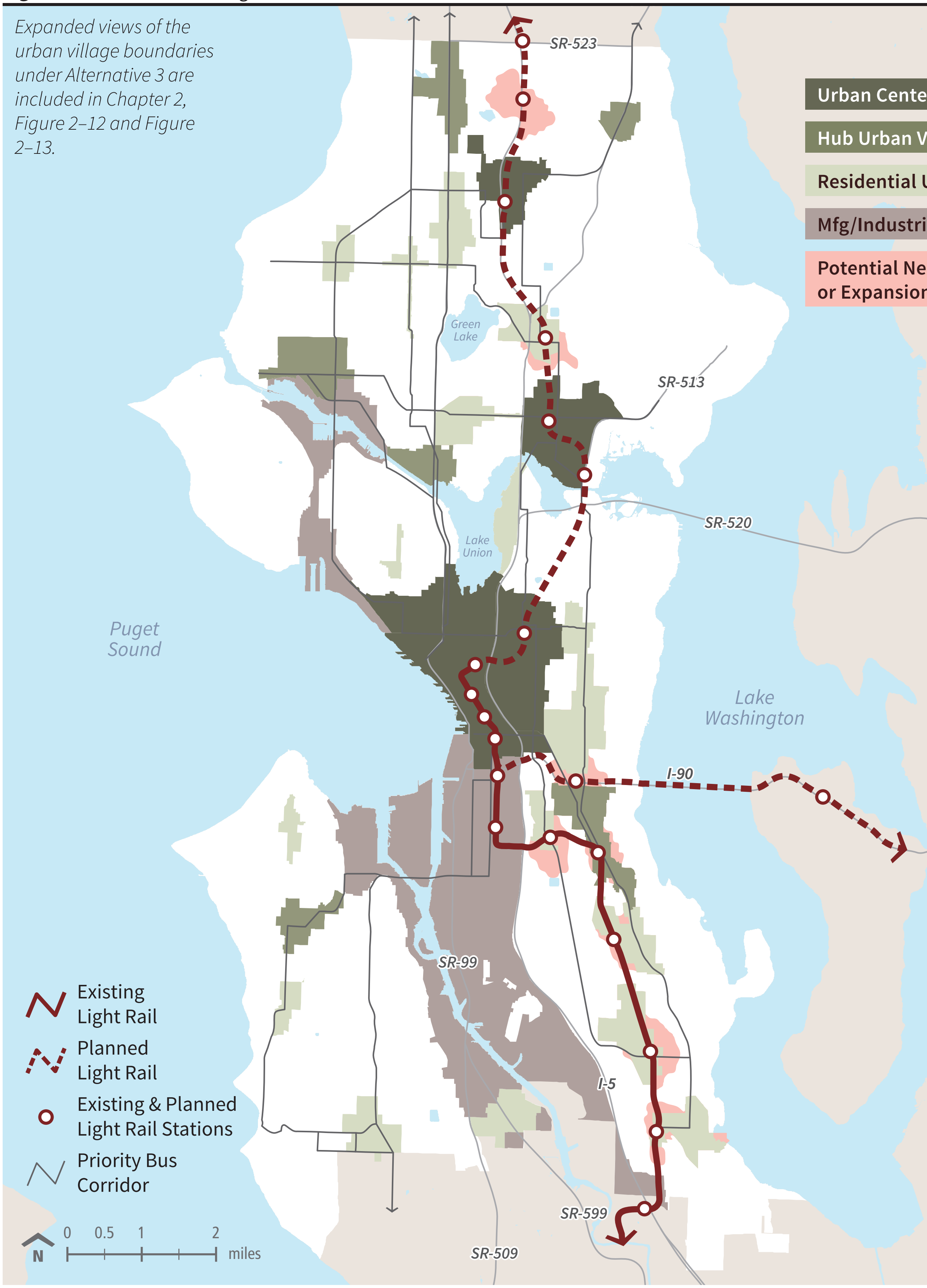
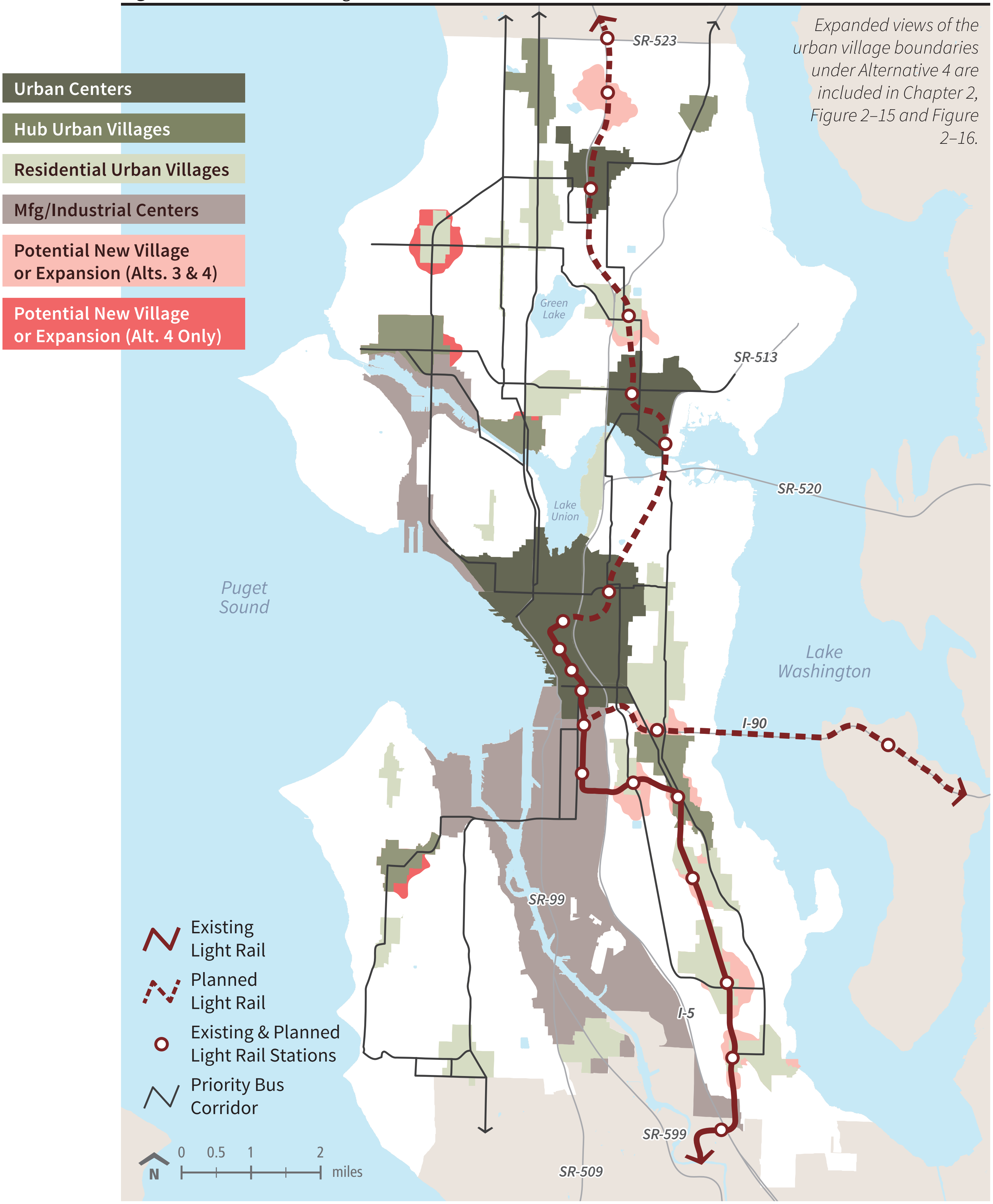


Figure 1–5 Urban village boundaries under Alternative 4



1.4 Significant Areas of Controversy and Uncertainty, and Issues to be Resolved

Key environmental issues and options facing decision-makers include:

- Where forecast growth should be guided, including continuation of current trends, focused within urban centers or guided toward urban villages that are well served by light rail and bus service;
- Effect of alternative growth patterns on housing affordability, displacement of residents and businesses, and demand for public services and transportation infrastructure investment; and
- Review and refinement of draft goals and policies

1.5 Summary of Impacts and Mitigation Strategies

The following pages summarize impacts of the alternatives and mitigation strategies for each element of the environmental analysis.

Please see Chapter 3 for a complete discussion of impacts and mitigation strategies for each element of the environment.

Earth and Water Quality

IMPACTS COMMON TO ALL ALTERNATIVES

Future construction activities will generate the potential for disturbed soil on construction sites to be conveyed to nearby drainage systems. On construction sites that are close to natural vegetated areas and/or Environmentally Critical Areas (ECAs), there may be increased potential for disturbance to generate adverse impacts, such as when potentially unstable steep slopes or poor quality soils are present. This could occur in places that drain to natural streams, or via drainage utility systems that are designed to outfall to natural receiving waterbodies, if soils and other pollutants are washed off and conveyed far enough away from construction sites.

Increased density and activity levels and the associated use of automobiles and other activities, could contribute to additional increments of adverse water quality impacts in ECAs such as wetlands and streams due to wash-off of pollutants from street surfaces and discharge of pollutants into drains.

ALTERNATIVES 1–4

Each alternative growth strategy described in this EIS may generate different levels or distributions of potential adverse critical area impacts. Potential differences are summarized below.

Alternative 1: Continue Current Trends (No Action)

Steep Slope/Landslide Prone Soils. Most or all of the steep slopes present in South Lake Union are likely to be affected due to their central locations within the neighborhood and within properties that are likely to be developed within the next twenty years.

In the portions of Uptown/Queen Anne where steep slopes are located in the most accessible and developable places, disturbance of steep slopes is relatively likely.

Comparatively high projected levels of growth in Eastlake could increase the total amounts of future disturbance of existing steep slope edges in this neighborhood.

Peat and Settlement Prone Soils. In Mount Baker, Greenwood-Phinney Ridge, Rainier Beach and South Park, peat and settlement prone soils are relatively widespread in the neighborhoods' core areas. For Greenwood-Phinney Ridge, Rainier Beach and South Park, the projected amounts of growth are relatively similar for all alternatives.

For Mount Baker, compared to the other alternatives, the residential and employment growth projected under Alternative 1 is less than the other alternatives, meaning a lesser exposure of the neighborhood's settlement prone soils to potential adverse impacts.

Comparatively, Northgate has a lesser overall presence of these potentially unstable soils than the other neighborhoods, but several of the properties with such soils could be subject to future development under any alternative. The residential and employment growth projected under Alternative 1 is less than the other alternatives, meaning a lesser exposure of the neighborhood's settlement prone soils to potential adverse impacts.

Presence of Streams or Wetland ECAs. Given the combination of proximity of these natural features to future development, and the amount of projected residential and employment growth, the neighborhoods facing a greater risk of adverse impacts on these ECAs under Alternative 1 are: Northgate, Lake City and Columbia City.

Alternatives 2, 3 and 4: Guide Growth to Urban Centers, Guide Growth to Urban Villages near Light Rail and Guide Growth to Urban Villages near Transit

Compared to Alternative 1, the potential adverse impacts related to alternatives 2, 3 and 4 are (1) a somewhat elevated risk of peat/settlement-prone soil ECA disturbances with future development in Northgate and Rainier Beach, given amounts of projected growth; (2) elevated risks of peat/settlement-prone soil ECA disturbances in Mount Baker and Rainier Beach, and; (3) a somewhat elevated risk of downstream creek or wetland ECA disturbances in Northgate (alternatives 2, 3 and 4), Columbia City (alternatives 3 and 4) and Westwood-Highland Park (alternatives 3 and 4).

MITIGATION STRATEGIES

None of these identified impacts are concluded to be significant adverse impacts. The continued application of the City's existing policies, review practices and regulations, including the operational practices of Seattle Public Utilities, would help to avoid and minimize the potential for significant adverse impacts to critical areas discussed in this section.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts to earth and water quality are anticipated.

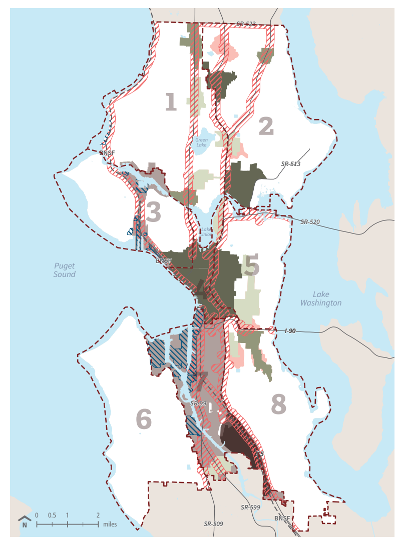
Air Quality and Greenhouse Gas Emissions

CONSTRUCTION-RELATED EMISSIONS

Development of new residential, retail, light industrial, office, and community/art space would generate construction phase air emissions, such as exhaust emissions from heavy duty construction equipment and trucks, as well as fugitive dust emissions associated with earth-disturbing activities. For construction equipment, the primary emissions of concern are NO_x and $PM_{2.5}$. NOx contributes to regional ozone formation and $PM_{2.5}$ is associated with health and respiratory impacts. Construction-related NO_x and $PM_{2.5}$ emissions are not expected to generate significant adverse air quality impacts nor lead to violation of standards under any of the alternatives. Given the transient nature of construction-related emissions, construction related emissions associated with all four alternatives of the Comprehensive Plan are identified as a minor adverse air quality impact.

LAND USE COMPATIBILITY AND PUBLIC HEALTH CONSIDERATION

Comprehensive Plan growth strategies may affect future growth and development patterns in ways that could increase exposure to mobile and stationary sources of air toxics and $PM_{2.5}$. A health risk assessment conducted by the Washington State Department of Health found that on-road mobile sources contribute to the highest cancer and non-cancer risks near major roadways over a large area of south Seattle and that risks and hazards are greatest near major highways. Portions of Seattle located within 200 meters of major highways are exposed to relatively high cancer risk values of up to 800 in one million. A similar phenomenon occurs near rail lines that support diesel locomotive operations as well as stationary sources, such as industrial areas



Thumbnail of Figure 3.2–5, 200 meter buffer around major freeways, rail lines and major port terminals.

Portions of several growth areas are within 200 meters of these pollution sources. Under any alternative, increased residential development within this buffer area could potentially expose future sensitive receptors to relatively high increased cancer risks. The percentage of growth areas within the 200 meter buffer is highest (52 percent) under Alternative 2 and lowest (36 percent) under Alternative 1.

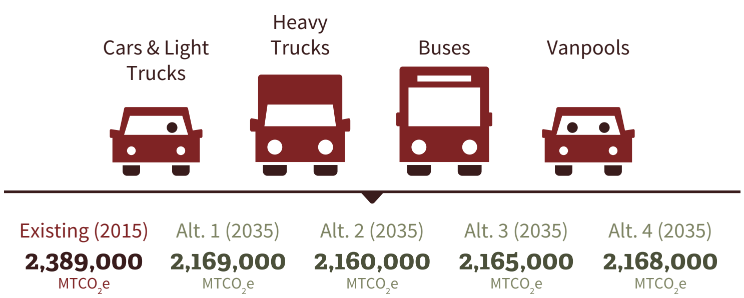
CONSTRUCTION-RELATED GREENHOUSE GAS EMISSIONS

GHGs would be emitted during construction activities from demolition and construction equipment, trucks used to haul construction materials to and from sites, and from vehicle emissions generated during worker travel to and from construction sites. An estimated 22 million metric tons of CO_2E over the 20-year period would be expected to result from construction activities. Because of the combination of regulatory improvements and Climate Plan Actions under way, construction related GHG emissions associated with all four alternatives of the Comprehensive Plan would be considered a minor adverse air quality impact.

OPERATION-RELATED GREENHOUSE GAS EMISSIONS

Operational GHG emissions associated with development under all alternatives would change due to a number of factors. Under all alternatives, projected improvements in fuel economy outweigh the projected increase in vehicle miles traveled. For this reason, all of the alternatives are expected to generate lower GHG emissions than current emissions in 2015 and all would generate roughly the same annual GHG emissions, ranging between 2,160,000 to 2,169,000 $MTCO_2e$ annually. As a result, no significant adverse impacts are identified with respect to GHG emissions.

Road Transportation GHG Emissions



MITIGATION STRATEGIES

To address potential land use compatibility and public health impacts, the City could consider separating residences and other sensitive uses (such as schools) from freeways, railways and port facilities by a buffer of 200 meters. Where separation by a buffer is not feasible, consider filtration systems for such uses.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.

No significant unavoidable adverse impacts to air quality and greenhouse gas emissions are anticipated.

Noise

The proposed comprehensive plan alternatives envision future residential and job growth primarily within areas where transit infrastructure either exists or is planned. As such, implementation of the alternatives would result in a concentration of development within existing infill development areas. Resulting construction activities associated with development of new residences and commercial and retail land uses would have the potential to temporarily affect nearby sensitive receivers such as existing residences, schools and nursing homes.

From a regional perspective, temporary construction noise and vibration within these infill development areas would occur in urban areas where ambient noise and vibration levels are already affected by roadway traffic and other transportation sources and would therefore be less noticeable to receivers than if these activities were to occur on the edges of existing development areas.

CONSTRUCTION NOISE AND VIBRATION IMPACTS

Construction noise standards established in the Seattle Municipal Code limit construction activities to times when construction noise would have the least effect on adjacent land uses, and also restrict the noise generated by various pieces of construction equipment. Development under the four alternatives would range from high intensity development (high-rise and mid-rise offices and residences) in urban centers to low intensity development (low-rise development) both within and outside of urban villages. Consequently, depending on the extent of construction activities involved and background ambient noise levels, localized construction-related noise effects could range from minor to significant.

Pile driving or similar invasive foundation work are the construction activities with the greatest potential for significant construction-related noise or vibration impacts. Generally speaking these types of construction activities are associated with high-rise development which all alternatives envision to occur within the city's urban centers. Pile driving adjacent (closer than 50 feet) to occupied buildings construction noise impacts are identified as a potential moderate noise impact.

Pile driving can also result in vibration levels that can damage adjacent sensitive structures (within 50 feet), such as historic buildings, and result in interference or annoyance impacts for land uses where people sleep, such as homes, hotels and hospitals. However, time restrictions in the Seattle Municipal Code are sufficient to avoid sleep interference impacts during times that most people sleep.

LAND USE COMPATIBILITY

All alternatives generally seek to locate residential uses in places where transit service is good in order to help reduce single occupant vehicle use. If an active industrial operation would locate adjacent to sensitive land uses, noise compatibility problems could also arise. This would be a moderate noise impact.

For all alternatives, roadside noise levels would increase by less than 0.5 dBA at all locations which is considered a minor impact on environmental noise. While the impacts of additional noise would not be discernible from background noise levels, all of the alternatives would increase noise levels that in some areas are already above levels considered healthy for residential and other sensitive land uses.

MITIGATION STRATEGIES

If residences or other sensitive receptors are located close to major roadway or noisy industrial operations, additional insulation or window treatments may be warranted to reduce interior noise levels to generally acceptable levels. To address the potential impact for impact pile driving on noise and vibration, best practices for noise control are recommended, including "quiet" pile-driving technology and cushion blocks to dampen impact noise from pile driving.

To address the potential for exposure of residences and other sensitive land uses to incompatible environmental noise, the comprehensive plan could include a policy that recommends that residences and other sensitive land uses (i.e., schools, day care) be separated from freeways or that such development achieve an interior noise performance standard of 45 dBA L_{dn}.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts to noise are anticipated.

Land Use: Patterns, Compatibility, Height, Bulk and Scale

IMPACTS COMMON TO ALL ALTERNATIVES

Land Use Patterns. All alternatives would focus the majority of future residential and job growth into urban centers and urban villages, which are characterized by higher densities and a more diverse mix of uses. Areas outside of the urban centers and villages would continue to be comprised of low-density predominantly single-family residential uses.

Land Use Compatibility. Future growth is likely to increase the frequency of different land use types locating close to one another often with differing levels of intensity, particularly in urban centers and villages.

Height, Bulk and Scale. Increased height, bulk and overall development intensity would occur primarily in the designated urban centers and urban villages with specific levels and locations of development varying in distribution by alternative. New development would likely expand low-rise, midrise and high-rise districts currently observed in urban villages and centers.

Alternative 1: Continue Current Trends (No Action)

Alternative 1 is projected to lead to the greatest amount of housing and job growth in areas outside urban centers or villages.

Land use incompatibilities could occur as a result of infill development of vacant lots and redevelopment of existing properties at higher intensities. Some localized incompatibilities could also occur on the edges of urban centers and villages where more intense development could occur near low-intensity uses outside urban centers and villages.

Alternative 2: Guide Growth to Urban Centers

Alternative 2 would result in the most concentrated development pattern of the four alternatives. Growth in urban centers is likely to result in the construction of more mid-rise and high-rise commercial and mixed-use buildings. There would be little effect on land use patterns outside urban centers or villages.

As urban centers within the Downtown core are already-intensely developed, new development would tend to be relatively compatible with existing forms and uses. However, the Northgate and University District urban centers would have increased potential for compatibility issues as these centers still contain areas of relatively low-intensity development. However, on a citywide basis, Alternative 2 is likely to result in fewer potential occurrences of incompatible uses in urban villages compared to other alternatives.

Alternative 3: Guide Growth to Urban Villages near Light Rail

Alternative 3 would include expansions of some urban villages and could also create a new urban village around the possible NE 130th Street transit station. Land use patterns in these areas would convert to higher levels of intensity as future growth occurs. As a result, Alternative 3 has the potential to result in localized compatibility issues within these villages as existing lower intensity uses transition to higher-intensity development forms.

<u>**Alternative 4: Guide Growth to Urban Villages near Transit**</u>

Similar to Alternative 3, Alternative 4 would result in new and expanded urban villages, converting existing lower-intensity land uses to higher-intensity development forms as future growth occurs. Impacts to land use patterns and compatibility would be similar to Alternative 3, but would occur in a greater number of locations.

MITIGATION STRATEGIES

Impacts identified in the land use analysis are not identified as probable significant adverse impacts, meaning that no mitigation strategies are required. The City would continue to rely upon use of regulations in its municipal code, including Land Use Code (Title 23), SEPA rules and policies (Title 25), the design review program (SMC 23.41 and related guidelines), and documents such as Urban Design Frameworks that address design intent in various subareas.

Although not required, other possible strategies that the City could pursue include:

- Consideration of transitions between urban centers and villages and surrounding ares through ongoing neighborhood planning efforts and/or amendments to zoning regulations.
- Additional station area planning efforts in new or expanded urban villages.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Under all alternatives, additional growth would occur in Seattle, leading to a generalized increase in building height and bulk and development intensity over time, as well as the gradual conversion of low-intensity uses to higher-intensity development patterns. This transition would be unavoidable and is an expected characteristic of urban population and employment growth.

In addition, future growth is likely to create localized land use compatibility issues as development occurs. However, the City's adopted development regulations, zoning requirements and design guidelines are anticipated to sufficiently mitigate these impacts. Therefore, no significant unavoidable adverse impacts to land use are anticipated.

Relationship to Plans, Policies and Regulations

GROWTH MANAGEMENT ACT

Seattle's adopted Comprehensive Plan contains the elements (i.e., chapters) required by the Growth Management Act (GMA), and the City has adopted development regulations that implement the plan. Focusing growth in urban villages, which is the Comprehensive Plan's basic strategy, is consistent with GMA planning policies that seek to prevent urban sprawl and preserve rural areas and resource lands. The City has sufficient zoned, developable land to accommodate the twenty-year population and employment targets; the Draft EIS is examining different ways that forecast growth could be distributed throughout the City.

VISION 2040

The Comprehensive Plan's Urban Village strategy is consistent with *Vision 2040*'s regional growth strategy, which seeks to focus the majority of the region's growth in designated centers. *Vision 2040* designates Seattle as a Regional Growth Center/Metropolitan Center, and the City is planning to accommodate the majority of its projected growth within identified urban centers, urban villages and manufacturing/industrial centers (MICs).

KING COUNTY COUNTYWIDE PLANNING POLICIES

The City is planning to accommodate the housing and employment growth targets in the King County Countywide Planning Policies (CPPs). The majority of that growth under all Draft EIS alternatives would be distributed to designated urban centers, urban villages and MICs. The Update will include quantitative growth targets/planning estimates for urban centers and MICs at a minimum.

SEATTLE COMPREHENSIVE PLAN

Urban Village Strategy. All Draft EIS alternatives would continue and reinforce the City's adopted Urban Village Strategy, which accommodates the majority of anticipated housing and employment growth in designated urban centers, urban villages and MICs. The Draft EIS alternatives examine the effects of distributing varying amounts of growth to designated urban centers, ranging from 42 percent of housing and 61 percent of jobs in Alternative 1, to 66 percent of housing and 75 percent of jobs in Alternative 2. Alternatives 3 and 4 distribute relatively more housing and jobs to urban villages to examine the effects of locating more growth within a ten-minute walk of light rail transit stations and frequent bus service.

Designation of Urban Villages. The boundaries of some designated urban villages could be modified somewhat under alternatives 3 or 4, to help focus villages on locations within a ten-minute walk of existing or planned light rail stations or frequent bus service corridors. To respond to planned light rail stations, a new urban village could be designated at 130th/I-5, and the boundary of the existing villages near the I-90 station could be reconfigured.

Land Use Element. A change in the land use designations used on the Future Land Use Map (FLUM) for urban villages is being considered. A single designation may be applied to each type of urban village, and this would be accompanied by policies that clearly describe the desired mix of uses and density. This change would be consistent with existing Comprehensive Plan policy (LU1 and LU2). A redundant policy containing criteria for rezones of single-family properties could also be eliminated; these criteria are currently contained in the Land Use Code (SMC 23.34), and this simplification would be consistent with adopted policy (LU3).

MITIGATION STRATEGIES

Because no significant adverse impacts are identified with respect to consistency with plans and policies, no mitigation strategies are required or proposed.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts are anticipated.

Population, Employment and Housing

IMPACTS COMMON TO ALL ALTERNATIVES

Population and Housing. Under all four alternatives, urban centers and urban villages have sufficient development capacity to accommodate planned levels of residential growth during the planning period. All four alternatives guide growth toward urban centers and urban villages over other areas.

Housing affordability is an issue of concern under all four alternatives and is identified as a probable significant impact in this EIS. A significant portion of Seattle's households are burdened by housing costs and over 60 percent of the lowest income renter households are estimated to pay more than one-half of their income for rent and basic utilities. Ultimately, housing prices are likely to be driven by demand generated as a result of Seattle's strong job market and attractive natural and cultural amenities. The city's limited land base will likely contribute to upward pressure on housing costs. Low vacancy rates and tight inventory is also likely to contribute to higher rent trends.

Employment. Anticipated future employment growth would occur predominantly in Seattle's urban centers, manufacturing-industrial centers and hub urban villages. All alternatives provide sufficient capacity to accommodate assumed employment growth in the City's centers, villages and manufacturing-industrial centers. Transit access, demographic trends and various market factors will influence which industry sectors locate in various locations.

Displacement. As growth continues in Seattle and development accelerates to meet increasing demands for housing as well as commercial and retail space, some existing uses are likely to be redeveloped to accommodate new growth, creating a potential for displacement of existing homes, businesses and cultural institutions. Displacement of housing and jobs that anchor communities of vulnerable populations could have negative impacts on neighborhoods.

Alternative 1: Continue Current Trends (No Action)

Alternative 1 would result in a more distributed growth pattern compared to the other alternatives and would likely result in patterns of development relatively consistent with the current development pattern. Projected growth under Alternative 1 (No Action) would generate moderate potential for displacement in those urban villages with the greatest amount of vulnerable populations, relative to the other alternatives.

Alternative 2: Guide Growth to Urban Centers

Alternative 2 would result in the most concentrated growth pattern, with the Downtown and South Lake Union urban centers absorbing the most growth. Growth in areas outside urban villages would be limited. Among the alternatives, Alternative 2 would direct the least additional housing and employment growth to those urban villages with the highest risk of displacement impacts on vulnerable populations.

Alternative 3: Guide Growth to Urban Villages near Light Rail

Alternative 3 guides future growth to areas around light rail transit stations. Because Alternative 3 would concentrate growth in urban villages served by light rail stations, most of which are located in South Seattle, it has a high overall potential to displace vulnerable populations in these areas.

Alternative 4: Guide Growth to Urban Villages near Transit

Similar to Alternative 3, Alternative 4 would guide growth toward urban villages with light rail or enhanced bus service. Potential for displacement of existing residents in urban villages with the greatest amount of vulnerable populations under Alternative 4 would be relatively high and similar to Alternative 3.

MITIGATION STRATEGIES

The following mitigation strategies are identified to address significant housing affordability issues and potential risk of vulnerable resident and business displacement:

- Tailor housing strategies to meet specific objectives and provide a balanced approach of public and private funding, incentives and regulations.
- Continue to preserve existing affordable housing through existing programs, including the Federal low-income housing tax credit program, programs funded through the voter-approved Seattle Housing Levy funds, developer contribution through the incentive zoning program, and the Multifamily Property Tax Exemption program.
- Mitigate projected impacts of growth by implementing a robust housing agenda that includes low-income housing preservation and tenant protection strategies. As an example, the Housing Affordability and Livability Agenda (HALA) is an initiative that was launched in late 2014 and is ongoing. The City is currently evaluating the impacts to affordable housing through the development of a needs assessment that will inform HALA's work.
- Address potential business displacement through tools and programs that the City already offers, including Community Development Block Grants, New Market Tax Credits, Section 108 loads, and contracts with community organizations, such as Washington CASH and Community Capital Development.
- Consider implementing a combination of strategies identified in the City's Equity Analysis that is a parallel effort to this EIS.
- Continue to conduct inclusive outreach through Seattle's Race and Social Justice Initiative (RSJI) as a platform for continuing to work towards equity in the City.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Seattle will face housing affordability challenges under all four alternatives. Rental costs can be expected to be highest in urban centers and hub urban villages—especially Downtown, First/Capitol Hill, South Lake Union, Ballard, Fremont and West Seattle Junction—and to rise the most in neighborhoods where existing rents are low.

Transportation

Four types of impacts were considered in this evaluation: auto and transit, pedestrian and bicycle, safety and parking. Other metrics were prepared in this analysis, including traffic operations on state highways, and travel times, walksheds and trip length for sub-areas of Seattle. These metrics are provided for informational purposes and are not used to determine significant impacts.

IMPACTS COMMON TO ALL ALTERNATIVES

Thumbnail of Figure 3.7–16 on page 3.7–32, 2035 screenline v/c ratios. A screenline is an imaginary line across which the number of passing vehicles is counted.

Auto and Transit. The City uses "screenlines" to evaluate auto (including freight) and transit operations. A screenline is an imaginary line across which the number of passing vehicles is counted. Each of those screenlines has a level of service (LOS) standard in the form of a volume-to-capacity (v/c) ratio: *the number of vehicles crossing the screenline compared to the designated capacity of the roadways crossing the screenline*. All of the screenlines are projected to meet the LOS standard for the PM peak hour under all alternatives. Therefore, no auto, freight[1] or transit impacts are expected under any of the alternatives.

Pedestrian and Bicycle Network. The City has identified plans to improve the pedestrian and bicycle network through its *Move Seattle, Pedestrian Master Plan, Bicycle Master Plan* and other planning efforts. These plans are being implemented and are expected to continue to be implemented under all alternatives. No significant impacts are expected to the pedestrian and bicycle system.

Safety. The City's safety goals, and the policies and strategies supporting them, will be pursued regardless of the land use alternative selected. The overall variation in vehicle trips is very small among alternatives (less than two percent). At this programmatic level of analysis, there is no substantial difference in safety among the alternatives, and no significant safety impacts are expected.

Parking. There are currently some areas of the city where on-street parking demand likely exceeds parking supply. Given the projected growth in the city and the fact that the supply of on-street parking is unlikely to increase by 2035, an on-street parking deficiency is expected under all alternatives.

1 This refers to impacts related to freight operations on city arterials. Freight loading and business access are addressed subsequently.

MITIGATION STRATEGIES

The recommended mitigation strategy focuses on five main themes:

Improving the Pedestrian and Bicycle Network. The City has developed *Move Seattle*, a citywide *Pedestrian Master Plan* (PMP) and citywide *Bicycle Master Plan* (BMP) along with other plans focused on particular neighborhoods. Implementation of the projects in these plans would improve the pedestrian and bicycle environment. Also, ongoing safety programs are aimed at reducing the number of collisions, benefiting both safety and reliability of the transportation system.

> Seattle has prioritized reducing vehicular demand rather than increasing capacity and reduced single occupant vehicle travel is key to the city's transportation strategy.

Implementing Transit Speed and Reliability Improvements. The Seattle Transit Master Plan (TMP) has identified numerous projects, including Intelligent Transportation Systems (ITS), to improve transit speed and reliability throughout the city.

Implementing Actions Identified in the Freight Master Plan. The City is preparing a revised Freight Master Plan, which may include measures to increase freight accessibility and travel time reliability. These projects could be implemented on key freight corridors to improve conditions for goods movement.

Expanding Travel Demand Management and Parking Strategies. The City has well-established Commute Trip Reduction (CTR) and Transportation Management Programs (TMPs), which could be expanded to include new parking-related strategies. CTR and TMP programs could expand to include smaller employers, residential buildings and other strategies.

Working With Partner Agencies. WSDOT, King County Metro, Sound Transit and PSRC all provide important transportation investments and facilities for the City of Seattle. The City should continue to work with these agencies. Key issue areas include regional roadway pricing and increased funding for transit operations.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts to transportation and parking are anticipated.

Public Services

IMPACTS ON POLICE SERVICES

Since population and employment growth do not directly correlate to an increased demand for police services, none of the four growth alternatives would necessarily result in proportional increases in call volumes or incidence of major crimes. Therefore, no specific findings of adverse effects on response times or criminal investigations volumes are made. Demand for police services varies over time and by neighborhood, population growth and shifts in composition could influence the characteristics of crime as neighborhoods change. Although hiring under the Seattle Police Department's (SPD's) Neighborhood Policing Staffing Plan has been delayed, additional officers are expected to be on staff in the next several years. Increased staffing levels may require expanded precinct facilities in the future.

IMPACTS ON FIRE AND EMERGENCY MEDICAL SERVICES (EMS)

The impacts of additional growth over the next twenty years would be gradual, distributing increased call volumes across many fire station coverage areas, but with an anticipated level of increased call concentration in urban centers and urban villages where the greatest levels of employment and residential growth would occur. Such increases in citywide call volumes would be considered an adverse impact of future growth.

IMPACTS TO PARKS AND RECREATION

Population and job growth over the 20-year planning period would generate more demand for parks, recreation facilities and open space across the city. As an illustration of possible demand to serve projected 20-year growth in a way that meets an aspirational goal of 1 acre per 100 residents, the City would need to add 1,400 acres of "breathing room" open space to its current park inventory of 6,200 acres.

Downtown, First/Capitol Hill, Greenwood-Phinney Ridge and Morgan Junction do not currently meet the 1 acre of usable open space per 1,000 households goal. Under all EIS alternatives, adding more households would widen these existing gaps. Under Alternative 2, the Downtown and First/Capitol Hill urban centers would have the highest level of demand for added space and facilities to meet the household-based goal among all urban centers and villages under all alternatives. Open space goals would likely also not be met in the Northgate and South Lake Union urban centers under Alternative 2, unless additional actions are pursued to address those needs. Population growth in a possible growth emphasis area near the future I-90/East Link station and in the Mount Baker and 23rd & Union-Jackson urban villages could also contribute to increased demand for parks and recreation, up to 1.50 acres of usable open space under alternatives 3 and 4.

IMPACTS TO SEATTLE PUBLIC SCHOOLS

The latest Seattle Public Schools capital program, BEX IV, ensures adequate capacity to meet enrollment projections for the 2021/21 school year, 13 years short of the comprehensive plan update planning horizon of 2035 (Wolf 2014). Student enrollment would likely continue to grow as population increases in Seattle, affecting school capacity in the long run.

Because only 34 of 117 schools (30 percent) are located in urban villages where all alternatives propose the most population growth, demand for Seattle Public Schools transportation services would likely increase. Focusing growth near light rail stations under Alternative 3 and 4 would provide better transit access to middle schools and high schools. Focusing population growth in urban villages with deficient sidewalk infrastructure in or near school walking boundaries would increase potential safety risks, which may burden some families with driving children to school who could otherwise walk if sidewalks were available. Residential areas that currently lack sidewalks are mostly concentrated in Northwest Seattle and Northeast Seattle north of N 85th Street, Southeast Seattle, South Park and Arbor Heights.

Currently no policies direct the district to purchase new property or to increase capacity in schools within urban villages, with the exception of a possible investment in a downtown school, currently under exploration.

MITIGATION STRATEGIES

Although future growth would contribute to increased demand for services and each has already-identified needs that the City anticipates addressing in coming years, the alternatives evaluated in this EIS would largely avoid generating significant adverse impacts. Future growth could cause adverse impacts relating to the availability or distribution of park/recreation facilities/amenities and open space in certain areas of the city. Mitigation strategies for parks/recreation are proposed to address the identified range of potentially significant adverse impacts.

Given that future growth would continue to generate additional demands upon parks/recreation and open spaces in relation to its per-capita goals, Parks would strive through the 20-year planning period to address possible shortfalls by continuing to leverage funds allocated in the Parks District to match state funding grants. The areas identified with probable outstanding needs include the following:

- ***Urban Centers.*** Downtown, First/Capitol Hill, Northgate and South Lake Union
- ***Hub Urban Villages.*** Ballard, Bitter Lake, Fremont, Mount Baker and West Seattle Junction
- ***Residential Urban Villages.*** Greenwood-Phinney Ridge, Morgan Junction, Westwood-Highland Park and portions of North Rainier and 23rd & Union-Jackson urban villages in the vicinity of the future I-90/East Link light rail station
- ***Other Neighborhoods.*** Whittier, Wedgewood and Beach Drive

Additional possible mitigation strategies included in EIS Section 3.8 offer advisory guidance on actions that could be taken to support improvements to public services to address potential impacts that are not identified as significant adverse impacts.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts to public services are anticipated.

Utilities

IMPACTS COMMON TO ALL ALTERNATIVES

The city-wide demand for utilities would be similar for all of the alternatives including the No Action Alternative. Depending on whether or not development occurs in concentrated areas, there potentially could be cumulative adverse impacts to localized portions of the utility system. However, both Seattle Public Utilities (SPU) and Seattle City Light (SCL) currently employ a variety of strategies to anticipate and adjust to changing demands. Both potential impacts and strategies employed by the utilities to respond to changing demand are discussed below.

SPU—Water. Currently total water system usage is declining and the water system has excess capacity. However design fire flow demands can be much greater than the average daily usage for a building. Under all alternatives, there will be greater demands on localized areas of the water supply and distribution system due to redeveloped buildings being brought up to current fire codes. SPU currently employs and will continue to employ management strategies (water availability certificates, developer improvements, etc.) to meet customer needs.

SPU—Sewer and Drainage. Under all alternatives, development could result in greater demands on the local sanitary sewer, combined sewer and stormwater collection systems, the downstream conveyance and the treatment facilities. There will be a greater overall need for sewage capacity with increased density. Increases in peak flow and total runoff caused by conversion of vegetated land area to impervious surfaces also create increased demand on drainage system capacity. SPU currently employs and will continue to employ management strategies (stormwater code updates, developer improvements, etc.) to meet customer needs.

SCL—Electric Power. Under all alternatives, future growth and development will increase demand for electrical energy. Despite recent population and economic growth, Seattle City Light's load is fairly stable since its service territory is well established and it has administered an aggressive energy conservation program for nearly 40 years. There is no significant variation in impacts between the alternatives. SCL currently employs and will continue to employ management strategies (energy code updates, advanced meter infrastructure, etc.) to meet customer needs.

MITIGATION STRATEGIES

None of these identified impacts are concluded to be significant adverse impacts. The continued application of the City's existing practices, including those described above, would help to avoid and minimize the potential for significant adverse impacts.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts to services provided by Seattle Public Utilities or Seattle City Light are anticipated.

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2.0 Description of the Proposal and Alternatives

2.1 Introduction

The City of Seattle Comprehensive Plan, *Toward a Sustainable Seattle*, is a 20-year vision and roadmap for Seattle's future. It provides the framework of goals and policies addressing most of Seattle's big picture decisions on how to grow while preserving and improving quality of life in the city. This may affect where people live and where they work, but it also will affect future choices about how to improve the transportation system and how to prioritize investment in public facilities, such as utilities, sidewalks and libraries.

The urban village strategy is a key component of the plan, providing a comprehensive approach to planning for future growth in a sustainable manner. The plan identifies 32 growth areas in four categories: urban centers, manufacturing/industrial centers, hub urban villages and residential urban villages. The current plan focuses growth in these urban villages.

Toward a Sustainable Seattle was originally adopted in 1994 and has been updated over time. As required by the Washington Growth Management Act, in 2015 the City is updating growth projections to address the 2015–2035 planning period. Through the alternatives considered in this Environmental Impact Statement (EIS), the City is considering alternative approaches to managing future growth patterns, all within the framework of the urban village strategy. The City has initiated this EIS to study the potential impacts of four different growth strategies, including a no action alternative that anticipates a continuation of the urban village strategy's implementation in ways similar to current practices and with similar growth distribution patterns as has occurred in the last twenty years. The three action alternatives represent a range of possible growth distributions, each of which emphasize a different pattern of growth and could lead to different implementing actions. For example, actions, such as rezones, development standards, infrastructure investment and others, could vary depending on the City's policy preferences to more strongly favor compact growth in some or all urban villages, in transit-served areas or a combination of these approaches. The balance of this chapter focuses on a description of these alternatives.

Proposal Overview

The City is considering text and map amendments to the Seattle Comprehensive Plan that would influence the manner and distribution of projected growth of 70,000 housing units and 115,000 jobs in Seattle through 2035, and that would influence the manner in which the

City conducts its operations to promote and achieve other goals such as those related to public health, safety, welfare, service delivery, environmental sustainability and equity.

All Comprehensive Plan elements will be reviewed and updated as part of the proposal. In many cases, proposed policy amendments reflect changes to state and regional guidance, incorporate language and editorial changes to policies to increase readability, clarify direction and remove redundancies; and add new or updated information since adoption of the current Comprehensive Plan. Other policy changes are intended to reflect evolving city policy.

Major policy questions and directions to be addressed in the plan update are briefly summarized below.

COMPREHENSIVE PLAN GROWTH PATTERNS AND LAND USE MAP AMENDMENTS

Pattern of Growth. Establish an updated distribution of growth within the urban village framework. Alternatives analyzed in this EIS provide a basis for comparison of four different growth scenarios, including a scenario that would generally continue current trends (identified as the No Action Alternative in this EIS).

Boundaries of Urban Centers and Villages. Consider whether to expand boundaries of certain existing urban villages and create new urban villages in order to direct growth to places that have either light rail or superior bus service. Expanded boundaries of urban villages containing high-frequency transit stations would be drawn to represent a 10-minute walking distance from the transit. A possible new urban village at 130th and I-5 would recognize a future light rail station there.

Growth Estimates. Determine whether to eliminate growth estimates for smaller urban villages, recognizing that rates of growth can vary greatly at the smaller urban village scale. Citywide and urban center growth estimates would be retained.

Future Land Use Map. In the urban villages, potentially replace the generalized land use designations with a single designation for each type of urban village (Residential, Hub and Urban Center). The single designation would be accompanied by policies that describe the types and intensities of uses allowed in each type of village. This change is intended to provide greater clarity about the planned future development pattern in each type of urban village and indicate limits to the most intense growth.

POLICY AND TEXT AMENDMENTS

Rezone Criteria. Potentially eliminate land use policies that establish detailed and strict criteria about when it is appropriate to change zoning from a single-family designation. This is the only zoning category that is addressed this way in the Plan and is at a level of detail that is more appropriate for the Land Use Code.

Homeownership. Consider eliminating the goal of increasing home ownership over time as outdated and no longer applicable in Seattle.

Affordable Housing

- Consider adding affordable housing as an appropriate use of City surplus land, along with some guidance for how to select among the various possible uses of surplus property.
- Potentially incorporate new policies that emerge from the City's Housing Affordability and Livability Agenda.

Travel Modes. Develop a system for identifying the priority travel mode for particular streets.

Tree Cover. Update urban forestry goals to be consistent with the Urban Forestry Stewardship Plan. This means the Comprehensive Plan goal to increase the overall tree cover by 2037 will change from 40 percent to 30 percent.

EQUITY

Through Executive Order 2014-02, Race and Social Justice Initiative, the City of Seattle states that "…equity is a cornerstone of a thriving democracy and the internal actions of local government that contribute to the health and well-being of everyone in our city." The City's Equitable Development Initiative is specifically focused on clear policy guidance for equitable growth and development that will be incorporated throughout the Comprehensive Plan. Additional discussion of equity in the context of the Comprehensive Plan and future growth and development can be found in a separate document, the Equity Analysis, available at www.seattle.gov/dpd.

Although a fundamental policy issue considered in the Comprehensive Plan, equity is not an environmental issue addressed through this SEPA EIS. As described in SMC 25.05.448, SEPA Rules establish that an EIS is required to analyze only environmental impacts, and not general welfare or other social policy considerations. The EIS environmental analysis is intended to be used by decision-makers in conjunction with other policy considerations and documents in making final decisions on proposals. For additional discussion of equity and the City's Equitable Development Initiative, please see the link shown above.

ALTERNATIVES OVERVIEW

Alternatives addressed in this EIS are summarized in Figure 2–1 on the following pages.

1. Continue Current Trends (No Action)
2. Guide Growth to Urban Centers
3. Guide Growth to Urban Villages near Light Rail
4. Guide Growth to Urban Villages near Transit

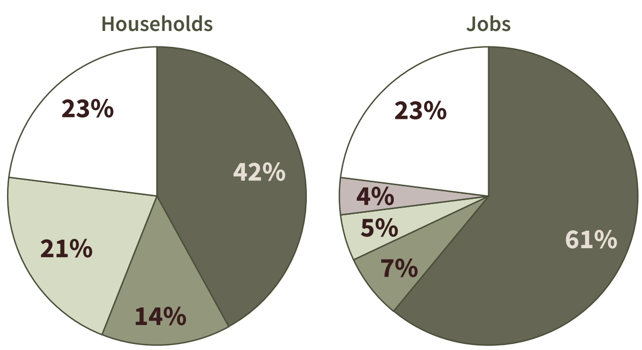
Each alternative is described more fully in Section 2.3.

Figure 2–1 Summary of alternatives

Alternative 1

Continue Current Trends (No Action)

Growth will generally follow current market trends. Residential growth will continue in the urban village neighborhoods that have experienced significant growth in the past 20 years, with a relatively low level of change in other urban villages. New jobs would occur primarily in Downtown and South Lake Union.

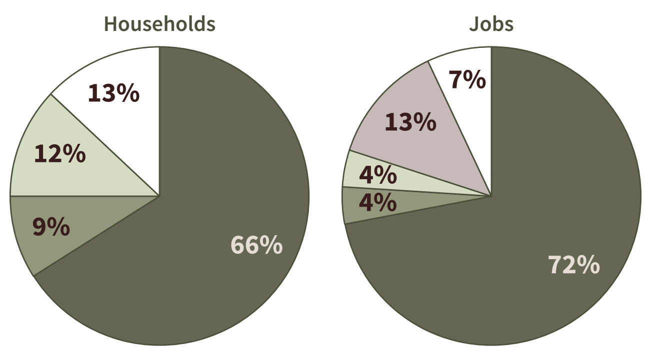


- No change in the number, designation or size of urban villages.
- Greater residential growth emphasis in hub urban villages, in selected residential urban villages and more growth outside of urban villages.
  - Hub urban village emphases: Ballard, Bitter Lake, Lake City and West Seattle Junction.
  - Residential urban village emphases: 23rd & Union-Jackson, Aurora-Licton Springs, Columbia City, Madison-Miller and Othello.
  - Nearly 1/4 of residential growth (16,000 units) to occur outside of urban villages.
- Comparatively, urban centers would have a smaller role in accommodating residential growth and a continued focus on job growth.

Alternative 2

Guide Growth to Urban Centers

Urban centers will become magnets that more strongly attract new residents and jobs, faster than over the last 20 years. This change may lead to a significant rise in the number of people walking or biking to work, and a corresponding decline in driving and car ownership. Alternative 2 represents a significantly more concentrated pattern of new growth in the urban centers compared to past trends.

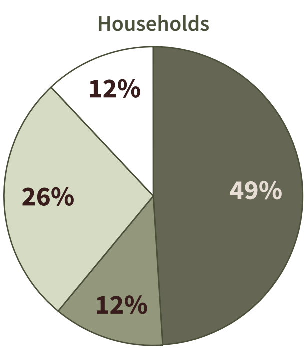


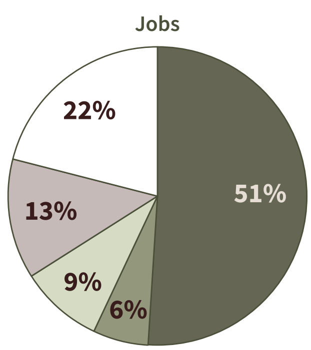
- No change in the number, designation or size of urban villages.
- More growth in urban centers, especially in Downtown, First/Capitol Hill and Northgate and South Lake Union.
- Less growth outside urban centers, including the least emphasis on hub urban village growth.
- More mid- and high-rise housing is likely to occur than under other alternatives, given the more concentrated growth patterns.
- A higher concentration of jobs in urban centers, especially Downtown, Northgate and South Lake Union.

Figure 2–1 Summary of alternatives (cont.)

Alternative 3
Guide Growth to Urban Villages near Light Rail

An emphasis on growth in urban centers, but also in urban villages near the light rail stations. Would include boundary adjustments to urban villages with light rail stations to encompass a 10-minute walk to the station. A new village could be designated at 130th St/I-5 and possible reconfiguration of the Mount Baker and 23rd & Union-Jackson urban villages near the I-90 East Link Station would occur.

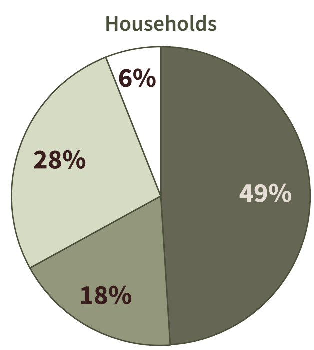


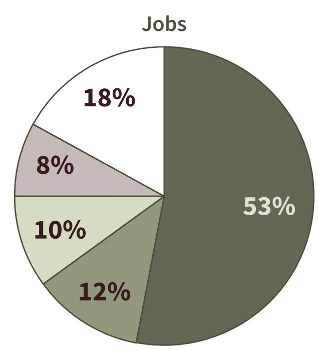


- Larger share of growth and expanded urban village boundaries near light rail stations (Mount Baker, Columbia City, North Beacon Hill, Othello, Rainier Beach, Roosevelt).
- Possible new residential urban village around the North Link 130th Street Station and possible reconfiguration of the Mount Baker and 23rd & Union-Jackson urban villages near the I-90 East Link station.
- An intermediate level of growth in urban centers that is less concentrated than assumed for Alternative 2.
- A relatively smaller share of growth in urban villages without light rail, comparable to Alternative 2.

Alternative 4
Guide Growth to Urban Villages near Transit

The greatest number of transit-oriented places—served by either bus or rail—that are preferred for growth. In addition to areas covered in Alternative 3, more growth would also be concentrated in other urban villages that currently have very good bus service. Relatively more urban villages would be subject to increased growth and possible boundary changes.

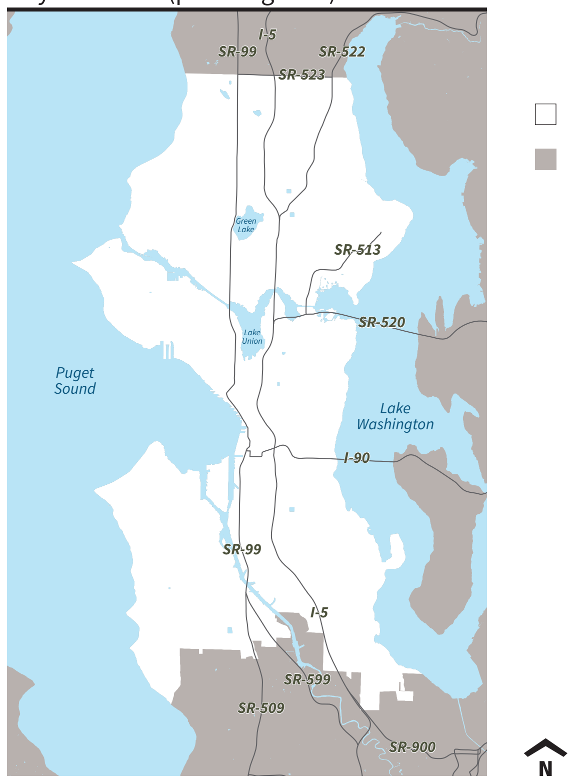




- Includes the higher-growth assumptions and expanded urban village boundaries of Alternative 3 (to capture 10-minute walksheds), and the addition of other selected areas that have very good bus service. These include areas are located in the western half of the city (Ballard, Fremont, West Seattle Junction and Crown Hill).
- Three of the four added areas are hub urban villages, which defines this alternative as having the greatest emphasis on growth in the hub urban villages.
- This assumes a smaller share of residential growth would occur outside centers and villages than all of the other alternatives.

Urban Centers
Hub Urban Villages
Residential Urban Villages
Mfg/Industrial Centers
Outside Centers & Villages

Figure 2–2
City of Seattle (planning area)



Planning Area

The proposal applies to the entire City of Seattle, as shown in Figure 2–2 above. The City encompasses approximately 83 square miles, or 53,182 acres. The City is bounded on the west by Puget Sound, the east by Lake Washington, the north by the cities of Shoreline and Lake Forest Park and the south by unincorporated King County and the cities of Burien and Tukwila.

Objectives of the Proposal

The City's objectives for this proposal include:

- Retaining the urban village strategy and achieving a development pattern in line with it
- Leverage growth to create housing choices and to promote healthy, complete communities
- Create jobs and economic opportunity for all city residents
- Build on regional transportation investments and balance transportation investments
- Support strategic public investment that addresses areas of need and maximizes public benefit
- Become a more climate-friendly city
- Distribute the benefits of growth more equitably

2.2 Planning Context

Seattle Comprehensive Plan

The Seattle Comprehensive Plan, *Toward a Sustainable Seattle*, is a 20-year plan that provides guidance for how Seattle will accommodate growth in a way that is consistent with the vision of the residents of the City. As a policy document, the plan lays out general guidance for future City actions. The City implements the plan through development and other regulations, primarily found in the City's zoning map and land use code. The City may also use functional plans to implement the policies in the Comprehensive Plan.

Consistent with the Washington Growth Management Act (GMA), the City adopted the Comprehensive Plan in 1994. Since then, it has been updated in an annual cycle of amendments, and in "periodic reviews" in 2004 and again in 2015. As part of the 2015 annual amendments, the City expects to adopt King County's allocation that the City accommodate 70,000 new housing units and 115,000 new jobs through 2035.

The City's Comprehensive Plan consists of thirteen major elements:

1. Urban Village
2. Land Use
3. Transportation
4. Housing
5. Capital Facilities
6. Utilities
7. Economic Development
8. Neighborhood Planning
9. Human Development
10. Cultural Resource
11. Environment
12. Container Port
13. Urban Design

All of these elements will be reviewed and updated as part of the proposal, in order to promote achievement of the City's overall Comprehensive Plan objectives.

URBAN VILLAGES

The urban village strategy is the foundation of the Comprehensive Plan and has shaped the planned pattern of future growth in the City. Four categories of growth areas are identified as shown in Figure 2–3: urban centers, manufacturing/industrial centers, hub urban villages and residential urban villages. Each urban village type has a different function and character, varying amounts and intensity of growth and different mixes of land uses. The Urban Village Element of the Comprehensive Plan describes their differences:

Figure 2–3 2012 Seattle housing units and jobs in urban centers and villages

Urban Centers

Regionally designated growth areas with planning estimates/ growth targets for households and jobs

22% of housing units
57% of jobs
7% of land area

Hub Urban Villages

Locally designated growth areas with planning estimates for households and jobs

7% of housing units
5% of jobs
3% of land area

Residential Urban Villages

Locally designated growth areas with planning estimates for households

13% of housing units
7% of jobs
7% of land area

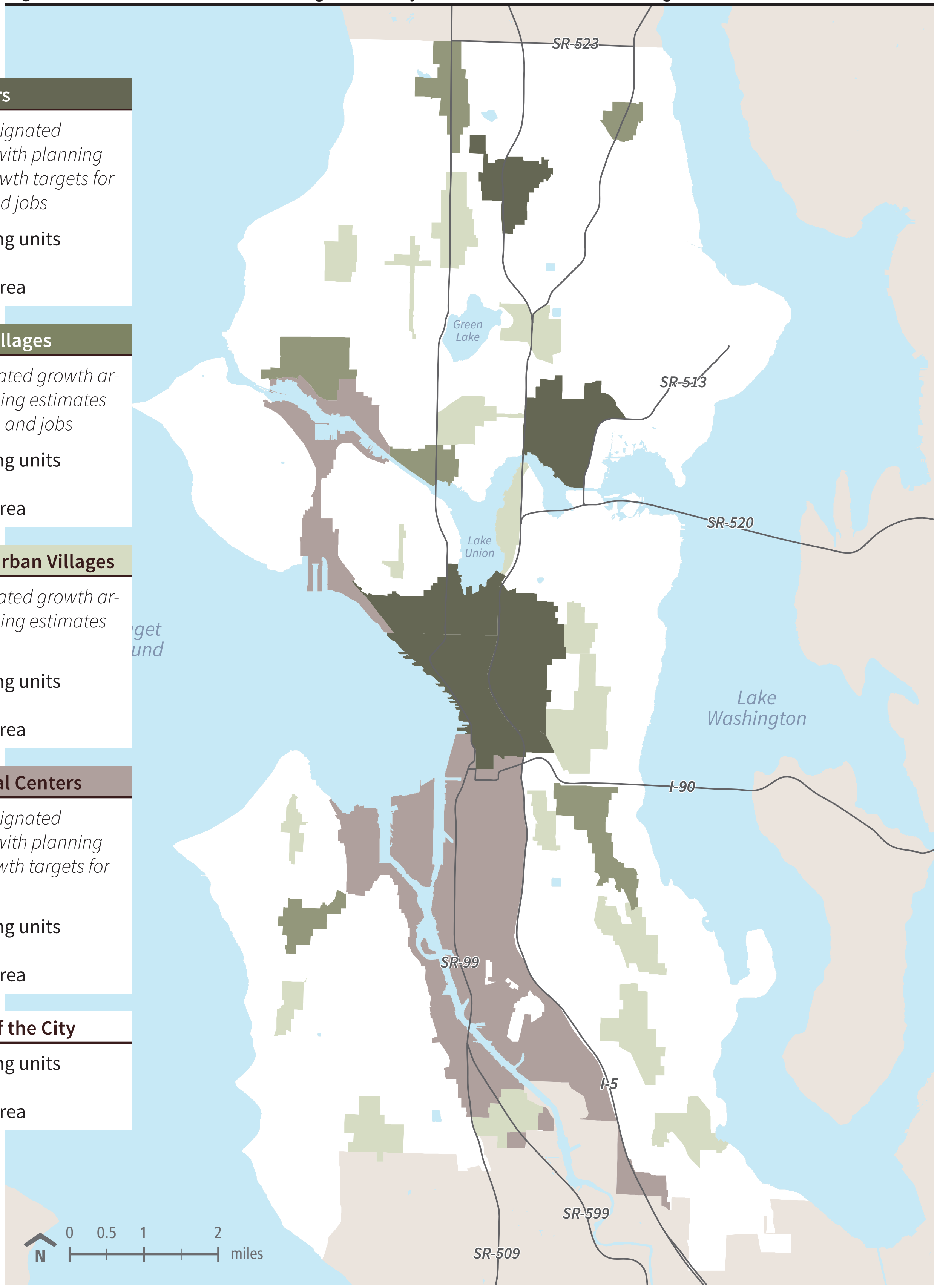
Mfg/Industrial Centers

Regionally designated growth areas with planning estimates/growth targets for jobs

<1% of housing units
15% of jobs
11% of land area

Remainder of the City

58% of housing units
16% of jobs
72% of land area



1. **Urban centers** are the densest neighborhoods in the city and are both regional centers and neighborhoods that provide a diverse mix of uses, housing and employment opportunities. Larger urban centers are divided into urban center villages to recognize the distinct character of different neighborhoods within them.
2. **Manufacturing/industrial centers** are home to the city's thriving industrial businesses. As with urban centers, manufacturing/industrial centers are regional designations and are an important regional resource.
3. **Hub urban villages** are communities that provide a balance of housing and employment, generally at densities lower than those found in urban centers. These areas provide a focus of goods, services and employment to communities that are not close to urban centers.
4. **Residential urban villages** provide a focus of goods and services for residents and surrounding communities but do not typically provide a concentration of employment.

FUTURE LAND USE MAP

The Future Land Use Map (FLUM) is a required part of the Comprehensive Plan that shows the locations of the urban villages and where different categories of designated uses, such as single family, multifamily, mixed-use, commercial and industrial are expected to occur. The FLUM is discussed in the Land Use Element of the Comprehensive Plan. The land use designations shown on the FLUM are implemented through the City's Official Zoning Map and Land Use Code. Please see Figure 2–5 for the current Comprehensive Plan Future Land Use Map.

PLANNING ESTIMATES FOR GROWTH

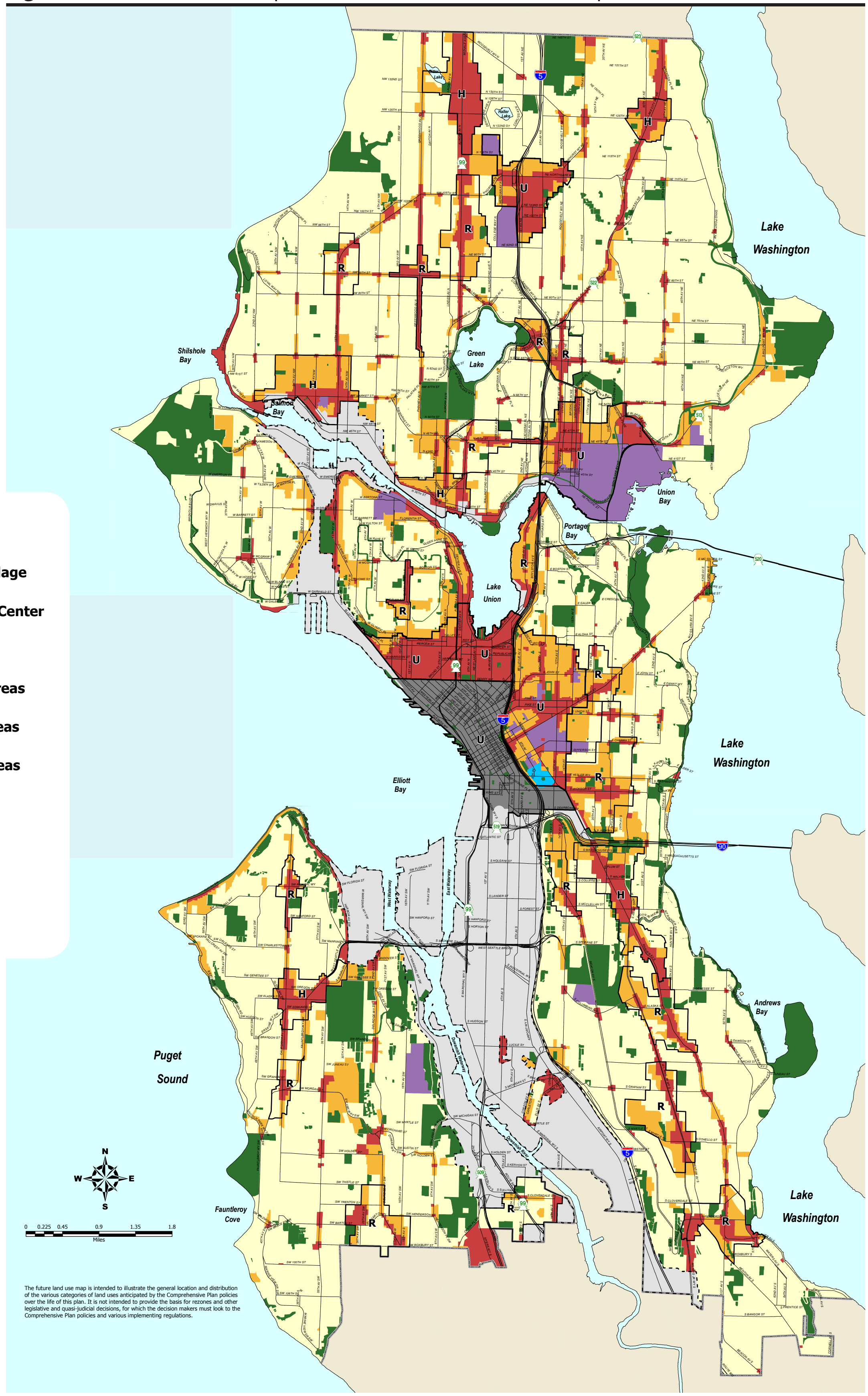
The proposal considered in this EIS assumes the citywide planning estimates for growth for the period from 2015 through 2035 of 70,000 new housing units and 115,000 new jobs (see Figure 2–4). For the purpose of analysis in this EIS, planning estimates for growth are also assumed for each urban village, as described in Section 2.3.

DEVELOPMENT CAPACITY

Development capacity, also referred to as zoned development capacity or zoned capacity, is an estimate of how much new development could occur theoretically over an unlimited time period. It represents the difference between the amount of development on the land today and the likely amount that could be built under current zoning. Because the city has many different zones, there are specific assumptions for each zone. Residential development capacity is expressed in number of units and non-residential development capacity is expressed as number of jobs.

Figure 2–4
Planning estimates for growth

Figure 2–5 Current Comprehensive Plan Future Land Use Map



- **U** Urban Center
- **H/R** Hub / Residential Urban Village
- Manufacturing / Industrial Center
- City-Owned Open Space
- Single Family Residential Areas
- Multi-Family Residential Areas
- Commercial / Mixed Use Areas
- Downtown Areas
- Industrial Areas
- Master Planned Community
- Major Institutions

As shown in Table 2–1, the existing urban centers, urban villages and manufacturing/industrial centers collectively have development capacity for 172,475 housing units and 217,172 jobs. Other capacity also exists outside these areas.

Table 2–1 Urban village development capacity

	Housing Units	Jobs
Urban Centers		
Downtown	33,512	51,764
First/Capitol Hill	19,009	3,186
University District	8,933	10,491
Northgate	10,966	14,089
South Lake Union	20,277	25,418
Uptown	4,165	4,900
Total	**96,862**	**109,848**
Hub Urban Villages		
Ballard	5,314	5,606
Bitter Lake	10,521	19,391
Fremont	1,677	515
Lake City	4,282	5,395
Mount Baker	9,276	12,868
West Seattle Junction	5,157	5,663
Total	**36,227**	**49,438**
Residential Urban Villages		
23rd & Union-Jackson	4,381	2,072
Admiral	817	66
Aurora-Licton Springs	4,072	6,099
Columbia City	3,405	1,824
Crown Hill	1,556	175
Eastlake	1,100	186
Green Lake	774	292
Greenwood-Phinney Ridge	2,295	1,395
Madison-Miller	1,493	702
Morgan Junction	583	40
North Beacon Hill	1,952	786
Othello	4463	4,001
Upper Queen Anne	848	46
Rainier Beach	4,362	751
Roosevelt	2,814	1,930
South Park	1,115	1,095
Wallingford	1,857	233
Westwood-Highland Park	1,499	149
Total	**39,386**	**21,842**
Mfg/Industrial Centers		
Greater Duwamish		27,797
Ballard-Interbay-Northend		8,247
Total		**36,044**
Total Development Capacity of Centers and Villages	**172,475**	**217,172**

Source: City of Seattle Department of Planning and Development, 2014.

Existing Zoning

Seattle Municipal Code Title 23 establishes general zoning classifications for land uses in the City. These can be broadly categorized into five major classifications, listed below:

- Single Family Residential
- Multi-family Residential
- Commercial
- Industrial
- Downtown

See the existing Zoning Map, Figure 2–6.

Public Outreach

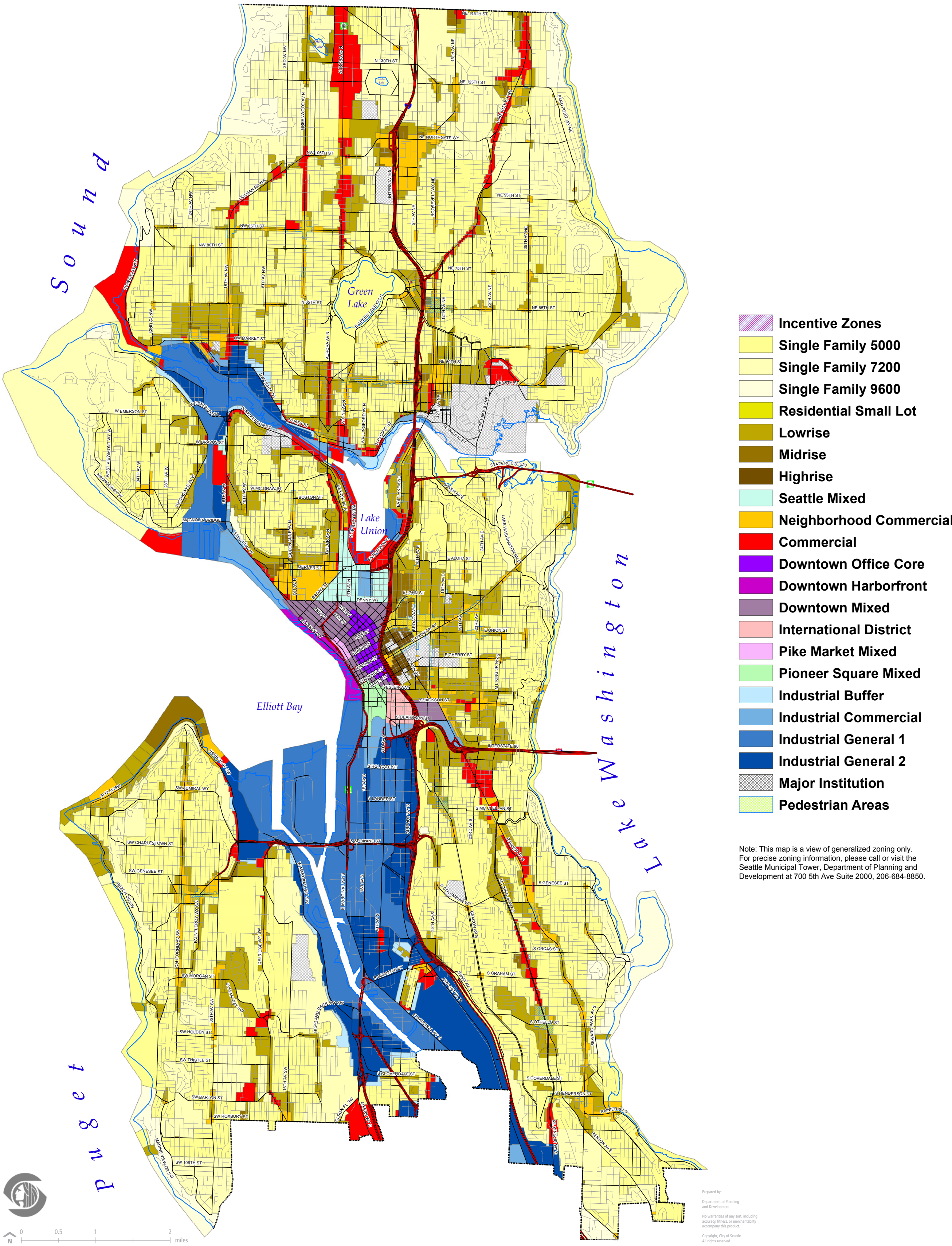
Interactive Seattle 2035 display.

The City's public outreach effort for the 2015 Comprehensive Plan update is intended to build awareness of the project, identify issues that people are concerned about, highlight key decisions to be made and collect feedback on the different patterns of growth that are being studied. As described in the Community Engagement Progress Report 2013–2014, the City's public engagement efforts have focused on both in-person and online strategies. Some of these are briefly summarized below:

- Open house format meetings at City Hall and other community locations, including nine community meetings with Public Outreach and Engagement Liaisons (POELs) in traditionally under-represented communities. Small meetings were held in six cultural communities: Oromo, Amharic, Cambodian, Filipino, Latino and African American.
- Partnerships with other organizations to produce lectures and panel discussions to highlight issues and invite discussion. Whenever possible an open house was held at the venue prior to the event, where people could talk with city staff. The Seattle Channel filmed events so video was available online for those unable to attend.
- Information tables at community and other public events where people gather
- A Seattle 2035 display with general information and engaging graphics was installed at six high traffic community locations such as libraries and recreation centers.
- An online branded website was created for the Comprehensive Plan update containing project information, calendar and a comment tool.

Active public outreach will continue to be an integral part of the comprehensive plan update planning process. Additional information about public outreach may be found in the *Seattle 2035 Community Engagement Progress Report* (January 2015).

Figure 2–6 City of Seattle generalized zoning



Branded website for the Comprehensive Plan update containing project information, calendar and a comment tool.

ENVIRONMENTAL SCOPING

Specific to this EIS, the City requested public comment on the topics to be addressed in this EIS through a formal public scoping process. A scoping notice was issued on October 17, 2013 and the public comment period continued through April 7, 2014. During this period an informational meeting to describe the EIS process, including proposed topics for analysis, and to ask for comments on issues that should be considered in the EIS was held. Following issuance of the Draft EIS, a public comment period and public hearing will be held to invite comment on the document.

2.3 Proposed Action and Alternatives

The City has identified four alternatives for consideration in this EIS. The alternatives are structured to evaluate differing levels of growth emphases that may occur in various areas of the city, and with differing levels of resulting land use intensities. Each alternative emphasizes different patterns of projected future growth amount and intensity among the urban centers, urban villages and transit-related areas.

- **Alternative 1, Continue Current Trends (No Action),** would plan for a continuation of current growth policies associated with the Urban Village Strategy along with a continuation of assumed trends that distribute growth among all of the urban centers and urban villages.
- **Alternative 2, Guide Growth to Urban Centers,** prioritizes greater growth concentrations into the six existing urban centers—Downtown, First/Capitol Hill, University District, Northgate, South Lake Union and Uptown.

The emphasis in alternatives 3 and 4 is on providing opportunity for more housing and employment growth in areas closest to existing and planned transit service. Specifically:

- **Alternative 3, Guide Growth to Urban Villages near Light Rail,** prioritizes greater growth concentrations around existing and planned light rail transit stations.
- **Alternative 4, Guide Growth to Urban Villages near Transit,** prioritizes greater growth concentrations around light rail stations and in specific areas along priority bus transit routes.

The boundaries of the existing urban villages would remain unchanged under both alternatives 1 and 2. Alternatives 3 and 4 would result in expansions to some urban village boundaries and the possible designation of one new urban village (at NE 130th Street/Interstate 5) in order to encompass a 10-minute walkshed around existing/planned future light rail stations and priority transit routes.

A ***walkshed*** *is the distance that the average person is able to walk in ten minutes (about one-half mile).*

The alternatives and their associated land use actions are further described below.

Alternative 1. Continue Current Trends (No Action)

Alternative 1, No Action, accommodates future growth by continuing to employ the Urban Village Strategy as over the past twenty years. This approach would encourage a substantial portion of residential and employment growth to locate in existing urban centers, an intermediate amount to hub urban villages and somewhat lesser amounts to most of the residential urban villages.

The continuation of growth trends and planning approaches is projected to lead to a broad distribution of growth across the designated urban centers and urban villages as well as in areas beyond. As they evolve, the urban centers and urban villages will continue to become more intensively developed with more residences and more retail and commercial establishments providing goods, services and amenities.

No changes to current urban village boundaries are proposed, as shown in Figure 2–8, Figure 2–9 and Figure 2–10. About 77 percent of new residential and employment growth is projected to occur within urban centers and urban villages, and 23 percent outside of the centers and villages. Compared to the other alternatives, Alternative 1 has the largest proportion of growth projected to occur outside the urban villages overall (see Figure 2–7).

Alternative 1 planning estimates of residential and employment growth for each of the designated urban centers and urban villages are shown in Table 2–2 (housing) and Table 2–3 (employment).

DEVELOPMENT CHARACTER

Under Alternative 1, the types, character and relative geographic distribution of future development are expected to occur in ways similar to that experienced over the past 20 years. Over time, residential and non-residential densities and intensities would continue to increase in the urban centers and urban villages. Outside of the urban centers and urban villages, growth and development would also continue, consistent with past growth patterns.

FUTURE LAND USE MAP

No changes to Future Land Use Map boundaries are proposed (as noted previously and shown in Figure 2–8).

POLICY AND REGULATORY AMENDMENTS

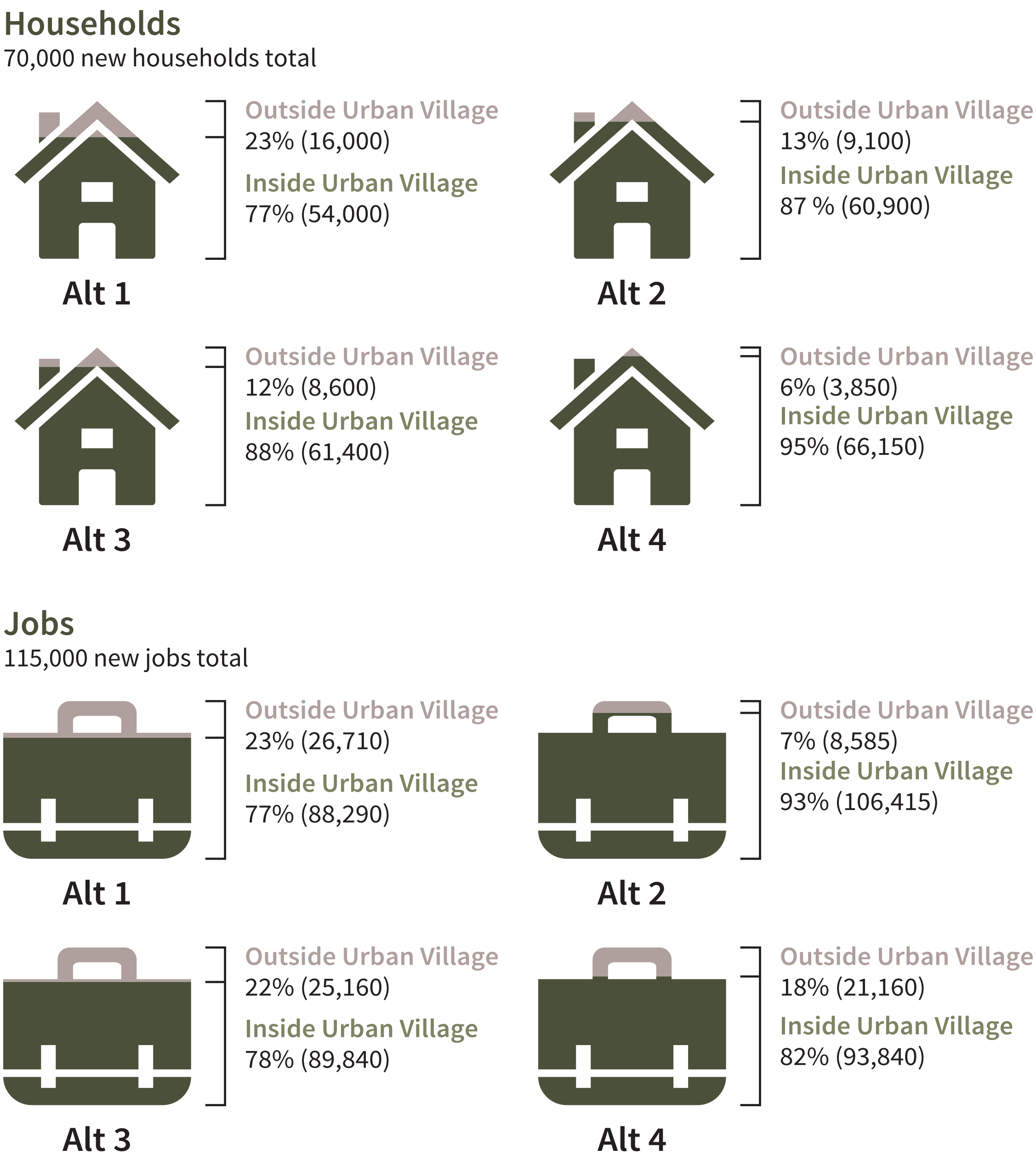
As shown in Table 2–4 on page 2–32, no amendments to the Land Use Code or other regulations are required to implement Alternative 1.

Alternative 2: Guide Growth to Urban Centers

Under Alternative 2, future growth would be focused in the six existing urban centers to a greater degree than the other alternatives, with about 66 percent of new residential growth and 72 percent of new jobs projected to occur in the urban centers. Alternative 2 would result in the most concentrated growth pattern of any alternative, emphasizing a denser "center city" core which includes Downtown, First/Capitol Hill, South Lake Union and Uptown. Denser mixed-use cores in the University District and Northgate would also occur.

Alternative 2 planning estimates of residential and employment growth for each of the designated urban centers and urban villages are shown in Table 2–2 (housing) and Table 2–3 (employment).

Figure 2–7 Growth inside and outside of urban villages



DEVELOPMENT CHARACTER

Under Alternative 2, relatively high density and high intensity development would occur in urban centers. Here, most new housing would be mid- and high-rise buildings with some low-rise, all primarily on properties that currently have low-density development.

In areas outside of the urban villages, the overall type, character and distribution of future development are likely to remain comparable to today's patterns, with a prevalence of relatively low-rise, small scale development. Given the greater emphasis on dense urban center growth, a lesser amount of growth is projected to occur in the urban villages and places outside urban villages and centers. This could result in growth that in many places could be perceived as a slower pace of change than has occurred over the past twenty years.

FUTURE LAND USE MAP

No changes to Future Land Use Map boundaries are proposed (as noted previously and shown in Figure 2–8, Figure 2–9 and Figure 2–10).

POLICY AND REGULATORY AMENDMENTS

As shown in Table 2–4 on page 2–32, implementing actions under Alternative 2 to encourage focused growth in urban centers may include increased zoning flexibility and development incentives and focused public investments to support increased livability.

Figure 2–8 Urban village boundaries under alternatives 1 and 2

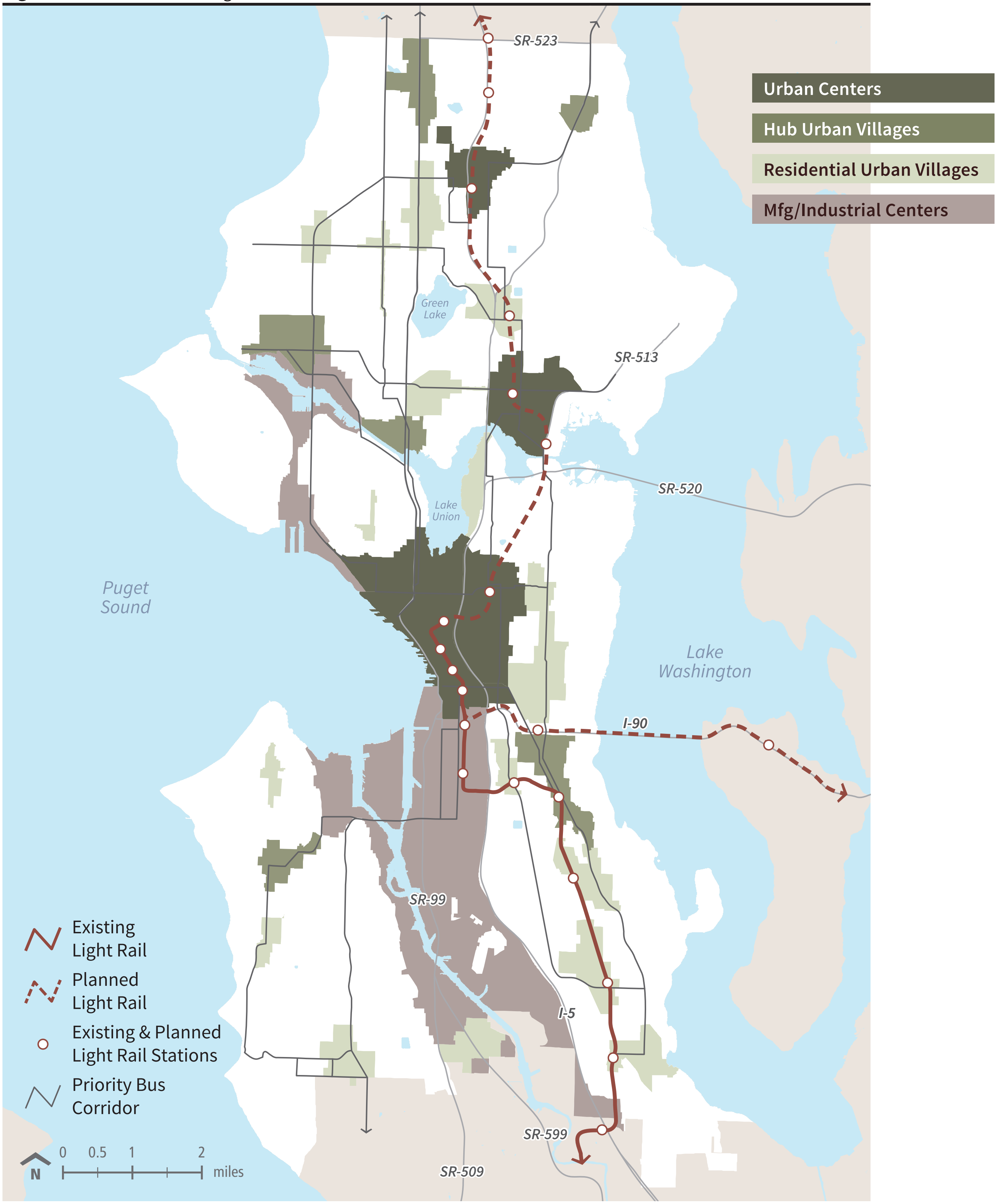


Figure 2–9 Urban village boundaries under alternatives 1 and 2 (north)

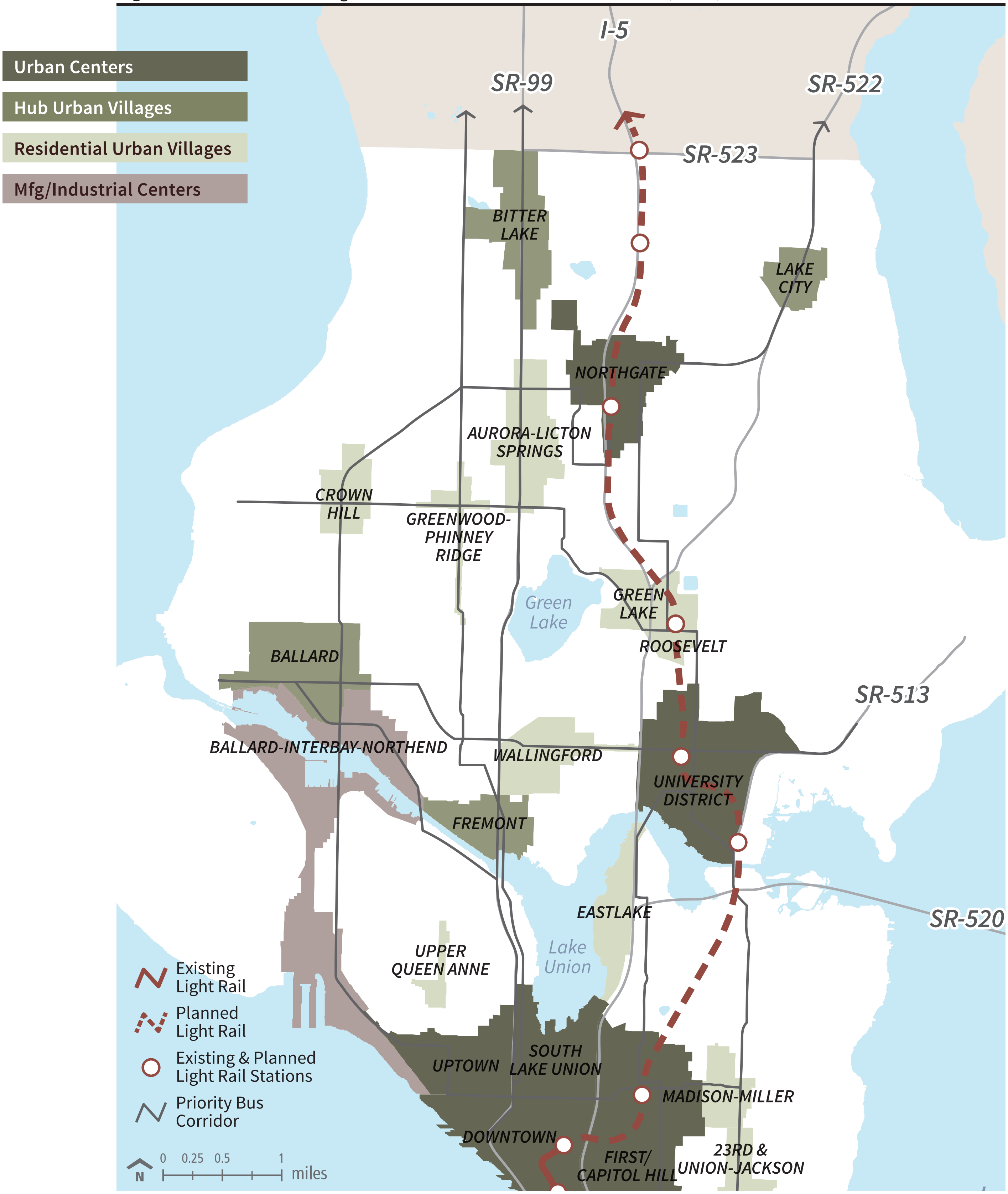


Figure 2–10 Urban village boundaries under alternatives 1 and 2 (south)

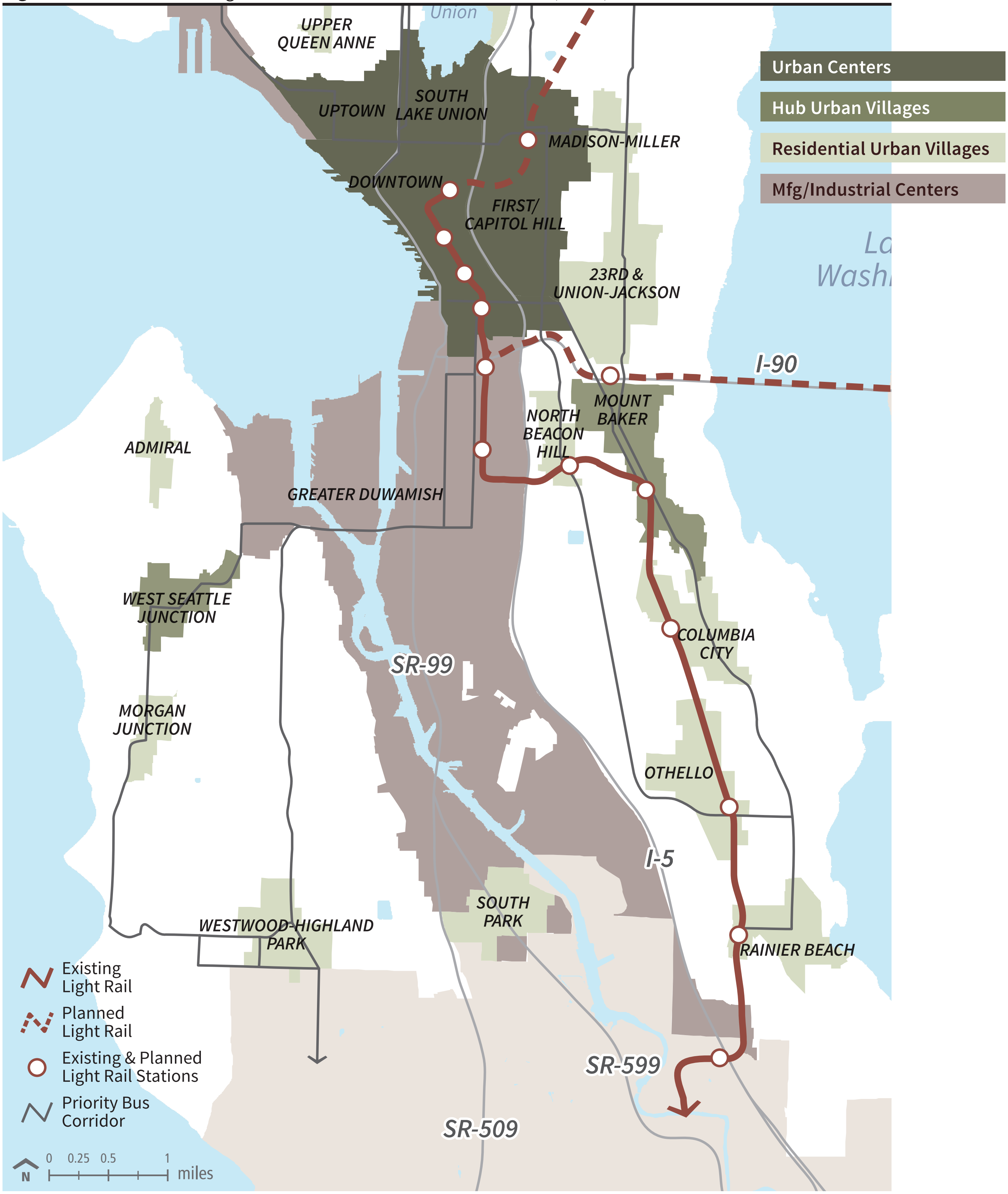


Table 2–2 Housing growth assumption

	Alt 1	Alt 2	Alt 3	Alt 4
Urban Centers				
Downtown	10,000	15,000	12,000	12,000
First/Capitol Hill	7,000	8,000	6,000	6,000
University District	2,700	4,000	3,500	3,500
Northgate	1,600	5,000	3,000	3,000
South Lake Union	4,700	12,000	8,000	7,500
Uptown	3,500	2,500	2,000	2,000
Total	**29,500 (42%)**	**46,500 (66%)**	**34,500 (49%)**	**34,000 (49%)**
Hub Urban Villages				
Ballard	3,000	1,500	1,500	3,000
Bitter Lake	2,100	1,000	1,000	1,000
Fremont	900	700	700	1,300
Lake City	1,400	1,000	1,000	1,000
Mount Baker	700	800	3,000	3,500
West Seattle Junction	1,400	1,200	1,250	3,000
Total	**9,500 (14%)**	**6,200 (9%)**	**8,450 (12%)**	**12,800 (18%)**
Residential Urban Villages				
23rd & Union-Jackson	2,200	600	1,750	1,750
Admiral	200	200	300	300
Aurora-Licton Springs	2,500	500	700	700
Columbia City	2,200	800	2,700	2,700
Crown Hill	100	300	300	1,200
Eastlake	800	300	300	300
Green Lake	500	500	700	700
Greenwood-Phinney Ridge	700	600	600	600
Madison-Miller	1,100	500	500	500
Morgan Junction	300	300	300	300
North Beacon Hill	200	500	1,500	1,500
Othello	1,700	800	2,500	2,500
Upper Queen Anne	600	300	300	300
Rainier Beach	100	500	1,500	1,500
Roosevelt	400	300	1,500	1,500
South Park	200	300	300	300
Wallingford	800	600	600	600
Westwood-Highland Park	400	300	600	600
Total	**15,000 (21%)**	**8,200 (12%)**	**18,450 (26%)**	**19,350 (28%)**
New Residential Urban Villages				
130th/I-5			1,500	1,500

Source: City of Seattle Department of Planning and Development, 2014.

Table 2–3 Employment growth assumptions

	Alt 1	Alt 2	Alt 3	Alt 4
Urban Centers				
Downtown	30,000	33,000	25,000	30,000
First/Capitol Hill	4,000	7,000	5,000	5,000
University District	8,000	8,000	4,000	4,000
Northgate	5,000	11,000	7,500	7,500
South Lake Union	20,000	20,000	15,000	12,000
Uptown	3,500	3,500	2,000	2,000
Total	**70,500 (61%)**	**82,500 (72%)**	**58,500 (51%)**	**60,500 (53%)**
Hub Urban Villages				
Ballard	2,500	1,200	1,200	4,000
Bitter Lake	1,500	500	800	2,000
Fremont	400	400	400	400
Lake City	1,500	900	900	1,200
Mount Baker	1,000	800	3,200	3,200
West Seattle Junction	800	600	800	2,500
Total	**7,700 (7%)**	**4,400 (4%)**	**7,300 (6%)**	**13,300 (12%)**
Residential Urban Villages				
23rd & Union-Jackson	400	400	1,200	1,200
Admiral	50	75	50	50
Aurora-Licton Springs	400	400	400	1,000
Columbia City	1,400	600	1,400	1,400
Crown Hill	150	150	150	150
Eastlake	150	150	150	150
Green Lake	250	250	250	250
Greenwood-Phinney Ridge	400	400	400	600
Madison-Miller	500	500	500	500
Morgan Junction	30	30	30	30
North Beacon Hill	150	150	500	500
Othello	600	300	2,000	2,000
Upper Queen Anne	30	30	30	30
Rainier Beach	300	300	600	600
Roosevelt	400	400	1,600	1,600
South Park	100	100	100	300
Wallingford	180	180	180	180
Westwood-Highland Park	100	100	100	100
Total	**5,590 (5%)**	**4,515 (4%)**	**10,040 (9%)**	**11,040 (10%)**
New Residential Urban Villages				
130th/I-5			400	400
Mfg/Industrial Centers				
Greater Duwamish	3,000	12,000	11,000	6,000
Ballard-Interbay-Northend	1,500	3,000	3,000	3,000

Source: City of Seattle Department of Planning and Development, 2014.

Alternative 3: Guide Growth to Urban Villages near Light Rail

Transit oriented development (TOD) *is typically described as a relatively high-density mixed use community that is centered around and within walking distance to a public transit station.*

Under Alternative 3, future growth would be accommodated primarily as transit-oriented development (TOD) with increased densities in areas around existing and planned light rail transit stations. Selected urban village boundaries near light rail stations would be expanded (see more details below). Future growth would also be concentrated in all urban centers, but at lower levels of intensity than Alternative 2 (see Figure 2–7).

Alternative 3 planning estimates of residential and employment growth for each of the urban centers and urban villages are shown in Table 2–2 (housing) and Table 2–3 (employment).

DEVELOPMENT CHARACTER

Under Alternative 3, the growth anticipated in urban centers would likely be a mix of mid- and high-rise development while growth in transit-oriented development nodes would likely be mid-rise. Growth in the hub urban villages would likely be mid-rise development while growth in the residential urban villages would likely be a mix of low-and mid-rise.

Areas of expanded or new urban villages would likely convert from existing lower intensity to higher intensity development. For example, if a light rail station is planned for an area currently zoned predominantly single-family, future land use actions would likely rezone the areas within a ¼ or ½ mile of the station to accommodate low-rise multifamily and possibly local-serving commercial uses.

In areas outside of the urban villages, the overall development character and pattern would likely remain as currently exists.

FUTURE LAND USE MAP

Alternative 3's proposed expansion of selected urban village boundaries to cover ten-minute walksheds of existing and planned light rail stations would affect portions of the Mount Baker Hub Urban Village and the 23rd & Union-Jackson, Columbia City, North Beacon Hill, Rainier Beach, Roosevelt and Othello residential urban villages. These changes would align with the TOD planning concept that encourages the most intensive development of locations that are in reasonable walking distance of high-capacity rail transportation stations. In addition, one possible new urban village included in Alternative 3 could be located around the NE 130th Street station. Although specific boundaries for the added and new urban village areas have not yet been defined, the approximate areas of proposed expansions and new villages are shown in Figure 2–11, Figure 2–12 and Figure 2–13.

The majority of the urban village boundaries would remain unchanged under this alternative. These include the hub urban villages of Ballard, Bitter Lake, Fremont, Lake City and West Seattle Junction and the residential urban villages of Admiral, Aurora-Licton Springs, Crown Hill, Eastlake, Green Lake, Greenwood-Phinney Ridge, Madison-Miller, Morgan Junction, Upper Queen Anne, South Park, Wallingford and Westwood-Highland Park.

Figure 2–11 Urban village boundaries under Alternative 3

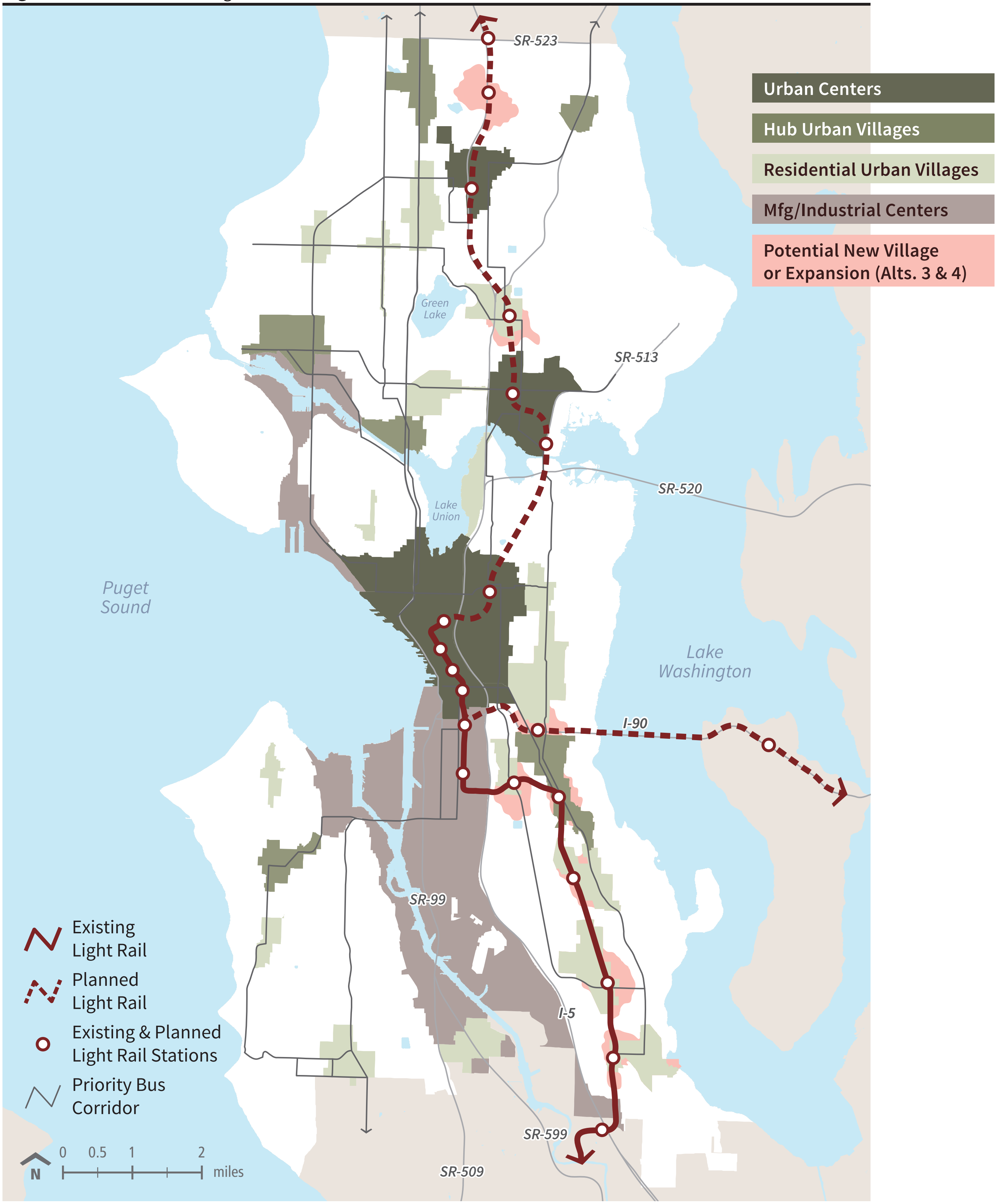


Figure 2–12 Urban village boundaries under Alternative 3 (north)

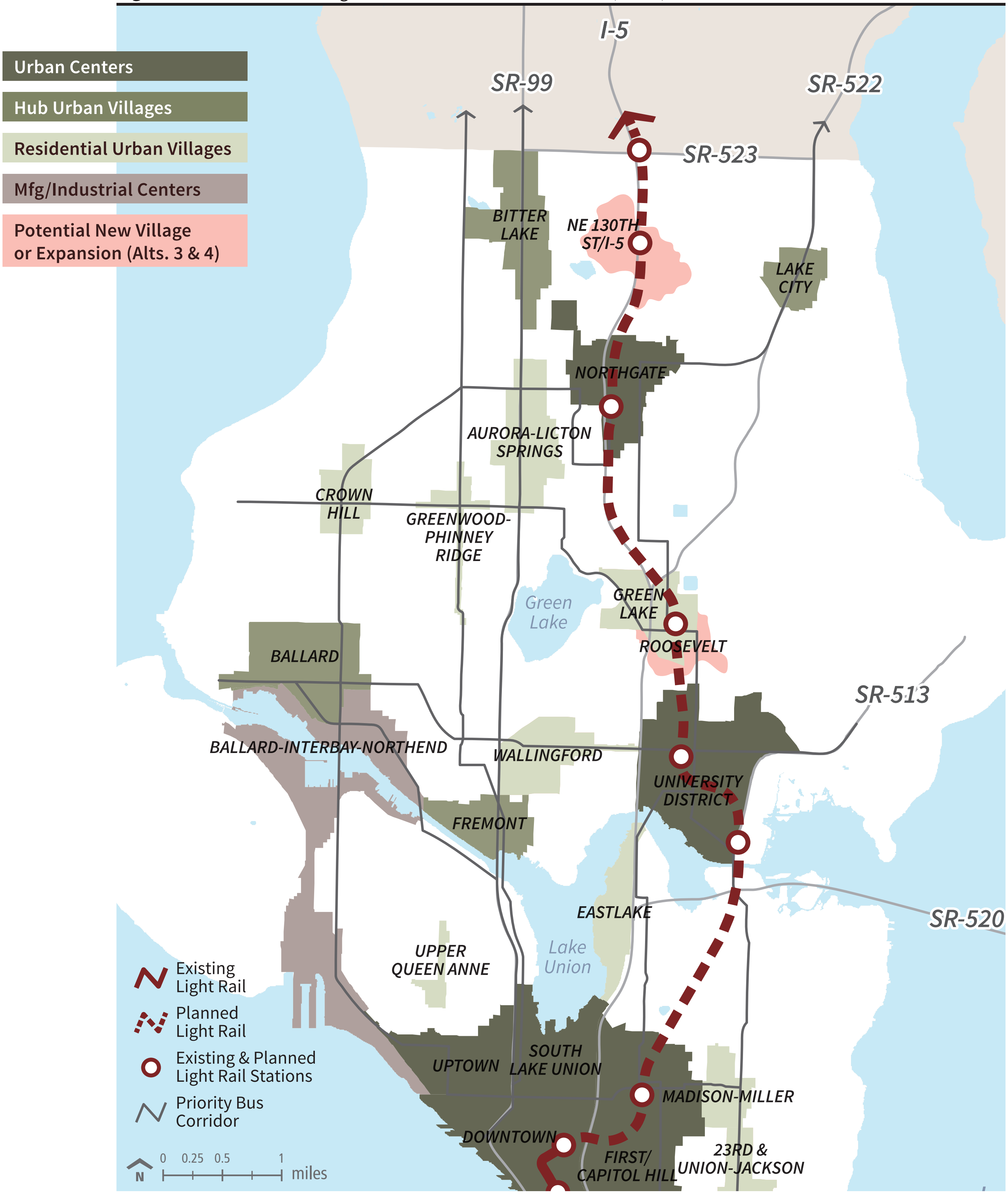
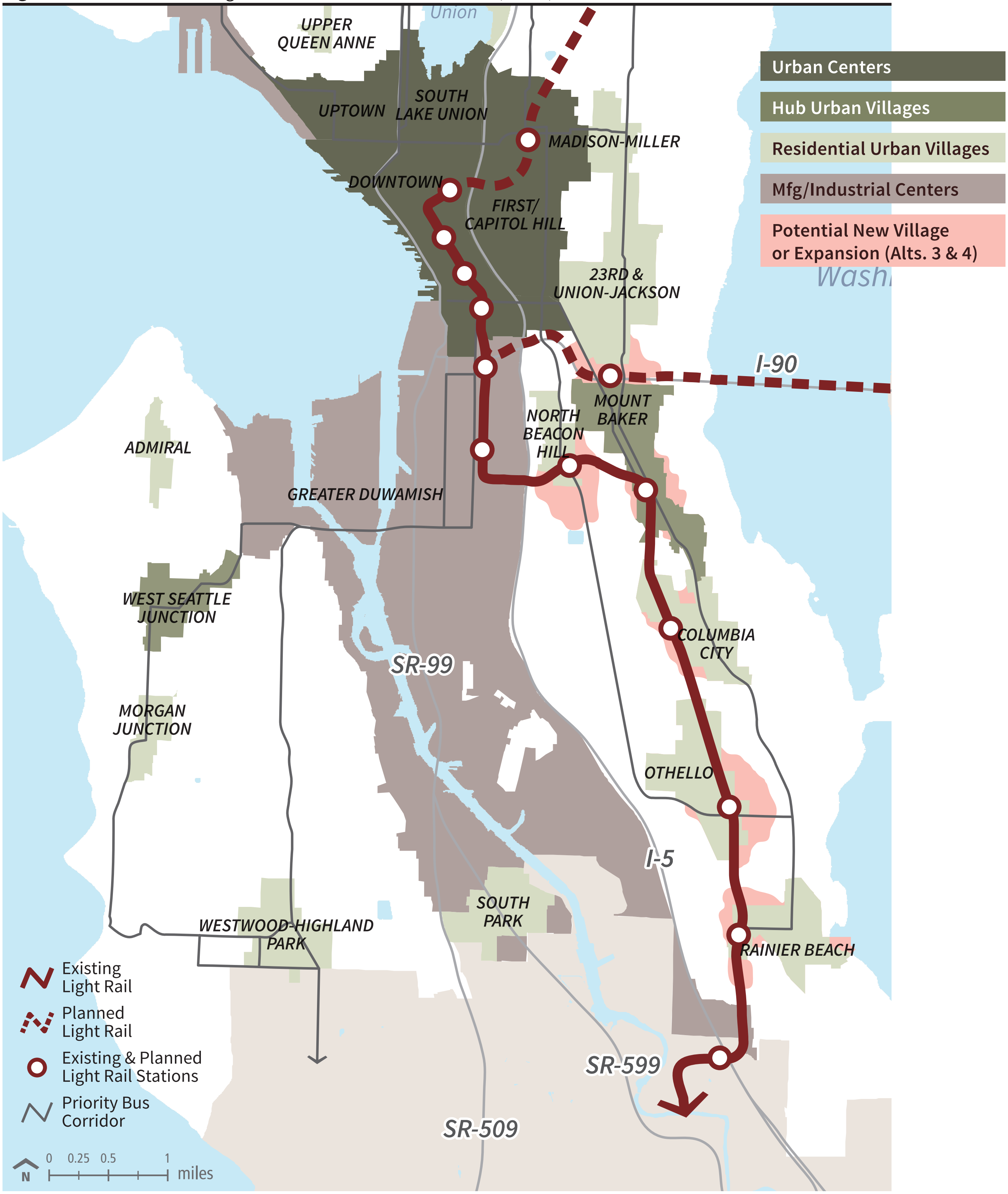


Figure 2–13 Urban village boundaries under Alternative 3 (south)



Alternative 3 would also generalize land use designations in the urban centers and urban villages to provide greater flexibility, consistent with the intent and function of the specific urban center and village, in place of the more specifically defined Future Land Use Map designations.

POLICY AND REGULATORY AMENDMENTS

Similar to Alternative 2 and as shown in Table 2–4 on page 2–32, implementing actions under Alternative 3 to encourage focused growth around existing and planned light rail stations may include increased zoning flexibility and development incentives and focused public investments to support increased livability. This would be accomplished by changing the designation of urban centers and urban villages on the Future Land Use Map so that each category (center, hub, residential) would show as a single category with a distinct color, compared to the current map, which shows major land use categories by color. The map change would be accompanied by policies that describe the types and scales of development that would be expected inside each category. The effect would be to allow more flexibility for the zoning types that could be applied in the centers and villages.

Alternative 4: Guide Growth to Urban Villages near Transit

Under Alternative 4, future growth would be accommodated around light rail transit stations and in selected urban villages along priority transit corridors.

Alternative 4 would include the expanded urban village boundaries of Alternative 3 with additional expansions to encompass ten-minute walksheds around selected bus transit nodes in the Ballard, Fremont, West Seattle Junction and Crown Hill urban villages. Like Alternative 3, a new urban village would be located around the potential NE 130th Street station as shown in Figure 2–14, Figure 2–15 and Figure 2–16. All other urban village boundaries would remain unchanged.

Under Alternative 4, about 95 percent of new residential and 82 percent of new employment growth would likely occur within the urban villages and urban centers. Compared to the other alternatives, Alternative 4 would result in the greatest amount of residential growth within urban centers and urban villages (see Figure 2–7). Alternative 4 would likely also produce a development pattern having more locations of greater growth, especially in urban villages. Compared to the other alternatives, Alternative 4 would yield more projected development in more urban villages, resulting in the largest expansion of urban village boundaries.

Alternative 4 planning estimates of residential and employment growth for each of the urban centers and urban villages are shown in Table 2–2 (housing) and Table 2–3 (employment).

Figure 2–14 Urban village boundaries under Alternative 4

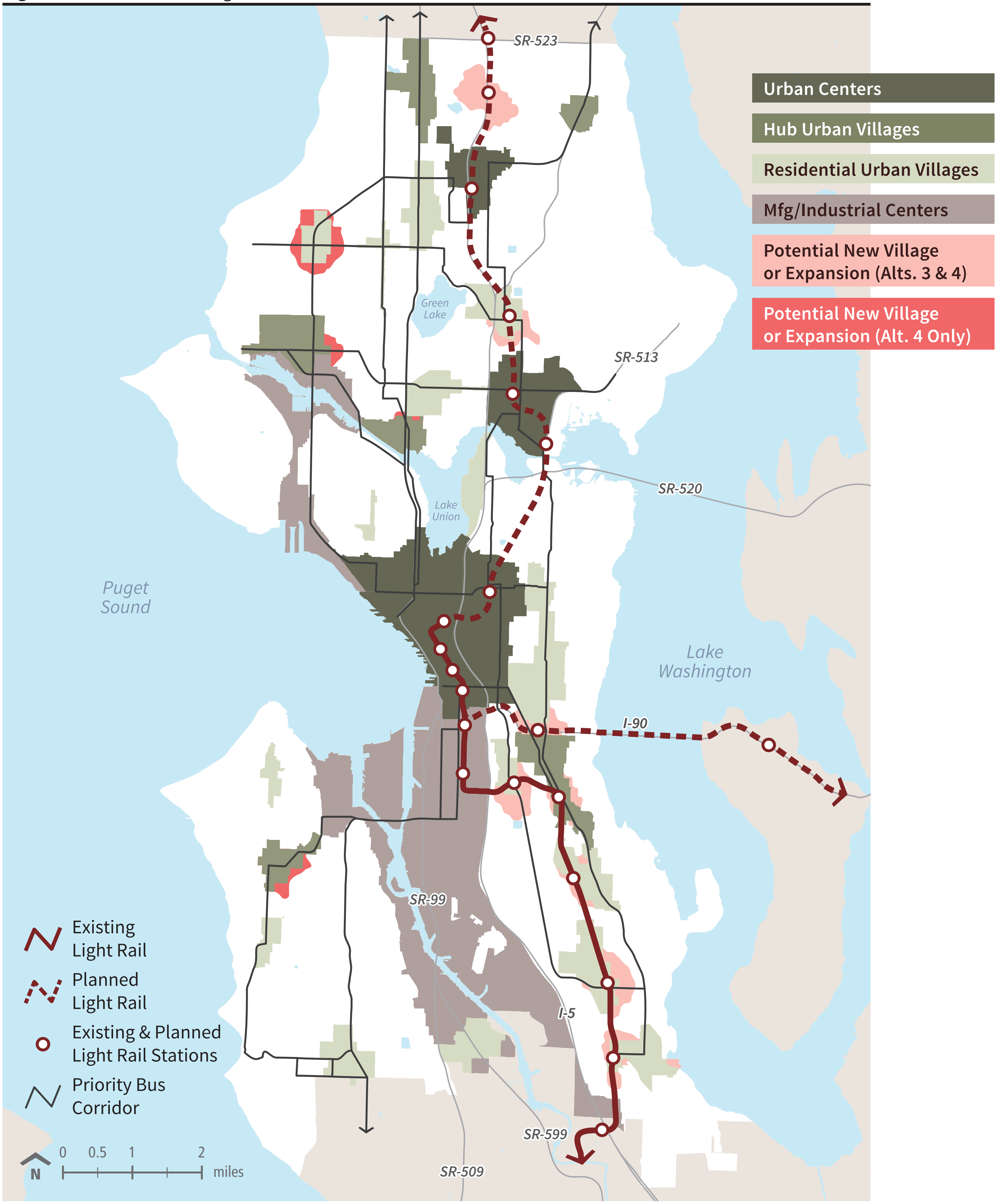


Figure 2–15 Urban village boundaries under Alternative 4 (north)

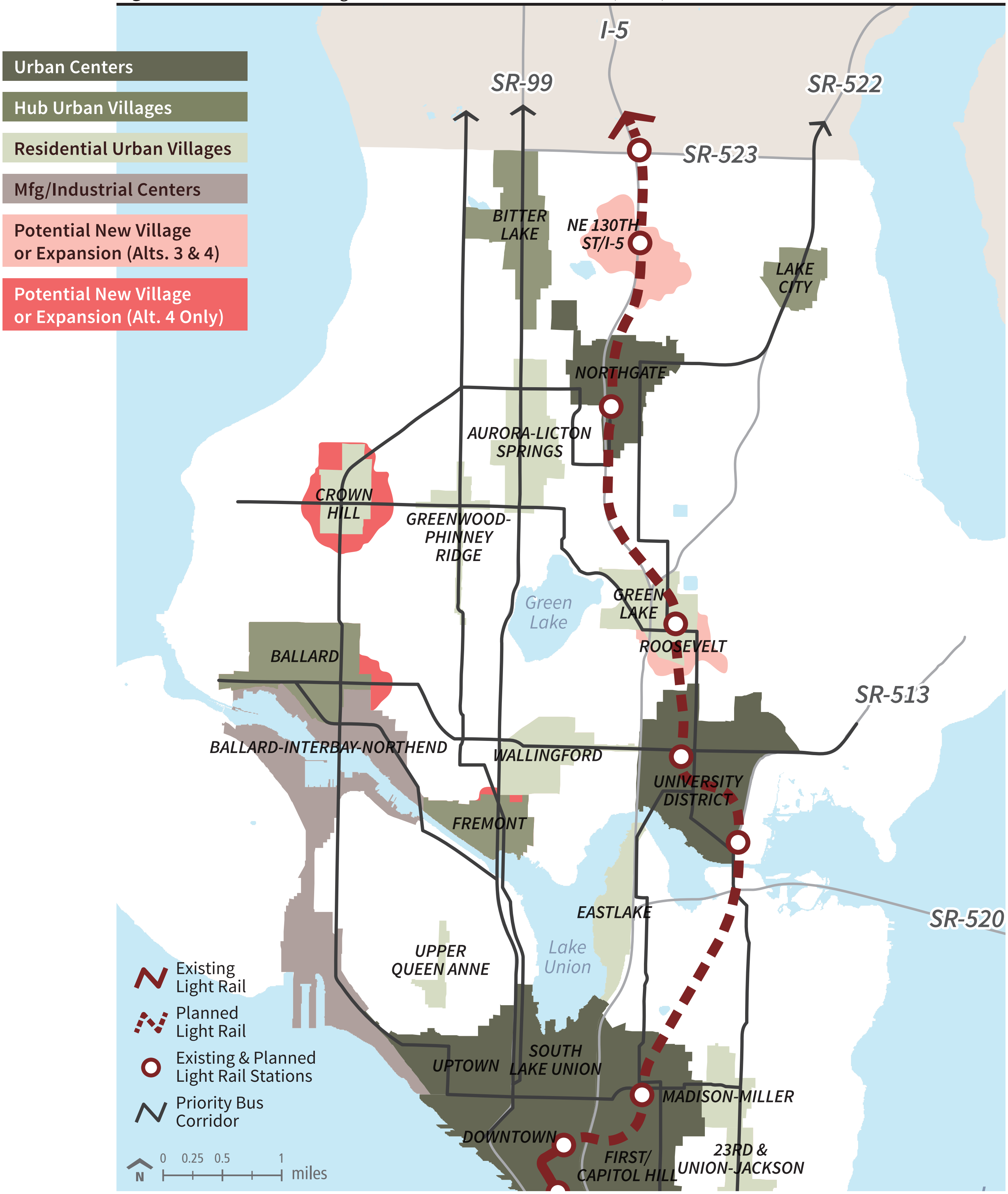
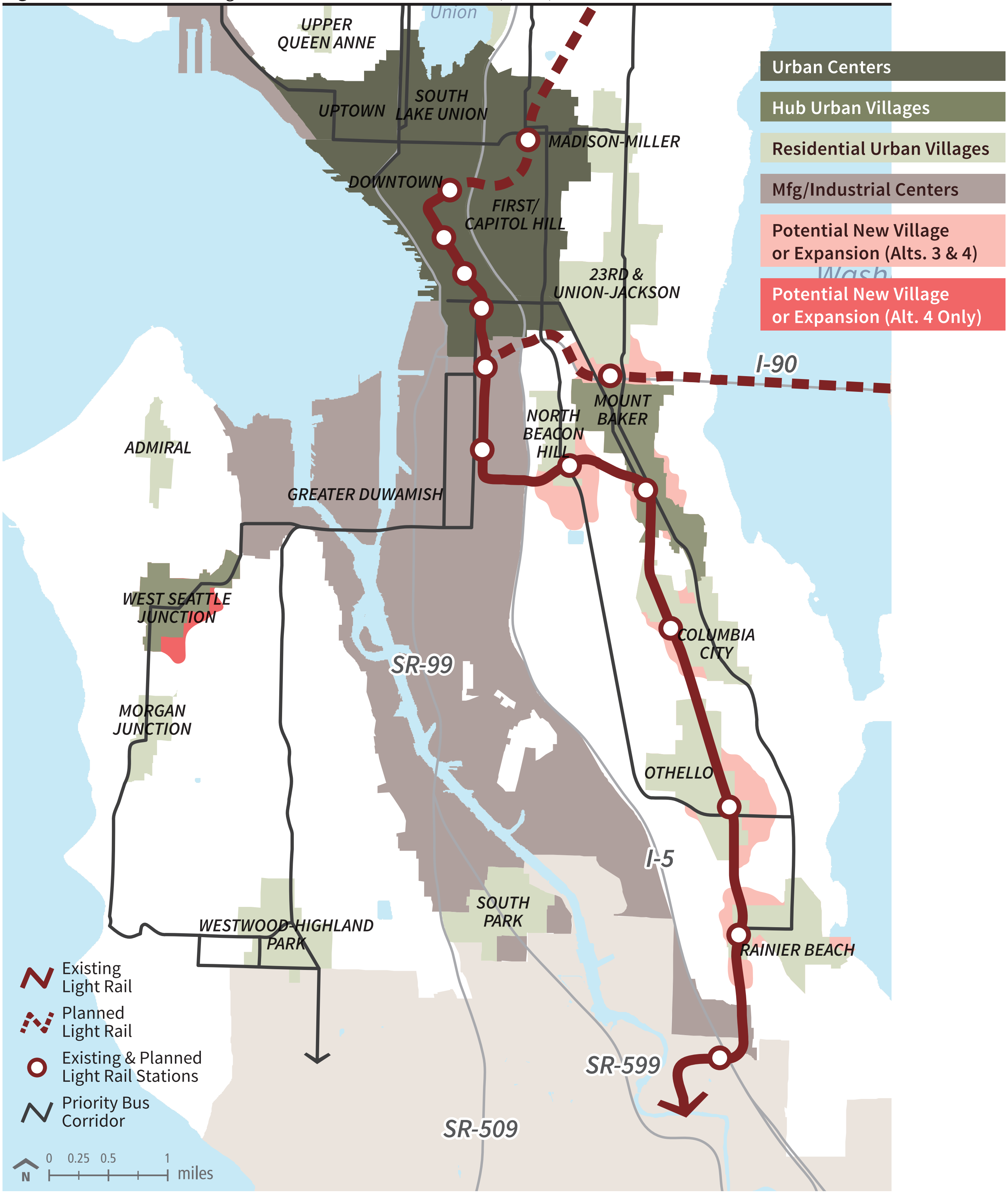


Figure 2–16 Urban village boundaries under Alternative 4 (south)



DEVELOPMENT CHARACTER

Residential and employment character would be anticipated to be similar to that described for Alternative 3. Additional urban villages affected under Alternative 4 include Ballard, Fremont, West Seattle Junction and Crown Hill.

FUTURE LAND USE MAP

Alternative 4 would include the same proposed changes as Alternative 3, plus additional expansions of urban villages to include all areas within a ten-minute walk-shed of selected bus transit nodes. These additional expansions would occur in West Seattle Junction, Ballard, Fremont and Crown Hill only under Alternative 4.

POLICY AND REGULATORY AMENDMENTS

Similar to Alternative 2 and 3, and as shown in Table 2–4, implementing actions under Alternative 4 to encourage focused growth around existing and planned light rail stations may

Table 2–4 Potential implementing measures

	Rezones	Other Zoning Code, regulatory, policy or investment strategies
Alternative 1 Continue Current Trends (No Action)	None known and none needed*	None known and none needed*
Alternative 2 Urban Center Focus	None known and none needed* Future potential rezones are undefined but could be pursued by the City, as an implementing strategy	Complementary strategies supporting urban center growth could be pursued: • Tools for zoning flexibility • Other growth incentive tools or programs to attract new buildings • Public investments to aid livability and attract development A precise description of content of such strategies is not defined at this time.
Alternative 3 Added Light Rail Community Focus	Change mapped designations of urban centers and urban villages on the FLUM to allow flexibility Similar to Alternative 2, except FLUM change may enable more rezones to occur inside urban villages	Same as Alternative 2
Alternative 4 Expanded Transit Focus	Same as Alternative 3	Same as Alternative 2

* Does not preclude future unrelated rezones or other comprehensive plan designation changes.

include increased zoning flexibility and development incentives and focused public investments to support increased livability. This would be accomplished by changing the designation of urban centers and urban villages on the Future Land Use Map so that each category (center, hub, residential) would show as a single category with a distinct color, compared to the current map, which shows major land use categories. The map change would be accompanied by policies that describe the types and scales of development that would be expected inside each category. The effect would be to allow more flexibility across zoning types that could be applied in the centers and villages.

Policy and Regulatory Amendments

Potential implementing measures associated with each alternative are summarized in Table 2–4 at left.

2.4 Environmental Review

PROGRAMMATIC REVIEW

SEPA requires government officials to consider the environmental consequences of proposed actions, and to consider ways to accomplish the objectives that minimize adverse impacts or enhance environmental quality. They must consider whether the proposed action will have a probable significant adverse environmental impact on the elements of the natural and built environment.

The adoption of a comprehensive plan or development regulations is classified by SEPA as a non-project (also referred to as programmatic) action. A non-project action is defined as an action that is broader than a single site-specific project, and involves decisions on policies, plans or programs. An EIS for a non-project proposal does not require site-specific analyses; instead, the EIS will discuss impacts and alternatives appropriate to the scope of the non-project proposal and to the level of planning for the proposal (see WAC 197-11-442 for detail). The analysis in this EIS may also be used in the future to help inform project level development proposals.

SEPA INFILL EXEMPTION

According to Washington State's environmental policies (see RCW 43.21c), the City may consider adjustments to "categorical exemptions" from environmental review, including for "infill development" as described in RCW 43.21c.229, if it fulfills certain requirements. Among these requirements is SEPA environmental review of a comprehensive plan in an EIS. By conducting this review, the City fulfills this obligation and identifies the potential range of impacts that may occur by pursuing alternative courses of growth policy directions ranging from a continuation of current policies (Alternative 1/No Action Alternative) to strategies that would differently emphasize growth patterns among urban centers, urban villages, light rail station area vicinities and/or other transit-served vicinities. The range of impact findings also help illustrate the implications of the possible future City action that could be taken to define higher SEPA categorical exemption levels related to infill development, which would eliminate environmental review for certain size ranges of future development. Such higher exemption levels could continue until applicable levels of density or intensity of development, as defined in the Comprehensive Plan, are met.

SCOPE OF ANALYSIS

The City issued a Determination of Significance and Scoping Notice on October 17, 2013. During the scoping comment period, which extended from October 17, 2013 to April 21, 2104, interested citizens, agencies, organization and affected tribes were invited to provide comments on the scope of the EIS. During the comment period, the City held a public scoping meeting to provide information and invite comment from interested parties.

Based on the comments received during the scoping process, the City finalized the alternatives and scope of the EIS. Elements of the environment addressed in this EIS include:

- Earth/Water Quality
- Air Quality and Climate Change
- Noise
- Land Use: Height, Bulk, Scale, Compatibility
- Relationship to Plans and Policies
- Population, Employment, Housing
- Transportation
- Public Services
- Utilities

OTHER ENVIRONMENTAL REVIEW ON THE COMPREHENSIVE PLAN

The City may at a later date in 2015, issue a Determination of Non-Significance for a set of amendments to the Comprehensive Plan on actions with 2015 deadlines or that are part of the 2015 annual amendment cycle, including:

- Adoption of new citywide growth targets and updated inventories and analysis into the Comprehensive Plan as required by the state Growth Management Act (GMA).
- Amendment to neighborhood-specific policies in the Neighborhood Planning Element and amendments to the Future Land Use Map for the Lake City Hub Urban Village and the 23rd & Union-Jackson and Morgan Junction residential urban villages.
- Amendments to policies addressing Environmentally Critical Areas.
- Amendments to Environment Element policies addressing stormwater drainage management and permeable surfaces.
- Housing Element amendments.

LEVEL OF ANALYSIS

In general, the analysis in the EIS is conducted on a citywide basis. Where information is available and would help in understanding potential impacts of the alternatives, smaller geographic units used by the City of Seattle are examined. These include, for example, urban villages, police precincts and fire service battalions. In other cases, particularly for transportation and some of the public services, this EIS defines eight analysis sectors for use in discussing potential impacts, including Northwest Seattle, Northeast Seattle, Queen Anne/Magnolia, Downtown/Lake Union, Capitol Hill/Central District, West Seattle, Duwamish and Southeast Seattle. These analysis sectors are shown in Figure 2–17 and referred to in the pertinent sections of Chapter 3.

ENVIRONMENTAL IMPACTS

For each of the alternatives, potential environmental impacts to the elements of the environment listed above are described in Chapter 3 of this EIS and briefly summarized in Chapter 1. Please refer to these chapters for a comparison of the impacts of the alternatives, potential mitigating strategies and significant unavoidable adverse impacts.

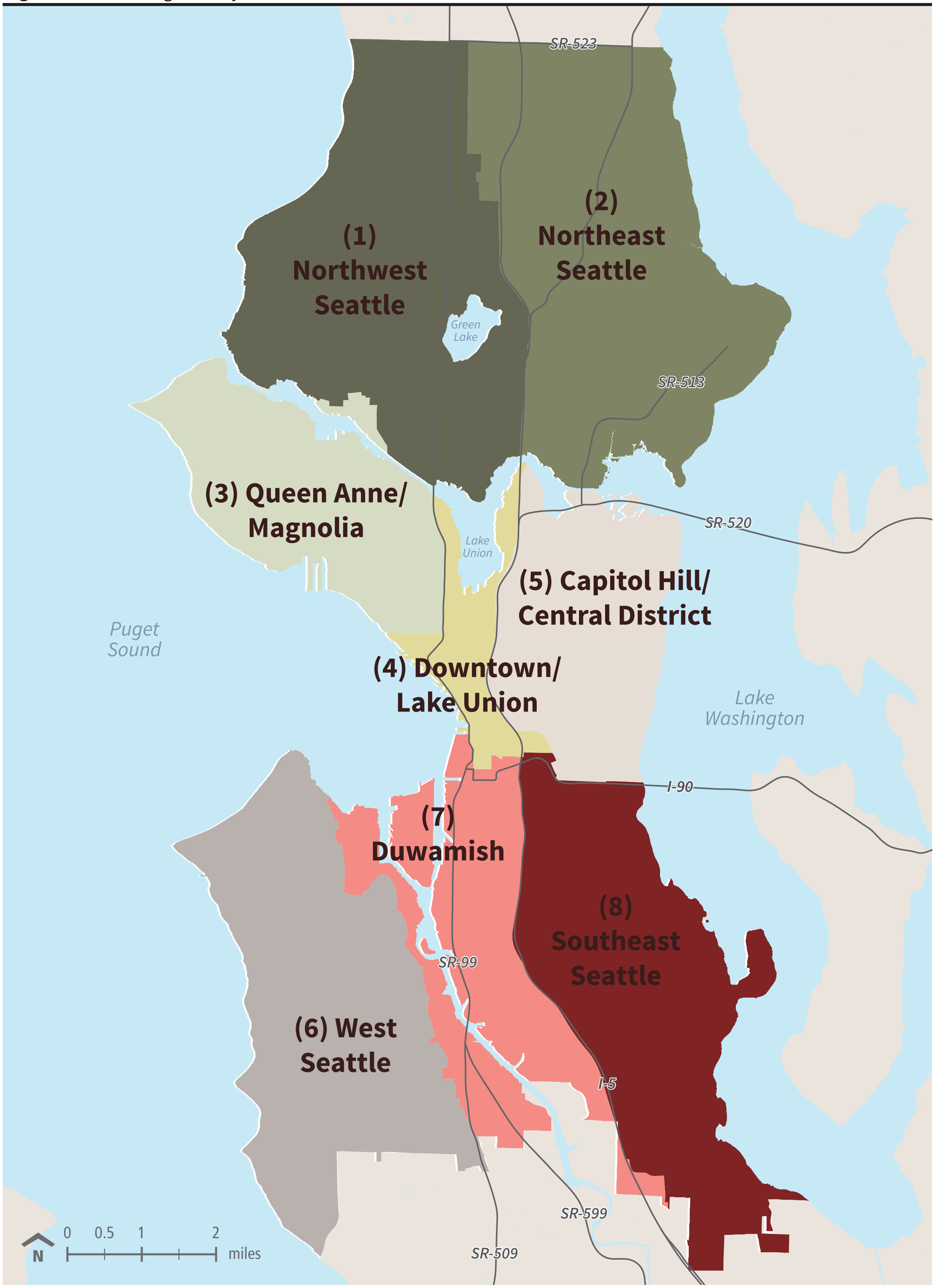
2.5 Benefits and Disadvantages of Delaying the Proposed Action

SEPA requires a discussion of the benefits and disadvantages of reserving, for some future time, the implementation of a proposal compared to possible approval at this time. In other words, the City must consider the possibility of foreclosing future options by implementing the Proposal.

From the perspective of the natural environment, there is neither benefit nor disadvantage to delaying implementation of the proposed action. Regardless of whether the proposal is adopted, future growth and development will continue and City, state and federal requirements for environmental protection will continue to apply.

From the perspective of the built environment, reserving implementation of the proposal for some future time could result in delay of the City's ability to focus future development and resource allocations to the urban centers and urban villages as portrayed in the action alternatives. Such a delay could result in relatively less development occurring in areas within a reasonable walkshed around existing and future light rail transit stations and priority transit corridors and related increased transportation congestion. If implementation of the proposal is delayed for some future time, existing growth trends and patterns of development would likely continue.

Figure 2–17 Eight analysis sectors



3.1 Earth and Water Quality

3.1.1 Affected Environment

Introduction

This section reviews Seattle's existing landforms and natural features, and discusses the relationship of Seattle's environmentally critical areas to future growth that is contemplated in the Comprehensive Plan update.

EXISTING LANDFORMS AND SHORELINES

Seattle's landforms reflect a naturally hilly glacial-influenced terrain, bounded by Lake Washington, Puget Sound and other waterbodies. The landforms also have been extensively modified by development over more than a century. In both east-west and north-south directions, Seattle varies extensively in elevation, encompassing major hills such as Queen Anne Hill and Capitol Hill, the many slopes down toward shorelines and smaller hills in places such as Ravenna, West Seattle and Columbia City. Typically, these hill and valley landforms run in north-south directions reflecting past glacial influences, but there is other variety in the form of drainage-defined ravines, such as along Thornton Creek. Places such as the Greater Duwamish industrial area, Interbay and parts of Rainier Valley were influenced in their form by saltwater marine systems or natural storm drainage systems (and past placement of fill soils). These areas tend to contain alluvial or sandy soil conditions that could be subject to greater movement and/or liquefaction during major earthquake events.

Port and industrial activities in Elliott Bay, Lake Union and Ballard, and engineering activities such as the construction of the Ballard Locks, Montlake Cut, Harbor Island and modifications to the Duwamish Waterway have also influenced the nature, forms and stability of the shoreline habitats in the city. In other parts of the city, shorelines vary in their relationship to human activities: many shorelines along Puget Sound and Lake Washington have low-density residential properties adjacent to them, and still others are in more natural conditions, though features such as the near-shore railroad north of Shilshole Marina inevitably have influenced the existing environment.

The landscape contributes many of Seattle's treasured natural assets and qualities, including:

- Its variety of saltwater and freshwater shorelines;
- Hillsides with varying levels of natural vegetative cover and greenbelts;
- Natural drainage systems such as Thornton Creek and Longfellow Creek;

- Distinctive natural preserves such as Seward Park, Carkeek Park and Discovery Park; and
- The Olmsted-designed system of parks and greenways.

These features have recreational and aesthetic value, and provide natural functions and values that support wildlife presence and fish passage through major waterbodies. They also influence Seattle's planning and stewardship for a wide range of activities and purposes that include parks management, utility improvements (such as those dedicated to eliminating combined sewer overflows (CSOs)), tree canopy restoration and shoreline use management. Review of new development proposals also reflects the incorporation of environmentally protective values in the City's land use regulations, SEPA evaluations and environmental critical areas protections.

OVERVIEW OF ENVIRONMENTALLY CRITICAL AREAS

The nature of Seattle's landforms, soils, streams, marshes and the risks posed by large seismic events and seasonal weather, has led the City to designate environmental critical areas (ECAs). These are places where landslides or floods could occur, or major soil movements during earthquakes, or where there are riparian features with distinct natural values for plant and animal habitat and drainage purposes. Many but not all of these features are in lightly developed areas or are otherwise protected by being in parklands.

The ECAs that are defined primarily by soils or geologic conditions are called geologic hazard areas and include:

- Landslide-prone areas (including steep slope areas, potential landslide areas and known landslide areas)
- Liquefaction-prone areas (sites with loose, saturated soil that can lose the strength needed to support a building during earthquakes)
- Peat-settlement-prone areas (sites containing peat and organic soils that may settle when the area is developed or the water table is lowered)
- Seismic hazard areas
- Volcanic hazard areas

Examples of ECAs in developed areas include steep slope ECAs that were originally defined using topographic maps and soils information. These recognize that steep slopes may be present but also may have been previously altered by grading or improvements such as retaining walls commonly used when residential properties are developed. When a development is proposed on a property with a mapped ECA, a different level of review occurs to ensure that slope stability, drainage and/or riparian values are protected where present, and that structures are designed to minimize risks of future problems. In addition to minimizing development within steep slopes, this includes designing structures to avoid adversely affecting the top or toe of steep slopes, which can cause instability, personal injuries and slope failures that damage property.

From a broader perspective, Seattle's planning and regulatory codes also consider the potential for future development to affect downstream locations by flooding or pollution. Such effects can include damage to ravines and wetland degradation that reduces natural functions relating to water quality and plant/animal habitat. Water quality effects from urban runoff can also occur in natural drainages and downstream waters that include Lake Washington, Puget Sound, Lake Union and the Duwamish Waterway. Design elements such as drainage control systems that meet or exceed minimum standards help to avoid such impacts.

Table 3.1–1 on the following page summarizes how the city's designated urban centers and villages relate to known ECAs. Generally, while there is often a scattered presence of mapped steep slope ECAs within many lower-density residential neighborhoods, the majority of the urban centers' and villages' areas are developed in the flatter and lesser constrained areas of the city. Many of the ECAs are located around the sloping peripheral edges of the city and its hills. However, some urban centers and villages contain limited amounts of more significant critical areas either nearby or at their periphery, such as landslide hazards in places with steeper slopes and certain kinds of soil conditions. In certain other places, such as Greenwood-Phinney Ridge, there are peat soils within portions of the urban village, and similarly situated settlement-prone soils in parts of the Rainier Beach Urban Village. Certain soils' composition and lesser density cause them to be at risk of "liquefaction" (i.e., temporary loss of soil strength and behavior in a fluid-like manner, due to the combination of seismic movement and water within the soils) during severe earthquakes. Fill soils and liquefiable soils are also present in the Greater Duwamish industrial area. These soils are settlement prone, which may influence the design of future development but usually does not preclude it from occurring. When soils in urban areas liquefy due to a seismic event, underground utilities such as water and sewer lines can be damaged, streets and sidewalks may settle or be uplifted, sink-holes may form and structures that are not adequately designed to withstand liquefaction can be damaged.

Other environmentally-protective objectives considered in Seattle's planning activities are related to principles of a shared social responsibility for protecting the environment and growing in ways that allow for long-term sustainment of the natural environment's quality and viability. Concepts of living and growing as a city in ways that allow communities to be "resilient" in the face of possible future challenges are also relevant. Examples of planning for resiliency are to provide or preserve capabilities to grow food locally (as in p-patches) or to tangibly support manners of living that are less dependent on continued consumption of resources at current levels such as electricity or petroleum products.

3.1.2 Impacts

Impacts Common to All Alternatives

Growth will occur under all alternatives in all urban centers and villages, and in places outside these designated areas, in varying amounts. Given the potential for future growth, all

Table 3.1–1 Presence of environmental critical areas In or near urban centers and villages

Urban Centers	Environmental Critical Areas
Downtown	Minor presence of steep slopes at periphery including near Yesler Way/I-5, Pike Place Market and International District; potential settlement prone soils in part of Pioneer Square; known and potential landslide hazards in Little Saigon north of S Jackson St and north of S Dearborn St; shoreline habitat
First/Capitol Hill	Landslide and steep slope hazards at hill edges near I-5 and Melrose Ave northwest of the urban village; minor presence of steep slopes in residential yards
University District	Minimal steep slope presence; shoreline habitat area
Northgate	Thornton Creek riparian corridor and wetland complex, east of 5th Ave NE; wetlands west of I-5 near N Seattle College; peat settlement prone soils near Thornton Creek drainages and N Seattle College
South Lake Union	Occasional presence of steep slopes, including east of Aurora Ave and in Cascade vicinity; Lake Union shoreline
Uptown	Minor steep slope presence at north and southwest edges of urban village

Hub Urban Villages	Environmental Critical Areas
Ballard	Shoreline habitat areas, heron habitat area near Locks, other wildlife habitat area near Locks
Bitter Lake	Bitter Lake, Haller Lake, minimal presence of steep slopes at property edges, former landfill west of Haller Lake
Fremont	Intermittent, relatively frequent presence of steep slopes in a band of residential properties, primarily north of the neighborhood core; shoreline habitat
Lake City	Stream/riparian corridors to east, west and south of urban village core at NE 125th St; peat settlement prone area nearby to north; potential landslide areas nearby to east
Mount Baker	Liquefiable soils throughout valley centered on Rainier Ave S, intermittent presence of steep slopes at periphery east and west of Rainier Ave S
West Seattle Junction	Relatively frequent presence of steep slopes in residential yards surrounding the periphery of the urban village

Residential Urban Villages	Environmental Critical Areas
23rd & Union-Jackson	Minor presence of steep slopes near 23rd Ave S and east of Rainier Ave S; wetland near 23rd Ave S/S Dearborn St
Admiral	Minimal steep slope presence except at ravine east of the urban village; past slides noted at top of slope there; wildlife habitat in the ravine
Aurora-Licton Springs	Licton Springs Park at east edge of urban village, includes stream corridor and peat settlement prone soils; minimal steep slope presence in urban village
Columbia City	Intermittent presence of steep slopes east and west of Rainier Ave S; three scattered wetlands
Crown Hill	None identified
Eastlake	Shoreline habitat; relatively frequent presence of steep slopes in residential yards; past landslides
Green Lake	Green Lake, minimal presence of steep slopes in residential yard edges
Greenwood-Phinney Ridge	Peat settlement prone soils distributed in and near Greenwood core north of N 84th St; minimal steep slope presence
Madison-Miller	Minor steep slope presence; landslide hazard areas nearby to the east
Morgan Junction	Minor presence of steep slopes in residential yard edges; steep ravine located nearby to the west of the urban village
North Beacon Hill	Extensive steep slope and landslide hazard areas at east and west periphery of this urban village, but only minor presence within core neighborhood. Past landslides noted.
Othello	Minimal presence of steep slopes at periphery of urban village; four scattered small wetlands in or near the urban village
Upper Queen Anne	Minor steep slope presence, southern periphery of urban village
Rainier Beach	Liquefiable and settlement prone soils in much of the neighborhood core; Mapes Creek corridor; steep slopes and landslide hazard areas at peripheral edges south and west of the urban village
Roosevelt	Minimal presence of steep slopes in residential yard edges; Ravenna Park ravine and stream nearby to southeast
South Park	Extensive liquefiable soils, shoreline habitat, scattered steep slopes
Wallingford	Minimal presence of steep slopes in residential yard edges
Westwood-Highland Park	Minor presence of steep slopes including at Denny Middle School, Longfellow Creek riparian corridor and wetland north of SW Thistle St, wetlands at Roxhill Park

Source: DPD, 2014.

of these places could experience adverse impacts generated during future construction and by increased density of urban uses and activities after construction.

DURING CONSTRUCTION

Future development across the city will lead to grading, demolition and similar construction activities that will generate the potential for disturbed soil to be conveyed off sites and into nearby drainage systems, primarily through stormwater runoff and tracking of soils and leaking of petroleum products on surfaces in the local vicinity. Releases could be intentional or unintentional in nature, and could make their way into local streams or wetlands through stormwater washoff and drainage. On construction sites that are close to natural vegetated areas and/or ECAs, there may be increased potential for disturbance to generate adverse impacts, such as when potentially unstable steep slopes or poor quality soils are present.

The City's rules require protective measures such as erosion controls that limit areas subject to construction-related disturbance and minimize the transport of soils and pollutants off site. This includes protections through critical areas regulations that will continue to be applied where relevant, such as buffers or prohibitions on disturbance or limitations on the nature and extent of development activities.

In a variety of places, future development in properties without ECAs could indirectly lead to adverse effects upon critical areas such as natural ravine drainages that lie in nearby downstream locations. This could occur in places that drain to natural streams, or via drainage utility systems that are designed to outfall to natural receiving waterbodies, if soils and other pollutants are washed off and conveyed far enough away from construction sites. Compliance with on-site regulations by future development is anticipated to sufficiently address and minimize the potential for adverse impacts of these kinds.

AFTER CONSTRUCTION

Even after construction, future possible activities on residential or commercial properties could adversely affect ECAs directly or indirectly. Examples include: landscaping involving earth movement in or near sensitive areas, improper tree cutting or other vegetation management that violates City rules, paving areas without including appropriate stormwater control features, or the cumulative effects of multiple parties' actions that could potentially alter drainage patterns and/or affect soil and slope stability.

As well, increased density and activity levels for residential or commercial purposes and the associated use of automobiles and other activities, could contribute to additional increments of adverse water quality impacts in ECAs. For example, wetlands and streams may be impacted by washoff of pollutants from street surfaces and discharge of pollutants into drains. However, the City's current level of requirements for stormwater and water quality controls mean that future development would in most cases be expected to lead to net increases in protection of nearby ECAs or other natural resources, due to the slowing, redirection and treatment of stormwater and surface runoff by on-site systems.

Impacts of the Alternatives

The distinctions among the alternative growth strategies defined for this EIS may generate different levels or distributions of potential adverse critical area impacts. Findings regarding the cumulative potential for impacts are summarized at a programmatic level of review. The range of potential adverse impacts relate to the potential for future development over the next two decades in given locations, and the relative degree of presence of the following physical conditions in or near particular urban centers and villages:

- Steep slope/landslide prone soils;
- Natural drainage features;
- Peat soils or other soil conditions that are susceptible to earthquake movement; and
- The combined presence of those ECA types.

Future site-specific development review would determine whether and how future development could be designed in ways that would avoid or reduce the potential impacts to ECAs.

Alternative 1: Continue Current Trends (No Action)

STEEP SLOPES/LANDSLIDE HAZARDS

Information in Table 3.1–1 indicates that certain neighborhoods have a somewhat greater presence of steep slopes than is typical of urban villages' average conditions. Those places are: Downtown, First/Capitol Hill, South Lake Union, Uptown, Fremont, West Seattle Junction and Eastlake.

Most of the steep slopes in these areas are either at peripheral locations of the urban village and/or are primarily located in front or rear yard edges of properties. Many are in low-density or low-to-moderate zoned properties. These locations are or were part of naturally sloping hillsides but many such locations have also been affected by past grading for development that has occurred over many decades. Future development in some of these locations potentially could occur over the next twenty years.

In the identified areas:

<u>Areas with greater potential risk of ECA disturbance:</u>

- Most or all of the steep slopes present in South Lake Union are likely to be affected due to their central locations within the neighborhood and within properties that are likely to be developed within the next twenty years.
- In the portions of Uptown Queen Anne where steep slopes are located in the most accessible and developable places, disturbance of steep slopes is relatively likely.
- Under Alternative 1, projected levels of growth in Eastlake are greater than under the other alternatives, which could increase the total amounts of future disturbance of existing steep slope edges in this neighborhood.

Area with low potential risk:

- For First/Capitol Hill, the limited nature of the affected area (just east of I-5 near Lakeview Boulevard E) and its remoteness from the primary neighborhood core suggests a low potential for development risks to ECAs.

PEAT SOILS/SETTLEMENT PRONE SOILS

Peat soils or soils that are otherwise susceptible to movement in a large earthquake are present in certain neighborhoods: Northgate, Mount Baker, Greenwood-Phinney Ridge, Pioneer Square, South Park and Rainier Beach. Such soil conditions can put physical constraints on future development or can require additional engineering and specialized structural design to ensure that stable development can occur. The City also has pertinent development regulations such as those in SMC 25.09. In the worst case, liquefaction effects and related property, roads and infrastructure damage could occur, which could displace households living in such areas until the damaging effects could be remedied.

To the extent that future development would occur as a result of Alternative 1 in areas potentially constrained by these soil conditions, this is identified as generating a potential adverse impact, that can be mitigated through application of the City's existing policies and regulations. Future site-specific development review would determine whether and how future development could be designed and conditioned in ways to avoid or reduce the potential impacts.

Areas with greater potential risk of ECA disturbance:

- In Greenwood, Rainier Beach, South Park and North Rainier, the soil conditions are relatively widespread in the neighborhoods' core areas and thus the degree of adverse impact would relate to the amount of future development anticipated.
  - For Greenwood-Phinney Ridge, Rainier Beach and South Park, the projected amounts of growth are relatively similar for all alternatives, including Alternative 1.
  - For Mount Baker, compared to the other alternatives, the residential and employment growth projected under Alternative 1 is less than the other alternatives, meaning a lesser exposure of the neighborhood's settlement prone soils to potential adverse impacts.
- Comparatively, Northgate has a lesser overall presence of these potentially unstable soils than the other neighborhoods, but several of the properties with such soils could be subject to future development under any alternative. The residential and employment growth projected under Alternative 1 is less than the other alternatives, meaning a lesser exposure of the neighborhood's settlement prone soils to potential adverse impacts.

PRESENCE OF STREAMS OR WETLAND ECAS NEARBY

Certain neighborhoods include the presence of streams or wetlands either within the urban village or in relatively close proximity to its core area: Northgate, Lake City, Columbia City, Morgan Junction and Westwood-Highland Park, with conditions as summarized in Table 3.1–1. In such areas, direct destruction or infringement upon these ECA resources is a relatively lower risk (due to current regulatory protections) than the possible indirect contributions of additional pollutants that could be generated by future development in the upstream vicinities. Also, the risk of indirect impacts would be mitigated to some degree by the use of drainage control and water quality best management practices in future development. However, despite such assumptions there would remain a risk of added pollution or other incremental increase in damage potential to streams or wetlands present in these locations near future urban village growth areas. This would represent a potential adverse impact.

Areas with greater potential risk of ECA disturbance:

- Given the combination of proximity of these natural features to future development, and the amount of projected residential and employment growth, the neighborhoods facing a greater risk of adverse impacts on these ECAs under Alternative 1 are: Northgate, Lake City and Columbia City.

Area with low potential risk:

- Given the relatively limited amounts of growth, the risk of ECA disturbance under Alternative 1 would be less in Westwood-Highland Park and Morgan Junction than in the other neighborhoods identified above.

PRESENCE OF STEEP SLOPES OR RAVINES NEARBY BUT OUTSIDE URBAN VILLAGES

Two neighborhoods are in relatively close proximity to steep slopes, but the slopes are either outside the urban village boundaries, or the slope edges are mostly already developed with residential uses, or both. Those places include: North Beacon Hill and Admiral. In both of these places, past slide events have been noted near the edges of the slopes, but in locations that are peripheral to the neighborhood cores and unlikely to experience elevated future development risks. However, there is a minor risk that future development in the urban villages might indirectly and adversely affect such slopes. Under Alternative 1, the risk related to the potential for added residential and employment growth is the lowest among all the alternatives.

LIKELY IMPACTS APPROXIMATELY RELATE TO AMOUNT OF GROWTH UNDER THE ALTERNATIVES

Table 2–2 and Table 2–3 in Chapter 2 summarize the projected residential and employment growth associated with each alternative in the urban centers and villages. These projected growth levels inform the impact analysis, with respect to the potential growth pressure that may lead to the eventual disturbance of known ECAs. However, this is only an approximate relationship. In Downtown, for example, the projected variations in residential and employment growth might or might not lead to pressures on the particular properties that have steep slope or landslide ECAs. It would depend on whether the sites with such constraints would develop or not.

Alternatives 2, 3 and 4: Guide Growth to Urban Centers, Guide Growth to Urban Villages near Light Rail and Guide Growth to Urban Villages near Transit

Table 3.1–2 on the following page describes the potential for adverse impacts to critical areas that could be generated by future growth patterns under alternatives 2, 3 and 4, in relation to the findings for Alternative 1. Like the Alternative 1 evaluation, these findings focus on the subset of urban centers and villages where such critical areas are present and most likely to be adversely affected.

Compared to Alternative 1's findings, the potential adverse impacts related to alternatives 2, 3 and 4 are:

- A somewhat elevated risk of peat/settlement-prone soil ECA disturbances with future development in Northgate and Rainier Beach, given amounts of projected growth;
- Elevated risks of peat/settlement-prone soil ECA disturbances in Mount Baker and Rainier Beach;
- A somewhat elevated risk of downstream creek or wetland ECA disturbances in Northgate (alternatives 2, 3 and 4), Columbia City (alternatives 3 and 4) and Westwood-Highland Park (alternatives 3 and 4).

3.1.3 Mitigation Strategies

This section has identified comparative differences in the potential for adverse impacts related to disturbance of ECAs by potential future development. However, none of these identified impacts are concluded to be significant adverse impacts. The continued application of the City's existing policies, review practices and regulations, including the operational practices of Seattle Public Utilities, would help to avoid and minimize the potential for significant adverse impacts to critical areas discussed in this section.

3.1.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to earth and water quality are anticipated.

Table 3.1–2 Potential critical area disturbance impacts of alternatives 2, 3 and 4, compared to Alternative 1

Urban Centers	Alternative 2	Alternative 3	Alternative 4
Steep slopes/ landslide hazards	**First/Capitol Hill:** Same as Alt. 1. **South Lake Union:** Same as Alt. 1. **Uptown:** Similar but lower risk of disturbance than Alt. 1. **Eastlake:** Lower risk of disturbance than Alt. 1; lesser growth.	**First/Capitol Hill:** Same as Alt. 1. **South Lake Union:** Same as Alt. 1; projected growth between Alt. 1 & 2 **Uptown:** Similar but lower risk of disturbance than Alt. 1. **Eastlake:** Lower risk of disturbance than Alt. 1; half as much growth.	**First/Capitol Hill:** Same as Alt. 1. **South Lake Union:** Nearly the same as Alt. 3. **Uptown:** Same as Alt. 3: a similar but lower risk of disturbance than Alt. 1. **Eastlake:** Lower risk of disturbance than Alt. 1; Same as Alt. 3.
Peat/ Settlement-prone soils	Findings same as Alt. 1 in Mount Baker, Greenwood-Phinney Ridge, South Park. In Rainier Beach, a higher projected growth of 500 dwellings rather than 100 dwellings indicates a greater potential for adverse impacts. **Northgate:** Alt.2 has a higher risk of disturbance than any other alternative. Development more likely & perhaps at greater densities. A possibly elevated risk of on-site or downstream adverse impacts re: soil settlement or changes in sub-surface drainage.	Findings same as Alt. 2 in Greenwood-Phinney Ridge & South Park. **Northgate:** Alt. 3's potential for adverse impacts is between that of Alt. 1 & Alt. 2. **Mount Baker:** Alt. 3's projected higher growth (approx. 2,200 more dwellings & 2,400 more employees than Alt. 2) mean a higher risk of peat/settlement prone soil disturbance. **Rainier Beach:** A projected higher growth (1,000 more dwellings & 300 more employees than Alt. 2) mean a higher risk of peat/settlement prone soil disturbance.	Findings similar to but slightly greater than Alt. 2 in Greenwood-Phinney Ridge & South Park. **Northgate:** Alt. 4's potential for adverse impacts is the same as for Alt. 3. **Mount Baker:** Alt 4's findings are similar to but somewhat greater than Alt. 3, given an added potential for 500 more dwelling units growth than Alt. 3. **Rainier Beach:** Findings are the same as for Alt. 3.
Nearby streams or wetland ECAs	**Northgate:** For Alt. 2, given more development than Alt. 1, there is a possibly elevated risk of downstream adverse impacts on streams & wetlands. **Lake City:** Given a lower projected growth in Lake City, potential impacts are lower than Alt. 1. **Columbia City:** Given a lower projected growth in Columbia City, potential impacts are lower than Alt. 1. **Morgan Junction:** A low potential for adverse impacts, similar to Alt. 1. **Westwood-Highland Park:** A low potential for adverse impacts, similar to Alt. 1.	**Northgate:** Given projected growth that is midway between that for Alt. 1 & 2, there is potential for possibly elevated risks, on-site & downstream, that are greater than for Alt. 1.. **Lake City:** Given a lower projected growth in Lake City, potential impacts are the same as Alt. 2, & less than Alt. 1. **Columbia City:** Alt. 3's projected higher growth (500 more dwellings than Alt. 1) mean the potential for impacts is somewhat greater than Alt. 1. **Morgan Junction:** A low potential for adverse impacts, similar to Alt. 1. **Westwood-Highland Park:** Up to 200 more dwelling units growth slightly increases the risk of adverse impacts to streams, wetlands compared to Alt. 1.	**Northgate:** Same findings as Alt. 3. **Lake City:** Slightly more potential for growth-related impacts than Alt.2 or 3, but less than potential impacts for Alt. 1. **Columbia City:** Same findings as Alt. 3. **Morgan Junction:** A low potential for adverse impacts, nearly the same as for Alt. 1. **Westwood-Highland Park:** Same findings as Alt. 3.

Source: DPD, 2014.

3.2 Air Quality and Greenhouse Gas Emissions

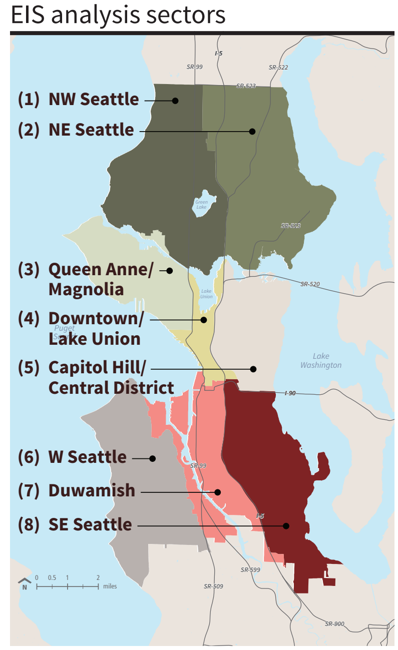
This section evaluates the regional air quality impacts of implementing the alternatives considered in this EIS. The analysis focuses on the following criteria pollutants: (1) carbon monoxide (CO) and (2) particulate matter (PM) emissions. It also considers other criteria pollutants such as ozone precursors and Toxic Air Pollutants (TAPs).

This EIS examines these potential air quality issues at a regional level. However, for TAPs and fine particulate matter ($PM_{2.5}$), a localized analysis is provided to the degree feasible to identify potential public health impacts from locating new sensitive receptors within transportation corridors areas.

This section of the EIS also analyzes how implementation of the alternatives considered in this EIS may contribute to global climate change through greenhouse gas emissions related to transportation and land uses. Transportation systems contribute to climate change primarily through the emissions of certain greenhouse gases (CO_2, CH_4 and N_2O) from nonrenewable energy (primarily gasoline and diesel fuels) used to operate passenger, commercial and transit vehicles. Land use changes contribute to climate change through construction and operational use of electricity and natural gas, water demand and waste production.

This analysis evaluates air quality and potential impacts on a citywide cumulative basis and, where appropriate, according to the EIS analysis sectors described in Chapter 2 and shown in Figure 2–17 and Figure 3.2–1.

Figure 3.2–1
EIS analysis sectors



3.2.1 Affected Environment

Regulatory Agencies and Requirements

Air quality in the Puget Sound region is regulated and enforced by federal, state and local agencies—the U.S. EPA, Ecology and the Puget Sound Clean Air Agency (PSCAA); each have their own role in regulating air quality. The City of Seattle has no policies in its Comprehensive Plan regarding air pollutants, but does have the SEPA policy SMC 25.05.675.A, which provides limited regulatory authority over actions that could degrade air quality.

U.S. ENVIRONMENTAL PROTECTION AGENCY

The 1970 Clean Air Act (last amended in 1990) requires that regional planning and air pollution control agencies prepare a regional air quality plan to outline the measures by which both stationary and mobile sources of pollutants will be controlled to achieve all standards by the deadlines specified in the Act. These ambient air quality standards are intended to protect the public health and welfare, and they specify the concentration of pollutants (with an adequate margin of safety) to which the public can be exposed without adverse health effects. They are designed to protect those segments of the public most susceptible to respiratory distress, including asthmatics, the very young, the elderly, people weak from other illness or disease or persons engaged in strenuous work or exercise.

As required by the 1970 Clean Air Act, the U.S. EPA initially identified six criteria air pollutants that are pervasive in urban environments and for which state and federal health-based ambient air quality standards have been established. The U.S. EPA calls these *criteria air pollutants* because the agency has regulated them by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. Ozone, CO, PM, nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and lead are the six criteria air pollutants originally identified by U.S. EPA. Since then, subsets of PM have been identified for which permissible levels have been established. These include PM_{10} (matter that is less than or equal to 10 microns in diameter) and $PM_{2.5}$ (matter that is less than or equal to 2.5 microns in diameter).

The Clean Air Act established National Ambient Air Quality Standards (NAAQS), with primary and secondary standards, to protect the public health and welfare from air pollution. Areas of the U.S. that do not meet the NAAQS for any pollutant are designated by the U.S. EPA as nonattainment areas. Areas that were once designated nonattainment but are now achieving the NAAQS are termed maintenance areas. Areas that have air pollution levels below the NAAQS are termed attainment areas. In nonattainment areas, states must develop plans to reduce emissions and bring the area back into attainment of the NAAQS.

Table 3.2–1 displays the primary and secondary NAAQS for the six criteria pollutants. Ecology and PSCAA have authority to adopt more stringent standards, although many of the state and local standards are equivalent to the federal mandate.

An area remains a nonattainment area for that particular pollutant until concentrations are in compliance with the NAAQS. Only after measured concentrations have fallen below the NAAQS can the state apply for redesignation to attainment, and it must then submit a 10-year plan for continuing to meet and maintain air quality standards that follow the Clean Air Act. During this 10-year period, the area is designated as a maintenance area. The Puget Sound region is currently classified as a maintenance area for CO. With regard to ozone, however, U.S. EPA revoked its 1-hour ozone standard and the area currently meets the 8-hour standard; therefore, the maintenance designation for ozone no longer applies in the Puget Sound region. The U.S. EPA designated Seattle Duwamish area (EIS analysis Sector 7 of the Plan area) as a maintenance area for PM_{10} in 2000 and in 2002.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Ecology maintains an air quality program with a goal of safeguarding public health and the environment by preventing and reducing air pollution. Washington's main sources of air pollution are motor vehicles, outdoor burning and wood smoke. Ecology strives to improve air quality throughout the state by overseeing the development and conformity of the State Implementation Plan (SIP), which is the state's plan for meeting and maintaining NAAQS. Ecology has maintained its own air quality standard for 1-hour ozone concentrations and established its own more stringent air quality standards for annual NO_2, SO_2 and PM concentrations, as shown in Table 3.2–1.

PUGET SOUND CLEAN AIR AGENCY

The PSCAA has local authority for setting regulations and permitting of stationary air pollutant sources and construction emissions. PSCAA also maintains and operates a network of ambient air quality monitoring stations throughout its jurisdiction.

Table 3.2–1 Federal and state ambient air quality standards

		(Federal) NAAQS[1]		State of WA
Pollutant	**Averaging Time**	**Primary Standard**	**Secondary Standard**	**Standard**
Ozone	8 hour	0.075 ppm	0.075 ppm	NSA
	1 hour	NSA[2]	NSA	0.12 ppm
Carbon monoxide (CO)	1 hour	35 ppm	NSA	35 ppm
	8 hour	9 ppm	NSA	9 ppm
Nitrogen dioxide (NO_2)	1 hour	0.100 ppm	NSA	0.100 ppm
	Annual	0.053 ppm	0.053 ppm	0.05 ppm
Sulfur dioxide (SO_2)	1 hour	0.075	0.5 ppm (3-hour)	0.40 ppm
	24 hour	0.14	NS	0.10
	Annual	0.03 ppm	NS	0.02 ppm
Particulate matter (PM_{10})	24 hour	150 μg/m3	150 μg/m3	150 μg/m3
	Annual	NSA	NSA	50 μg/m3
Fine particulate matter ($PM_{2.5}$)	24 hour	35 μg/m3	35 μg/m3	NSA
	Annual	12 μg/m3	15 μg/m3	NSA
Lead	Rolling 3-month average	0.15 μg/m3	0.15 μg/m3	NSA

NAAQs = national ambient air quality standards; NSA = no applicable standard; ppm = parts per million; μg/m3 = micrograms per cubic meter

1 NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 8 hour ozone standard is attained when the 3-year average of the fourth highest daily concentration is 0.08 ppm or less. The 24 hour PM_{10} standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than the standard. The 24 hour $PM_{2.5}$ standard is attained when the 3-year average of the 98th percentile is less than the standard.

2 The U.S. EPA revoked the national 1 hour ozone standard on June 15, 2005. This state 8 hour ozone standard was approved in April 2005 and became effective in May 2006.

Sources: U.S. EPA, 2012b and Ecology, 2011a.

Climate and Air Quality

The City of Seattle is in the Puget Sound lowland. Buffered by the Olympic and Cascade mountain ranges and Puget Sound, the Puget Sound lowland has a relatively mild, marine climate with cool summers and mild, wet and cloudy winters.

The prevailing wind direction in the summer is from the north or northwest. The average wind velocity is less than 10 miles per hour. Persistent high-pressure cells often dominate summer weather and create stagnant air conditions. This weather pattern sometimes contributes to the formation of photochemical smog. During the wet winter season, the prevailing wind direction is south or southwest.

There is sufficient wind most of the year to disperse air pollutants released into the atmosphere. Air pollution is usually most noticeable in the late fall and winter, under conditions of clear skies, light wind and a sharp temperature inversion. Temperature inversions occur when cold air is trapped under warm air, thereby preventing vertical mixing in the atmosphere. These can last several days. If poor dispersion persists for more than 24 hours, the PSCAA can declare an "air pollution episode" or local "impaired air quality."

Pollutants of Concern

Air quality is affected by pollutants that are generated by both natural and manmade sources. In general, the largest manmade contributors to air emissions are transportation vehicles and power-generating equipment, both of which typically burn fossil fuels. The main criteria pollutants of interest for land use development are CO, PM, ozone and ozone precursors (volatile organic compounds (VOCs) and oxides of nitrogen (NO_x)). Both federal and state standards regulate these pollutants, along with two other criteria pollutants, SO_2 and lead. The Puget Sound region is in attainment for ozone, NO_2, lead or SO_2.

The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions, and no lead emissions are associated with development under the Comprehensive Plan. Emissions of NO_2 associated with the proposed project are estimated because they are a precursor to ozone formation and assessed relative to their potential impact on ozone concentrations. SO_2 is produced by the combustion of sulfur-containing fuels, such as oil, coal and diesel. Historically, Washington has measured very low levels of SO_2. Because the levels were so low, most monitoring was stopped. SO_2 emissions have dropped over the past 20 years because control measures were added for some sources, some larger SO_2 sources shut down and the sulfur content of gasoline and diesel fuel was cut by nearly 90 percent (Ecology 2011b). SO_2 emissions would not be appreciably generated by development under the Comprehensive Plan and, given the attainment status of the region, are not further considered in this analysis.

The largest contributors of pollution related to land development activity are construction equipment, motor vehicles and off-road construction equipment. The main pollutants emitted from these sources are CO, PM, ozone precursors (VOC and NO_x), GHGs and TAPs. Motor vehicles and diesel-powered construction equipment also emit pollutants that contribute to the formation of ground-level ozone. This section discusses the main pollutants of concern and their impact on public health and the environment.

CARBON MONOXIDE

CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The largest sources of CO are motor vehicle engines and traffic, and industrial activity and woodstoves. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness and fatigue; impair central nervous system function; and induce angina (chest pain) in persons with serious heart disease. Very high levels of CO can be fatal. The federal CO standards have not been exceeded in the Puget Sound area for the past 20 years (PSCAA 2014), but the Puget Sound region continues to be designated as a maintenance area for CO.

PARTICULATE MATTER

PM is a class of air pollutants that consists of heterogeneous solid and liquid airborne particles from manmade and natural sources. PM is measured in two size ranges: PM_{10} and $PM_{2.5}$. Fine particles are emitted directly from a variety of sources, including wood burning (both outside and indoor wood stoves and fireplaces), vehicles and industry. They also form when gases from some of these same sources react in the atmosphere.

Exposure to particle pollution is linked to a variety of significant health problems, such as increased hospital admissions and emergency department visits for cardiovascular and respiratory problems, including non-fatal heart attacks and premature death. People most at risk from fine and coarse particle pollution exposure include people with heart or lung disease (including asthma), older adults and children. Pregnant women, newborns and people with certain health conditions, such as obesity or diabetes, also may be more susceptible to PM-related effects.

The federal annual $PM_{2.5}$ standard has not been exceeded in the Puget Sound area since the U.S. EPA established its NAAQS in 2007. The daily federal $PM_{2.5}$ standard has not been exceeded in the Puget Sound dating back to the initiation of monitoring for this pollutant in 2001 (PSCAA 2014). The U.S. EPA recently adopted a more stringent federal standard for $PM_{2.5}$ in December 2012, but attainment designations are not expected until December 2014. Notwithstanding the continued attainment of federal PM_{10} standards, portions of the Puget Sound region continue to be designated as a maintenance area for PM_{10}. Specifically, the majority of EIS analysis Sector 7 is located within the Seattle Duwamish Particulate Matter Maintenance Area.

OZONE

Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving VOCs (also sometimes referred to by some regulating agencies as reactive organic gases, or ROG) and NO_x. The main sources of VOC and NO_x, often referred to as ozone precursors, are combustion processes (including motor vehicle engines) and the evaporation of solvents, paints and fuels. Ozone levels are usually highest in the afternoon because of the intense sunlight and the time required for ozone to form in the atmosphere. Ecology currently monitors ozone from May through September because this is the period of concern for elevated ozone levels in the Pacific Northwest. No violations of the NAAQS for ozone have occurred at the Seattle monitoring station since monitoring commenced there in 1999.

Elevated concentrations of ground-level ozone can cause reduced lung function and respiratory irritation and can aggravate asthma. Ozone has also been linked to immune system impairment. People with respiratory conditions should limit outdoor exertion if ozone levels are elevated. Even healthy individuals may experience respiratory symptoms on a high-ozone day. Ground-level ozone can also damage forests and agricultural crops, interfering with their ability to grow and produce food. The Puget Sound region is designated as an attainment area for the federal ozone.

TOXIC AIR POLLUTANTS

Other pollutants known to cause cancer or other serious health effects are called air toxics. Ecology began monitoring air toxics at the Seattle Beacon Hill site in 2000. The Clean Air Act identifies 188 air toxics; the U.S. EPA later identified 21 of these air toxics as mobile source air toxics (MSATs) and then extracted a subset of seven priority MSATs: benzene, formaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, naphthalene, polycyclic organic matter and 1,3-butadiene. Exposure to these pollutants for long durations and sufficient concentrations increases the chances of cancer, damage to the immune system, neurological problems, reproductive, developmental, respiratory and other serious health problems.

Diesel particulate matter poses the greatest potential cancer risk (70 percent of the total risk from air toxics) in the Puget Sound area (PSCAA 2011). This pollution comes from diesel-fueled trucks, cars, buses, construction equipment, rail, marine and port activities. Particulate matter from wood smoke (a result of burning in woodstoves and fireplaces or outdoor fires) presents the second-highest potential cancer health risk. Wood smoke and auto exhaust also contain formaldehyde, chromium, benzene, 1,3-butadiene and acrolein. Chromium is also emitted in industrial plating processes. The U.S. EPA also prioritizes reductions of these air toxics.

Greenhouse Gases and Climate Change

Gases that trap heat in the atmosphere are referred to as GHGs because, like a greenhouse, they capture heat radiated from the earth. The accumulation of GHGs has been identified as a driving force in global climate change. Definitions of climate change vary between and across regulatory authorities and the scientific community. In general, however, climate change can be described as the changing of the earth's climate caused by natural fluctuations and anthropogenic activities (i.e., activities relating to, or resulting from the influence of, human beings) that alter the composition of the global atmosphere.

Increases in GHG concentrations in the earth's atmosphere are believed to be the main cause of human-induced climate change. GHGs naturally trap heat by impeding the exit of solar radiation that has hit the earth and is reflected back into space. This trapping of heat is called a "greenhouse effect." Some GHGs occur naturally and are necessary for keeping the earth's surface habitable. However, increases in the concentrations of these gases in the atmosphere during the last 100 years have decreased the amount of solar radiation that is reflected back into space, intensifying the natural greenhouse effect and resulting in the increase of global average temperature.

The principal GHGs of concern are CO_2, CH_4, N_2O, SF_6, perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs). Electric utilities, including City Light, use SF_6 in electric distribution equipment. Each of the principal GHGs has a long atmospheric lifetime (1 year to several thousand years). In addition, the potential heat-trapping ability of each of these gases varies significantly. CH_4 is 23 times as potent as CO_2 at trapping heat, while SF_6 is 23,900 times more potent than CO_2. Conventionally, GHGs have been reported as CO_2 equivalents (CO_2e). CO_2e takes into account the relative potency of non-CO2 GHGs and converts their quantities to an equivalent amount of CO_2 so that all emissions can be reported as a single quantity.

The primary human-made processes that release GHGs include combustion of fossil fuels for transportation, heating and electricity generation; agricultural practices that release CH_4, such as livestock production and crop residue decomposition; and industrial processes that release smaller amounts of high global warming potential gases such as SF_6, PFCs and HFCs. Deforestation and land cover conversion also contribute to global warming by reducing the earth's capacity to remove CO_2 from the air and altering the earth's albedo (surface reflectance), thus allowing more solar radiation to be absorbed.

Like global mean temperatures, U.S. temperatures also warmed during the 20th century and have continued to warm into the 21st century. According to data compiled by the National Oceanic and Atmospheric Administration, average annual temperatures for the contiguous U. S. (or lower 48 states) are now approximately 1.25°Fahrenheit (F) warmer than at the start of the 20th century, with an increased rate of warming over the past 30 years (U.S. EPA 2009b). The rate of warming for the entire period of record (1901–2008) is 0.13°F per decade, while the rate of warming increased to 0.58°F per decade for the period 1979–2008. The last ten 5-year periods were the warmest 5-year periods (i.e., pentads) in the period of record (since 1901; U.S. EPA 2009b).

$MMTCO_2e$ *or million metric tons of CO_2 equivalents, is how greenhouse gas emissions are typically expressed. CO_2 equivalents is a universal standard of measurement that recognizes the differences between greenhouse gases and their ability to trap heat in the atmosphere.*

Ecology estimated that in 2010, Washington produced about 96 million gross metric tons ($MMTCO_2e$; about 106 million U.S. tons) of CO_2e (Ecology 2012). Ecology found that transportation is the largest source, at 44 percent of the state's GHG emissions; followed by electricity generation (both in-state and out-of-state) at 22 percent and residential, commercial and industrial energy use at 20 percent. The sources of the remaining 14 percent of emissions are agriculture, waste management and industrial processes.

In December 2010, Ecology adopted Chapter 173-441 Washington Administrative Code—Reporting of Emissions of Greenhouse Gases. This rule institutes mandatory GHG reporting for the following:

- Facilities that emit at least 10,000 metric tons of GHGs per year in Washington; or
- Suppliers of liquid motor vehicle fuel, special fuel or aircraft fuel that supply products equivalent to at least 10,000 metric tons of CO_2 per year in Washington.

CITY OF SEATTLE CLIMATE ACTION PLAN

Seattle became the first city in the nation to adopt a green building goal for all new municipal facilities, and in 2001 the City created a Leadership in Energy and Environmental Design (LEED) incentive program for private projects. City Resolution 30144 established Seattle City Light's long-term goal of meeting all of Seattle's electrical needs with zero net GHG emissions. City Light achieved GHG neutrality in 2005 through eliminating and reducing emissions, inventorying remaining emissions and purchasing offsets to offset the remaining emissions (SCL 2012) and has maintained GHG neutrality since that date.

In 2011, the City Council adopted a long-term climate protection vision for Seattle (through Resolution 31312) which included achieving net zero GHG Emissions by 2050 and preparing for the likely impacts of climate change. To achieve these goals the City has prepared a Climate Action Plan (2013 CAP) which details the strategy for realizing this vision. The strategy focuses on City actions that reduce GHG emissions while also supporting other community goals, including building vibrant neighborhoods, fostering economic prosperity and enhancing social equity. City actions in the 2013 CAP focus on those sources of emissions where City action and local community action will have the greatest impact: road transportation, building energy and waste, which comprise the majority of local emissions. The City's Comprehensive Plan is identified in the 2013 CAP as one of many plans through which the Climate Action Plan is to be implemented. With 2008 as the baseline year, the 2013 CAP identifies the following as targets by 2030:

- 20 percent reduction in vehicle miles traveled
- 75 percent reduction in GHG emissions per mile of Seattle vehicles
- 10 percent reduction in commercial building energy use
- 20 percent reduction in residential building energy use
- 25 percent reduction in combined commercial and residential building energy use

The 2013 CAP also calls for identification of equitable development policies to support growth and development near existing and planned high capacity transit without displacement.

CITY OF SEATTLE COMPREHENSIVE PLAN 2004-2024

The existing City of Seattle Comprehensive Plan contains climate change-related goals and policies within its Environmental Element. These are listed in Appendix A.1.

Air Quality Information Sources, Monitoring and Trends

The PSCAA monitors criteria air pollutant concentrations at five facilities within Seattle city limits. The primary monitoring station within Seattle is located in Beacon Hill in EIS analysis Sector 8. This station collects data for ozone, CO, NO_2 and SO_2. The other four stations are located at Queen Anne Hill (Sector 3), Olive Way and Boren Avenue (Sector 4), Duwamish (Sector 7) and South Park (Sector 7). These other four stations monitor only $PM_{2.5}$.

Table 3.2–2 displays the most recent four years of available monitoring data at these locations and shows that the air pollutant concentration trends for these pollutants remain below the NAAQS.

Emission projections and ongoing monitoring throughout the central Puget Sound region indicate that the ambient air pollution concentrations for CO and $PM_{2.5}$ have been decreasing over the past decade. Measured ozone concentrations, in contrast, have remained fairly static. The decline of CO is primarily due to improvements made to emission controls on motor

Table 3.2–2 Ambient air quality monitoring data for monitoring stations in Seattle

Pollutant	Station	Averaging Time	2009 max concentration	2010 max concentration	2011 max concentration	2012 max concentration	NAAQS[1] Standard
Ozone	Beacon Hill (Sector 8)	8 hour[2]	0.049 ppm	0.043 ppm	0.046 ppm	0.049 ppm	0.075 ppm
		1 hour	1.4 ppm	1.2 ppm	1.1 ppm	1.0 ppm	35 ppm
Carbon monoxide (CO)	Beacon Hill (Sector 8)	8 hour	1.0 ppm	0.8 ppm	0.9 ppm	0.7 ppm	9 ppm
		24 hour	23 μg/m3	21.4 μg/m3	21.6 μg/m3	21.8 μg/m3	35 μg/m3
Fine particulate matter ($PM_{2.5}$)	Queen Anne (Sector 3)	Annual	5.9 μg/m3	6.3 μg/m3	6.3 μg/m3	5.7 μg/m3	15 μg/m3
		24 hour	20 μg/m3	20.4 μg/m3	20.8 μg/m3	23.5 μg/m3	35 μg/m3
Fine particulate matter ($PM_{2.5}$)	Olive & Boren (Sector 4)	Annual	5.7 μg/m3	5.9 μg/m3	6.4 μg/m3	6.1 μg/m3	15 μg/m3
		24 hour	38 μg/m3	26.1 μg/m3	26.2 μg/m3	26.6 μg/m3	35 μg/m3
Fine particulate matter ($PM_{2.5}$)	Duwamish (Sector 7)	Annual	8.0 μg/m3	8.5 μg/m3	9.0 μg/m3	8.2 μg/m3	15 μg/m3
		24 hour	34 μg/m3	23.5 μg/m3	25.1 μg/m3	19.5 μg/m3	35 μg/m3
Fine particulate matter ($PM_{2.5}$)	South Park (Sector 7)	Annual	7.6 μg/m3	8.5 μg/m3	9.0 μg/m3	8.9 μg/m3	15 μg/m3
		1 hour	0.070 ppm	0.052 ppm	0.054 ppm	0.057 ppm	0.100 ppm
Nitrogen dioxide (NO_2)	Beacon Hill (Sector 8)	Annual	0.015 ppm	0.013 ppm	0.012 ppm	0.012 ppm	0.053 ppm
		1 hour	0.053 ppm	0.030 ppm	0.028 ppm	0.030 ppm	0.075 ppm
Sulfur dioxide (SO_2)	Beacon Hill (Sector 8)	24 hour	0.008 ppm	0.009 ppm	0.011 ppm	0.006 ppm	0.14 ppm
		Annual	0.002 ppm	0.001 ppm	0.001 ppm	0.001 ppm	0.02 ppm

NAAQs = national ambient air quality standards; NSA = no applicable standard; ppm = parts per million; μg/m3 = micrograms per cubic meter

1 NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 8 hour ozone standard is attained when the 3-year average of the fourth highest daily concentration is 0.08 ppm or less. The 24 hour $PM_{2.5}$ standard is attained when the 3-year average of the 98th percentile is less than the standard.

2 The U.S. EPA revoked the national 1 hour ozone standard on June 15, 2005. This state 8 hour ozone standard was approved in April 2005 and became effective in May 2006.

Sources: PSCAA, 2012b.

vehicles and the retirement of older, higher-polluting vehicles. However, the Puget Sound Regional Council estimates that by 2040, the Puget Sound region population will grow by 1.7 million people, increasing 52 percent, to reach a population of 5 million people (PSRC 2009). The highest population increase is estimated to be in King County. Estimates such as this indicate that CO, $PM_{2.5}$ and ozone emissions will increase, which could lead to future violations of the NAAQS. Future regulations on fuel and motor vehicles are expected to reduce air pollutant emissions from 1990 by more than 75 percent by 2020 (U.S. EPA 2012a).

Air toxic pollutant emissions are also of concern because of the projected growth in vehicle miles traveled. The U.S. EPA has been able to reduce benzene, toluene and other air toxics emissions from mobile sources by placing stringent standards on tailpipe emissions and requiring the use of reformulated gasoline.

Sources of Air Pollution in Seattle

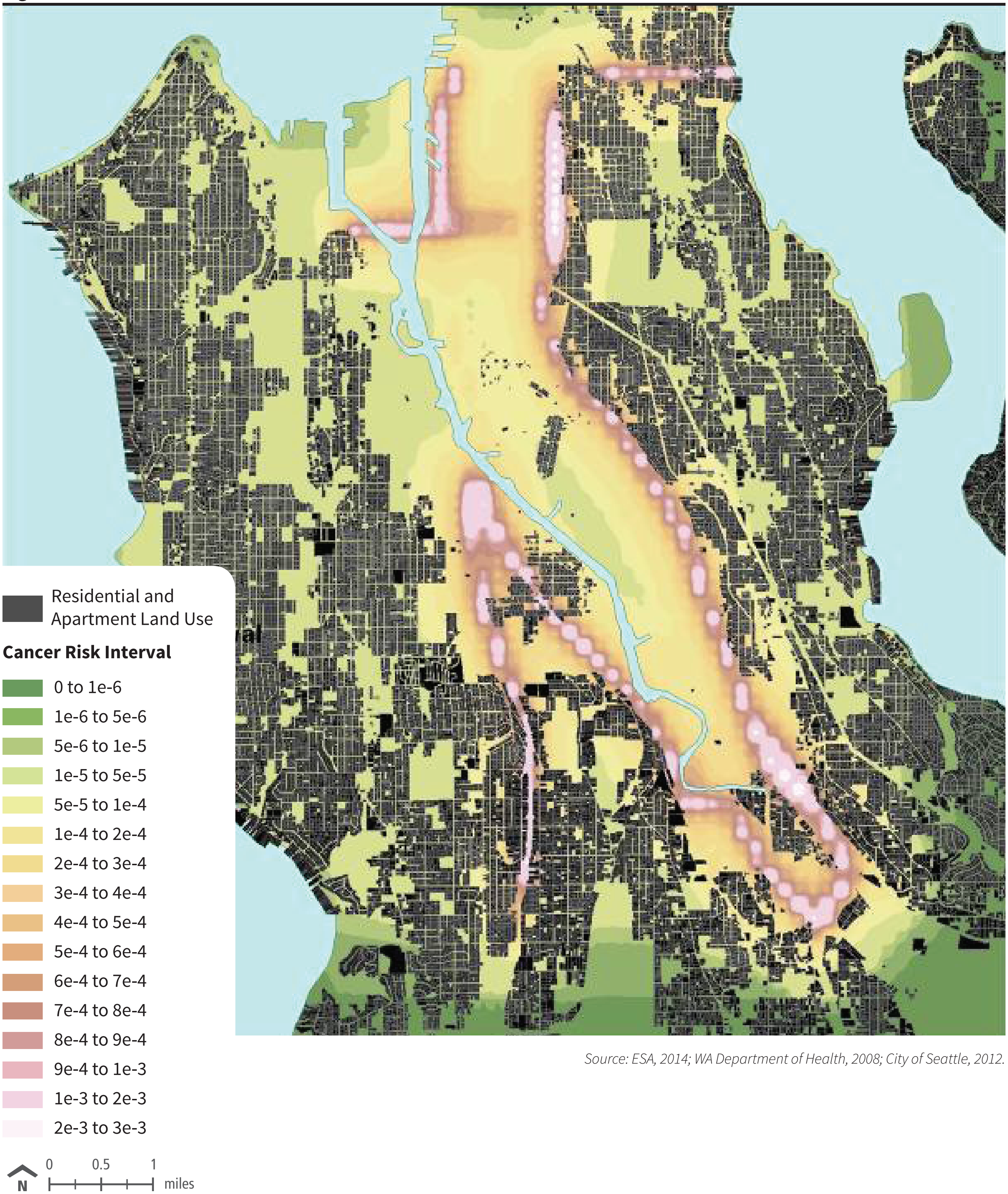
Air pollution sources within Seattle and its environs can be categorized into point sources, transportation sources and area sources.

Transportation sources include freeways, highways and major arterial roadways, particularly those supporting a high percentage of diesel truck traffic such as State Routes 99 and 599. A health risk assessment conducted by the Washington State Department of Health (DOH) found that on-road mobile sources contribute to the highest cancer and non-cancer risks near major roadways over a large area of south Seattle and that risks and hazards are greatest near major highways and drop dramatically about 200 meters (656 feet) from the center of highways (WSDH 2008).

Figure 3.2–2 presents the geographical prediction of increased cancer risks from roadway sources in the south Seattle area as determined by the Department of Health. This figure and its corresponding DOH analysis focus on the south Seattle/Duwamish Valley area. The Residents of Georgetown and South Park neighborhoods in south Seattle asked the DOH to conduct an assessment of pollutant impacts on their health and to date this is the only such assessment for the greater Seattle area. The majority of land use in the Duwamish Valley is commercial or industrial with the exception of the two residential communities of Georgetown and South Park. Data from this study, particularly as related to exposure from highway sources would also be expected to be similar to the northern areas of Seattle.

As a point of reference, risks above 100 per one million persons (100 excess cancer risk) is a criterion identified by U.S. EPA guidance for conducting air toxic analyses and making risk management decisions at the facility and community-scale level and, consequently, may be interpreted as a relatively high cancer risk value from a single air pollutant source (BAAQMD 2009). Other states have identified recommended separation distances of residential uses from rail yard source of 1,000 feet. This 1000-foot distance correlates to increased cancer risks below 500 in one million and which may be interpreted as a risk level above which would be considered inappropriate for sensitive land uses and potentially represent a moderate to severe air quality impact (CARB 2005). In relation to these criteria, the mapped areas illustrate

Figure 3.2–2 Cancer risk attributable to on-road sources



Source: ESA, 2014; WA Department of Health, 2008; City of Seattle, 2012.

risks that are quantified as increased cancer risk. Cancer estimates are expressed in scientific notation, for example 1e-6 or 1×10^{-6}, is interpreted as 1 excess cancer per million individuals exposed, or an individual's probability of getting cancer from exposure to air pollutants is 1 in 1,000,000. These risks should not be interpreted as estimates of disease in the community, only as a tool to define potential risk. Color-coded risks presented in Figure 3.2–2 range from below one in one million (dark green shading) to 3,000 in one million (white shading).

Additional transportation sources include railway lines supporting diesel locomotive operations. BNSF Railway Company (BNSF) owns and operates a mainline dual-track from Portland to Seattle. Union Pacific owns and operates a single mainline track with two-way train operations between Tacoma and Seattle. BNSF owns and operates tracks that extend north from downtown Seattle to Snohomish County and then east to Spokane. A connecting spur, operated by the Ballard Terminal Rail Company, serves the Ballard and the western ship canal area. Aircraft (from Boeing Field) and marine sources (ferries, tugs, container ships etc.) are also transportation sources which contribute to regional and localized pollutant concentrations.

Point sources (also termed stationary sources) are generally industrial equipment and are almost always required to have a permit to operate from PSCAA. Industrial turbines and cement manufacturing plants are examples of point sources of air pollution. Figure 3.2–3 presents the distribution of point sources in south Seattle, where the majority of industrial land use is located. Examples of area sources include ports, truck-to train intermodal terminals and distribution centers.

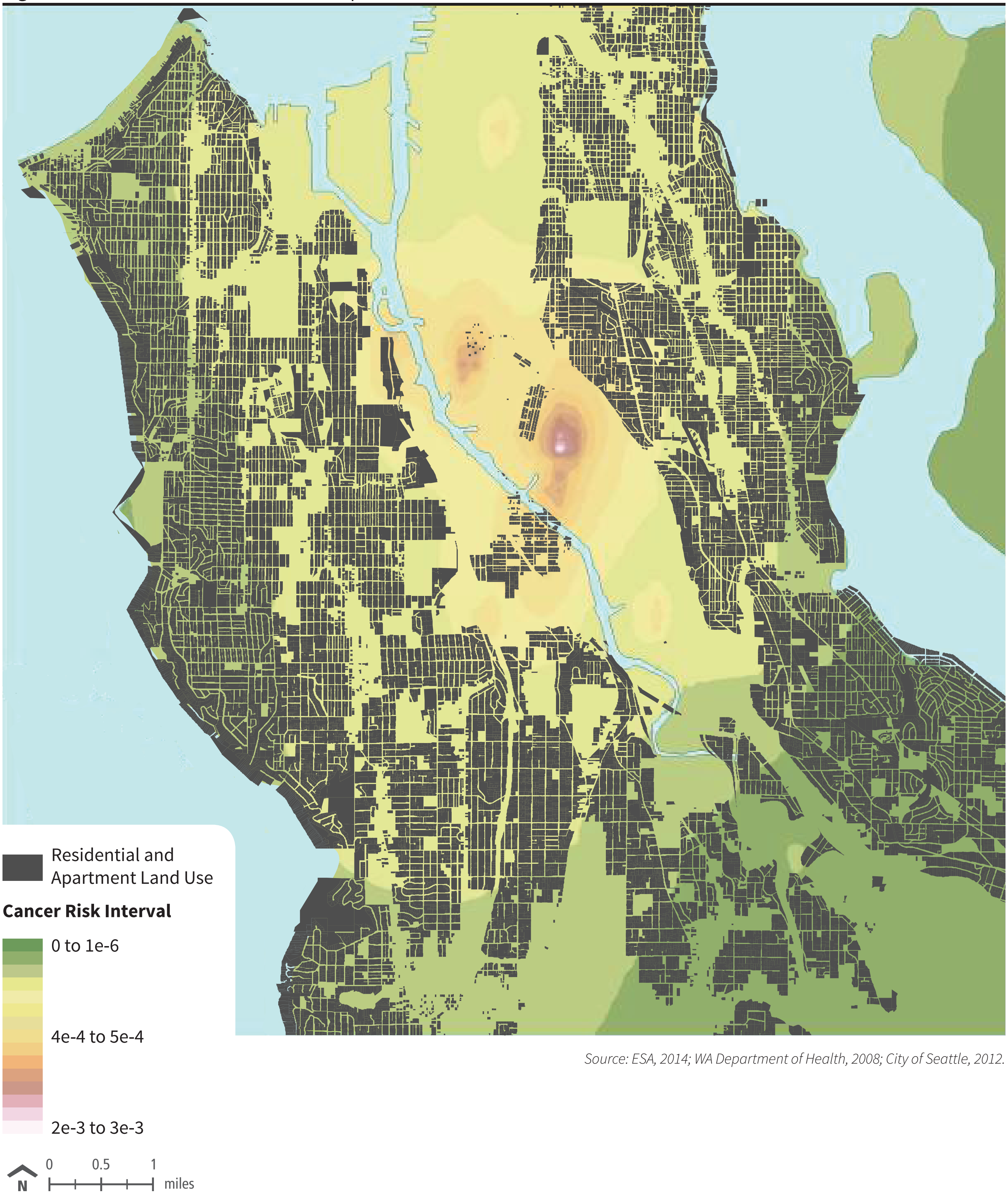
Recent goals set by the Port of Seattle aims to reduce PM emissions from ships by 70 percent while they are in port, and to reduce emissions from land-based equipment by 30 percent (Port of Seattle et al. 2007). Providing power plug-ins to ships is an example of measures being taken to reduce emissions while ships are in port. Color-coded risks presented in Figure 3.2–2 range from below one in one million (dark green shading) to 1,100 in one million (white shading).

Sensitive Populations

Populations that are more sensitive to the health effects of air pollutants include the elderly and the young; population subgroups with higher rates of respiratory disease, such as asthma and chronic obstructive pulmonary disease; and populations with other environmental or occupational health exposures (e.g., indoor air quality) that affect cardiovascular or respiratory diseases. Therefore, land uses and facilities such as schools, children's daycare centers, hospitals and nursing and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses are more susceptible to respiratory distress.

Parks and playgrounds are considered moderately sensitive to poor air quality because persons engaged in strenuous work or exercise have increased sensitivity to poor air quality; however, exposure times are generally shorter in parks and playgrounds than in residential locations and schools. Residential areas are considered more sensitive to air quality condi-

Figure 3.2–3 Cancer risk attributable to point sources



Source: ESA, 2014; WA Department of Health, 2008; City of Seattle, 2012.

tions compared to commercial and industrial areas because people generally spend longer periods of time at their residences, with proportionally greater exposure to ambient air quality conditions. Workers are not considered sensitive receptors because all employers must follow regulations set forth by the Occupational Safety and Health Administration to ensure the health and well-being of their employees with regard to their own operations.

Trends: Greenhouse Gas Emissions in Seattle

In April 2014, the City of Seattle published its 2012 Seattle Community Greenhouse Gas Emissions Inventory. Primary sources (core emissions) of GHG emissions include on-road transportation, building energy and waste generation. Transportation sources comprise approximately 64 percent of inventoried emissions, while building energy (electricity generation and natural gas and other fuel combustion) comprise an additional 33 percent. Core emissions of GHGs declined from 3.8 million metric tons of CO_2e in 1990 to 3.6 million metric tons of CO_2e in 2012, a 4 percent decline. This decline occurred despite an overall increase in population during the same period of 23 percent.

TRANSPORTATION RELATED GREENHOUSE GAS EMISSIONS

The analysis completed for this EIS builds off of the findings in the 2014 report. This analysis calculates transportation GHG emissions at the citywide level.[1] The Seattle inventory estimates 2,389,000 metric tons of CO_2e ($MTCO_2e$) in 2012.

Based on a review of traffic and fuel economy trends, the 2012 GHG emissions estimate is assumed to adequately represent 2015 conditions, and may be conservatively high. Additional details may be found in Appendix A.1. Figure 3.2–4 summarizes the 2015 road transportation greenhouse gas emissions.

3.2.2 Impacts

Impacts Common to All Alternatives

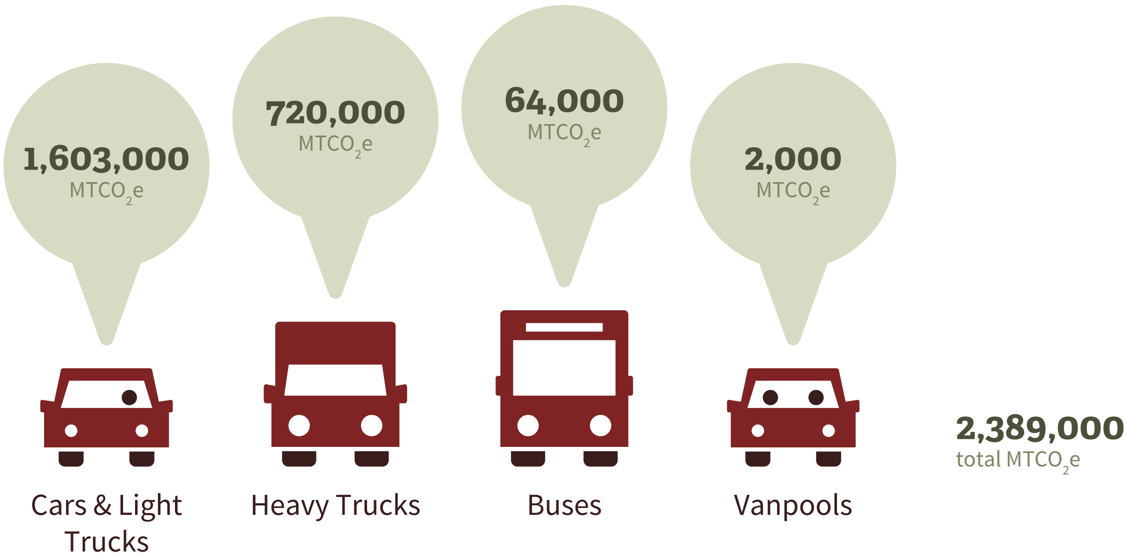
AIR QUALITY

<u>Construction-related Emissions</u>

Future growth under any alternative would result in development of new residential, retail, light industrial, office and community/art space. Most development projects in the city would entail demolition and removal of existing structures or parking lots, excavation and

1 The Transportation Chapter of this EIS generally summarizes transportation conditions at a sector or neighborhood level. However, given the amount of travel between sectors, accounting for sector-specific GHG emissions is not relevant. Therefore, only citywide GHG emissions are calculated. This approach is also consistent with the 2014 report.

Figure 3.2–4 Road transportation emissions (2015)



Source: 2012 Seattle Community Greenhouse Gas Emissions Inventory, 2014.

site preparation and construction of new buildings. Emissions generated during construction activities would include exhaust emissions from heavy duty construction equipment, trucks used to haul construction materials to and from sites, worker vehicle emissions, as well as fugitive dust emissions associated with earth-disturbing activities and other demolition and construction work.

Fugitive dust *is dust that is generated during construction and that escapes from a construction site and is not emitted through an exhaust pipe.*

Fugitive dust emissions are typically generated during construction phases. Activities that generate dust include building and parking lot demolition, excavation and equipment movement across unpaved construction sites. The PSCAA requires dust control measures (emissions control) be applied to construction projects through Article 9, Section 9.15. Of these measures, those applicable to fugitive dust include (1) use control equipment, enclosures or wet suppression techniques, (2) paving or otherwise covering unpaved surfaces as soon as possible, (3) Treating construction sites with water or chemical stabilizers, reduce vehicle speeds and cleaning vehicle undercarriages before entering public roadways and (4) covering or wetting truck loads or providing freeboard in truck loads. In light of these requirements, impacts related to construction dust are concluded to be less than significant.

Criteria air pollutants would be emitted during construction activities from demolition and construction equipment, much of it diesel-powered. Other emissions during construction would result from trucks used to haul construction materials to and from sites, and from vehicle emissions generated during worker travel to and from construction sites. Exhaust emission from diesel off-road equipment represent a relatively small percentage of the overall emission inventory in King County: 0.6 percent of county-wide CO, 8.8 percent of countywide NO_x, 6.7 percent of countywide $PM_{2.5}$ and 0.9 percent of county wide VOC (PSCAA 2008). Consequently the primary emissions of concern (greater than 1 percent contribution) with regard to construction equipment are NO_x and $PM_{2.5}$ (the latter a priority air toxic). NO_x is primarily an air quality concern with respect to its role in (regional) ozone formation and the Puget Sound air shed has long been designated as an attainment area (meeting standards) with respect to ozone. Construction-related NO_x emissions are not expected to generate significant adverse air quality impacts nor lead to violation of standards under any of the Comprehensive Plan alternatives. The same conclusion is reached for diesel-related emissions of $PM_{2.5}$, which could generate temporary localized adverse impacts within a few hundred feet of construction sites.

A number of federal regulations require cleaner off-road equipment. Specifically, the U.S. EPA has set emissions standards for new off-road equipment engines, classified as Tier 1 through Tier 4. Tier 1 emission standards were phased in between 1996 and 2000, and Tier 4 interim and final emission standards for all new engines are being phased in between 2008 and 2015. To meet the Tier 4 emission standards, engine manufacturers will be required to produce new engines with advanced emission-control technologies. Although the full benefits of these regulations will not be realized for several years, the U.S. EPA estimates that by implementing the federal Tier 4 standards, NO_x and PM emissions will be reduced by more than 90 percent (U.S. EPA 2004). Consequently, it is anticipated that as the region-wide construction fleet converts to newer equipment the potential for health risks from off-road diesel equipment will be substantially reduced. So, given the transient nature of construction-related emissions and regulatory improvements scheduled to be phased in, construction related emissions associated with all four alternatives of the Comprehensive Plan would be considered only a minor adverse air quality impact.

Land Use Compatibility and Public Health Considerations

Future growth and development patterns conceivably might be influenced by Comprehensive Plan growth strategies in ways that would affect future residences' (or other "sensitive receptors") relationships to mobile and stationary sources of air toxics and particulate matter $PM_{2.5}$. The degree of potential for adverse impacts on new sensitive receptors would depend on proximity to sources, the emissions from these sources and the density of future sensitive development.

As discussed in Section 3.2.1 and shown on Figure 3.2–2, portions of Seattle located along major roadways (freeways and the most-traveled highways) are exposed to relatively high cancer risk values. Modeling indicates increased cancer risks in existing residential areas of up to 800 in one million.[2] Risks above 100 per one million persons (100 excess cancer risk) is a criterion identified by U.S. EPA guidance for conducting air toxic analyses and making risk management decisions at the facility and community-scale level. Residential parcels are located near such highway traffic corridors in south Seattle (although often at higher elevations on Beacon Hill than Interstate 5 and in some areas buffered by greenbelts), and thus at least some such parcels are located in areas of higher exposure and risk. Risks and hazards drop

2 These risks should not be interpreted as estimates of disease in the community, only as a tool to define potential risk.

dramatically in places farther than 200 meters (656 feet) from the center of highways. A similar phenomenon occurs in proximity to rail lines that support diesel locomotive operations. Given this, it would be prudent to consider risk-reducing mitigation strategies such as setbacks for residential and other sensitive land uses from major traffic corridors and rail lines and/or to identify measures for sensitive land uses proposed to be in areas near such sources.

As indicated in Figure 3.2–3, portions of Seattle are also exposed to relatively high cancer risk values from stationary sources. Risks could be similarly high near port operations where ship emissions and diesel locomotive emissions and diesel forklift emissions can all occur. Similarly distribution centers that involve relatively high volume of diesel truck traffic can also represent a risk hazard to nearby sensitive land uses. This would also warrant a comprehensive plan to consider setbacks for residential and other sensitive land uses from industrial sources and/or to identify measures for receptors proposed in areas proximate to such sources to reduce the potential risk. This is considered a moderately adverse impact to air quality.

Figure 3.2–5 shows a 200 meter buffer around major freeways, rail lines and major port terminals. This shows that several urban centers, hub urban villages and residential urban villages are already within 200 meters of these pollution sources. Under any alternative, increased residential densities could be expected within this buffer. Variations in potential density increases in these areas under each alternative are discussed further below.

The following urban centers, hub urban villages and residential urban villages are within the 200 meter buffers:

Urban Centers
- Downtown
- First/Capitol Hill
- University District
- Northgate
- South Lake Union
- Uptown

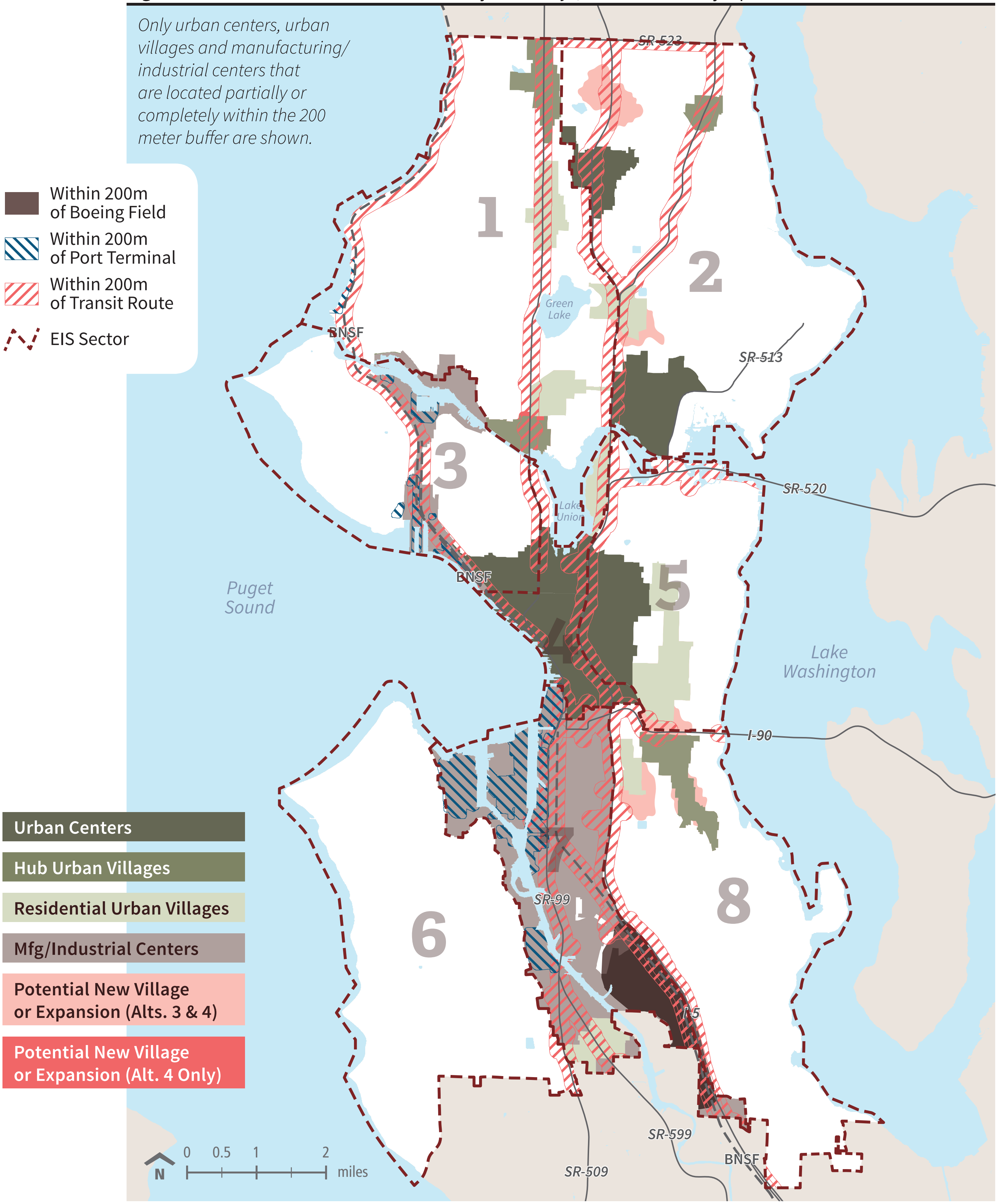
Hub Urban Villages
- Bitter Lake
- Fremont
- Lake City
- Mount Baker

Residential Urban Villages
- 23rd & Union-Jackson
- Aurora-Licton Springs
- Eastlake
- Green lake
- North Beacon Hill
- Roosevelt
- South Park
- Wallingford

This potential increased exposure to cancer risk is considered a potential moderate adverse impact related to air quality.

Given this, it would be prudent to consider risk-reducing mitigation strategies such as setbacks for residential and other sensitive land uses from major traffic corridors, rail lines, port terminals and similar point sources of particulates from diesel fuel and/or to identify measures for sensitive populations proposed to be in areas near such sources.

Figure 3.2–5 200 meter buffer around major freeways, rail lines and major port terminals



GREENHOUSE GAS EMISSIONS

The scale of global climate change is so large that one action's impacts can only be considered on a "cumulative" scale. It is not anticipated that a single development project or programmatic action, even on the citywide scale of the development alternatives in this Draft EIS, would have an individually discernible impact on global climate change. It is more appropriate to conclude that GHG emissions from future development in Seattle would combine with emissions across the state, country and planet to cumulatively contribute to global climate change.

Construction-related Greenhouse Gas Emissions

GHGs would be emitted during construction activities from demolition and construction equipment, much of it diesel-powered. Other emissions during construction would result from trucks used to haul construction materials to and from sites, and from vehicle emissions generated during worker travel to and from construction sites. Industrial equipment operations, which include the operation of construction equipment, represent approximately 3.3 percent of the emissions estimated in the 2012 GHG emissions inventory (City of Seattle 2014a).

Construction-related GHG emissions from any given development project that may occur in the next 20 years would be temporary and would not represent an on-going burden to the City's inventory. However, cumulatively it can be assumed that varying levels of construction activities within the city would be ongoing under any of the Plan alternatives and hence, cumulative construction related emissions would be more than a negligible contributor to GHG emissions within the city. An estimate of the GHG emissions resulting from 20 years of construction envisioned under the Comprehensive Plan alternatives was calculated using the City of Seattle's SEPA GHG Emissions Worksheet. The estimated total construction-related emissions of 22 million metric tons of CO_2E over 20 years also include "embodied "or "life cycle" emissions related to construction such as those generated by the extraction, processing and transportation of construction materials.

The City's Climate Action Plan recognizes the relevance of construction related GHG emissions and has included actions to be implemented by 2030 to address them. These include:

- Support new and expanded programs to reduce construction and demolition waste, such as creating grading standards for salvaged structural lumber so that it can be more readily reused;
- Expand source reduction efforts to City construction projects, and incorporate end-of-life management considerations into City procurement guidelines; and
- Phase-in bans on the following construction and demolition waste from job sites and private transfer stations: recyclable metal, cardboard, plastic film, carpet, clean gypsum, clean wood and asphalt shingles.

Additionally, the West Coast Collaborative, a public-private partnership including EPA, equipment manufacturers, fleet owners, state and local governments and non-profit organizations leverages federal funds to reduce emissions from the highest polluting engines. With Ecology and privately owned construction companies, the Collaborative recently installed diesel oxidation catalysts on construction equipment and trucks. The project will reduce emissions of carbon by 121.4 tons annually (City of Seattle 2013b).

Consequently, although construction related emissions would not be negligible, because of the combination of regulatory improvements and Climate Plan Actions under way, construction related GHG emissions associated with all four alternatives of the Comprehensive Plan would be considered a minor adverse air quality impact.

Transportation-related Greenhouse Gas Emissions

The approach to estimating future year transportation-related GHG emissions considers two factors:

- The projected change in vehicle miles traveled (VMT)
- The projected change in fuel economy of the vehicle fleet

VMT in 2035. Travel demand models include findings about projected vehicle-miles traveled in future years for various classes of vehicles (e.g. cars, trucks, buses). The model generally assumes continuation of current economic and demographic trends, with minor shifts toward shorter trips and more trips made by modes other than automobile travel. This will reduce VMT per capita, but total VMT in the region would continue to rise modestly due to population and employment growth.

If emissions were projected based solely on the increase in VMT, with no changes assumed to fuel economy, emissions under each of the 2035 alternatives would increase by approximately 15 percent compared to 2015. However, the trend toward more stringent federal standards means it is reasonable to assume improved fuel economy by 2035.

Fuel Economy in 2035. Federal programs are mandating improved fuel economy and reduced GHG emissions for passenger cars and light trucks in 2017–2025. According to those standards, fuel economy for passenger cars and light trucks would improve from 33.8 miles per gallon (mpg) in 2015 to 54.5 mpg by 2025. This equates to a GHG emissions decrease of roughly 38 percent for new passenger cars and light trucks entering the vehicle fleet (U.S. EPA 2010, 4; 2012c, 4). Similarly, the EPA and NHTSA issued an initial set of fuel efficiency standards for medium and heavy trucks for model years 2014 to 2018 and plan to issue updated regulations for model years beyond 2018. Based on the initial regulations, GHG emissions are expected to decrease between 9 and 23 percent compared to 2010 models (U.S. EPA 2011, 5).

Although these regulations will result in improved fuel economy for new vehicles, older vehicles would still make up some portion of the 2035 fleet. To account for this, the analysis used the California Air Resource Board's EMFAC 2011 tool which includes GHG emissions forecasts adjusted for future vehicle fleet composition. The resulting estimate is that GHG emissions of the 2035 vehicle fleet would be 30 percent lower than the 2015 vehicle fleet for passenger cars and light trucks. For heavy trucks, 2035 GHG emissions are projected to be four percent lower than 2015 emissions. Note that these are conservative assumptions since no additional gains in new vehicle fuel economy are assumed beyond 2025.

Fuel economy for buses was also considered. King County Metro (KCM) and Sound Transit (ST) set their goals for GHG emission reductions in their respective Sustainability Plans. KCM's goal equates to a roughly 40 percent reduction in emissions between 2015 and 2030 (King County Metro 2014, 8). ST's goal equates to a roughly 30 percent reduction in emissions between 2015 and 2030 (Sound Transit 2014, 15).For this analysis, bus emissions were assumed to be reduced by 35 percent between 2015 and 2030. This is a conservatively low assumption given that the majority of the fleet is operated by KCM which has a higher reduction goal, and the horizon year is 2035 which is five years beyond the goal date set by each transit agency.

Results. All four 2035 alternatives generate roughly the same annual GHG emissions, as shown in Table 3.2–3. Alternative 1, the No Action Alternative, is expected to have the highest GHG emissions among the alternatives. Alternative 2, which includes the most concentrated growth pattern, is expected to have the lowest GHG emissions among the alternatives. However, the variation is within one half of one percent. All of the 2035 alternatives are expected to generate lower GHG emissions than in 2015. This is because the projected improvements in fuel economy outweigh the projected increase in VMT.

Table 3.2–3 Road transportation emissions (2035)

	GHG Emissions in $MTCO_2e$				
Type of Vehicle	**2015 Existing**	**2035 Alt. 1**	**2035 Alt. 2**	**2035 Alt. 3**	**2035 Alt. 4**
Cars and Light Trucks	1,603,000	1,233,000	1,224,000	1,229,000	1,233,000
Heavy Trucks	720,000	892,000	892,000	892,000	891,000
Buses	64,000	42,000	42,000	42,000	42,000
Vanpools	2,000	2,000	2,000	2,000	2,000
Total	**2,389,000**	**2,169,000**	**2,160,000**	**2,165,000**	**2,168,000**

Source: Fehr & Peers, 2014.

When evaluated in comparison to the No Action Alternative, emissions under alternatives 2, 3 and 4 would be lower and thus have no identified adverse impacts.

GHG emissions can also be considered from a regional perspective. While the variation between the alternatives' projected emissions within Seattle is minor, the same amount of growth in other jurisdictions in the area would result in very different results. To that end, VMT for auto trips with at least one endpoint outside Seattle was compared to VMT for trips with at least one endpoint in Seattle. The VMT per population/job is nearly 55 percent higher outside of Seattle (but within the four county—Snohomish, King, Kitsap, Pierce—region) than inside of Seattle. This indicates that placing the same amount of development outside Seattle would result in substantially higher emissions (since 2035 fuel economy would remain equivalent regardless of the jurisdiction).

Alternative 1: Continue Current Trends (No Action)

Under Alternative 1 future growth would continue based on current plans and development trends. No changes to current urban village boundaries are proposed. About 77 percent of new residential and employment growth would occur within urban villages and centers and 23 percent would occur outside of the villages. Compared to the other alternatives, Alternative 1 contemplates the largest proportion of growth outside the urban villages overall.

TRANSPORTATION-RELATED AIR QUALITY EMISSIONS

Vehicle miles traveled within the City of Seattle would increase as a result of population and employment growth under Alternative 1. Projected changes in VMT were extracted from the projected travel demand model for cars, light duty trucks, heavy trucks, buses and vanpools. The travel demand model generally assumes existing economic and demographic trends continue with minor changes due primarily to mode share shifts and shortened trips due to increased traffic congestion. These changes cause projected VMT per capita to decline slightly by 2035. However, total VMT would continue to rise modestly due to population and employment growth.

All of the 2035 alternatives are expected to generate lower air pollutant emissions than in 2015, resulting in a net decrease in transportation-related air pollutant emissions. This is because the projected improvement in fuel economy outweighs the projected increase in VMT. Transportation-related air pollutant emissions under existing conditions and each of the four alternatives are presented in Figure 3.2–6 and Appendix A.1. Note that these emissions are City-wide assuming development under each alternative and do not reflect a development-specific increment attributable to each Comprehensive Plan alternative.

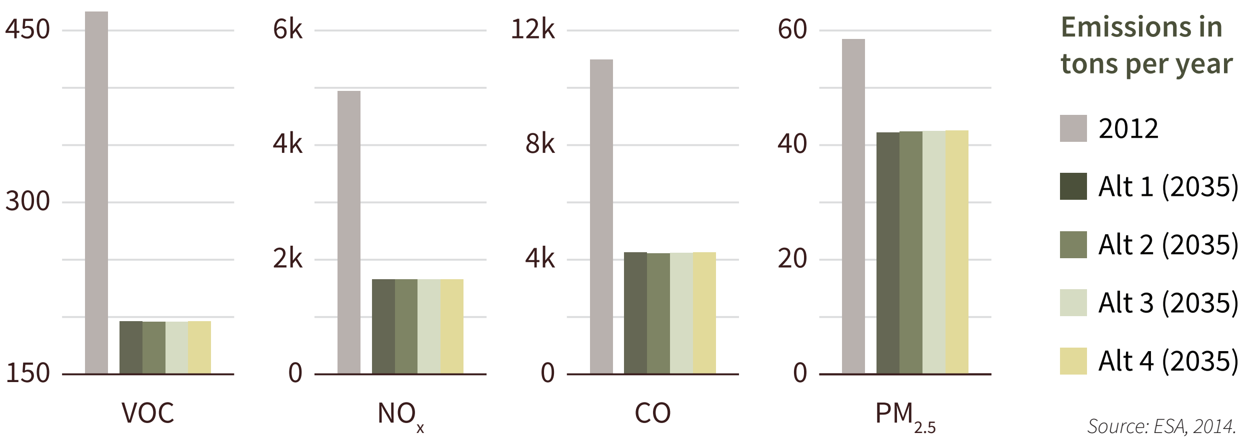
In addition to the tailpipe emissions presented in Figure 3.2–6, vehicle travel would also generate $PM_{2.5}$ through tire and brake wear and, more significantly, from entrained road dust. These non-tailpipe emissions would not benefit from future improvements to the vehicle fleet as a whole or from improvements to fuel composition.

As can be seen from Figure 3.2–6, regional pollutant emissions under Alternative 1 would be substantially lower than under existing background conditions. This is because the projected improvement in fuel economy, emission controls and fuel composition will outweigh the projected increase in VMT. This would represent a beneficial future air quality outcome. As indicated in Figure 3.2–6, Alternative 1 would have the lowest degree of air quality improvements of the four alternatives.

LAND USE COMPATIBILITY AND PUBLIC HEALTH CONSIDERATIONS

As shown in Figure 3.2–5, 18 urban centers and villages are within 200 meters of a major highway, rail line or port terminal. Of these, the areas where the highest proportion of the urban center village would be affected are: Downtown, South Lake Union, Bitter Lake,

Figure 3.2–6 Road transportation pollutant emissions



Source: ESA, 2014.

Fremont, Lake City, Northgate, Aurora-Licton Springs, Eastlake, Green Lake, Roosevelt and South Park.

Collectively these urban centers and villages represent 36 percent of all projected residential growth in the city through 2035. Only a portion of each center or village is within the 200 meter buffer, so the potentially affected portion of the new residents would be smaller.

GREENHOUSE GAS EMISSIONS

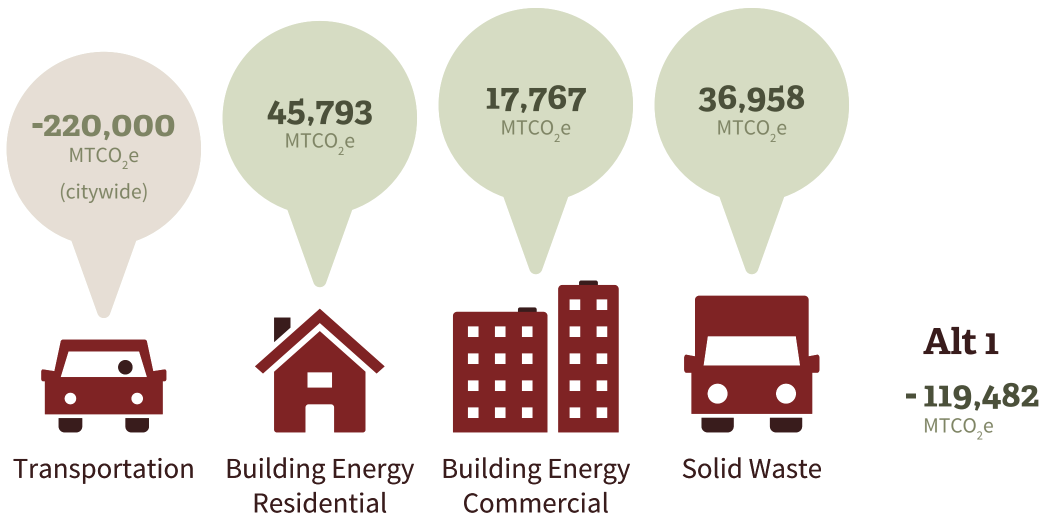
Changes in operational GHG emissions associated with development under Alternative 1 would result from increases in VMT and improvements to the vehicle fleet, increased electrical and natural gas usage and solid waste generation. GHG emissions from electrical usage are generated when energy consumed is generated by the non-renewable resources of an electrical supplier such as Seattle City Light. However, Seattle City Light is carbon neutral and, consistent with the City's Climate Action Plan, no emissions related to electricity are assumed because City Light will maintain its commitment to carbon neutrality. GHG emissions from natural gas are direct emissions resulting from on-site combustion for heating and other purposes. Solid waste-related emissions are generated when the increased waste generated by development is disposed in a landfill where it decomposes, producing methane gas.[3]

Energy Generated GHG

GHG emissions from energy demand are calculated using The CalEEMod land use model (version 2013.2.2). This model is recognized by the Washington State Department of Ecology as an estimation tool (Ecology 2011). These emissions are then adjusted to account for increased efficiency implemented through performance requirements fostered by the Climate Action Plan.

3 CH_4 from decomposition of municipal solid waste deposited in landfills is counted as an anthropogenic (human-produced) GHG (U.S. EPA,2006).

Figure 3.2–7 Operational GHG emissions of Alternative 1



Source: ESA, 2014; Fehr & Peers, 2014.

<u>Solid Waste Generated GHG</u>

Because the total increase in population and jobs would be the same under all four alternatives, increased waste generation and its associated GHG emissions would also be the same among all four alternatives. Increased emissions from solid waste generation were estimated using the most recent (2012) waste generation rate of the Seattle Climate Action Plan. These emissions were then adjusted to account for waste diversion implemented through waste reduction, recycling and composting fostered by the City's carbon-neutral goal target of 70 percent waste diversion by 2030.

<u>Total Emissions</u>

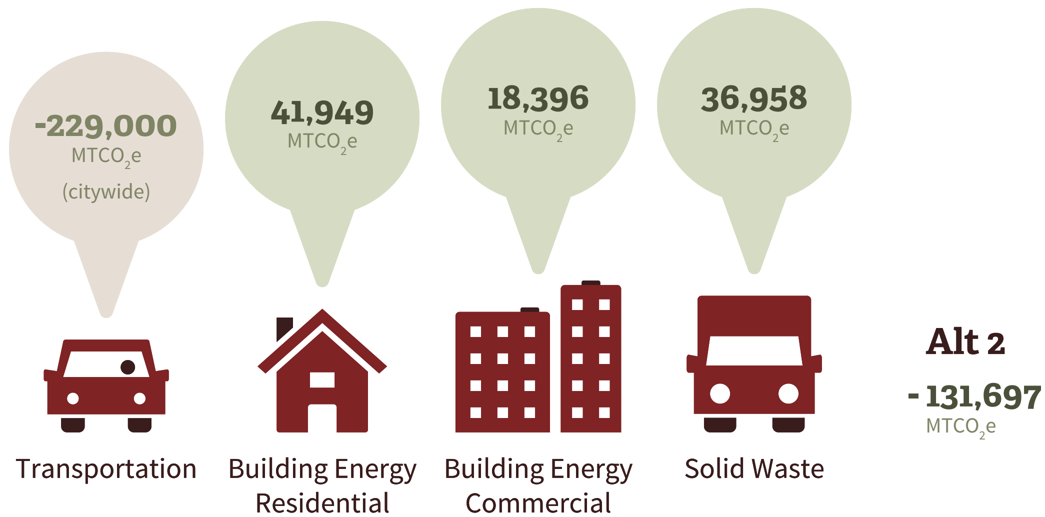
Operational GHG emissions from Alternative 1 are presented in Figure 3.2–7 and Appendix A.1. No significant adverse impacts are identified with respect to these GHG emissions. The emissions reductions from Alternative 1 would be the lowest of any of the four alternatives, largely as the result of greater predicted VMT than the other alternatives, which is a reflection of the greater number of residential development and jobs in the more peripheral urban villages in the city and in places outside urban villages.

Alternative 2: Guide Growth to Urban Centers

TRANSPORTATION AIR QUALITY EMISSIONS

Transportation-related air pollutant emissions under existing conditions and each of the four alternatives are presented in Figure 3.2–6 and Appendix A.1.

Figure 3.2–8 Operational GHG emissions of Alternative 2



Source: ESA, 2014; Fehr & Peers, 2014.

As can be seen from Figure 3.2–6, regional pollutant emissions under Alternative 2 would be substantially less than under existing background conditions. This is because the projected improvement in fuel economy, emission controls and fuel composition will outweigh the projected increase in VMT. This would result in a beneficial future air quality outcome. As indicated in Figure 3.2–6, Alternative 2 would have the highest degree of air quality improvements of the four alternatives.

LAND USE COMPATIBILITY AND PUBLIC HEALTH CONSIDERATIONS

This alternative would place the emphasis for growth in the urban centers, all of which have portions within 200 meters of a major highway, rail line or port terminal. As such a greater portion of projected growth in the city would be closer to these sources of pollution and thus at higher risk than under Alternative 1. Of the 18 urban centers and villages that are within 200 meters of a major highway, rail line or port terminal, the ones with the highest proportion of the urban center or village affected represent 52 percent of all projected residential growth in the city through 2035, as compared to 36 percent for Alternative 1. Only a portion of each center or village is within the 200 meter buffer, so the potentially affected portion of the new residents would be smaller.

GREENHOUSE GAS EMISSIONS

GHG emissions under development of Alternative 2 were calculated using the same methodologies as those described for Alternative 1, but reflect the land use differences of increased density of residential development in the urban core. Operational GHG emissions from Alternative 2 are presented in Figure 3.2–8 and Appendix A.1. No significant adverse impacts are identified with respect to these GHG emissions. The emissions reductions from Alternative 2 would be the greatest of any of the four alternatives, largely as the result of reduced VMT which is a reflection of the greater number of residential development and jobs in the more central urban centers and villages.

Alternative 3: Guide Growth to Urban Villages near Light Rail

TRANSPORTATION AIR QUALITY EMISSIONS

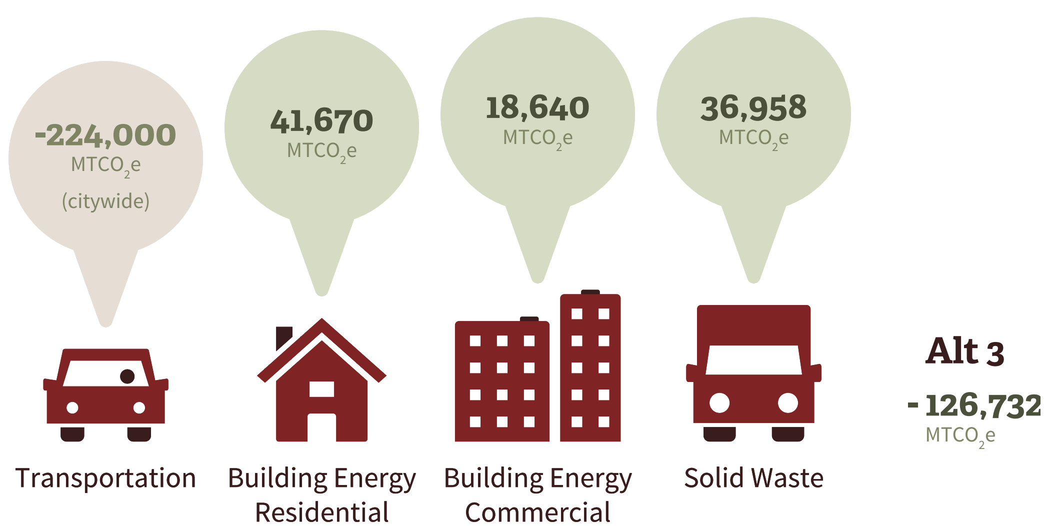
Transportation-related air pollutant emissions under existing conditions and each of the four alternatives are presented in Figure 3.2–6 and Appendix A.1.

As can be seen from Figure 3.2–6, regional pollutant emissions under Alternative 3 would be substantially less than under existing background conditions. This is because the projected improvement in fuel economy, emission controls and fuel composition will outweigh the projected increase in VMT. This would result in a beneficial future air quality outcome. As indicated in Figure 3.2–6, emissions reductions realized from implementation of from Alternative 3 would be less than those of Alternative 2 but greater than those of Alternative 1.

LAND USE COMPATIBILITY AND PUBLIC HEALTH CONSIDERATIONS

This alternative would place the emphasis for growth near the light rail stations, many of which have portions within 200 meters of a major highway, rail line or port terminal, particularly those in the northern portions of the city. It would also add a new urban village near I-5. As such, a greater portion of projected growth in the city would be closer to these sources of pollution and thus at higher risk than under Alternative 1. Of the 18 urban centers and villages that are within 200 meters of a major highway, rail line or port terminal, the ones with the highest proportion of the urban center or village affected represent 44 percent of all projected residential growth in the city through 2035, as compared to 36 percent for

Figure 3.2–9 Operational GHG emissions of Alternative 3



Source: ESA, 2014; Fehr & Peers, 2014.

Alternative 1. Only a portion of each center or village is within the 200 meter buffer, so the potentially affected portion of the new residents would be smaller.

GREENHOUSE GAS EMISSIONS

GHG emissions under development of Alternative 3 were calculated using the same methodologies as those described for Alternative 1, but reflect the land use differences of increased density of residential development in the urban core and places served by light rail. Operational GHG emissions from Alternative 3 are presented in Figure 3.2–9 and Appendix A.1. No significant adverse impacts are identified with respect to these GHG emissions. The emissions reductions realized from implementation of Alternative 3 would be less than those of Alternative 2 but greater than those of Alternative 1.

Alternative 4: Guide Growth to Urban Villages near Transit

TRANSPORTATION AIR QUALITY EMISSIONS

Transportation-related air pollutant emissions under existing conditions and each of the four alternatives are presented in Figure 3.2–6 and Appendix A.1.

As can be seen from Figure 3.2–6, regional pollutant emissions under Alternative 4 would be substantially less than under existing background conditions. This is because the projected improvement in fuel economy, emission controls and fuel composition will outweigh the projected increase in VMT. This would result in a beneficial future air quality outcome. As indicated in Figure 3.2–6, emissions reductions realized from implementation of Alternative 4 would be similar to those of Alternative 3.

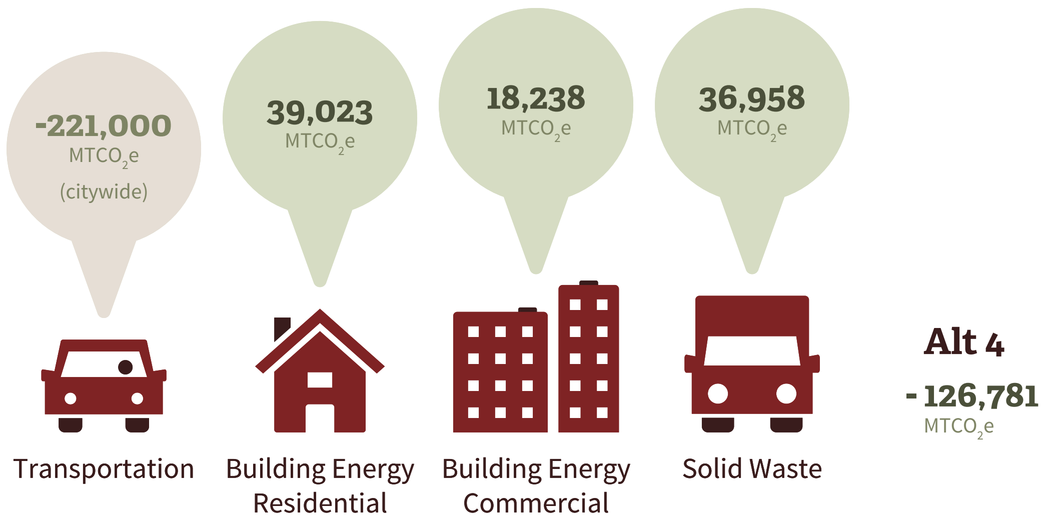
LAND USE COMPATIBILITY AND PUBLIC HEALTH CONSIDERATIONS

This alternative would place the emphasis for growth in near transit centers, including both frequent bus service and light rail stations, many of which have portions within 200 meters of a major highway, rail line or port terminal, particularly those in the northern portions of the city. Similar to Alternative 3, it would also add a new urban village near I-5, and a greater portion of projected growth in the city would be closer to these sources of pollution and thus at higher risk than under Alternative 1. Of the 18 urban centers and villages that are within 200 meters of a major highway, rail line or port terminal, the ones with the highest proportion of the urban center or village affected represent 44 percent of all projected residential growth in the city through 2035, as compared to 36 percent for Alternative 1. Only a portion of each center or village is within the 200 meter buffer, so the potentially affected portion of the new residents would be smaller.

GREENHOUSE GAS EMISSIONS

GHG emissions under development of Alternative 4 were calculated using the same methodologies as those described for Alternative 1, but reflect the land use differences of increased density of residential development in the urban core and selected places served

Figure 3.2–10 Operational GHG emissions of Alternative 4



Source: ESA, 2014; Fehr & Peers, 2014.

by light rail or bus service. Operational GHG emissions from Alternative 4 are presented in Figure 3.2–10 and Appendix A.1. No significant adverse impacts are identified with respect to these GHG emissions. The emissions reductions realized from implementation of from Alternative 4 would be similar to those of Alternative 3.

3.2.3 Mitigation Strategies

Land Use Compatibility with Sources of Air Pollution

Although mitigation strategies are not required due to a lack of significant adverse impact findings, to address the moderate adverse impact potential for exposure of residences and other sensitive land uses to air toxic in high risk areas identified by PSCAA throughout the Seattle area:

- The 2015–2035 Comprehensive Plan could include policy guidance that recommends that residences and other sensitive land uses (i.e., schools, day care) be separated from freeways, railways and port facilities by a buffer area of approximately 200 meters (656 feet), to reduce the potential exposure of sensitive populations to air toxics.
- If sensitive land uses are proposed in such areas, ventilation systems that are capable of filtering pollutant transportation generated particulates could be considered. Specifically, U.S. EPA identifies that mechanical ventilation/filtration systems with a Minimum Efficiency Reporting Value (MERV) of 9 through 12 are adequate for removing 25 to 80 percent of automobile emission particles (U.S. EPA 2009a).

Greenhouse Gas Emissions

Since no significant adverse impacts have been identified, no mitigation strategies are required.

3.2.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to air quality and greenhouse gas emissions are anticipated.

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3.3 Noise

This chapter assesses the potential noise/vibration impacts associated with implementing the alternatives considered in this EIS. The following includes acoustical terminology and background information relevant to the Proposal, a presentation of applicable regulatory standards, assessment of acoustical impacts related to implementing the alternatives considered in this EIS and identification of potentially feasible noise mitigation measures where appropriate.

This analysis evaluates noise conditions and potential impacts on a citywide cumulative basis and, where appropriate according to the EIS analysis sectors described in Chapter 2 and shown in Figure 2–17 and Figure 3.3–1.

3.3.1 Introduction

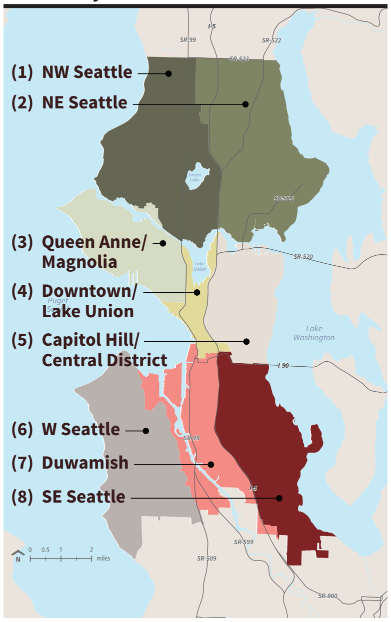
Environmental Noise and Vibration Fundamentals

NOISE EXPOSURE FUNDAMENTALS AND DESCRIPTORS

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound, which is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), a logarithmic loudness scale with 0 dB corresponding roughly to the threshold of human hearing and 120 dB to 140 dB corresponding to the threshold of pain. Because sound pressure can vary by over 1 trillion times within the range of human hearing, the logarithmic loudness scale is used to calculate and manage sound intensity numbers conveniently.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 hertz (Hz) and above 5,000 Hz in a manner corresponding

Figure 3.3–1
EIS analysis sectors



to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A weighting and is expressed in units of A-weighted decibels (dBA). Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements.

Given the variation of community noise level from instant to instant, community noise levels must be measured over an extended period of time to characterize a community noise environment and evaluate cumulative sound impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are as follows:

L_{eq} The equivalent sound level is used to describe noise over a specified period of time, typically 1 hour, in terms of a single numerical value. The L_{eq} is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

L_{max} The L_{max} is the instantaneous maximum noise level measured during the measurement period of interest.

L_{dn} The day-night average sound level (also written as DNL) is the energy average of the A-weighted sound levels occurring during a 24-hour period, accounting for the greater sensitivity of most people to nighttime noise by weighting ("penalizing") nighttime noise levels by adding 10 dBA to noise between 10:00 p.m. and 7:00 a.m.

Steady-state sound is sound for which average characteristics remain constant in time (e.g., sound of an air conditioner, fan or pump) and are typically described using the L_{eq} descriptor. Impulse sound is sound generated over a relatively short duration period (e.g., a car horn or back-up alarm). Impulsive sound is typically characterized using the L_{max} descriptor or a normalized Sound Exposure Level. The City's Noise Ordinance defines "Impulsive sound" as "sound having the following qualities: the peak of the sound level is less than one (1) second and short compared to the occurrence rate; the onset is abrupt; the decay rapid; and the peak value exceeds the ambient level by more than ten (10) dB(A)."

Effects of Noise on People

The effects of noise on people can be placed into three categories: (1) subjective effects of annoyance, nuisance and dissatisfaction; (2) interference with activities such as speech, sleep and learning; and (3) physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants generally experience noise in the third category. There is no completely accurate way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Because there is such wide variation in individual noise thresholds, an important way of predicting human reaction to a new or changed noise environment is the way the noise levels compare to the existing environment to which one has adapted, or the "ambient" noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be to the individual. With regard to increases in A-weighted noise levels, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by the human ear.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5-dBA is required before any noticeable change in human response would be expected.
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence, the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Health Effects of Environmental Noise

The World Health Organization (WHO) is a major source of current knowledge regarding the health effects of noise impacts. According to WHO, sleep disturbance can occur when continuous indoor noise levels exceed 30 dBA or when intermittent interior noise levels reach 45 dBA, particularly if background noise is low (1999). With a bedroom window slightly open (a reduction from outside to inside of 15 dB), the WHO criteria suggest that exterior continuous (ambient) nighttime noise levels should be 45 dBA or below, and short-term events should not generate noise in excess of 60 dBA. WHO also notes that maintaining noise levels within the recommended levels during the first part of the night is believed to be effective for the ability of people to initially fall asleep.

Other potential health effects of noise identified by WHO include decreased performance for complex cognitive tasks, such as reading, attention span, problem solving and memorization; physiological effects such as hypertension and heart disease (after many years of constant exposure, often by workers, to high noise levels); and hearing impairment (again, generally after long-term occupational exposure, although shorter-term exposure to very high noise levels, for example, exposure several times a year to concert noise at 100 dBA, can also damage hearing). Finally, noise can cause annoyance and can trigger emotional reactions like anger, depression and anxiety. WHO reports that, during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA or moderately annoyed with noise levels below 50 dBA.

Vehicle traffic and continuous sources of machinery and mechanical noise contribute to ambient noise levels. Short-term noise sources, such as truck backup beepers, the crashing of material being loaded or unloaded, car doors slamming and engines revving, contribute very little to 24-hour noise levels but are capable of causing sleep disturbance and severe annoyance. The importance of noise to receptors depends on both time and context. For example, long-term high noise levels from large traffic volumes can make conversation at a normal voice level difficult or impossible, while short-term peak noise levels, if they occur at night, can disturb sleep.

Vibration Fundamentals and Descriptors

As described in the Federal Transportation Administration (FTA) Transit Noise and Vibration Impact Assessment (FTA 2006a), groundborne vibration causes buildings to shake and generates audible rumbling sounds. Vibration levels can also result in interference or annoyance impacts at residences or other land uses where people sleep, such as hotels and hospitals. It is unusual for vibrations from sources such as buses and trucks on a normal roadway to be perceptible by individuals, even in locations close to major roads. However, there are some common sources of groundborne vibration, including trains; buses on rough roads; and construction activities such as blasting, pile driving and operating heavy earth-moving equipment.

The types of construction activities that could be associated with propagation of groundborne vibration typically include pile driving, blasting, use of hoe rams for demolishing large concrete structures and drilling.

There are no adopted state or local policies or standards for groundborne vibration with regard to human annoyance; however, the Federal Transit Administration has established some standards for acceptable levels of vibration associated with impact equipment as experienced by sensitive receptors. Those criteria are established in terms of vibration velocity level (VdB). For frequent events, the criterion is 72 VdB, while for infrequent events the criterion is 80 VdB. Construction-related activity, which is temporary in nature and would typically be restricted to daytime when most people are not sleeping, is generally assessed by applying the 80 VdB criterion, unless such activity were to occur during nighttime when most people would be sleeping.

Effects of Vibration on Structures and People

The effects of groundborne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of effects from blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings.

Vibration intensity is generally expressed as peak particle velocity (the maximum speed that the ground moves while it temporarily shakes, referred to as PPV). Since ground-shaking speeds are very small, PPV is measured in inches per second.

The Federal Transit Administration has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to groundborne vibration PPV levels of 0.5 inch per second without experiencing structural damage (FTA 2006a).

Regulatory Setting and Impact Assessment Criteria

WASHINGTON STATE NOISE CONTROL ACT OF 1974

The State of Washington recognized the harm that excessive noise can have on public health, safety and well-being and authorized the establishment of rules to abate and control noise pollution (Revised Code of Washington 70.107). The regulations on Maximum Environmental Noise Levels (Washington Administrative Code (WAC) 173-60) apply to a variety of activities and facilities including general construction activities, park-and-rides and maintenance facilities and exempts electrical substations, mobile noise sources and vehicles traveling in public right of- way, as well as safety warning devices (i.e., bells). The state provisions have been adopted by most cities around the state, including the City of Seattle (SMC 25.08).

SEATTLE MUNICIPAL CODE 25.08 NOISE CONTROL

Operational Noise Standards

Chapter 25.08 of the SMC establishes exterior sound level limits for specified land use zones or "districts," which vary depending on the district generating the sound and the district affected by the sound (see Table 3.3–1).

Table 3.3–1 Exterior sound level limits (Seattle Municipal Code 25.08.410)

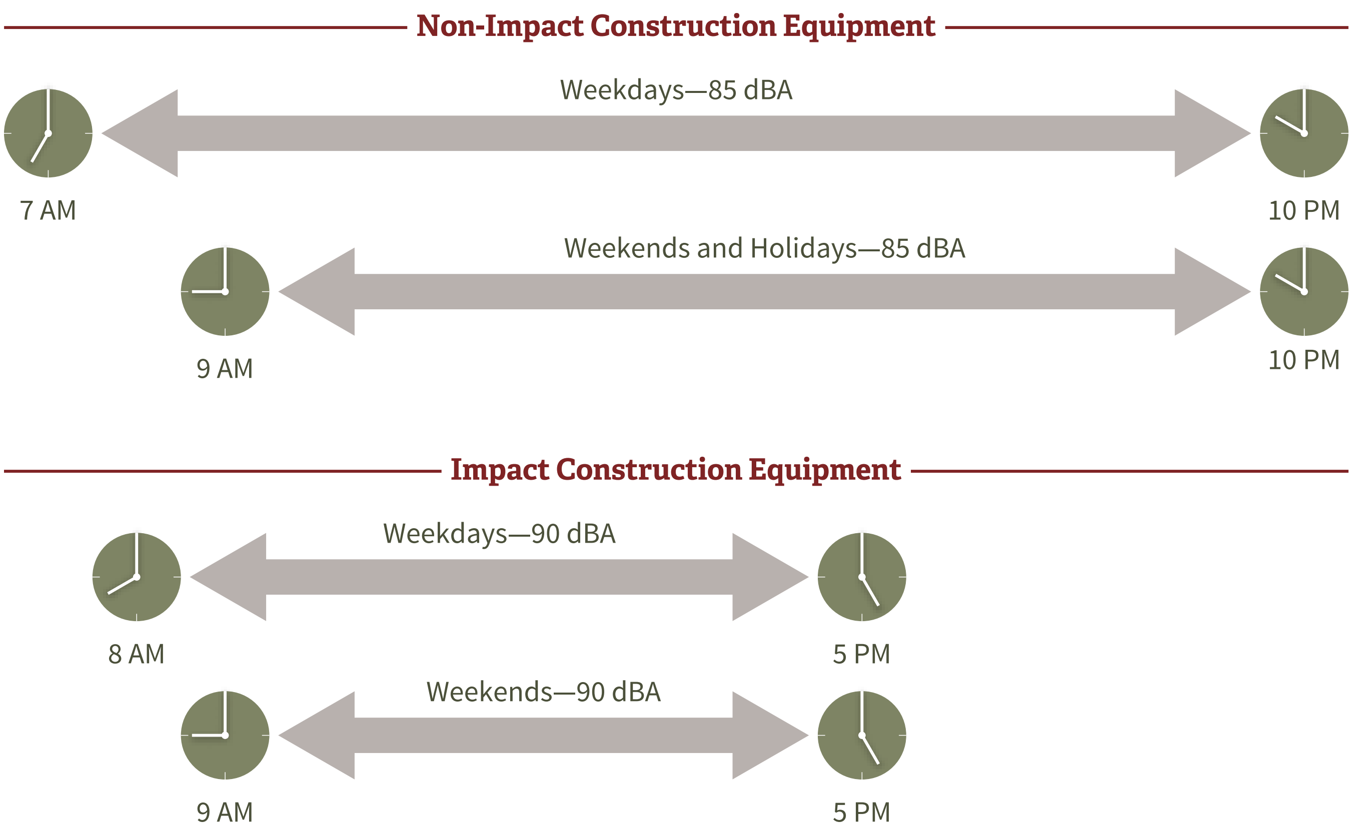
	Sound Receiving District		
Sound Generating District	**Residential (dBA L_{eq})**	**Commercial (dBA L_{eq})**	**Industrial (dBA L_{eq})**
Residential	55	57	60
Commercial	57	60	65
Industrial	60	65	70

Source: Fehr & Peers, 2014.

Construction Noise Standards

The City's Noise Ordinance allows the exterior sound level limits to be exceeded by certain types of construction equipment operating in commercial districts between 7 a.m. and 10 p.m. on weekdays and between 9 a.m. and 10 p.m. on weekends and legal holidays, provided

Figure 3.3–2 Construction noise time limits for public projects in commercial zones under the City of Seattle Noise Ordinance*



* As measures from the property line or at a distance of 50 feet from the equipment, whichever is greater.

that the equipment is being used for a public project (SMC 25.08.425; see Figure 3.3–2). The types of equipment that would usually exceed the exterior sound level limit of 60 dBA are loaders, excavators and cranes. This equipment may exceed the applicable standard by up to 25 dBA (an 85 dBA standard) when measured at a reference distance of 50 feet. Use of impact equipment, such as a concrete breaker, is restricted to 8 a.m. to 5 p.m. on weekdays and 9 a.m. to 5 p.m. on weekends and holidays and limited to a continuous noise level of 90 dBA and a maximum noise level of 99 dBA L_{max} when measured at a reference distance of 50 feet.

Noise and Vibration Sources in Seattle

For this analysis, the existing noise environment in the City of Seattle is divided into two primary categories of noise sources: transportation and non-transportation. Transportation sources include surface vehicle traffic; railroad train operations, including light rail and commuter trains; and aircraft operations. Non-transportation, or stationary/fixed sources include commercial/industrial equipment, construction equipment and any other sources not associated with the transportation of people or goods. Existing noise exposure in Seattle associated with these primary noise sources is presented below.

TRAFFIC NOISE SOURCES

Traffic noise exposure is primarily a function of the volume of vehicles per day, the speed of those vehicles, the number of those vehicles represented by medium and heavy trucks, the distribution of those vehicles during daytime and nighttime hours and the proximity of noise-sensitive receivers to the roadway. Existing traffic noise exposure is expected to be as low as 50 dB L_{dn} in the most isolated and less frequented locations of the City, while receivers adjacent to interstate highways are likely to experience levels as high as 75 dB L_{dn} (FTA 2006). Bus transit can also make a meaningful contribution to roadway noise levels. Traffic noise assessment in this analysis is inclusive of bus transit, as buses are an assumed percentage of overall roadway volumes used in the calculation of roadside noise levels. Table 3.3–2 presents the distance to various noise contours for freeways and State Routes in the Seattle area. The values in Table 3.3–2 do not take into consideration the presence of existing sound barriers, topographical conditions or roadway elevation, all of which can vary by location. The 65 L_{dn} contour is important because it represents the exterior noise level which can be reduced to 45 dBA L_{dn} using standard construction techniques. An interior noise level of 45 L_{dn} is the commonly accepted maximum recommended interior noise level for residential uses (HUD 2009, 14).

Table 3.3–2 Existing roadway noise levels

			Distance (feet) from Roadway Center to Noise Contours		
Roadway	**Roadway Segment**	**L_{dn} at 150’ from Roadway Center**	**65 dBA L_{dn}**	**70 dBA L_{dn}**	**75 dBA L_{dn}**
Interstate 5	At Albro (Sectors 7 & 8)	78.1	1,126	523	243
	At Union (Sector 4)	78.3	1,154	536	249
	At 45th Street (Sector 2)	77.5	1,016	471	219
	At 130th Street (Sector 2)	78.0	1,105	513	238
Interstate 90	At Lakeside Ave. (Sectors 5 & 8)	74.5	643	299	139
State Route 99	At 82nd Street (Sector 1)	69.6	304	141	66
	At 40th Street (Sector 3)	69.6	304	141	66
	At Cloverdale (Sector 7)	68.0	238	110	51
State Route 513	At 45th (Sector 2)	62.0	95	44	21
State Route 520	At SR 513 (Sector 5)	67.6	224	104	48
State Route 522	At 98th (Sector 2)	64.0	130	60	28
State Route 523	At 30th (Sector 2)	62.0	95	44	21

Traffic Information Source: WSDOT, 2013 Annual Traffic Report.
Table Source: ESA, 2014. Calculation data and results provided in Appendix A.2.

RAIL NOISE SOURCES

Seattle is also affected by noise from freight and passenger rail operations. While these operations generate significant noise levels in the immediate vicinity of the railways, train operations are intermittent and area railways are widely dispersed. Commuter rail such as Sound Transit's light rail system operate with more frequency than standard gauge rail operations but electrification and lower speeds result in lower noise levels. The contribution of rail noise to the overall ambient noise environment in the Seattle area is relatively minor compared to other sources such as traffic. However, areas near train yards from assembling railcars into long trains and idling engines frequently experience high noise levels. Train operations may be a source of significant groundborne vibration near the tracks. Vibration sensitive receivers within 100 feet of rail operations may be adversely affected by vibration exposure during train events (FTA 2006).

AIRCRAFT NOISE SOURCES

Seattle is home to one public airport—King County International Airport, also known as Boeing Field which generates approximately 500 aircraft operations a day. In addition to the numerous daily aircraft operations originating and terminating at Boeing Field, aircraft originating from other airports such as Seattle-Tacoma International Airport (Sea-Tac) frequently fly over Seattle. All of these operations contribute to the overall ambient noise environment. In general, like rail noise, the proximity of the receiver to the airport and aircraft flight path determines the noise exposure. Other contributing factors include the type of aircraft operated, altitude of the aircraft and atmospheric conditions. Atmospheric conditions may contribute to the direction of aircraft operations (flow) and affect aircraft noise propagation. Figure 3.3–3 presents the noise contours for Boeing Field as of the most recent FAA Noise Study (King County 2005).

CONSTRUCTION NOISE SOURCES

Construction activities for new development and transportation improvements can create high noise levels of relatively short duration. Noise production from construction equipment varies greatly depending on factors such as operation being performed and equipment type, model, age and condition. Noise from heavy equipment diesel engine operations often dominates the noise environment in the vicinity of construction sites. Stationary sources such as generators, pumps and compressors may also produce a significant contribution. However, if present, operations from impact equipment (e.g., pile driving, pavement breaking) will generally produce the highest noise levels, and may also produce significant vibration in the vicinity. Maximum noise exposure from typical construction equipment operations is approximately 75–100 dB (L_{max} at 50 feet) with noise from heavy demolition and pile driving operations having the highest noise production. Please refer to Table 3.3–3 for typical construction noise levels.

Figure 3.3–3 Boeing Field noise contours

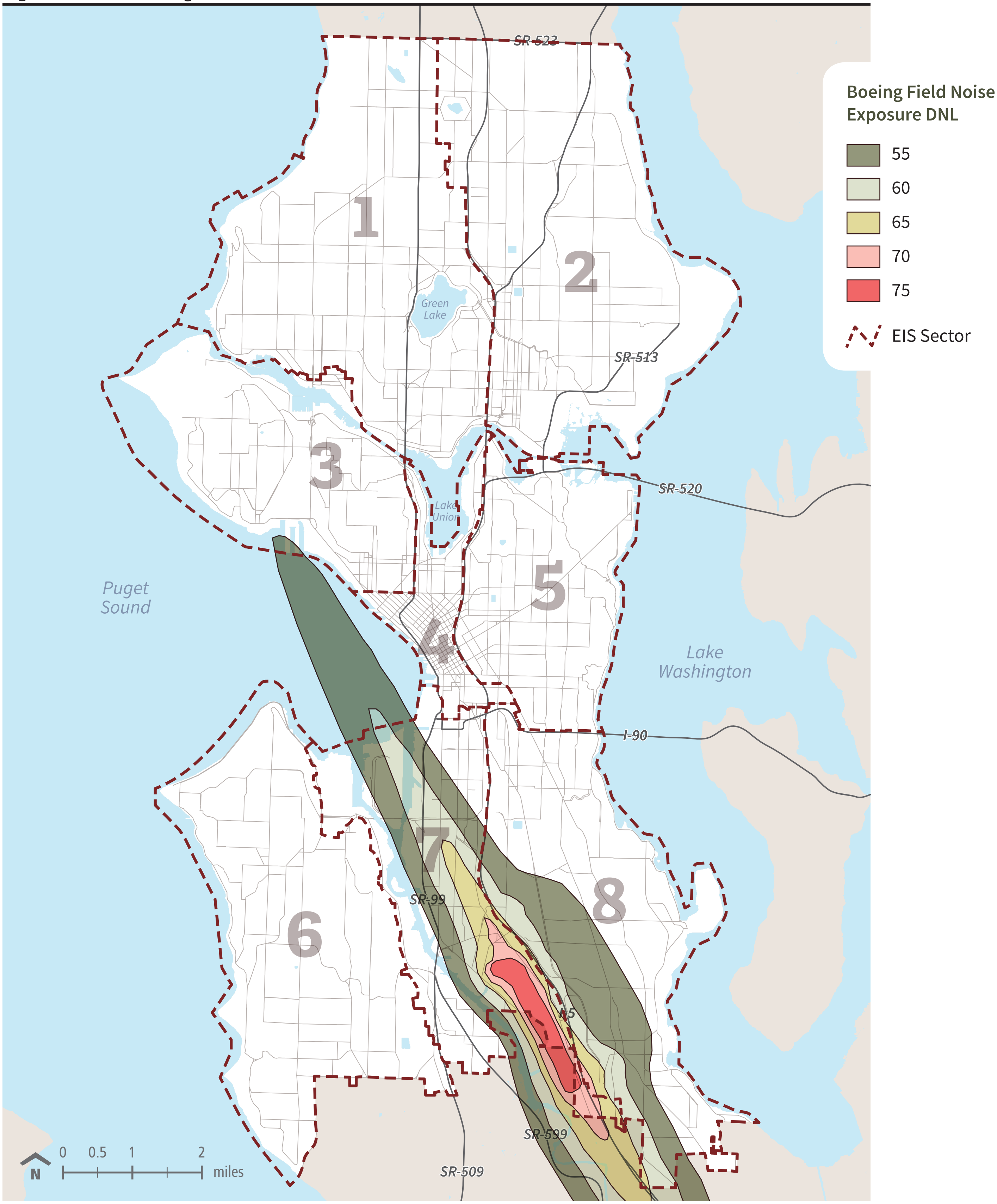


Table 3.3–3
Typical noise levels from demolition/construction equipment operations

Construction Equipment	Noise Exposure Level, dB L_{max} @ 50 Feet
Air Compressor	78-81
Backhoe	78-80
Compactor	82-83
Concrete Mixer (Truck)	79-85
Concrete Pump (Truck)	81-82
Concrete Vibrator	76-80
Crane	81-88
Dozer	82-85
Generator	81
Grader	85
Jack Hammer	88-89
Loader	79-85
Paver	77-89
Pile Driver (Impact)	101
Pneumatic Tool	85
Pump	76-81
Shovel	82
Heavy Diesel Truck	88

Source: FTA Guidance Manual (Chapter 12); FHWA RCNM V.1.00.

INDUSTRY AND OTHER NON-TRANSPORTATION NOISE SOURCES

A wide variety of industrial and other non-transportation noise sources are located in Seattle. These include manufacturing plants, landfills, treatment plants (e.g., water), food packaging plants and lumber mills, just to name a few. Noise generated by these sources varies widely, but in many cases may be a significant contributor to a local noise environment.

Noise levels in Seattle

A compilation of available noise data within the City of Seattle was collected from publicly available documents to provide an example of various noise environments throughout the City. These noise levels are presented in Table 3.3–4 and the location of the measurements is presented in Figure 3.3–4.

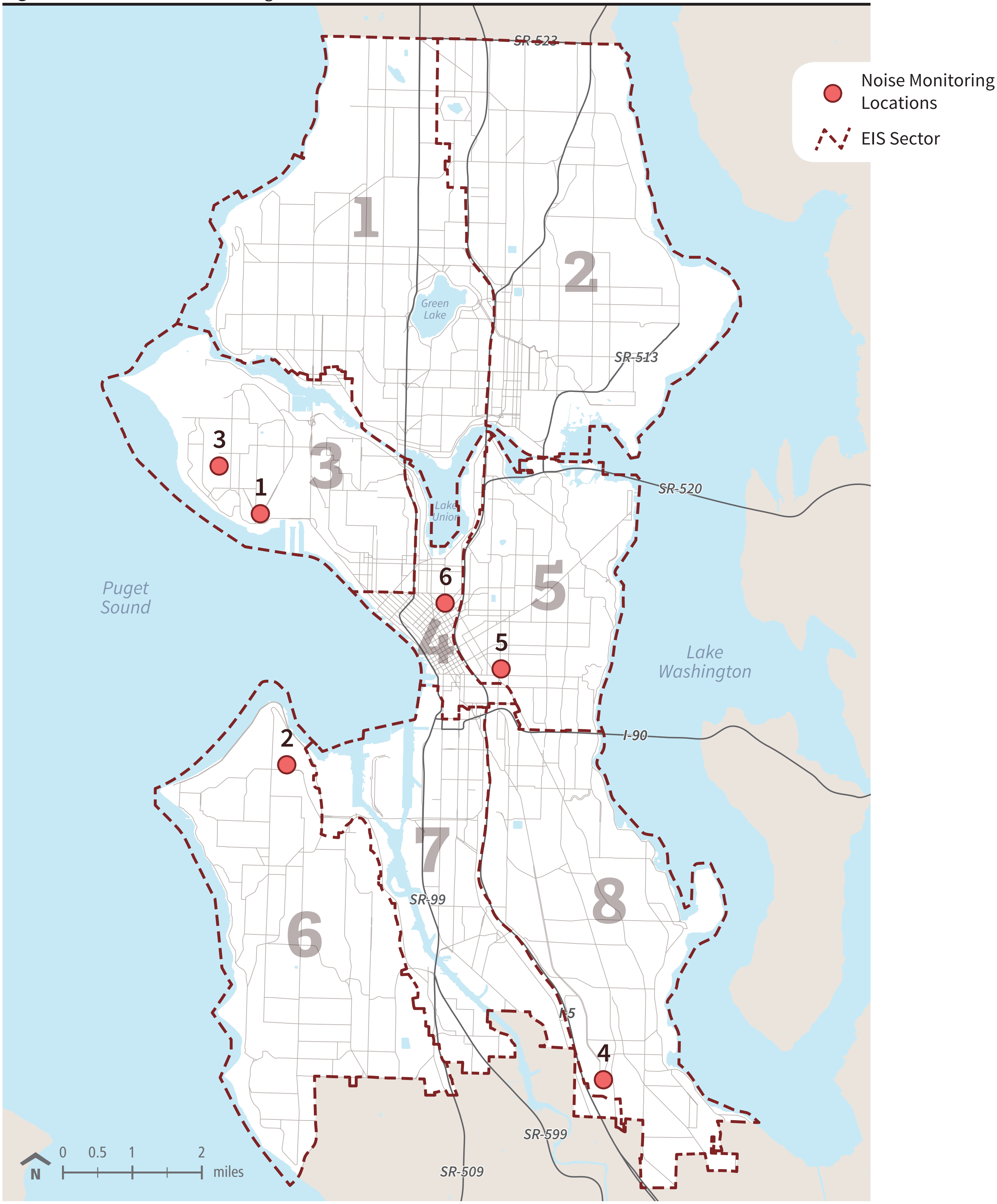
These data show that ambient noise levels in the urban center of the city (locations 5 and 6 in Figure 3.3-4) are substantially higher than other developed areas of the city. Larger traffic volumes on local roadways and transit bus operations are largely responsible for this phenomenon. Urban areas with low roadway volumes can regularly experience typical ambient noise levels below 50 dBA, L_{50}. Locations adjacent to freeways and highways can experience daytime ambient noise levels of 65–75 dBA, L_{50} (Caltrans 2009).

Table 3.3–4 Ambient noise level data in the Seattle area

	Noise Levels in dBA		
Roadway	Median L_{50}	L_{max}	DNL
Location 1: 1515 28th Ave, Magnolia neighborhood (Sector 3)	46	82	57
Location 2: 4117 SW Hill St, West Seattle (Sector 6)	47	79	56
Location 3: 37th Ave W and Smith St, Magnolia neighborhood (Sector 3)	46	91	58
Location 4: 3903 S. Burns St (Sector 8)	61	95	70
Location 5: Boren Ave and E Fir St (Sector 5)	69[1]	100	73
Location 6: Denny Way at Minor Ave (Sector 4)	67[2]	94	72

dBA = A-weighted decibels; DNL = day-night average sound level; L_{eq} = equivalent sound level; L_{max} = instantaneous
1 This value is a 24 hour average L_{eq} not L_{50}.
2 This value is a daytime L_{eq} not L50.

Figure 3.3–4 Noise monitoring locations



Sensitive Receptors

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses typically include residences, hospitals, schools, transient lodging, libraries and certain types of recreational uses. Noise-sensitive residential receivers are found throughout the study area.

3.3.2 Impacts

Impacts Common to All Alternatives

CONSTRUCTION NOISE AND VIBRATION IMPACTS

The proposed comprehensive plan alternatives envision future residential and job growth primarily within areas where transit infrastructure either exists or is planned. As such, implementation of the alternatives would result in a concentration of development within existing infill development areas. Resulting construction activities associated with development of new residences and commercial and retail land uses would have the potential to temporarily affect nearby sensitive receivers such as existing residences, schools and nursing homes.

From a regional perspective, temporary construction noise and vibration within these infill development areas would occur in urban or suburban areas where ambient noise and vibration levels are already affected by roadway traffic and other transportation sources and would therefore be less noticeable to receivers than if these activities were to occur on the edges of existing development areas.

Construction noise standards established in Section 25.08.425 of the Seattle Municipal Code limit construction activities to times when construction noise would have the least effect on adjacent land uses, and also restrict the noise generated by various pieces of construction equipment. Development under the alternatives would range from high intensity development of high-rise and mid-rise offices and residences in urban centers to low-rise development both within and outside of villages. Consequently, depending on the extent of construction activities involved and background ambient noise levels, localized construction-related noise effects could vary widely.

Construction activities with the greatest potential for adverse construction-related noise or vibration impacts are those for which pile driving or other similar invasive foundation work would be required. Generally speaking these types of construction activities are associated with high-rise development which all alternatives envision to occur within the urban center.

The Seattle noise ordinance restricts the use of impact equipment, such as pile drivers, to 8 a.m. to 5 p.m. on weekdays and 9 a.m. to 5 p.m. on weekends and holidays and limits their operation to a continuous noise level of 90 dBA and a maximum noise level of 99 dBA L_{max} when measured at a reference distance of 50 feet.

Because the potential exists for development within urban center areas to require pile driving adjacent (closer than 50 feet) to other buildings that may be occupied by residents or other sensitive receptors, construction noise impacts in excess of 90 dBA within these areas are identified as a potential moderate noise impact and mitigation is identified.

The City of Seattle has not adopted any quantitative standards with regard to vibration. Construction-related vibration impacts from pile driving are generally assessed in environmental review documents by applying the methodology of the FTA which includes standards for structural damage as well as for human annoyance.

Pile driving can result in peak particle velocities (PPV) of up to 1.5 inches per second (in/sec) at a distance of 25 feet (FTA 2006), but typically average about 0.644 PPV. The California Department of Transportation (Caltrans) measure of the threshold of architectural damage for conventional sensitive structures is 0.5 in/sec PPV for new residential structures and modern commercial buildings and 0.25 in/sec PPV for historic and older buildings. Therefore, the potential exists for pile driving to occur within 50 feet of a historic building, resulting in a potential significant vibration impact related to structural damage and mitigation measures are recommended.

Vibration levels can also result in interference or annoyance impacts for residences or other land uses where people sleep, such as hotels and hospitals. FTA vibration annoyance potential criteria depend on the frequency of the events. When vibration events occur more than 70 times per day, as would be the case with pile driving, they are considered “frequent events.” Frequent events in excess of 72 VdB are considered to result in a significant vibration impact. However the time restrictions of the City’s Ordinance are sufficient to avoid sleep interference impacts during times that most people sleep.

LAND USE COMPATIBILITY

As indicated in Table 3.3–2 and Table 3.3–4, exterior noise levels in Seattle close to freeways and highways can exceed 65 dBA L_{dn}. The 65 L_{dn} noise level is important because it represents the exterior noise level which can be reduced to 45 dBA L_{dn} using standard construction techniques. An interior noise level of 45 L_{dn} is the commonly accepted maximum interior noise level for residential uses (HUD 2009, 14). All four alternatives seek to locate residential uses near to transit to reduce vehicle miles traveled within the City. Consequently, if residences or other sensitive receptors are located too close to major roadway or noisy industrial operations additional insulation or window treatments may be warranted to reduce interior noise levels to generally acceptable levels. Conversely, if an active industrial operation is proposed adjacent to sensitive land uses noise compatibility problems could also arise. This potential for residents of future development to experience roadway noise of use-adjacency-related noise conditions would be a potential moderate noise impact and mitigation measures could be considered.

For all alternatives, roadside noise levels would increase by less than 0.5 dBA at all locations. As discussed above, outside of the laboratory, a 3-dBA change is considered a just-perceivable difference. Consequently, an increase of less than 0.5 dBA would be considered a minor impact on environmental noise. However, while the impacts of additional noise would not be discernible from background noise levels, all of the alternatives would worsen noise levels that in some areas are already above levels considered healthy for residential and other sensitive uses.

Alternative 1: Continue Current Trends (No Action)

TRANSPORTATION NOISE IMPACTS

Future development under Alternative 1 would result in increased vehicle traffic on roadways throughout the Seattle area. To quantify the degree of noise increases, traffic noise was modeled to assuming an annual growth rate of VMT of 0.4 percent, consistent with the transportation analysis. Resultant noise levels are presented in Table 3.3–5 and compared to existing conditions at the same roadside distance, 150 feet from the roadway center for major roadways throughout the city.

Alternative 2: Guide Growth to Urban Centers

TRANSPORTATION NOISE IMPACTS

Development under Alternative 2 would result in increased vehicle traffic on roadways throughout the Seattle area. To quantify the degree of noise increases, traffic noise was modeled to assuming an annual growth rate of VMT of 0.36 percent, consistent with the transportation analysis. Resultant noise levels are presented in Table 3.3–6 and compared to existing conditions at the same roadside distance, 150 feet from the roadway center for major roadways throughout the city.

Table 3.3–5 Modeled noise (L_{dn}) levels at 150 feet from the roadway center under Alternative 1 (2035)

Roadway	Roadway Segment	Existing	2035 with Alternative 1	dBA Difference Over Existing	Significant Increase?
Interstate 5	At Albro (Sectors 7 & 8)	78.1	78.5	0.4	No
	At Union (Sector 4)	78.3	78.6	0.3	No
	At 45th Street (Sector 2)	77.5	77.8	0.3	No
	At 130th Street (Sector 2)	78.0	78.4	0.4	No
Interstate 90	At Lakeside Ave. (Sectors 5 & 8)	74.5	74.8	0.3	No
State Route 99	At 82nd Street (Sector 1)	69.6	70.0	0.4	No
	At 40th Street (Sector 3)	69.6	70.0	0.4	No
	At Cloverdale (Sector 7)	68.0	68.3	0.3	No
State Route 513	At 45th (Sector 2)	62.0	62.4	0.4	No
State Route 520	At SR 513 (Sector 5)	67.6	68.0	0.4	No
State Route 522	At 98th (Sector 2)	64.0	64.4	0.4	No
State Route 523	At 30th (Sector 2)	62.0	62.4	0.4	No

Notes Road center to receptor distance is assumed to be 150 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be the posted speed for each roadway.

Source: ESA, 2014.

Table 3.3–6 Modeled noise (L_{dn}) levels at 150 feet from the roadway center under Alternative 2 (2035)

Roadway	Roadway Segment	Existing	2035 with Alternative 2	dBA Difference Over Existing	Significant Increase?
Interstate 5	At Albro (Sectors 7 & 8)	78.1	78.4	0.3	No
	At Union (Sector 4)	78.3	78.6	0.3	No
	At 45th Street (Sector 2)	77.5	77.8	0.3	No
	At 130th Street (Sector 2)	78.0	78.3	0.3	No
Interstate 90	At Lakeside Ave. (Sectors 5 & 8)	74.5	74.8	0.3	No
State Route 99	At 82nd Street (Sector 1)	69.6	69.9	0.3	No
	At 40th Street (Sector 3)	69.6	69.9	0.3	No
	At Cloverdale (Sector 7)	68.0	68.3	0.3	No
State Route 513	At 45th (Sector 2)	62.0	62.3	0.3	No
State Route 520	At SR 513 (Sector 5)	67.6	67.9	0.3	No
State Route 522	At 98th (Sector 2)	64.0	64.4	0.4	No
State Route 523	At 30th (Sector 2)	62.0	62.3	0.3	No

Notes Road center to receptor distance is assumed to be 150 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be the posted speed for each roadway.

Source: ESA, 2014.

Alternative 3: Guide Growth to Urban Villages near Light Rail

TRANSPORTATION NOISE IMPACTS

Development under Alternative 3 would result in increased vehicle traffic on roadways throughout the Seattle area. To quantify the degree of noise increases, traffic noise was modeled to assuming an annual growth rate of VMT of 0.38 percent, consistent with the transportation analysis. Resultant noise levels are presented in Table 3.3–7 and compared to existing conditions at the same roadside distance, 150 feet from the roadway center for major roadways throughout the city.

Alternative 4: Guide Growth to Urban Villages near Transit

TRANSPORTATION NOISE IMPACTS

Development under Alternative 4 would result in increased vehicle traffic on roadways throughout the Seattle area. To quantify the degree of noise increases, traffic noise was modeled to assuming an annual growth rate of VMT of 0.4 percent, consistent with the transportation analysis. Resultant noise levels are presented in Table 3.3–8 and compared to existing conditions at the same roadside distance, 150 feet from the roadway center for major roadways throughout the city.

3.3.3 Mitigation Strategies

Strategies to Reduce Construction-Related Noise and Vibration Impacts

Although mitigation strategies are not required due to a lack of significant adverse impact findings, to address the potential moderate adverse noise impact from impact pile driving adjacent (closer than 50 feet) to sensitive land uses or moderate adverse vibration impacts to historic structures, the 2015–2035 Comprehensive Plan could consider adoption of a policy that Seattle Noise Ordinance be updated to require best practices for noise control, including “quiet” pile-driving technology (such as pre-drilling of piles, use of sonic or vibratory drivers instead of impact pile drivers, where feasible); and cushion blocks to dampen impact noise from pile driving).

Measures to Reduce Land Use Compatibility Noise Impacts

Although mitigation strategies are not required due to a lack of significant adverse impact findings, to address the potential for exposure of residences and other sensitive land uses to incompatible environmental noise, the 2015–2035 Comprehensive Plan could consider adoption of a policy that recommends that residences and other sensitive land uses (i.e.,

Table 3.3–7 Modeled noise (L_{dn}) levels at 150 feet from the roadway center under Alternative 3 (2035)

Roadway	Roadway Segment	Existing	2035 with Alternative 3	dBA Difference Over Existing	Significant Increase?
Interstate 5	at Albro (Sectors 7 & 8)	78.1	78.5	0.4	No
	at Union (Sector 4)	78.3	78.6	0.3	No
	at 45th Street (Sector 2)	77.5	77.8	0.3	No
	at 130th Street (Sector 2)	78.0	78.3	0.3	No
Interstate 90	at Lakeside Ave. (Sectors 5 & 8)	74.5	74.8	0.3	No
State Route 99	at 82nd Street (Sector 1)	69.6	69.9	0.3	No
	at 40th Street (Sector 3)	69.6	69.9	0.3	No
	at Cloverdale (Sector 7)	68.0	68.3	0.3	No
State Route 513	at 45th (Sector 2)	62.0	62.4	0.4	No
State Route 520	at SR 513 (Sector 5)	67.6	67.9	0.3	No
State Route 522	at 98th (Sector 2)	64.0	64.4	0.4	No
State Route 523	at 30th (Sector 2)	62.0	62.4	0.4	No

Notes Road center to receptor distance is assumed to be 150 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be the posted speed for each roadway.

Source: ESA, 2014.

Table 3.3–8 Modeled noise (L_{dn}) levels at 150 feet from the roadway center under Alternative 4 (2035)

Roadway	Roadway Segment	Existing	2035 with Alternative 4	dBA Difference Over Existing	Significant Increase?
Interstate 5	at Albro (Sectors 7 & 8)	78.1	78.5	0.4	No
	at Union (Sector 4)	78.3	78.6	0.3	No
	at 45th Street (Sector 2)	77.5	77.8	0.3	No
	at 130th Street (Sector 2)	78.0	78.4	0.4	No
Interstate 90	at Lakeside Ave. (Sectors 5 & 8)	74.5	74.8	0.3	No
State Route 99	at 82nd Street (Sector 1)	69.6	70.0	0.4	No
	at 40th Street (Sector 3)	69.6	70.0	0.4	No
	at Cloverdale (Sector 7)	68.0	68.3	0.3	No
State Route 513	at 45th (Sector 2)	62.0	62.4	0.4	No
State Route 520	at SR 513 (Sector 5)	67.6	68.0	0.4	No
State Route 522	at 98th (Sector 2)	64.0	64.4	0.4	No
State Route 523	at 30th (Sector 2)	62.0	62.4	0.4	No

Notes Road center to receptor distance is assumed to be 150 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be the posted speed for each roadway.

Source: ESA, 2014.

schools, day care) be separated from freeways, railways and ports and other active industrial facilities where exterior noise environments exceed 65 dBA L_{dn}. If sensitive land uses are proposed in such areas, a policy addressing the need for additional mitigation strategies could be considered to achieve an interior noise performance standard of 45 dBA, L_{dn}. The types of strategies that could help to accomplish this include:

- Coordination with WSDOT on noise wall construction where major highways pass through residential areas.
- Use of appropriate building materials such as walls and floors with an STC rating of 50 or greater as necessary to achieve this performance standard.
- Site design measures, including use of window placement to minimize window exposure toward noise sources, avoid placing balcony areas in high noise areas, and use of buildings as noise barriers.
- Use of acoustically rated additional building materials (insulation and windows).

3.3.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to noise are anticipated.

3.4 Land Use: Patterns, Compatibility, Height, Bulk and Scale

This section focuses on physical land use patterns, height, bulk and scale of potential development patterns and implications for land use compatibility that may occur if the City adopts housing and employment growth strategies that follow the policy directions described under each alternative. For a review of land use policies, please see Section 3.5 on page 3.5–1, Relationship to Plans and Policies.

3.4.1 Affected Environment

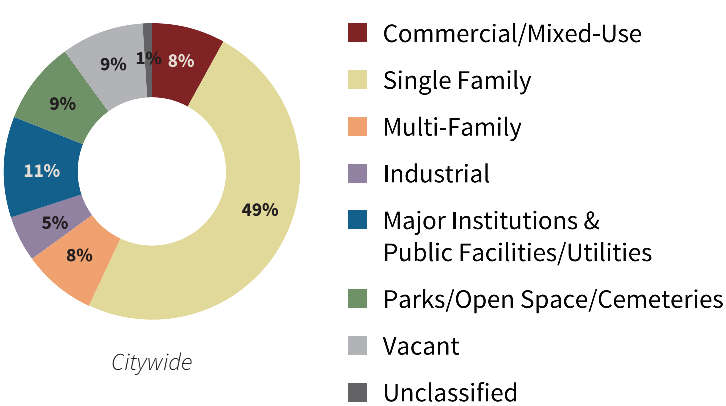
This section addresses land use patterns and development character and form in the City of Seattle. This review—on a citywide scale, as well as in the City's urban villages—provides a baseline for analyzing the impacts of land use and development of the four alternative growth scenarios.

Current Land Use

CITY OF SEATTLE

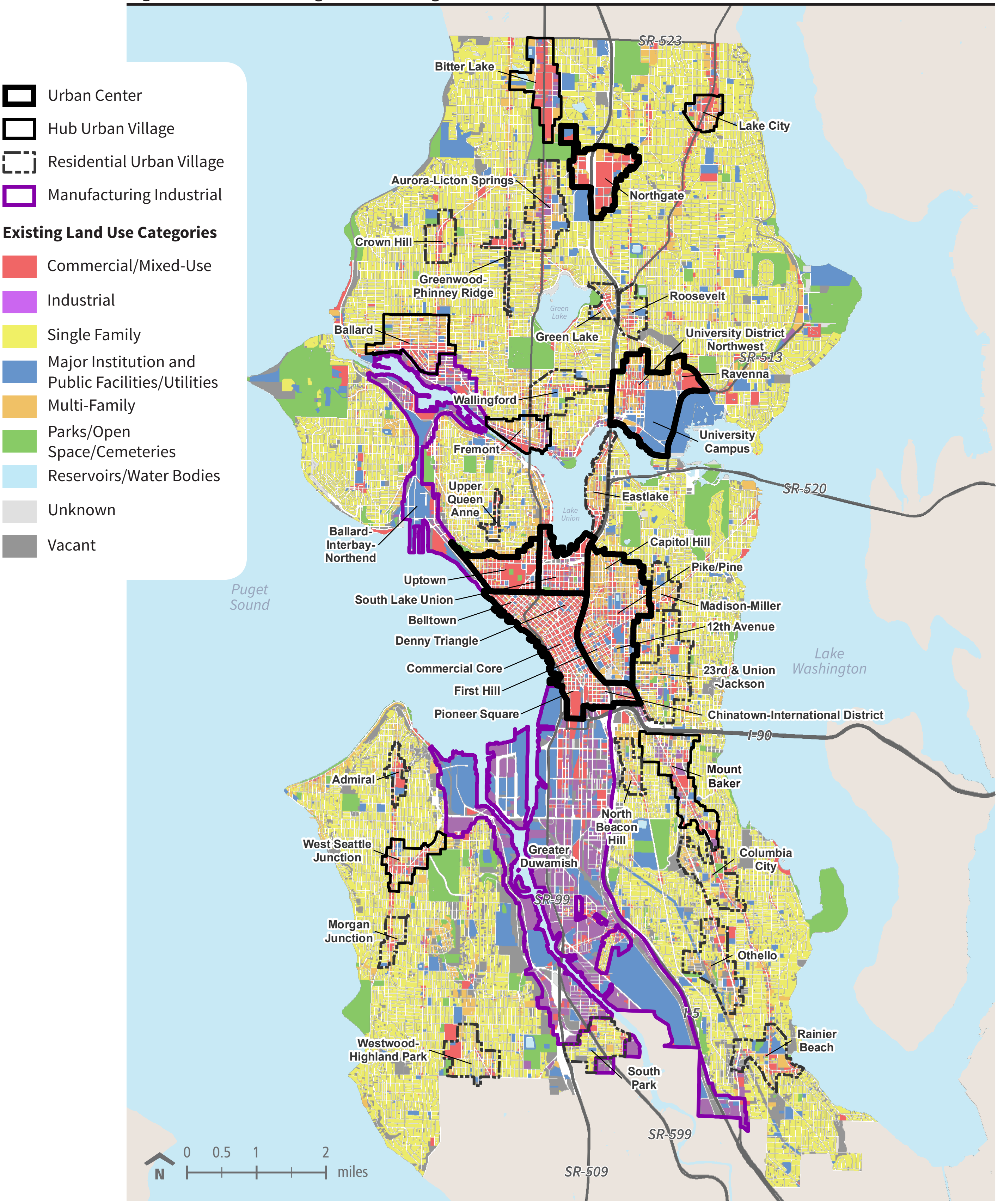
The City of Seattle encompasses approximately 83 square miles (53,182 acres). Excluding water bodies and public right-of-way, the city contains approximately 38,728 acres of buildable lands. The largest land use category is single family residential, which comprises about 49 percent of current land use in the city. Major institutions and public facilities and utilities account for about 11 percent of Seattle's land use. Vacant, parks and open space, commercial/mixed-use and multi-family land uses comprise 8 to 9 percent each of total land use in Seattle (see Figure 3.4–1).

Figure 3.4–1
Existing land use distribution—citywide



The highest concentrations of commercial and mixed-use development are in the four urban centers that constitute the area sometimes called the "center city" (Downtown, First/Capitol Hill, South Lake Union and Uptown). Other urban centers, urban villages and smaller nodes around the city also contain varying levels of commercial and mixed-use development.

Figure 3.4–2 Existing land use categories



Source: City of Seattle, 2014.

Single-family residential neighborhoods fill the intervening areas, along with parks, open space and major institutional uses. Industrial development is concentrated in the Greater Duwamish Manufacturing/Industrial Center (MIC) in south central Seattle and in the Ballard-Interbay-Northend MIC, located northwest of Downtown. Figure 3.4–2 shows existing land use distribution across the city.

URBAN CENTERS, VILLAGES AND MANUFACTURING/INDUSTRIAL CENTERS

The Urban Village Element of Seattle's Comprehensive Plan establishes a strategy for accommodating future growth in the city by creating areas of concentrated development that maximize efficient use of infrastructure and services. Urban centers and manufacturing/industrial centers (MICs) are regionally-designated dense centers that serve as economic engines for Seattle and surrounding communities. Urban villages are City-designated areas, most of which are smaller and less dense than urban centers, that provide a mix of residential and employment uses that serve more localized areas. Combined, these areas comprise the City's Urban Village Strategy. Each center/village type serves a particular purpose, and they are distinguished by differences in land use composition, spatial patterns and development types and character. Figure 3.4–3 illustrates the unique characteristics of each type of urban center and urban village, using typical neighborhoods of each type.

Urban centers and villages are described in more detail in the following sections.

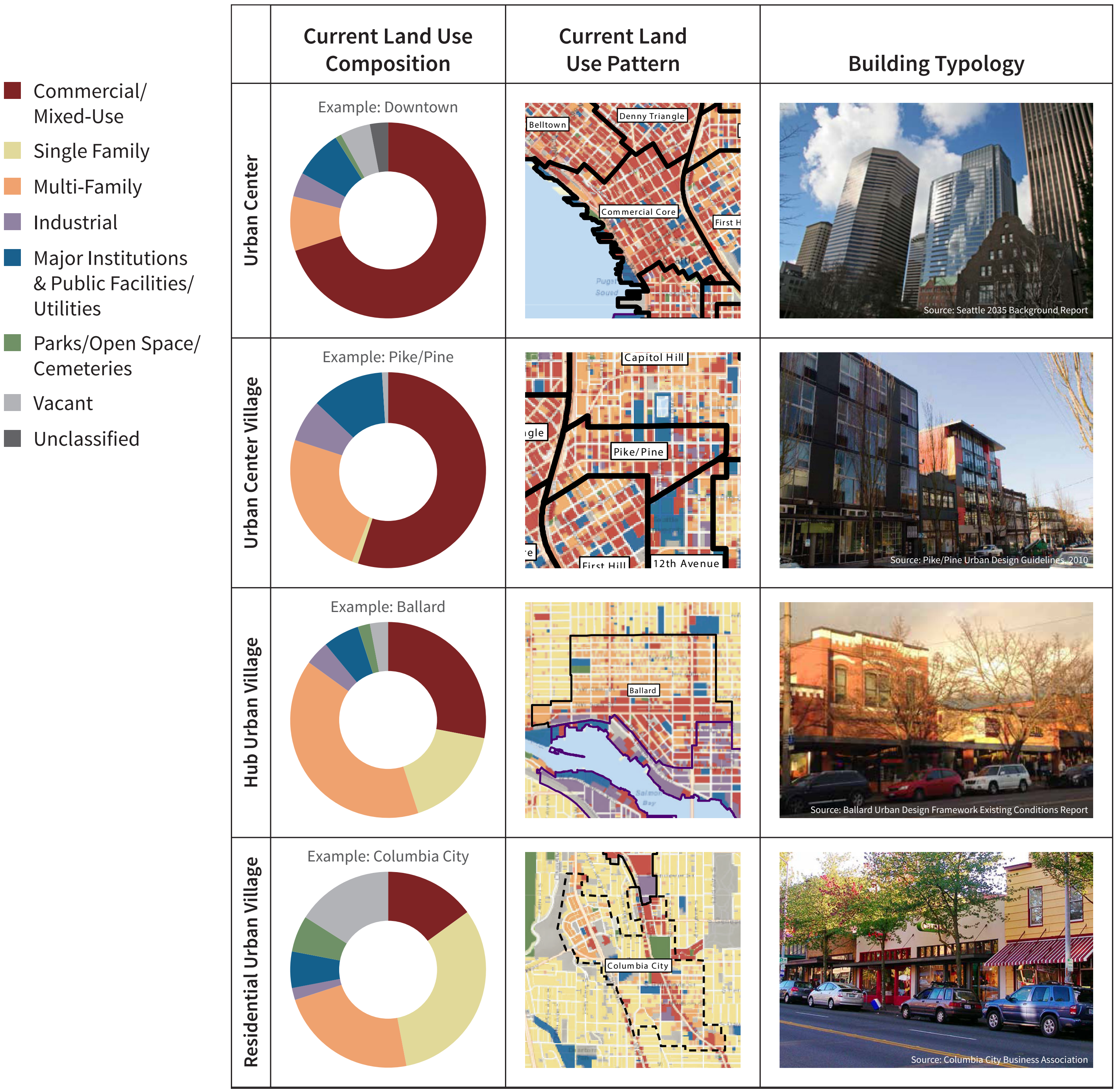
Urban Centers

Seattle contains six designated urban centers: Downtown, First/Capitol Hill, the University District, Northgate, South Lake Union and Uptown. Urban centers are characterized by their high percentage of commercial and mixed-use development, which accounts for over half of the land use in each urban center. The predominant residential typology in urban centers is multi-family, and single family residential usually makes up a very small percentage of the land use mix. Citywide, urban centers consist of 47 percent commercial/mixed-use, 21 percent multi-family residential, 19 percent major institution or public facility and 3 percent industrial land use. None of Seattle's urban centers are truly "average," however, as each is home to its own unique character and mix of uses. For example, both the Downtown and First/Capitol Hill urban centers share the density, development intensity and mixed-use character that typify urban centers, but Downtown is more heavily commercial. By contrast, the University District contains a mix of commercial, residential and industrial uses, but it is dominated by the presence of the University of Washington campus, and it contains the greatest proportion of public facility and institutional uses of all the city's urban centers.

Urban centers *are the densest neighborhoods in the city and are both regional centers and neighborhoods that provide a diverse mix of uses, housing, and employment opportunities. Larger urban centers are divided into urban center villages to recognize the distinct character of different neighborhoods within them.*

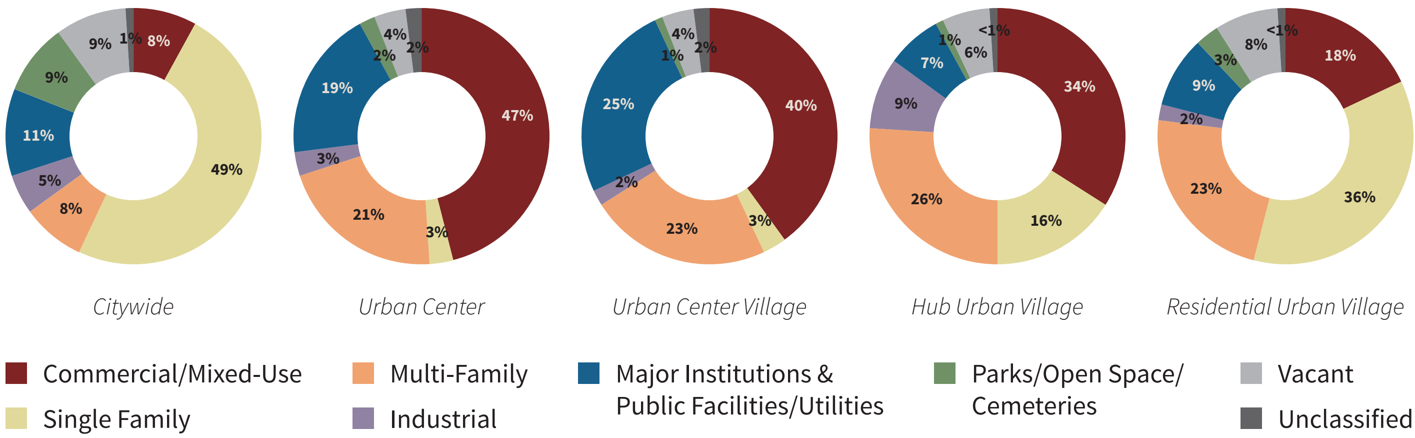
The Seattle Comprehensive Plan divides larger urban centers into urban center villages to recognize neighborhoods within urban centers with distinct characteristics. The Downtown Urban Center is divided into five villages, the First/Capitol Hill Urban Center is divided into four villages and the University District is divided into three villages. Urban center villages represent the variability present within the primarily commercial urban centers. For example, the Capitol Hill Urban Center Village is much more heavily residential than the Pike/Pine

Figure 3.4–3 Urban center and village development patterns



Urban Center Village immediately to the south, and both have fewer institutional uses than the First Hill or 12th Avenue urban center villages, through all are part of the larger First/Capitol Hill Urban Center. Urban center villages generally contain less commercial development and more residential uses than urban centers as a whole. On average, urban center villages contain 40 percent commercial/mixed-use, 23 percent multi-family residential, 25 percent major institution or public facility and 2 percent industrial land use. Figure 3.4–4 shows a

Figure 3.4–4 Existing land use distribution—urban centers and villages



comparison of the average land use composition of urban centers, urban center villages and urban villages.

<u>Urban Villages</u>

Seattle's six **hub urban villages** account for about 1,232 acres of land in Seattle (3.2 percent). They are Ballard, Bitter Lake, Fremont, Lake City, Mount Baker and West Seattle Junction

Hub urban villages *are communities that provide a balance of housing & employment, generally at densities lower than those found in urban centers. These areas provide a focus of goods, services & employment to communities that are not close to urban centers.*

The main land use types in hub urban villages are commercial/mixed-use, multi-family residential and single family residential. On average, about 34 percent of land in hub urban villages is in commercial and mixed land uses, 26 percent in multi-family residential land use and 16 percent in single family residential land use. Hub urban villages exhibit a range of variation among their land use patterns. Commercial/mixed-use land use varies from 25 percent of land use in Mount Baker to about 47 percent in Bitter Lake. Multi-family residential land use ranges from 41 percent of land use in Ballard to only 13 percent in Mount Baker. Single family residential use ranges from 27 percent in Mount Baker and West Seattle Junction to just 5 percent in Bitter Lake and Lake City.

Seattle's 18 **residential urban villages** account for 2,631 acres of land (6.8 percent) in Seattle. They include 23rd & Union-Jackson, Admiral, Aurora-Licton Springs, Columbia City, Crown Hill, Eastlake, Green Lake, Greenwood-Phinney Ridge, Madison-Miller, Morgan Junction, North Beacon Hill, Othello, Upper Queen Anne, Rainier Beach, Roosevelt, South Park, Wallingford and Westwood-Highland Park.

Residential urban villages *provide a focus of goods & services for residents & surrounding communities but may not provide a concentration of employment.*

On average, the main land use types in residential urban villages are single family residential (36 percent), multi-family residential (23 percent) and commercial/mixed-use (18 percent). Residential urban villages exhibit a range of variation among their land use patterns. For example, commercial/mixed-use accounts for just 7 percent of land use in South Park but accounts for approximately 63 percent of land use in Greenwood-Phinney Ridge. Single family residential makes up about 63 percent of land use in South Park, but just 4 percent of land use in Upper Queen Anne.

Manufacturing/Industrial Centers

Manufacturing/industrial Centers (MICs) are regionally-designated centers identified by the Puget Sound Regional Council (PSRC) as target areas for employment growth as the Puget Sound region continues to grow.

Seattle has two MICs, the Greater Duwamish MIC in south-central Seattle, and the Ballard-Interbay-Northend MIC northwest of Downtown. At over 5,000 acres in size, the Greater Duwamish MIC is the second largest MIC designated by PSRC and is one of the largest industrial and manufacturing areas anywhere in the Pacific Northwest. The Greater Duwamish MIC serves as Seattle's primary terminal for marine shipping, and multi-modal facilities in the area allow for easy transfer of goods between air, rail, land and water transportation networks. Land uses in the Greater Duwamish MIC are overwhelmingly industrial in nature (85 percent), and, according to PSRC, the MIC accounts for nearly 13 percent of Seattle's total employment (PSRC 2013).

In contrast, the Ballard-Interbay-Northend MIC is one of the smallest regional MICs, covering approximately 971 acres. Compared to other MICs, however, it is developed at a density roughly twice the average, and it accounts for 3 percent of Seattle's employment. Like other MICs, Ballard-Interbay-Northend is mostly industrial in nature, and serves as the home of the North Pacific Fishing Fleet, providing substantial moorage on Salmon Bay (PSRC 2013).

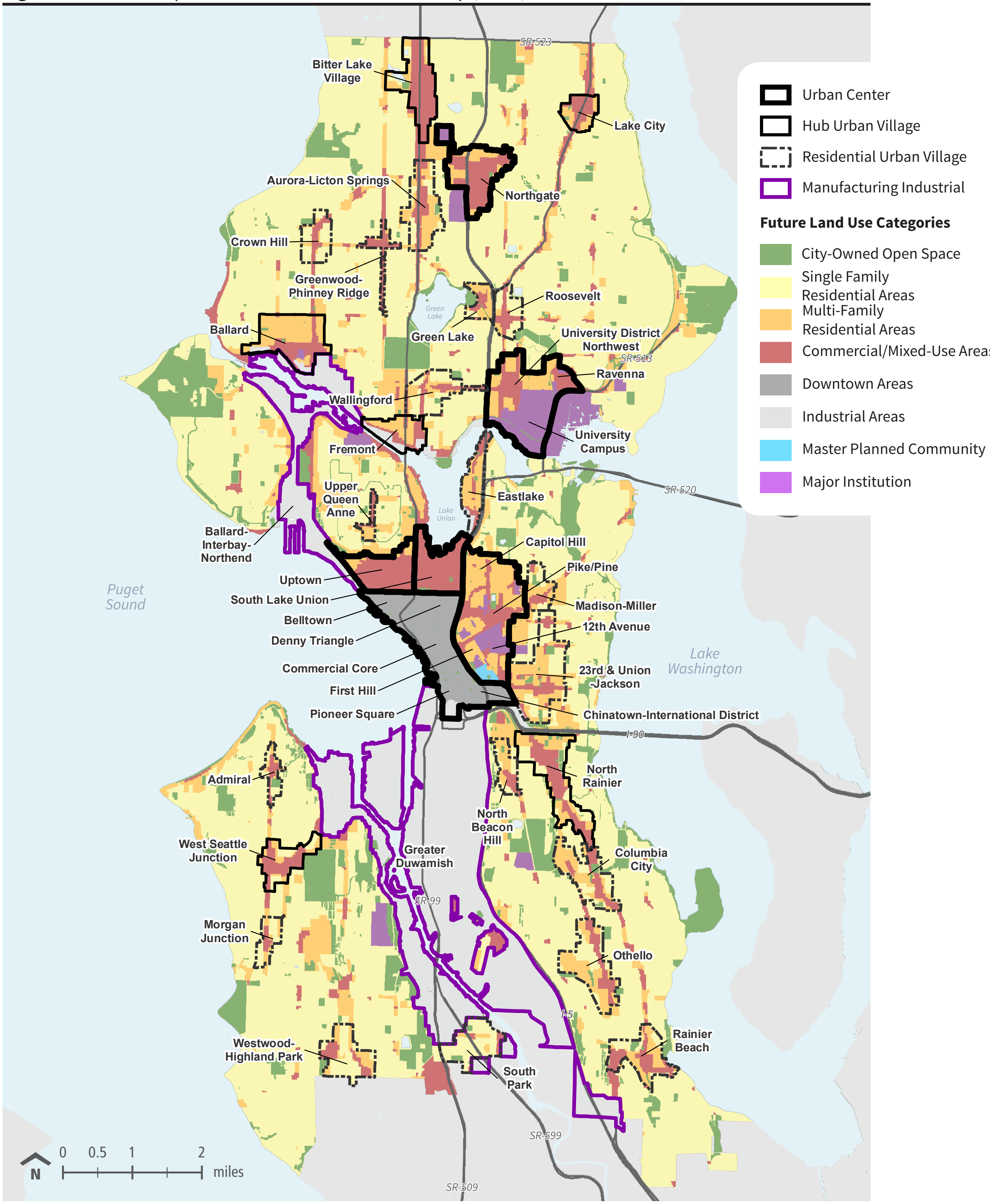
Future Land Use Designations and Zoning

CITY OF SEATTLE

The City of Seattle Comprehensive Plan's Future Land Use Map (FLUM) establishes future land use designations to guide development within the city. These designations are implemented by a corresponding range of zoning districts, which are established in Title 23 of the Seattle Municipal Code (SMC). Adopted aggregate Future Land Use designations in Seattle are mapped in Figure 3.4–5. A detailed discussion of the adopted comprehensive plan and zoning regulations is contained in Section 3.5 on page 3.5–1, Relationship to Plans and Policies.

Similar to existing land use, the largest future land use designation category is single-family residential, accounting for 55 percent of the city's land base. Industrial lands and public open space account for a further 12 percent each, multifamily residential encompasses approximately 10 percent and commercial/mixed-use accounts for approximately 7 percent. Most of the areas designated and zoned for commercial/mixed use or multi-family residential uses are located in urban centers or villages. Most of the area outside urban center or urban village boundaries is zoned for single-family residential use, with the exception of land located in the Greater Duwamish or Ballard-Interbay-Northend MICs. Commercial and multifamily zoning outside urban centers or villages tends to be concentrated around major arterials.

Figure 3.4–5 Comprehensive Plan Future Land Use Map (FLUM)



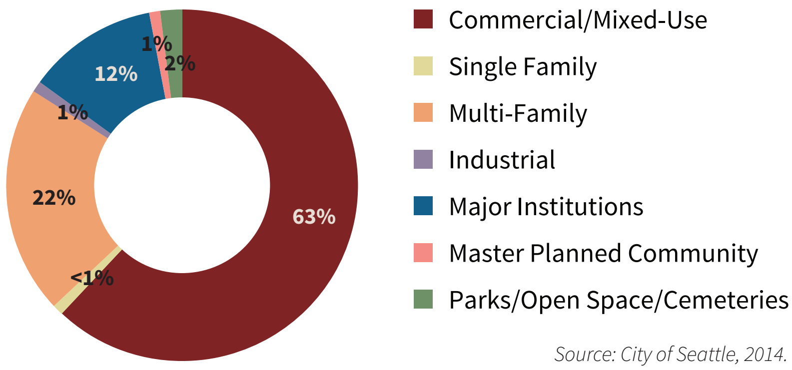
Source: City of Seattle, 2014.

URBAN CENTERS, VILLAGES AND MANUFACTURING/INDUSTRIAL CENTERS

Urban Centers

Similar to existing land use conditions, FLUM urban centers are designated primarily for commercial and mixed-use development. While the individual centers' precise distribution of land use designations and zoning vary, urban centers' zoning composition averages approximately 63 percent in commercial/mixed-use zones, 22 percent in multifamily residential zones and 12 percent in major institutions zoning and public facilities designations (including for parks). On average, open space, industrial and single-family residential designations each comprise 2 percent or less of the land area in urban centers. Figure 3.4–6 shows the average distribution of land use designations for urban centers.

Figure 3.4–6 Urban centers—land use designations



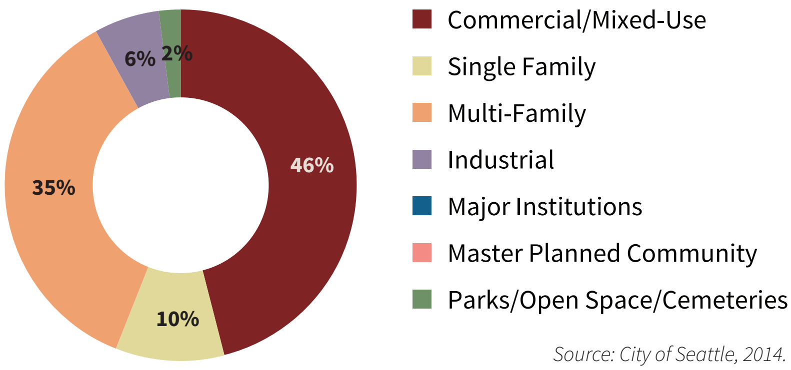
Source: City of Seattle, 2014.

Urban Villages

Hub Urban Villages. The FLUM's designations within the six hub urban villages result in a zoning composition that is on average 46 percent in commercial mixed use zones and 35 percent in multi-family residential zones. However, there is considerable variation. For example, commercial and mixed use zoning ranges from 30 percent of land area in Ballard to 70 percent of land area in Bitter Lake. Conversely, multi-family zoning ranges from 17 percent of land in Bitter Lake to 58 percent in Ballard. The Ballard and Fremont hub urban villages contain no single family residential zoning, which ranges up to about 24 percent of land area in the West Seattle Junction hub village. Figure 3.4–7 shows the average distribution of land use designations for hub urban villages.

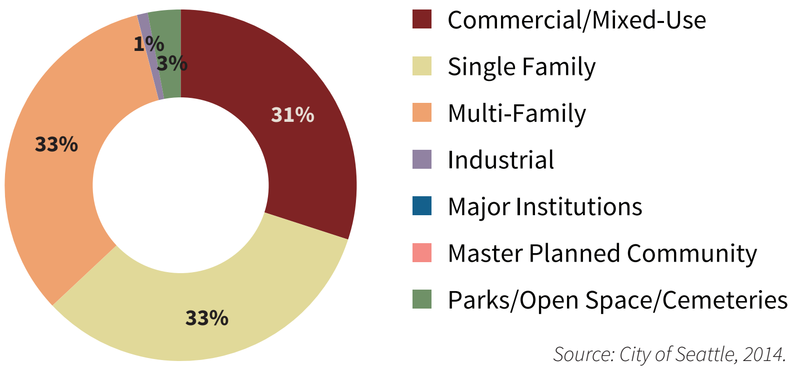
Residential Urban Villages. On average, residential urban villages are designated and zoned with a balanced mix of commercial/mixed use (31 percent), multi-family residential (33 percent) and single family residential (33 percent) zones. As with hub urban villages, land use designations and zoning vary between individual residential urban villages. Commercial/mixed use zoning within residential urban villages ranges from 10 percent in South Park up to 88 percent in Greenwood-Phinney Ridge. Multi-family residential zoning ranges from about 9 percent in South Park to 63 percent in Green Lake. Single family residential zoning ranges from 1 percent in Greenwood-Phinney Ridge to 62 percent in Crown Hill. Figure 3.4–8 shows the average distribution of land use designations for residential urban villages.

Figure 3.4–7 Hub urban villages—land use designations



Source: City of Seattle, 2014.

Figure 3.4–8 Residential urban villages—land use designations



Source: City of Seattle, 2014.

MANUFACTURING/INDUSTRIAL CENTERS

MICs are regionally-designated centers that drive economic growth for entire Puget Sound region. While the MICs are recognized by PSRC, they are designated by local jurisdictions that also enact future land use designations and zoning for these areas to facilitate industrial-type employment development, while discouraging uses incompatible with the industrial purpose, such as residential or large commercial uses. Both the Greater Duwamish and Ballard-Interbay-Northend MICs are zoned almost entirely for industrial uses, with some small areas zoned for industrial-commercial uses.

Height, Bulk, and Scale

As described previously, development in the City of Seattle is guided by Future Land Use Map designations and implemented by zoning and development regulations. Development regulations govern what uses are permitted, as well as the physical form (such as heights and setbacks) of development, which influences urban character. This section describes existing regulations regarding the height, bulk and scale of urban development, as well as the design review process and policies and regulations regarding protection of significant views.

CITY OF SEATTLE

The height, bulk, scale and character of development vary considerably across Seattle. Seattle's zoning regulations include limits on building height, as well as other characteristics, including density, floor area ratio (FAR), minimum setbacks and maximum lot coverage. All of these qualities contribute to the overall intensity of development at any given location. Building height and FAR limits are two of the most important code elements that directly influence how intense a development feels in a given location. FAR is the ratio of a building's floor area to the size of the lot where it is located. For most zoning districts, the City of Seattle has established both a maximum allowed height and a maximum allowed FAR. The relationship between building height and FAR can be viewed as a shorthand for assessing the "bulkiness" of building. For example, a tall building with a low FAR will take up a smaller proportion of its building site than a relatively short building with a higher FAR (see Figure 3.4–9).

A floor plate is the horizontal plane of the floor of a building, measured to the inside surface of exterior walls.

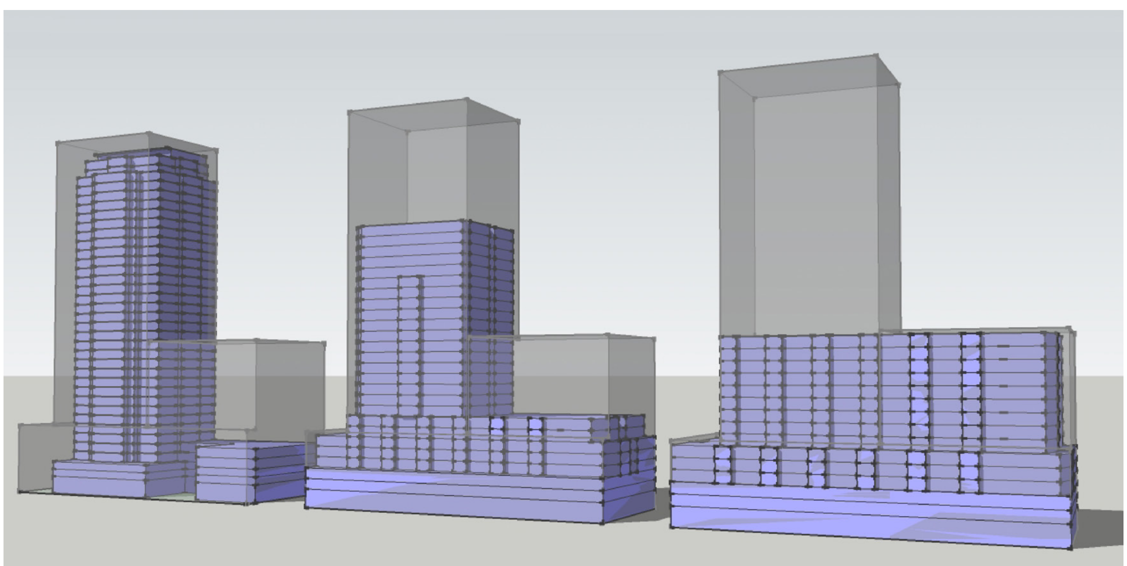
Floor area ratio is the ratio of the total square feet of a building to the total square feet of the property on which it is located.

Building floor area / Lot size = Floor Area Ratio

Figure 3.4–9 Zoning envelopes and floor area ratios

Gray: *hypothetical "zoning envelopes" established by setbacks, height limits, tower floorplate limits, minimum tower separation and other development standards.*

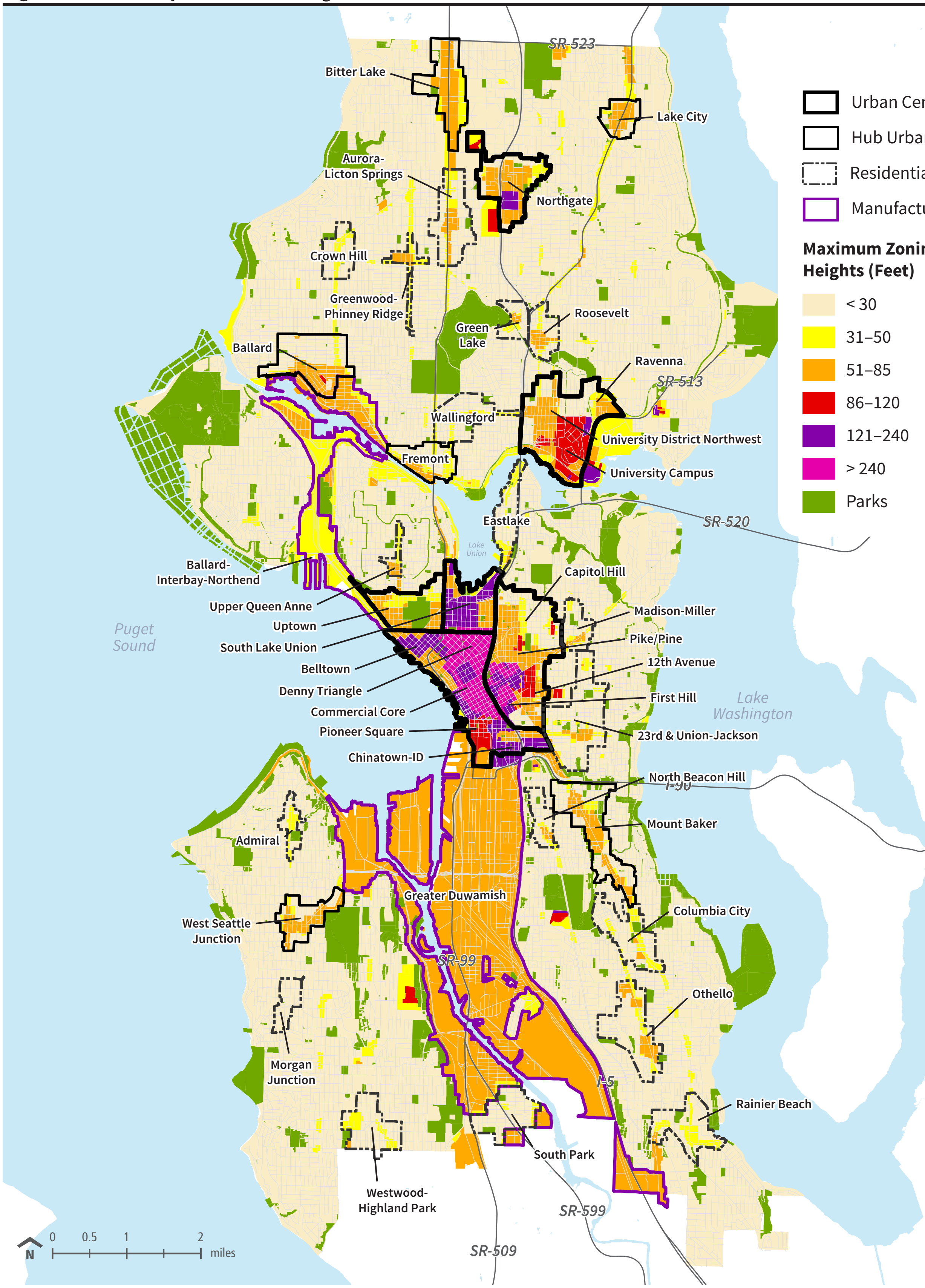
Blue: *possible building configurations within the allowed zoning envelope, limited by a floor area ratio (FAR) of 12. All three buildings have the same amount of floor area but they configure the space differently.*



Source: City of Seattle, 2013.

Figure 3.4–10 maps the maximum allowed height across Seattle, providing a general representation of where higher development intensities are allowed under current development regulations. As shown in the figure, most of Seattle is limited to relatively low heights (30–40 feet). Greater allowed heights are generally concentrated in urban centers and urban villages, as described in the following sections.

Figure 3.4–10 Citywide allowed height



Source: City of Seattle, 2014; BERK, 2014.

URBAN CENTERS, VILLAGES AND MANUFACTURING/INDUSTRIAL CENTERS

Urban Centers

As shown on Figure 3.4–10, Downtown and South Lake Union have greater allowances for building height than the other four urban centers. Allowed heights in Downtown can reach up to 400 feet in north Downtown (through the use of incentive zoning) and is unlimited in the commercial core, and allowed FAR—while generally under 3.0 in the Belltown area and along portions of the waterfront—can go as high as 20.0 in the commercial core. Portions of Pioneer Square, while restricted to comparatively low heights, actually have no limit on FAR. In South Lake Union, maximum heights range from 55–up to 400 feet, and maximum FAR limits range up to 7.

The First/Capitol Hill, University District, Northgate and Uptown urban centers are less intensely zoned. Maximum heights are predominantly 125 feet or lower, and the maximum allowed FAR ranges from 3.0-6.0. The high-rise multifamily zone in First/Capitol Hill allows heights up to 300 feet. The City is currently considering a proposal to increase the allowable height and FAR in a portion of the University District Urban Center.

Urban Villages

Many urban villages, especially residential urban villages, are mostly residential in character, organized around a typically compact commercial/mixed-use node or corridor. As shown on Figure 3.4–10, many urban villages have similar height allowances inside their boundaries as the areas immediately surrounding them. However, there are exceptions—including the Bitter Lake, Lake City and Greenwood-Phinney Ridge urban villages—where there is a higher degree of commercial, mixed-use and multifamily residential development, and where most of their area is zoned for a maximum FAR of 3.0 or greater.

Manufacturing/Industrial Centers

Seattle's two MICs are almost entirely industrial in nature, encompassing the majority of the city's industrial, shipping and manufacturing land uses. Zoning in the MICs generally allows for development heights in the range of 45–85 feet with high levels of allowed lot coverage, though structure height limits apply primarily to structures containing commercial uses. This provides for development of moderate height, high lot coverage and high intensity land uses.

Viewsheds

Seattle's Comprehensive Plan and Land Use Code establish policies and regulations for the protection of public views of important landmarks and natural features, as well as views from specific designated viewpoints within the city and scenic qualities along mapped scenic routes. The following sections provide an overview of relevant policies and regulations.

COMPREHENSIVE PLAN GOALS AND POLICIES

The Land Use Element of the current Comprehensive Plan establishes the importance of public view preservation:

Policy LU48 *Seek to preserve views through:*

- *Land use regulations that address view impacts with height, bulk, scale, view corridor and design review provisions;*
- *Zoning policy that considers the effect of zone designations on views, with special emphasis on protection of views related to shoreline areas; and*
- *Application of adopted environmental policy to protect public views, including views of mountains, major bodies of water, designated landmarks and the Downtown skyline, in review of development projects.*

The Land Use Element also encourages the protection of views through policies related to building height limits, minimization of building bulk and the creation of access to views and waterways.

The Comprehensive Plan lists the following as important landmarks for public views:

- Downtown skyline
- Major bodies of water
- Shoreline areas
- Elliott Bay
- West Seattle
- Mount Rainier
- Olympic Mountains
- Space Needle
- Puget Sound
- Lake Washington
- Lake Union
- Portage Bay

SEATTLE MUNICIPAL CODE

The Seattle Municipal Code (25.05.675.P) establishes environmental review policies for public view protection, specifically the following:

It is the City's policy to protect public views of significant natural and human-made features: Mount Rainier, the Olympic and Cascade Mountains, the downtown skyline, and major bodies of water including Puget Sound, Lake Washington, Lake Union and the Ship Canal, from public places consisting of… [a lengthy list of] specified viewpoints, parks, scenic routes, and view corridors….

In Downtown, there are also view corridors to be protected through upper-level building setbacks in future development along the following streets (SMC 23.49.024):

- Broad, Clay, Vine, Wall, Battery and Bell Streets west of First Avenue; and
- University, Seneca, Spring, Madison and Marion Streets west of Third Avenue.

While the Comprehensive Plan and the municipal code establish the importance of view corridors and view preservation, the precise requirements for individual development projects are not strictly defined in the development regulations, and protection of public views is deferred to consideration during project reviews and the design review process.

3.4.2 Impacts

Impacts Common to All Alternatives

LAND USE PATTERNS

Under all alternatives, Seattle would likely continue to experience housing and employment growth over the long term, consistent with the planning growth estimates described in Chapter 2, resulting in additional development activity. The primary differences between the alternatives lie in the distribution and intensity of growth across the city and the land use patterns that are projected to result, influenced in part by the implementation of comprehensive plan policies, related regulations and actions and by decisions made by individual property owners and developers.

In general, all alternatives would focus the majority of future growth into urban centers and urban villages, which are characterized by higher densities and a more diverse mix of uses than other areas of the city. By focusing most future growth into urban centers and villages, all alternatives would reinforce the existing citywide range and distribution of land use patterns, though the precise mix of uses and the locations of development would vary by alternative. What this means is that Seattle's land use patterns, broadly defined, would continue to emphasize:

- Growth leading to a denser and more continuous pattern of intensive land uses in its geographic center (Downtown plus the surrounding neighborhood districts including Uptown, South Lake Union, Capitol Hill and First Hill);
- Growth in two north Seattle urban centers (University District and Northgate);
- Business and port-related activity and employment growth within two central Port and industrial-use centers (Greater Duwamish and Ballard-Interbay-Northend MIC); and
- Growth in a wide range of other mixed-use urban villages such as Ballard, Columbia City and West Seattle Junction distributed through the various sectors of the city, including urban villages located along major transportation corridors (such as Aurora Avenue, Lake City Way, MLK Jr. Way, Rainier Avenue and California Avenue) that radiate through the various geographic sectors and industrial-use centers.

Most other areas of the city outside of the urban centers and villages would continue to be comprised of low-density predominantly single-family residential uses plus a wide range of parks and vegetated spaces, all shaped by hilly topography and bounded by the shorelines of multiple water bodies. Figure 3.4–11 and Figure 3.4–12 illustrate the increases in housing and employment density projected to occur in urban centers and villages under each alternative.

LAND USE COMPATIBILITY

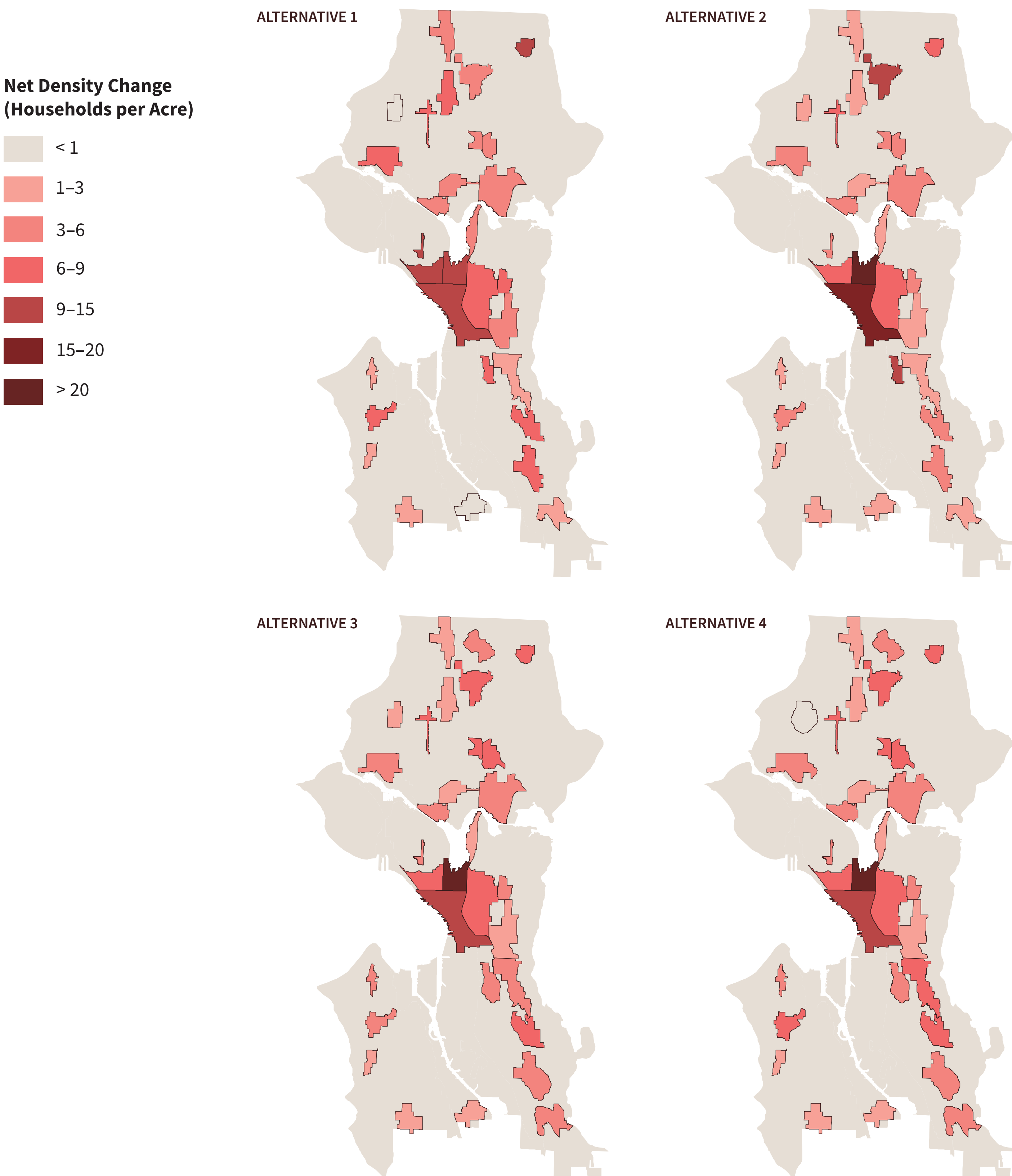
Future growth within the planning horizon under all alternatives is likely to increase the frequency of different land use types locating close to one another, and similarly likely to increase the frequency of land use patterns that contain mixes of land uses with differing levels of intensity, both within urban centers and villages and, to a lesser extent, in other areas of the city. Mixing uses in urban centers and villages is a goal of the current Plan because having a variety of uses, including housing, near one another makes it possible for people to conduct more of their daily business without driving; however, some adjacencies could potentially cause adverse compatibility impacts on less intense uses. Over time, infill development and redevelopment would occur in urban centers and villages to accommodate increased growth, gradually increasing the intensity of development in portions of the centers and villages that are not currently developed to their full capacity.

In addition, as mixed-use growth occurs in urban centers and villages, new uses may be introduced to areas originally developed under single-use zoning. This could occur in places where zoning has already changed since the original construction, or could potentially change under any alternative if rezones to mixed-use zones occur in the future. If such transitions toward increased mixing of uses occur, there is a greater likelihood that localized adverse spillover effects could occur, such as residential or commercial activities that might lead to increased noise. These compatibility challenges would not be an uncommon or new phenomenon within Seattle's urbanized context, but they would represent a potential adverse land use impact of future growth under any alternative. This potential adverse impact would be avoided to a degree by continuing to implement land use policies and zoning patterns that consider the potential for land use incompatibilities and avoid them through use of transitions in intensity, use restrictions and/or avoiding proximity of certain kinds of zones. As well, complaint-based enforcement of the City's applicable regulations pertaining to noise, nuisance and public safety would continue to provide protection against some of these potential impacts.

Areas outside urban centers and villages would receive a minority share of future growth under all alternatives, resulting in a limited potential for adversely-impacting changes in land use and development intensity or mix in these areas under any alternatives.

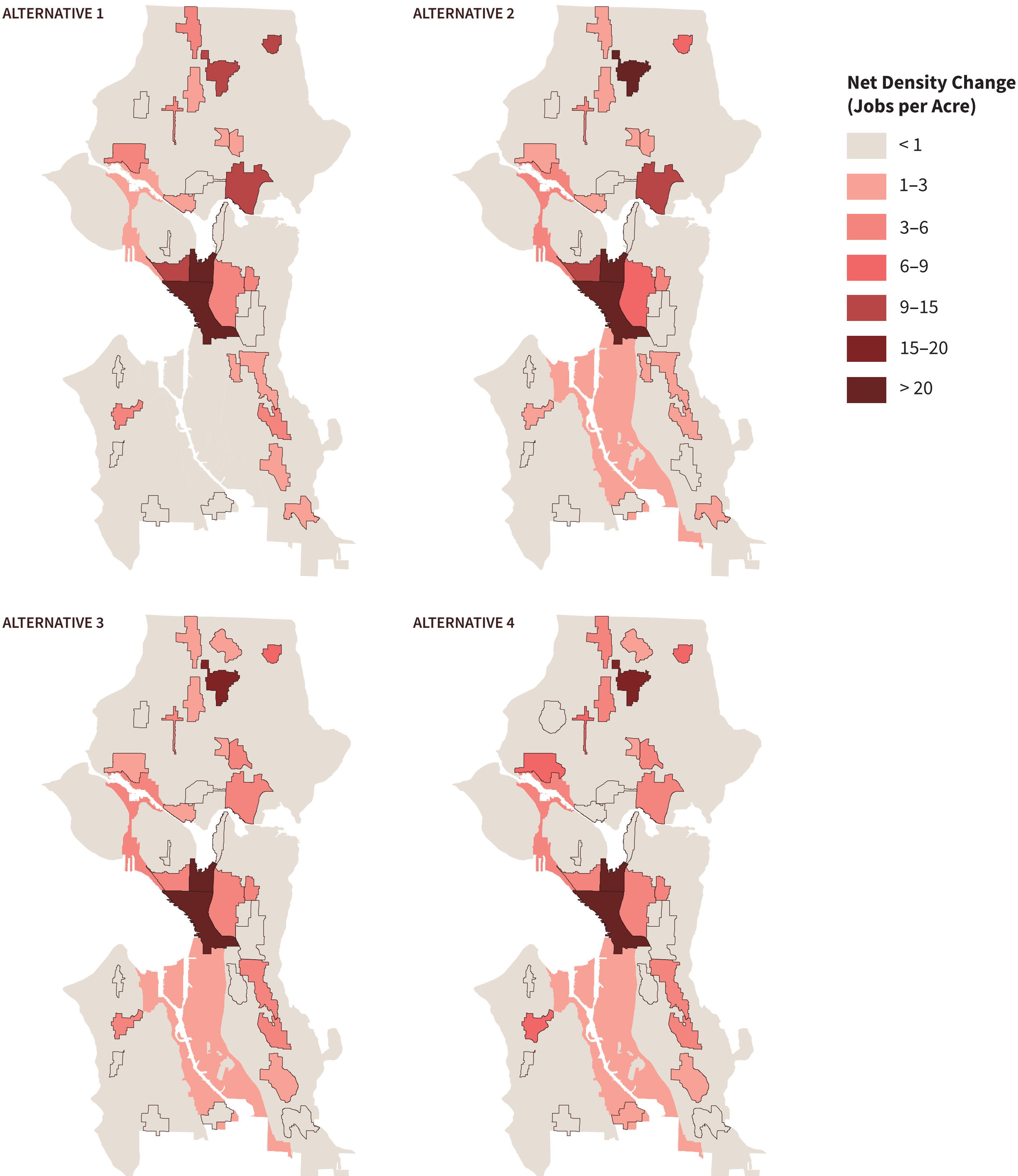
With respect to future employment growth in MICs, there is only a minor potential that land uses and activities associated with such growth would generate adverse impacts upon residential uses. Most edges of port facilities and industrial areas are well-buffered by distance, greenbelts, natural slopes, and other factors that limit instances where there are residential neighborhoods. There are, however, a few exceptions, such as in the Ballard-Interbay-Northend MIC edges near Ballard, or at the east edge of the Admiral neighborhood at Harbor Ave SW near Harbor Island. The conclusion of minor impact potential above must factor in the City's policy guidance that emphasizes the importance of the MICs as employment centers that are significant economic drivers for Seattle and the region. This acknowledges a general preference for industrial and industrial-commercial uses in such areas that tends

Figure 3.4–11 Projected increase in housing density in urban centers and villages under each alternative



Source: City of Seattle, 2014; BERK, 2014.

Figure 3.4–12 Projected increase in employment density in urban centers and villages under each alternative



Source: City of Seattle, 2014; BERK, 2014.

to outweigh most land use compatibility concerns potentially present in immediate edge areas near MICs, such as residential uses' potential sensitivities to impacts like excess noise, odor and light/glare.

HEIGHT, BULK AND SCALE

The intent of Seattle's SEPA policies for height, bulk and scale is to provide for smooth transitions between areas of different use type, which helps to maintain the overall character of neighborhoods and avoid unusually abrupt transitions between buildings of different scales. Such conditions can occur due to many factors, which can include the effects of local topography in a given development site vicinity. For example, this might occur if a residence is located to the rear of a more intensively zoned property that sits higher on sloping topography. Abrupt transitions might also occur temporarily, due to the incremental nature of the development process, in which not all properties take advantage of their full zoning potential at the same time.

Growth under all alternatives would result in increased residential and non-residential density and overall development intensity, primarily in the designated urban centers and urban villages, though the precise levels and locations would vary by alternative. The greatest potential for increased height, bulk and scale in future development would be in urban centers and villages, which contain the most intensive zoned areas on average, and are projected to receive the majority of growth under all alternatives.

The future construction of buildings would in many cases add building bulk (e.g., physical mass and presence) as properties are redeveloped, that would exceed the size of buildings present today. Such construction also would likely expand the geographic extent of buildings and use patterns with increased building scale (e.g., differences in height and overall proportions) compared to typical existing building sizes within urban villages and centers as those areas experience infill development. This conclusion is based on an existing typical condition in many local districts where buildings are low-scaled and relatively few approach the maximum zoned height limit. Such increases in building bulk and scale could also occur on properties near urban village or urban center boundaries, where it is more likely that lower-intensity zones and uses (such as single-family homes) could be present. As an "impact common to all alternatives," the future addition of building bulk within neighborhoods and a probable increase in average building scale represent adverse land use impacts. Such impacts would be moderated to a degree by continuing to implement land use policies and zoning patterns that encourage transitions between zones as an important principle in setting limits on land use development patterns. See the discussion of alternative-specific impacts below.

VIEWS

Under all alternatives, additional future development would result in localized increases in building height and development intensity over existing conditions. As development height and bulk increase, there would be an increased potential for interference with the defined and protected view corridors and scenic routes, as well as private views in these areas. Private views are not protected to the extent that public view corridors are, though view conditions on specific development sites are considered as part of the City's design review process. The greatest potential for increased effects on such view corridors and scenic routes due to future development would be in urban centers and villages, which contain the most intensive zoned areas and are projected to receive the majority of growth under all alternatives. However, it is also noted that there is only a moderate degree of overlap between the mapped scenic routes and urban centers and villages, most notably in places such as Uptown, South Lake Union, Downtown and Capitol Hill. See the alternative-specific discussions below.

SEPA INFILL EXEMPTION PROVISIONS (RCW 43.21C.229)—FUTURE POSSIBLE ACTION

The City's current Code exempts projects below certain sizes from review under the provisions the State Environmental Policy Act (SEPA). SEPA allows jurisdictions to set higher than standard exemption levels under certain conditions including the preparation of an environmental impact statement to analyze the impacts of the jurisdiction's comprehensive plan. The impact analyses in this EIS help Seattle fulfill that requirement to enable setting categorical exemptions using the "infill development" provisions in RCW 43.21C.229. This could define the sizes of development (residential and non-residential uses) above which SEPA review would be required, at levels higher than the maximum exemption limits that would otherwise apple per WAC 197-11-800(1)(c) and (d). Per RCW 43.21C.229, higher exemption limits are possible as long as development would not lead to exceeding levels of density or intensity of use called for in the comprehensive plan. As already previously defined in Seattle per Ordinances 122670 and 12939 (2008 and 2012, respectively), development review has occurred without a project-specific SEPA environmental review process required for projects in urban centers or urban villages containing up to 200 dwelling units and up to 30,000 square feet of non-residential space in mixed-use developments in certain urban centers and urban villages.[1] For the current proposal, the City anticipates that categorical exemption levels could be set as high as defined above, and that levels of density and intensity of use would be stated in the Comprehensive Plan. Such definitions of density and intensity of use could be defined in different ways, depending on other policy choices to be decided at a later date, and so the density/intensity limits are not precisely defined at this time. However, they would be stated in terms that would allow for ongoing monitoring of density/intensity outcomes in the urban centers and urban villages where applicable.

Development at those previously defined categorical exemption levels recognizes the ameliorating effects of the City's codes and programs in preventing or otherwise reducing the potential for adverse effects. These include but are not limited to the following kinds: Land

1 As has been noted in Seattle Department of Planning and Development Director's Rule 3-2014, those exemptions also have been subject to downward adjustments as residential density levels in certain urban centers or urban villages have approached or exceeded levels related to growth targets for individual urban centers or urban villages in the Comprehensive Plan.

Use Code and zoning, design review program, environmental critical area rules, historic and cultural resource protections, use of incentive zoning (or similar tools) that address housing impacts and transportation concurrency and impact mitigation methods in SMC Chapter 23.52. Practically, this means that there is not likely to be a need for SEPA-based mitigation strategies to be identified because other City programs, rules and requirements will be sufficient to avoid significant adverse impacts occurring for development projects below the SEPA thresholds.

For any of the specific alternatives considered, this EIS analysis concludes that the use of SEPA infill exemption provisions at levels comparable to those previously defined in Ordinance 123939, accompanied by the application of the range of relevant City programs and codes, would likely encourage future growth and development patterns that would be consistent with the City's comprehensive plan. This conclusion is based on a reasonable assumption that defining higher SEPA categorical exemptions within growth areas such as urban centers would encourage future development to occur there in amounts and sizes that would contribute toward the fulfillment of preferred growth strategies for urban centers and urban villages. This also would be important at the citywide level because growth that supports the growth patterns defined in the Comprehensive Plan would help fulfill overall planning purposes and objectives relating to growth management, natural environmental protection, housing, land use and management and operation of major infrastructure such as transportation systems and utilities.

At the same time, the City's range of codes and programs would be likely to:

- Reasonably provide protections that would likely help avoid significant adverse environmental impacts from occurring, cumulatively, and for individual developments that would be below the categorical exemption levels; and
- Require SEPA environmental review for development at levels where such adverse impacts are reasonably interpreted as possible.

Alternative 1: Continue Current Trends (No Action)

LAND USE PATTERNS

Alternative 1 would continue the strategy of the 1994 Comprehensive Plan to encourage future growth primarily in urban centers and villages, with a projected growth distribution outcome that would be comparable to the outcome of growth trends over the last 20 years. This Alternative is projected to lead to approximately 77 percent of both future housing and job growth to urban centers and villages; the remaining 23 percent of growth would occur throughout the rest of the city. Compared to the other alternatives, Alternative 1 is projected to lead to the greatest amount of housing and job growth in areas outside urban centers or villages. This would tend to spread the potential disruptions of growth and change across more areas, likely closer to more residents, but typically with a lower severity of change due to what is permissible to build in most areas outside urban centers and villages.

To the extent that a wider-spread pattern of growth and change occurs, housing and job growth outside the centers and villages would take a different form than growth occurring in urban centers and villages, in keeping with zoning regulations and prevailing development patterns. Housing development, for example, would likely occur at lower densities and could consist of more single-family homes or lower-density multifamily forms than the probable higher-density pattern of multifamily and mixed-use housing that is likely to occur in urban centers and villages.

As the No Action Alternative, Alternative 1 represents the least amount of difference from past growth patterns in its projected future growth and likely change in land use patterns, compared to the other EIS alternatives. It represents a kind of "future baseline" condition where growth in Seattle would be distributed across the city in generally the same proportions the city has seen over the past 20 years.

LAND USE COMPATIBILITY

Growth under Alternative 1 would be consistent with recent urban development trends in Seattle. Impacts to land use compatibility under Alternative 1, the No Action Alternative, would be similar to those described under Impacts Common to All Alternatives. This means there is the potential for mixing of new and existing uses to generate adverse localized incompatibilities, either within urban centers and urban villages, or at their periphery, where more intense development inside a center or village could occur adjacent to low-intensity uses outside the center or village. However, the City's adopted development regulations contain provisions meant to reduce impacts associated with future land use adjacencies and transitions. Therefore, no significant adverse impacts are anticipated with respect to land use compatibility under Alternative 1 (No Action).

HEIGHT, BULK AND SCALE

Impacts to height, bulk and scale under Alternative 1 would be similar to those described under Impacts Common to All Alternatives. As growth is directed into existing urban centers and villages, a moderate amount of additional height and bulk would result from future development in these commercial and mixed-use nodes. The overall height, bulk and scale implications from such future development would likely be consistent with that experienced during growth over the last twenty years, because Alternative 1 does not anticipate or require changing land use codes, zones or development standards. The City's existing development regulations and design review process are anticipated to be sufficient to reduce impacts to height, bulk and scale to less than significant levels.

VIEWS

Impacts to views under Alternative 1 would be similar to those described under Impacts Common to All Alternatives. As future development creates additional building height and bulk in urban centers and villages, there is a minor but recognized potential for localized adverse disruption of protected views. This is evaluated as minor because most, although not all, SEPA-protected public viewpoints are located away from urban centers and urban villages, capturing scenic views at edges of hillsides, parks and schools. In a slightly different manner, views from defined scenic routes are less generalizable, but are often views down corridors to distant features (such as Mount Rainier or the Seattle skyline) and/or are episodic in nature, meaning only certain places along the routes have the best scenic qualities that might be adversely affected by future development. The precise nature and degree of potential future view disruptions along scenic routes would depend upon specific locational view qualities and individual project designs. As applicable, individual project-level review would include detailed evaluation and opportunities to define mitigation during future land use permit application and design review processes.

Alternative 2: Guide Growth to Urban Centers

LAND USE PATTERNS

As described in Chapter 2, Alternative 2 focuses the majority of future growth in urban centers, most notably in Downtown, First/Capitol Hill and South Lake Union. In total, Alternative 2 would direct 87 percent of future housing and 93 percent of future employment to existing urban centers, villages or MICs, resulting in the most concentrated development pattern of the four alternatives. The majority of this development would be directed to urban centers, which are allocated 66 percent of future housing and 72 percent of future employment. This represents the largest proportion of future growth directed toward urban centers of any alternative. Growth in urban centers is likely to follow existing development patterns, resulting in the construction of more mid-rise and high-rise commercial and mixed-use buildings in urban centers. The overall effect on the citywide land use pattern would be an intensification of both employment and residential uses in Downtown and the immediately adjacent areas, as well more intense growth expected in Northgate and the University District urban centers, with modest growth in urban villages.

As a result of this concentrated development pattern, Alternative 2 would have lesser potential for effects on land use patterns outside urban centers or villages. Some growth would continue to occur in single-family neighborhoods and local commercial nodes, but this growth would be minor compared with what is projected for the urban centers and villages.

LAND USE COMPATIBILITY

Under Alternative 2, the majority of future development would occur in existing urban centers, primarily in Downtown, First/Capitol Hill and South Lake Union. Development in these areas would intensify and become denser. Due to the already developed and relatively dense land use patterns of Downtown and these other urban centers, future development would most likely be relatively compatible with existing forms and uses. The South Lake Union Urban Center and the urban center villages of Capitol Hill, Pike/Pine and First Hill have experienced an increased pace and degree of redevelopment over the past 10 years in keeping with zoned development capabilities, and new infill development associated with this Alternative going forward would likely be similar in use and scale to recent development trends. This comparability in use patterns may limit the potential for adverse land use incompatibilities and abrupt transitions in form, although such impacts could be possible at peripheral edges next to lower-density zones.

The Northgate and University District urban centers are also likely to see a higher rate and more intense type of infill development within their boundaries under this alternative. Because these centers still contain areas of varying scale use patterns, including relatively low-intensity development, there would be increased potential for adverse compatibility impacts if developments of differing use and character to occur in close proximity to one another.

As described under Land Use Patterns, Alternative 2 is the alternative with the smallest portions of housing and job growth allocated to urban villages. As a result, Alternative 2 has a relatively smaller potential for instances of adverse incompatible uses or scale differences due to future development in urban villages. However, there would still be some potential for adverse compatibility impacts to arise, such as at the periphery of urban villages where there can be differences in scale of development permitted by existing zoning.

HEIGHT, BULK AND SCALE

Under Alternative 2, additional growth in urban centers would result in increased average building height and bulk. In urban centers, this is likely to take the form of mid- and high-rise buildings, both for housing and employment uses. As shown on Figure 3.4–10, current zoning in urban centers allows the greatest building heights and FARs, particularly Downtown and South Lake Union, which would receive the greatest share of growth under Alternative 2. As such, additional moderate-scale or higher-scaled development in these areas would tend to be consistent with established development and regulatory patterns, which would help limit and diminish the adverse effects of increased height and bulk due to future development.

As similarly described in the discussion of Land Use Compatibility above, increased height and bulk through future development in urban centers could potentially impact surrounding areas by creating more abrupt transitions between taller, more intense development within centers and less intense development outside them. However, greater building size and intensity in urban centers is an established feature of the city's land use pattern. The urban centers to which the most growth has been allocated (Downtown, First/Capitol Hill and South Lake Union) are bordered only relatively rarely by low-density development. As with land use incompatibilities, the City could review applicable development regulations and zoning requirements for peripheral portions of urban centers to consider methods of accomplishing more gradual transitions in building height and bulk and thereby further reduce the potential for adverse effects on surrounding neighborhoods.

EFFECTS OF OTHER POLICY CHANGES

Alternative 2 would also remove two policies (LU59 and LU60) from the Comprehensive Plan that establish very detailed criteria for when it is appropriate to upzone land included in a single-family land use designation. The Land Use Code contains regulations that are very similar to these policies. Removal of these policies from the Comprehensive Plan does not remove any of the procedures or steps required to change designated zoning of a given area, especially if the code provisions remain. However, by removing approval criteria, it would provide more flexibility for zoning in single-family areas and multifamily areas nearby, potentially allowing a greater variety of residential uses in and near single-family areas. While this could lead to a small increase in conversion of uses and location of differing development intensities in close proximity, as described in the previous sections, the practical effects of this change are anticipated to be minor. Proponents of future upzones would be expected to show compatibility with the comprehensive plan and Land Use Code requirements for any given area. Also, the revised comprehensive plan would include policies to reinforce the need for gradual transitions, so drastic changes in use or intensity are not likely to occur as a result of this policy change.

VIEWS

Impacts to views under Alternative 2 would be similar to those described under Impacts Common to All Alternatives. As future development adds more tall buildings in urban centers, there is a minor but recognized potential for localized adverse disruption of protected views. Because the greatest share of development would occur in urban centers under Alternative 2, the greatest potential for disruption of views would occur in these areas. The precise nature and degree of potential future view disruptions along scenic routes or from particular SEPA-protected public viewpoints would depend upon the specific locational qualities and designs of individual projects. As applicable, individual project-level review would include detailed evaluation and opportunities to define mitigation during future land use permit application and design review processes.

Alternative 3: Guide Growth to Urban Villages near Light Rail

LAND USE PATTERNS

As described in Chapter 2, Alternative 3 would focus future growth in urban centers and also in urban villages containing current and planned light rail stations. This alternative would also include expansions to several urban villages' boundaries to encompass certain areas that are within an approximate 10 minute walking distance from the transportation intensive light rail nodes: Green Lake, Roosevelt, North Beacon Hill, Columbia City, Othello and Rainier Beach. Overall, Alternative 3 would distribute growth to more locations than alternatives 1 or 2, creating a citywide land use pattern focused on relatively small residential and commercial/mixed-use nodes with access to light rail. Alternative 3 places less emphasis on urban centers than alternatives 1 or 2, directing a larger share of employment to residential urban villages and the Greater Duwamish and Ballard-Interbay-Northend MICs, as well as areas outside centers or villages. This focus on distributed nodes is more likely to result in construction of a mix of low and mid-rise development types, with more intense development concentrated near light rail station areas.

In addition, Alternative 3 would create a new urban village around the NE 130th Street transit station and amend the boundaries of the of the Mount Baker and 23rd & Union-Jackson urban villages to focus future development on the area surrounding the planned I-90 Eastlink light rail station. The expanded urban village areas and the new NE 130th Street urban village are shown on Figure 2–12 and Figure 2–13. These expansion areas consist primarily of single-family residential areas. Over time, these areas would gradually be converted to denser multifamily residential use patterns.

Under Alternative 3, approximately 88 percent of new residential growth would be anticipated to occur within urban villages, divided between 49 percent in urban centers, 26 percent in hub urban villages and 12 percent in residential urban villages. This is a residential growth distribution more heavily weighted toward hub and residential villages than under alternatives 1 or 2. In addition, only 51 percent of future job growth would be directed to urban centers under Alternative 3—the lowest of any alternatives. Hub and residential urban villages would receive 6 percent and 9 percent of citywide employment growth, respectively. This represents more combined urban village job growth than either Alternative 1 or Alternative 2, but less than what would be allocated under Alternative 4. The Greater Duwamish and Ballard-Interbay-Northend MICs are projected to receive 13 percent of anticipated job growth.

Overall, Alternative 3 would distribute growth to more locations than alternatives 1 or 2, contributing more than the other alternatives to a growth of a citywide land use pattern of residential and commercial/mixed-use nodes with access to light rail. This focus on distributed nodes is likely to result in construction of more low-to moderately scaled building types, with the highest density of development likely to be concentrated near light rail station areas.

Under Alternative 3, areas outside urban centers and villages would receive a minority share of future household growth at 12 percent—nearly the same as Alternative 2 and twice the amount of Alternative 4. Areas outside urban centers and villages would be anticipated to receive 22 percent of expected employment growth, nearly the same as the No Action alternative and the highest among the action alternatives. As a result, land use patterns in areas outside urban villages would be expected to be similar to development trends experienced through the last twenty years: predominantly residential uses with scattered small-scale office or commercial development.

The possible creation of a new residential urban village at NE 130th Street, if it occurs and is followed by rezones, would likely result in gradual conversion of existing single-family residential and limited low-intensity commercial uses to higher-intensity multifamily or mixed uses over time. The proposed village area contains two existing limited nodes of commercial and multifamily development at N 135th Street/Roosevelt Way N and N 125th Street/ Roosevelt Way NE.

LAND USE COMPATIBILITY

Under Alternative 3, future housing and job growth would be focused in urban villages and centers where existing or planned light rail stations are located. This would have the potential to result in localized use compatibility issues as existing, lower intensity uses in these areas transition to higher-density development forms. Specifically, those areas closest to existing and planned light rail station would experience the most rapid and extensive levels of infill redevelopment. However, many of these urban village cores already contain a mix of uses at various intensities. In contrast, in the areas where the urban villages would be expanded, or where new urban villages would be created, the predominantly single-family residential character would make them more sensitive to changes in development intensity and scale. For example, such areas could experience more occurrences of slightly sharper transitions in urban form if new, more intensive forms, such as multi-family apartments, are built alongside or across the street from existing single family homes. Where new villages are created, the effect could be adversely greater if denser commercial and mixed uses develop over time near the planned light rail stations.

Although Alternative 3 more directly impacts residential urban villages, adverse land use compatibility impacts to a lesser degree could also arise in those urban centers and urban center villages containing existing or planned light rail stations, including Chinatown/ID, Pioneer Square, Capitol Hill, Northgate and the University District Northwest. The lesser degree of potential impact is concluded based on the comparative density and intensity of use that already exists in most of those areas.

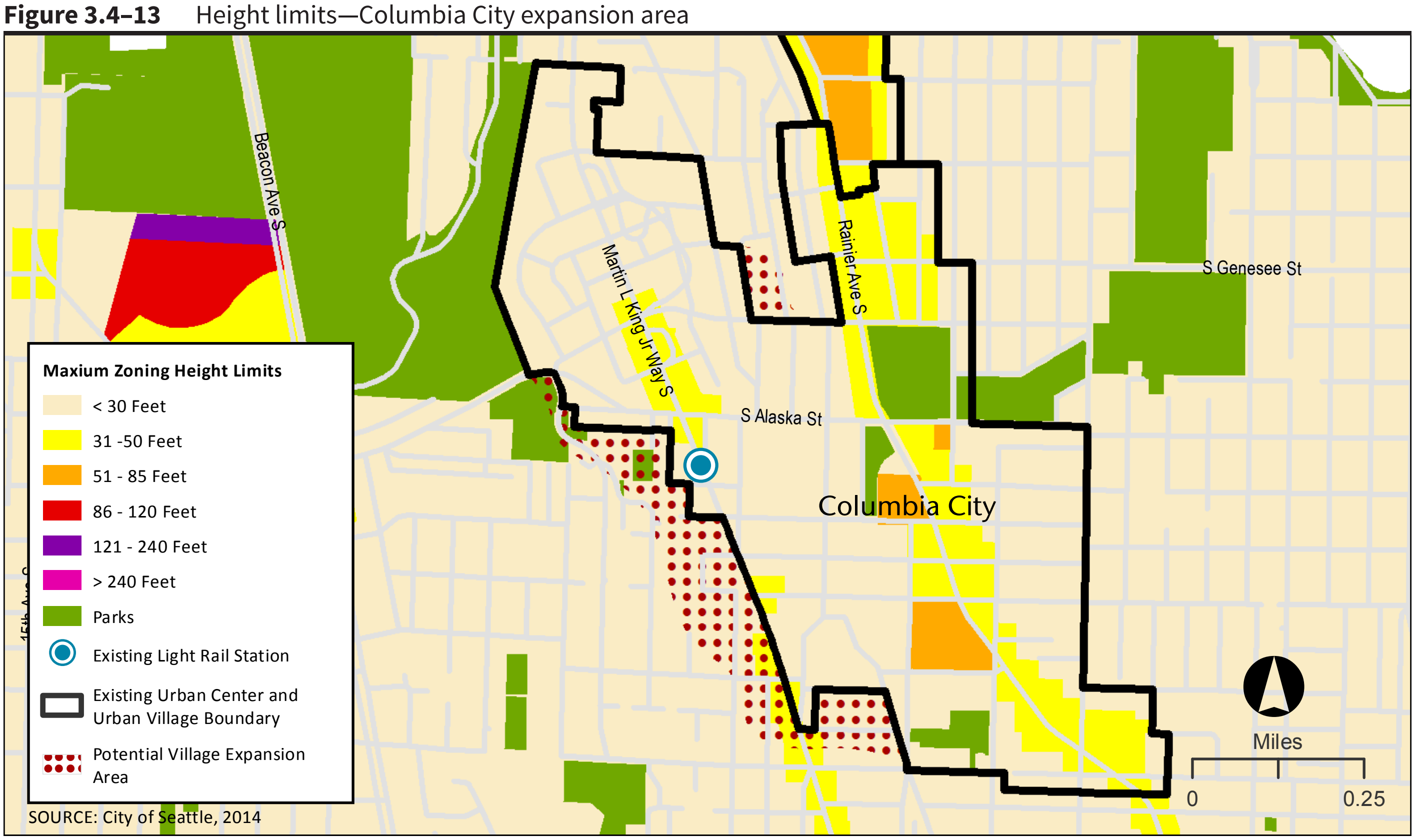
HEIGHT, BULK AND SCALE

As described under Impacts Common to All Alternatives, additional growth in urban centers and villages would result in increased building bulk, height and scale. Alternative 3 would additionally include expansions to several urban villages to accommodate growth focused along light rail corridors, as well as the creation of a new urban village surrounding the proposed NE 130th Street light rail station. Figure 3.4–13 through Figure 3.4–19 illustrate the current maximum allowed height in each of the potential urban village expansion areas. As these figures show, the areas to be added to the existing urban villages are characterized by relatively low building heights. Over time, overall building height and bulk in these areas would likely increase with additional development, and localized conflicts could occur as the areas transition to a more intense development pattern with development expected to be the densest near light rail stations.

EFFECTS OF OTHER POLICY CHANGES

Alternative 3 would also remove two policies (LU59 and LU60) from the Comprehensive Plan that establish detailed criteria for when it is appropriate to upzone land included in a single-family land use designation. The Land Use Code contains regulations that are very similar to these policies. Removal of these policies from the Comprehensive Plan does not remove any of the procedures or steps required to change designated zoning of a given area, especially if the code provisions remain. However, by removing approval criteria, it would provide more flexibility for future possible zoning choices in single-family areas and multifamily areas nearby, potentially allowing a greater variety of residential uses in and near single-family areas. While this could lead to an increase in the conversion of uses and the location of differing development intensities in close proximity, the actual effects of this change upon the environment are anticipated to be minor. Future potential upzone analyses would be expected to show compatibility with comprehensive plan and Land Use Code guidance. Also, the revised comprehensive plan would include policies to reinforce the need for gradual transitions in building scale and use, so drastic changes in use or intensity are not likely to occur as a result of this policy change.

Figure 3.4–13 Height limits—Columbia City expansion area



SOURCE: City of Seattle, 2014

Figure 3.4–14 Height limits—North Beacon Hill expansion area

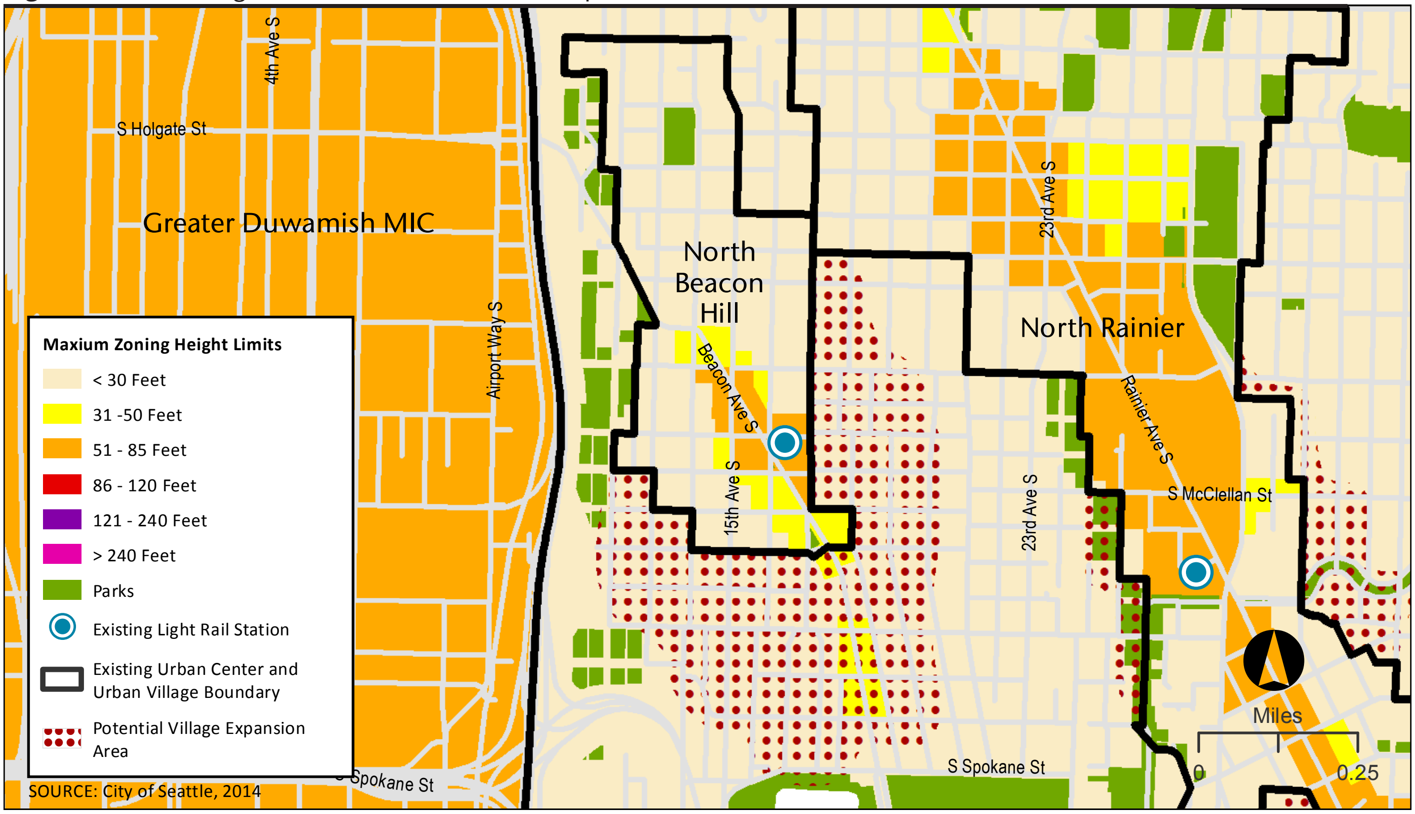


Figure 3.4–15 Height limits—Rainier Beach expansion area

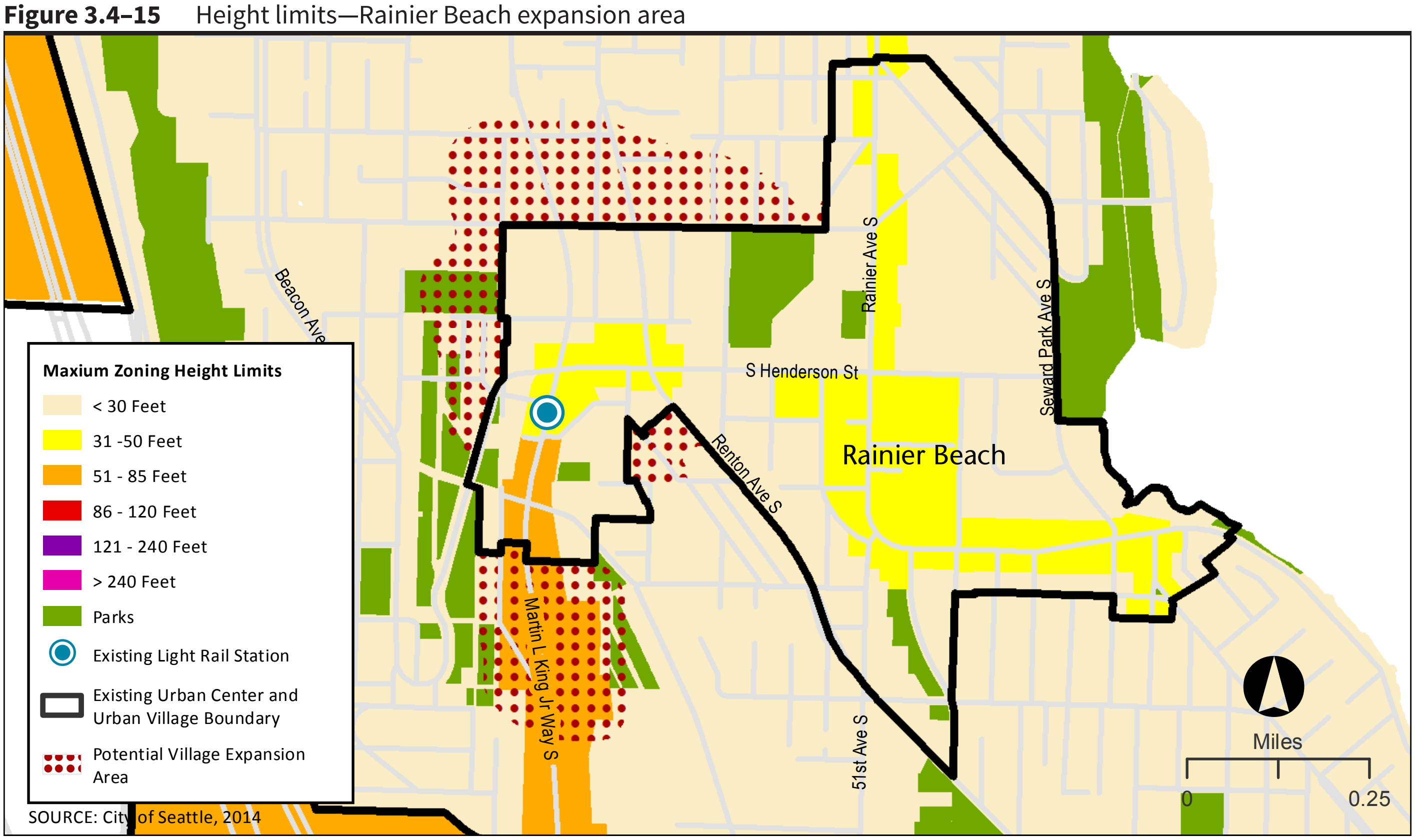


Figure 3.4–16 Height limits—Roosevelt expansion area

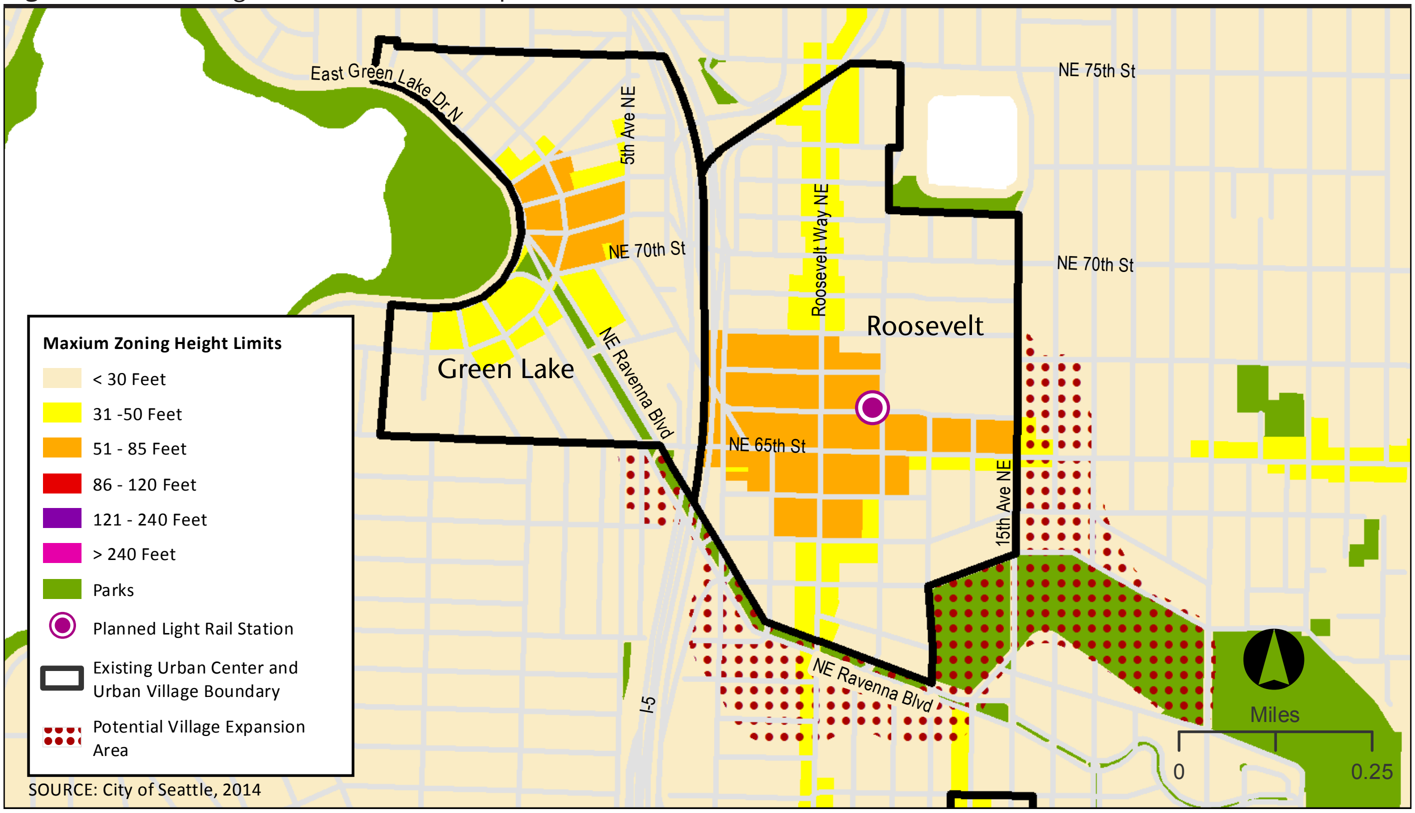


Figure 3.4–17 Height limits—Othello expansion area

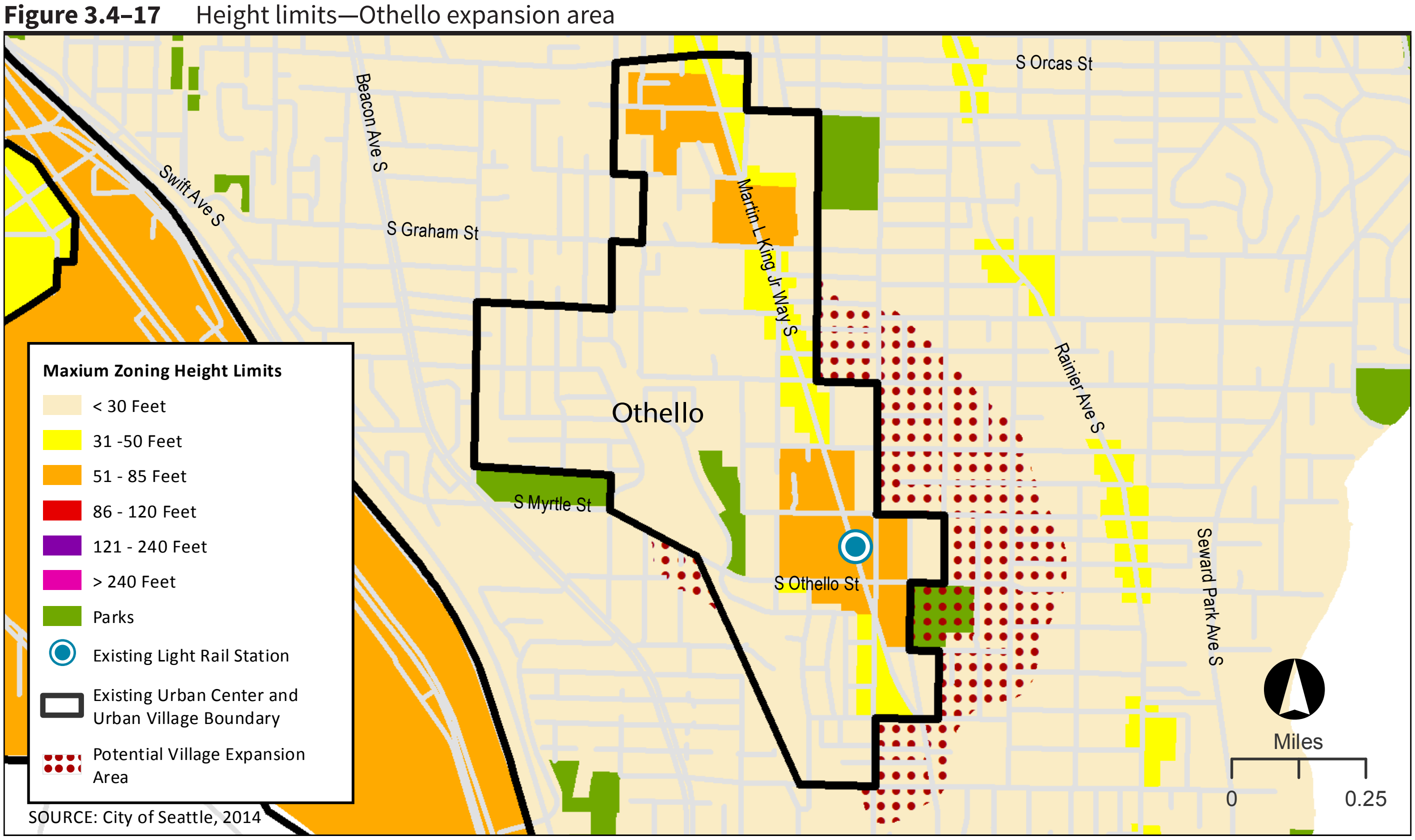


Figure 3.4–18 Height limits—NE 130th Street new urban village

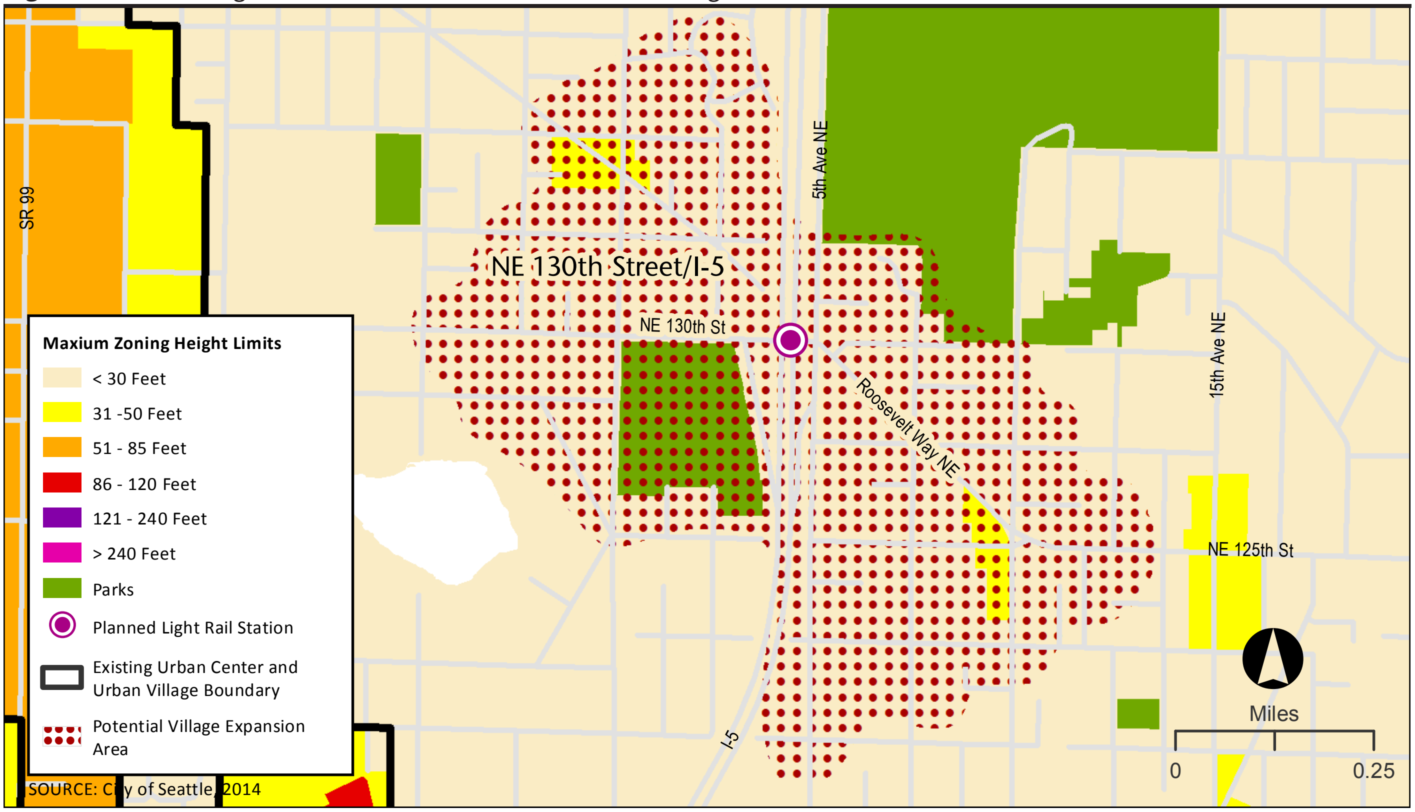
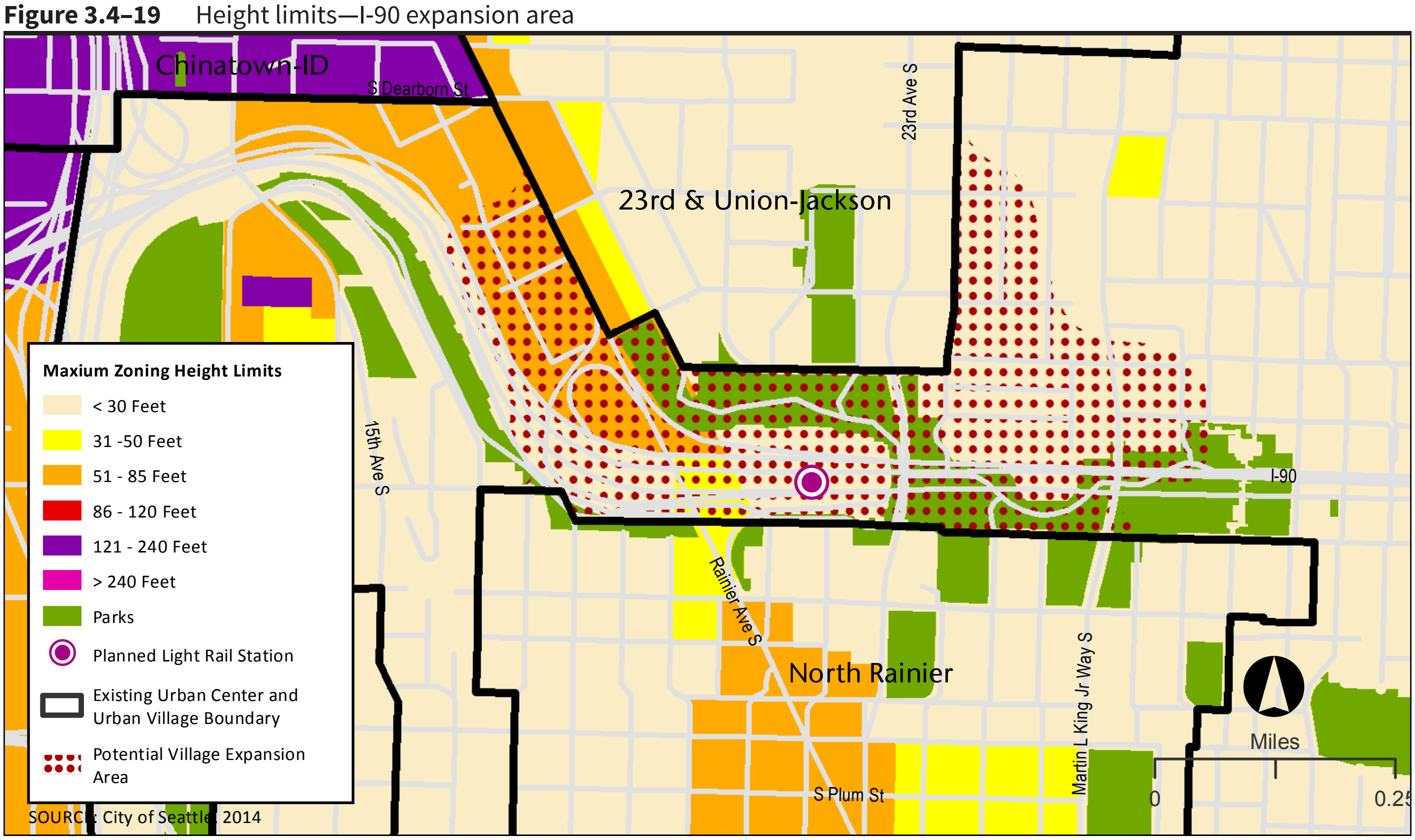


Figure 3.4–19 Height limits—I-90 expansion area



Alternative 3 also proposes to change how urban villages are depicted on the Future Land Use Map. This proposed change would show each type of urban village (Center, Hub and Residential) as a unique color on the map with accompanying policies that would describe the types and intensities of uses allowed in each type of village instead of the current mapping of individual land use designations within respective urban village boundaries that closely align with zoning categories. This would provide a generalized indication of preferable types and patterns of future development in the respective villages (i.e. urban center, urban center village, hub urban village and residential urban village), but would provide a greater degree of flexibility in future land planning while still indicating some limits to the most intense types of growth. In practice, this policy would be likely to facilitate more timely processes of selecting and deciding upon land use designation changes, which could accommodate a faster pace of new development within mapped urban centers and urban villages. This could be helpful to aid in production of housing sooner, for example. Under the current system, any future proposed zoning changes for a given property or area must be consistent with the associated comprehensive land use designation. This limits potential changes in land use type and intensity to a relatively narrow spectrum; more substantial zoning changes first require an amendment to the comprehensive plan land use map. Under Alternative 3, future zoning changes would instead be required to be consistent with the appropriate policies for that type of urban village.

VIEWS

Impacts to views under Alternative 3 would be similar to those described under Alternative 1. In addition, the expansion of existing urban villages and the creation of new villages would direct growth to a larger geographic area than Alternative 1. As future development creates additional building height and bulk in urban centers and villages, there is a minor but recognized potential for localized adverse disruption of protected views. The precise nature and degree of potential future view disruptions along scenic routes or from particular SEPA-protected public viewpoints would depend upon specific locational qualities and individual project designs. As applicable, individual project-level review would include detailed evaluation and opportunities to define mitigation during future land use permit application and design review processes.

Alternative 4: Guide Growth to Urban Villages near Transit

LAND USE PATTERNS

As described in Chapter 2, Alternative 4 would focus future growth in urban villages around light rail stations and also along priority transit corridors. In addition to the residential urban village expansions described in Alternative 3, Alternative 4 would include additional expansions in the following urban villages: Ballard, Fremont, West Seattle Junction and Crown Hill. The expansion of the villages above would reflect a ten-minute walkshed to well-served bus service. Similar to Alternative 3, a new residential urban village could be created around the NE 130th Street transit station, and the boundaries of the Mount Baker and 23rd & Union-Jackson urban villages are proposed to be amended to encourage future development in the area near the planned I-90 East Link light rail station as shown in Figure 2–15 and Figure 2–16.

In general, probable changes to land use patterns under Alternative 4 would be similar to Alternative 3, except that Alternative would distribute future growth to a greater number of villages. Under Alternative 4 about 94 percent of new household growth would be directed toward urban centers and urban villages—the highest concentration of any alternative under consideration. Of that amount, 49 percent is projected to be in urban centers, 28 percent in hub urban villages and 18 percent in residential urban villages. This allotted growth in hub and residential urban villages represents a full 46 percent of future household growth and is the highest in urban villages among all the alternatives. Under Alternative 4, about 53 percent of future employment growth is projected to occur in urban centers, 12 percent in hub urban villages and 10 percent in residential urban villages. Under Alternative 4, the combined future employment growth of 22 percent in hub and residential urban villages is the largest among all the alternatives.

Overall, Alternative 4 distributes growth to a greater number of locations than any other alternative, which is likely to result in a citywide land use pattern more focused on residential and commercial/mixed-use nodes with access either to light rail or frequent bus service. The focus on more distributed transportation nodes is likely to result in the construction of more moderate-density, moderate-height development types with a combination of multi-family, mixed-use and commercial uses over time.

Areas outside urban centers and villages would receive the lowest share of future household growth of any alternative at only 6 percent. Corresponding job growth in areas outside urban villages would be 18 percent. This is relatively fewer jobs than under alternatives 1 or 3, but more than double the amount under Alternative 2. As a result, there would likely be fewer expected changes to the largely residential pattern of land use in areas outside urban villages and centers.

Similar to Alternative 3, the possible creation of a new residential urban village at NE 130th Street, if it occurs and is followed by rezones, would likely result in gradual conversion of existing single-family residential and limited low-intensity commercial uses to higher-intensity multifamily or mixed uses over time.

LAND USE COMPATIBILITY

Impacts to land use compatibility under Alternative 4 would be similar to those under Alternative 3. However, the impacts would be more geographically widespread due to the expansion of additional urban villages than those already identified in Alternative 3. Similar to Alternative 3, this would create a potential to result in localized adverse but relatively minor compatibility issues as existing, lower intensity uses in these urban villages transition to higher-density development forms. Specifically, those areas closest to existing and planned light rail and transit station would likely experience the most redevelopment. However, many of these urban village cores already contain a mix of uses at various intensities. In contrast, areas where the urban villages would be expanded, or where new urban villages would be created, are predominantly single-family residential in character, making them more sensitive to changes in development intensity and scale. For example, these areas may experience more occurrences of slightly sharper transitions in urban form as new, more intensive forms, such as townhomes and multi-family apartments, could be built alongside existing single family homes and properties. Comparing villages whose expansion areas are related to light rail with those villages whose expansion areas are related to enhanced bus service, it is expected that those with light rail stations would redevelop more intensively and quickly under this alternative; most villages identified for frequent bus service are already served by bus transit and have experienced some amount of increased development intensity near transit nodes.

HEIGHT, BULK AND SCALE

Potential adverse impacts of height, bulk and scale under Alternative 4 would be similar to those under Alternative 3. Impacts would also occur in the additional urban villages identified for expansion as previously described. Figure 3.4–20 through Figure 3.4–22 illustrate the current maximum allowed height in each of the potential urban village expansion areas.

Figure 3.4–20 Height limits—Ballard expansion area

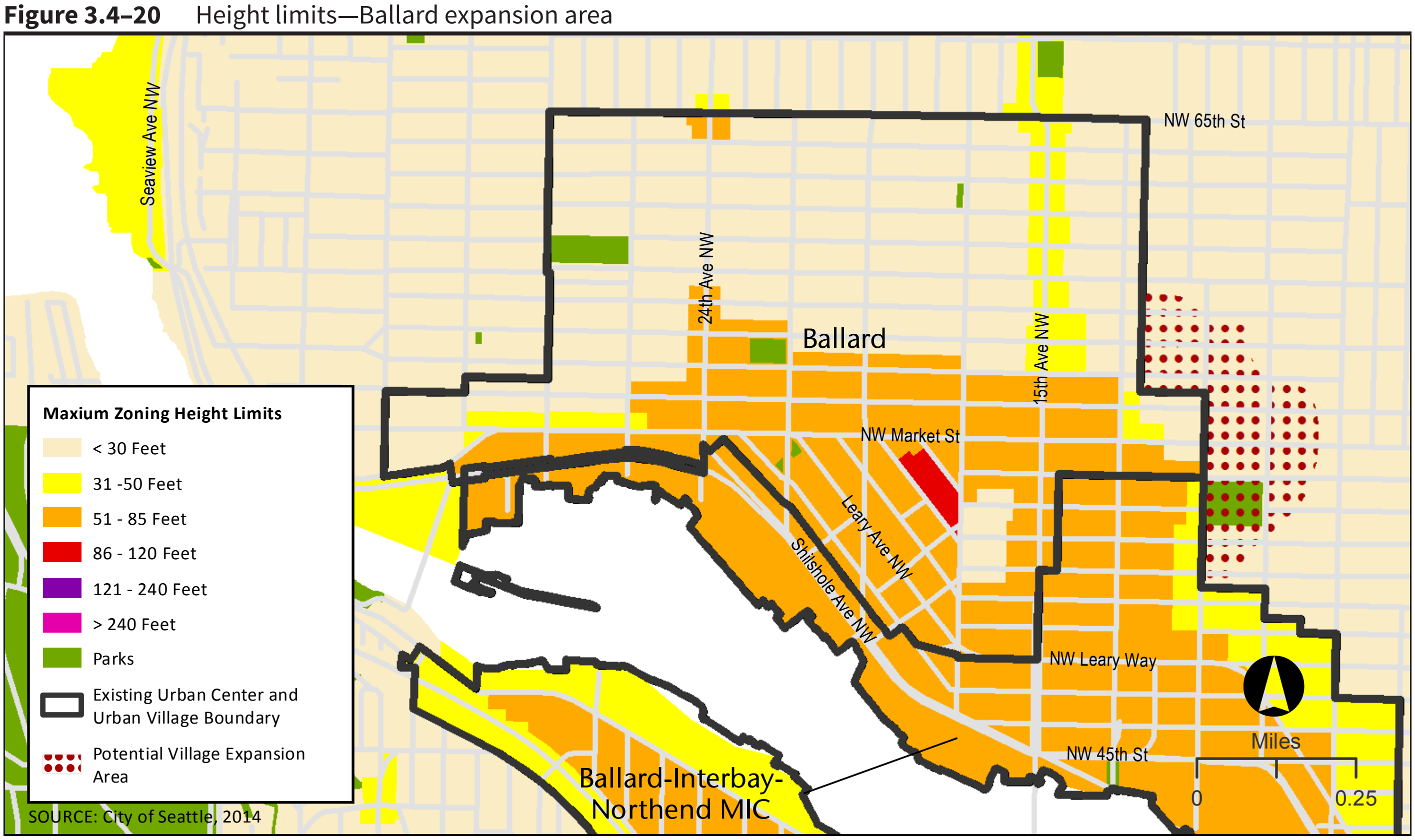


Figure 3.4–21 Height limits—West Seattle Junction expansion area

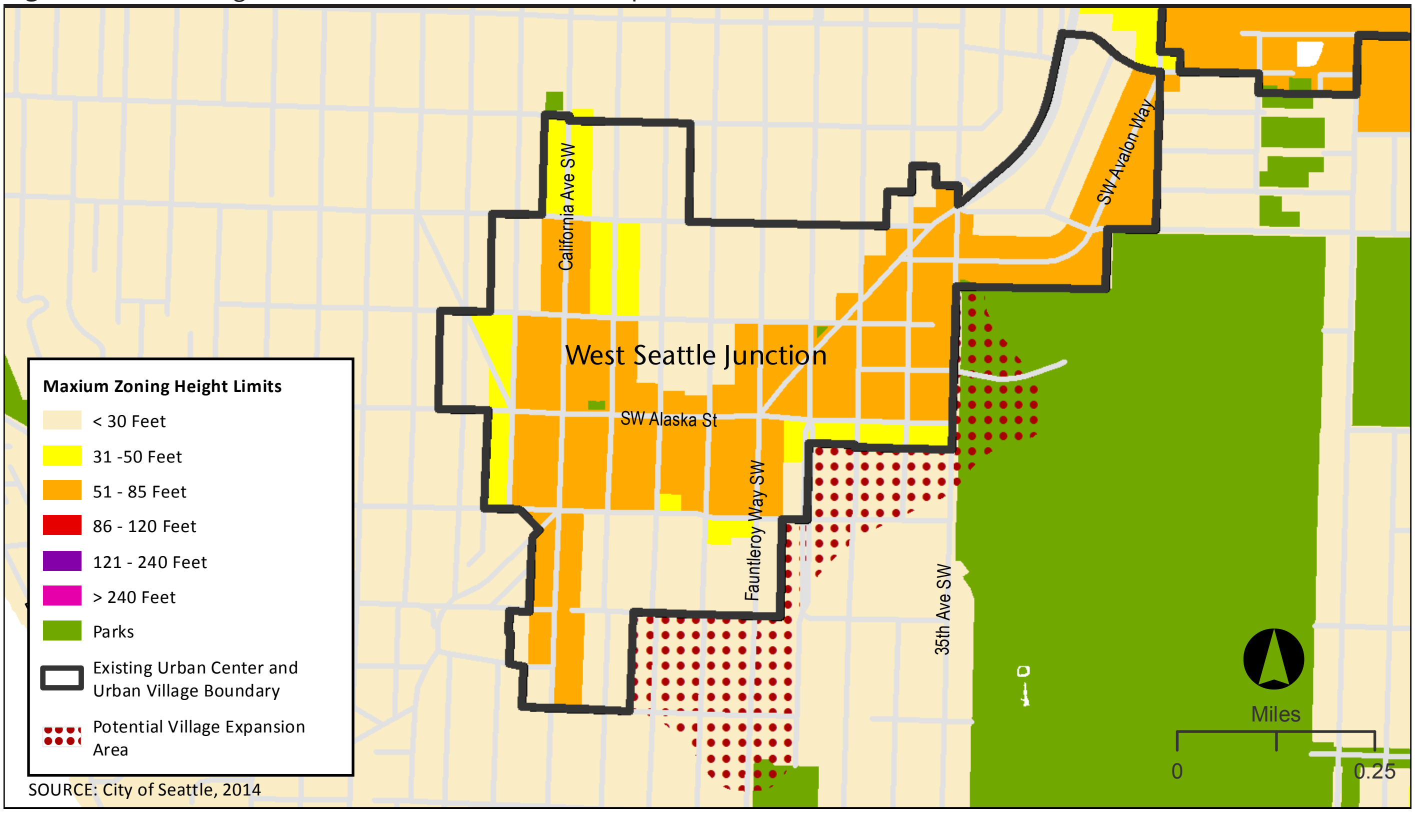
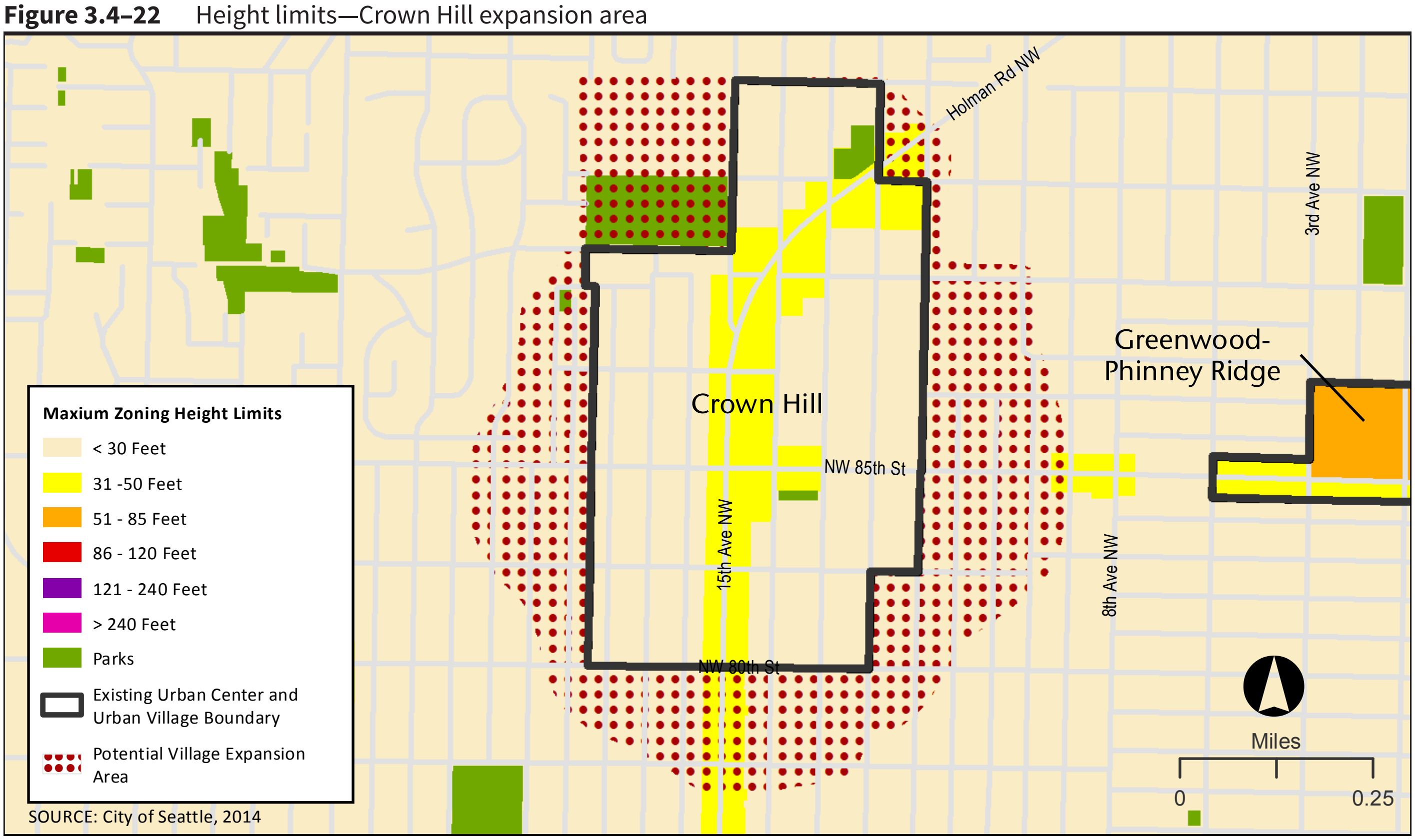


Figure 3.4–22 Height limits—Crown Hill expansion area



As these figures show, the areas to be added to the existing urban villages are characterized by relatively low building heights and low FAR limits. Over time, height and bulk in these areas would increase with additional development, and localized conflicts could occur as the area transitions to a more intense development pattern.

EFFECTS OF OTHER POLICY CHANGES

Alternative 4 would include the same policy amendments related to single-family rezoning and urban village comprehensive plan land use designations as Alternative 3. The effects on land use patterns and compatibility under Alternative 4 would be similar to Alternative 3, with the exception that effects related to urban village comprehensive plan land use designations would have the potential to occur in more locations due to the larger number of possible urban village expansions under Alternative 4.

VIEWS

Impacts to views under Alternative 4 would be similar to those described under Alternative 3. In addition, the expansion of additional urban villages would direct growth to a larger geographic area than Alternative 3. As future development creates additional building height and bulk in urban centers and villages, there is a minor but recognized potential for localized disruption of protected views. The precise nature and degree of potential future view disruptions along scenic routes or from particular SEPA-protected public viewpoints would depend upon specific locational qualities and individual project designs. As applicable, individual project-level review would include detailed evaluation and opportunities to define mitigation during future land use permit application and design review processes.

3.4.3 Mitigation Strategies

APPLICABLE REGULATIONS AND COMMITMENTS

The analysis in this section identifies a range of adverse land use related impacts, but it does not identify these as probable significant adverse impacts, meaning no mitigation strategies need to be defined. The City would continue to rely upon use of regulations in its municipal code, including Land Use Code (Title 23), SEPA rules and policies (Title 25), the design review program (SMC 23.41 and related guidelines), and documents such as Urban Design Frameworks that address design intent in various subareas.

Other Potential Mitigation Strategies

Although not required to address identified impacts, the City could pursue the following kinds of actions if it wishes to address standards or guidelines for addressing possible future conditions:

- Consider amendments to zoning regulations in existing and future urban centers and villages to more directly address transitions to surrounding areas.
- Consider addressing transitions between urban centers/villages and surrounding areas as part of ongoing neighborhood planning efforts.
- Consider additional station area planning efforts in locations where new urban villages could be created, such as NE 130th Street, or where substantial expansion of existing villages could occur. The primary goal of such efforts would be to establish policies, design guidelines and development regulation mechanisms to manage the transition of such areas from their current low-intensity, predominantly single-family character to a more intense, mixed-use pattern that characterizes urban villages. Policies, guidelines and regulations could focus on defining guidance and standards for transitions between development types and mitigating differences of development scale.

3.4.4 Significant Unavoidable Adverse Impacts

Under all alternatives, additional growth would occur in Seattle, leading to a generalized increase in building height and bulk and development intensity over time, as well as the gradual conversion of low-intensity uses to higher-intensity development patterns. This transition would be unavoidable and is an expected characteristic of urban population and employment growth.

In addition, future growth is likely to create localized land use compatibility issues as development occurs. However, the City's adopted development regulations, zoning requirements and design guidelines are anticipated to sufficiently mitigate these impacts. Therefore, no significant unavoidable adverse impacts to land use are anticipated.

3.5 Relationship to Plans, Policies and Regulations

Introduction

This section of the Draft EIS describes pertinent plans, policies and regulations that guide or inform the proposal. Plans and policies of the *Growth Management Act*, the *King County Countywide Planning Policies* and *Vision 2040* define a policy framework with which all comprehensive plans must be consistent. The other plans and policies relate to City of Seattle policy and regulatory framework, including elements of the Comprehensive Plan, several environmental programs (shoreline management and tree preservation) and numerous transportation plans and programs.

For the purpose of this analysis, the general direction of anticipated policy changes is noted. The most significant policy components identified at this time are:

- Distributing updated population/housing and employment forecasts, consistent with the King County Countywide Planning Policies (CPPs);
- Confirming urban centers and villages as the appropriate locations for future growth;
- Using growth "estimates" or growth "targets" for designated urban centers, urban villages and manufacturing/industrial centers (MICs), but considering eliminating estimates for urban villages;
- Using proximity to transit or frequent bus service and walkability as factors to determine the land use pattern of urban centers and villages;
- Possibly modifying the boundaries of some urban villages to correspond to planned light rail stations or frequent bus service;
- Possibly designating a new urban village at NE 130th Street and Interstate-5 if a light rail station is confirmed to occur there;
- Potentially simplifying the Future Land Use Map (FLUM) by indicating a single designation for each urban village type, which would be accompanied by policies describing the types and intensities of uses permitted in each type of village;
- Eliminating land use policies that establish rezone criteria for single family areas, since these criteria are currently already addressed in the Land Use Code;
- Modifying policies in the Housing Element to be consistent with CPP affordable housing goals and adding affordable housing as an appropriate use of City surplus property; and
- Adjusting the quantitative tree canopy goal in the Environment Element to be consistent with the 2013 Urban Forest Stewardship Plan.

The evaluation also considers the relationship of the alternatives to the major state and regional policies that influence the Comprehensive Plan Update—the *Growth Management Act*, *Vision 2040* and the *King County Countywide Planning Policies*—and selected other plans and policy documents.

Growth Management Act

SUMMARY

The Growth Management Act (GMA) establishes policies and procedures intended to manage growth and protect environmental resources. The state's most populous cities and counties must adopt, and periodically update, comprehensive plans that embody state-wide planning goals and adopt development regulations to implement their plans. The planning goals address the following: locating urban and rural growth appropriately; reducing sprawl outside urban areas; adequate multi-modal transportation systems; housing that is affordable to all economic segments of the population; economic development; protecting private property rights; fair and timely permit processing; maintaining resource-based industries; retaining open space and developing parks and recreation facilities; conserving fish and wildlife habitat and protecting the environment; encouraging citizen participation in planning; providing and coordinating adequate facilities and services with growth; and preserving lands with cultural, historic and archaeological significance.

Local plans must contain specific chapters, referred to as elements, that address land use, housing, capital facilities, utilities, transportation, economic development and parks and recreation.[1] Level of service standards must also be established for transportation and may be established for other services. Important infrastructure must be provided concurrent with development, to ensure that growth and local infrastructure systems are synchronized. Plan elements must be internally consistent and must be implemented by development regulations.

Seattle's current plan update is mandated by the GMA statute, and it includes evaluation of new population forecasts prepared by the Washington Office of Financial Management (OFM). OFM's twenty-year county-level population forecast, which is allocated to individual cities through a regional decision-making process, provides an important basis for local comprehensive planning (see the discussion of the Countywide Planning Policies below). Plans and development regulations must provide sufficient land capacity to accommodate the twenty-year forecasts. Cities in King County are required to prepare buildable lands reports to demonstrate that sufficient capacity exists.

1 The requirement for economic development and parks and recreation elements is null and void until sufficient funding to cover local government costs is appropriated (WAC 365-196).

DISCUSSION

Seattle adopted its Comprehensive Plan complying with the GMA in 1994 and it has been amended periodically since that time. The plan contains the elements required by the GMA and the City has adopted land use and environment regulations (SMC Titles 23 and 25) that implement the plan. The Draft EIS alternatives each accommodate the 2035 growth targets and examine different ways the City could distribute its 2035 forecast growth with varying degrees of concentration and dispersal. All alternatives, however, emphasize locating the majority of growth within designated urban centers and urban villages. Focusing growth within urban areas in this manner is consistent with GMA policies that seek to prevent sprawl and preserve rural areas and resource lands. Based on an updated buildable lands analysis (City of Seattle 2014), all alternatives have sufficient zoned vacant and redevelopable land to accommodate the twenty-year population and job forecasts without rezoning.

Vision 2040

SUMMARY

Vision 2040, adopted by the Puget Sound Regional Council (PSRC), contains a strategy and framework for managing growth in the four-county Puget Sound region. The regional growth strategy is to focus a significant portion of the region's future population and job growth in centers, which are compact, mixed-use, pedestrian-oriented areas developed at higher densities. "Regional growth centers" and "manufacturing/industrial centers (MICs)" are designated in *Vision 2040* as the major focal points for population and employment growth; only employment growth is expected in the MICs. Regional centers correspond to the urban centers that Seattle's Comprehensive Plan designates. Cities may also identify other internal subareas that they will plan for population and/or job growth.

Vision 2040 also contains Multicounty Planning Policies (MPPs), which are required by the GMA and provide some direction for the Countywide Planning Policies, which are discussed below. MPP-DP-3 requires the inclusion of local employment and housing targets, including targets for each Regional Growth Center. Periodic updates to the King County Countywide Planning Policies are used to adopt new housing and employment growth targets for all cities in the county.

DISCUSSION

The Comprehensive Plan's urban village strategy is consistent with *Vision 2040*'s regional growth strategy. All of the growth alternatives considered in this EIS assume significant concentrations of housing and job growth in the designated urban centers, a strategy that is promoted in *Vision 2040*. Seattle is planning to accommodate the majority of its projected growth within identified urban centers, urban villages and MICs. This basic strategy is the foundation of the Comprehensive Plan's growth strategy and is embodied in all EIS alternatives.

King County Countywide Planning Policies

SUMMARY

The King County Countywide Planning Policies provide a GMA-mandated framework that all cities in the county must follow when they prepare or update their comprehensive plans. Key policy elements of the CPPs for cities include Urban Centers, Housing, Economy, Transportation and Public Facilities. The CPPs also establish housing and employment growth targets for each city. Seattle's 2015–2035 growth targets (as proportioned and extended by the City) are 70,000 housing units and 115,000 jobs. The CPP's require that housing and employment growth be concentrated in designated centers. Comprehensive plans must adopt maps and growth targets for each urban center and MIC. The CPPs also establish percentage goals for affordable housing, by income categories, which cities should strive to achieve.

DISCUSSION

The City is planning to accommodate the CPP housing and growth targets, and the majority of this growth is being planned to occur within urban centers, urban villages and MICs that have been designated pursuant to *Vision 2040* and the CPPs. The Comprehensive Plan Update would include quantitative targets for designated urban centers and MICs. However, the City may consider some changes to existing Comprehensive Plan's policy direction and terminology for urban village planning estimates, which are discussed further below.

Existing Housing Element policies establish the number of housing units the City will accommodate over the twenty-year planning period (HG1) and goals for various categories of affordable housing (H30). These policies will be revised to remain current with City policy positions. To provide additional opportunities to create affordable housing and achieve the CPP goals, the City may also consider identifying affordable housing as an appropriate use of City surplus land. These changes would be consistent with the GMA, CPP and Comprehensive Plan goals of providing housing affordable to all segments of the population.

Seattle Comprehensive Plan

The following discussion is focused on selected goals and policies in the Urban Village Element and Land Use Element of the Comprehensive Plan. Policy issues embodied in the Draft EIS alternatives relate primarily to variations in the location, amount and pattern of citywide growth, and these variations are the focus of the analysis.

URBAN VILLAGE STRATEGY AND DISTRIBUTION OF GROWTH

<u>**Summary**</u>

The urban village strategy is the foundation of the Comprehensive Plan and shapes the planned pattern of future growth in the City. Four categories of urban villages are identified:

urban centers, manufacturing/industrial centers, hub urban villages and residential urban villages. Each type has a different function and character and is defined in terms of varying relative amounts and intensity of growth, and different mixes of land uses.

Existing Comprehensive Plan goals and policies direct the greatest proportion of future growth to urban centers and urban villages, with the greatest proportion going to designated urban centers (UVG4, UVG31). The current Plan establishes the distribution of 2004–2024 growth among urban centers, urban villages and MICs and to locations outside these sub-areas (UVG32). Growth targets are established for each individual center (UVG34), based on criteria relating to regional and City expectations for centers, zoning and land capacity, existing conditions, access to transit, density goals, infrastructure plans and other factors (UV41). The amount of growth occurring outside villages and centers is intended to be limited, both to preserve existing character and to help focus growth within the centers (UVG36). The growth targets are intended to be used as a tool to help future planning for these areas (UV40).

<u>Discussion</u>

All Comprehensive Plan Update Draft EIS alternatives would maintain consistency with the broad objectives of the Comprehensive Plan by continuing and reinforcing the City's preferred urban village growth strategy, which accommodates the majority of anticipated housing and employment growth in designated urban centers, urban villages and manufacturing/industrial centers. The alternatives examine the effects of focusing different relative amounts of growth within urban centers, but all would be consistent with the existing urban village strategy.

The Update will result in decisions about the distribution of growth and targets for urban centers.

Also, the existing policies that adopt and/or distribute targets (UVG32 and UVG34) would be revised to reflect new targets for the 2015–2035 period.

All Draft EIS alternatives are based on a citywide growth target for 2035—70,000 housing units and 115,000 jobs—and all alternatives have sufficient zoned capacity to accommodate the expected growth distribution without rezoning. Consistent with the adopted Urban Village Strategy, all Draft EIS alternatives would allocate the largest proportion of growth to urban centers. Alternative 1 approximates the current plan's proportion of growth that is allocated to urban centers (42 percent of housing and 61 percent of jobs) and to hub and residential urban villages combined (35 percent of housing and 12 percent of jobs), while Alternative 2 would focus the greatest proportion of 2035 growth within urban centers (66 percent of housing and 72 percent of jobs). Alternatives 3 and 4, respectively, would distribute larger relative proportions of growth to hub and residential urban villages—38 to 46 percent of housing and 15 to 22 percent of jobs—compared to Alternative 1. The wider distribution in alternatives 3 and 4 is intended to examine the effects of locating more housing and jobs within a 10-minute walk of light rail transit stations and frequent bus service.

Industrial activities would locate within designated MICs under all alternatives, consistent with UVG23. No changes to the existing boundaries of MICs are anticipated. Based on updated land capacity estimates, both MICs have sufficient capacity to accommodate the 2035 planning estimates without rezoning.

The amount of growth occurring outside urban villages also varies by Draft EIS alternative, from a high of 23 percent of housing and jobs under Alternative 1 (current plan/No Action) to a low of 6 percent of housing and 7 percent of jobs under Alternative 4. Any of the Draft EIS alternatives would be consistent with the intent of UV7 and UV38, but there is a policy choice for decision-makers relating to the amount of growth that is desired to occur outside of urban centers and urban villages.

The City may consider modifying the terminology and methodology it uses to distribute growth to its centers. The term "planning estimates" may be used in the plan in place of "targets," to help emphasize the fact that the housing and job numbers allocated to individual centers are for planning purposes only, do not have a regulatory effect and do not establish a ceiling or a floor for future growth. This use of growth allocations is consistent with the description in UV40. No functional difference is inherent in the use of the term "estimate" in place of "target."

While *Vision 2040* and the CPPs require that cities adopt "growth targets" for urban centers and MICs, no such requirement applies to the City's locally designated urban villages. The City may even consider discontinuing the use of numerical targets for individual hub and residential urban villages. The precise methodology and benchmarks that would be used to gauge the performance of urban villages in place of numerical growth estimates has not yet been determined. The City currently monitors growth within centers and villages; this monitoring would continue and would enable the City to identify any locations where growth is occurring faster or more slowly than anticipated in capital facility plans and to ensure that infrastructure is coordinated with growth.

DESIGNATION OF URBAN VILLAGES

Summary

The Comprehensive Plan contains policies that guide the designation of urban villages. Criteria address natural conditions, land supply, existing and planned public service and infrastructure capacity, access to transportation and other factors that are conducive to the growth of intensively developed, pedestrian-oriented mixed-use areas over time (UV5). Village boundaries should be clearly defined and used to help focus growth (UV6). The size of residential urban villages may vary with local conditions and residents within the village should be within walking distance of services (UV33). Villages may achieve the desired characteristics and infrastructure over time (UV34).

Discussion

The current boundaries of urban centers and urban villages would not change under Alternative 1 (No Action) or Alternative 2. However, some boundary changes could occur under alternatives 3 or 4, to further the objective of focusing growth within a 10-minute walk of existing or planned light rail stations or frequent bus service. New and modified village boundaries, shown in Figure 2–11 through Figure 2–16 for discussion purposes, could occur at several locations, including at 130th/I-5, where a new residential urban village is being considered to correspond to a possible future light rail station location. UV32 would be modified to reflect any newly designated urban villages. Boundaries shown on Figure 2–11 through Figure 2–16 are conceptual at this time; they will be refined through further planning. To the extent that the 130th/I-5 area does not currently reflect all desired characteristics of an urban village, it would be planned to transition to a more compact, mixed-use pedestrian area over time. This planned transition would be consistent with UV34.

LAND USE ELEMENT

Summary

Most policies in the Land Use Element of the Comprehensive Plan provide direction for the development of particular land uses, and these policies cannot be evaluated meaningfully in the context of the current proposal, which is broad in scope and geographic extent. However, some general citywide Land Use policies do provide direction regarding the desired location and form of growth, and also speak to designations used on the Comprehensive Plan's Future Land Use Map. The FLUM designations are intended to describe broad categories of land uses (LU1) and to require map amendments only when the functions of large areas are changed (LU2). Policies call for adoption of rezone evaluation criteria to guide decisions about land use (LU3), and general policies are provided for each category of land use (e.g., commercial). Specific criteria are included, however, for upzones of single-family zoned land (LU59).

Discussion

A change in the designations used on the Future Land Use Map for urban villages is being considered. A single designation could be applied to each type of urban village, which would be accompanied by policies describing the types and intensity of uses intended for each type of village. While the current Comprehensive Plan's policies broadly address the desired overall character of each type of urban village, they do not clearly describe the desired mix of uses or density. The potential change in map designations would be consistent with the intent of policies LU1 (use broad categories of land uses on the map) and LU2 (require map changes only when the functions of large areas change). The change in designation could reduce the need for Comprehensive Plan amendments to permit changes in land use within urban villages when proposals are consistent with the mix of uses and densities identified for the particular type of village.

LU59 and LU 60 contain detailed criteria for upzones of single-family land, and this is the only land use category for which criteria are provided in the Comprehensive Plan. Elimination of these policies is being considered, since it is more detailed and regulatory than is typical or necessary for a Comprehensive Plan, and because it essentially duplicates criteria that are currently included in the Land Use Code (SMC 23.34.008, 23.34.010). Rezone criteria are addressed sufficiently in the Land Use Code, and elimination of the redundant Comprehensive Plan would be consistent with LU3.

Shoreline Master Program

SUMMARY

The Seattle Shoreline Master Program (SMP) is composed of the Seattle Shoreline Master Program Regulations, the Shoreline Goals and Policies in the Seattle Comprehensive Plan, the Shoreline Restoration and Enhancement Plan required by WAC 173-26-201(2)(f) and Chapter 25.09 regulations for Environmental Critical Areas. Updating the SMP is a state mandated requirement under the State of Washington's Shoreline Management Act (SMA), created by citizen referendum in 1972. The SMA establishes policy goals for the management of shorelines, and the state's SMP guidelines establish the requirements on how to achieve the policy goals, with flexibility to acknowledge local concerns and conditions. The SMA establishes three major policy goals for SMPs:

- ***Preferred Shoreline Uses***: The SMA establishes a preference for uses that are water-oriented and that are appropriate for the environmental context (such as port facilities, shoreline recreational uses, and water-dependent businesses). Single-family residences are also identified as a preferred use when developed in a manner consistent with protection of the natural environment.
- ***Environmental Protection***: The SMA requires protections for shoreline natural resources, including "… the land and its vegetation and wildlife, and the water of the state and their aquatic life …" to ensure no net loss of ecological function. No net loss of ecological functions means that the existing condition of shoreline ecological functions should not deteriorate due to development allowed in the Shoreline District. The existing condition or baseline is documented in the shoreline inventory and characterization report.
- ***Public Access***: The SMA promotes public access to shorelines, including view protection by mandating inclusion of a public access element in local SMPs and requiring provisions to ensure that new development maintains public access features. The goal of the update process is to improve Seattle's SMP to both comply with the new SMA guidelines developed by the Washington State Department of Ecology (Ecology) in 2003 and better implement the people of Seattle's vision for Seattle's shorelines.

The amendments and adoption of the SMP must follow a public process that includes notice and public hearings and approval by the Department of Ecology before they become effective.

The Shoreline District includes all "shorelines of the state," which includes marine water bodies, lakes of 20 acres or larger, streams and rivers with a flow greater than 20 twenty cubic feet per second, uplands extending 200 feet from the ordinary high water mark of waters of the state ("shorelands") and wetlands and floodplains that are "associated" with waters of the state. Seattle adopted its updated SMP in January 2013 and submitted its SMP to Ecology for review. In April 2015, the City adopted additional amendments to policies and regulations to respond to Ecology's comments. Final Ecology approval is pending as of this writing.

DISCUSSION

Seattle water bodies that are subject to the SMA and the City's SMP include Puget Sound, Lake Washington, the Duwamish River, Lake Union, the Ship Canal and Green Lake, as well as associated wetlands. The SMP designates shoreline environments for these water bodies; permitted uses and development standards within each shoreline environment are regulated by the Land Use Code (SMC 23.60A), which establishes a shoreline overlay district.

Several designated urban centers and villages (Downtown and South Lake Union, for example) and both MICs are located adjacent to and within the Shoreline District. The SMP, including the standards of the shoreline overlay district, will apply to all future development that is proposed within waters of the state, adjacent shorelands and associated wetlands, and would mitigate the impacts of planned growth within affected areas under any EIS alternative. Over time, the SMP's Restoration and Enhancement Plan would also restore and improve degraded water bodies and ecological functions.

In areal terms, the largest extent of the City's shoreline resources are located adjacent to lower density residential areas and outside of designated urban villages. Under most EIS alternatives, a relatively small portion of future growth would be planned for these areas. Planned growth outside of urban centers and urban villages varies from a low of 6 percent for Alternative 4 to 12 or 13 percent for alternatives 2 and 3, respectively, compared to a high of 23 percent for Alternative 1 (No Action). EIS alternatives with more concentrated spatial patterns would also be less likely to indirectly result in dispersed shoreline development.

Considering each on its own terms and as a whole, each of the Draft EIS alternatives' growth distribution would be able to be accommodated in ways that would not likely generate significant adverse impacts to the Shoreline District, and would not conflict with the SMP. The most direct relationships to the Shoreline District could arise in relation to the varying amounts of employment growth directed toward MICs in the alternatives. Alternatives 2 and 3 would result in the greatest amounts of projected employment growth in the Greater

Duwamish MIC, with 12,000 and 11,000 added jobs respectively; Alternative 1 has the lowest projected employment growth for this area, with 3,000 added jobs; and Alternative 4 is projected to add an intermediate amount of 6,000 jobs. Projected employment growth in the Ballard-Interbay-Northend MIC would be less than the Greater Duwamish, with 1,500 added jobs under Alternative 1, and 3,000 added jobs under the other alternatives.

However, even these employment growth estimates only approximately address the actual potential for future related development in the Shoreline District, because much of the employment growth that might occur in the MICs would be most likely to occur outside of the Shoreline District. For example, industrial or industrial-commercial development could occur in many parts of the Greater Duwamish MIC while remaining outside of the Shoreline District. Future employment growth that occurs in MIC areas within the Shoreline District will be required to comport with City's SMP. It is also noted that Port of Seattle uses that operate in the Shoreline District could grow in the future, but would be expected to conduct its activities in ways that comport with the City's SMP.

Capital Improvement Program

SUMMARY

The six-year Capital Improvement Program (CIP) is a planning tool, required by state law, that is used to coordinate capital investment priorities and facility planning with the City's budget decisions and available revenues. The CIP itself is a list of projects that are programmed for construction within a six-year time period; the current CIP extends from 2014–2019. CIP planning is ongoing and iterative; the CIP is updated annually as part of the budget process to encompass a new six-year period and to reflect the realities of available revenues and shifting needs. Capital investment priorities are guided by citywide investment policies, which were established in Resolution 31203 (June 2010). Overall program funding decisions for the CIP are guided by policies in the City's Comprehensive Plan.

The functional plans of City departments, such as for transportation and public safety, the Comprehensive Plan's policies, and projects identified in neighborhood plans, are also used to establish departmental priorities. The CIP reflects the City's legislative decision about investments for the six-year period.

Projects selected for implementation are included in the 6-year CIP. Facilities are then planned and constructed based on the availability of funding; in effect, projects compete for available revenues. Fluctuating economic conditions and tax revenues, and revenue-raising limitations imposed by state law (such as property tax limits) affect the funds available for capital projects in any given year, which in turn affects the implementation schedule for individual projects.

The GMA also requires that the City use a twenty-year planning horizon for capital facilities to assess the adequacy and need for capital facilities to accommodate forecast growth. This is intended to ensure that the Comprehensive Plan's land use element and the provision of essential infrastructure are coordinated.

DISCUSSION

Comprehensive Plan policies and priorities regarding the provision and targeting of adequate facilities to urban villages are incorporated in the CIP decision-making processes. The GMA requires the CIP to include a six-year plan that will finance the capital facilities with projected funding capacities.

Urban Forest Stewardship Plan

SUMMARY

A 2007 study estimated that Seattle contains between 1.6 million and 3 million trees, and that canopy cover is approximately 23 percent. The Urban Forest Stewardship Plan (UFSP), adopted in 2013, is based on the principles that trees are a shared community resource, part of the natural urban ecology and provide important environmental and social functions. In addition to beauty, shade and views, the urban forest reduces energy use, sequesters carbon and reduces air pollution, all of which also save money. The UFSP's goals include developing an ethic of stewardship; replacing and enhancing urban forest functions and benefits when trees are lost and achieving a net increase in urban forest functions and benefits; enhancing tree cover to over 30 percent by 2037; removing invasive species and improving diversity. Priority actions identified to achieve the plan's goals include: preserving and maintaining existing trees; restoring and planting new trees; and developing a program of engagement and education to increase awareness of the value and proper care of trees. Regulation of trees on private property is also part of the overall strategy to achieve the UFSP's goals, and the City has adopted tree preservation and replacement requirements in the Land Use Code (SMC 25.11).

DISCUSSION

The Urban Forest Stewardship Plan's goals and the implementing regulations in SMC 25.11 would apply to development that occurs under all EIS alternatives and would help to mitigate for the potential removal of trees and reduction of canopy cover with future development. In this respect, the growth patterns examined under all alternatives would be able to be implemented while remaining consistent with the UFSP's goals.

However, the location of future growth relative to existing canopy cover would also affect the degree of potential future environmental impacts. The following information is offered for general comparative purposes about potential overlap between future growth and areas with tree canopy. The City's Canopy Cover map (Seattle 2009) depicts percentage of canopy cover in City neighborhoods. As might be expected, tree cover tends to be lowest in the most intensively developed areas, which includes designated urban centers (e.g., Downtown, South Lake Union) and MICs (Greater Duwamish and Ballard-Interbay-Northend). Canopy cover tends to be highest in lower density residential neighborhoods located outside of designated urban centers and Villages, particularly those adjacent to Puget Sound and Lake Washington. In general, EIS alternatives that plan for more growth to occur within urban centers or urban villages also plan for less growth to occur outside these centers, and would, therefore, result in less potential disturbance to existing tree cover. Alternative 4 entails the highest proportion of greatest proportion of growth within urban villages and the smallest proportion outside urban villages, and would likely result in the least potential adverse impact upon existing tree canopy coverage. Conversely, a continuation of the current allocation of growth within and outside urban villages (Alternative 1/No Action), has the greatest potential to disturb existing tree canopy cover compared to the other EIS alternatives.

3.6 Population, Employment and Housing

3.6.1 Affected Environment

This section addresses population, employment and housing in the City of Seattle. A review of these aspects of the affected environment—on a citywide scale and for each of the city's urban centers and urban villages—will serve as a baseline for analyzing the impacts of the four different alternative growth scenarios.

Population

CITY OF SEATTLE

Residents: The City of Seattle's population is 640,500 as of 2014, an 8 percent increase between 2000 and 2010 (45,286 new residents) and a further 5 percent gain since 2010 (31,840 new residents). By comparison, growth during the 1990s brought a 9 percent increase in residents, totaling a population of 563,374 in 2000. Over the last twenty years (1990–2010), Seattle's pace of growth (up 18 percent) was slower than King County's 28 percent population gain and the Puget Sound region's 34 percent gain.

Population of Seattle

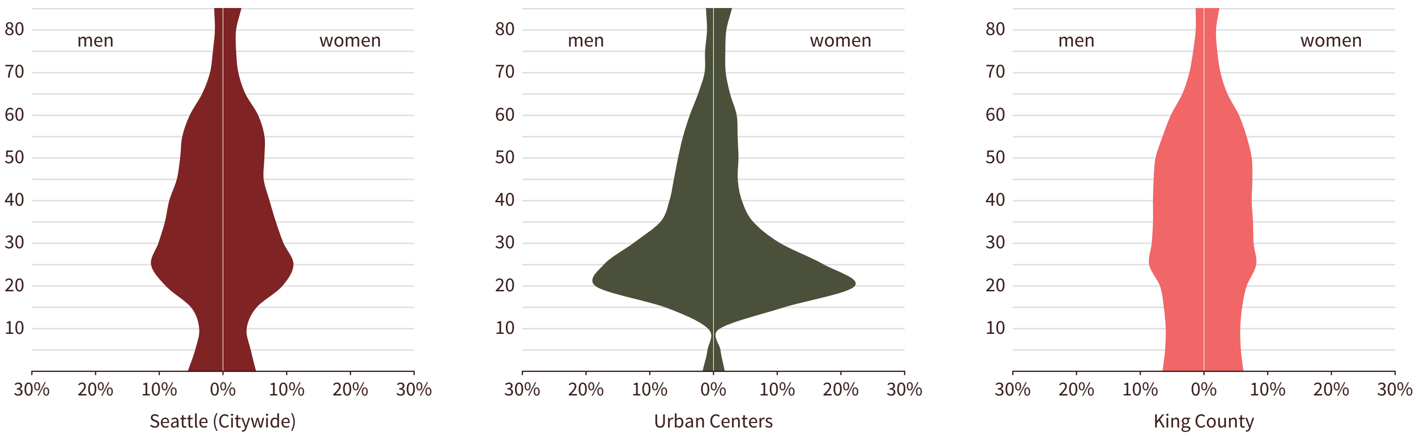
2000
563,374
2010
608,660
2014
640,500

Households: In 2010 Seattle had 283,510 households, with an average household size of 2.06. This compares to an average household size of 2.08 in 2000. The household size trends have been declining: 2.06 in 2010, 2.08 in 2000, 2.09 in 1990 and 2.15 in 1980.

Age Profile: Seattle's demographic age profile includes many young adults: nearly one-half of the population is in the 18 to 44 year old range per the 2010 Census (see Figure 3.6–1).

In-Migration Trend: There is a trend of relatively recent in-migration consistent with Seattle's role as a regional employment and growth center. According to the Washington Office of Financial Management (OFM), King County experienced net in-migration of 34,607 people between 2010 and 2014, in addition to the County's natural increase of 51,394 (net gain from births and deaths); a portion of this in-migration is taking place in Seattle, which includes both domestic and foreign populations. According to census data analyzed by the Martin Prosperity Institute, Seattle attracted between 10,000 and 20,000 international immigrants between 2012 and 2013 alone. As one of the country's leading knowledge and technology hubs, during this same time period Seattle was one of the largest net gainers of domestic migration in the country (CityLab 2014).

Figure 3.6–1 Population profile of the City of Seattle, urban centers in Seattle and King County



Race and Ethnicity: Seattle's population is more diverse than in 1990. The share of persons identifying as white declined from about 75 percent in 1990 to 69.5 percent in 2010; the share of Asian persons increased by 1 percent to 13 percent of the population in the same period, while the share of black or African American persons decreased from about 10 percent to 8 percent from 1990-2010. Persons that identified as Hispanic or Latino grew in population share from 3.6 percent to 6.6 percent in 2010 (persons in any race categories may be of Hispanic or Latino ethnicity). Persons that identified themselves as two or more races grew slightly to about 5 percent of the population in the last ten years. Persons in other race categories—such as American Indian, Alaska Native, Pacific Islander and other—held about the same share or declined slightly in their share of population between 1990 and 2010.[1]

About 18 percent of Seattle's residents were foreign born in 2010, an increase from the 13 percent share in 1990 (Seattle DPD 2014a). About 15 percent of the region's residents were foreign born in 2010, an increase from the 7.6 percent share in 1990.

In 2010, while Seattle's Asian/Pacific Islander and black or African American populations had slightly higher shares in Seattle than those measured for the Puget Sound region's population as a whole, the region's trends demonstrate a faster pace of growth for these populations than in Seattle. Persons of Hispanic/Latino ethnicity in the Puget Sound region are growing the most rapidly of any race/ethnic group within the region (+322 percent over the last 20 years) while Seattle's population identifying as Hispanic/Latino has grown about 120 percent over twenty years.

The population of people of color is not evenly distributed in Seattle. Census data and maps show a substantial concentration of minority populations toward central and southeast Seattle; there is also a concentration of this population in south King County and Pierce County, as well as a notable growth trend in people of color in Snohomish County, the Eastside communities of King County, Shoreline and North Seattle (PSRC 2014).

1 Given differences in how the U.S. Census asked about these questions in 1990 versus later censuses, observation about relative shares of population, trends, and Hispanic/Latino ethnicities must be made carefully.

A "dissimilarity index" has been calculated for the region to evaluate degrees of race/ethnicity concentrations and what they indicate about degrees of integration and segregation among the population. Based on guidelines from the U.S. Department of Housing and Urban Development (HUD), a dissimilarity index value of less than 0.40 indicates "low" levels of segregation, a value of 0.41–0.54 indicates "moderate" levels of segregation and a value of 0.55 or greater indicates "high" levels of segregation. In Seattle, index values that compare among differing groups show "low" levels of segregation, except for values measuring among white and black/African American populations. The dissimilarity index value of 0.50 for 2010 for these groups indicates a "moderate" degree of segregation. Comparisons nationally indicate that among 318 metro areas ranked for these indices, the Seattle-Bellevue-Everett area ranked 172nd for dissimilarity between whites and blacks (with a number 1 ranking indicating the highest levels of segregation). Among metro areas of similar size (between 2 and 3 million persons), Seattle-Bellevue-Everett ranked 11th lowest out of 12 in its dissimilarity index between white populations and black/African American populations (ranked most closely to San Diego; PSRC 2014).

Income: Seattle's population has a higher per-capita income (approximately $40,000) than residents of other communities in the Seattle metropolitan area, and the U.S. as a whole. However, due to Seattle's concentration of single-person households including students and elderly, its median household income was slightly lower than the Seattle metro area's median household income (approximately $61,000 compared to about $64,000).

Seattle's poverty rate was 15 percent for the survey period of 2007-2011: this proportion of households earned less than the poverty threshold, which varies depending on number of people in a household. For example, the poverty threshold for a family of three with one child below age 18 was approximately $18,000. (Seattle DPD 2011; U.S. Census Bureau 2011). Seattle's 15 percent poverty rate was higher than the metropolitan area's poverty rate of 12 percent. Poverty levels, compared to 2007, have trended upward, due in part to the recession that began in 2008. In addition, income data show disparity of poverty rates by race/ethnicity. Black/African American, Hispanic and Asian households earn less than white households in King County: compared to a median household income of approximately $73,000 for white households, black/African American households had a median income of approximately $35,000, Hispanic households had a median income of approximately $48,000 and Asian households had a median income of approximately $70,000 (PSRC 2014; U.S. Census Bureau 2011).

Geographically, the distribution of households with lower incomes occurs broadly throughout most of southeast Seattle, with elevated concentrations in other areas including the University District, Northgate, Bitter Lake, Lake City, South Park, High Point and Highland Park.

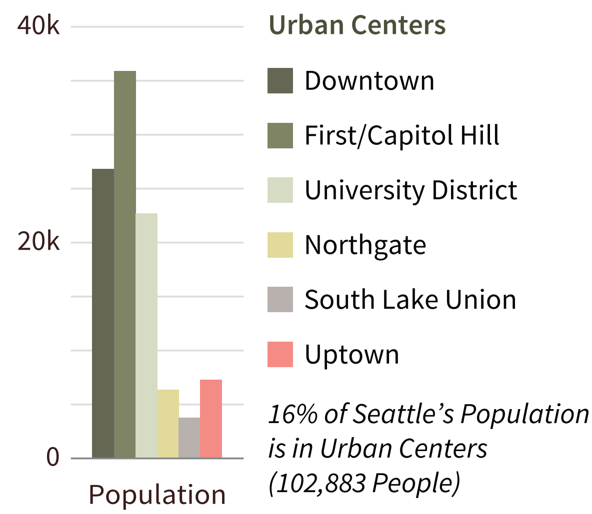
URBAN CENTERS

Approximately 102,883 people currently live in Seattle's urban centers, accounting for 16 percent of the city's total population. Figure 3.6–2 shows the distribution of population throughout the individual urban centers.

Figure 3.6–2 Urban centers: population characteristics, 2010

Urban Center	Population
Downtown	26,844
First/Capitol Hill	35,892
University District	22,704
Northgate	6,369
South Lake Union	3,774
Uptown	7,300

Source: City of Seattle Department of Planning and Development, 2013.



Seattle's urban centers are characterized by racial diversity similar to that of Seattle overall, as shown in Figure 3.6–3. A detailed table of the demographic profile in urban centers can be found in Appendix A.3.

HUB URBAN VILLAGES

Total population in Seattle's hub urban villages is approximately 30,900, accounting for 5 percent of Seattle's total population. Figure 3.6–4 shows the distribution of population throughout the individual hub urban villages.

Figure 3.6–3 shows the racial and ethnic diversity of the hub urban villages as a whole. Individual urban villages vary widely in terms of diversity, with the proportion of white residents ranging from 27.9 percent to 84.8 percent of hub urban village population, and the black population share ranging from 2.2 percent to 26.1 percent of hub urban village population. A detailed table of the demographic profile in hub urban villages can be found in Appendix A.3.

RESIDENTIAL URBAN VILLAGES

Total population in Seattle's residential urban villages was approximately 72,200, accounting for 12 percent of Seattle's total population. Figure 3.6–5 shows the distribution of population for each of Seattle's residential urban villages.

Figure 3.6–3 shows the racial and ethnic diversity of the residential urban villages as a whole. As with the city's hub urban villages, the residential urban villages vary widely in terms of diversity, with white resident population shares ranging from 12.5 percent to 84.4 percent of residential urban village population, and the black population share ranging from 1.8 percent to 45.2 percent of residential urban village population. A detailed table of the demographic profile in residential urban villages can be found in Appendix A.3.

Figure 3.6–3 Population by racial and ethnic categories, 2010

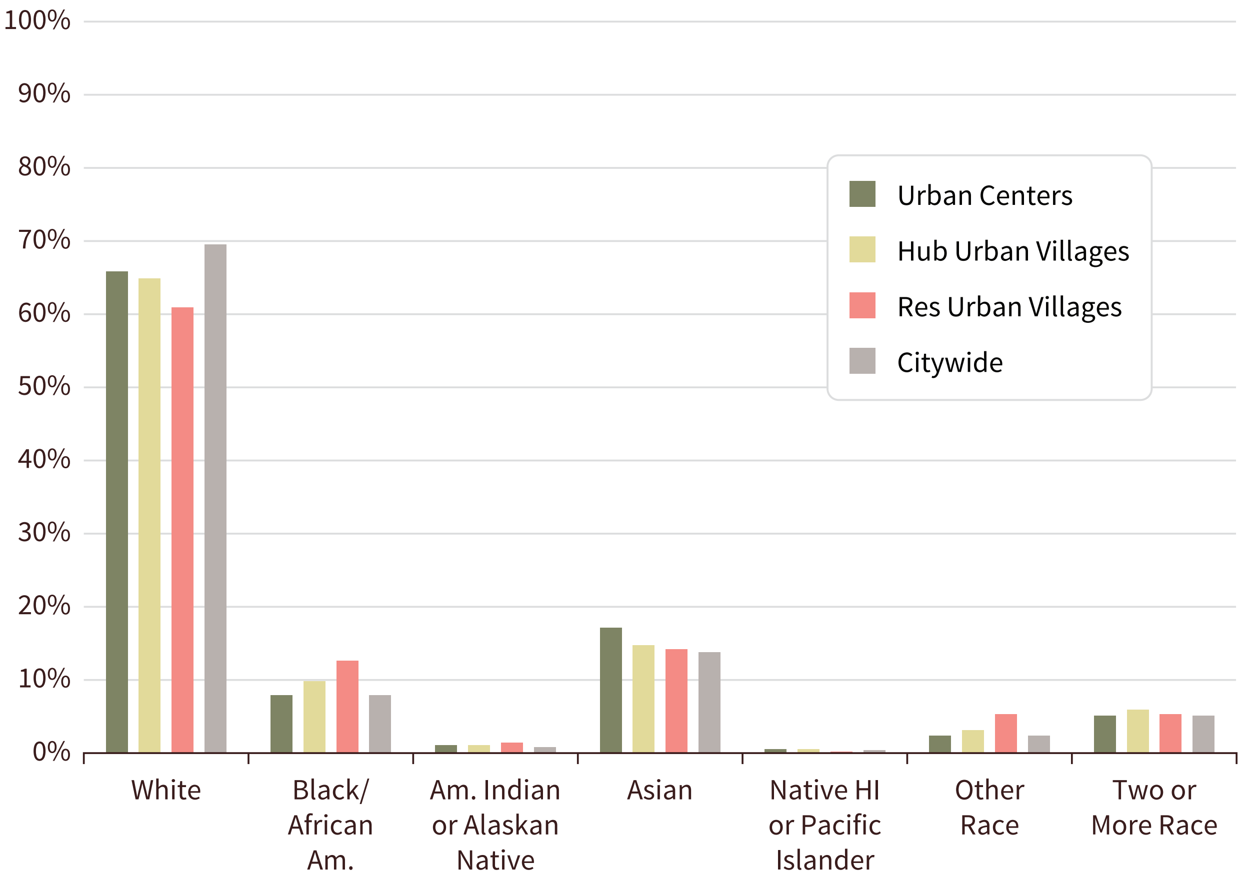


Figure 3.6–4 Hub urban villages: population characteristics, 2010

Hub Urban Village	Population
Ballard	10,078
Bitter Lake	4,273
Fremont	3,960
Lake City	3,899
Mount Baker	4,908
West Seattle Junction	3,788

Source: City of Seattle Department of Planning and Development, 2013.

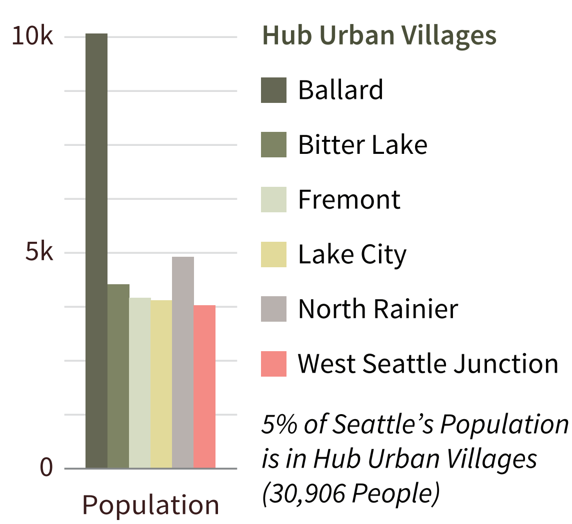
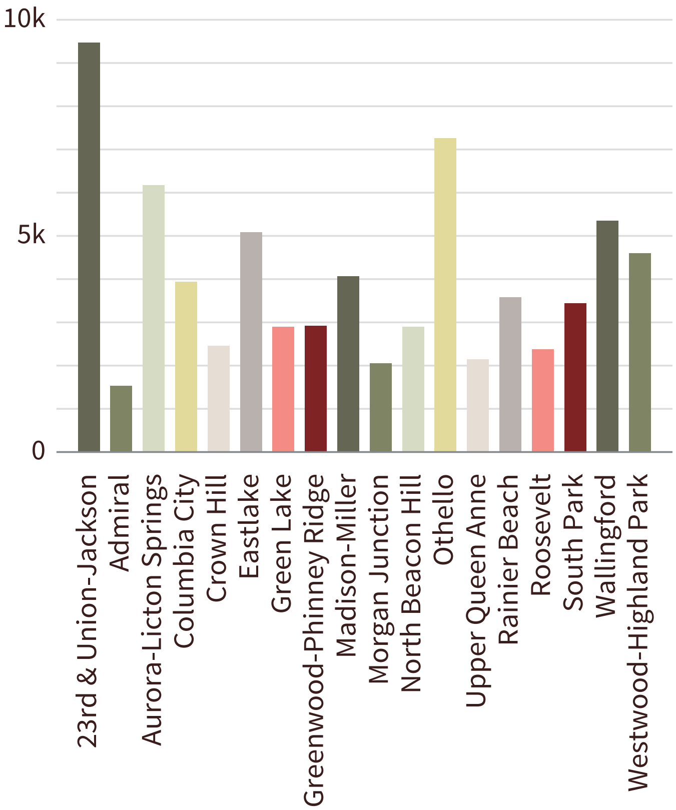


Figure 3.6–5 Residential urban villages: population characteristics, 2010



Residential Urban Villages

12% of Seattle's Population is in Residential Urban Villages (72,279 People)

Residential Urban Village	Population
23rd & Union-Jackson	9,468
Admiral	1,528
Aurora-Licton Springs	6,179
Columbia City	3,937
Crown Hill	2,459
Eastlake	5,084
Green Lake	2,904
Greenwood-Phinney Ridge	2,927
Madison-Miller	4,066
Morgan Junction	2,046
North Beacon Hill	2,900
Othello	7,267
Upper Queen Anne	2,143
Rainier Beach	3,583
Roosevelt	2,384
South Park	3,448
Wallingford	5,350
Westwood-Highland Park	4,606

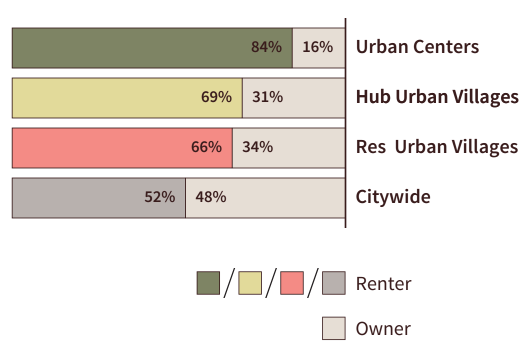
Source: City of Seattle Department of Planning and Development, 2013.

Housing

CITY OF SEATTLE

The City of Seattle had an estimated 317,600 housing units in 2013, of which approximately 48 percent are owner-occupied and 52 percent are renter-occupied (see Figure 3.6–6). A diverse citywide mix of housing ranges from downtown high rises to single-family detached units. Over 90 percent of newer units (numbering about 40,000 net new units built in 2005 and 2014) are in the form of multifamily and mixed-use units. Over 3/4 of the 40,000 net new units built in 2005-2014 are located in Seattle's urban villages.

Figure 3.6–6
Renter versus owner occupied housing, 2010



Source: City of Seattle, Census 2010.

Although approximately 55 percent of Seattle's housing stock consists of multifamily units, multifamily structures account for only approximately 16 percent of the residential structures in the City. Single family homes, by contrast, account for 84 percent of the residential structures, but supply only 45 percent of Seattle's housing units. Seattle's housing stock is more heavily represented by multifamily units than the regional average of 43 percent (Seattle DPD 2014b).

The City of Seattle Department of Planning and Development annual building permit summaries indicate that in the five years from 2010 to 2014, there were 24,432 residential units completed and 2,152 lost for a net gain of 22,280 units. The trends since 2005 show that housing unit gains in Seattle remained high even through the recession years, with average annual net gain in units between 2005 and 2014 at 4,287 units.

Just over 8 percent of the units completed during this time were single family homes and around 17 percent were multifamily. About 73 percent of the new units were mixed use residential, many of which were located in downtown neighborhoods or urban villages such as Ballard, Capitol Hill, Columbia City and West Seattle Junction. From 1995–2009, only 35 percent of units in completed projects were mixed-use. A sharp, upward trend in mixed use completions started in 2007, and by 2013 82 percent of units completed were in mixed-use projects.

According to Polaris Pacific's May 2014 condominium and apartment market report, 1,343 condominiums and 9,522 apartment units were either under construction or permitted within the city (Polaris Pacific 2014) at that time.

Housing Affordability

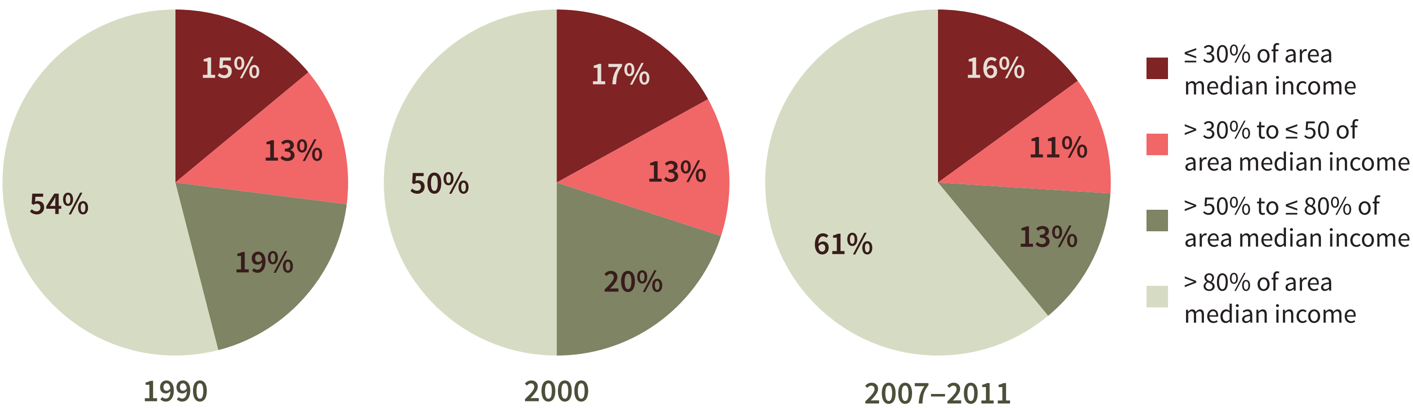
Housing affordability is typically expressed in relation to household income, sometimes referred to as a rent-to-income ratio. According to HUD, housing that costs 30 percent or less of a household's gross income is considered affordable. Households that pay more than 30 percent of their gross income for housing costs (rent and basic utilities; or mortgage, including principal interest taxes and insurance, homeowners dues and other costs directly related to ownership of a unit) are "cost-burdened" with respect to housing, and those households that pay more than 50 percent of their gross income for housing costs are "severely cost burdened."

Our nation's urgent housing challenges are well documented. In Seattle and other high-cost cities, housing affordability is of particular concern as income inequality increases. Figure 3.6–7 on the following page summarizes estimates by HUD of shares of households by income level.

As shown in Figure 3.6–7, most Seattle households (61 percent) earn at least 80 percent of the area median income (AMI); this group was the only of the four categories to grow over the decade between 2000 and 2011. The smallest share of households in Seattle has consistently been those within the 30 to 50 percent AMI category.

Demand for housing by a growing share of households with greater wealth and income has put upward pressure on housing costs, particularly rents. This has resulted in increasing

Figure 3.6–7 Share of total households by household income level, 1990, 2000 and 2007–2011



Sources: U.S. Department of Housing and Urban Department (HUD), Consolidated Housing Affordability Strategy (CHAS) Datasets; U.S. Census Bureau, 1990 and 2000; 5-Year American Community Survey 2007-2011; City of Seattle.

housing cost burden for lower income households, as summarized in Table 3.6–1. Households that pay more than 30 percent of their household income for housing costs are defined by HUD as "housing cost burdened."

Housing burden data shows the extreme burden that those Seattle residents in lower AMI categories experience. However, increases in the shares of households in the 50 to 80 percent AMI and the over 80 percent AMI categories experiencing housing cost burden illustrate an increasing affordability issue in Seattle across all income groups. There is a widening gap between housing costs and income across all income categories. Overall, the percentage of households spending 30 percent or more on housing costs is increasing.

Table 3.6–1 Share of total renter households with housing cost burden, 1990, 2000 and 2007–2011

Income Category	1990	2000	2007–2011
≤ 30% of area median income	75.6%	70.5%	76.2%
> 30% to ≤ 50 of area median income	74.1%	71.7%	79.0%
> 50% to ≤ 80% of area median income	33.8%	35.7%	46.4%
> 80% of area median income	Not available	5.9%	10.4%

Sources: U.S. Department of Housing and Urban Department (HUD), Consolidated Housing Affordability Strategy (CHAS) Datasets; U.S. Census Bureau, 1990 and 2000; 5-Year American Community Survey 2007-2011; City of Seattle.

Table 3.6–2 summarizes the shares of households in each income level defined by HUD as "severely cost burdened," meaning they spend more than one-half of their income for housing costs.

Table 3.6–2 Share of total renter households with severe housing cost burden, 1990, 2000 and 2007–2011

Income Category	1990	2000	2007–2011
≤ 30% of area median income	54.8%	54.4%	61.0%
> 30% to ≤ 50 of area median income	20.5%	21.6%	27.8%
> 50% to ≤ 80% of area median income	3.1%	4.3%	7.8%
> 80% of area median income	Not available	0.7%	0.8%

Sources: U.S. Department of Housing and Urban Department (HUD), Consolidated Housing Affordability Strategy (CHAS) Datasets; U.S. Census Bureau, 1990 and 2000; 5-Year American Community Survey 2007-2011; City of Seattle.

The trends for those households experiencing severe housing cost burdens are similar to those spending over 30 percent of their income. Increases in the shares of households by income level experiencing severe housing cost burden were not as drastic in the decade between 1990 and 2000 as they were in the decade following 2000. Overall, the percentage of households spending 50 percent or more on housing costs is increasing. Average rents are highest in Downtown, South Lake Union and other urban centers and villages in or near the center city and by the Ship Canal (see Table 3.6–3).

Average rent for 1-bedroom units in Seattle increased 35 percent between 2005 and 2014, after adjusting for inflation. Table 3.6–4 on the following page summarizes the percent by which average rent for 1-bedroom apartments increased, in market areas defined by Dupre+Scott Apartment Advisors. The market areas are in order of rent increase, from greatest to least. The 2005 rents are adjusted for inflation.

Sales prices based on closed sales for all residential units, including condominiums, either stayed stable or declined during the 2005–2014 period by as much as 10 percent (in "Central Seattle SW, Beacon Hill"), after adjusting for inflation. The only Northwest Multiple Listing Service (NWMLS)

Table 3.6–3 Average rent for 1-bedroom unit by market area, 2014

Market Area	Avg. Rent/Unit
Belltown/Downtown/South Lake Union	$1,841
Ballard	$1,489
Queen Anne	$1,469
Greenlake/Wallingford	$1,444
Capitol Hill, Eastlake	$1,430
First Hill	$1,409
Central	$1,380
Madison/Leschi	$1,284
Magnolia	$1,248
University	$1,240
West Seattle	$1,211
Beacon Hill	$1,055
Rainier Valley	$1,042
North Seattle	$1,020

Source: Dupre+Scott Apartment Advisors, Apartment Vacancy Report, 20+ Unit Buildings, Fall 2014, 14 market areas.

Table 3.6–4 Percent increase in average rent for 1-bedroom units, 2005 versus 2014

Market Area	Percent Increase
Ballard	63%
Rainier Valley	47%
Capitol Hill/Eastlake	42%
West Seattle	35%
First Hill	34%
Queen Anne	34%
Magnolia	33%
University	32%
Green Lake/Wallingford	32%
Beacon Hill	30%
Belltown/Downtown/South Lake Union	26%
Central	16%
Madison Leschi	15%

Source: Dupre+Scott Apartment Advisors, Apartment Vacancy Report, 20+ Unit Buildings, Fall 2014, 14 market areas.

market area in Seattle to experience an increase in home sale prices between 2005 and 2014, totaling 9 percent, was what NWMLS refers to as "Central Seattle, Madison Park, Capitol Hill."

Areas with high rates of growth may experience greater upward pressure on housing costs relative to slower growing areas. Average rents for units built in 2012 through 2014 were 23 percent higher than those for all units citywide (Dupre+Scott Apartment Advisors 2014).

The City's Office of Housing maintains a list of income and rent-restricted housing units based on best available information from Seattle's Office of Housing, Washington State's Housing Finance Commission, HUD and Seattle Housing Authority. In 2014, there were over 27,000 rent-restricted units in the City's subsidized housing inventory.

The inventory does not include units produced on-site through the City's incentive zoning program and the multi-family tax-exempt (MFTE) units that are voluntarily rent-restricted for up to 12 years. As of 2014, 4,650 affordable units have been produced through the MFTE, and 111 affordable units have been produced on-site using incentive zoning (this does not include number of affordable units produced with nearly $53 million of developer contributions through incentive zoning's housing bonus payment option, which is part of the 27,000+ unit figure).

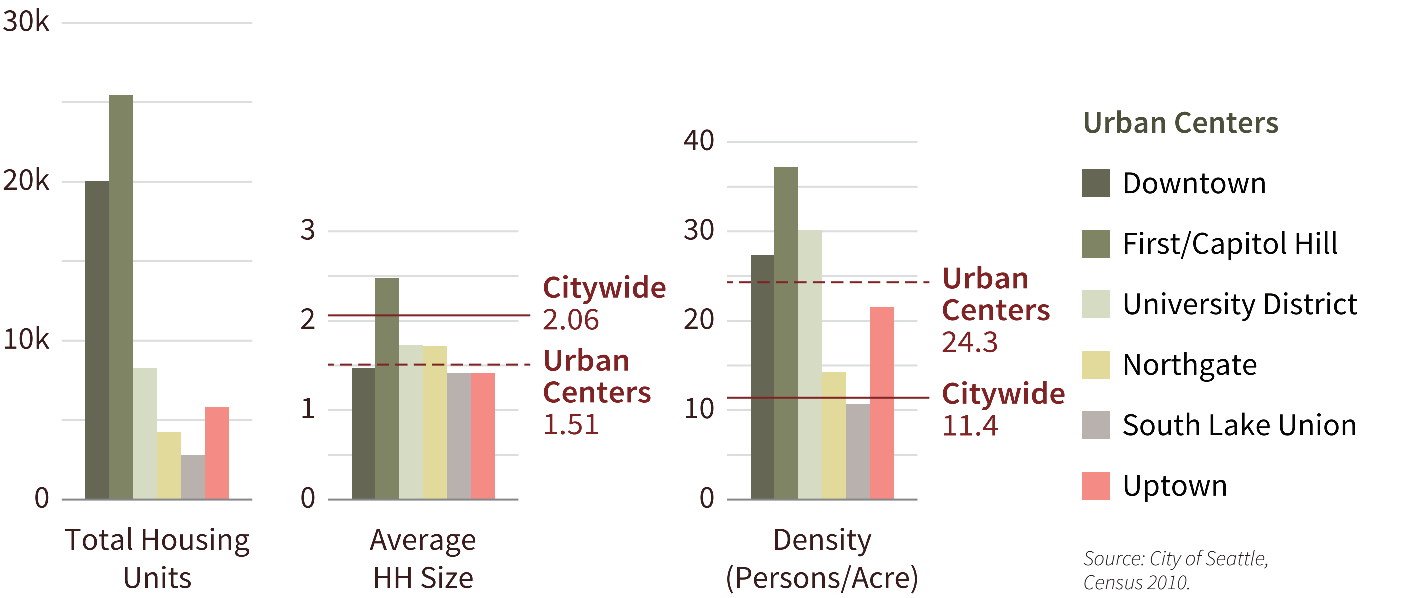
URBAN CENTERS

Housing in Seattle's urban centers is provided at densities ranging from low/moderate to in some cases high densities, with an emphasis on multifamily units. The average density of the urban centers is 24.3 persons per acre, with an average household size of 1.51 (Seattle DPD 2011; City of Seattle 2014e; BERK 2014). The urban centers contain approximately 66,500 units, representing about 22 percent of Seattle's total housing units. On average, about 84 percent of occupied units in the urban centers are rentals and 16 percent owner-occupied. Figure 3.6–6 and Figure 3.6–9 show tenure and housing characteristics for each of the six urban centers. Appendix A.3 contains a detailed table of the housing mix in urban centers.

HUB URBAN VILLAGES

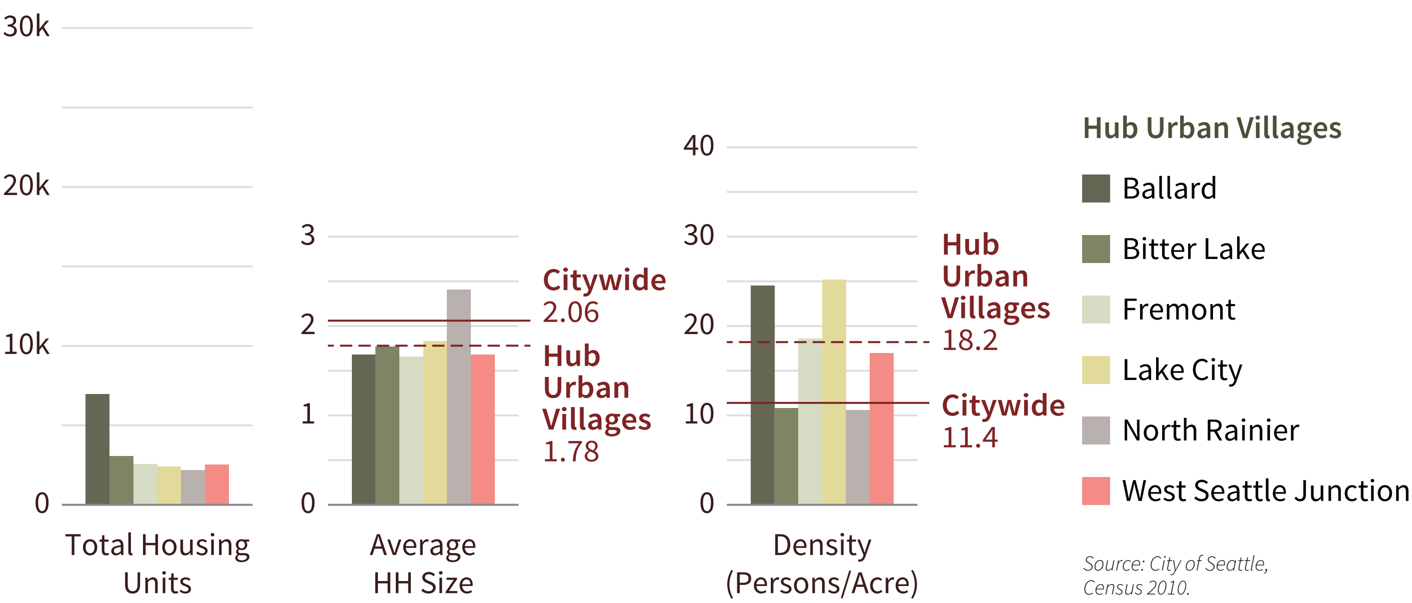
Housing in Seattle's hub urban villages is generally at low to moderate densities, with a variety of unit types. The average density of the hub urban villages is 18.2 persons per acre, with an average household size of 1.78. Certain hub urban villages such as Bitter Lake and Mount Baker are at lower densities given their traditionally commercially-dominated use

Figure 3.6–9 Urban centers: housing characteristics, 2010



Source: City of Seattle, Census 2010.

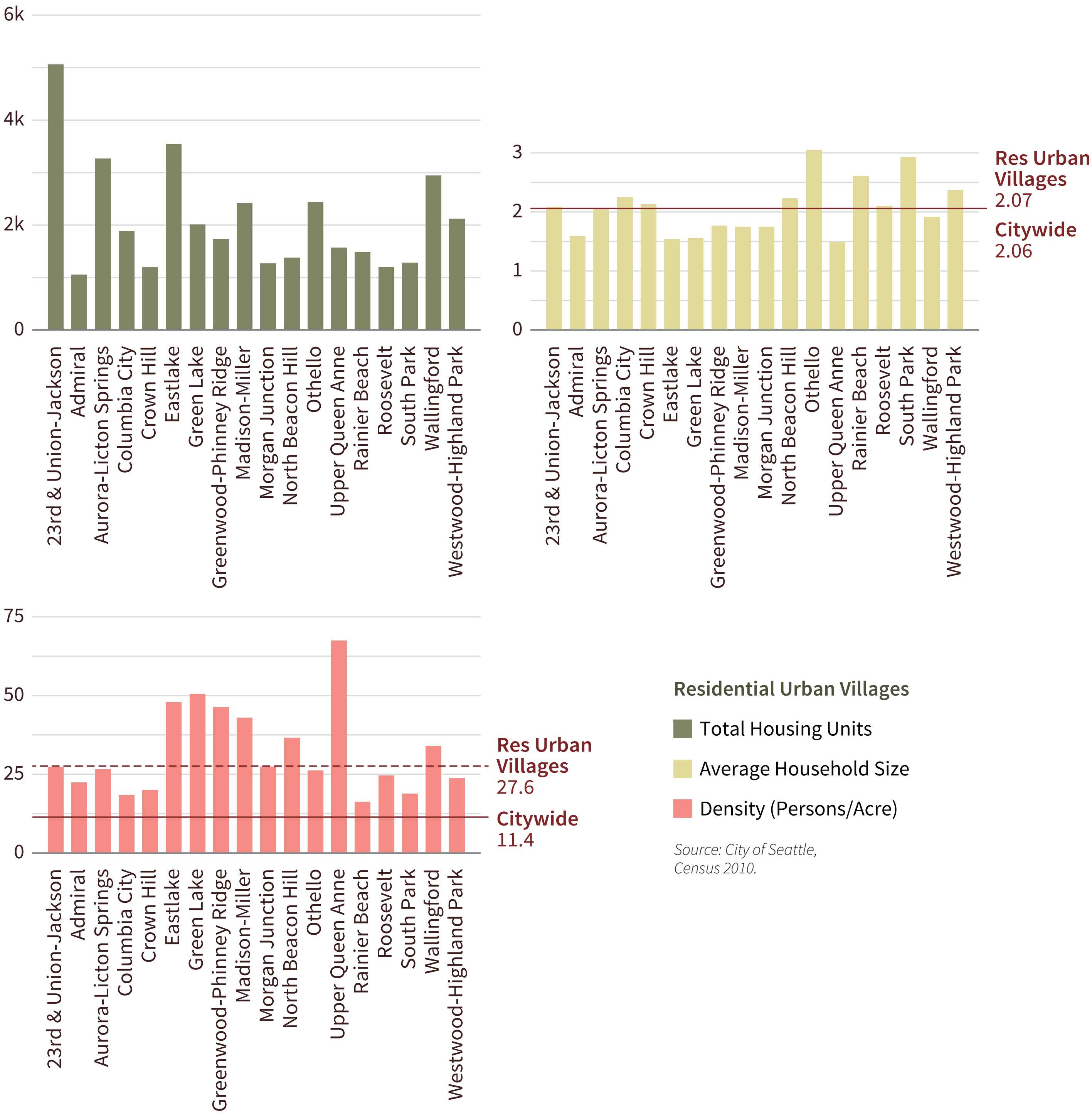
Figure 3.6–10 Hub urban villages: housing characteristics, 2010



Source: City of Seattle, Census 2010.

patterns that still persist, while other hub urban villages such as Lake City are more compact. Hub urban villages contain approximately 19,759 units, representing about 6 percent of Seattle's overall housing units. On average, 58 percent of these units are rentals, with 42 percent owner-occupied. Figure 3.6–6 and Figure 3.6–10 show tenure and housing characteristics for each of the six hub urban villages. Appendix A.3 contains a detailed table of the housing mix in hub urban villages.

Figure 3.6–11 Residential urban villages: housing characteristics, 2010



Source: City of Seattle, Census 2010.

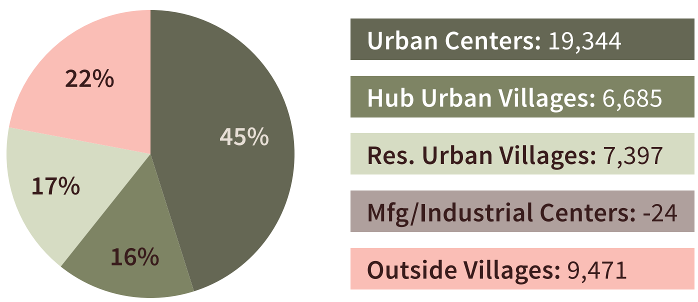
RESIDENTIAL URBAN VILLAGES

Housing development in Seattle's residential urban villages generally consists of medium to high density development types. Residential urban villages have an average household size of 2.07 persons—essentially the same as the citywide average of 2.06 persons per household—and the actual density of development varies widely between villages. Population density averages 27.6 persons per acre, but varies from as low as 12.6 persons per acre to as high as 40.4 persons per acre. This reflects the differing past histories of the urban villages with varying degrees of established residential presence, and also reflects the tightness of defined urban village boundaries in some cases. Residential urban villages contain approximately 37,832 units, representing 12 percent of Seattle's overall housing units. On average, 66 percent of these units are rentals and 34 percent are owner-occupied. Figure 3.6–6 and Figure 3.6–11 show tenure and housing characteristics for each of the residential urban villages. Appendix A.3 contains a detailed table of the housing mix in residential urban villages.

HOUSING DEVELOPMENT TRENDS

As shown in Figure 3.6–12, new housing development in Seattle since 2005 has occurred mostly in urban centers and in areas outside centers or villages, followed by residential urban villages and hub urban villages, respectively. The MICs experienced a net reduction in housing during this period, in keeping with their industrial, employment-related character.

Figure 3.6–12 Net new residential units, 2005–2014



Source: DPD Permit Warehouse, Building Construction Permits.

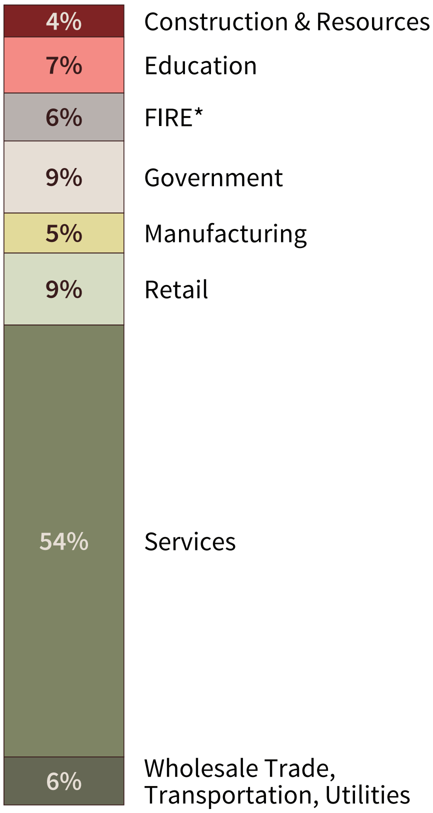
The total number of units built between 2005 and 2014 was 48,359. With 5,486 units demolished over this time, the net new amount of units built over that period was 42,873.

Employment

CITY OF SEATTLE

The City of Seattle contained approximately 500,000 jobs in 2013, broken down into eight sectors identified in Figure 3.6–13. The sector with the greatest representation is the services

Figure 3.6–13
Seattle employment by sector



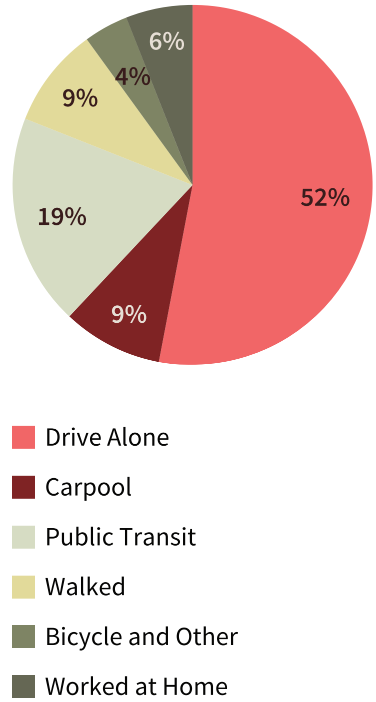
* Finance, insurance and real estate

Source: PSRC, 2013.

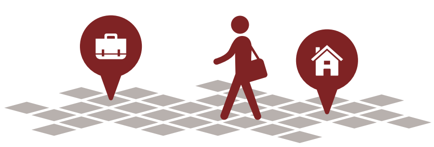
Figure 3.6–14 Worker commute modes in Seattle

Mode	Quantity
Car, truck or van—drove alone	182,436
Car, truck or van—carpooled	32,693
Public Transportation	64,944
Walked	31,863
Bicycle	11,923
Other (incl. motorcycle, taxicab, etc.)	4,559
Worked at Home	22,265
Total	**350,673**

Source: US Census Bureau. 5-year ACS. 2012.



sector, which is responsible for around 54 percent of employment in the city. Employment in Seattle and the Puget Sound region is highly influenced by the presence of high-tech and biotech industries; this industry cluster in particular has drawn related businesses to Seattle and has contributed to in-migration and the growth in population of young professionals.



74% *of Seattle residents live and work in the same place, a significantly greater share than the average across the country*

About 74 percent of workers in Seattle both live and work within the city. According to Census data, the majority of Seattle's residents commute to work, both inside and outside the city, by driving alone. Figure 3.6–14 shows 2012 American Community Survey results for Seattle worker commute modes. While single-occupant vehicle commuting is still the dominant mode, 19 percent of Seattle residents commute by public transit and an additional 13 percent commute by bicycle or on foot. Approximately 69 percent of Seattle's 2012 employment was concentrated in the city's urban centers and villages (Seattle DPD 2014b), which are the most accessible hubs for commuters of all modes, particularly those using public transit modes provided by King County Metro, Sound Transit, Washington State Ferries and Community Transit.

URBAN CENTERS

According to the 2012 Covered Employment Estimates from Washington State's Employment Security Department (ESD) as analyzed by the City, urban centers contain 57 percent of Seattle jobs, including 77 percent of finance, insurance and real estate (FIRE) industry jobs, 58 percent of retail jobs, 60 percent of service jobs, 68 percent of government jobs and 76 percent of education jobs (see Figure 3.6–15 on the following page). Appendix A.3 contains a detailed table of employment by sector in urban centers.

HUB URBAN VILLAGES

Seattle's hub urban villages contain 5 percent of Seattle's jobs, with the highest sector shares in retail (10 percent) and construction and resources (8 percent). See Figure 3.6–16 on the following page for a breakdown of employment by sector for each hub urban village.

RESIDENTIAL URBAN VILLAGES

Seattle's residential urban villages contain approximately 7 percent of Seattle's employment. The highest sector shares of Seattle's jobs in residential urban villages are retail (11.2 percent) and services (7.8 percent). See Figure 3.6–17 on the following page for a breakdown of employment by sector for each residential urban villages.

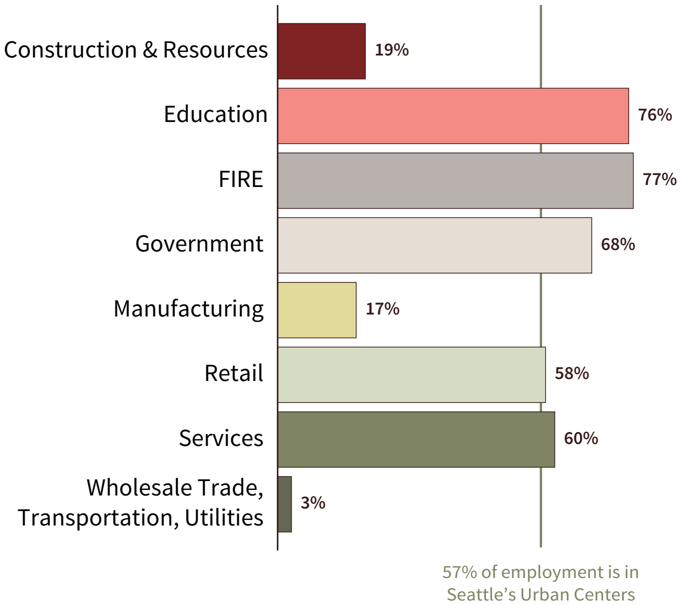
MANUFACTURING/INDUSTRIAL CENTERS

Seattle's Greater Duwamish and Ballard-Interbay-Northend manufacturing/industrial centers (MICs) are important regional centers and drivers of employment growth for the manufacturing and industrial sectors. According to the 2012 Covered Employment Estimates from Washington State's ESD as analyzed by the City, Seattle's manufacturing/industrial centers contain approximately 15 percent of Seattle's employment. The highest shares of each of the following job sectors are located in manufacturing/industrial centers: construction and resources (43.9 percent), manufacturing (62.5 percent), wholesale trade, transportation and utilities (52.7 percent). See Figure 3.6–18 on the following page for a breakdown of employment by sector for the two manufacturing/industrial centers.

The Ballard-Interbay-Northend MIC has an industrial character, with a significant presence of maritime industries located on the Ballard Ship Canal. It is anchored on the north by Port of Seattle's Fisherman's Terminal Marina on the canal and on the south by the Port of Seattle's Pier 91 Cruise Facility and the Terminal 86 Grain Facility on Puget Sound. Freight rail lines run through Ballard-Interbay-Northend MIC, connecting the land and sea shipping networks.

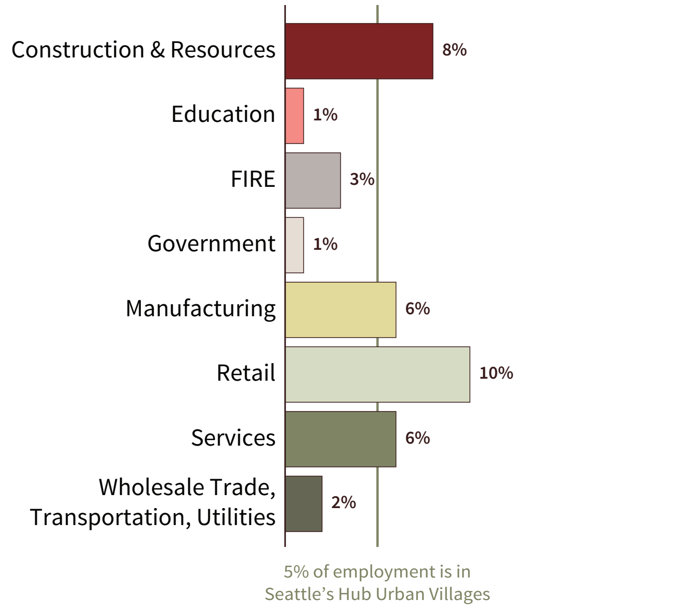
The Greater Duwamish Center contains Seattle's primary port terminal, which acts as an intermodal hub for marine, air, rail, land and water transportation networks. The Port of Seattle Seaport, located where the terminus of the Duwamish meets Elliott Bay, operates a range of cargo activities on the 1,500 acres of waterfront property. The Seaport was the 3rd largest load center in 2014, and creates a significant impact on Seattle's and the state's economies (Port of Seattle 2015b).

Figure 3.6–15 Percent of Seattle employment sectors in urban centers



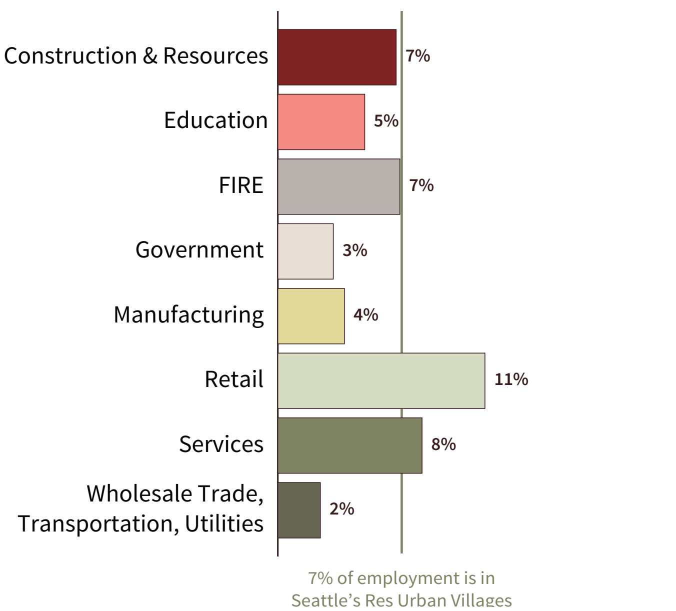
Source: Washington State Employment Security Department, 2012.

Figure 3.6–16 Percent of Seattle employment sectors in hub urban villages



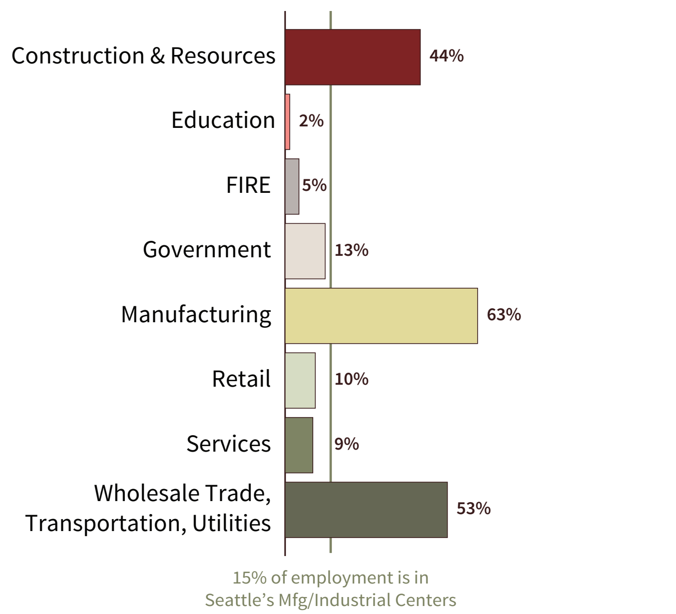
Source: Washington State Employment Security Department, 2012.

Figure 3.6–17 Percent of Seattle employment sectors in residential urban villages



Source: City of Seattle, 2012 Covered Employment Estimates (ESD)

Figure 3.6–18 Percent of Seattle employment sectors in manufacturing/industrial centers



Source: Washington State Employment Security Department, 2012.

The Port of Seattle has a large influence on Seattle's economy and drives economic activities in a variety of related sectors. With the exception of a few smaller properties, much of the Port of Seattle's activities are located on properties within Seattle's two manufacturing/industrial centers, and much of the economic growth directly related to the Port occurs in these areas. In 2013, the Port generated about 216,000 jobs, and businesses located on Port properties saw $19.8 billion in revenues and generated $894 million in state and local taxes (Port of Seattle 2015a).

3.6.2 Impacts

Impacts Common to All Alternatives

POPULATION AND HOUSING

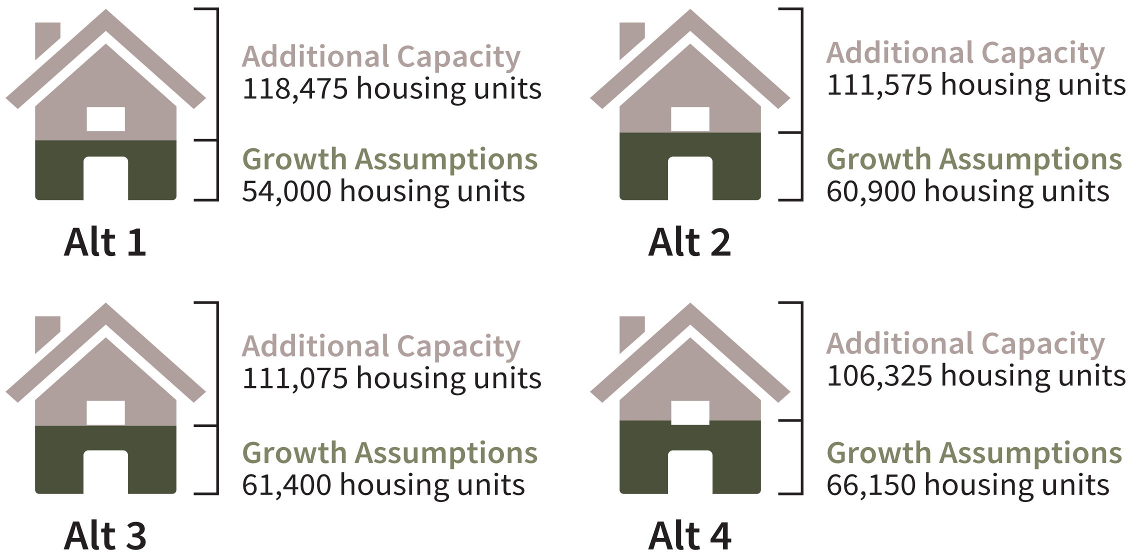
The four alternatives are distinguished by the way growth is distributed across the city's urban centers, villages and other areas. As described in Chapter 2, the rationales for the alternatives' growth distributions range from Alternative 1's continuation of current growth policy preferences in the Urban Village strategy, to pursuing a higher concentration of growth in the urban centers (Alternative 2), to increasing the emphasis on locating growth in areas relatively close to transit service (alternatives 3 and 4).

Under all four alternatives, the defined growth areas (including urban centers, hub urban villages and residential urban villages) have sufficient development capacity to accommodate planned levels of residential growth during the planning period (as shown in Figure 3.6–19), and none of the alternatives assume rezones are needed to increase allowed residential densities. However, alternatives 3 and 4 contemplate the possibility of FLUM mapping policy and designation changes that could affect future use-density possibilities. To the extent that future infill housing development occurs anywhere in the city, population density would increase and developable land would decrease over time. All four alternatives prioritize residential growth in urban centers and urban villages over other areas. Housing in urban villages is likely to be provided primarily in multifamily structures, which would continue Seattle's trend toward apartment and condominium units in the overall mix of available housing. It is likely that future housing will include a greater share of smaller-sized units, given current trends in housing development and the city's lower average household sizes of 2 persons or less in its urban centers and villages.

FLUM: Future Land Use Map

Housing affordability will be an issue of concern under all four alternatives, including Alternative 1. As noted in the Affected Environment section, a significant portion of Seattle's households are burdened by housing costs and, over 60 percent of the lowest income renter households (≤ 30 percent of AMI) are estimated to pay more than one-half of their income for rent and basic utilities. Ultimately, housing prices are likely to be driven by demand generated as a result of Seattle's strong job market and attractive natural and cultural ame-

Figure 3.6–19 Urban village housing capacity and growth assumptions*



* Existing capacity within urban villages is 172,475 housing units (same for all four alternatives).

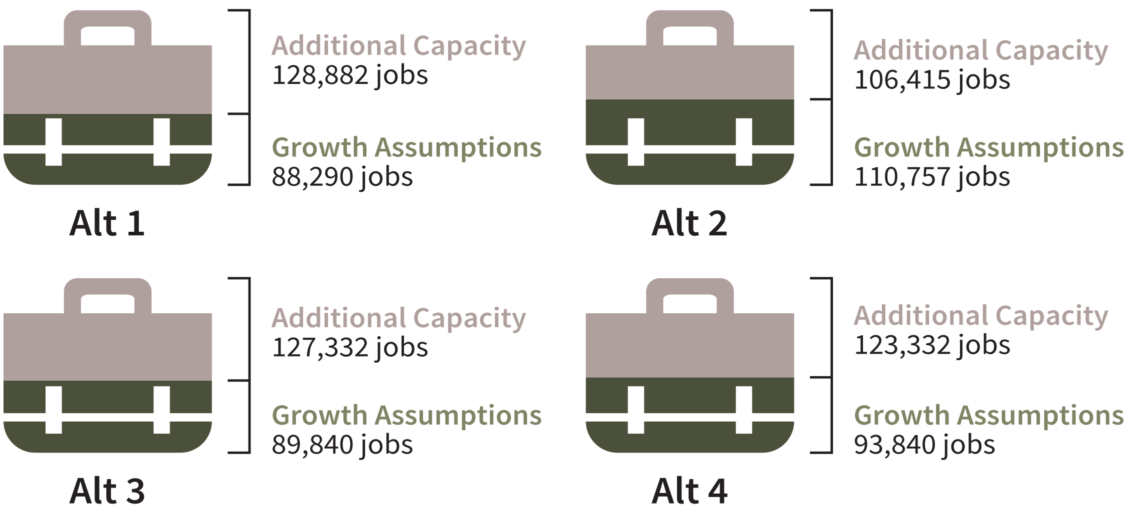
Source: City of Seattle, Department of Planning and Development.

nities. The city's limited land base also will likely contribute to upward pressure on housing costs. Low vacancy rates and tight inventory also would likely contribute to higher rent trends, especially when demand is fueled by a comparatively highly educated, high-wage workforce.

Several other factors would be influenced by the distribution of development as outlined in the alternatives. Cost and affordability factors considered include:

- **Land Value.** The initial land cost for developers contributes to the total cost of each housing unit. Higher density developments with higher floor-area-ratios (FAR; see Figure 3.4–9 for an illustration of FAR) will have a smaller land cost per unit. Land values vary across the city, with the highest found downtown and generally decreasing outward.
- **Construction Costs.** The cost of housing construction also influences sale and rental prices. Building material costs will be roughly equal across the city, though the type of construction will not. Generally, taller buildings with steel framing are more expensive to build than shorter, wood framed structures. The alternatives that promote the most concentrated development patterns will result in construction of taller buildings to provide housing accommodating higher numbers of residents in a smaller geographic area. Taller buildings will generally be more expensive to construct than low-rise residential structures in areas not designated for growth.

Figure 3.6–20 Urban village employment capacity and growth assumptions*



* Existing capacity within urban villages is 217,172 jobs (same for all four alternatives).

Source: City of Seattle, Department of Planning and Development.

- **Proximity to Transportation and Services.** Higher density areas with the greatest proximity to neighborhood amenities, jobs and transportation (urban centers and hub urban villages) will generally have higher land values and thus, higher housing costs. However, proximity to transit and services may also lead to more frequent commuting by transit and help decrease resident spending on transportation, which could help households to control cost-of-living burdens generated by rent and transportation costs..

EMPLOYMENT

The anticipated future employment growth of 115,000 new jobs over twenty years will occur predominantly in Seattle's urban centers, hub urban villages and manufacturing/industrial centers. This is likely to continue past trends, and follow the policy preferences of the Comprehensive Plan to focus employment primarily in these particular kinds of areas.

For all four alternatives, there is already sufficient capacity to accommodate assumed employment growth in the City's urban centers, urban villages and manufacturing/industrial centers, as shown in Figure 3.6–20. The recent buildable lands study found that 217,000 jobs could be accommodated within the existing and—for alternatives 3 and 4 potentially expanded—urban centers and hub urban villages. Transit access, demographic trends and various market factors will influence precisely which industry sectors locate in various locations. See the following discussion for alternative-specific analysis.

DISPLACEMENT

As growth continues in Seattle and development accelerates to meet increasing demands for housing as well as commercial and retail space, some existing uses are likely to be redeveloped to accommodate new growth, creating a potential for displacement of existing homes and businesses. This displacement would occur where there is demolition and eviction, as well as where market forces would increase the cost of living or doing business to a level that is no longer affordable for certain groups. Displacement risk is likely to rise in those areas where populations are least able to absorb increasing housing costs, where desirable amenities (such as transit) are available and where development costs relative to projected rents are such that the potential for new development is high. Given the factors identified in this analysis, the risk of displacement of vulnerable resident populations and existing businesses is concluded to generate probable significant adverse impacts.

Older structures are sometimes demolished to make way for construction projects. In general, older residential units are less expensive than new construction; of apartment buildings with 20 or more units, those built in the 1970s and 1980s are Seattle's most affordable (Dupre+Scott Apartment Advisors). Older housing stock provides relatively more affordable options for lower-income households, and can play an important role in enabling vulnerable populations to remain in their communities. Housing costs for new units are often higher than those of the older structures that are replaced, and existing residential and business tenants are typically forced into seeking affordable options in another neighborhood or sometimes outside the city. This process often occurs when existing uses are replaced by higher-density residential development or more intense commercial uses, and it can create significant changes in the character of a neighborhood, destabilizing a community that may have been living or working in a particular neighborhood for decades and generations. In areas with high concentrations of vulnerable populations, displacement of businesses and cultural institutions on which local residents rely for services and employment and that provide community cohesion could result in adverse impacts on the community. If businesses that cater to immigrant communities or other vulnerable populations are displaced, the commercial uses that replace them may not offer the same services or may not be affordable to local residents. If vulnerable populations no longer have access to affordable housing and services in their existing neighborhoods, many residents could potentially be pressured to relocate.

Recognizing that socioeconomic and racial inequities are still present, neighborhoods with higher concentrations of vulnerable populations are identified so that the potential use of mitigation strategies to address unintended impacts of growth can be prioritized. This should include efforts toward prevention and mitigation of displacement of vulnerable populations from housing and businesses, particularly in areas identified as high risk.

Certain neighborhoods—urban villages in the central area, southeast Seattle and certain parts of north Seattle—are identified as more sensitive to change than others due to the greater presence of vulnerable populations. Vulnerable populations are defined by the City as low-income populations, people of color and English language learners. Review of city-wide demographic data indicates that certain urban villages contain higher concentrations of vulnerable populations. As a result, future growth in these areas would have a greater potential to result in displacement of vulnerable populations than growth in other parts of the city. Urban villages identified as containing higher concentrations of vulnerable populations include the following:

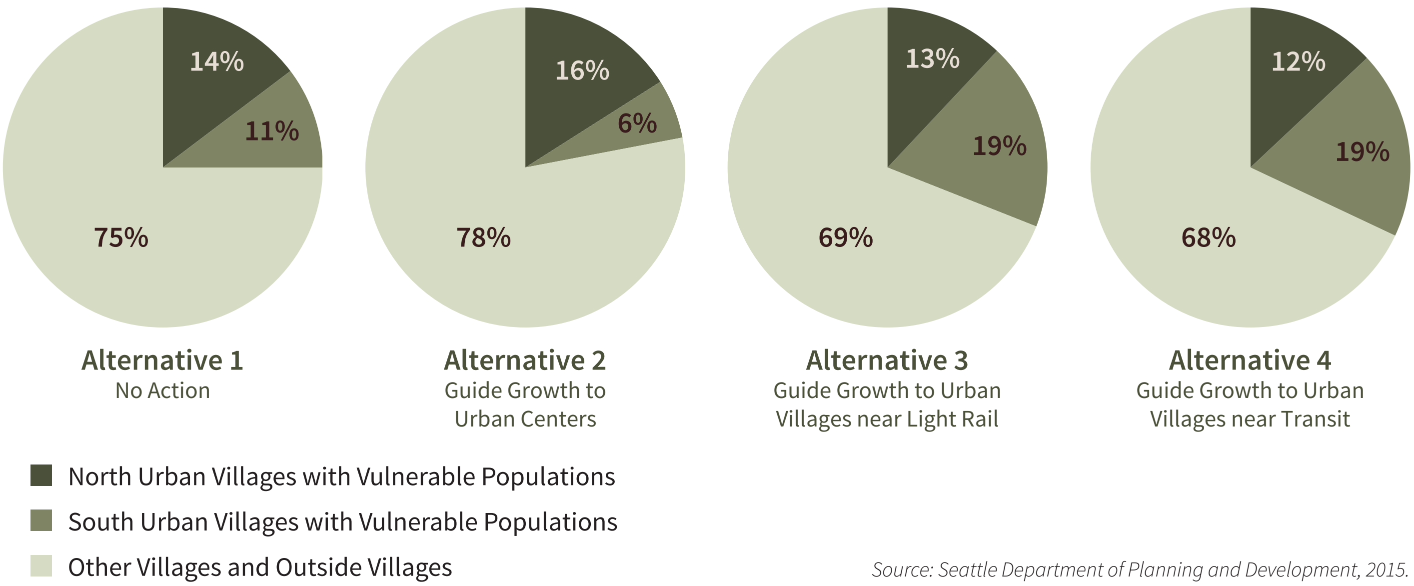
North Seattle
- University District
- Northgate
- Bitter Lake
- Lake City
- Aurora-Licton Springs

South Seattle
- Mount Baker
- 23rd & Union-Jackson
- Columbia City
- Othello
- North Beacon Hill
- Rainier Beach
- South Park
- Westwood-Highland Park

Figure 3.6–21 compares the amount of housing growth projected to occur in urban villages with vulnerable populations under each alternative. The share of growth projected for urban villages with vulnerable populations ranges from 22 percent of total growth (Alternative 2) to 32 percent of total growth (Alternative 3). Also, when comparing the difference between the shares of growth projected for north versus south end urban villages with vulnerable populations, Figure 3.6-22 illustrates that the south end villages of this kind are projected to accept a 6-7 percent greater share of residential growth than the north end villages with vulnerable populations (for alternatives 3 and 4), or as much as a 10 percent lesser share of projected growth under Alternative 2. The projected residential growth shares are somewhat more balanced under Alternative 1. These observations generally illustrate how residential growth pressures could be experienced differently across the city depending upon how preferred growth policies are chosen.

Focusing growth in urban centers (as in Alternative 2) appears as though it could lessen displacement risks in urban villages identified as having vulnerable populations. On the other hand, concentrating growth in areas zoned for highest density could result in significantly higher cost housing, taking land and related construction costs into account, and could further trends toward increasing income stratification in Seattle. Therefore, challenges with respect to equity, potential displacement and housing affordability are identified with any alternative studied in this EIS.

Figure 3.6–21 Comparison of projected residential growth in areas with vulnerable populations, by alternative



Source: Seattle Department of Planning and Development, 2015.

Additional discussion of equity in the context of the Comprehensive Plan and future growth and development can be found in a separate document, the Equity Analysis, available at www.seattle.gov/dpd.

Alternative 1: Continue Current Trends (No Action)

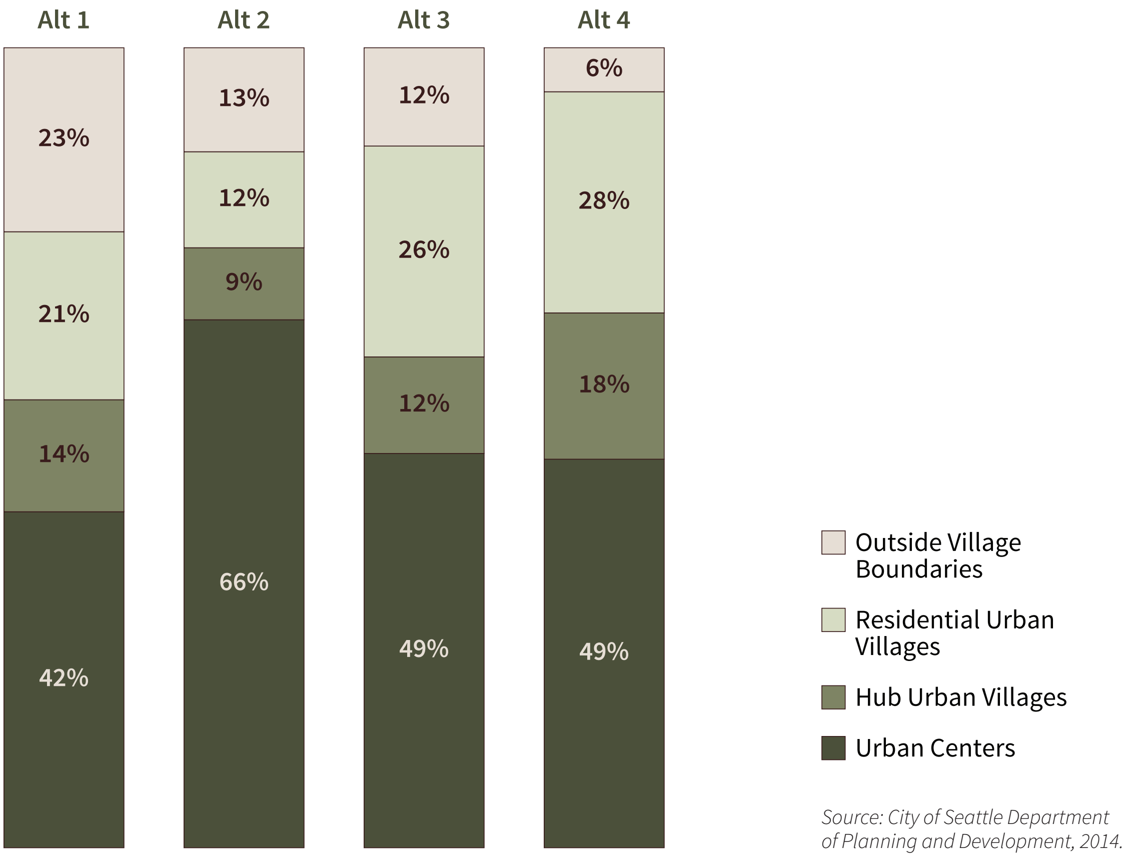
Alternative 1, Continue Current Trends (No Action), proposes a continuation of existing growth trends, resulting in a more distributed growth pattern than the three action alternatives. This alternative designates 77 percent of planned future housing growth and 77 percent of planned future employment growth to Seattle's existing urban centers and urban villages. The remaining 23 percent of growth is allocated to areas outside of existing center and village boundaries.

POPULATION AND HOUSING

Under Alternative 1, approximately 42 percent of housing growth (29,500 units) would occur in the urban centers, 14 percent in hub urban villages and 21 percent in residential urban villages (see Figure 3.6–22). The areas outside centers and village boundaries would absorb more new units compared to the other alternatives. As shown in Figure 3.6–19, zoning capacity in urban villages and centers is more than sufficient to accommodate growth projected for those areas.

Alternative 1 would likely result in patterns of development relatively consistent with the current development pattern, which follows the scales of development defined by current land use/zoning rules. With this existing regulatory framework that is assumed to contin-

Figure 3.6–22 Distribution of housing growth under each alternative



Source: City of Seattle Department of Planning and Development, 2014.

ue, the future mix of new buildings in residential and hub urban villages are likely to occur within a range of heights and densities that would blend relatively closely with current development patterns. Downtown, First/Capitol Hill and South Lake Union would absorb a substantial portion of housing growth projected in urban centers, while Ballard and Bitter Lake would absorb a significant portion of the growth projected in hub urban villages. Among residential urban villages, 23rd & Union-Jackson, Aurora-Licton Springs, Columbia City, Madison-Miller and Othello would absorb the greatest levels of projected growth.

Due to the relatively compact nature of future housing development in urban centers and many urban villages, these areas are likely to remain most attractive to small households, such as smaller families or younger residents without children. Currently, only 6 percent of Seattle's total housing units are in hub urban villages, in mid-density buildings, and these areas would likely see mild-to-moderate increases in population density. Urban centers are likely to continue growing in ways that reinforce and expand the extent of high-rise building forms (as in Downtown), or that gradually transform areas with more mid-rise and limited high-rise building development. Considerably more growth would occur outside urban villages under Alternative 1 than under other alternatives, with an expected range of lower-density housing types fitting within existing zoning allowances.

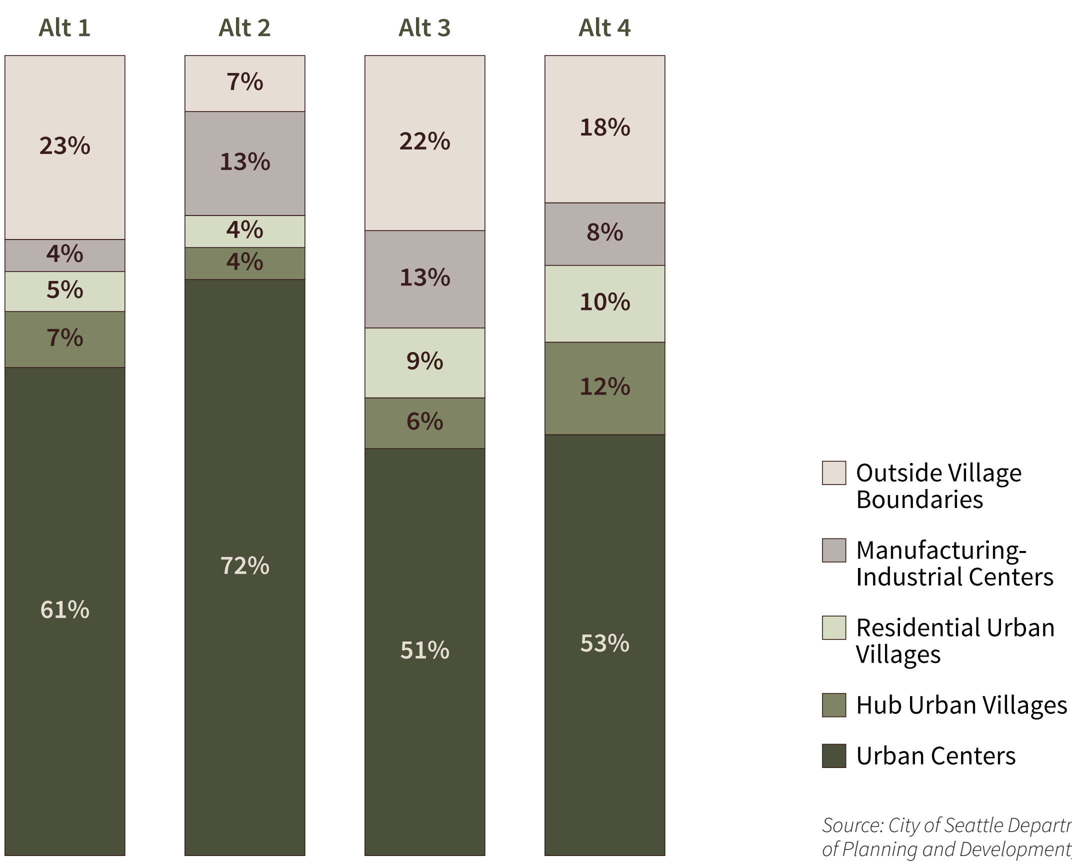
Displacement of existing residents: As shown in Figure 3.6–21, the projected growth under Alternative 1 would generate moderate potential for displacement in urban villages with the greatest amount of vulnerable populations, given the identified 25 percent share of total residential growth allocated to that kind of urban village. Future housing growth in these urban villages would be relatively evenly divided between North and South Seattle, resulting in moderate potential for displacement in each of these areas, relative to the other alternatives.

Housing affordability: Refer to the discussion under Impacts Common to All Alternatives.

EMPLOYMENT

Alternative 1 would result in employment patterns that are relatively consistent with existing patterns and trends, with slightly higher job growth than in the past and more jobs directed to urban village areas. Currently, only 5 percent of Seattle's employment is located in the hub urban villages; under this alternative, about 7 percent of the projected job growth is allocated to hub urban villages, at densities that could range up to 25 jobs per acre (see Figure 3.6–23). Hub urban villages projected to receive the most employment growth would be Ballard, Bitter Lake and Lake City. About 61 percent of job growth is projected to occur

Figure 3.6–23 Distribution of job growth under each alternative



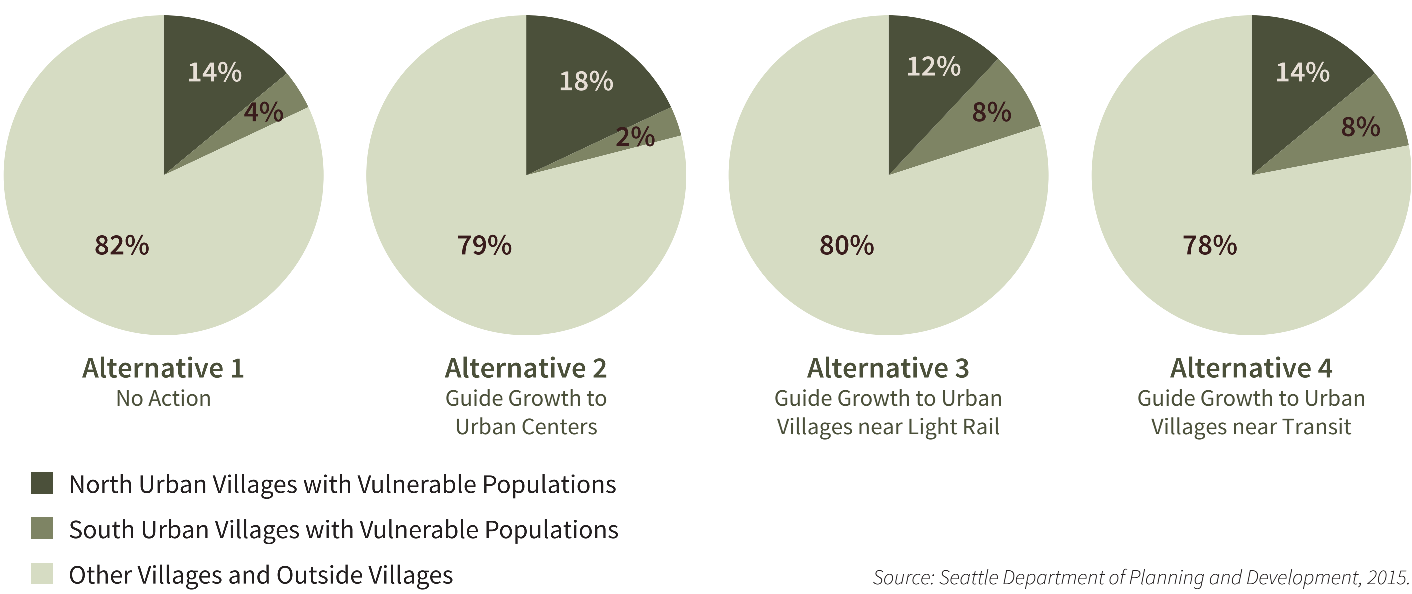
Source: City of Seattle Department of Planning and Development, 2014.

in urban centers under Alternative 1. About 30,000 jobs would be added to the Downtown Urban Center, with 20,000 more in South Lake Union and 8,000 in the University District. Although only 5 percent of 20-year job growth is expected in residential urban villages, these areas would still play a role in employment growth, especially through jobs at neighborhood-serving businesses. Among the residential urban villages, Columbia City is projected to experience the greatest employment growth, adding around 1,400 jobs.

As shown in Figure 3.6–20, capacity for around 92,828 jobs would remain in urban villages and centers after projected growth has been fulfilled.

Displacement of existing businesses: Under Alternative 1, employment would grow in a pattern similar to recent trends, concentrating in the existing employment centers and areas with industry clusters, such as Downtown and South Lake Union, with some concentrated areas of employment spread throughout the city's neighborhoods, in particular the hub urban villages. As described under Impacts Common to All Alternatives, displacement of businesses that provide services, jobs or community cohesion for vulnerable populations could potentially generate negative impacts on the community and make it difficult for residents to afford to remain in their neighborhoods. As shown in Figure 3.6–24, Alternative 1 would generate the lowest overall potential for displacement impacts in those urban villages with the highest amount of vulnerable populations, given the identified 18 percent share of total employment growth. Projected employment growth in urban villages with vulnerable populations would occur mostly in North Seattle; relative to other alternatives, Alternative 1 would have the lowest potential for displacement impacts in South Seattle urban villages given the identified 4 percent share of total employment growth, while it would have moderate potential for displacement impacts in urban villages in North Seattle.

Figure 3.6–24 Comparison of projected employment growth in areas with vulnerable populations, by alternative



Source: Seattle Department of Planning and Development, 2015.

Alternative 2: Guide Growth to Urban Centers

Alternative 2, Guide Growth to Urban Centers, would result in the most concentrated growth pattern, with the Downtown and South Lake Union urban centers absorbing the most population, housing and employment growth. Growth in areas outside urban villages would be limited. Alternative 2 designates 87 percent of planned future housing growth and 93 percent of planned future employment growth within urban center and urban village boundaries. Compared to Alternative 1, development would occur primarily in the current urban centers, which would absorb around 66 percent of this growth. While urban villages would still serve as local housing and employment hubs, they would likely receive less growth under Alternative 2 than under Alternative 1.

POPULATION AND HOUSING

Under Alternative 2, 66 percent of future housing growth would occur in urban centers (46,500 units), 9 percent in hub urban villages, 12 percent in residential urban villages and 13 percent in neighborhoods outside of village boundaries (see Figure 3.6–22). As shown in Figure 3.6–19, zoning capacity in urban villages and centers is more than sufficient to accommodate growth designated for those areas.

If growth occurs as projected under Alternative 2, Downtown and South Lake Union would experience the greatest concentration of new housing units in urban centers, followed by First Hill/Capitol Hill. A significant portion of assumed housing growth would likely occur in Northgate and the University District, as well. Among hub urban villages, Ballard and West Seattle Junction would experience the most growth, followed by Bitter Lake and Lake City. With only 12 percent of growth going to residential urban villages, growth in most of these neighborhoods would be modest.

Currently, about 16 percent of the City's population lives within urban centers, which have a mid- to high-density of 23.5 persons per acre and a household size of 1.7. As the primary focus of housing growth under Alternative 2, residential development in urban centers would likely continue to consist of high-density multifamily housing that would help accommodate the amount of growth forecast for these areas, such as the commercial core and South Lake Union, where developable land is limited and the centers are highly developed already. Dwelling units in these areas are likely to remain relatively small and to attract small households, such as young professionals, single individuals, seniors or households without children, adding to the current trend in Seattle—particularly in the urban centers—toward smaller household sizes.

Compared with Alternative 1, Alternative 2 would result in the creation of a more concentrated development pattern; development would be concentrated in areas where developable or redevelopable land is increasingly limited and where most new units would be in mid- to high-rise buildings. This type of development is typically more expensive per square-foot and these costs would be passed onto residents. However, concentrating growth in a smaller geographic area may necessitate less demolition of residential units citywide than other alternatives and thus cause the least potential displacement of existing tenants from their residences or their communities in non-urban center parts of the city.

Displacement of existing residents: Among the alternatives, Alternative 2 would direct the least additional housing growth to those urban villages with the highest risk of displacement impacts on vulnerable populations, a 22 percent share of the total as shown in Figure 3.6–21. By concentrating new housing growth in city's densest neighborhoods, Alternative 2 would likely help to relieve development pressure in areas with high potential for displacement. However, this growth potentially affecting vulnerable populations would be more concentrated in the northern areas of the city (16 percent share in northern neighborhoods versus a 6 percent share in the southern neighborhoods).

Housing affordability: Refer to the discussion under Impacts Common to All Alternatives.

EMPLOYMENT

Alternative 2 would direct 72 percent of future job growth to the urban centers, with 4 percent in hub urban villages and 4 percent in residential urban villages (see Figure 3.6–23). Another 13 percent of job growth would be allocated to the manufacturing/industrial centers of Greater Duwamish and Ballard-Interbay-Northend, leaving only 7 percent of future job growth allocated to areas outside urban villages.

As shown in Figure 3.6–20, the capacity for 74,703 additional jobs would remain in urban villages and centers after projected growth has been fulfilled. With 72 percent of job growth in urban centers, new employment would be heavily concentrated in Downtown, Northgate and South Lake Union. Ballard would accommodate the most job growth of the hub urban villages, while residential urban villages would experience only modest job growth. Compared with other alternatives, Alternative 2 would result in a more centralized employment pattern in Seattle, concentrating the majority of the city's jobs into a relatively compact geographic area. Concentrating employment in this manner would reinforce the high-density, mixed-use character of urban centers and the larger hub urban villages; residential urban villages and areas outside urban villages would continue to be highly residential in character, with relatively modest employment emphasis.

Displacement of existing businesses: Overall, under Alternative 2, the potential displacement impact on those urban villages with the highest amount of vulnerable populations would be moderate, relative to the other alternatives, as shown in Figure 3.6–24. With respect to the urban villages with the highest amount of vulnerable populations in South Seattle, Alternative 2 would direct the least amount of future growth to these areas and would have the lowest potential for displacement impacts. With respect to vulnerable populations in North Seattle, however, Alternative 2 would direct the most employment growth to these areas and would have the highest potential for displacement among the four alternatives.

These neighborhoods are likely to see notable increases in the density of development, with mixed use and commercial spaces likely to gradually replace older, low density buildings and push out some existing businesses. As described under Impacts Common to All Alternatives, displacement of businesses that provide services, jobs or community cohesion for vulnerable populations could potentially have negative impacts on the community and make it difficult for residents to afford to remain in their neighborhoods.

Alternative 3: Guide Growth to Urban Villages near Light Rail

Alternative 3, which would focus growth along light rail corridors, designates 88 percent of planned future housing growth and 78 percent of planned future employment growth to Seattle's urban centers and hub urban villages with emphasis on those served by light rail stations. Similar to Alternative 1, Alternative 3 spreads growth throughout the city, though increased growth would be allocated to areas around transit stations.

POPULATION AND HOUSING

Under Alternative 3, 49 percent of housing growth would be in urban centers (34,500), 12 percent in hub urban villages and 26 percent in residential urban villages (see Figure 3.6–22). The areas outside of village boundaries would absorb 12 percent of housing growth. As shown in Figure 3.6–19, capacity for 111,075 housing units would remain in urban villages and centers after projected growth has been fulfilled

Alternative 3 allocates the most housing growth to the Downtown, First/Capitol Hill and South Lake Union urban centers. Among hub urban villages the greatest growth is allocated to Mount Baker, which has an existing light rail station, as well as Ballard and West Seattle Junction. The greatest housing growth among residential urban villages is planned for those with existing or planned light rail stations—23rd & Union-Jackson, Columbia City, North Beacon Hill, Othello, Rainier Beach and Roosevelt.

Compared with Alternative 2 and Alternative 1, Alternative 3 would have greater effects on residential urban villages that currently have or are planned to have light rail stations, such as Othello, North Beacon Hill, Rainier Beach and Roosevelt. While these villages are allocated relatively little growth compared to areas such as Downtown or South Lake Union, Alternative 3 would direct a greater amount of housing and employment to these areas than in other alternatives, targeting them for future transit-oriented development. In addition, Alternative 3 would create new urban villages along proposed light rail corridors, forming new concentrations of housing and jobs in areas currently developed at relatively low intensities.

Location near frequent transit service is a significant amenity, and the availability of transit is likely to spur future development in these areas, resulting in high-cost, mid- to high-density residential development close to light rail stops. As existing low-density housing stock is redeveloped in these residential urban villages in favor of higher-density, higher-priced housing, some displacement of existing dwelling units is likely to occur. Overall, Alternative

3 concentrates development more than alternatives 1 and 4 and would result in comparatively less potential displacement. However, it would have a greater potential for displacement compared to Alternative 2 (Urban Centers Focus) by allocating a greater share of growth outside of urban centers and villages.

Displacement of existing residents: As shown on Figure 3.6–21, Alternative 3 would generate a relatively high potential for displacement of residents in urban villages with the greatest amount of vulnerable populations. With respect to south Seattle neighborhoods of this kind, Alternative 3 would have the greatest potential for displacement impacts (on par with Alternative 4). This would relate to the intent to emphasize growth in urban villages served by light rail stations.

Housing affordability: The discussion above suggests that under Alternative 3, the potential for growth-related impacts on housing affordability in light rail station areas is likely to be greater than Alternative 2, due to a greater amount of anticipated residential and employment growth in those areas, including several that have relatively higher presence of "vulnerable populations." Also refer to the discussion under Impacts Common to All Alternatives.

EMPLOYMENT

Alternative 3 would place 51 percent of job growth in urban centers, 6 percent in hub urban villages and 9 percent in residential urban villages (see Figure 3.6–23). Another 13 percent of job growth would be allocated to the manufacturing/industrial centers of Greater Duwamish and Ballard-Interbay-Northend. About 22 percent of job growth would be located in areas outside of urban village boundaries. As shown in Figure 3.6–20, the capacity for 91,278 jobs would remain in urban villages and centers after projected growth has been achieved.

The urban centers with the most anticipated growth under Alternative 3 are Downtown, South Lake Union and Northgate, where a light rail station is planned. Of the hub urban villages, the greatest share of job growth is planned for Ballard and Mount Baker. Residential urban villages with light rail stations would be allocated the greatest employment growth under Alternative 3. As discussed above, the availability of frequent transit is anticipated to provide an incentive for employers to locate in these areas.

Currently, the largest share of Seattle commuters (52 percent) drive alone, and 19 percent use public transportation, as discussed above. A focus on transit-oriented development and light rail stations as employment centers could influence commuting trends away from single-occupancy vehicles and promote greater transit ridership among commuters.

Displacement of existing businesses: Under Alternative 3, approximately 20 percent of Seattle's employment growth is projected to occur in neighborhoods with the highest amounts of vulnerable populations, as shown in Figure 3.6–24. As described under Impacts Common to All Alternatives, displacement of businesses that provide services, jobs or community cohesion for vulnerable populations could potentially have negative impacts on the community and make it difficult for residents to afford to remain in their neighborhoods.

Relative to other alternatives, Alternative 3 would have a moderate potential for displacement impacts, similar overall to Alternative 2. However, Alternative 3 would distribute employment growth more evenly between the at-risk north-end and south-end neighborhoods, with the least impact of any alternative on the at-risk north-end neighborhoods.

Although Alternative 3 spreads employment growth throughout the City, it concentrates it in fewer centers than in other alternatives due to the particular focus on light rail transit connections. As a result, these transit station villages are more likely to experience displacement along the light rail corridor in the nodes around the transit stops. Those existing businesses in these areas of probable growth would likely experience higher rent, and many remaining buildable parcels could be identified for new development for employment and housing growth, displacing existing businesses.

Alternative 4: Guide Growth to Urban Villages near Transit

Alternative 4, which focuses growth along transit corridors, designates 95 percent of planned future housing growth and 82 percent of planned future employment growth within urban centers and urban villages, especially those served by light rail stations or frequent bus service. Similar to Alternative 1, Alternative 4 spreads growth over a large portion of the city, although the increased growth would be allocated with an emphasis on transit corridors.

POPULATION AND HOUSING

Under Alternative 4, 49 percent of housing growth would be in urban centers (34,500), 18 percent in hub urban villages and 28 percent in residential urban villages (see Figure 3.6–22). The areas outside of village boundaries would absorb 6 percent of housing growth. As shown in Figure 3.6–19, capacity for 106,325 housing units would remain in urban villages and centers after projected growth has been fulfilled.

Alternative 4 would yield considerable housing growth Downtown, with notable growth in the First Hill/Capitol Hill and South Lake Union urban centers. The greatest growth in hub urban villages would occur in Ballard, Fremont, Mount Baker and West Seattle Junction. The residential urban villages with the best transit access—23rd & Union-Jackson, Columbia City, North Beacon Hill, Othello, Rainier Beach and Roosevelt—would experience the greatest housing growth.

Similar to Alternative 3, Alternative 4 would have the greatest effects on residential urban villages with light rail or frequent bus service. In addition, Alternative 4 proposes to create one new urban village and expand several existing ones, forming new concentrations of housing in areas currently developed at comparatively low densities.

As noted under Alternative 3, locating near frequent transit service is a significant amenity. The availability of transit is likely to spur future development in these areas, resulting in more mid- to high-density residential development close to light rail stops with higher housing prices. As existing low-density housing stock is redeveloped in these residential urban villages in favor of higher-density, higher-priced housing, some displacement of existing dwelling units is likely to occur. Overall, Alternative 4 concentrates development more than Alternative 1, but would produce a less concentrated development pattern than alternatives 2 or 3 and would have greater potential for displacement by allowing for more growth to be spread over a larger portion of the city and in areas currently developed at lower densities.

Displacement of existing residents: As shown in Figure 3.6–21, potential for displacement of existing residents in urban villages with the greatest amount of vulnerable populations under Alternative 4 would be relatively high, compared with alternatives 1 and 2, and would be similar to Alternative 3. Alternative 4 would generate the highest potential for displacement impacts both overall and in South Seattle urban villages with the greatest amount of vulnerable populations, although the potential for displacement impacts in similar urban villages in North Seattle would be moderate and only slightly higher than Alternative 3.

Housing affordability: The discussion above suggests that under Alternative 4, the potential for growth-related impacts on housing affordability in light rail station areas is likely to be greater than Alternative 2 and slightly greater than under Alternative 3, due to a greater amount of anticipated residential and employment growth in those areas, including several that have relatively higher presence of "vulnerable populations." Also, refer to the discussion under Impacts Common to All Alternatives.

EMPLOYMENT

Alternative 4 would place 53 percent of job growth in the urban centers, with 12 percent in hub urban villages and 10 percent in residential urban villages (see Figure 3.6–23). Another 8 percent of job growth would be allocated to the manufacturing/industrial centers of Greater Duwamish and Ballard-Interbay-Northend. About 18 percent of job growth would be located in areas outside of urban center and village boundaries. As shown in Figure 3.6–20, capacity for 87,278 jobs would remain in urban villages and centers after projected growth has been fulfilled.

The urban centers with the most anticipated growth in Alternative 4 are Downtown, Northgate (where a light rail station is planned) and South Lake Union. Of the hub urban villages, Ballard, Bitter Lake, Mount Baker and West Seattle Junction would have the greatest job growth. Residential urban villages with the best access to transit (23rd & Union-Jackson, Aurora-Licton Springs, Columbia City, Othello and Roosevelt) would be allocated the greatest employment growth. As discussed above, the availability of frequent transit is anticipated to provide an incentive for employers to locate in these areas.

A focus on transit-oriented development and light rail stations as employment centers could influence commuting trends away from single-occupancy vehicles and promote greater transit ridership among commuters.

Displacement of existing businesses: As shown in Figure 3.6–24, the potential for displacement of existing businesses in urban villages with the greatest amount of vulnerable populations would be highest overall under Alternative 4. Alternative 4 would generate the highest potential for displacement impacts both overall and in South Seattle urban villages with the greatest amount of populations, although the potential for displacement impacts to similar urban villages in North Seattle would be moderate and on par with Alternative 1.

As described under Impacts Common to All Alternatives, displacement of businesses that provide services, jobs or community cohesion for vulnerable populations could potentially generate negative impacts on the community and make it difficult for residents to afford to remain in their neighborhoods. Overall, Alternative 4 spreads projected employment growth throughout the City, with an intent to focus development on light rail and other transit connection hubs. As a result, these villages would be more likely to experience displacement in particular along the light rail and along main transit corridors in nodes around transit stops and transit connection hubs. Those existing businesses in these areas could expect increasing rents, with many remaining buildable parcels likely identified for new developments and a likely effect of displacing existing businesses.

3.6.3 Mitigation Strategies

Under all alternatives, including the No Action Alternative, housing affordability and risk of displacement will continue to be a significant concern. As described previously, housing affordability and displacement are driven by demand generated as a result of Seattle's strong job market, land value, construction costs and other factors outside of the proposal and alternatives. Nevertheless, the City recognizes the critical importance of these issues and recommends consideration of the following mitigation strategies.

Housing affordability strategies should be tailored to meet specific objectives, for example:

- Creating an environment where the community retains the conditions that afford it good opportunities while providing for stability and economic mobility for people vulnerable to displacement;
- Expanding choices in areas that are currently unaffordable for lower income people who may want to live or operate a business there; and
- Stabilizing areas that are transitioning to higher levels of desirability due to amenities such as light rail service.

This should require a balanced approach that includes public and private funding incentives and regulations.

Efforts to preserve existing affordable housing will be crucial. The Federal low-income housing tax credit program is the primary source of funding for low-income housing development in Washington State. Locally, the City of Seattle uses voter-approved Seattle Housing Levy funds as well as contributions from developers through Seattle's incentive zoning program for production and preservation of low-income housing. This City of Seattle has funded over 11,000 units since 1981 through its **Rental Production and Preservation Program**.

Other Seattle Housing Levy-funded programs include:

- **Acquisition & Opportunity Loans** for affordable rental and ownership units
- **Operating & Maintaining Program** for residents in the extremely low income category
- **Homebuyer Program** for first-time home buyers
- **Rental Assistance Program** for those at risk of homelessness

The City's incentive zoning, mentioned above, and Multifamily Property Tax Exemption (MFTE) programs encourage for-profit developers to include affordable units as part of new housing developments or, in the case of incentive zoning, make a cash contribution used to produce housing with long-term affordability restrictions.

- While voluntary, **Incentive zoning** provides mutual benefit to developers, the city and low- or moderate-income residents. Per provisions stipulated in SMC 23.58A, participating developers are able to achieve floor area beyond base density or height in their projects by either providing a modest number of affordable units on-site or by contributing to the City's housing development capital fund.
- The **MFTE Program** awards a tax exemption on the residential improvements for multifamily projects in which 20 percent of the units are reserved for moderate-income households. The affordable units are available for as long as the tax exemption is in place, for up to 12 years. This program is available in targeted residential areas throughout the City.

Seattle can mitigate projected impacts of growth by implementing a robust housing agenda that includes low-income housing preservation and tenant protection strategies. The **Housing Affordability and Livability Agenda (HALA)** is an initiative that was launched in late 2014 and is ongoing. Mayor Murray and members of City Council called together 28 community leaders together to develop an agenda for increasing the affordability and availability of housing in Seattle. This agenda will chart a course for the next 10 years to ensure the development and preservation of a diversity of housing for people across the income spectrum. The HALA Advisory Committee is charged with evaluating potential housing strategies and delivering a set of recommendations to the Mayor and City Council in 2015 that span financing, affordable housing resources, zoning and housing types, construction costs and timelines, tenant protections, preservation and homeownership. The City is currently evaluating the impacts to affordable housing through the development of a needs assessment that will inform HALA's work.

Efforts to address potential business displacement with future growth should continue to implement tools and programs that the City already offers to help stabilize and grow small businesses that are vulnerable to displacement, including:

- **Community Development Block Grants**
- **New Market Tax Credits**
- **Section 108 loans**
- **Contracts with community organizations such as Washington CASH and Community Capital Development**

To address interests relating to racial and socioeconomic equity in helping to mitigate the impacts of the Comprehensive Plan, as well as the adverse impacts relating to housing affordability, and risk of displacement of residents and businesses, consider implementing a combination of strategies that are identified in the **City's Equity Analysis** that is a parallel effort to this EIS. Identified strategies in the Equity Analysis are broadly organized around the place-based typology of "Improve Access", "Protect and Grow", "Stabilize and Enhance Community", and "Leverage Demand and Expand Choice." These strategic themes and the accompanying recommendations are oriented toward pursuing actions differently in different neighborhoods, in ways that will lead to optimal enhancements to neighborhood quality, accessibility to key determinants of well-being for marginalized populations, and a reinforced ability for people of all means and identities to be able to find places to live and thrive throughout Seattle.

Seattle's **Race and Social Justice Initiative (RSJI)** provides a platform for continuing to work towards equity in the City by engaging city government and leaders in the community by achieving racial equity in city services, operations and the broader community. RSJI promotes inclusive outreach, which will be important in communities with vulnerable populations of residents and business owners, and builds relationships with communities of color as planning and other activities within city government are conducted. These efforts will help mitigate the risk of certain communities being left out of conversations as growth occurs in Seattle's neighborhoods.

These land use regulations and financial incentives will continue to help the City address affordability issues for residents and businesses as Seattle experiences 20 years of growth.

3.6.4 Significant Unavoidable Adverse Impacts

Seattle will face housing affordability challenges due to increasing demand (both as a result of growth in the number of households and in the economic profile of households, which are becoming more economically stratified). Seattle's fixed land supply and the premium in terms of housing cost and commercial space that are placed on higher density development close to transit and other amenities would likely exacerbate this issue in those locations. Rental costs can be expected to be highest in urban centers and some hub urban villages—especially Downtown, First/Capitol Hill, South Lake Union, Ballard, Fremont and West Seattle Junction—and to rise the most in neighborhoods where existing rents are relatively low.

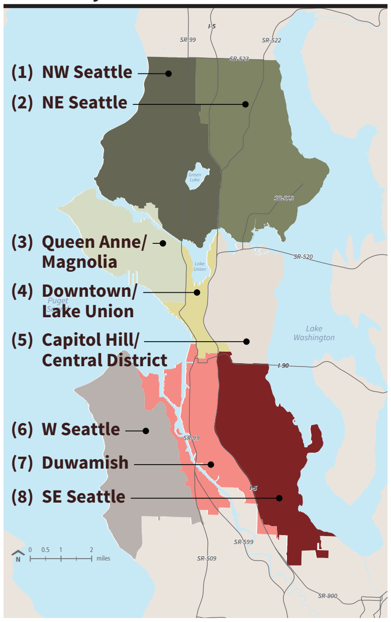
3.7 Transportation

This chapter presents a multimodal transportation analysis prepared to evaluate the potential impacts of implementing the range of land use alternatives under consideration. The chapter presents existing transportation conditions within the City of Seattle, as well as future transportation conditions under four alternatives—one No Action Alternative representing a continuation of the City's Urban Village Strategy and three action alternatives reflecting variations in how the City may manage the distribution of future growth over the next twenty years. Significant transportation impacts and potential mitigation strategies are identified for each future action alternative based on the policies and recommendations established in local plans.

3.7.1 Affected Environment

This section describes the existing transportation conditions in Seattle. Information is provided on a citywide basis as well as for eight defined areas (or "EIS analysis sectors") described in Chapter 2 and shown in Figure 2–17 and Figure 3.7–1, including Northwest Seattle, Northeast Seattle, Queen Anne/Magnolia, Downtown/Lake Union, Capitol Hill/Central District, West Seattle, Duwamish and Southeast Seattle. These sectors are used throughout the analysis to describe how transportation conditions vary within the city.

Figure 3.7–1
EIS analysis sectors



Existing Transportation Network

This section describes the existing transportation network in Seattle for all modes, including pedestrians, bicycles, transit, autos and freight.

PEDESTRIAN NETWORK

The Seattle pedestrian network is composed of sidewalks, crosswalks, staircases, pedestrian bridges, curb ramps and trails. Most urban centers and urban villages have well-connected sidewalk networks. The *2009 Seattle Pedestrian Master Plan* (PMP) states that there are over 6,000 marked crosswalks, 2,256 miles of sidewalks and 26,712 curb ramps in Seattle as of 2008 (SDOT 2009). However, the study did find that approximately 30 percent of all residential zones do not have a sidewalk on one or both sides of the street. These locations are mostly found in the Northwest and Northeast Seattle sectors north of NE 85th Street, near the southwest city boundaries in the West Seattle Sector, in sections of the Duwamish Sector and the edges of the Southeast Seattle Sector.

The PMP designated "high priority" areas based on high potential pedestrian demand, equity and corridor function. Generally these areas coincide with designated urban villages, urban centers and are along major transit corridors. With this information, the City prioritized pedestrian improvement locations into two tiers, with the highest priority areas categorized as "Tier 1" locations. These Tier 1 areas are mapped in Figure 3.7–2 and Figure 3.7–3.

Figure 3.7–2 identifies the "along the roadway" areas noted for pedestrian improvements. The "along the roadway" analysis is indicative of the comfort level of pedestrians based on presence of sidewalks, buffers such as landscaping and the traffic volume or speeds on roads. Figure 3.7–3 identifies the "crossing the roadway" pedestrian improvements. The "crossing the roadway" improvement locations are intersections with high vehicle volumes that may need crosswalk improvements such as striping or curb ramps.

The "along the roadway" improvements are generally located in the north half of the Northwest and Northeast Seattle sectors, north of NE 85th Street. Other locations with a number of improvement projects are in Southeast Seattle and the Duwamish Sector. Crossing the roadway improvements are more spread throughout Seattle with projects in all sectors of the city.

From 2008 to 2012, there have been 63 new blocks of sidewalk constructed, 97 blocks of sidewalks repaired and over 150 pedestrian crossings improved, among other improvement projects such as installing school zone signs and pedestrian beacons (SDOT 2010a; SDOT 2010b; SDOT 2012b; SDOT 2013).

BICYCLE NETWORK

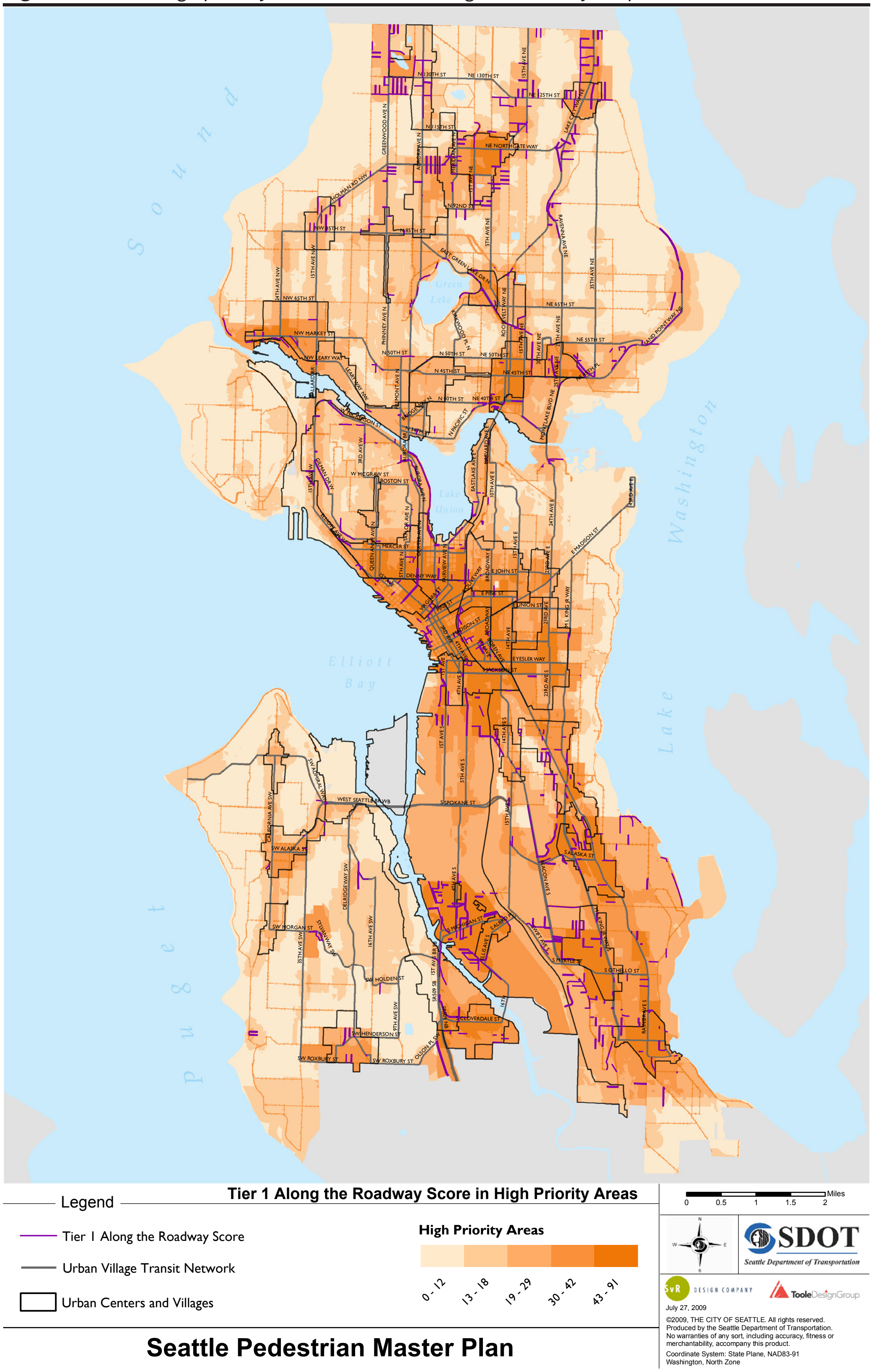
Seattle has over 300 miles of bicycle facilities. There are 47 miles of off-street facilities such as multi-use trails, 3 miles of cycle tracks—protected bicycle lanes physically separated (raised or with an on-street barrier), 6 miles of neighborhood greenway, 78 miles of bicycle and climbing lanes, 92 miles of shared street bicycle facilities, or "sharrows" and 128 miles of signed routes; SDOT 2014f).[1] The *Bicycle Master Plan* (BMP) map of the existing bicycle network is shown in Figure 3.7–4; the recommended future network is shown in Figure 3.7–5.

Bicycle facilities are spread throughout the city and are more prevalent in urban centers such as Downtown, First/Capitol Hill, the University District, South Lake Union and Uptown (also known as Lower Queen Anne). Trails are generally along the water (Lake Washington, Ship Canal, Puget Sound), while neighborhood greenways are in more residential locations of the Northwest, Northeast, Southeast and West Seattle sectors. Locations of gaps in the bicycle network are identified throughout Seattle in the BMP, which recommends over 400 miles of new bicycle facilities and connections by 2030.

The City collects bicycle counts on a quarterly basis at 50 locations in Seattle. The BMP states that the highest bicycle count locations are at ship canal crossings, and in the South

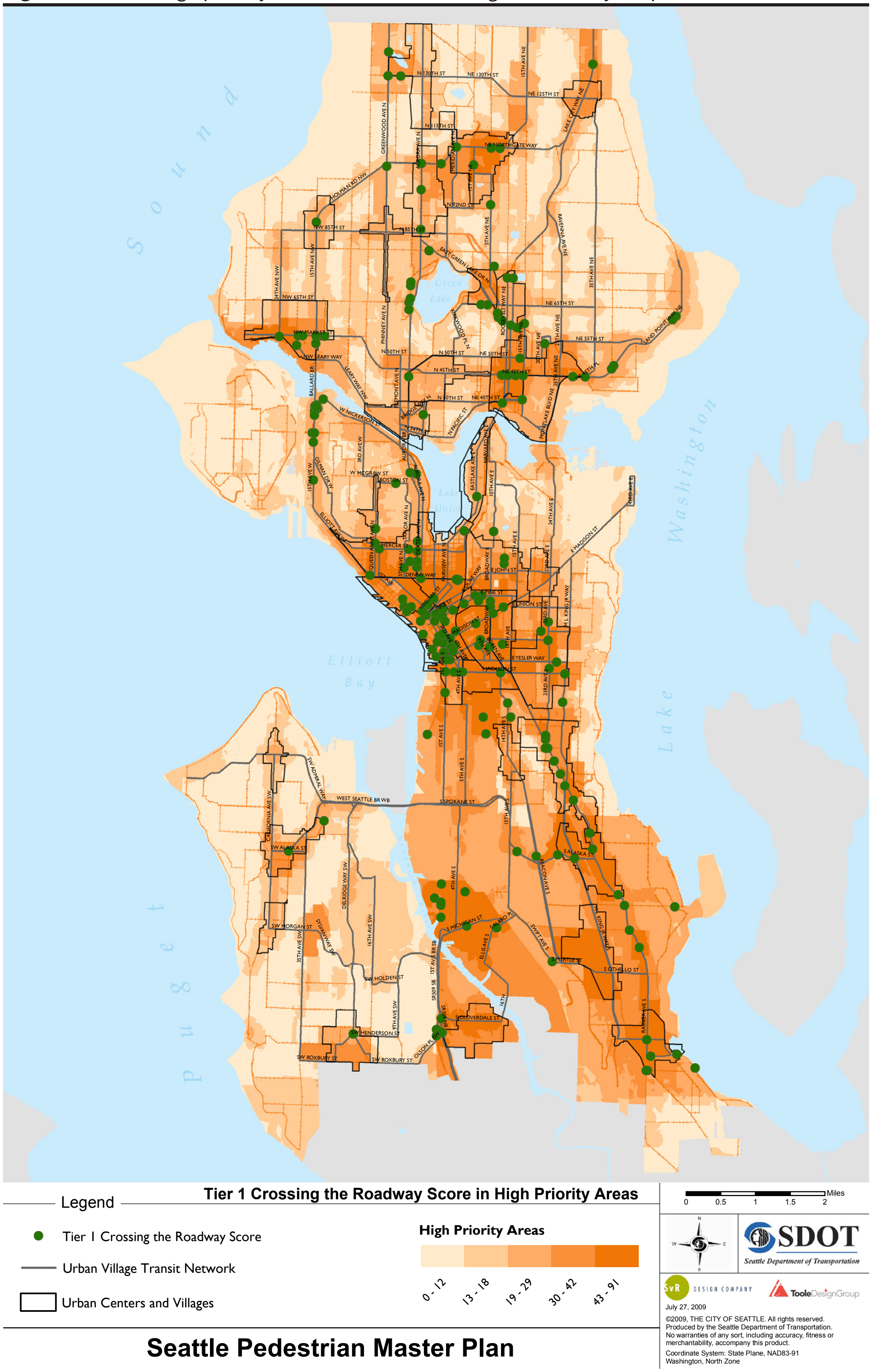
1 Total miles of bicycle facilities do not include 128 miles of signed bicycle routes.

Figure 3.7–2 High priority areas and tier 1 "along the roadway" improvement locations



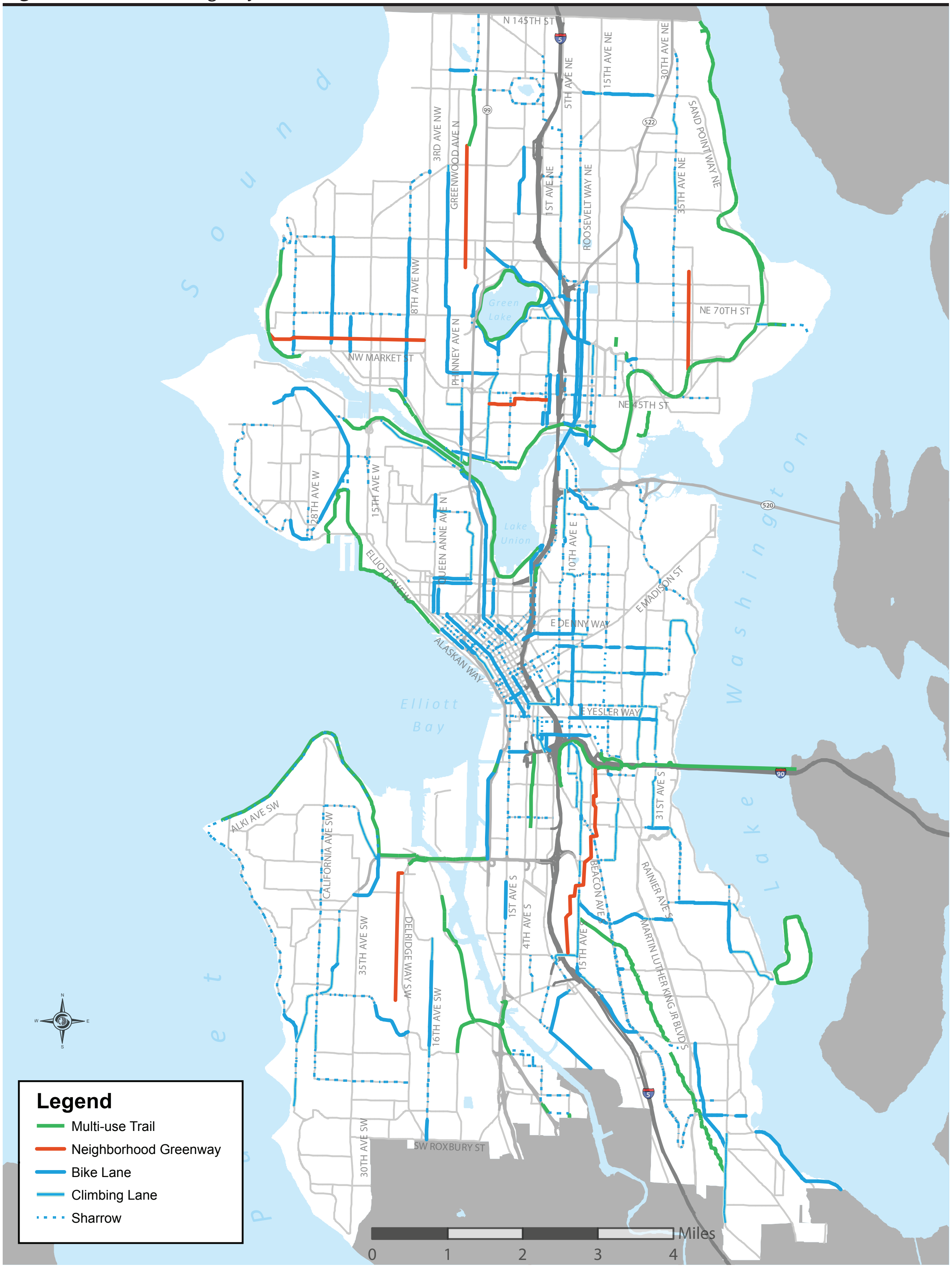
Source: Seattle Pedestrian Master Plan, 2009.

Figure 3.7–3 High priority areas and tier 1 "crossing the roadway" improvement locations



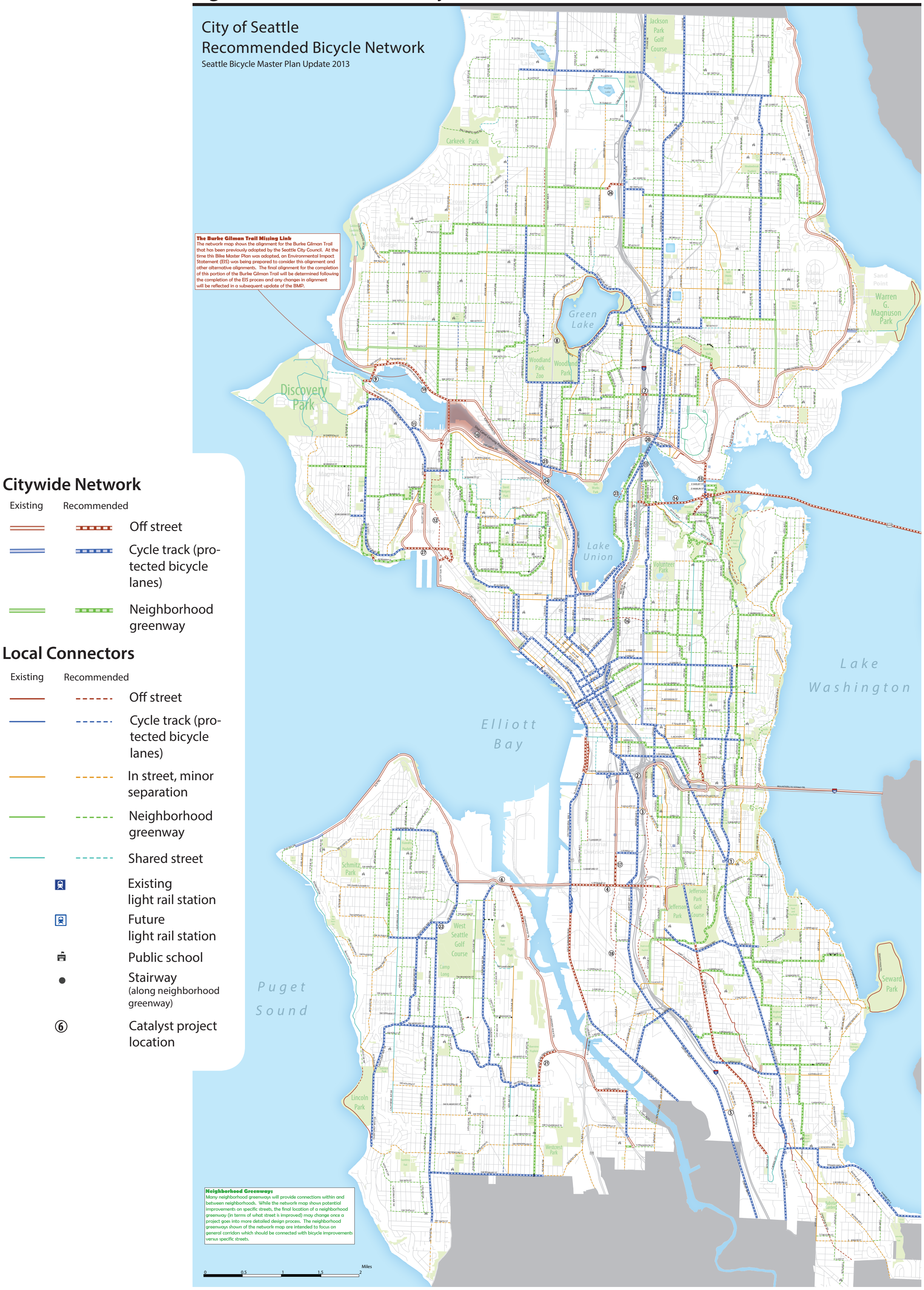
Source: Seattle Pedestrian Master Plan, 2009.

Figure 3.7–4 Existing bicycle facilities as of 2013



Source: Seattle Bicycle Master Plan, 2014.

Figure 3.7–5 Planned bicycle network



Lake Union, Capitol Hill and the Downtown neighborhoods. Appendix A.4 includes a map showing high bicycle count locations. In 2012, there was a citywide 4.7 percent increase in bicycle counts compared to 2011 (SDOT 2014b).

The Puget Sound Bike Share is a non-profit organization that launched the Pronto! Cycle Sharing program in Seattle in the fall of 2014. The program has a dense network of bicycle stations that allow members to check out a bicycle from one station, ride to a destination and park the bicycle at another designated station. This program is intended for short trips that are typically less than two miles. Phase I of the program has 500 bicycles docked at 50 bike share stations in Downtown Seattle, First/Capitol Hill, Eastlake and the University District. The bike share program is expected to grow its network into other dense areas of the city.

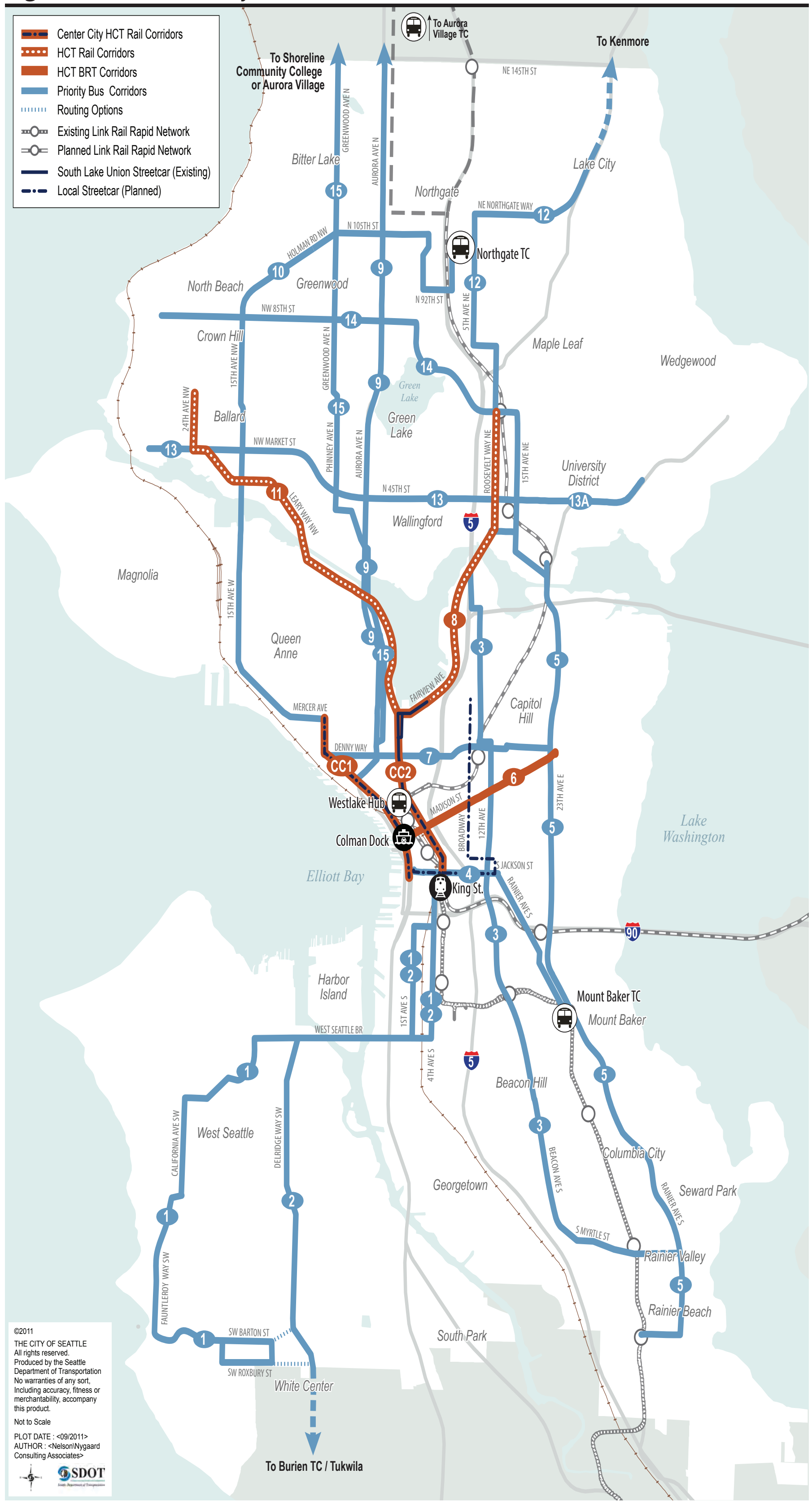
TRANSIT SERVICES

Seattle's public transit services are provided by King County Metro, Sound Transit, Community Transit and the City of Seattle. In 2012, the mode share of workers who arrived to Seattle's center city core between 6 AM and 9 AM by public transit was 43 percent (Commute Seattle 2013), much greater than the 19 percent citywide transit share for workers (U.S. Census Bureau 2013). The share of workers who drove alone to center city was 34 percent.

- King County Metro operates a fixed route bus system that also includes "RapidRide," a separately-branded set of frequent transit routes in West Seattle, Ballard, North Seattle and Downtown.
- Sound Transit Express and Community Transit operate buses that provide service from outside the City of Seattle.
- Rail transit services include Sound Transit Link Light Rail, City-operated streetcars in South Lake Union and First Hill, the City-operated monorail between Downtown and Seattle Center and the Sounder Commuter Train that provides service between Lakewood, Seattle and Everett during peak hours.

In 2012, the City proposed the Transit Master Plan (TMP) which outlines the transit facilities, services and programs needed over the next 20 years to accommodate anticipated growth in Seattle. The City has designated 15 priority transit corridors categorized as High Capacity Transit (HCT) Corridors and Priority Bus Corridors, along with designated Center City Corridors (see Figure 3.7–6). These corridors are prioritized for capital investments to ensure mobility within Seattle, one of the key objectives outlined in the TMP. Another goal is to provide frequent transit service on these corridors to create and expand the Frequent Transit Network (a map of which may be found in Appendix A.4). The Frequent Transit Network is composed of transit corridors that have, or are recommended for, frequent transit service. This level of service is defined to encompass routes with average service frequency of 15 minutes or better for at least 12 hours six days per week, and an average service frequency of at least 30 minutes for 18 hours per day on each day of the week.

Figure 3.7–6 Priority transit network



ROADWAY NETWORK

The City of Seattle includes roughly 1,540 lane-miles of arterial streets, 2,410 lane-miles of non-arterial streets, 122 bridges and 1,070 signalized intersections (City of Seattle 2014b). Much of Seattle's transportation network is constrained by the waterways within and around the city. The Ship Canal divides north Seattle from the rest of the city, with only six crossing points: the Ballard Bridge, the Fremont Bridge, State Route (SR) 99, Interstate 5 (I-5), the University Bridge and the Montlake Bridge. Likewise, West Seattle is separated from the rest of the city by the Duwamish Waterway, and is accessed via the West Seattle Bridge, Spokane Street Bridge, the First Avenue S Bridge and the South Park Bridge.

I-5 runs north-south throughout the city, serving both local and regional travelers. SR 99 also runs north-south through the city and tends to serve more locally focused trips. To the east, there are two bridges across Lake Washington: SR 520 and Interstate 90 (I-90). Other key state routes within the city include SR 522 connecting to the northeast and SR 509 connecting south to Sea-Tac Airport. City arterials generally follow a grid pattern. The City has designated a major truck street network throughout the city that carries a substantial amount of freight traffic. The state routes, interstates and major arterials linking major freight destinations are part of this network.

PARKING

The City of Seattle regulates parking within its right-of-way by issuing on-street permits, charging by the hour, setting time limits and defining load zones. The city regularly assesses the performance of its parking management programs to manage changing demand patterns.

Restricted Parking Zone (RPZ) Program

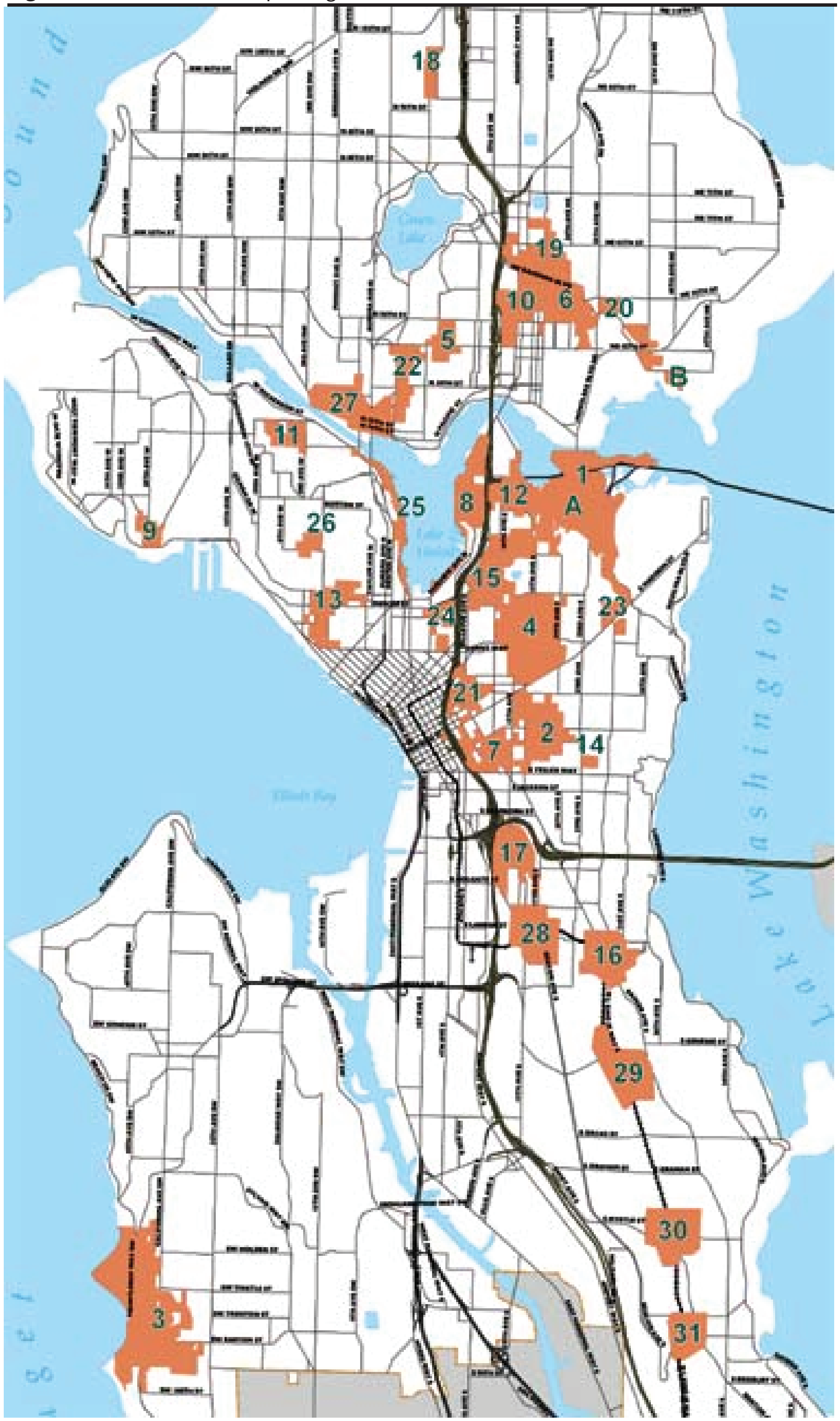
Seattle designates certain areas as Restricted Parking Zones (RPZ), as shown in Figure 3.7–7. These zones have time-limited parking available to the public. Residents with eligible addresses can apply for a permit to use the curb parking in their neighborhood without time limits. The aim is to balance the parking needs of the public and the residents and ease parking congestion in certain locations. There are 31 zones in Seattle, with an additional 2 zones during University of Washington Husky game days.

On-Street Paid Parking

On-street paid parking is located in most Seattle urban centers (except for the Northgate area) and in select smaller locations near commercial business areas such as Fremont, Green Lake and Roosevelt neighborhoods. The map of all paid on-street parking locations is shown in Figure 3.7–8.

Through Seattle's Performance-Based Parking Pricing Program, on-street parking rates are adjusted in neighborhoods to reach a target parking occupancy. The Seattle Department of Transportation regularly collects citywide parking utilization data to implement the Per-

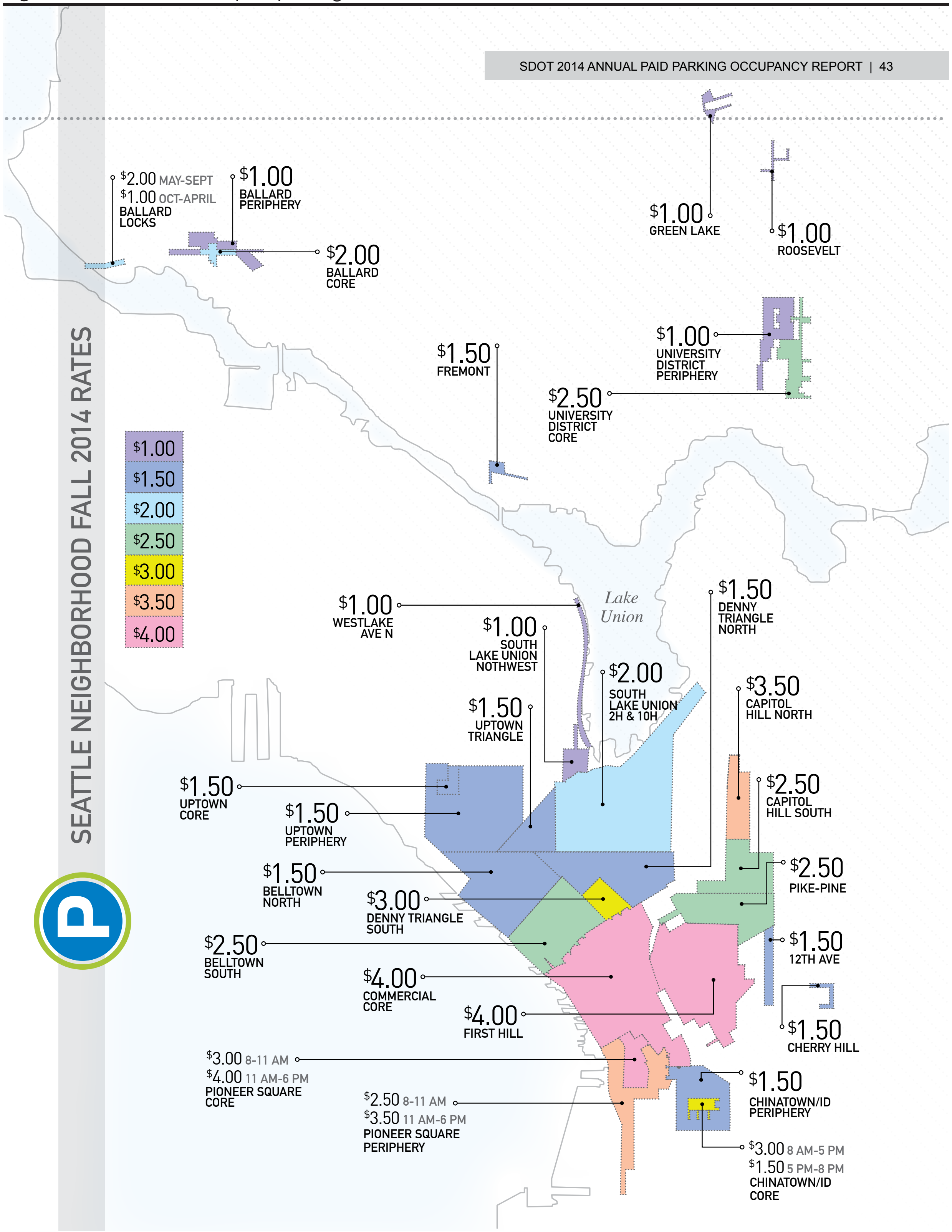
Figure 3.7–7 Restricted parking zones in Seattle



1: Montlake
2: Squire Park/Cherry Hill
3: Fauntleroy
4: Capitol Hill
5: Wallingford
6: University Park
7: First Hill
8: Eastlake
9: Magnolia
10: University District West
11: North Queen Anne
12: North Capitol Hill
13: Lower Queen Anne
14: Central District
15: Belmont/Harvard
16: Mount Baker
17: North Beacon Hill
18: Licton Springs
19: Roosevelt
20: Ravenna/Bryant
21: Pike/Pine
22: Wallingford/Lincoln HS
23: Madison Valley
24: Cascade
25: Westlake East
26: Upper Queen Anne
27: Fremont
28: Beacon Hill
29: Columbia City
30: Othello
31: Rainier Beach
A: Montlake /Husky Game Days
B: Ravenna/Laurelhurst Husky Game Days

Source: City of Seattle, 2014.

Figure 3.7–8 On-street paid parking facilities



formance-Based Parking Pricing Program, established by Seattle Municipal Code 11.16.121 that states, in part:

> *"The Director shall establish on-street parking rates and shall adjust parking rates higher (up to the Maximum Hourly Rate), or lower (as low as the Minimum Hourly Rate) in neighborhood parking areas based on measured occupancy so that approximately one or two open spaces are available on each blockface."*

The goals of the Performance-Based Parking Pricing Program are to:

- Support neighborhood business districts by having available on-street parking;
- Maintain adequate turnover and reduce meter feeding in commercial districts;
- Encourage adequate on-street parking availability, efficient use of off-street parking facilities and enhanced use of transit and other transportation alternatives; and
- Reduce congestion in travel lanes caused by drivers looking for on-street parking.

Seattle's target on-street parking occupancy is 70–85 percent utilization citywide. Table 3.7–1 shows the 2013 to 2014 daytime and evening occupancy rates by neighborhood. Daytime peak occupancy is on an upward trend in most locations. In 2013, of the 35 surveyed locations, 14 fell within the target 70–85 percent utilization range, 7 were below the target range and 13 were above the target range. The 13 locations with more than 85 percent occupancy were:

- Capitol Hill—North (92%)
- Cherry Hill (88%)
- Chinatown—International District (89%)
- Commercial Core—Financial (95%)
- Denny Triangle—South (93%)
- First Hill (93%)
- Pike-Pine (96%)
- Pioneer Square—Core (96%)
- Pioneer Square—Periphery (94%)
- South Lake Union—10 Hour (100%)
- South Lake Union—2 Hour (92%)
- University District—Core (88%)
- Uptown Triangle (92%)

Evening occupancy data tends to show higher utilization than the daytime with some areas exceeding the available supply. Of the 35 surveyed locations, 14 have evening utilization above 85 percent. The following six locations have utilization over 100 percent:

- 12th Avenue (106%)
- Ballard—Core (109%)
- Capitol Hill—North (100%)
- Capitol Hill—South (101%)
- Green Lake (102%)
- Pike-Pine (106%)

Table 3.7–1 2014 on-street paid parking occupancy (percent)

		Daytime Peak Occupancy		7 PM Occupancy	
Neighborhood	**Subarea**	**2013**	**2014**	**2013**	**2014**
12th Avenue		83	77	108	106
Ballard	Core	75	83	103	109
	Periphery	58	58	99	84
Ballard Locks	High seasonal differences*				
Belltown	North	52	68	53	74
	South	87	78	93	77
Capitol Hill	North	89	92	98	100
	South	85	77	101	101
Cherry Hill		71	88	68	95
Chinatown-ID	Core	89	89	72	77
	Periphery	65	69	52	70
Commercial Core	Financial	90	95	69	61
	Retail	80	84	73	84
	Waterfront	83	79	80	81
Denny Triangle	North	69	68	66	81
	South	89	93	78	88
First Hill		87	93	91	91
Fremont		80	78	98	95
Green Lake		76	83	110	102
Pike-Pine		93	96	104	106
Pioneer Square	Core**	Morning: 64	Morning: 53	78	87
		Afternoon: 95	Afternoon: 96		
		Evening: 77	Evening: 78		
	Periphery**	Morning: 64	Morning: 63	80	86
		Afternoon: 89	Afternoon: 94		
		Evening: 79	Evening: 81		
Roosevelt		63	65	88	64
South Lake Union	2-Hour	81	92	72	74
	10-Hour	95	100	55	58
	Northwest	no data	69	no data	31
University District	Core	89	88	107	96
	Periphery	57	56	52	43
Uptown	Core	75	81	93	93
	Periphery	72	77	88	85
Uptown Triangle		59	92	62	67
Westlake Avenue N		76	85	48	49

* Seasonal occupancy is used to set paid parking rates, hours and time limits. Ballard Locks rates will be set for May-September and October-April consistent with the hours of the Visitors Center.

** Time of day paid parking rates will be implemented in Pioneer Square based on the morning. (9–10 AM), afternoon (11 AM–5 PM) and evening (6–7 PM).

Source: City of Seattle, Annual Paid Parking Occupancy Report, 2014.

SAFETY

The City periodically releases reports summarizing citywide collision data. The most recently available data is for 2012, which had nearly 11,600 police reported collisions. This number was slightly higher than the previous two years, but well below the highs of roughly 14,000 in years 2003 through 2007 (SDOT 2012a). The City has a goal of zero traffic fatalities and serious injuries by 2030. In 2012, there were 20 fatalities in the City. Fatalities on city streets are on a downward trend, decreasing by roughly one-third since 1992 (SDOT 2012a).

Relevant Plans and Policies

Relevant policies related to transportation in Seattle are summarized below. The City of Seattle has a 10-year strategic plan outlined in *Move Seattle* (2015). Seattle also has master plans for transit, pedestrians and bicyclists, and is in the process of developing a Freight Master Plan. More detailed information is available in the specified documents.

MOVE SEATTLE (2015)

Move Seattle is a strategic document published in Spring 2015 that guides SDOT's work over the next ten years. The plan identifies the following three key elements:

- Organizing daily work around core values: a safe, interconnected, vibrant, affordable, and innovative city.
- Integrating modal plans to deliver transformational projects: this includes creating a near-term strategy to integrate recommendations from the freight, transit, walking, and bicycling 20-year modal plans.
- Prioritizing projects and work to identify funding: as the Bridging the Gap levy expires in 2015, SDOT is exploring ways to replace it as a funding source to ensure transportation maintenance and improvements can continue.

TRANSPORTATION STRATEGIC PLAN (2005)

The *Transportation Strategic Plan* (TSP) is the Seattle Department of Transportation's (SDOT's) 20-year work plan developed in 2005. This strategic plan was updated in 2015 as part of the Move Seattle initiative. It includes the strategies and actions required to achieve the goals and policies outlined in the Seattle Comprehensive Plan and to comply with PSRC regional planning documents. The TSP guides prioritization of resources to projects, programs and services. The TSP includes supporting data such as street classifications and traffic volumes, planning areas, transit routes and sidewalk inventory, among others. In addition annual reports show the progress made toward reaching the set goals.

TRANSIT MASTER PLAN (2012)

The *Transit Master Plan* (TMP) is a 20-year plan that outlines the needs to meet Seattle's transit demand through 2030. It prioritizes capital investment to create frequent transit services that meet the needs of residents and workers. It outlines the high priority transit corridors and the preferred modes (see Figure 3.7–6). This document refers to the Transportation Strategic Plan and specifies capital projects to improve speed and reliability. Goals include:

- Meet sustainability, growth management and economic development goals
- Make it easier and more desirable to take transit
- Respond to needs of transit-reliant populations
- Create great places where modes connect
- Advance implementation within constraints. The elements of the document include policies and programs, transit corridors and service, access and connections to transit and funding and performance monitoring.

PEDESTRIAN MASTER PLAN (2009)

The *Pedestrian Master Plan* (PMP) sets the following goals:

- Reduce the number and severity of crashes involving pedestrians.
- Make Seattle a more walkable city for all through equity in public engagement, service delivery, accessibility and capital investments.
- Develop a pedestrian environment that sustains healthy communities and support vibrant communities.
- Raises awareness of the important role of walking in promoting health and preventing disease.

The plan documents existing pedestrian facilities and outlines prioritized Tier 1 and Tier 2 improvement projects (see Figure 3.7–2 and Figure 3.7–3).

SEATTLE BICYCLE MASTER PLAN (2014)

The *Seattle Bicycle Master Plan* (BMP) provides guidance on future investments in bicycle facilities in Seattle, with a vision for bicycling as a safe and convenient mode for people of all ages and abilities on a daily basis. Goals include increasing bicycle ridership, safety, connectivity, equity and livability. The document outlines the existing network and over 400 miles of planned future network for the city (see Figure 3.7–4 and Figure 3.7–5). Strategies for end-of-trip facilities, programs, maintenance, project prioritization and funding are included.

FREIGHT MOBILITY STRATEGIC ACTION PLAN (2005)

The *Freight Mobility Strategic Action Plan* was developed by SDOT in 2005 to protect and grow the industrial job base. This document is especially important for assisting the two designated manufacturing and industrial centers: Ballard-Interbay-Northend and Greater

Duwamish. The plan identifies 22 actions to enhance freight movement, including coordinating with Seattle's freight community, actively participating in regional and state forums seeking freight funding and maintaining and updating an inventory of known trucking obstacles. A revised *Freight Master Plan* is currently being developed by SDOT and is expected to be completed in 2015. The *Freight Master Plan* would supersede the *Freight Mobility Strategic Action Plan*.

CITY OF SEATTLE 2013-2018 TRANSPORTATION CAPITAL IMPROVEMENT PROGRAM

For the 2013 to 2018 period the *Capital Improvement Program* (CIP) plans to spend $1.54 billion on developing, maintaining and operating Seattle's transportation system. The CIP aims to promote safe and efficient movement of people and goods and to enhance the quality of life, environments and economy within the City and surrounding areas. Funding has been designated for projects in the *Seattle Pedestrian Master Plan*, *Transit Master Plan*, *Bicycle Master Plan* and freight improvement projects. Highlighted improvement projects include:

- Safe Routes to School projects
- Sidewalk safety repair
- Sound Transit North Link Station bike and pedestrian improvements
- 3rd Avenue Corridor Improvements
- Eastlake High Capacity Transit planning
- Madison Corridor Improvements
- Transit Corridor Improvements
- Seattle Center City Connector Transit Analysis
- Fauntleroy Green Boulevard
- Enhanced Paving Plan
- Alaskan Way Viaduct and Seawall Replacement
- Elliott Bay Seawall Project
- Waterfront Improvement Program
- Mercer Corridor Project- West Phase
- First Hill Streetcar
- South Lake Union Streetcar

COMPLETE STREETS

This 2006 policy directs SDOT to consider roadway designs that balance the needs of all roadway users, including pedestrians, bicyclists, transit riders and people of all abilities, as well as automobiles and freight. Design decisions are based on data, such as the adjacent land uses and anticipated future transportation needs. There is no set design template for complete streets as every situation requires a unique balance of design features within the available right-of-way. However, examples include providing wider sidewalks, landscaping, bicycle lanes, transit stop amenities and adequate lane widths for freight operations.

Analysis Methodology

The proposed actions being evaluated in this document are area-wide and programmatic in nature, rather than location specific. Therefore, the methodology used to evaluate potential changes and impacts to the transportation network is broad-based as is typical for the analysis of large-scale plan updates.[2]

This section describes the methodology used to analyze base year transportation conditions in Seattle. The base year for this analysis is 2015. For some metrics, the most recently available data is provided while others use estimates from the 2015 project travel demand model. The project travel demand model is discussed in more detail in 3.7.2.

The analyses conducted for this EIS fall into two categories: those used to determine significant adverse transportation impacts and those provided for informational purposes only. These metrics are described in the following sections.

COMPREHENSIVE PLAN LEVEL OF SERVICE STANDARDS

The standards included in the current Comprehensive Plan are used to determine significant transportation impacts in this EIS. The Comprehensive Plan sets the PM peak period level of service (LOS) standards for locally-owned arterials and transit routes. The City uses "screenlines" to evaluate autos (including freight) and transit since buses generally travel in the same traffic stream as autos. A screenline is an imaginary line across which the number of passing vehicles is counted. Each of those screenlines has an LOS standard in the form of a volume-to-capacity (v/c) ratio: the number of vehicles crossing the screenline compared to the designated capacity of the roadways crossing the screenline. The City's Comprehensive Plan evaluates 28 screenlines during the PM peak hour. Table 3.7–2 and Figure 3.7–9 summarize the location of each screenline, as well as its LOS standard as designated in the Comprehensive Plan.

OTHER METRICS

This EIS includes additional metrics to help illustrate the differences between existing conditions and each of the future year alternatives. However, the City has not adopted any formal standards for these metrics and they are not used to identify deficiencies or impacts within this environmental document.

STATE FACILITIES

The designated screenlines include some facilities owned by the Washington Department of Transportation (WSDOT), such as SR 99 and SR 522. To provide a complete assessment, this analysis was supplemented to include those state facilities not included in the screenlines.

2 This large-scale analysis approach differs from the intersection-level analysis that may be more appropriate for assessing the effects of development on individual parcels or blocks.

Table 3.7–2
Seattle Comprehensive Plan screenline level of service thresholds

Screenline #	Screenline Location	LOS Standard
1.11	North City Limit—3rd Ave NW to Aurora Ave N	1.20
1.12	North City Limit—Meridian Ave N to 15th Ave NE	1.20
1.13	North City Limit—30th Ave NE to Lake City Way NE	1.20
2	Magnolia	1.00
3.11	Duwamish River—West Seattle Bridge & Spokane St	1.20
3.12	Duwamish River—1st Ave S & 16th Ave S	1.20
4.11	South City Limit—Martin Luther King Jr. Way to Rainier Ave S	1.00
4.12	South City Limit—Marine Dr SW to Meyers Way S	1.00
4.13	South City Limit—SR 99 to Airport Way S	1.00
5.11	Ship Canal—Ballard Bridge	1.20
5.12	Ship Canal—Fremont Bridge	1.20
5.13	Ship Canal—Aurora Bridge	1.20
5.16	Ship Canal—University & Montlake Bridges	1.20
6.11	South of NW 80th St—Seaview Ave NW to 15th Ave NW	1.00
6.12	South of N(W) 80th St—8th Ave NW to Greenwood Ave N	1.00
6.13	South of N(E) 80th St—Linden Ave N to 1st Ave NE	1.00
6.14	South of NE 80th St—5th Ave NE to 15th Ave NE	1.00
6.15	South of NE 80th St—20th Ave NE to Sand Point Way NE	1.00
7.11	West of Aurora Ave—Fremont Pl N to N 65th St	1.00
7.12	West of Aurora Ave—N 80th St to N 145th St	1.00
8	South of Lake Union	1.20
9.11	South of Spokane St—Beach Dr SW to W Marginal Way SW	1.00
9.12	South of Spokane St—E Marginal Way S to Airport Way S	1.00
9.13	South of Spokane St—15th Ave S to Rainier Ave S	1.00
10.11	South of S Jackson St—Alaskan Way S to 4th Ave S	1.00
10.12	South of S Jackson St—12th Ave S to Lakeside Ave S	1.00
12.12	East of CBD	1.20
13.11	East of I-5—NE Northgate Way to NE 145th St	1.00
13.12	East of I-5—NE 65th St to NE 80th St	1.00
13.13	East of I-5—NE Pacific St to NE Ravenna Blvd	1.00

Source: Seattle's Comprehensive Plan, Toward a Sustainable Seattle, 2008.

These include I-5, I-90, SR 509, SR 519 and SR 520, which are designated as Highways of Statewide Significance by WSDOT. Table 3.7–3 summarizes the segments analyzed. WSDOT sets the standard for these facilities at LOS D.[3] The purpose of the evaluation of state facilities is to monitor performance and facilitate coordination between the city and state per the Growth Management Act.

3 LOS D is defined using the methodologies outlined in the *Highway Capacity Manual*, Transportation Research Board, 2010 and other methods based on this document.

Figure 3.7–9 City of Seattle screenlines

Table 3.7–3 State facility analysis locations

State Facility	Location	LOS Standard
I-5	North of NE Northgate Way	D
I-5	Ship Canal Bridge	D
I-5	North of West Seattle Bridge	D
I-5	North of Boeing Access Rd	D
I-90	East of Rainier Ave S	D
SR 509	West of 4th Ave	D
SR 519	Between S 112th St and Cloverdale St	D
SR 520	Lake Washington Bridge	D

Source: WSDOT Community Planning Portal, 2014.

The freeway segments are analyzed using the same v/c concept that the City uses for its screenlines. Average daily volumes were collected from WSDOT's online Community Planning Portal. Capacities were determined using a set of tables developed by the Florida Department of Transportation (FDOT) based on the *2010 Highway Capacity Manual*. The capacities are based on the characteristics of the roadway including number of lanes, presence of auxiliary lanes and presence of ramp metering.

The remaining metrics evaluate the transportation system on a sector basis to present a holistic view of the network. The following sections describe the metrics evaluated for each of the sectors shown in Figure 2–17. Some metrics are area-wide, while others are based on travel from a specific location. Figure 3.7–10 summarizes the specific analysis locations chosen within each sector.

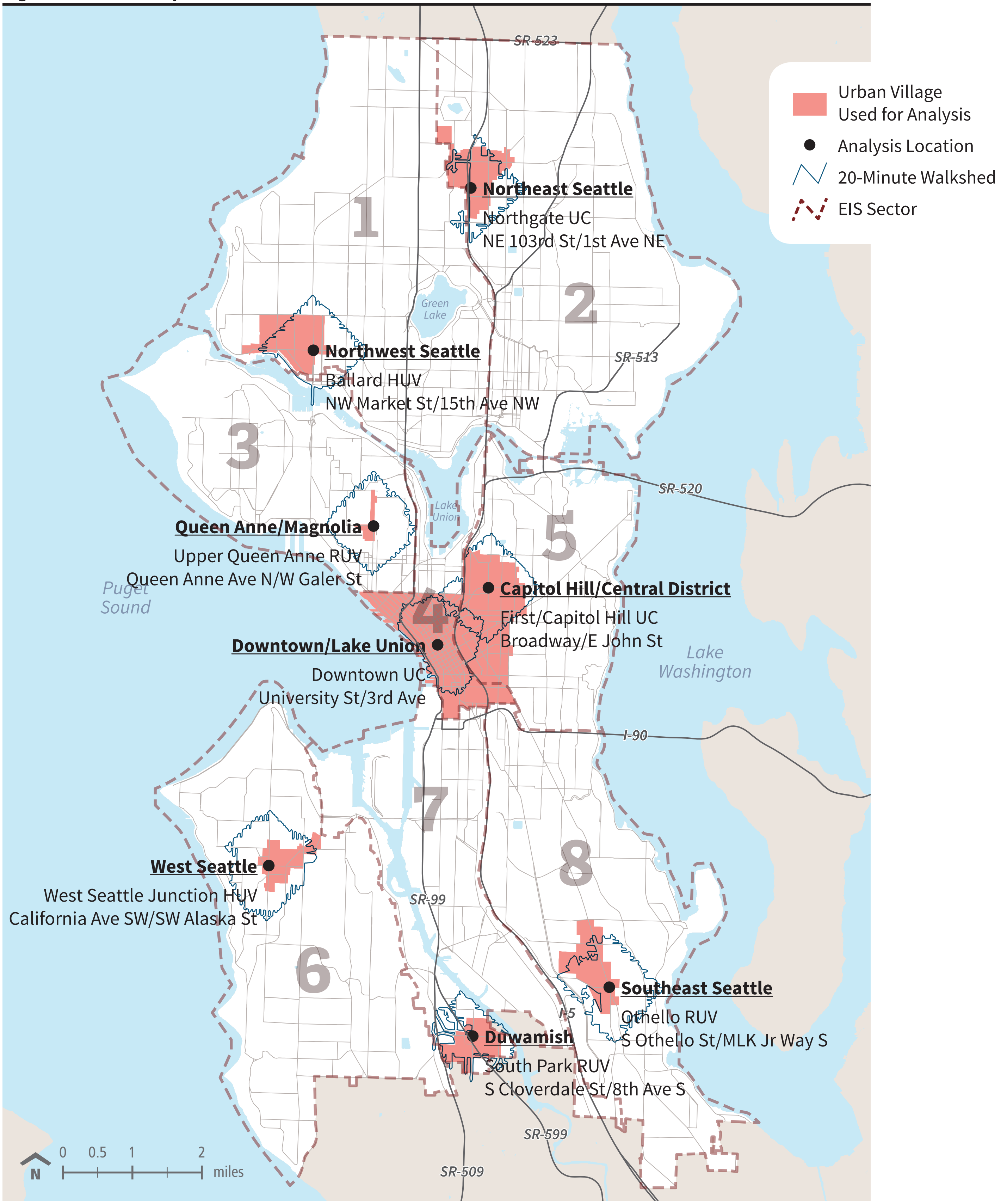
Travel Time

Travel time was selected as a performance measure for autos, freight and transit because it addresses the fundamental concern of most travelers—how long does it take to move within the city? Travel times are provided from three of the city's urban centers (Downtown, the University District and Northgate) to each of the eight sectors. Within each of the eight sectors, a representative location was selected as the destination—an urban center, hub urban village or residential urban village.

For transit, travel times were collected using Sound Transit's online trip planner to determine the PM peak hour travel time between each pair of locations based on current bus[4] and light rail schedules. For autos, travel times were collected during the PM peak hour from Google's real-time travel time estimates.[5] Travel times are not expected to change substantially in the next year (i.e. by the base year of 2015). Therefore, the travel times collected in 2014 are assumed to adequately represent the 2015 base year.

4 Sound Transit's online trip planner includes information on King County Metro routes.
5 Google's travel time estimates are based on a variety of sources, including INRIX speed data.

Figure 3.7–10 Analysis locations and 20-minute walkshed boundaries



Walksheds

A "walkshed" map shows the area accessible by foot within a certain amount of time from a given point. Portland and Tacoma, along with a growing list of other cities, have used the concept of a "20-minute neighborhood" to represent places with a mix of commercial and residential uses within close proximity. In essence, a 20-minute neighborhood is a place where residents can reach all of their daily needs within a comfortable walking distance (20 minutes or about a mile). Based on that concept, this evaluation maps the area within a 20-minute walk from the representative intersection (as shown in Figure 3.7–10) was mapped using Geographic Information Systems (GIS) software. The distance that can be traveled within 20 minutes varies depending on the street network connectivity and local topography. Walksheds indicate how accessible an area is by foot, and highlight physical barriers to walking. In addition to the walkshed map itself, the number of households and the retail employment within the walkshed was calculated. This provides an indication of the density of land uses currently present within each of the evaluated urban villages or urban centers.

Mode Share

Mode share was evaluated for trips originating from or destined to each of the eight sectors during the PM peak period. The estimated single occupant vehicle (SOV), high occupancy vehicle (HOV), transit, pedestrian and bicycle shares are provided for each area. All types of trips are included in the analysis. The base year project travel demand model was used to estimate the mode shares (see 3.7.2 for details).

Average Trip Length

Average trip length is measured as the average travel time in minutes for trips originating from or destined to each sector during the PM peak period. All modes and all types of trips

Mode Share Estimates

The mode share estimates used in this analysis come from the project travel demand forecasting model. While the model has updated land use and transportation network inputs, the mode share estimates are fundamentally rooted in the PSRC 2006 household travel survey, the most recent household survey available at the time of analysis. The 2006 survey used a traditional "travel diary" survey where participants are asked to keep track of their daily trips in a hand-written log. This year, the PSRC will finalize survey results from a new household travel survey that was conducted in 2014. The 2014 household travel survey used a web-based travel diary with automated prompts for survey respondents to ensure the survey was fully completed. The results of the 2014 household travel survey show substantially more non-SOV (particularly walk) trips than did the 2006 household survey. The PSRC is currently reviewing the data to determine how much of the mode share shift is due to changes in travel behavior as opposed to the change in data collection methodology. This difference in methodology is the main difference between the EIS mode share results (which are based on the 2006 survey) and those being prepared for the 2035 Move Seattle work (based on the 2014 survey). The more recent results will likely be used to inform future mode share target-setting.

are included in the analysis using the base year project travel demand model (see 3.7.2 for details). This measure differs from the Travel Time measure described above since it includes all trips to all origins/destinations to/from the sector.

VMT per Capita

Vehicle miles traveled (VMT) per capita is the average VMT for trips originating from or destined to each sector during the PM peak period divided by the number of residents and employees[6] of the sector. This analysis was completed using the base year project travel demand model (see 3.7.2 for details).

Analysis Results

This section summarizes the results of the analysis used to evaluate existing transportation conditions in Seattle.

COMPREHENSIVE PLAN LEVEL OF SERVICE STANDARDS

Screenlines

The most recently available PM peak hour traffic counts collected by the City of Seattle were compiled for the screenline analysis. Count volumes older than 2012 were factored using growth trends along similar roadways. Recent traffic growth trends were also reviewed to determine if volumes should be factored up to approximate 2015 conditions. That evaluation found relatively steady (unchanged) traffic volumes over the past five years; therefore, the recent counts are expected to adequately represent 2015 conditions.

As shown in Table 3.7–4, none of the City's screenlines are expected to exceed their PM peak hour LOS standard in 2015. The screenline nearest to the capacity threshold is the Ballard Bridge at 0.99 in the northbound direction. However, the threshold is currently set at 1.2 so it is below the LOS threshold.

OTHER METRICS

State Facilities

Table 3.7–5 summarizes the existing conditions on the state facility locations not included in the screenline analysis. Shaded cells indicate that the volume-to-LOS D capacity ratio is over 1.0 meaning the facility is not meeting WSDOT's LOS standard.

These include three segments on I-5 (north of NE Northgate Way, the Ship Canal Bridge and north of the West Seattle Bridge) and I-90 east of Rainier Avenue S. The fourth I-5 segment is currently operating at a 1.0 v/c ratio; therefore, any additional traffic will push it beyond the

6 The sum of employees and residents in an area is sometimes called the "service population" and helps to compare the results for areas that are housing rich or jobs rich.

Table 3.7–4 2015 PM peak hour screenline volume-to-capacity

Screenline #	Screenline Location	LOS Standard	Existing NB/EB	Existing SB/WB
1.11	North City Limit—3rd Ave NW to Aurora Ave N	1.20	0.70	0.52
1.12	North City Limit—Meridian Ave N to 15th Ave NE	1.20	0.41	0.32
1.13	North City Limit—30th Ave NE to Lake City Way NE	1.20	0.73	0.63
2	Magnolia	1.00	0.53	0.55
3.11	Duwamish River—West Seattle Bridge & Spokane St	1.20	0.61	0.87
3.12	Duwamish River—1st Ave S & 16th Ave S	1.20	0.35	0.52
4.11	South City Limit—Martin Luther King Jr. Way to Rainier Ave S	1.00	0.47	0.63
4.12	South City Limit—Marine Dr SW to Meyers Way S	1.00	0.37	0.42
4.13	South City Limit—SR 99 to Airport Way S	1.00	0.41	0.45
5.11	Ship Canal—Ballard Bridge	1.20	0.99	0.52
5.12	Ship Canal—Fremont Bridge	1.20	0.71	0.54
5.13	Ship Canal—Aurora Bridge	1.20	0.81	0.62
5.16	Ship Canal—University & Montlake Bridges	1.20	0.80	0.87
6.11	South of NW 80th St—Seaview Ave NW to 15th Ave NW	1.00	0.45	0.43
6.12	South of N(W) 80th St—8th Ave NW to Greenwood Ave N	1.00	0.66	0.49
6.13	South of N(E) 80th St—Linden Ave N to 1st Ave NE	1.00	0.44	0.27
6.14	South of NE 80th St—5th Ave NE to 15th Ave NE	1.00	0.65	0.53
6.15	South of NE 80th St—20th Ave NE to Sand Point Way NE	1.00	0.49	0.47
7.11	West of Aurora Ave—Fremont Pl N to N 65th St	1.00	0.48	0.58
7.12	West of Aurora Ave—N 80th St to N 145th St	1.00	0.50	0.57
8	South of Lake Union	1.20	0.78	0.78
9.11	South of Spokane St—Beach Dr SW to W Marginal Way SW	1.00	0.51	0.58
9.12	South of Spokane St—E Marginal Way S to Airport Way S	1.00	0.47	0.52
9.13	South of Spokane St—15th Ave S to Rainier Ave S	1.00	0.45	0.58
10.11	South of S Jackson St—Alaskan Way S to 4th Ave S	1.00	0.56	0.65
10.12	South of S Jackson St—12th Ave S to Lakeside Ave S	1.00	0.48	0.58
12.12	East of CBD	1.20	0.35	0.45
13.11	East of I-5—NE Northgate Way to NE 145th St	1.00	0.71	0.59
13.12	East of I-5—NE 65th St to NE 80th St	1.00	0.44	0.41
13.13	East of I-5—NE Pacific St to NE Ravenna Blvd	1.00	0.55	0.54

Source: Seattle's Comprehensive Plan, Toward a Sustainable Seattle, 2008; SDOT count data, 2014; Fehr & Peers, 2014.

LOS D standard. SR 520, which has tolling that limits demand, is currently meeting the LOS D standard, as are SR 509 and SR 519.

This analysis indicates I-5 and I-90 are currently exceeding WSDOT's LOS D standard. This is consistent with WSDOT's assessment in the Draft Congested Interstate Corridor Report for the WA State Highway System Plan (WSDOT 2006).

Table 3.7–5 Existing conditions of state facility analysis locations

State Facility	Location	LOS Standard	Daily Traffic Volume	Maximum Daily Capacity for LOS D	Volume-to-LOS D Capacity Ratio
I-5	North of NE Northgate Way	D	207,000	204,225	1.01
I-5	Ship Canal Bridge	D	203,000	162,015	1.25
I-5	North of West Seattle Bridge	D	228,000	194,500	1.17
I-5	North of Boeing Access Rd	D	194,000	194,500	1.00
I-90	East of Rainier Ave S	D	132,000	116,600	1.13
SR 509	West of 4th Ave	D	53,000	93,100	0.57
SR 519	Between S 112th St & Cloverdale St	D	27,000	32,400	0.83
SR 520	Lake Washington Bridge	D	62,000	77,900	0.80

Note: Existing average daily traffic volumes do not include the express lane volumes on I-5 and I-90.

Source: WSDOT Community Planning Portal, 2014.

Travel Times

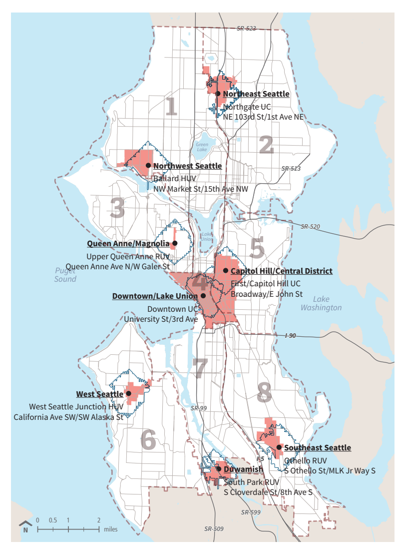
Figure 3.7–11 summarizes 2015 auto travel times from Downtown, the University District and Northgate to each of the eight sectors. All of the studied urban villages and urban centers are within a 20 minute drive of Downtown (note this includes travel on the I-5 express lanes rather than the general purpose lanes). Travel times to the University District and Northgate urban centers from West Seattle, Duwamish and Southeast Seattle are the longest travel times within the City—ranging from roughly a half hour to 45 minutes. Traffic congestion is more difficult for freight to navigate and trucks typically travel at slower speeds than general auto traffic.

Figure 3.7–11 also summarizes 2015 transit travel times from Downtown, the University District and Northgate to each of the eight sectors. Service from Downtown tends to have the shortest travel times given the concentration of direct routes and its central location. Travel to the University District and Northgate often requires a transfer downtown which results in lengthy travel times. Appendix A.4 contains a detailed table of 2015 auto and transit travel times from Downtown, the University District and Northgate to each of the eight sectors.

Walksheds

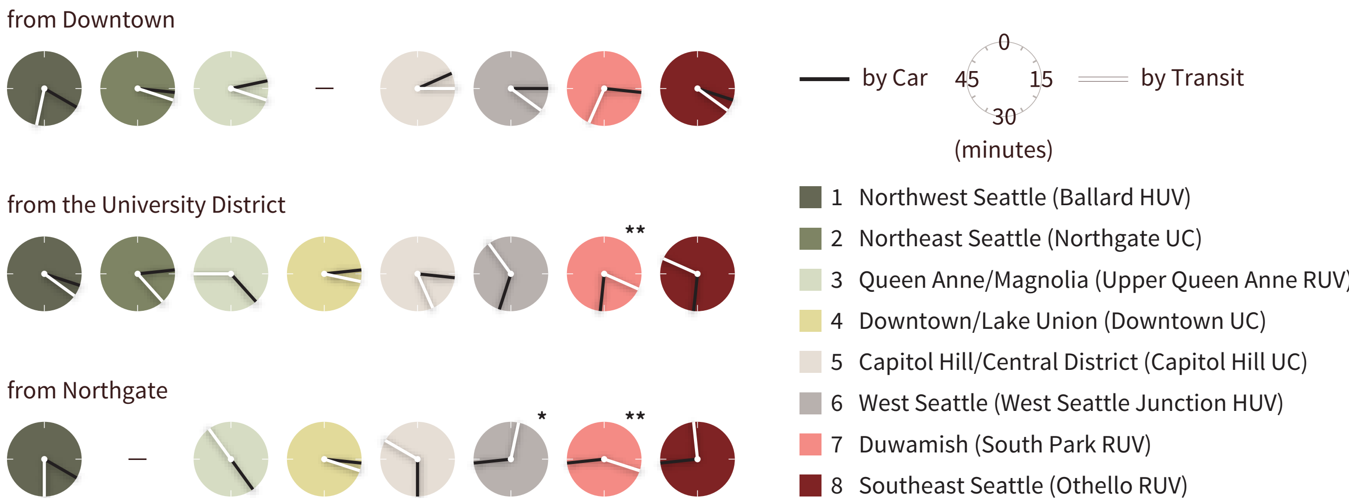
Figure 3.7–10 shows the 20-minute walkshed for each sector. While some walksheds show few barriers, others are limited by freeways or topography. For instance, the western side of the Northgate walkshed is limited by I-5, the South Park walkshed is limited by SR 99 and the incomplete street grid and the Othello walkshed is limited by the nearby greenbelt and incomplete street grid.

Figure 3.7–12 summarizes the number of households and retail jobs within each 20-minute walkshed in 2015. The downtown walkshed contains the densest land use with 17,900 households and 7,600 retail jobs. Capitol Hill/Central



Thumbnail of Figure 3.7–10

Figure 3.7–11 2015 PM peak period auto and transit travel times



Note: For auto travel times, I-5 travel times include travel on the express lanes whenever possible.
* Existing transit travel time from Northgate to West Seattle (West Seattle Junction) is 62 minutes.
** Existing transit travel time from the University District to Duwamish (South Park) is 79 minutes and from Northgate to Duwamish (South Park) is 78 minutes.

Source: Google Maps, 2014; Sound Transit trip planner, 2014.

District is similar with 20,700 households and 2,000 retail jobs. The South Park residential urban village (representing the Duwamish Sector) has very few households and retail jobs within the 20-minute walkshed. Appendix A.4 contains a detailed table of the number of households and retail jobs within each 20-minute walkshed in 2015.

Mode Share

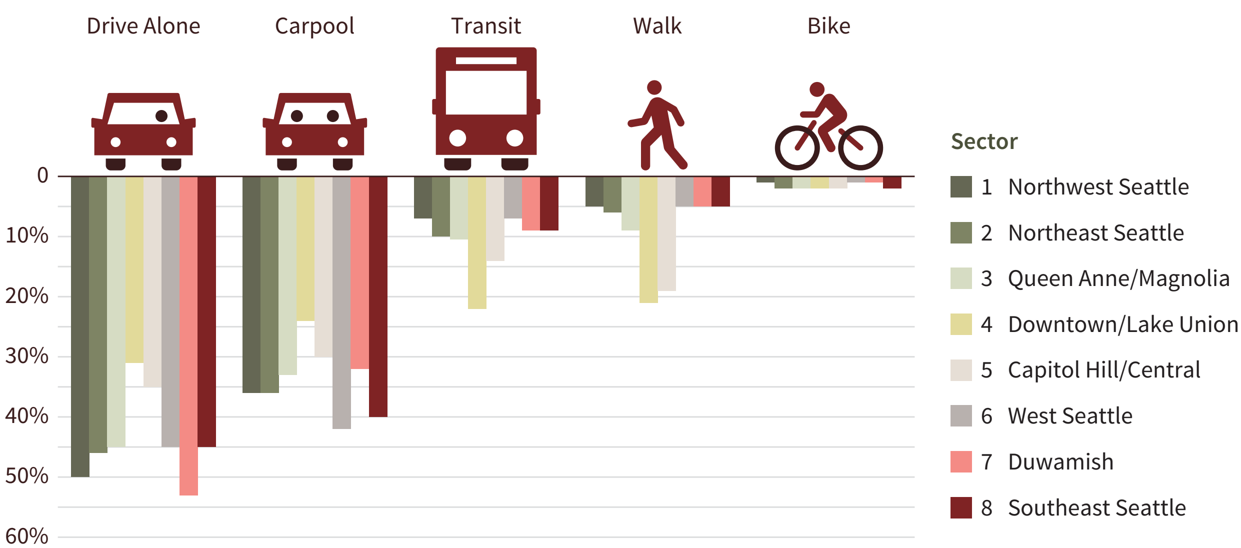
The PM peak period mode share for all trips for each of the sectors is shown in Figure 3.7–13. Auto trips are broken into SOV and HOV trips below. Downtown has the lowest SOV share at 31 percent and Duwamish has the highest SOV share at 53 percent. SOV trips generally account for one-half to two-thirds of the total auto trips. The proportion of trips made by transit varies considerably by sector. The highest proportion by far occurs in Downtown/Lake Union (22 percent). The lowest transit mode share (7 percent) occurs in Northwest Seattle and West Seattle. Appendix A.4 contains a detailed table of the PM peak period mode share for all trips for each of the sectors.

The walk mode share also varies considerably within the city. Downtown/Lake Union and Capitol Hill/Central District have the highest walk share at 21 and 19 percent, respectively. The sectors dominated by residential uses (Northwest, Northeast, West and Southeast Seattle) have walk shares of 5 to 6 percent. The Duwamish area which is dominated by manufacturing and industrial uses also has a 5 percent walk share. Bike mode share is less variable with 1 to 2 percent throughout the city. Although some urban centers may have higher walk or bike mode shares (for example the University District, which is within the Northeast Sector), the differences are minor when viewed at the sector level.

Figure 3.7–12 2015 households and retail employment within 20-minute walkshed

Source: Fehr & Peers, 2014.

Figure 3.7–13 2015 PM peak period mode share by sector



Note: Shares may not add to 100% due to rounding

Source: Project travel demand model, 2014.

Average Trip Length

The average trip length in minutes for trips originating from or destined to each sector during the PM peak period is summarized in Figure 3.7–14. Average travel times among the eight sectors range from 20 to 27 minutes. The citywide average trip length is 23 minutes. Appendix A.4 contains a detailed table of the peak period average trip length in minutes for each of the sectors.

The areas with the shortest trip lengths are Northwest Seattle and West Seattle. These areas are predominantly residential in nature, limiting the number of regional trips. In contrast, the more central areas of Seattle have slightly higher trip lengths as they contain more regional attractions, namely Downtown as the regional employment center drawing workers from throughout the Puget Sound region. The Duwamish area has the highest average travel time at 27 minutes. The Duwamish is dominated by a manufacturing and industrial center which draws trips from throughout the region, includes a relatively high proportion of long-distance truck trips and also has the lowest non-motorized mode share which tends to push the average trip length higher.

VMT per Capita

The VMT per capita for each sector during the PM peak period is summarized in Figure 3.7–15. The citywide average is 3.3 miles per resident and employee. The Downtown/Lake Union and Capitol Hill/Central District sectors fall below the average; this is due to the relatively low vehicle mode share and relatively high population and employment density. Heavily residential areas tend to have higher vehicle mode share and lower population and

Figure 3.7–14
2015 PM peak period average trip length in minutes

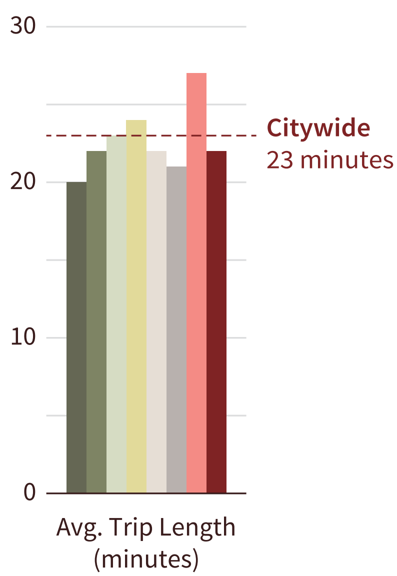
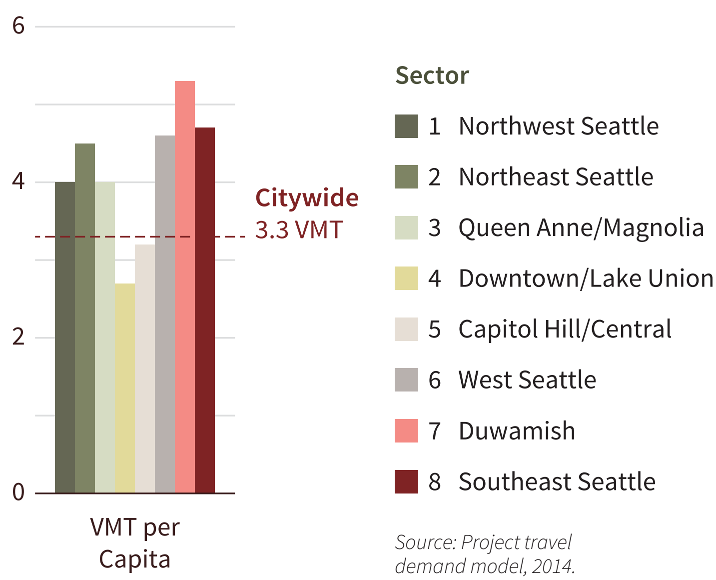


Figure 3.7–15
2015 PM peak period vehicle miles traveled per capita



Source: Project travel demand model, 2014.

employment, bringing their VMT per capita above the citywide average. The sector with the highest VMT per capita is the Duwamish area which includes a robust manufacturing and industrial center that generates substantial auto and truck traffic. Appendix A.4 contains a detailed table of the VMT per capita for each of the sectors.

3.7.2 Impacts

This section describes the planning scenarios evaluated, the methodology used for the future year analysis and the results of the future year analysis. The future analysis year is 2035.

Planning Scenarios Evaluated

Four alternatives are evaluated under future year 2035 conditions. All four alternatives assume the same growth in new households and employment (70,000 households and 115,000 jobs) but vary in how the growth would be distributed (see Chapter 2, Figure 2–1). The same transportation network is assumed under each alternative.

Analysis Methodology

This section summarizes the analysis methodology used to evaluate future year (2035) conditions.

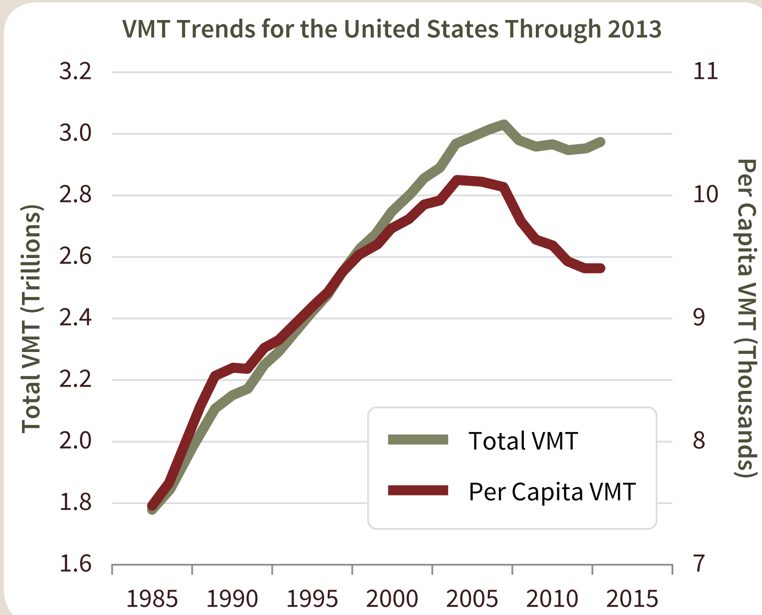
TRANSPORTATION NETWORK AND LAND USE ASSUMPTIONS

The analysis used a citywide travel demand forecasting model to distribute and assign vehicle traffic to area roadways. The travel demand forecasting model was refined to create more accurate 2015 and 2035 networks. The following is a description of some of the travel demand model's key features:

- **Analysis Years.** This version of the model has a base year of 2015 and a horizon year of 2035. Travel forecasts were developed by updating the land use inputs throughout the city.
- **Land Use.** The City of Seattle developed land use forecasts for 2015 using a combination of sources including data from the Puget Sound Regional Council, Employment Securities Department and Department of Planning and Development. Land use forecasts were then developed for each of the four 2035 alternatives by distributing the expected growth according to each alternative's assumed development pattern.
- **Highways and Streets.** The existing highway and major street systems within the City of Seattle are fully represented in the 2015 model; those planned to be present by 2035 are included in the 2035 model.
- **Transit.** The travel model has a full representation of the transit system under base year (2015) conditions (which did not include the expanded transit service under

Potential Changes to VMT per Capita

After 50 years of steady growth, nationwide vehicle miles traveled per capita leveled off in 2004 and declined by eight percent between 2004 and 2012. Whether travel will return to growth rates of past decades, remain static or continue to decline is of critical importance to decision-makers in government at all levels. VMT growth affects many areas of transportation ranging from fuel tax revenues, to modal investment decisions, to environmental impacts, which is the focus of this document.



Source: FHWA; U.S. Census Bureau; McCahill, 2014.

For this study, VMT is estimated using a travel demand model based on the PSRC's regional model. The model's estimate of VMT generation is based on a range of factors including trip generation rates, auto operating costs, household size and income and traffic congestion levels. With the exception of traffic congestion levels, PSRC does not project major changes in the factors listed above, which translates into a relatively static level of VMT per capita from the travel model. Demographic shifts not captured in the travel demand model could potentially result in lower VMT per capita. A sensitivity analysis to estimate the magnitude of that change resulted in VMT per capita 7 percent lower than what would be predicted without considering those demographic factors. A more detailed discussion is included in Appendix A.4.

Proposition 1). The horizon year transit system is based on assumptions of service from Sound Transit's 2035 travel demand model (released in September 2013) and the Seattle Transit Master Plan (adopted in April 2012).

- **Travel Costs.** The model accounts for the effects of auto operating costs, parking, transit fares and tolls (on SR 520 and SR 99) on travel demand.
- **Travel Demand.** The model predicts travel demand for seven modes of travel: drive alone, carpool (2 person), carpool (3 or more people), transit, trucks, walking and bicycling. Travel demand is estimated for five time periods. This analysis will focus on the PM peak period.

The 2035 network was modified to reflect completion of the City's transportation modal plans, thus providing a test of the City's planned infrastructure. This includes rechannelization that could occur with implementation of the City's Bicycle Master Plan. Key Transit Master Plan projects such as frequent service on priority transit corridors and dedicated bus lanes were included in the model. Detailed assumptions may be found in Appendix A.4. The assumptions were determined in conjunction with City staff using the best knowledge available at the time.

FORECAST DEVELOPMENT

Forecasts including traffic volumes, travel times and mode shares, were prepared for each of the four alternatives during the PM peak period using the travel model. To reduce model error, a technique known as the "difference method" was applied for traffic volumes, travel times and mode share. Rather than take the direct output from the 2035 model, the difference method calculates the growth between the base year and 2035 models and adds that growth to existing data when available. For example, assume a road has an existing hourly volume of 500 vehicles. If the base year model showed a volume of 400 vehicles and the future year model showed a volume of 650 vehicles, 250 vehicles would be added to the existing count for a future expected volume of 750 vehicles.

Thresholds of Significance

The City sets its transportation level of service standards using the screenline concept in the Transportation Element of the proposed update to the Comprehensive Plan.

In an EIS, the action alternatives (alternatives 2, 3 and 4) are assessed against the No Action Alternative (Alternative 1) to identify impacts. A deficiency is identified for the No Action Alternative if it would cause a screenline to exceed its stated LOS threshold.

The above criterion also applies to action alternatives provided no deficiency has been identified for the No Action Alternative. However, if the No Action Alternative already meets the deficiency criteria, then an impact will only be identified if the action alternative would fail to meet the aforementioned threshold and do so at a level worse than the No Action Alternative. Specifically, an impact is identified if the action alternative would cause a screenline to exceed its stated LOS threshold by at least 0.01 more than the No Action Alternative.

Other metrics have been prepared in this analysis, including state facility v/c ratios, travel times, walksheds, trip length and VMT per capita. Since the City has not adopted standards for those metrics, they are not currently used to determine significant impacts. They are provided for informational purposes only.

The rationale behind this approach to identifying impacts is to compare changes to the transportation system from the actions that would require action by the City Council to change, compared to what is expected to happen under "business-as-usual" conditions. Therefore potential impacts are compared to a future condition assuming current trends continue, as opposed to existing conditions.

Analysis Results

COMPREHENSIVE PLAN LEVEL OF SERVICE STANDARDS

<u>Screenlines</u>

Figure 3.7–16 and Table 3.7–6 summarize the projected PM peak hour volumes across each screenline in 2035. All of the screenlines are projected to meet the LOS standard under all

Figure 3.7–16 2035 screenline v/c ratios

Table 3.7–6 2035 PM peak hour screenline volume-to-capacity

			Alternative 1		Alternative 2		Alternative 3		Alternative 4	
Screenline #	**Screenline Location**	**LOS Standard**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
1.11	North City Limit—3rd Ave NW to Aurora Ave N	1.20	1.03	0.80	1.04	0.79	1.02	0.78	1.04	0.79
1.12	North City Limit—Meridian Ave N to 15th Ave NE	1.20	0.76	0.61	0.76	0.61	0.76	0.62	0.77	0.62
1.13	North City Limit—30th Ave NE to Lake City Way NE	1.20	0.96	0.83	0.98	0.83	0.96	0.83	0.97	0.83
2	Magnolia	1.00	0.56	0.56	0.55	0.56	0.56	0.56	0.56	0.55
3.11	Duwamish River—West Seattle Bridge & Spokane St	1.20	0.69	1.15	0.68	1.15	0.70	1.14	0.70	1.15
3.12	Duwamish River—1st Ave S & 16th Ave S	1.20	0.38	0.55	0.38	0.55	0.39	0.55	0.38	0.55
4.11	South City Limit—Martin Luther King Jr Way to Rainier Ave. S	1.00	0.57	0.98	0.56	0.93	0.58	0.94	0.57	0.93
4.12	South City Limit—Marine Dr SW to Meyers Way S	1.00	0.56	0.72	0.55	0.72	0.56	0.72	0.56	0.73
4.13	South City Limit—SR 99 to Airport Way S	1.00	0.58	0.73	0.57	0.76	0.59	0.76	0.58	0.75
5.11	Ship Canal—Ballard Bridge	1.20	1.19	0.72	1.15	0.70	1.16	0.70	1.17	0.73
5.12	Ship Canal—Fremont Bridge	1.20	0.79	0.71	0.78	0.70	0.78	0.70	0.77	0.71
5.13	Ship Canal—Aurora Bridge	1.20	0.94	0.82	0.92	0.82	0.91	0.82	0.91	0.83
5.16	Ship Canal—University & Montlake Bridges	1.20	0.96	1.06	0.96	1.06	0.95	1.05	0.94	1.05
6.11	South of NW 80th St—Seaview Ave NW to 15th Ave NW	1.00	0.52	0.49	0.51	0.47	0.51	0.48	0.53	0.50
6.12	South of N(W) 80th St—8th Ave NW to Greenwood Ave N	1.00	0.87	0.77	0.85	0.75	0.86	0.76	0.87	0.78
6.13	South of N(E) 80th St—Linden Ave N to 1st Ave NE	1.00	0.55	0.41	0.54	0.41	0.53	0.41	0.54	0.42
6.14	South of NE 80th St—5th Ave NE to 15th Ave NE	1.00	0.76	0.67	0.74	0.65	0.74	0.68	0.73	0.67
6.15	South of NE 80th St.—20th Ave NE to Sand Point Way NE	1.00	0.64	0.58	0.63	0.57	0.62	0.58	0.62	0.58
7.11	West of Aurora Ave—Fremont Pl N to N 65th St	1.00	0.55	0.66	0.53	0.64	0.55	0.64	0.57	0.65
7.12	West of Aurora Ave—N 80th St to N 145th St	1.00	0.56	0.66	0.55	0.65	0.56	0.65	0.56	0.66
8	South of Lake Union	1.20	0.92	0.83	0.91	0.78	0.92	0.79	0.89	0.78
9.11	South of Spokane St—Beach Dr SW to W Marginal Way SW	1.00	0.59	0.71	0.57	0.71	0.59	0.71	0.60	0.72
9.12	South of Spokane St—E Marginal Way S to Airport Way S	1.00	0.60	0.71	0.60	0.71	0.61	0.71	0.60	0.71
9.13	South of Spokane St—15th Ave S to Rainier Ave S	1.00	0.67	0.89	0.65	0.89	0.67	0.91	0.67	0.91
10.11	South of S Jackson St—Alaskan Way S to 4th Ave S	1.00	0.64	0.84	0.64	0.85	0.64	0.83	0.64	0.84
10.12	South of S Jackson St—12th Ave S to Lakeside Ave S	1.00	0.74	0.91	0.74	0.92	0.76	0.91	0.76	0.91
12.12	East of CBD	1.20	0.39	0.52	0.39	0.52	0.38	0.52	0.39	0.52
13.11	East of I-5—NE Northgate Way to NE 145th St	1.00	0.84	0.78	0.88	0.80	0.85	0.79	0.84	0.78
13.12	East of I-5—NE 65th St to NE 80th St	1.00	0.50	0.53	0.50	0.51	0.50	0.54	0.49	0.54
13.13	East of I-5—NE Pacific St to NE Ravenna Blvd	1.00	0.62	0.67	0.62	0.67	0.63	0.65	0.63	0.65

Note: Shaded cells denote screenlines that exceed the LOS threshold set in the Comprehensive Plan.

Source: Seattle's Comprehensive Plan, Toward a Sustainable Seattle, 2008; Fehr & Peers, 2014.

alternatives. Screenline 1.11 (North City Limit—3rd Avenue NW to Aurora Avenue N), Screenline 3.11 (Duwamish River—West Seattle Bridge and Spokane Street), Screenline 5.11 (Ballard Bridge) and Screenline 5.16 (University & Montlake Bridges) are projected to near the threshold with v/c ratios over 1.0. However, the LOS threshold on all of those screenlines is 1.2.

Therefore, no significant adverse automobile traffic, freight[7] or transit impacts are expected under any of the alternatives.

OTHER METRICS

State Facilities

Table 3.7–7 summarizes 2035 conditions on the state facilities not included in the screenline analysis. Shaded cells indicate that the v/c ratio is over 1.0 meaning the facility would not meet WSDOT's LOS standard.

Table 3.7–7 State facility analysis—volume-to-LOS D capacity ratio

		2015	2035			
State Facility	**Location**	**Existing**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**
I-5	North of NE Northgate Way	1.01	1.18	1.19	1.18	1.19
I-5	Ship Canal Bridge	1.25	1.37	1.37	1.37	1.37
I-5	North of West Seattle Bridge	1.17	1.26	1.27	1.26	1.26
I-5	North of Boeing Access Rd	1.00	1.18	1.18	1.18	1.18
I-90	East of Rainier Ave S	1.13	1.33	1.34	1.34	1.34
SR 509	Between S 112th St & Cloverdale St	0.57	0.77	0.78	0.77	0.77
SR 519	West of 4th Ave	0.83	0.90	0.93	0.90	0.90
SR 520	Lake Washington Bridge	0.80	1.04	1.04	1.04	1.04

Note: Forecasted average daily traffic volumes do not include express lane volumes on I-5 and I-90.

Source: WSDOT Community Planning Portal, 2014.

As indicated by the rising v/c ratios, traffic is expected to increase along the major freeway corridors between 2015 and 2035. This growth in traffic is due in part to increased development in Seattle, but regional and statewide growth also contributes to increased traffic on the freeways. With this increase in traffic, six study segments are expected to exceed WSDOT's LOS D standard under all four alternatives. SR 509 and SR 519 are expected to meet WSDOT's LOS D standard under all four alternatives.

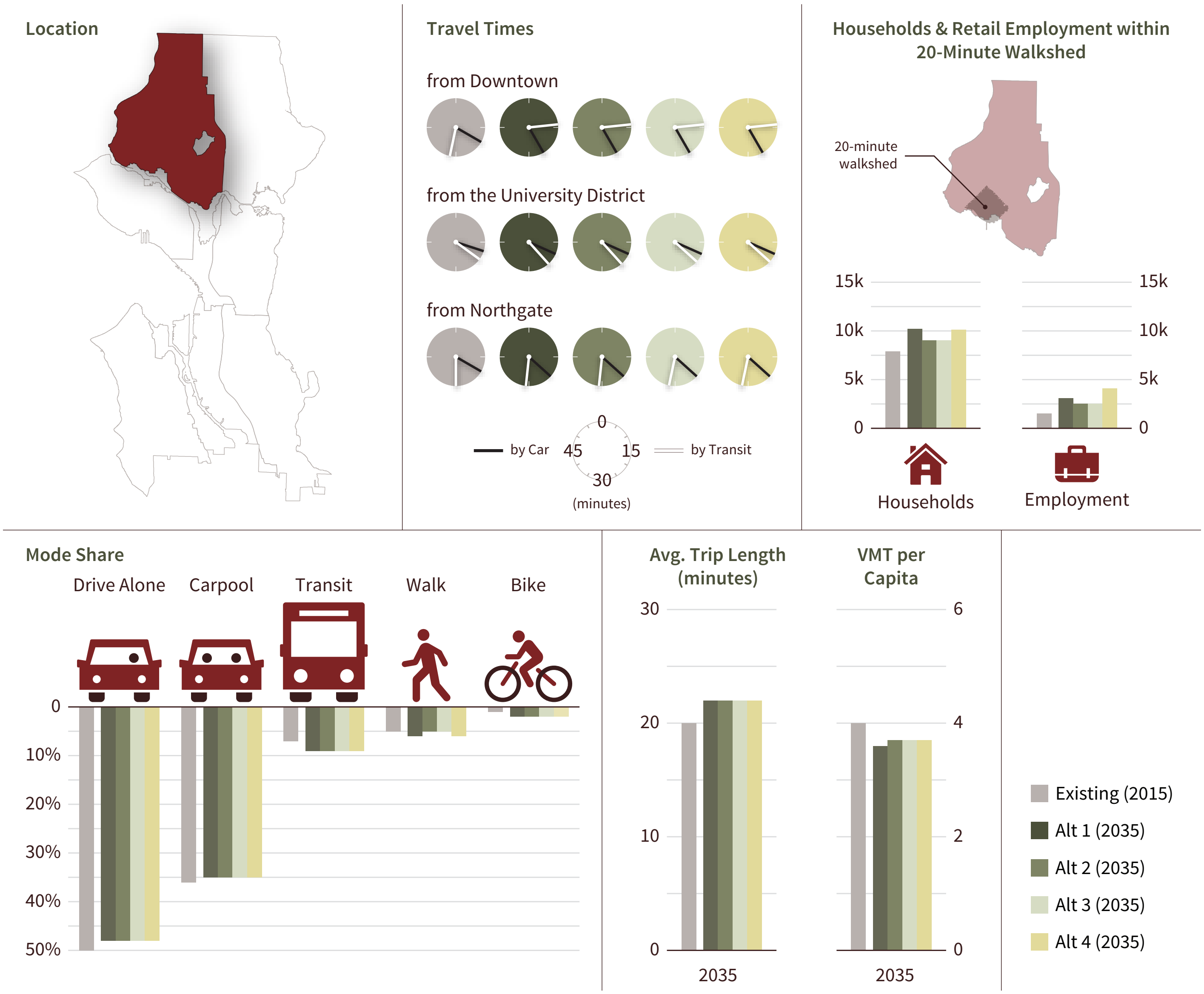
Note that the difference in the v/c ratios between the action and No Action alternatives is very small, generally no more than 0.01 v/c. Daily traffic fluctuations tend to be of this magnitude or larger and this difference may not be noticed by drivers.

7 This section refers to impacts related to freight operations on city arterials.

The other metrics evaluated for each of the eight sectors are shown in Figure 3.7–17 through Figure 3.7–24. For each sector, the applicable figure compares travel times, walksheds, mode shares, trip length and VMT per capita for 2015 and each of the 2035 alternatives.

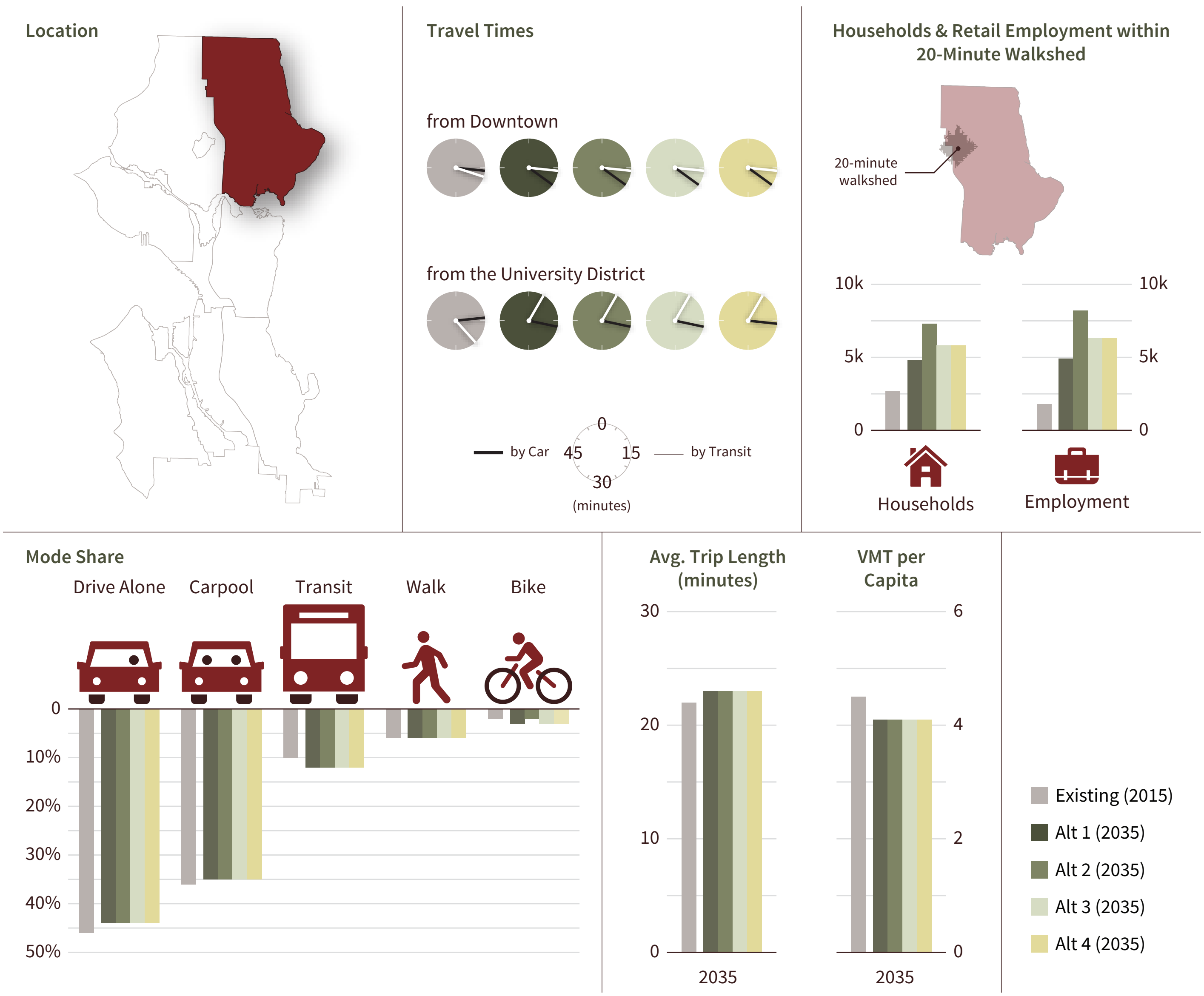
Each metric is discussed in the following sections. Detailed tables for each are included in Appendix A.4.

Figure 3.7–17 Northwest Seattle (Sector 1): other metrics evaluated



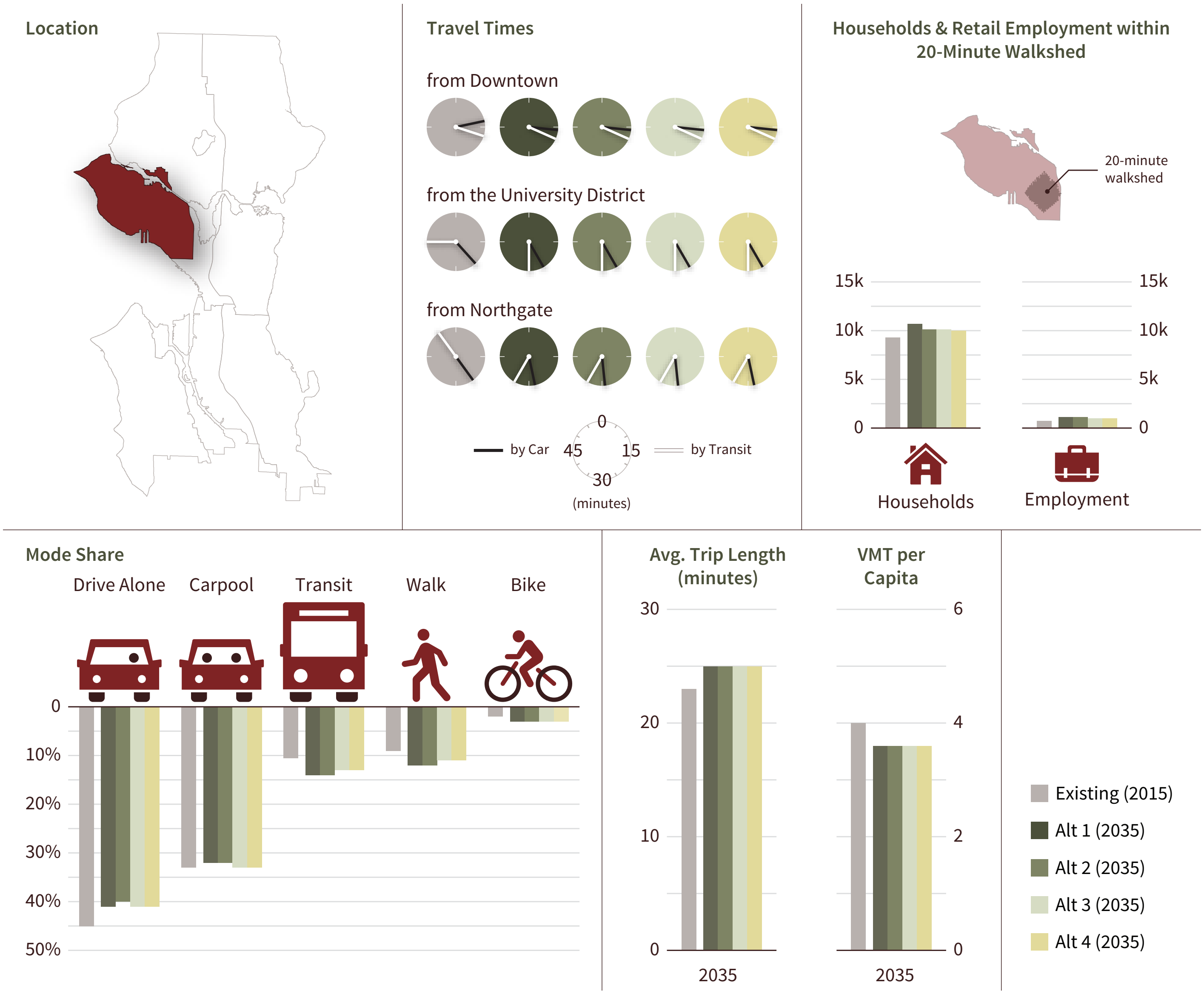
Sources: Fehr & Peers, 2014 (auto and transit travel time; households and retail employment within 20-minute walkshed); project travel demand model, 2014 (mode share; average trip length; vehicle miles traveled).

Figure 3.7–18 Northeast Seattle (Sector 2): other metrics evaluated



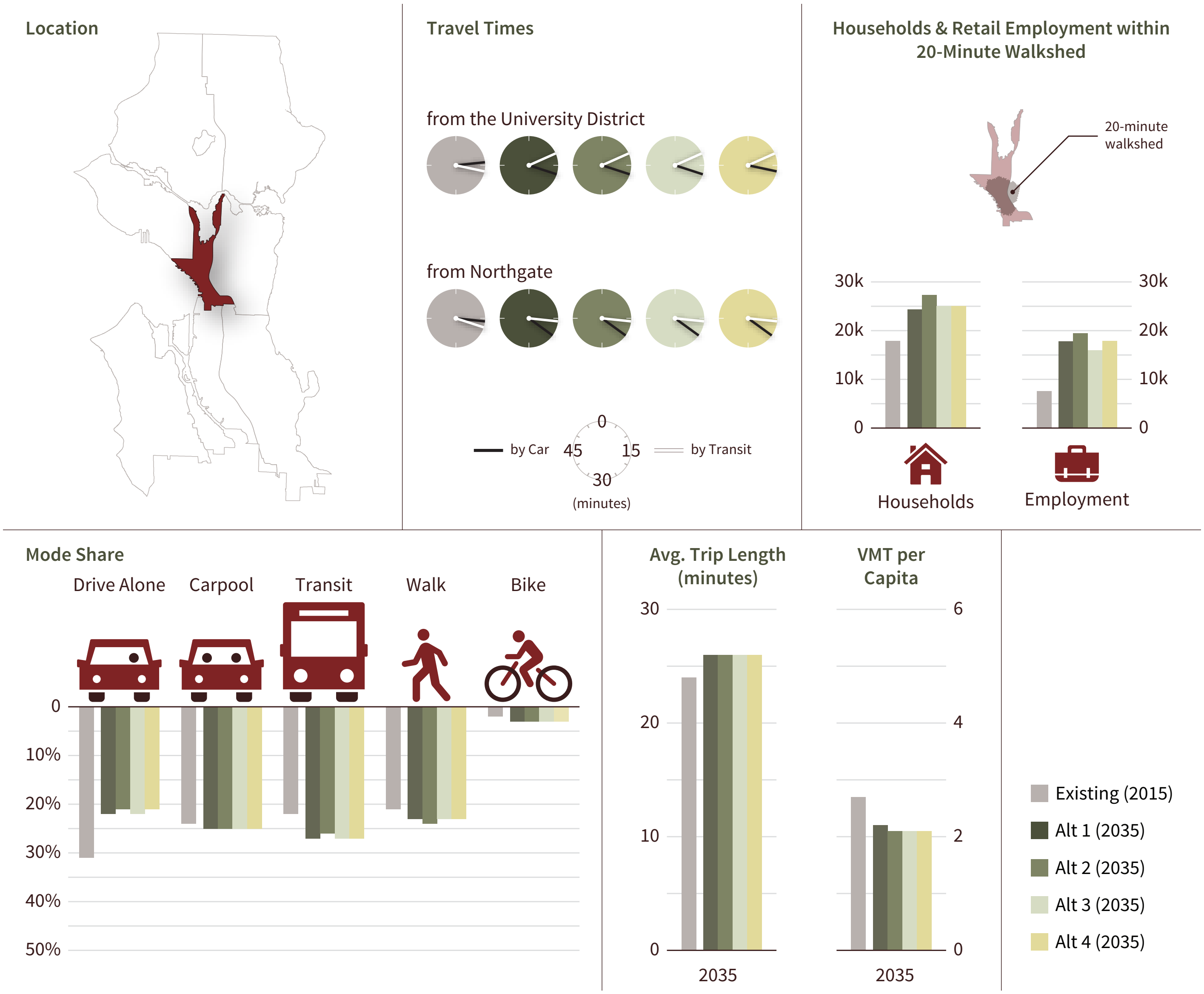
Sources: Fehr & Peers, 2014 (auto and transit travel time; households and retail employment within 20-minute walkshed); project travel demand model, 2014 (mode share; average trip length; vehicle miles traveled).

Figure 3.7–19 Queen Anne/Magnolia (Sector 3): other metrics evaluated



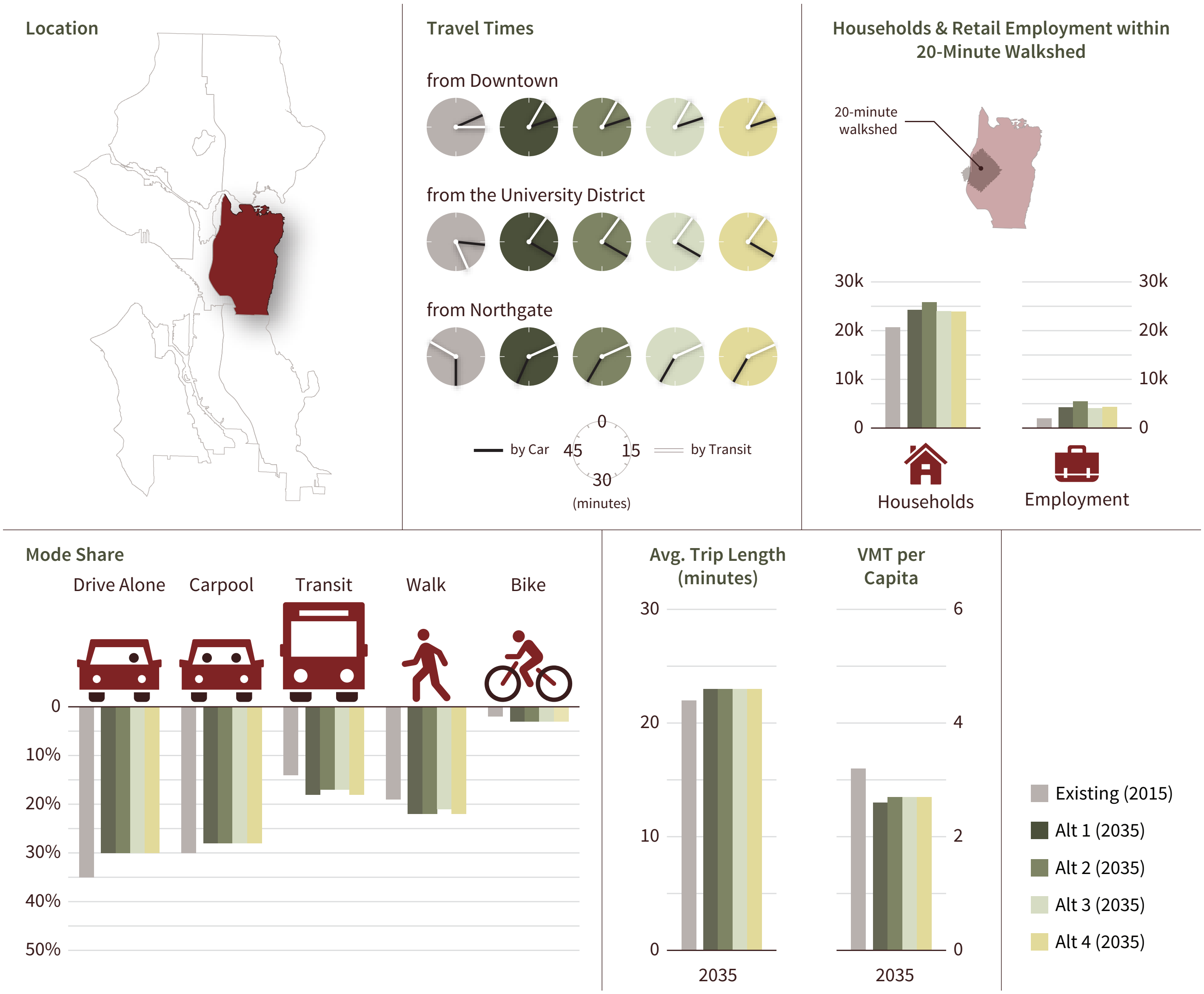
Sources: Fehr & Peers, 2014 (auto and transit travel time; households and retail employment within 20-minute walkshed); project travel demand model, 2014 (mode share; average trip length; vehicle miles traveled).

Figure 3.7–20 Downtown/Lake Union (Sector 4): other metrics evaluated



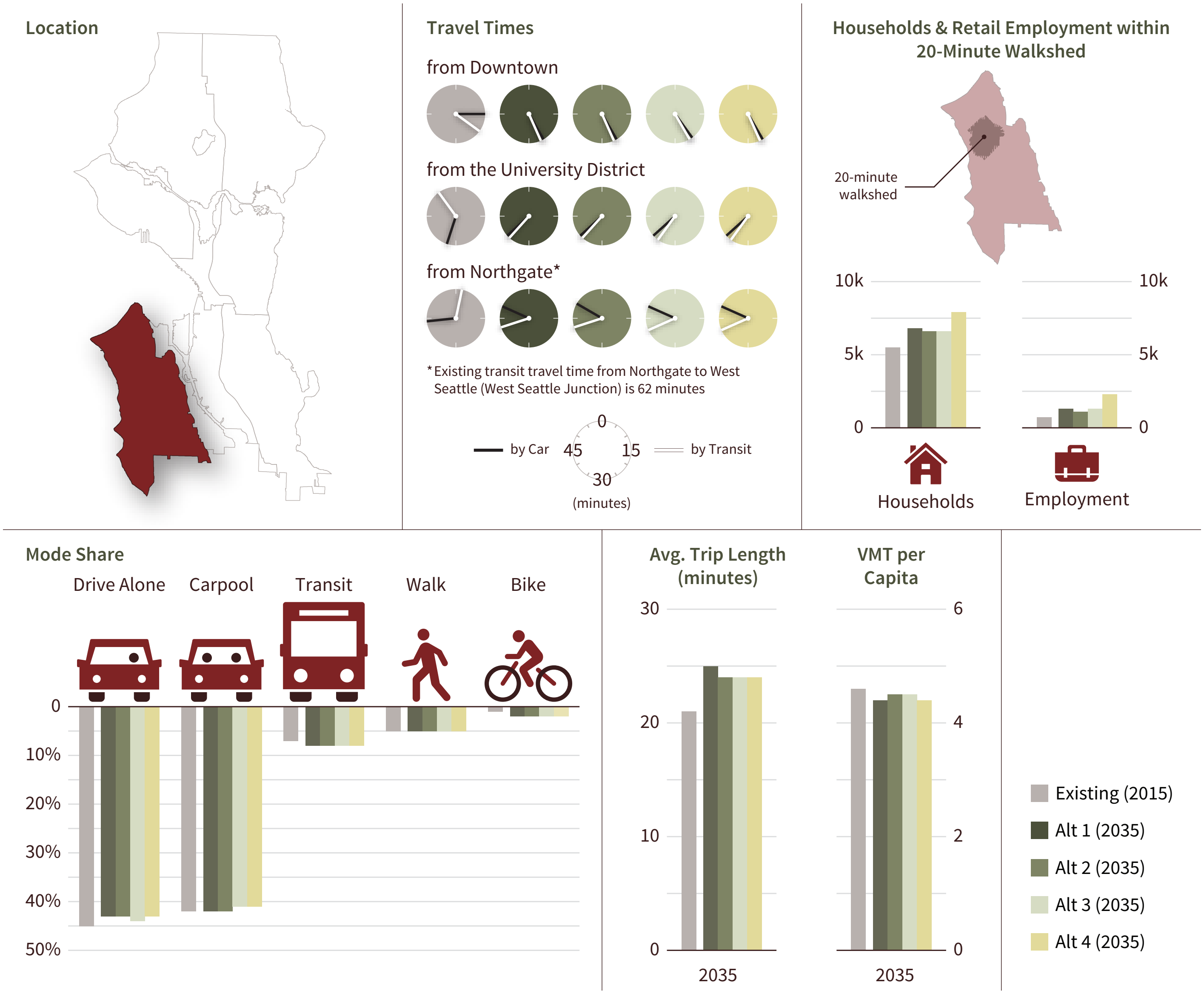
Sources: Fehr & Peers, 2014 (auto and transit travel time; households and retail employment within 20-minute walkshed); project travel demand model, 2014 (mode share; average trip length; vehicle miles traveled).

Figure 3.7–21 Capitol Hill/Central District (Sector 5): other metrics evaluated



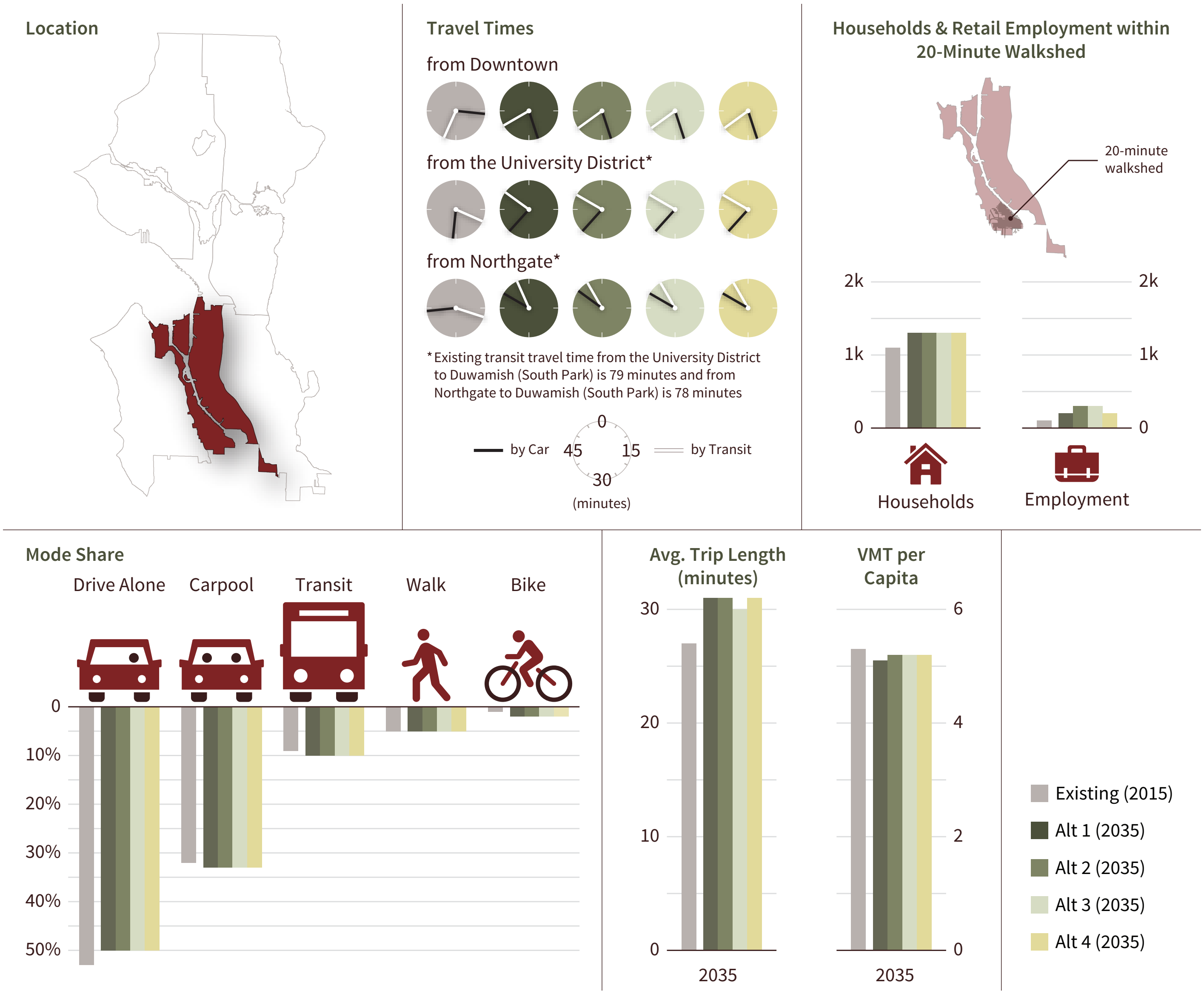
Sources: Fehr & Peers, 2014 (auto and transit travel time; households and retail employment within 20-minute walkshed); project travel demand model, 2014 (mode share; average trip length; vehicle miles traveled).

Figure 3.7–22 West Seattle (Sector 6): other metrics evaluated



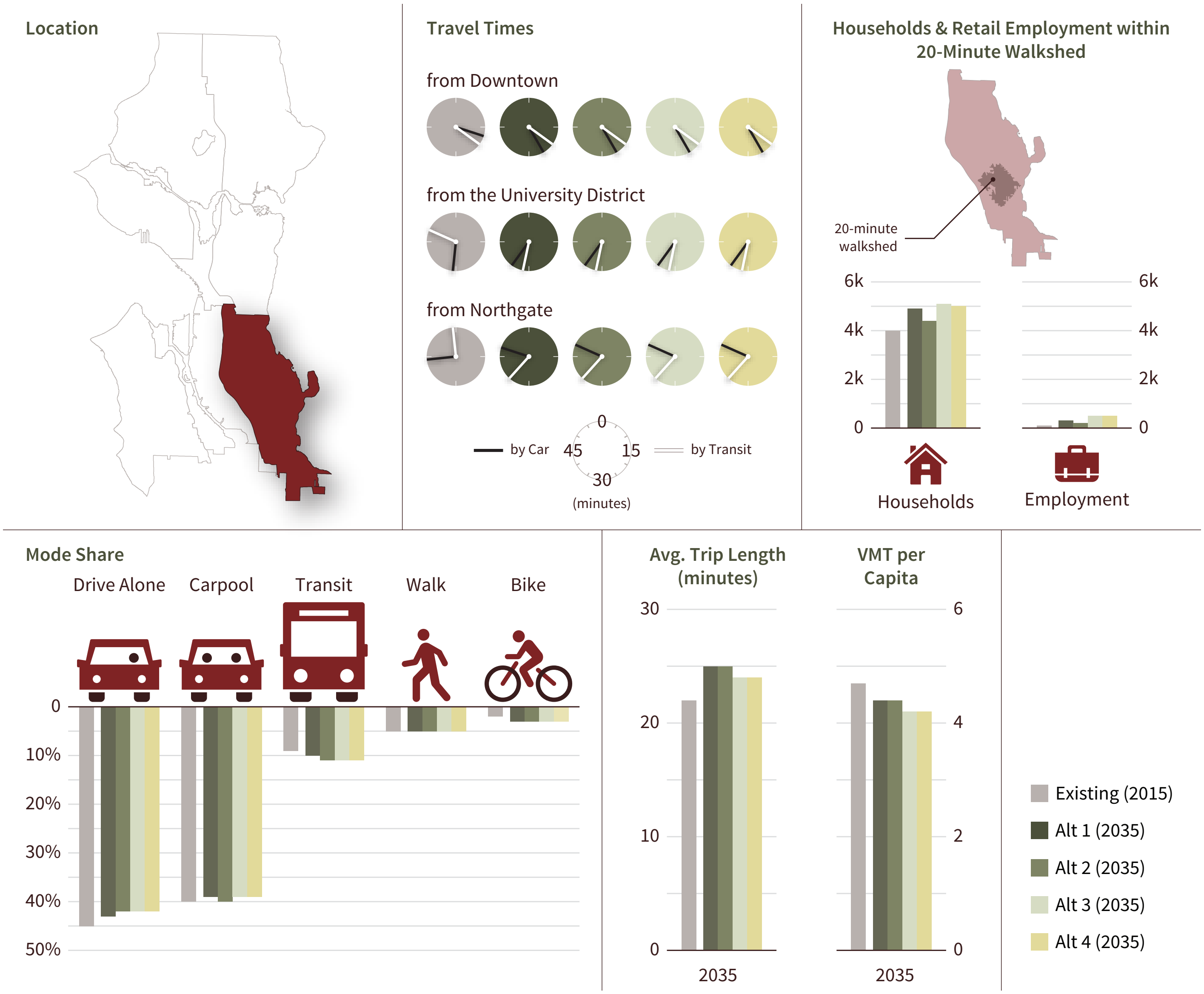
Sources: Fehr & Peers, 2014 (auto and transit travel time; households and retail employment within 20-minute walkshed); project travel demand model, 2014 (mode share; average trip length; vehicle miles traveled).

Figure 3.7–23 Duwamish (Sector 7): other metrics evaluated



Sources: Fehr & Peers, 2014 (auto and transit travel time; households and retail employment within 20-minute walkshed); project travel demand model, 2014 (mode share; average trip length; vehicle miles traveled).

Figure 3.7–24 Southeast Seattle (Sector 8): other metrics evaluated



Sources: Fehr & Peers, 2014 (auto and transit travel time; households and retail employment within 20-minute walkshed); project travel demand model, 2014 (mode share; average trip length; vehicle miles traveled).

Travel Time

Figure 3.7–17 through Figure 3.7–24 summarize 2035 auto travel times from Downtown, the University District and Northgate to each of the eight sectors. Note that these results are also indicative of freight operations. However, traffic congestion is more difficult for freight to navigate, and trucks typically travel at slower speeds than general auto traffic.

Auto travel times are expected to increase by one to eleven minutes between 2015 and 2035, with most increases falling between three and six minutes. The largest increases are projected from Downtown to West Seattle (10 minutes), Duwamish (11 minutes) and Southeast Seattle (7 minutes). This equates to roughly a 40-70 percent increase in travel times. Among the alternatives, there is little variation in projected travel times with no more than a minute increase or decrease for travel times between any of the areas evaluated.

Auto travel times are expected to increase by ***1 to 11 minutes*** *between 2015 and 2035.*

More substantial differences are expected for transit travel times due to the extension of Link light rail. 2035 transit travel times from the Northgate and University District urban centers will be shorter than 2015 transit travel times due to light rail. For example, a trip between the University District and Northgate will take only 5 minutes rather than the current 23 minutes. Trips that would still be completed using a bus in the general purpose travel lanes would feel the effects of the increase in auto congestion. For example, a trip from Downtown to West Seattle Junction would increase from 21 to 25-26 minutes. Variation in travel times among the alternatives is minimal since the same transit network is assumed under all alternatives.

Walksheds

The only walkshed that is expected to substantially change in area by 2035 is in Northgate. SDOT is currently studying a pedestrian bridge that would connect the Northgate Transit Center to the west side of I-5. That connection would increase the walkable area within 20 minutes of the analysis point.

The only walkshed that is expected to substantially change in area by 2035 is ***Northgate****, due to a planned pedestrian bridge across I-5.*

Figure 3.7–17 through Figure 3.7–24 summarize the number of households and retail jobs within each 20-minute walkshed in 2035. Alternative 1 (No Action) continues the current focus on concentrating development in urban villages. Alternative 2 would concentrate development in urban centers; therefore, Northeast Seattle, Downtown/Lake Union and Capitol Hill/Central District are projected to have the highest growth under Alternative 2. Alternative 3 focuses growth on the light rail corridor, as demonstrated by the projected large increases in residential and employment land uses at Northgate and Othello. In addition to land use increases in those light rail station areas, Alternative 4 would also place more development in West Seattle and Ballard.

Under any alternative, Downtown/Lake Union and Capitol Hill/Central District would remain the sectors with the most households within a 20-minute walkshed, while Duwamish would remain the area with the least households within a 20-minute walkshed.

The Downtown/Lake Union walkshed would have the highest employment growth among any of the alternatives, while the evaluated walkshed centers in Queen Anne/Magnolia, Duwamish (South Park) and Southeast Seattle (Othello) would have the lowest employment growth of the studied places.

Mode Share

By 2035, **the SOV mode share is expected to decrease***, with Downtown/Lake Union experiencing the highest decrease.*

As noted in the Methodology section, the mode share estimates presented here are based on the project travel demand forecasting model which is rooted in the PSRC 2006 household travel survey results. More recent data sources are expected to be released by PSRC this year that may inform future mode share target-setting. By 2035, the SOV mode share is expected to decrease (a positive trend), although the amount of the decrease varies depending on the sector, as shown in Figure 3.7–17 through Figure 3.7–24. Citywide, the non-SOV mode share for all trip types is expected to shift by 3 to 4 percentage points, from 57 percent in 2015 to 60–61 percent in 2035. Downtown/Lake Union is expected to see the highest decrease of 8-9 percentage points, while West Seattle is projected to have a 1 percentage point decrease at most. The other large shift occurs in transit usage, which is expected to increase by 2035. Again, Downtown/Lake Union would experience the largest shift. More residential areas and the Duwamish would have smaller changes. The percentage of walk trips is expected to grow up to 3 percentage points in the central areas of the city, with smaller increases if any, in more residential sectors. HOV trips are projected to stay relatively steady between 2015 and 2035 with a downward trend in some locations. Bike trips are expected to increase about one percentage point due to a more complete bike lane and cycle track network.

Trip Length

Compared to 2015, the average trip length would **increase by 2 minutes** *citywide.*

Average trip length in minutes for each of the sectors is shown in Figure 3.7–17 through Figure 3.7–24. Generally, the 2035 alternatives result in consistent trip lengths, varying by no more than a minute. Compared to 2015, the average trip length would increase by two minutes citywide. Among the eight sectors, West Seattle and Duwamish would experience the highest increase in trip length at up to four minutes. Most sectors would have increases of one to three minutes. The higher increase for West Seattle and Duwamish is likely due to geographic constraints that limit the number of roadways connecting to those areas. Since there are fewer paths for cars to take, those routes become more congested, leading to longer average trip lengths.

Among the alternatives, Alternative 1 (No Action) has the highest average trip length and Alternative 3 has the lowest average trip length. However, these differences are minor.

VMT per Capita

All vehicle miles traveled figures discussed in this section refer to the PM peak period, and VMT per capita includes both residents and workers. The 2035 VMT per capita for each sector during the PM peak period is summarized in Figure 3.7–17 through Figure 3.7–24.

Citywide, the PM peak period VMT per capita is expected to decrease from 3.3 miles in 2015 to 2.9 miles by 2035 under all four alternatives. This is a notable finding since it represents a substantial shift in historical trends. It is also consistent with national projections that VMT peaked in the mid-2000s and will likely remain flat or slightly decrease in the future. This trend is discussed in more detail in the Analysis Methodology section.

Citywide, the PM peak period VMT per capita is expected to decrease from 3.3 miles in 2015 to **2.9 miles by 2035** *under all four alternatives.*

All sectors are projected to have lower VMT per capita in 2035 than in 2015, regardless of the alternative. The Downtown/Lake Union and Capitol Hill/Central District sectors are expected to experience the largest decreases while the West Seattle and Duwamish sectors are expected to have the smallest decreases.

As is currently the case, the densest and most central areas of the city, Downtown/Lake Union and Capitol Hill/Central District, would continue to have the lowest VMT per capita while other residential areas would have higher VMT per capita. The Duwamish area is projected to continue to be the sector with the highest VMT per capita due to its manufacturing and industrial nature.

Alternatives 3 and 4, concentrating growth around light rail and transit corridors, would result in larger VMT decreases in Southeast Seattle than alternatives 1 and 2.

IMPACTS COMMON TO ALL ALTERNATIVES

Pedestrian and Bicycle Network

The City has identified robust plans to improve the pedestrian and bicycle network through its *Pedestrian Master Plan*, *Bicycle Master Plan* and various other subarea planning efforts. These plans are actively being implemented and are expected to continue to be implemented regardless of which land use alternative is selected. The prioritization and/or phasing of projects may vary depending on the expected pattern of development. However, given that the pedestrian and bicycle environment is expected to become more robust regardless of alternative, no significant impacts are expected to the pedestrian and bicycle system.

Safety

The City has a goal of zero traffic fatalities and serious injuries by 2030. This goal, and the policies and strategies supporting it, will be pursued regardless of the land use alternative selected. The City will continue to monitor traffic safety and take steps, as necessary, to address areas with high collision rates. The overall variation in vehicle trips remains very small among alternatives: less than two percent. Therefore, at this programmatic level of analysis, there is not expected to be a substantive difference in safety among the alternatives. Therefore, no significant impacts are expected.

Parking

As stated in the Affected Environment section, there are currently some areas of the city where on-street parking demand exceeds parking supply. Given the projected growth in the city and the fact that the supply of on-street parking is unlikely to increase by 2035, a parking deficiency is expected under the No Action Alternative and parking impacts are expected under the three action alternatives. The location and severity of probable impacts would vary by alternative depending on the concentrations of land use. Because some urban centers and urban villages in particular are projected to experience more growth in the next twenty years under the action alternatives than under the No Action Alternative, they would similarly be expected to become denser in their land use patterns as they grow under the action alternatives. Therefore, it is reasonably expected that such areas would experience a larger increase in parking demand under the action alternatives than under the No Action Alternative, constituting a possible parking impact.

The degree of the deficiency and impacts experienced in any given neighborhood would depend on factors including how much off-street parking is provided by future development projects, as well as varying conditions related to on-street parking patterns within each unique neighborhood. For instance, parking impacts can be quite localized within smaller urban villages, or they can be more widespread in nature throughout larger areas such as urban centers (like First/Capitol Hill).

Summary of Impacts

Table 3.7–8 summarizes the impacts for each action alternative.

Table 3.7–8 Summary of impacts

Type of Impact	2035 Alternative 2	2035 Alternative 3	2035 Alternative 4
Screenline (auto, freight and transit)	—	—	—
Pedestrian and bicycle	—	—	—
Safety	—	—	—
Parking	✓	✓	✓

✓ Impact
— No Impact

3.7.3 Mitigation Strategies

Seattle is committed to investing in the City's transportation system to improve access and mobility for residents and workers and to reduce the potential severity of transportation impacts identified above. Reducing the share of SOV travel is key to Seattle's transportation strategy. Lower SOV mode share not only reduces parking demand impacts; it is consistent with numerous other goals and policies in the Comprehensive Plan. From a policy perspective, the City has prioritized reducing vehicular demand rather than increasing operating capacity.

The City has **prioritized reducing vehicular demand** *rather than increasing operating capacity.*

This section identifies a range of potential mitigation strategies that could be implemented to help reduce the severity of the potential adverse impacts identified in the previous section. These include impacts that would affect parking.

Proven strategies to decrease vehicle demand include transportation demand management strategies (such as employer-subsidized transit passes, unbundled parking costs for residents and increased car-sharing opportunities). These incentives, combined with constrained parking supplies and increased traffic congestion levels would tend to shift demand for travel from autos to other modes. Therefore, the recommended mitigation strategy for this programmatic action primarily focuses on improving facilities and operations capabilities for modes other than automobiles.

Given the citywide nature of the zoning alternatives, the recommended mitigation strategy focuses on five main themes:

- **Improving the Pedestrian and Bicycle Network—**The City has developed a citywide Pedestrian Master Plan (PMP) and citywide Bicycle Master Plan (BMP) along with other subarea plans focused on particular neighborhoods. These plans and documents include myriad projects that, if implemented, would improve the pedestrian and bicycle environment. SDOT also has ongoing safety programs that are aimed at reducing the number of collisions, benefiting both safety and reliability of the transportation system.
- **Implementing Transit Speed and Reliability Improvements—**The Seattle Transit Master Plan (TMP) has identified numerous projects, including Intelligent Transportation Systems (ITS), to improve transit speed and reliability throughout the city.
- **Implementing Actions Identified in the Freight Master Plan**—As mentioned earlier, the City is currently preparing a revised Freight Master Plan, which may include measures to increase the freight accessibility and travel time reliability. These projects could be implemented on key freight corridors to improve conditions for goods movement.
- **Expanding Travel Demand Management and Parking Strategies**—Managing demand for auto travel is an important element of reducing overall congestion impacts that affect auto, freight, transit and parking demand. The City has well-established Commute Trip Reduction (CTR) and Transportation Management Programs (TMPs) which could be expanded to include new parking-related strategies. CTR and TMP programs could evolve substantially toward smaller employer, residential buildings and other strategies (CTR and TMPs are now largely focused on large employers).

- **Working With Partner Agencies**—WSDOT, King County Metro, Sound Transit and PSRC all provide important transportation investments and facilities for the City of Seattle. The City has a long history of working with these partner agencies to expand multimodal access to and within the City. The City should continue to work with these agencies. Key issue areas include regional roadway pricing and increased funding for transit operations.

The possible mitigation strategies are discussed in more detail below. It should be noted that some mitigation projects could have secondary impacts. For example, converting a general purpose travel lane to a transit lane or a cycle track would reduce capacity for autos. As required, the City would prepare additional analysis before implementing specific mitigation projects. Given the programmatic nature of this study, this EIS simply lists the types of projects that could be considered to mitigate potential impacts.

Pedestrian and Bicycle System Improvements

Improvements to the pedestrian and bicycle system would provide a better connected and safer walking and riding environment, thereby encouraging travelers to choose walking or biking rather than driving. There is a well-documented link between improved, safer bicycle and pedestrian accessibility and reduced demand for vehicle travel (CAPCOA 2010).

- Specific projects and/or high priority areas for improvement may be found in the City's adopted Pedestrian and Bicycle Master Plans.
- Development codes could also be modified to include requirements for wider sidewalks, particularly along greenways and green streets, to promote walking and bicycling.
- In conjunction with other funding sources, new private and public development could pay for a share of PMP and BMP improvements.

Speed and Reliability Improvements

Transit and freight travel times could be reduced by providing targeted speed and reliability improvements on key routes frequented by transit and freight. The 2012 Transit Master Plan identifies such improvements throughout the city. An update to the City's Freight Master Plan is currently underway; the plan will identify near- and long-term improvements that would benefit freight mobility. In conjunction with other funding sources, new development could pay for a share of improvements on key routes. Some of the transit improvements could be funded through the recent passage of Proposition 1.

Travel Demand Management and Parking Strategies

The City of Seattle currently has travel demand management programs in place including strategies outlined in the transportation modal plans: the *Pedestrian Master Plan*, the *Bicy-*

cle Master Plan and the *Transit Master Plan*. In addition, the City could consider enhancing the travel demand management programs already in place. Research by the California Air Pollution Control Officers Association (CAPCOA), which is composed of air quality management districts in that state, has shown that implementation of travel demand management programs can substantially reduce vehicle trip generation, which in turn reduces congestion for transit, freight and autos. The specific measures described below are all potential projects that the City could consider to modify or expand current strategies:

- Parking maximums that would limit the number of parking spaces which can be built with new development;
- Review the parking minimums currently in place for possible revisions;
- Unbundling of parking to separate parking costs from total property cost, allowing buyers or tenants to forgo buying or leasing parking spaces;
- Review and revise transit pass provision programs for employees; and
- Consider transit pass provision programs for residents—King County Metro has a new Passport program for multifamily housing that is similar to its employer-based Passport program. The new program discounts transit passes purchased in bulk for residences of multifamily properties.

These types of possible mitigation strategies would tend to reduce the number of work-based commute trips and all types of home-based trips. Shopping-based trips would also decrease, but likely at a lower level since these types of trips are less sensitive to parking costs and limited supply for short-term use. Zoning changes could be considered to require development to fund specific transportation demand management strategies.

Beyond those already incorporated in existing zoning, additional provisions could be explored to further encourage developers to include parking spaces for car share and bike share programs. This could include provisions to accommodate bike share stations on private sites in high demand areas, such as:

- Adding bike share stations as a “residential amenity” in the open space provisions;
- Floor area ratio (FAR) bonuses allowing bike share setback;
- Listing bike share stations in the street improvement manual (as a “green street” improvement or separately); and
- Allowing modifications from landscaping setbacks to allow bike share stations, where appropriate.

The City could also consider encouraging or requiring parking operators to upgrade their parking revenue control systems (PARC) to the latest hardware and software technology so it could be incorporated into an electronic guidance system, compatible with the e-Park program that is currently operating Downtown. This technology would help direct drivers to off-street parking facilities with available capacity. The City could also continue to manage on-street paid parking through existing programs and refine them to redefine subareas and manage them with time-of-day pricing and paid parking to new areas.

In the absence of a new ITS parking program, the City would continue to manage on-street paid parking through SDOT's Performance-based Parking Pricing Program which evaluates data to determine if parking rates, hours of operation and/or time limits could be adjusted to achieve the City's goal of one to two available spaces per block face throughout the day.

The City could also consider establishing new subarea transportation management partnership organizations to provide programs, services and strategies to improve access to employment and residences while decreasing the SOV rate, particularly during peak periods. This could include partnerships with transit providers. Local Transportation Management Associations (TMAs) could provide some of these services. Programs like the state's Growth and Transportation Efficiency Center (GTEC)[8] or the City's Business Improvement Area (BIA) are possible models or future funding sources. The programs could include features of relevant programs such as Seattle Center City's Commute Seattle, Whatcom County's SmartTrip or Tacoma's Downtown on the Go programs. Portland, OR has an innovative program, also called SmartTrip, which delivers a customized set of information to all new residents in the City via email or bicycle courier. The city uses utility data to identify new residents and asks them if they would like additional information about transportation options in their neighborhood and to their workplace. This program has been demonstrated to reduce the SOV rate of new residents by about nine percent.

The City could consider updating municipal code and/or Director's Rules related to Transportation Management Plans required for large buildings to include transportation demand management measures that are most effective in reaching the City's mode share goals. This may include membership in a TMA and discounted or free transit passes and/or car share and bike share memberships. For residential buildings, the City could also consider extending Transportation Management Plans or requiring travel options programs (such as Green Trips in Oakland, CA and Residential Services in Arlington, VA).

The City could seek to improve monitoring of the parking occupancy and RPZs to determine if changes are necessary. These changes could include splitting existing RPZs into multiple zones, adding new RPZs or adjusting RPZ boundaries. The City could also review the RPZ program and its policies in areas that are oversubscribed (where there are more permits issued than parking spaces).

Potential Mitigation Measure Implementation

Funding for mitigation projects could come from a variety of sources. One way to generate additional funding would be a citywide development impact fee program that could include monitoring, project prioritization and use of collected fees to construct street system projects. The program could emulate practices used in the existing South Lake Union and

8 GTEC is an extension of the existing CTR program which engages residents and employers of all sizes through an area-wide approach.

Northgate Voluntary Impact Fee Programs. This type of program would require additional analysis to identify needed projects and a fee schedule before it could be implemented.

Travel demand management, parking mitigation strategies and bikeshare and carshare parking incentives could be implemented through updates to the City municipal code and additional investments in city programs.

3.7.4 Significant Unavoidable Adverse Impacts

Potentially significant adverse impacts are identified in this Draft EIS. However, the parking impacts are anticipated to be brought to a less-than-significant level by implementing a range of possible mitigation strategies such as those discussed in Section 3.7.3. While there may be short-term impacts as individual developments are completed (causing parking demand to exceed supply), it is expected that over the long term, the situation would reach a new equilibrium as drivers shift to other modes. Therefore, no significant unavoidable adverse impacts to transportation and parking are expected.

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3.8 Public Services

This chapter describes the existing status of public services provided by City of Seattle and the Seattle Public Schools and evaluates the impacts of household and job growth on service providers under the EIS alternatives. Public services considered in this section include: police, fire and emergency medical, parks and recreation and public schools.

This analysis evaluates services on a citywide cumulative basis and, where appropriate, according to geographic areas within the city. For each of the services, the smaller geographic areas are defined as follows:

- Police—Seattle Police Department precincts
- Fire and Emergency Medical—Seattle Fire Department Battalions
- Parks and Recreation—EIS analysis sectors, as defined in Chapter 2
- Public Schools—EIS analysis sectors, as defined in Chapter 2

3.8.1 Affected Environment

Police Services

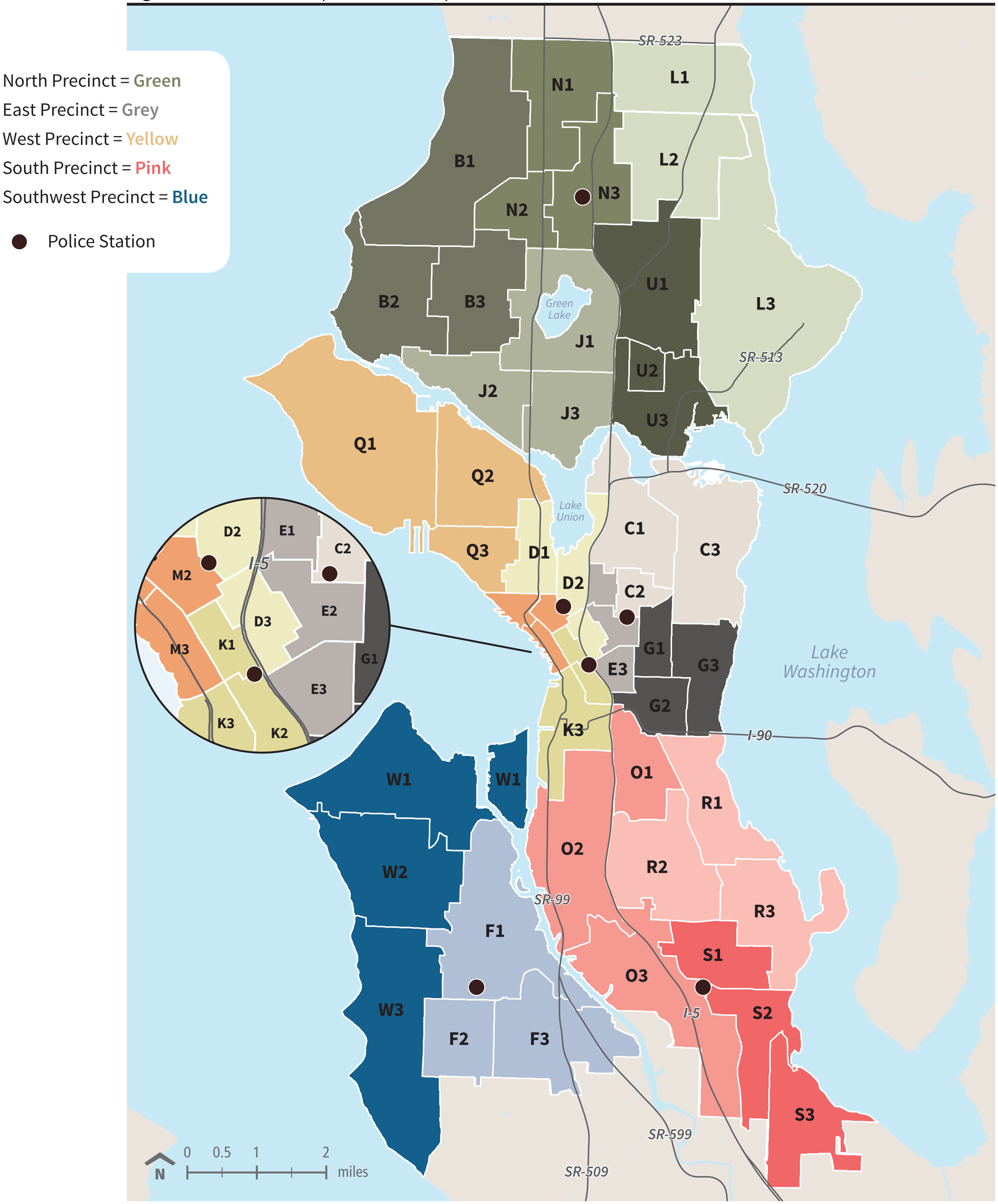
EXISTING INVENTORY OF POLICE FACILITIES AND DEPARTMENT STAFF

The Department employs approximately 1,820 staff, including 1,319 officers and 26 police recruits. Personnel are divided among five precincts: north, west, east, south and southwest. Each precinct is further divided into sectors and beats which are dependent on the geographic area of each precinct. Each precinct has a police station that provides the following services:

- Patrol Officers and 9-1-1 Responders
- Bike Patrol
- Anti-Crime Team
- Liaison Attorney (on-site)
- Burglary/Theft Detectives
- Community Police Teams
- Crime Prevention

Figure 3.8–1 shows the police station locations, sector and beat boundaries. Figure 3.8–2 summarizes the urban villages served by each precinct and identifies policing priorities, population and land area served by each precinct. Three of the five police stations are located in the Downtown Urban Center. The remaining stations are located outside urban villages.

Figure 3.8–1 Seattle police stations, precincts and beats



Source: City of Seattle Police Department, 2014.

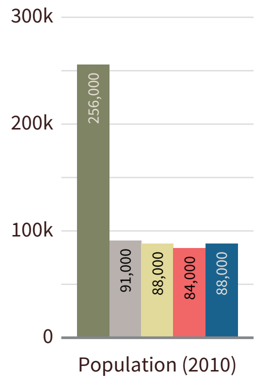
Figure 3.8–2 Seattle police priorities, urban centers & villages, population and land area, by precinct

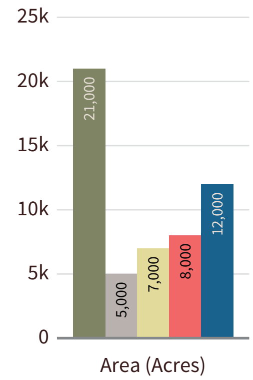
Seattle Police Precincts

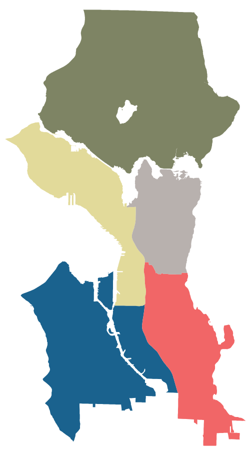
Geography & Demographics

Priorities

Urban Centers & Villages







North Precinct

Priorities

- Extended foot, bicycle & car patrol presence in the University District business core
- Two-officer emphasis patrols in the Aurora corridor, Ballard-Fremont & Lake City-Northgate business districts
- Emphasis on Friday & Saturday nights on Greek Row in the spring

Urban Villages (13): *University District; Northgate; Ballard; Bitter Lake; Fremont; Lake City; Aurora-Licton Springs; Crown Hill; Green Lake; Greenwood-Phinney Ridge; Roosevelt; Wallingford; Ballard-Interbay-Northend**

East Precinct

Priorities

- Proactive patrol in the areas of 20th & Madison, Yesler/Jackson, Colman neighborhood & Pike/Pine/ Broadway nightclub area
- Undercover operations to address drive-by shooting incidents in the Central Area
- Patrols to address public inebriation & narcotics activity in parks

Urban Villages (4): *First/Capitol Hill; 23rd & Union-Jackson; Eastlake; Madison-Miller*

West Precinct

Priorities

- Focus patrols in Downtown to address early morning drinking
- Counter-drug enforcement in Pike/Pine Corridor
- Proactively abate safety threats around nightclubs in Belltown & Pioneer Square

Urban Villages (6): *Downtown; South Lake Union; Uptown; Upper Queen Anne; Ballard-Interbay-Northend*; Greater Duwamish***

South Precinct

Priorities

- Special emphasis patrols along the Rainier corridor
- Focus on youth & gang-related activities
- Georgetown weekend emphasis to address early morning property crimes

Urban Villages (5): *Mount Baker; Columbia City; North Beacon Hill; Othello; Rainier Beach*

Southwest Precinct

Priorities

- Narcotics interdiction efforts along Delridge outside of the "Weed & Seed" area
- South Park weekend emphasis to address early morning property crimes

Urban Villages (6): *West Seattle Junction; Admiral; Morgan Junction; South Park; Westwood-Highland Park; Greater Duwamish***

Note: Urban village boundaries do not align exactly with police precinct boundaries. When an urban village boundary overlaps multiple precincts, the neighborhood or urban center or village is included in the precinct where there is greatest overlap. The only two exceptions are Ballard-Interbay-Northend and Greater Duwamish.

* Ballard-Interbay-Northend lies primarily in the West Precinct but includes a significant area north of the ship canal in the North Precinct.

** Greater Duwamish lies almost evenly in the West and Southwest Precincts. A relatively small portion of the center is also within the South Precinct.

Source: City of Seattle Police Department, 2014.

In addition to police stations located throughout the city, the Seattle Police Department (SPD) also has facilities for their headquarters, administration offices, warehouse storage and horse stalls, kennels and mobile mini-precincts (soon to be replaced with new vehicles to allow more frequent deployment; Socci 2014a).

CRIME RATES AND SERVICE CALLS

Violent Crime

Includes homicide, rape, robbery and aggravated assault.

Property Crime

Includes burglary, larceny and vehicle theft.

In Seattle, the 2012 reported crime rate per 100,000 inhabitants was 616 offenses for violent crime and 5,030 offenses for property crime.

The Seattle Police Department issued a report in 2012 (SPD 2012) evaluating major crimes in a 25-year period, from 1988–2012. Key findings include:

- The number of major crimes reported has shown a steady downward trend, with an overall drop of 52 percent.
- Reported violent crimes have also shown a downward trend, with an overall drop of 45 percent. The downward trend was most pronounced in the 1990, followed by a more gradual decline since then.
- Reported property crimes have shown a continuous downward trend, with an overall drop of 53 percent.
- Reported property crime outnumbers reported violent crime by 8 or 9 to 1.

Figure 3.8–3 shows city-wide reported property and violent crime over the past ten years, from 2004–2013. The trend for reported violent crime has continued to decrease in 2013 while property crime reports increased slightly from 2012 to 2013. By comparison, from 2006–2013 the population of Seattle increased by approximately 6 percent, indicating that there is not a direct relationship between population growth and crime rates.

Dispatched Calls

Includes officers dispatched in response to a 9-1-1 call

On-views

Includes events logged by officers during routine patrols

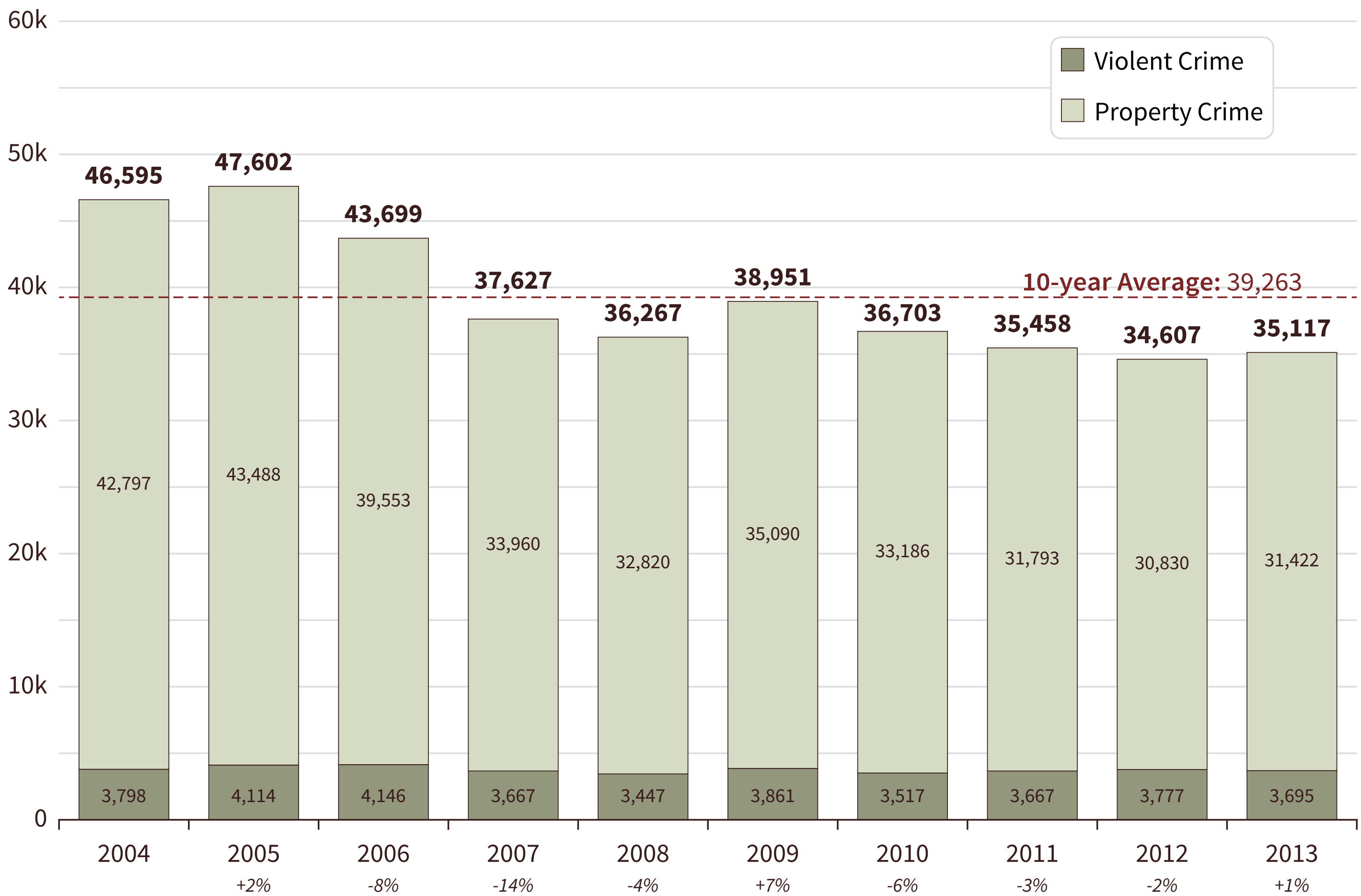
Figure 3.8–4 provides the total number of dispatched calls and on-views in the city from 2004 to 2013. Although the type of calls for service has varied slightly from year to year, the overall number of service calls has decreased by 8 percent since 2004. There was a decline in total volumes from 2005 through 2011, but an upward trend in volumes in 2012 and 2013. Similar to crime rates, there does not appear to be a direct relationship between population growth and service calls.

Figure 3.8–5 displays service calls by precinct from 2010 to 2013. The North and West Precincts have the highest number of service calls in the city.

SEATTLE POLICE DEPARTMENT EMERGENCY RESPONSE TIME

The Seattle Police Department has established an average emergency response time target of seven minutes (SPD 2007). The department currently meets this goal, although performance is uneven geographically, by time of day and by day of week. Figure 3.8–6 provides the average response time by police precinct. The response time goal has been consistently

Figure 3.8–3 Major crimes reported citywide over the last decade (2004–13)



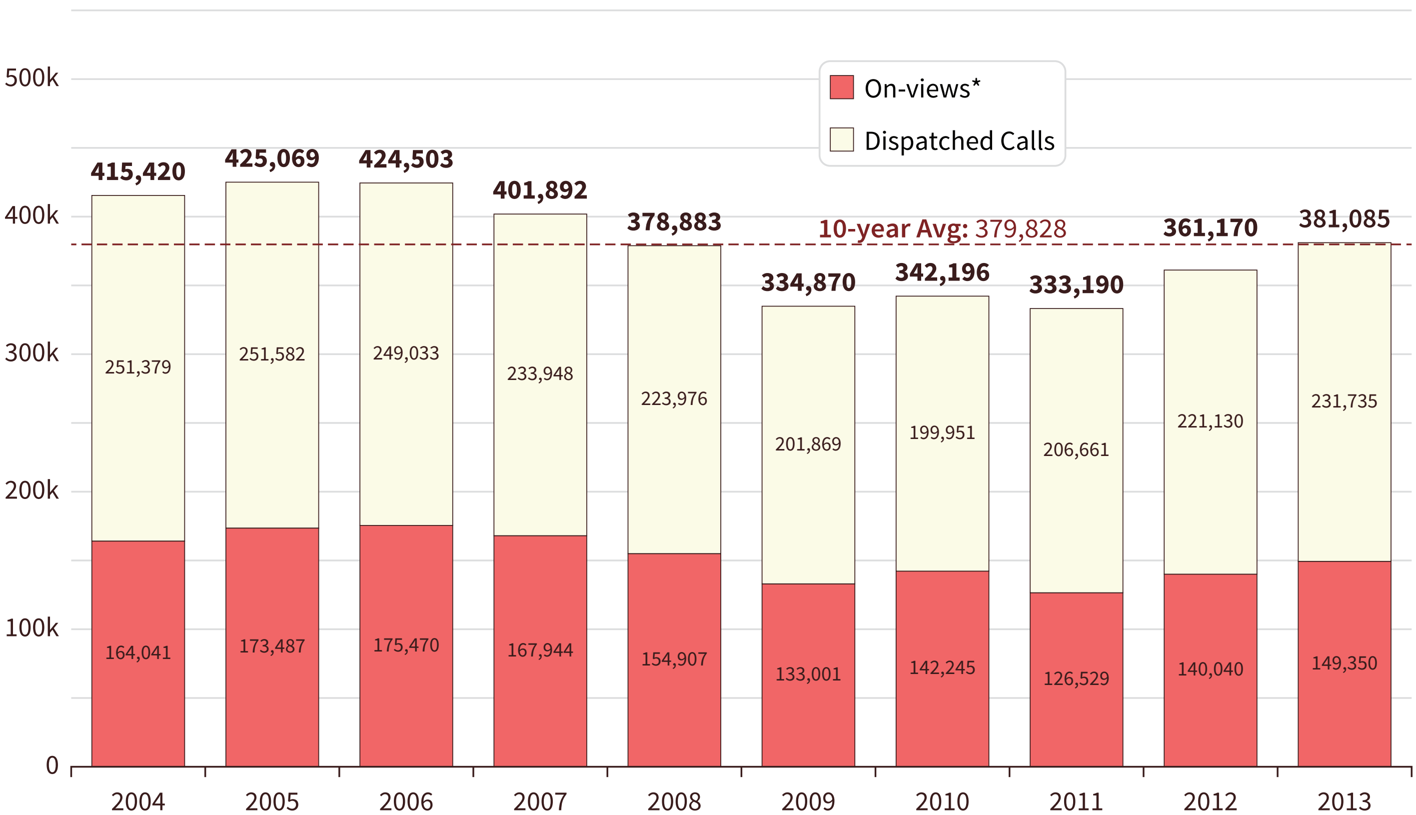
Source: City of Seattle Police Department, 2014.

met over the past five years only in the east and west precincts. The north and southwest precincts have the largest geographic area to cover and have congested arterials which may be a cause of the longer response times.

EXISTING AND PROPOSED STAFFING AND FACILITY CHANGES

In response to a 2008–2012 Neighborhood Policing Staffing Plan, the Department was authorized to hire 20 or 21 new officers each year in 2008, 2009 and 2010. Budget challenges resulting from the economic downturn derailed the hiring plan in 2010, which was put on hold in 2011. Consequently, the Department's number of sworn staff began to decline from the peak staffing level reached in mid-2010. Hiring for attrition resumed in 2012, and SPD is currently trying to achieve the Neighborhood Policing Staffing Plan staffing targets (Socci 2014a).

Figure 3.8–4 Calls for service citywide over the last decade (2004–13)

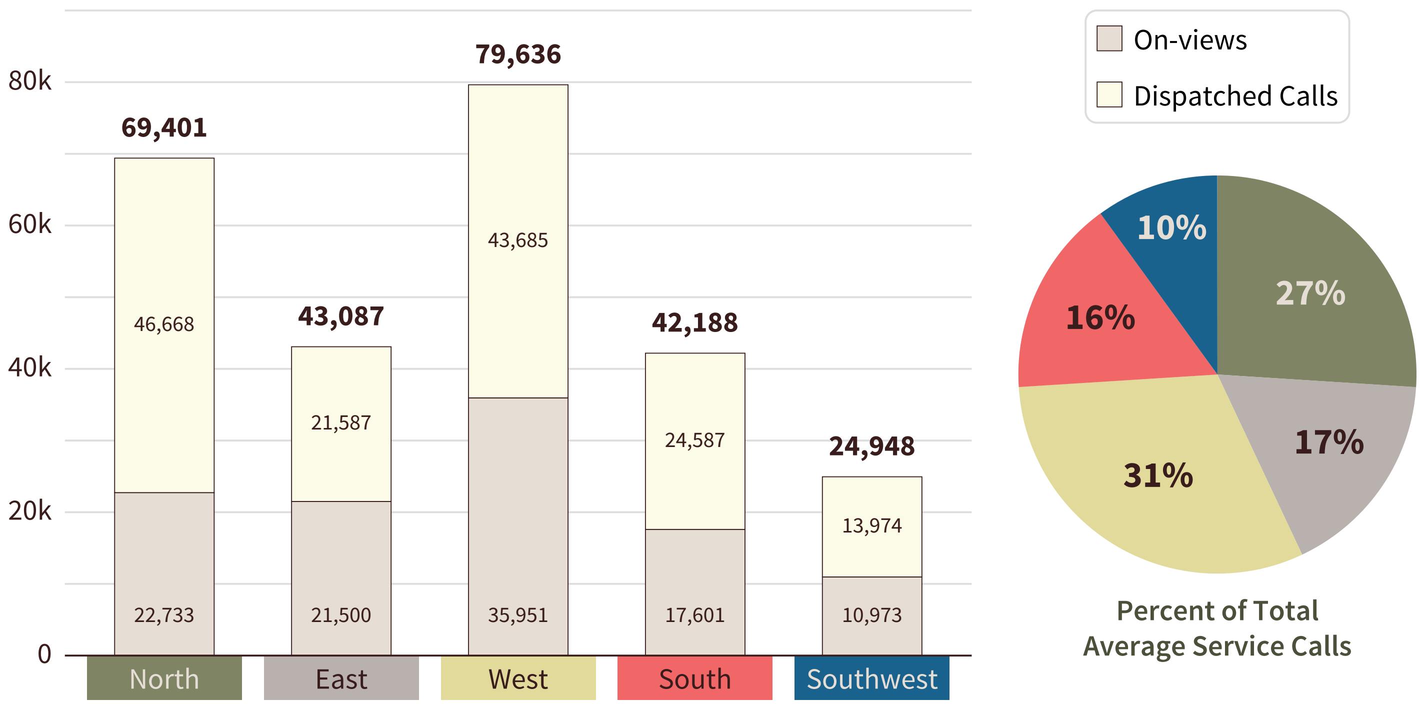


* Events that officers log during routine patrols.

Source: Socci, 2014a.

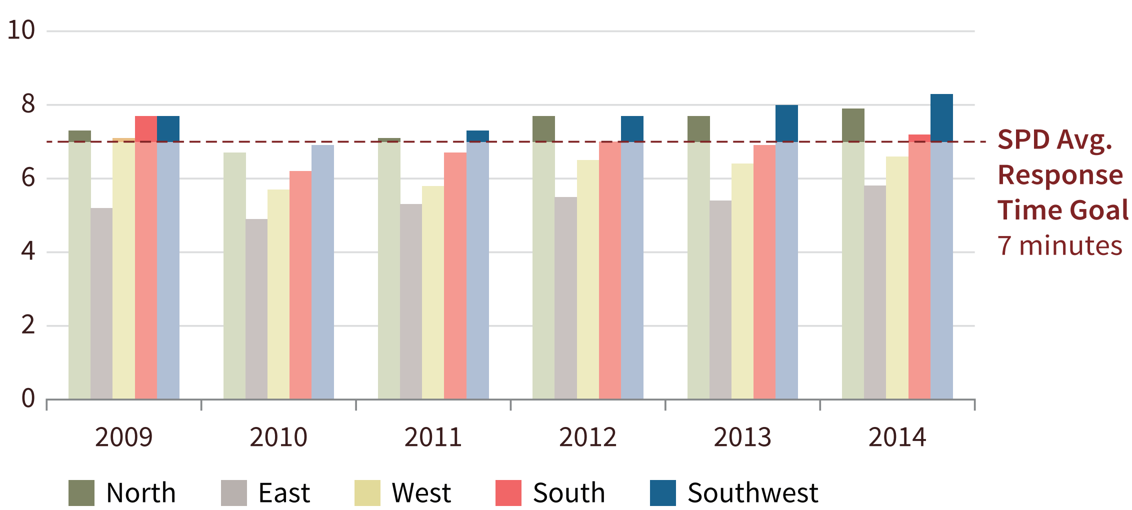
SPD will be replacing the North Precinct police station with a larger facility at a different site to address capacity issues. The North Precinct was designed to accommodate 154 SPD staff and currently houses 254 staff, with some overflow staff currently accommodated in a nearby office. The new station will be located at Aurora Avenue N and N 130th Street and will have the capability to house the current staff as well as the anticipated future levels of staffing for the North Precinct through approximately 2038 (Seattle FAS 2015a). The East, West and South Precincts' station facilities are currently at capacity and the Southwest Precinct is slightly below capacity (118 staff at a facility designed for 131 staff). The South Precinct requires seismic upgrades and renovations to accommodate any growth in staff, training and parking needs and bring the facility up to current essential facility standards (Socci 2014b).

Figure 3.8–5 Service calls by precinct (4-year average 2010–13)



Source: Socci, 2014a.

Figure 3.8–6 Emergency response time (in minutes) by precinct 2009–14



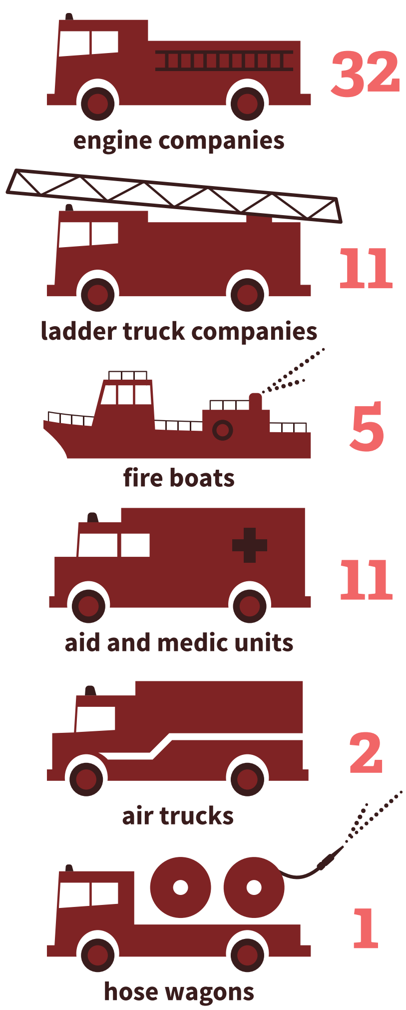
Source: Socci, 2014a.

Fire and Emergency Medical Services

INVENTORY OF EXISTING FIRE FACILITIES AND DEPARTMENT STAFF

The Seattle Fire Department provides fire and rescue response, fire prevention and public education, fire investigation and emergency medical services (EMS) throughout the city. Emergency medical services include basic life support (BLS) and advanced life support (ALS). The Seattle Fire Department also has specially trained technical teams that provide technical and heavy rescue, dive rescue, tunnel rescue, marine fire/EMS response and hazardous materials response.

As shown in Figure 3.8–7, Seattle's 33 fire stations are organized by battalion and station service areas to provide a full range of fire protection, prevention and emergency medical services citywide. Twenty-one fire stations are located within urban villages. While all stations (except Fire Station 14) are equipped with at least one fire engine, other equipment varies by facility. Additional facilities include the Medic One Headquarters at the Harborview Medical Center, the Joint Training Facility, fire department headquarters, and the new building housing the Fire Alarm Center, Emergency Operations Center and Fire Station 10.



Seattle Fire Department staff includes the following:

- 995 uniformed personnel
- 207 on-duty
- 38 department chiefs
- 905 firefighter/emergency medical technicians
- 70 firefighter/paramedics
- 86 non-uniformed civilian personnel

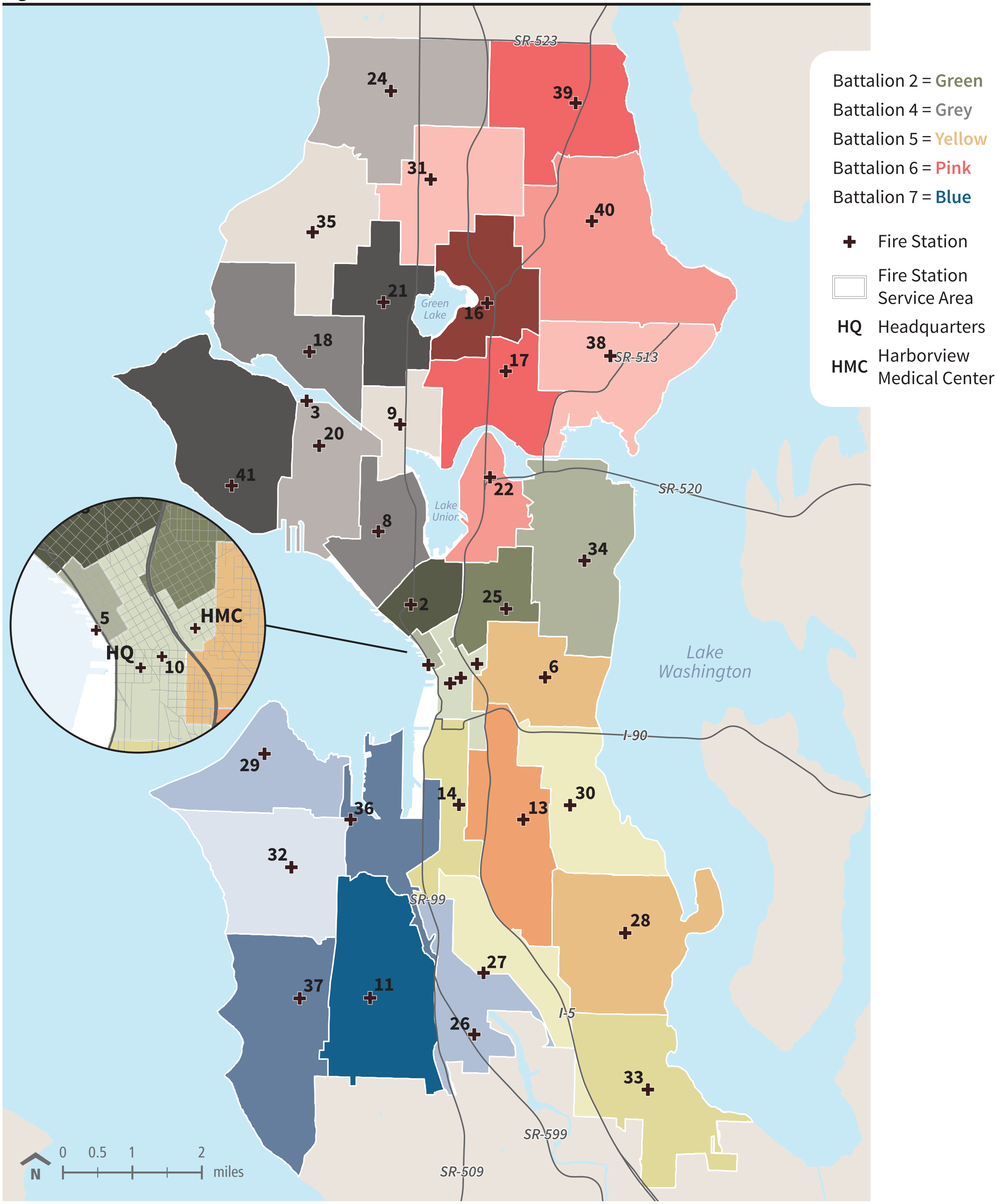
As shown at left, the Fire Department has 32 engine companies (including one on-duty fire boat), 11 ladder truck companies, 5 fire boats, 4 aid units, 7 medic units (advanced life support), 2 air trucks and 1 hose wagons, along with other specialized units for heavy rescue, hazardous materials and marine fire-fighting.

In addition to emergency medical services provided by the Seattle Fire Department, several private companies also provide EMS throughout the city.

Beginning in 2004, Seattle's entire fire and emergency response system has been undergoing improvements and upgrades funded by the Fire Facilities and Emergency Response Levy. As of the end of year 2014, 26 neighborhood fire stations have been upgraded, renovated or replaced, with 8 more levy-funded stations still underway. Upgrades to Station 5 on the downtown waterfront are occurring in coordination with the Elliott Bay Seawall Project under separate funding.

Figure 3.8–8 identifies planned or completed station upgrades under the Fire Facilities and Emergency Response Levy, existing equipment, geographic area and populations served by battalion.

Figure 3.8–7 Seattle fire battalions and stations



Source: City of Seattle Fire Department, 2014.

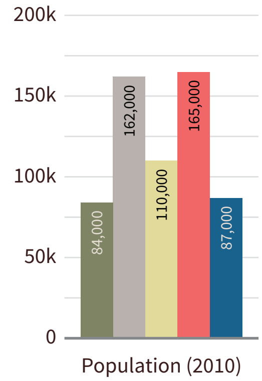
Figure 3.8–8 Seattle fire station upgrades, urban centers & villages, geographic area and populations served, by battalion

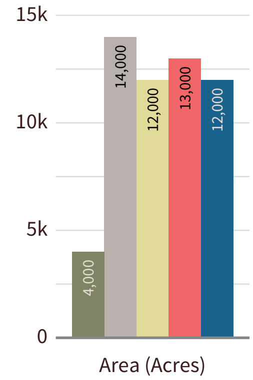
Seattle Fire Battalions

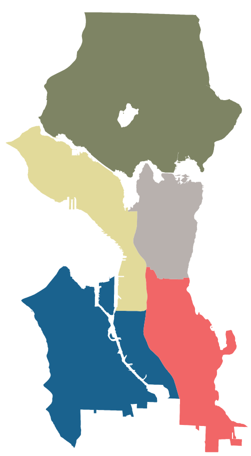
Geography & Demographics

Urban Centers & Villages

Equipment







Battalion 2 (4 stations)

- Seismic retrofits & upgrades completed for 3 stations
- 1 new station was constructed in 2008

Urban Villages (4): *Downtown; First/Capitol Hill*; South Lake Union; Madison-Miller*

Equipment: *4 engine companies; 3 ladder units (+1 reserve); 1 battalion chief unit (+1 reserve); 1 medic unit (+1 reserve); 4 aid units; 1 fireboat engine; 1 primary hazardous materials unit (+1 reserve); 1 mobile ventilation unit; 1 hose wagon*

Battalion 4 (9 stations)

- 4 new stations are planned or already constructed
- Seismic upgrades & remodels planned for all other stations & Station 3

Urban Villages (9): *Uptown; Ballard; Bitter Lake; Fremont; Crown Hill; Greenwood-Phinney Ridge; Upper Queen Anne; Wallingford**; Ballard-Interbay-Northend*

Equipment: *8 engine companies (+2 reserves); 2 ladder units (+1 reserve); 1 battalion chief unit (+1 reserve); 1 medic unit (+1 reserve); 1 multiple casualty unit; 1 compressed air equipment & truck; 1 hose wagon*

Battalion 5 (7 stations)

- Reconstruction of 3 stations completed
- Seismic upgrades & remodels planned for 4 other stations

Urban Villages (8): *First/Capitol Hill*; Mount Baker; 23rd & Union-Jackson; Columbia City; North Beacon Hill; Othello; Rainier Beach; Greater Duwamish****

Equipment: *6 engine companies (+2 reserves); 3 ladder units; 1 battalion chief unit (+1 reserve); 2 aid units; 1 technical rescue team; 1 urban search & rescue equipment cache; 1 metropolitan medical response system cache; 1 mobile decontamination unit*

Battalion 6 (7 stations)

- Reconstruction of 3 stations completed
- Seismic upgrades & remodels completed for the remaining stations

Urban Villages (8): *University District; Northgate; Lake City; Aurora-Licton Springs; Eastlake; Green Lake; Roosevelt; Wallingford***

Equipment: *7 engine companies (+3 reserves); 2 ladder units; 1 battalion chief unit (+1 reserve); 1 medic unit (+1 reserve); 1 reserve aid unit; 1 incident command unit*

Battalion 7 (7 stations)

- 2 new stations are planned or already constructed
- Seismic upgrades & remodels planned for remaining stations

Urban Villages (6): *West Seattle Junction; Admiral; Morgan Junction; South Park; Westwood-Highland Park; Greater Duwamish****

Equipment: *7 engine companies (+2 reserves); 1 ladder units (+1 reserve); 1 battalion chief unit (+1 reserve); 1 medic unit (+1 reserve); 1 fireboat engine; 1 tunnel rescue unit; 1 marine specialty unit; 1 mobile compressed air unit*

Note: Urban village boundaries do not align exactly with fire battalion boundaries. When a boundary overlaps multiple battalions, the urban village is included in the battalion where there is greatest overlap. The only three exceptions are First/Capitol Hill, Wallingford and Greater Duwamish.

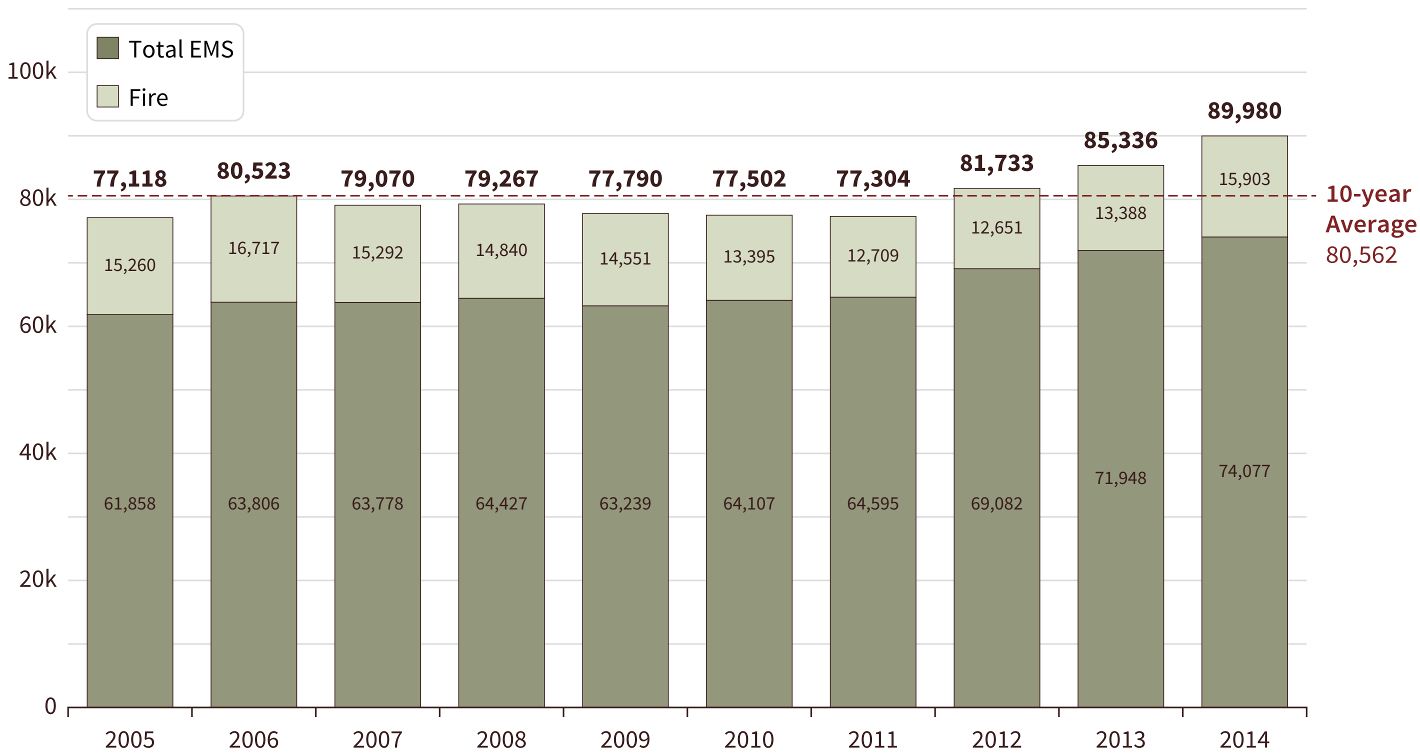
* First/Capitol Hill lies primarily in the 2nd Battalion, but includes a significant area in the 5th Battalion.

** Wallingford lies almost evenly in the 4th and 6th Battalions.

*** Greater Duwamish lies almost evenly in the 5th and 7th Battalions.

Source: City of Seattle Fire Department, 2014.

Figure 3.8–9 Seattle Fire Department incidents over the last decade (2003–12)*



Source: City of Seattle Fire Department, 2014.

FIRE AND EMERGENCY MEDICAL RESPONSES

Historical incident response data for the Seattle Fire Department over the last ten years are shown in Figure 3.8–9. Eighty-percent (80 percent) of all incidents were for emergency medical services. While EMS incidents have shown a steady increase over time, fire incidents have decreased. Fire incidents include structure fires, vehicle fires, non-structure fires and fire alarm responses. Structure fires have increased in the past two years counter to national trends. EMS incidents are exceeding forecasts—the department has seen its largest recorded increases in activity over the past three years (Roberts 2014a).

SEATTLE FIRE DEPARTMENT EMERGENCY RESPONSE TIME

Consistent with National Fire Protection Association Standard guidelines, the Seattle Fire Department regularly monitors and documents response times. The department has also established response standards specifying the minimum criteria for effectively and efficiently delivering fire suppression and emergency medical services. On average, fire stations meet EMS response standards 86 percent of the time and fire response standards 89 percent of the time (see Table 3.8–1).

Use of the public right of ways is critical to the Seattle Fire Department meeting their response goals; many factors contribute to impacts on response time including increased population and employment, development activity, land use modifications and changed transportation condi-

Table 3.8–1 Citywide emergency response times in 2012

Service Type	Response Goal (measured from en route to on scene)	Percentage of Time Response Time Goal Met
Basic Life Support	4 minutes, 90% of the time	84%
Advanced Life Support	8 minutes, 90% of the time	87%
Fire incident	8 minutes, 90% of the	89%

Source: City of Seattle Fire Department, 2014.

tions. In support of meeting the city's overall safety goals, including reducing traffic collisions, the design of roadways continues to evolve to include narrower lane widths, a decrease in the number of travel lanes, a more extensive bicycle network, and an increase in the number of traffic calming devices such as curb bulbs, speed cushions and traffic circles that may contribute to increases in Seattle Fire Department's emergency response time. The addition of new fire stations will need to be considered to mitigate these impacts while still advancing the City's transportation goals so that response times can be maintained or improved.

EXISTING AND PROJECTED EMS INCREASES

Citywide growth in population, employment, residential development and commercial activity strongly correlate with an increase in medical emergencies, along with the relative absence or presence of hospitals, clinics, adult care facilities, parks and open space, institutions and industry.

Other factors that produce variability in the number of medical emergencies include changes in income and age of population. Additionally, response times will be impacted due to traffic congestion and construction in key areas of the city.

Existing facilities and equipment conditions that the Seattle Fire Department and City facilities planning staff have discussed as possibly warranting adjustments to ensure sufficient service provision into the future include (Roberts 2014a):

Fire Station 2 in the South Lake Union Urban Center experiences very high run volumes (incident responses) compared to other stations, exceeding an ideal workload of greater than 3,000 runs per engine company. To serve existing and projected population and employment growth in South Lake Union and Denny Regrade, the Seattle Fire Department anticipates planning for a new fire station, equipment and resources in this area.

Fire Station 31 is in the Broadview–Bitter Lake–Haller Lake districts, which includes portions of the Bitter Lake, Aurora-Licton Springs, Crown Hill and Greenwood-Phinney Ridge urban villages, as well as area outside of the urban villages. This area has the second busiest engine company in the city. Additional fire resources may be necessary to address current and projected growth in this area, and the Seattle Fire Department also anticipates planning for a new fire station subject to future funding.

The Seattle Fire Department used an EMS Demand Forecast model developed with the assistance of the University of Alberta to project demand for emergency medical services.

The forecast showed an increase in EMS in the following neighborhoods (Roberts 2014a):

- Denny Regrade (Uptown Urban Center)
- South Lake Union (South Lake Union Urban Center)
- Broadview–Bitter Lake–Haller Lake (multiple urban villages and surrounding areas)
- Alki/Admiral (multiple urban villages and surrounding areas)
- Rainier Valley (multiple urban villages and surrounding areas)

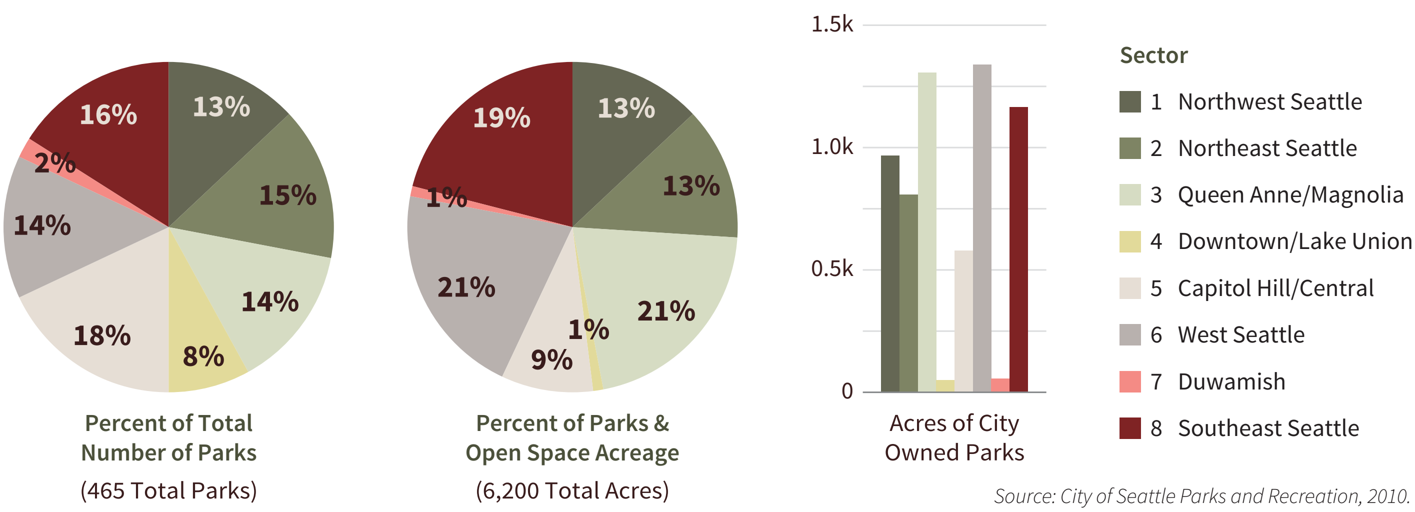
Parks and Recreation

INVENTORY OF EXISTING PARK FACILITIES

Seattle Parks and Recreation operates approximately 6,200 acres of parks, open space areas and facilities. This includes more than approximately 465 parks and open space areas, facilities and unique features including developed parks, a conservatory, athletic fields, teen life centers, education centers, cultural arts center, community centers, tennis courts, indoor and outdoor swimming pools, small craft centers, boat ramps, swimming beaches, fishing piers, outdoor camp, golf courses, p-patch gardens, shorelines, green belts and natural areas as shown in Figure 3.8–11 (Seattle Parks and Recreation 2011b). Non-city-owned parks and open space areas in the city include the Ballard Locks, Montlake Cut, Port of Seattle and King County parks, Seattle Center and open spaces at public and private schools, colleges and universities (Seattle Parks and Recreation 2011a).

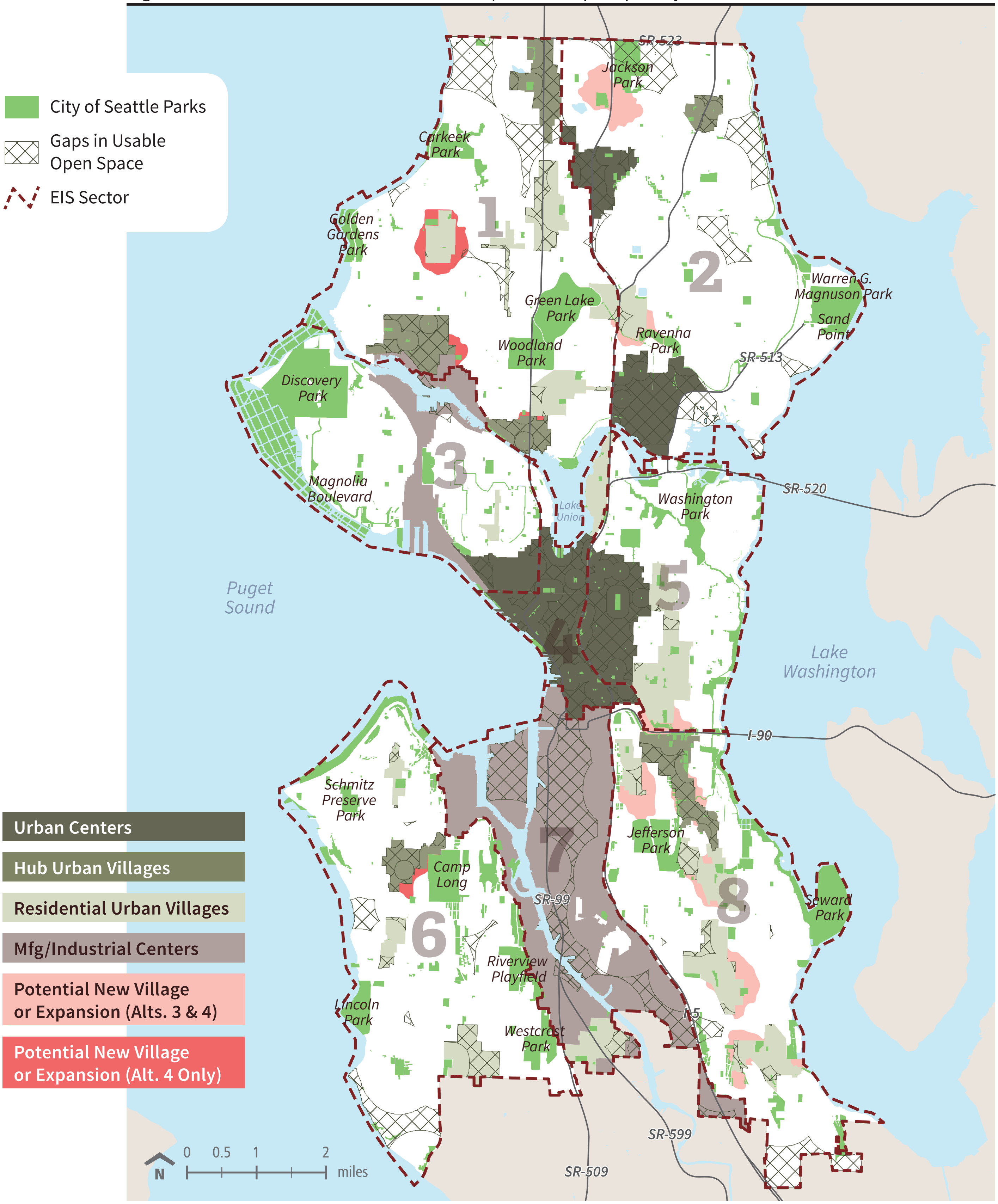
Figure 3.8–10 displays the distribution of City-owned park space by EIS analysis sector. Notable facts include: Downtown/Lake Union and Duwamish (sectors 4 and 7) contain only 2 percent of the City-owned open space park system. Queen Anne/Magnolia and West Seattle (sectors 3 and 6) have the highest amount of park acreage.

Figure 3.8–10 Park inventory by EIS analysis sector



Source: City of Seattle Parks and Recreation, 2010.

Figure 3.8–11 Seattle Parks and Recreation parks and open space system



Source: City of Seattle.

Table 3.8–2 Parks and open space goals

	Area	Population, Household and Job-based Goals	Distribution Goals
Breathing Room Open Space			
Dedicated open spaces (parks, greenspaces, trails and boulevards) but not including tidelands and shorelands (submerged park lands).	citywide	• 1 acre per 100 residents (⅓ acre per 100 residents acceptable)	• citywide
Usable Open Space			
Relatively level and open, easily accessible, primarily green open space available for drop-in use (can be part of a larger citywide park space).	outside urban villages	• ¼ to ½ acre within ¼ to ½ mile of every resident	• ¼ to ½ mile of every resident
	in primarily single-family residential areas	• ½ acre of usable open space within ½ to 1 mile of households	• ½ mile of Seattle households in primarily single-family areas (within 1 mile is acceptable)
Urban Village Open Space			
Publicly owned or dedicated open space that is easily accessible and intended to serve the immediate urban village. This encompasses various types of open space for passive enjoyment as well as activity and includes green areas and hard surfaced urban plazas, street parks and pocket parks. Dedicated open spaces should be at least 10,000 square feet in size.	in urban centers	• 1 acre per 1,000 households • 1 acre per 10,000 jobs in each urban center, or in the four contiguous urban centers comprising the center city, considered as a whole • 1 Village Commons park that is at least one acre in size where existing and target households total 2,500 or more	• all locations in the village within ⅛-mile of Village Open Space
	in residential urban village	• 1 acre per 1,000 households • 1 Village Commons park, at least 1 acre in size where overall residential density is 10 households/gross acre or more	• All locations in the village within ⅛–¼-mile for moderate and high density areas (varies based on open space size) of Village Open Space • ¼ mile for low density areas
	in hub urban village	• 1 acre per 1,000 households • 1 Village Commons park, at least 1 acre in size	• All locations in the village within 1/8 mile of Village Open Space

Source: City of Seattle, 2005 and Seattle Parks and Recreation, 2011a .

PARKS AND OPEN SPACE DISTRIBUTION GOALS

The City of Seattle has not adopted level of service standards relative to parks and open space. However, the Seattle Comprehensive Plan (City of Seattle 2005) and City of Seattle Parks and Recreation Plan (2011b) identify types of open space and goals for their provision based on population, households, jobs and geographic distribution as shown in Table 3.8–2. The type of open space that can count towards each goal is defined along with acceptable goals that fall below the desirable goal.

GAPS IN SEATTLE'S OPEN SPACE NETWORK

To evaluate whether goals for distribution of open space and facilities (summarized in Table 3.8–2) were being met, Seattle Parks and Recreation measured existing park acreage against desired goals and identified where gaps exist in Seattle's open space network (Seattle Parks and Recreation 2011a). Twenty-one of the urban villages do not have gaps in relation to the open space distribution goals. However, in eleven of the City's 32 urban villages, over half of the urban village area is outside the distance established by the distribution goals shown in Table 3.8–2. These include the following:

- ***Urban Centers:*** Downtown, First/Capitol Hill and Northgate
- ***Hub Urban Villages:*** Ballard, Bitter Lake, Fremont, Mount Baker and West Seattle Junction
- ***Residential Urban Villages:*** Greenwood-Phinney Ridge, Morgan Junction and Westwood-Highland Park

Of the 32 urban villages, 28 meet the goals for open space per household, and 30 of 32 urban villages meet their "village commons" goal. However, 11 of 32 urban villages do not meet one or more Village Open Space goals and/or may fall short in the distribution of open space. Table 3.8–3 identifies the urban villages that do not meet Village Open Space goals, organized by EIS analysis sector. Urban villages not meeting the distribution goal are concentrated in Northwest Seattle and West Seattle, respectively (sectors 1 and 6). Three out of six urban centers do not meet the distribution goal or have urban centers that do not meet the distribution goal. Two urban centers (Downtown and First/Capitol Hill) also do not meet the minimum 1 acre per 1,000 households goal and 1 acre per 10,000 jobs goal.

The largest open space gaps in single family areas are in Northwest Seattle (Sector 1; Whittier neighborhood), Northeast Seattle (Sector 2; Wedgewood neighborhood), West Seattle (Sector 6; Beach Drive Area northwest of the Morgan Junction Residential Urban Village and

Table 3.8–3 Significant open space gaps by EIS analysis sector

EIS Analysis Sector*	Open Space Gap in Over Half of Urban Center or Urban Village	Per Household Goal Not Met	Village Commons Goal Not Met	Per Job Goal Not Met
NW Seattle (1)	Ballard, Bitter Lake, Fremont and Greenwood-Phinney Ridge	Greenwood-Phinney Ridge	Greenwood-Phinney Ridge	Not applicable
NE Seattle (2)	Northgate	All urban centers and urban villages meet goal	All urban centers and urban villages meet goal	All urban centers and urban villages meet goal
Queen Anne/ Magnolia (3)	None	All urban centers and urban villages meet goal	All urban centers and urban villages meet goal	Not applicable
Downtown/ Lake Union (4)	Downtown	Downtown	All urban centers and urban villages meet goal	Downtown
Capitol Hill/ Central (5)	First/Capitol Hill	First/Capitol Hill	All urban centers and urban villages meet goal	First/Capitol Hill
West Seattle (6)	Morgan Junction, Westwood-Highland Park and West Seattle Junction	Morgan Junction	Morgan Junction	Not applicable
Duwamish (7)	None	Urban village meet goal	Not applicable	Not applicable
SE Seattle (8)	Mount Baker	Urban villages meet goal	Urban villages meet goal	Not applicable

Source: City of Seattle Parks and Recreation, 2011a .

in large lot areas at the very southwest edge of the city) and Southeast Seattle (Sector 8; large lot areas at the very southeast edge of the city).

The open space gaps (among other needs like park renovation) were used as the basis for developing parks and green spaces levies. The 2001 Pro Parks Levy funded projects at more than 110 sites all over the city, implementing park and open space priorities from neighborhood plans, acquiring green spaces, improving athletic fields, adding pedestrian and bike trails, supporting Woodland Park Zoo programs and maintenance, enhancing park maintenance and expanding recreation programs for youth and seniors. Citizens in every neighborhood in the city have benefited from these projects. In addition, the City added 47.1 acres to its park system. The four major categories for funding were:

- **Development**—neighborhood parks; playfields and facilities; trails and boulevards
- **Acquisition**—neighborhood park space; greenbelts and natural areas
- **Acquisition and Development Opportunity Fund**—new acquisition and development projects identified by neighborhood and community groups
- **Programming, Maintenance and Environmental Stewardship**—recreational programming for youth and seniors; operational support for Woodland Park Zoo; maintenance of new parks and green spaces, and enhanced maintenance of existing properties; and environmental stewardship programming.

The 2008 Parks and Green Spaces Levy was approved by voters and provided $146 million in funds to pay for improvements to neighborhood parks and playgrounds, cultural facilities, playfields, neighborhood parks, and trails; acquisition and community-initiated projects; restoration of forests and streams; development of community gardens; preservation of shoreline street ends; and acquisition of parks in urban villages and green spaces. Since the start of the 2008 Parks and Green Spaces Levy, Seattle Parks and Recreation has acquired about 23 acres of park land and received an additional 49 acres in transfer from other City departments. Most recently, three acres of neighborhood park space was acquired in Capitol Hill, University District, Fremont, Lake City, Mount Baker, West Seattle Junction, Greenwood-Phinney Ridge, Morgan Junction and the International District (Seattle Parks and Recreation 2014). In 2014, Seattle voters approved Proposition 1 creating the Seattle Park District, a metropolitan park district that has the same boundaries as the City of Seattle. Seattle City Council members serve on the Park District's Governing Board. Property taxes collected by the Seattle Park District will provide funding for City parks and recreation including maintaining parklands and facilities, operating community centers and recreation programs, and developing new neighborhood parks on previously acquired sites.

Park space is proposed as part of Seattle's central waterfront project. This would help to address the current household-based gaps in the Downtown Urban Center.

Public Schools

INVENTORY OF EXISTING SCHOOL FACILITIES

The Seattle Public Schools (SPS) provides kindergarten through 12th grade public education to children in all of Seattle. It is the largest district in the state operating 96 schools with a current enrollment of 51,000 students (SPS 2014). SPS provides educational programs in 60 elementary schools (kindergarten through 5th grade), 10 kindergarten through 8th grade schools, 11 middle schools (6th through 8th grades), 15 high schools (9th through 12th grades) and 23 alternative programs and schools. SPS also has 9 closed or vacant schools that could potentially be reactivated. Including administration buildings and additional sites, SPS owns 119 buildings and sites as shown in Figure 3.8–12.

Figure 3.8–13 describes the number and type of public schools operated by Seattle Public Schools and is organized by EIS analysis sector.

In addition to the public schools, there are private schools in Seattle that provide educational programs for kindergarten through 12th grade. There are 82 private schools located throughout the city, of which 33 (40 percent) are located in urban centers/villages.

Seattle Public Schools Vision and Mission

The Seattle Public Schools (SPS) has established the following vision and mission statements:

Vision

Every student achieving, everyone accountable.

Mission

Enabling all students to achieve to their potential through quality instructional programs and a shared commitment to continuous improvement.

SPS also established seven core beliefs including one that focuses on equitable access: "Every student in Seattle Public Schools should have equitable access to quality programs."

Seattle Public Schools, 2014a

PUBLIC SCHOOL ATTENDANCE AREAS

Seattle Public Schools establish attendance areas throughout the city to assign students to schools. In 2009, a new assignment method was developed. Implementation has since been phased, with the final transition plan implemented during the 2013–2014 school year. Elementary, middle and high school students are assigned to a designated attendance area school based on residency, unless participating in special programs offered only at certain schools. Elementary school attendance areas are combined to create middle school attendance areas. This creates a geographically-based feeder pattern as students move from elementary to middle school. High schools have their own geographic attendance areas that do not necessarily correspond to middle school attendance areas (SPS 2009; SPS 2013b).

SPS provides yellow bus, door-to-door, Metro and cab service to students attending Seattle Public Schools consistent with the following transportation service standards (Seattle Public Schools 2014b):

- **Elementary and K-8** SPS-arranged transportation is provided to students that live outside designated walk boundaries (one mile from the school) and within the attendance area.
- **Middle School** SPS-arranged transportation is provided to students that live more than 2 miles from their assigned school and within their attendance area.
- **High School** ORCA cards are provided to students that live more than 2 miles from their assigned school.

Safe Routes to School

A national movement to make it easier and safer for students to walk and bike to school to increase physical activity and decrease traffic and pollution.

The Seattle Department of Transportation (SDOT) created school walking maps that show preferred routes for walking to school safely as part of their Safe Routes to School program

Figure 3.8–12 Seattle school district facilities

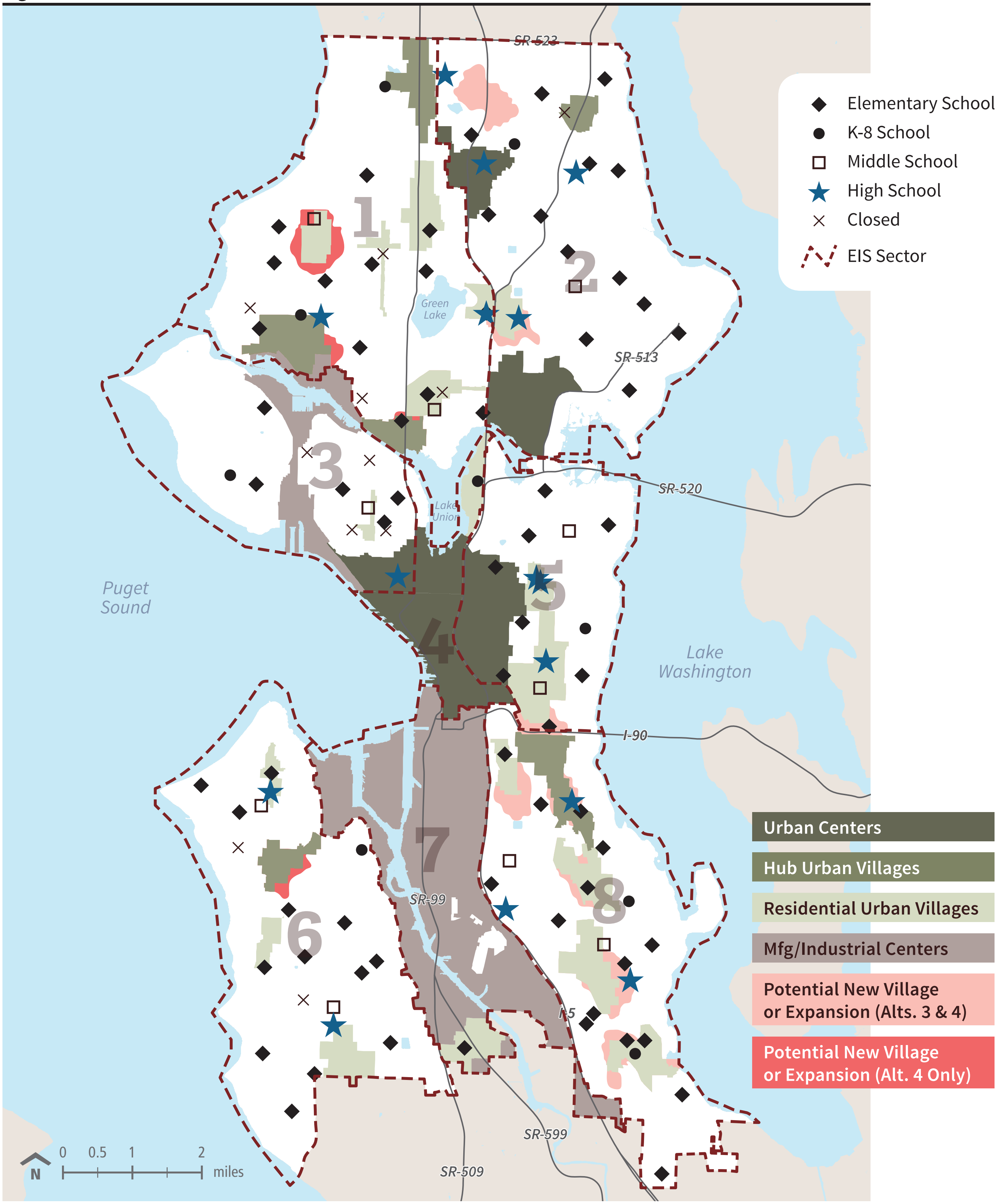
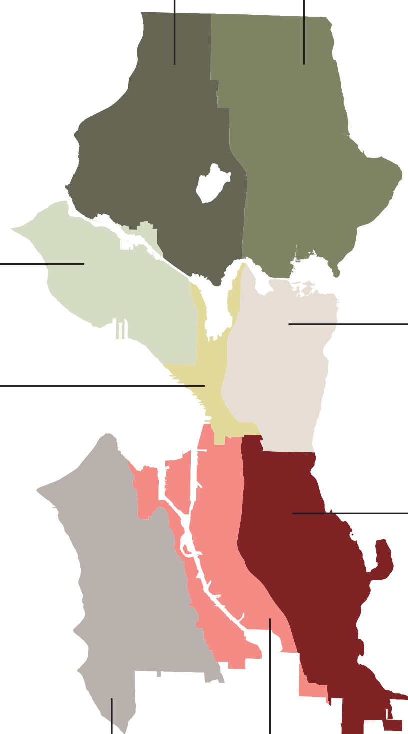


Figure 3.8–13 Seattle public schools, by EIS analysis sector



Sector 1

Schools (26)

16 elementary
2 K-8
2 middle
2 high
4 closed/vacant

13 are in the following urban villages:

Ballard
Fremont (Alt 4)
Aurora-Licton Springs
Green Lake (Alt 3)
Greenwood-Phinney Ridge
Wallingford

Sector 3

Schools (22)

5 elementary
1 K-8
1 middle
2 high
2 closed/vacant

1 is in Uptown

Sector 4

Schools (1)

1 K-8

The school is in Eastlake

Sector 6

Schools (20)

13 elementary
1 K-8
2 middle
2 high
2 closed

3 are in the following urban villages:

Admiral
Morgan Junction

Sector 2

Schools (20)

12 elementary
3 K-8
1 middle
3 high
1 closed/vacant

3 are in the following urban villages:

Northgate
Lake City
Roosevelt (Alt 3)

Sector 5

Schools (14)

8 elementary
1 K-8
2 middle
3 high

6 are in the following urban villages:

First/Capitol Hill
23rd & Union-Jackson
Madison-Miller

Sector 8

Schools (22)

15 elementary
2 K-8
2 middle
3 high

6 are in the following urban villages:

North Rainier (Alt 3)
Columbia City (Alt 3)
North Beacon Hill
Rainier Beach

Sector 7

School (1)

1 elementary

The school is in South Park

(SDOT 2014d). The SDOT walking maps identify traffic signals, crosswalks, multi-use paths and public facilities. For neighborhoods that do not have adequate sidewalk infrastructure, the map recommends students walk on the left side of the roadway as far off the traveled part of the roadway as possible. Although an extensive connected sidewalk network exists in the urban core and in many of the urban villages, several residential areas currently lack sidewalks. These are mostly concentrated in Northwest Seattle and Northeast Seattle (sectors 1 and 2) north of N 85th Street and Duwamish (Sector 7). Figure 3.8–14 identifies where there is a substantial lack of sidewalk infrastructure (no sidewalks on either side of the street on over half of the streets) within the designated walk boundaries of elementary, K-8, middle schools, high schools and closed schools. A walk boundary of 2 miles was assumed for closed schools in the event that closed schools are used during the planning period of 20 years. Table 3.8–4 on page 3.8–23 identifies the schools where more than half of the streets in the designated walk boundary are missing sidewalks on both sides of the street.

Out of a total of 105 schools in the SPS district, there are 25 schools that are missing sidewalk infrastructure along more than half of the streets in the designated walk boundary. These include 18 elementary/K-8 schools, six middle or high schools and one closed school.

Urban villages that are near or contain schools lacking full sidewalk infrastructure in their walk routes include:

- Northgate
- Bitter Lake
- Lake City
- North Beacon Hill
- Othello
- Rainier Beach
- South Park
- Greater Duwamish

SDOT invests in safety around schools by selecting several schools each year to receive engineering improvements, an education and encouragement campaign, and traffic enforcement support. The program is funded by Seattle's Bridging the Gap levy, revenue from school speed zone cameras, and grants from the Washington Traffic Safety Commission and the Washington State Department of Transportation. Engineering improvements can include new sidewalks, sidewalk repair, new or improved crosswalks, and curb ramps. In 2014, new sidewalks were placed near the Arbor Heights, Roxhill and Olympic Hills schools. Other engineering improvements were made for 25 other schools (SDOT 2014e).

STUDENT ENROLLMENT

In the last 50 years, student enrollment in Seattle Public Schools has decreased significantly. Enrollment reached its peak of 99,326 students in 1962. During the 1960s and 1970s, enrollment decreased rapidly until the mid-1980s when the decline slowed, hitting a low of 41,002 students in 1989. Student enrollment gradually increased for the next ten years and

Figure 3.8–14 Lack of sidewalk infrastructures within designated walk boundaries of Seattle school facilities

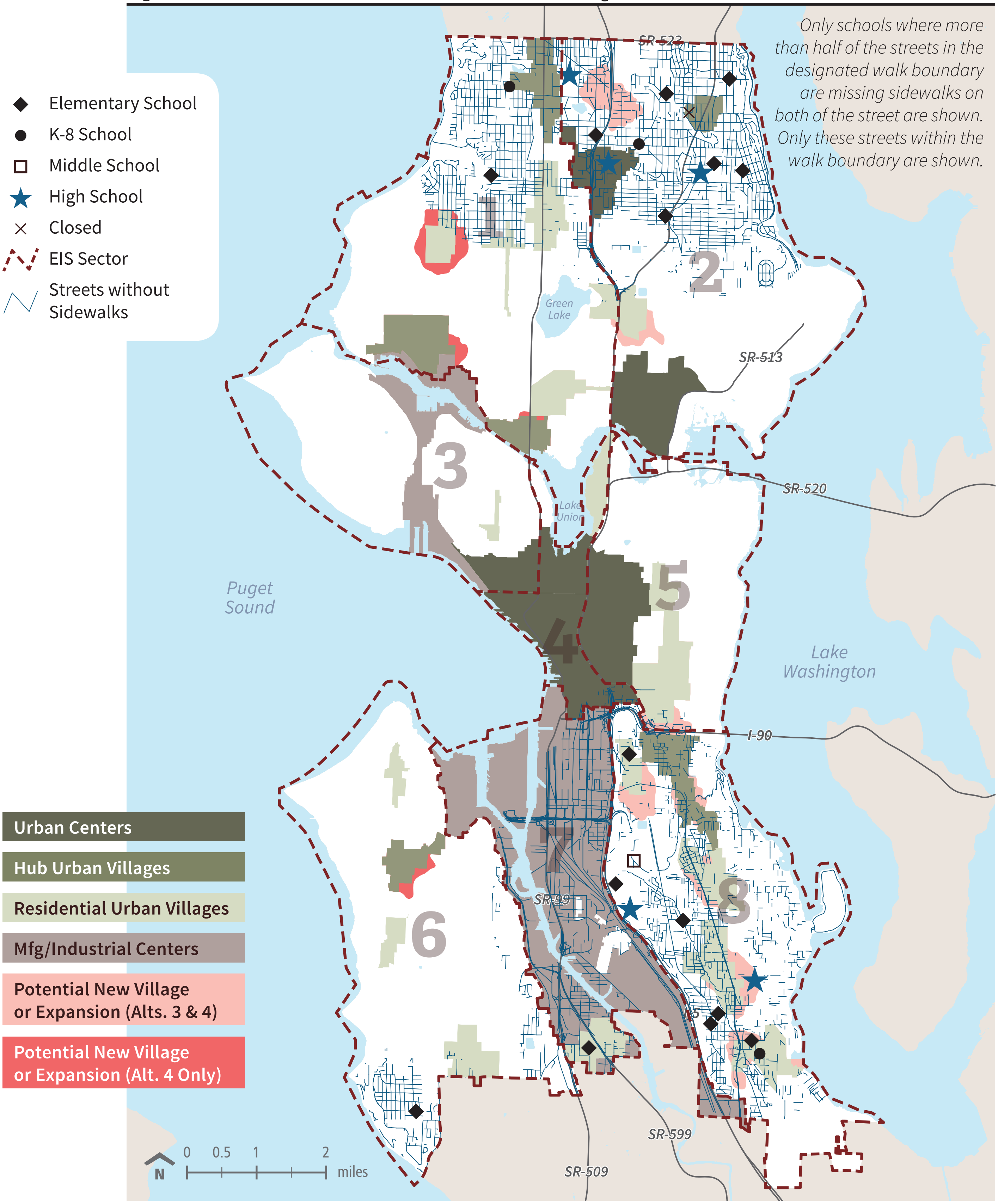


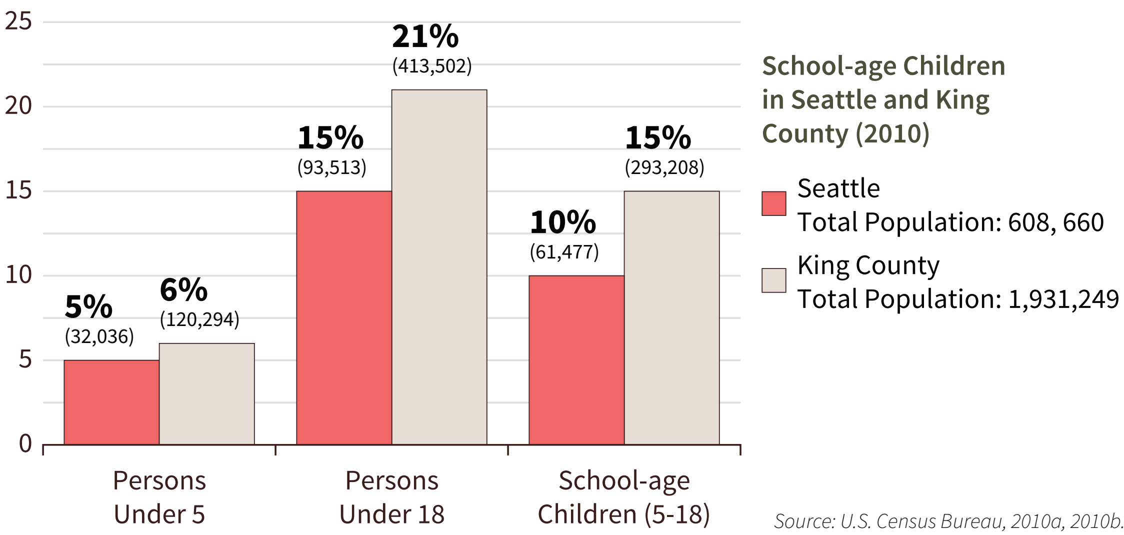
Table 3.8–4 Schools with more than half of streets missing sidewalks on both sides in the designated walk boundary

School by Type	Percentage of Streets with No Sidewalks Within Designated Walk Boundary
Elementary/K-8	
Arbor Heights	53%
Beacon Hill International School	53%
Broadview-Thomson	81%
Cedar Park	86%
Concord International School	73%
Dearborn Park	53%
Dunlap	59%
Jane Addams	88%
John Rogers	89%
Maple	56%
Northgate	75%
Olympic Hills	80%
Pinehurst	81%
Sacajawea	53%
South Shore	60%
Van Asselt	65%
Viewlands	76%
Wing Luke	60%
Middle/High School	
Asa Mercer	56%
Cleveland—STEM	57%
High Point	63%
Ingraham	78%
Nathan Hale	64%
Rainier Beach	50%
Closed	
Lake City	81%

then slowly declined between 1998 and 2007. Since 2007, enrollment has steadily increased and is expected to continue to do so into the foreseeable future (SPS 2012b).

Of the 61,477 school-age children living in Seattle in 2010, 76 percent were enrolled in Seattle Public Schools (47,008). The majority of the remaining 24 percent were most likely enrolled in private schools or home-schooled. Figure 3.8–15 provides a comparison of school-age population groups for Seattle and King County as a whole. The percentage of children living

Figure 3.8–15 School-age children in Seattle and King County in 2010



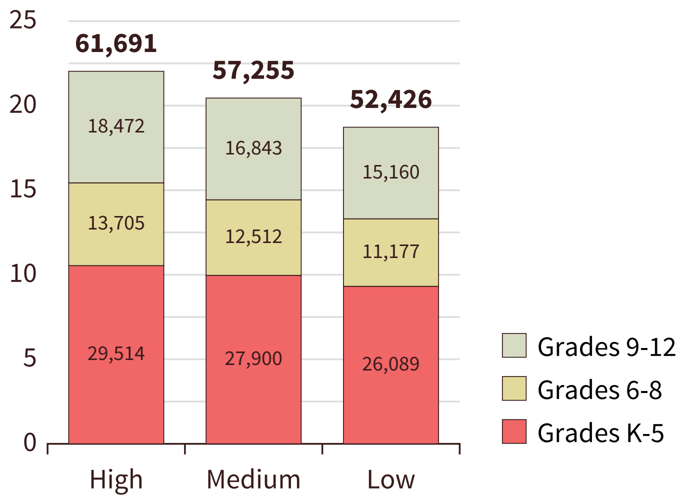
Source: U.S. Census Bureau, 2010a, 2010b.

in Seattle that are under the age of 5 is slightly less than those living in King County as a whole: 5 percent and 6 percent, respectively. However, when children under the age of 18 living in Seattle are compared with those in King County, the difference becomes much larger: 15 percent and 21 percent, respectively. This difference can also be seen when comparing school-age children living in Seattle with those living in King County: 10 percent and 15 percent. These differences imply that while the percentage of total population under the age of 5 is comparable in Seattle with the whole of King County, many Seattle families move out of the city before their children are old enough to be enrolled in school.

To plan for future student enrollment, SPS uses the cohort survival model which projects a "survival rate" for each grade, based on the proportion of students who historically continue from one grade to the next. To project future kindergarten enrollment, a "birth-to-kindergarten ratio" is estimated, based on the proportion of children born in Seattle who historically enroll in Seattle Public Schools five years later. That ratio is then applied to the number of live births in the fifth year prior to the school year being projected. This generates an enrollment projection based on a projection of live births as the basis for ten-year projections. Projections beyond five years are less robust than projections based on known live births, which is why SPS updates its projections annually.

The 2012 Facilities Master Plan identified enrollment projections for elementary, middle and high schools. Figure 3.8–16 provides the low, medium and high projections by school grade based on the cohort survival method projection model. Based on the medium projection, over 57,000 students are estimated to attend Seattle schools in the 2021–2022 school year. The Facilities Master Plan determined that a growth of nearly 9,000 students would outstrip the capacity of the schools, especially at elementary and middle school levels. (The Facilities Master Plan was prepared at a time when school enrollment was 48,000 students; SPS 2012b).

Figure 3.8–16 Enrollment projections by grade for the 2021–22 school year



The capacity limits identified in the Facilities Master Plan through 2022 is used as the basis for developing the SPS's capital programs, including Building Excellence (BEX) Phase IV. The BEX Phase IV levy was approved in 2013 and provided $695 million in funds to pay for the construction of 18 new or replacement schools, seismic upgrades of 37 additional schools, technology improvements for all SPS schools and Downtown school planning. The planning period for this capital program is 2014–2019. BEX Phase IV assumed capacity needs based on the high projection for kindergarten through 5th grades and for 6th through 8th grades in the North region. Capacity needs were based on the medium projection for all other regions and for 9th through 12th grades. BEX Phase IV will provide an added capacity of 7,900 students to address the shortage identified in the Facilities Master Plan. This Phase IV includes planning for a K–5 elementary school in the downtown commercial core. SPS has begun the search for a suitable location.

3.8.2 Impacts

Impacts Common to All Alternatives

POLICE SERVICES

Population and job growth are not automatically presumed to cause a citywide increase in reported crime. Past trends show an overall decline in violent and property crime even when Seattle's population was growing. A myriad of other factors are known to affect the volume and type of crime (Federal Bureau of Investigation 2013):

- Population density and degree of urbanization
- Variations in composition of the population, particularly youth concentration

- Stability of the population, especially mobility, commuting patterns and transience
- Modes of transportation and highway system
- Economic conditions, including median income, poverty level and job availability
- Cultural factors, including education, recreation and religion
- Family conditions, especially divorce and family cohesiveness
- Climate
- Effective strength of law enforcement agencies
- Administrative and investigative emphases of law enforcement
- Policies of other components of the criminal justice system (i.e., prosecutorial, judicial, correctional and probational)
- Prevalent attitudes toward crime
- Crime reporting practices of the local population

Since demand for police services varies over time and by neighborhood, population growth and shifts in area characteristics could influence the characteristics of crime. Although hiring under the Neighborhood Policing Staffing Plan has been delayed, additional officers are expected to be on staff in the next several years. Implementation of the staffing plan would assist the department in achieving prevention and response-time goals through increased staffing availability for neighborhood-oriented policing. A Resource Allocation Plan is expected to be completed by mid-2015, which will shed more light on probable future staffing directions (Seattle FAS 2015b).

The Resource Allocation Plan will also inform judgments about overall future police facility needs as well. However, some observations are possible at this time:

- The South Precinct station is the facility most likely to need improvements with any future growth in staffing there. It is near capacity for staffing space, it is in need of seismic upgrades, and would probably also warrant renovations and a possible building addition, and more parking.
- While additional staff hiring is probable in the North Precinct over the next twenty years, the planned new facility at N 130th St/Aurora Ave. N has already anticipated the space needs and will provide sufficient building area to meet those needs. The new facility would remedy the needs of both existing and future possible staff, which would help avoid adverse police facility impacts in that precinct. Land for the North Precinct facility has already been acquired.

In other precincts, no facilities needs are identified at this time in relation to serving projected growth. The Southwest Precinct station has capacity for 13 additional staff members, which is likely to be sufficient to accommodate staffing for the 20-year planning period. For the East and West precincts, ongoing planning will help determine staffing and related facility needs, if any, in the coming year.

Since population and employment growth do not directly correlate to an increased demand for police services, none of the four growth alternatives would necessarily result in proportional increases in call volumes or incidence of major crimes. Therefore, no specific findings of adverse effects on response times or criminal investigations volumes are made. SPD will continue to analyze where best to focus its resources to respond to changes in demand for police services regardless of which alternative is selected. Implementation of Crime Prevention Through Environmental Design (CPTED) principles in future development provide methods by which criminal activity might be reduced through better site and building design.

FIRE AND EMERGENCY SERVICES

The impacts of additional growth over the next twenty years would be gradual, distributing increased call volumes across many fire station coverage areas, but with an anticipated level of increased call concentration in urban centers and urban villages where the greatest levels of employment and residential growth would occur. Such increases in citywide call volumes would be considered an adverse impact of future growth.

Anticipated housing and employment growth would not likely be so adverse as to substantively change how the City manages its fire and EMS services to the city as a whole (Roberts 2014b). Over the next several years, a probable continuation of recent growth trends is likely to lead to increased service demand in places where the Seattle Fire Department is monitoring facilities and equipment sufficiency. This includes the South Lake Union and Broadview-Bitter Lake-Haller Lake neighborhoods. The Fire Department anticipates proactively addressing these existing needs by making adjustments through system-wide evaluations that are conducted regularly to identify trends, and by planning for new fire stations, subject to funding availability. See the discussion of alternative-specific impacts for additional observations.

All new buildings associated with projected growth would be constructed consistent with the 2012 Seattle Fire Code, comprised of the 2012 International Fire Code with amendments adopted by the City in Ordinance 124288. Adequate fire flow and emergency access would be provided in new structures as required by the fire code.

PARKS AND RECREATION

Population and job growth over the 20-year planning period would generate more demand for parks, recreation facilities and open space across the city.

As an illustration of possible demand to serve projected 20-year growth in a way that meets an aspirational goal of 1 acre per 100 residents, the City would need to add 1,400 acres of breathing room open space to the current park inventory of 6,200 acres. Demand for usable open space would similarly increase as growth would lead to more people working and living in urban villages. A parks analysis calculated the acreages of usable open space that would be needed to meet the household-based goal for each urban village by 2035 based on the existing inventory of usable open space within and abutting urban village boundaries and the number of households projected to be added by 2035 under each of the four EIS alternatives.

Urban villages in which over half of the geographic area does not meet adopted open space distribution standards:

Urban Centers

Downtown
First/Capitol Hill
Northgate

Hub Urban Villages

Ballard
Bitter Lake
Fremont
Mount Baker
West Seattle Junction

Residential Urban Villages

Greenwood-Phinney Ridge
Morgan Junction
Westwood-Highland Park

Under all EIS alternatives, Downtown, First/Capitol Hill, Greenwood-Phinney Ridge and Morgan Junction are projected to have less than the amount of usable open space that would meet the 1 acre per 1,000 households goal. These urban villages are currently not meeting the household-based goals and adding more households would widen the existing gap, unless additional actions are pursued to address those needs. Parks' ability to acquire sizable open space is currently very difficult given the cost of land, the need to pay fair market value and the lack of available space for purchase. This is particularly the case in the Downtown Urban Center, which, for example, could need as much as 5 acres of usable open space (for Alternative 2) to meet the household-based goal given the projected growth. Five acres of land in Downtown is equivalent to roughly about 5 blocks in size.

Significant open space gaps in single family areas in Northwest Seattle (Sector 1; Whittier neighborhood), Northeast Seattle (Sector 2; Wedgewood neighborhood) and West Seattle (Sector 6; Beach Drive area) are all likely to continue under all alternative scenarios, unless additional actions are pursued to address those needs. Distribution goals that are currently not met would probably continue to be unmet until Parks purchases and develops property in those urban villages.

PUBLIC SCHOOLS

Enrollment forecasts have been calculated by the Seattle Public School District to the 2021/22 school year, 13 years short of the comprehensive plan update planning horizon of 2035 (Wolf 2014). The latest capital program, BEX IV, ensures adequate capacity to meet those enrollment projections. Student enrollment would likely continue to grow as population increases in Seattle, affecting school capacity in the long run. When student enrollment exceeds capacity, SPS typically responds in several ways:

- Adjust school boundaries to address capacity needs
- Adjust geographic zones for option schools
- Add or remove portables
- Add or renovate buildings
- Open closed buildings or schools
- Pursue future capital programs

Population growth under the four alternatives would increase student enrollment in various EIS Sectors. Because only 34 of 117 schools (30 percent) are located in urban villages where all alternatives propose the most population growth, demand for SPS transportation services would likely increase. Families with school-age children may also choose to locate closer to schools outside of urban center and urban village boundaries. Historically the district has relied on existing SPS-owned property to provide school services. Currently no policies direct the district to purchase new property or to increase capacity in schools within urban villages, with the exception of a possible investment in a downtown school, currently under exploration.

Focusing population growth in urban villages with deficient sidewalk infrastructure in or near school walking boundaries would increase potential safety risks, which may burden some families with driving children to school who could otherwise walk if sidewalks were available.

Alternative 1: Continue Current Trends (No Action)

POLICE SERVICES

Under Alternative 1, projected growth levels across the city would be comparable to growth patterns over the last twenty years. This can be summarized as intermediate levels of growth distributed among the urban centers and hub urban villages including Ballard and Bitter Lake, and in other urban villages such as Columbia City, but with an emphasis of greater growth in employment and residential development in South Lake Union.

The Impacts Common to all Alternatives discussion identifies a probable adverse facilities impact to the South Precinct police facilities with future growth under any alternative, but does not make other findings of direct adverse impacts necessarily occurring regarding growth in service call volumes. Additional police officer staffing appears probable. Given these factors, it is difficult to make distinct conclusions that the distribution of growth under the different EIS alternatives would definitely generate different impact levels, citywide or in particular parts of the city. The police would continue to provide services that would respond to call volumes received, and would actively manage its efforts to address trends in call service types and locations over time.

FIRE AND EMERGENCY SERVICES

Under Alternative 1, projected growth levels across the city would be comparable to growth patterns over the last twenty years. This can be summarized as intermediate levels of growth distributed among the urban centers and hub urban villages including Ballard and Bitter Lake, and in other urban villages such as Columbia City, but with an emphasis of greater growth in employment and residential development in South Lake Union. In such areas, this growth would result in increased service call volumes. In the worst case, this could contribute to slower average response times, unless the Fire Department proactively takes steps to manage and balance service and equipment availability throughout its system, and plans for additional station construction subject to future funding availability.

PARKS AND RECREATION

See discussion under Impacts Common to All Alternatives on page 3.8–27. Under Alternative 1 (No Action), the projected growth levels across the city would be distributed in a manner comparable to growth patterns over the last twenty years. The discussion under Impacts Common to All Alternatives addresses areas with potentially significant adverse impacts. Other neighborhoods as well would experience adverse increases in demand for parks and recreation, proportional to their projected growth. This would include neighborhoods such as Uptown, 23rd & Union-Jackson, Aurora-Licton Springs, Columbia City and Othello among others, that are projected to experience considerable growth during the 20-year planning period. As the No Action Alternative, this range of potential adverse impacts represents a baseline impact level against which other alternatives are compared.

PUBLIC SCHOOLS

Under Alternative 1, Northwest Seattle, Northeast Seattle, Downtown/Lake Union and Capitol Hill/Central District (sectors 1, 2, 4 and 5) would experience the highest percentage of population growth. With only one school in Downtown/South Lake Union (Sector 4) more students would rely on SPS and public transportation systems to get to school. Northwest Seattle, Northeast Seattle and Capitol Hill/Central District (sectors 1, 2 and 5) are currently well-served by schools and thus prepared to serve anticipated growth under Alternative 1 without experiencing significant adverse impacts.

Alternative 2: Guide Growth to Urban Centers

POLICE SERVICES

Under Alternative 2, a greater concentration of projected residential and employment growth within urban centers is noted.

However, given the observations discussed in Impacts Common to All Alternatives and for Alternative 1, there is no clearly identified basis to speculate that different patterns of growth distribution under Alternative 2 would result in different patterns of call volume increase. Therefore, the potential adverse impacts for Alternative 2 are concluded to be similar to those for Alternative 1. The police would continue to provide services that would respond to call volumes received, and would actively manage its efforts to address trends in call service types and locations over time. The potential impacts upon police facilities are therefore concluded to be similar to Alternative 1, and could result in a need for improvements to South Precinct facilities

FIRE AND EMERGENCY SERVICES

Compared to Alternative 1, greater concentrations of projected residential and employment growth within urban centers under Alternative 2 could contribute to somewhat greater adverse impacts on fire and emergency services due to higher demand, specifically in Downtown, South Lake Union and similar "center city" neighborhood areas, and in the University District and Northgate. There would be relatively lesser potential for the impacts of added service demands in places such as Ballard, Bitter Lake, Lake City, Aurora-Licton Springs and Columbia City.

PARKS AND RECREATION

In addition to the impacts identified under Impacts Common to All Alternatives, usable open space goals for the number of households likely would not be met in the Northgate and South Lake Union Urban Centers under Alternative 2, unless additional actions are pursued to address those needs. The Downtown and First/Capitol Hill Urban Centers would experience the greatest increase in household growth under Alternative 2 and proportional increases in demand for parks and recreation, relative to the other alternatives. As a result of this growth, the First/Capitol Hill Urban Center would have the highest level of demand for added space and facilities to meet the household-based goal, equivalent to approximately 10 acres. The Downtown Urban Center would have the second highest level of demand for added space and facilities, equivalent to approximately 5 acres. Due to the concentration of growth in the urban centers, most of the urban villages would face a somewhat lower projected growth under Alternative 2, and therefore a somewhat lesser potential adverse impact on parks and recreation demand, compared to Alternative 1.

PUBLIC SCHOOLS

Alternative 2 would affect public schools similarly to Alternative 1, including in Downtown and South Lake Union, except that higher projected growth in those areas could result in more enrollment growth for those neighborhoods. Similarly, somewhat more enrollment growth could be generated in the First/Capitol Hill, University District and Northgate urban centers. No significant adverse impacts from this different growth pattern are identified.

Alternative 3: Guide Growth to Urban Villages near Light Rail

POLICE SERVICES

The potential adverse impacts for Alternative 3 are similar to those of alternatives 1 and 2. Also see the Impacts Common to All Alternatives discussion on page 3.8–25.

FIRE AND EMERGENCY SERVICES

Compared to Alternative 1, greater concentrations of projected residential and employment growth in urban villages served by light rail transit under Alternative 3 could contribute to somewhat greater adverse impacts on fire and emergency services due to higher demand. This includes Mount Baker, Columbia City, Othello, Rainier Beach, Roosevelt and the vicinity just north of Interstate 90 near Rainier Ave S. Depending on the rate of growth in these areas, these changes could cause the Fire Department to adjust its service provision and equipment over time as it monitors performance.

The increase in service demands in places including the Downtown and South Lake Union urban centers and urban villages in northwest Seattle would be less than identified for Alternative 1. This would probably result in somewhat less growth in service demand at the

Bitter Lake fire station, but would nonetheless contribute to impacts and possible station facility needs in the South Lake Union vicinity.

PARKS AND RECREATION

See discussion under Impacts Common to All Alternatives on page 3.8–25. Under Alternative 3, a greater concentration of growth in urban villages served by light rail transit would contribute to increased potential for impacts on parks and recreation in those places compared to Alternative 1. This is most likely to occur in southeast Seattle urban villages with light rail stations. It is noted that a possible growth emphasis area near the future I-90/East Link station and in the Mount Baker and 23rd & Union-Jackson Urban Villages would also contribute to increased demand for parks and recreation, up to 1.50 acres of usable open space. Overall, this pattern could create a greater number of neighborhoods with moderate growth concentrations than Alternative 1, which could contribute to slightly greater potential for overall impacts upon parks and recreation than Alternative 1, because more places would face increased demands for added open space and facilities.

PUBLIC SCHOOLS

The potential impact findings under Alternative 3 are between the levels identified for alternatives 1 and 2 in comparative effect on different neighborhoods. Potential adverse impacts on school enrollment from growth in the urban centers would be less than Alternative 2, due to a lesser emphasis on concentrating growth in urban centers. Comparatively, more population growth could generate more enrollment growth in Southeast Seattle neighborhoods, but this sector of the city is judged to be well served by school facilities and can serve future growth within the context of the school district's facilities planning efforts. Also, focusing growth near light rail stations would likely provide for better student access to middle schools and high schools than alternatives 1 and 2.

Alternative 4: Guide Growth to Urban Villages near Transit

POLICE SERVICES

The potential adverse impacts for Alternative 4 are similar to those of alternatives 1, 2 and 3. Also see the Impacts Common to All Alternatives discussion.

FIRE AND EMERGENCY SERVICES

Under Alternative 4, the projected growth patterns would generate increased service call volumes in a manner similar to the combined patterns of alternatives 1 and 3. This would reflect projected growth in central urban centers as well as in northwest Seattle areas, southeast Seattle transit station areas and in other places including Crown Hill, Fremont and West Seattle Junction. Alternative 4 would distribute growth across the most number of places of any alternative. This means a wider array of fire stations experiencing increased call volumes and potential equipment or operational challenges potentially requiring the Fire Department to make a greater number of management decisions on how it distributes its operations to serve and respond to call volumes across the city. Therefore, the identified potential citywide adverse impacts on fire and emergency services are concluded to be greater than for alternatives 1, 2 or 3.

PARKS AND RECREATION

Park and recreation impacts under Alternative 4 would be similar to those identified for Alternative 3, but somewhat greater in overall degree, due to an even greater geographic span of ares experiencing higher amounts of growth. This would include the added growth emphasis areas identified for this alternative, including Fremont, West Seattle Junction and Crown Hill. This conclusion is also reached because Alternative 4 is projected to see more growth in the Ballard, Fremont and Mount Baker neighborhoods, and each of these neighborhoods includes a notable proportion of its area mapped as having gaps in usable open space.

PUBLIC SCHOOLS

Under Alternative 4, Northwest Seattle, Northeast Seattle, Downtown/Lake Union and Southeast Seattle (sectors 1, 2, 4 and 8) would experience the highest percentage of projected population growth. Growth patterns in urban villages would be similar to Alternative 3, except there would also be added growth anticipated in places such as West Seattle Junction and Crown Hill, compared to Alternative 3. The greater geographic span of areas experiencing higher amounts of growth is noted as one factor that could potentially require SPS to make a greater number of management decisions on how it distributes its operations to serve future growth. This impact analysis does not identify any significant adverse impacts to facilities under Alternative 4's pattern of growth for any part of the city. Comparatively, Alternative 4's level of overall potential impacts would be similar to Alternative 3.

3.8.3 Mitigation Strategies

Although future growth over twenty years would contribute to increased demand for services and certain facilities from these service providers, and each has already-identified needs that the City anticipates addressing in coming years, the alternatives evaluated in this EIS would largely avoid generating significant adverse impacts. Future growth could cause adverse impacts relating to the availability or distribution of park/recreation facilities/amenities and open space in certain areas of the city. Mitigation strategies for parks/recreation are proposed, to address the identified range of potentially significant adverse impacts.

"Other Possible Mitigation Strategies" are also included below to offer advisory guidance on actions that could be taken to support improvements that would address existing conditions that could be remedied by a combination of continued departmental management choices and execution of improvements fitting within capital improvement funding capabilities.

Each of the service providers studied here actively manages how its operations and facilities are allocated to serve its customers. However, their responsiveness and ability to deliver services in certain ways could potentially be constrained due to funding availability when competing for available resources to provide capital improvements, or when City decision makers decide how to allocate the available resources among potential improvements.

Proposed Mitigation Strategies

Given that future growth across the city would continue to generate additional demands upon parks/recreation and open spaces in relation to its per-capita goals, Parks would strive through the 20-year planning period to address possible shortfalls by continuing to leverage funds allocated in the Park District to match state funding grants. The areas identified with outstanding needs include the following:

- ***Urban Centers:*** Downtown, First/Capitol Hill, Northgate and South Lake Union
- ***Hub Urban Villages:*** Ballard, Bitter Lake, Fremont, Mount Baker and West Seattle Junction
- ***Residential Urban Villages:*** Greenwood-Phinney Ridge, Morgan Junction, Westwood-Highland Park and portions of Mount Baker and 23rd & Union-Jackson Urban Villages in the vicinity of the future I-90/East Link light rail station
- ***Other Neighborhoods:*** Whittier, Wedgewood and Beach Drive

Other Possible Mitigation Strategies

FIRE AND EMERGENCY SERVICES

- The Fire Department could take steps to obtain funding for and construction of a new fire station in South Lake Union.
- The Fire Department could take steps to address additional equipment assignment and/or other changes to address possible operational challenges identified as possibly present at the Broadview-Bitter Lake-Haller Lake fire station under existing conditions.

PARKS AND RECREATION

- Update Comprehensive Plan goals and policies related to the acquisition of new park lands and development of usable open space within existing parks.
- For urban villages that have limited opportunities for park acquisition, the City could consider the following tools with respect to open space goals:

- Examine whether separate goals should be established in areas where non-park open space provides for some open space needs, such as college campuses and schoolyards.
- Conduct an evaluation of best practices for public community center operations and conduct a peer review of Seattle's current model and operating plan.
- Consider allowing green streets or other greening efforts to count towards meeting open space goals.
- The City could incorporate incentives and other regulatory tools to encourage and enforce developers to set aside publicly accessible usable open space.
- The City could partner with other government agencies or private property owners to provide and maintain open space that is available to the public

PUBLIC SCHOOLS

- The City could identify specific objectives to assist SPS in acquiring and developing a downtown school.
- The City could establish Comprehensive Plan policies or other agreements that would recognize that public schools in urban areas must contend with constrained properties, and allow flexible mitigation for tree preservation, landscaping, critical areas, and drop-off and bus-loading, for future school project planning and design flexibility.
- The City could consider prioritizing installation of sidewalk infrastructure in areas that are expected to receive new residents. Prioritization criteria could include considerations relating to equity in how these improvements are distributed.

3.8.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to public services are anticipated from projected population and employment growth.

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3.9 Utilities

This chapter considers the potential impacts to utility services that may result from implementation of the four alternative land use scenarios described in Chapter 2 of this Draft EIS. Utilities discussed in this chapter include the public water system, sanitary sewer system, stormwater drainage and electrical power.

Seattle Public Utilities (SPU) manages the public water system, sanitary sewer system, combined sewer system and drainage system in the City of Seattle. Seattle City Light (SCL) manages the electric power generation, transmission and distribution services in the City of Seattle.

3.9.1 Affected Environment

Seattle Public Utilities—Water, Drainage and Sewer

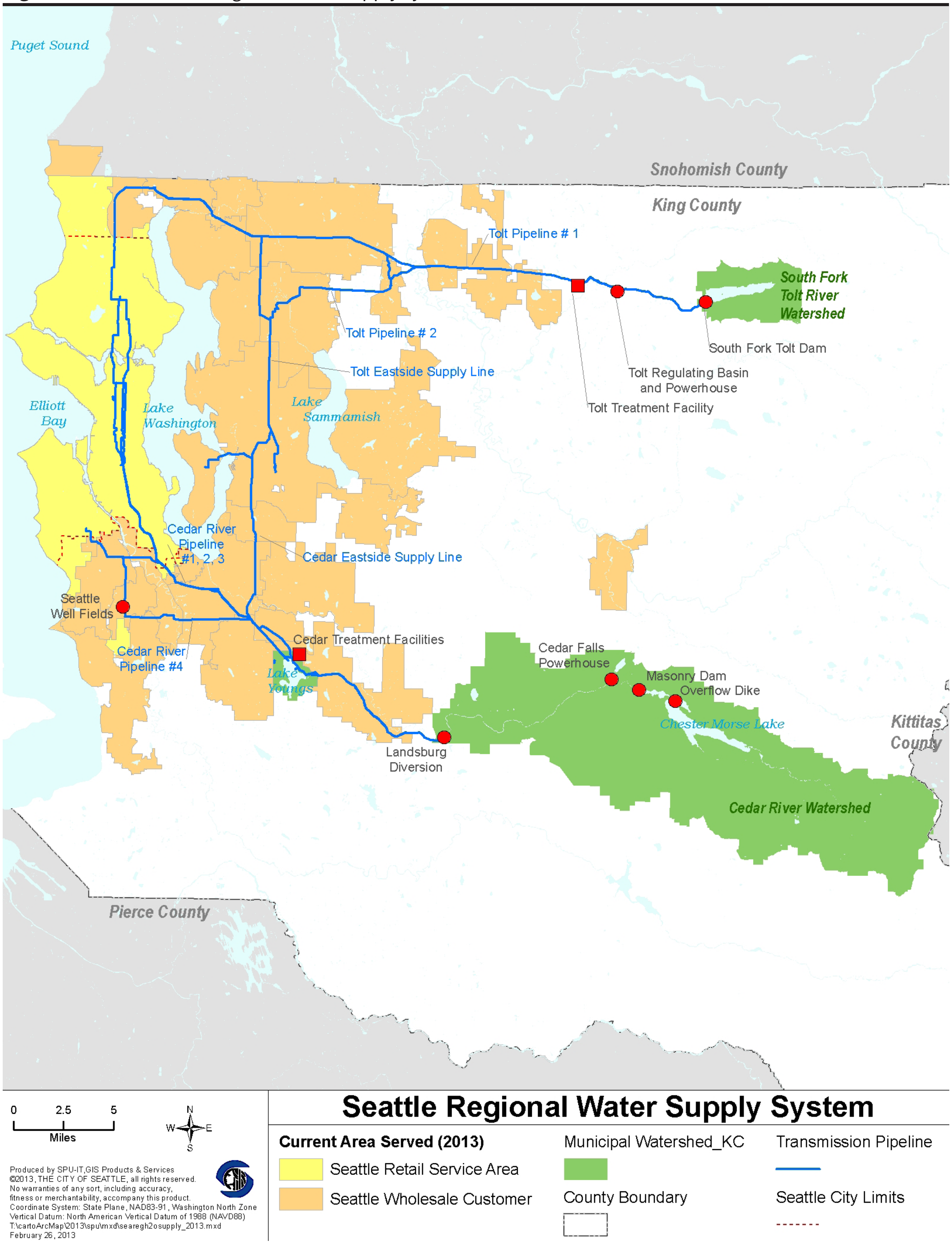
SPU tracks a number of performance metrics to determine if its utilities (water, drainage and sewer) are meeting established service levels. SPU monitors water system performance using real-time monitoring, regular water quality sampling and testing, field inspections and customer calls. All problems and crew responses are tracked in SPU's work order management system (Maximo).

Water System

SPU provides municipal water service, including water for fire suppression, to Seattle customers from its two surface sources: the Cedar River watershed and the South Fork of the Tolt Reservoir. The Cedar River system supplies 60–70 percent of the water SPU delivers and the South Fork Tolt provides 30–40 percent. A small amount of groundwater is obtained from the SPU's Seattle Well Fields located south of the City.

SPU's water system consists of transmission and distribution pipelines, treatment and storage facilities throughout Seattle and several other cities. Figure 3.9–1 on the following page shows SPU's regional supply system. SPU delivers water to Seattle retail and wholesale customers through 1,880-miles of transmission and distribution pipes. SPU maintains, improves and repairs this network as needed.

Figure 3.9–1 Seattle regional water supply system



Sewer and Drainage

SPU drainage infrastructure includes combined, fully separated and partially separated sewer systems, each serving approximately one-third of the City of Seattle. Figure 3.9–2 provides the generalized location of these systems within the city.

Combined Sewer System

King County Wastewater Treatment Division (KC) and SPU own and operate combined sewer systems that serve about one-third of the city. Each combined sewer system is a piped network carrying both sanitary wastewater and stormwater runoff to a King County wastewater treatment plant (WWTP).

King County Wastewater Treatment Division currently operates three secondary WWTP (West Point WWTP, South WWTP and Brightwater WWTP) and four combined sewer overflow (CSO) treatment facilities (Alki, Carkeek, Elliott West and Henderson/Norfolk). These facilities discharge treated wastewater to Elliott Bay, Puget Sound and the Lower Duwamish Waterway. KC and SPU manage the CSO systems based on the size of the drainage basin served by each overflow outfall. SPU manages basins smaller than 1,000 acres (86 basins) and KC Metro manages basins larger than 1,000 acres (38). When storm flows exceed the capacity of the system, the combined system, by design, discharges wastewater directly into Lake Union, Portage Bay, Lake Washington, Puget Sound, Thornton Creek, Longfellow Creek and Piper's Creek (SPU 2014).

> The older parts of Seattle's wastewater system use a single set of pipes to carry both sewage and rain running off streets and buildings. Most of the time, this polluted water goes to a wastewater treatment plant. But in heavy rains, the pipes can overflow into rivers, lakes, or Puget Sound. Overflow points called **"combined sewer overflows"** or CSOs are built into the system. CSOs prevent sewer backups into homes and streets.
>
> The water released by CSOs is 10 percent sewage and 90 percent stormwater. CSOs may be harmful to people and animals living in the water because they carry chemicals and disease-causing germs.

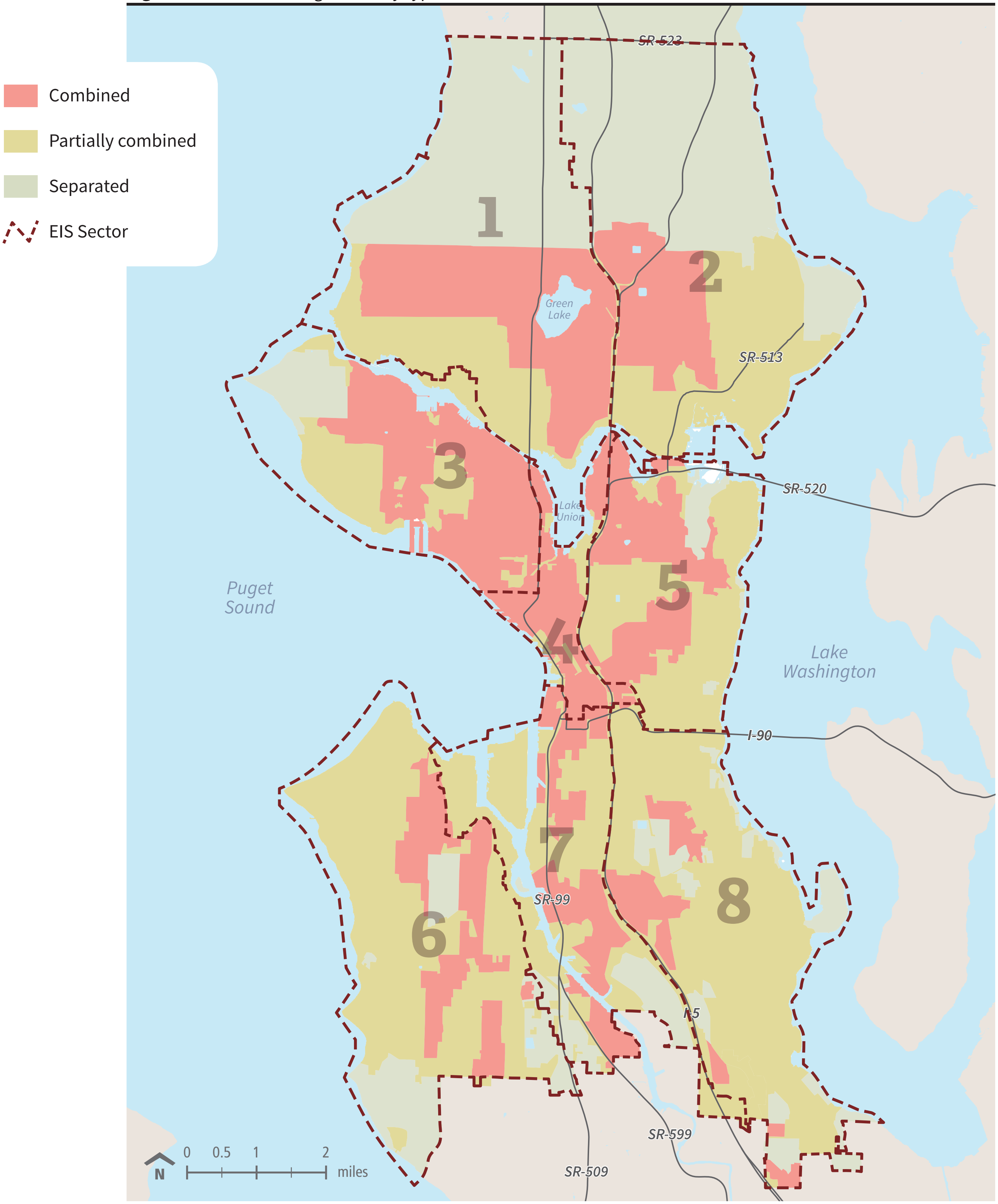
Figure 3.9–3 details the combined pipe system, pump stations and KC Metro wastewater system.

Some portions of the drainage system have been identified as capacity constrained. In these areas development is required to limit the peak discharges of stormwater. Any area that discharges to an informal ditch and culvert system is considered capacity constrained. Capacity constrained areas are shown in Figure 3.9–4.

Separated Systems (Sewer and Drainage)

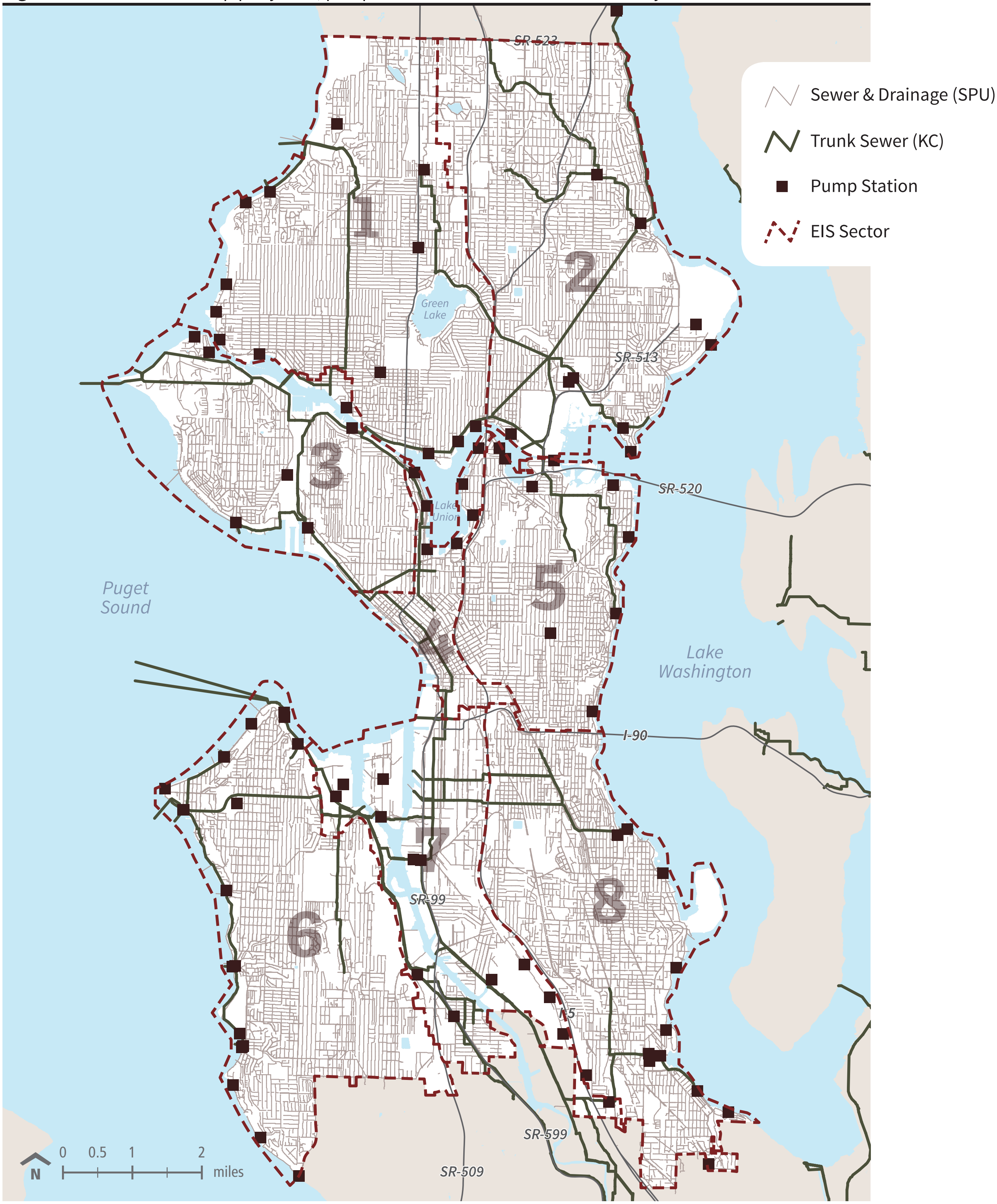
Beginning in the 1950s, additions to the sewer system were designed with separate networks of pipes for sewage and stormwater. In these areas, runoff is collected and conveyed in a drainage system and sewage is conveyed in a separate sanitary sewer system (shown in Figure 3.9–2).

Figure 3.9–2 Drainage areas by type



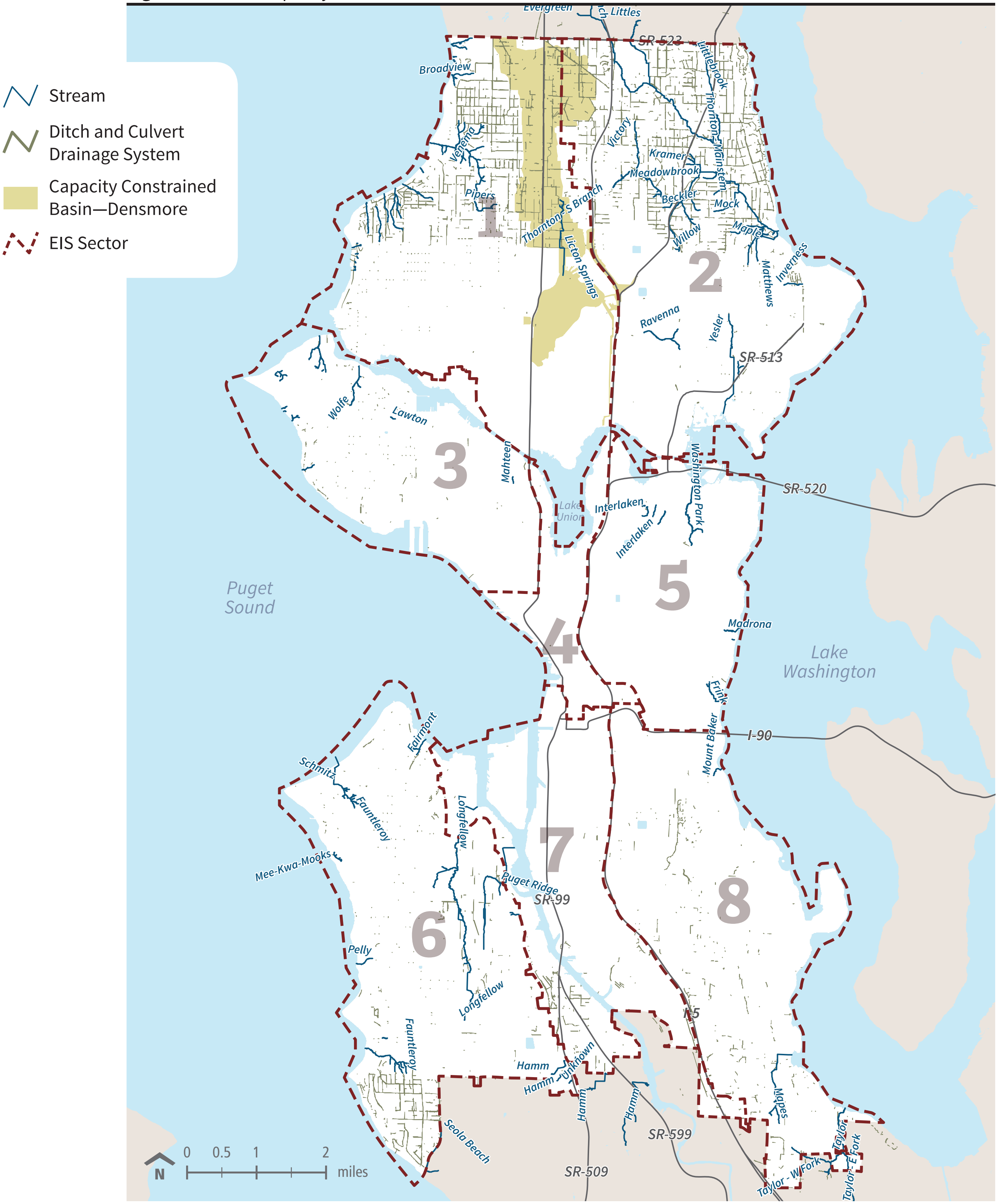
Source: City of Seattle, 2002.

Figure 3.9–3 Combined pipe system, pump stations and KC Metro wastewater system



Source: City of Seattle, 2002.

Figure 3.9–4 Capacity constrained areas



Source: City of Seattle, 2002.

Some portions of the drainage system are piped while others are an informal system of ditches and culverts, most of which drain to creeks or large receiving waters. For example, the area north of 85th Street (annexed by the City in 1954) is served primarily by ditch-and-culvert drainage systems (SPU 2014). Figure 3.9–5 shows the percentage of streets that do not have formal drainage systems by sector.

Partially Separated System

During the 1960s, portions of the combined sewer system were retrofitted with storm drain separators that diverted street runoff into the drainage system. The primary objective of these separation projects was to reduce emergency overflows of untreated sewage. Runoff from rooftops and properties outside the road rights-of-way was not diverted and is still conveyed to wastewater treatment plants (SPU 2014). Figure 3.9–2 shows the partially separated areas in the city.

Seattle City Light—Electric Power

In 1905 the Cedar Falls power plant began supplying electricity to Seattle's streetlights. The City's charter was amended in 1910 to create a Light and Power Department that eventually became known as Seattle City Light.

The heart of the SCL's water storage and generating facilities are four dams supplying hydroelectric power to the area: Ross, Diablo, Gorge and Boundary dams (SCL 2013).

Figure 3.9–6 shows the zones of substations that serve Seattle.

3.9.2 Impacts

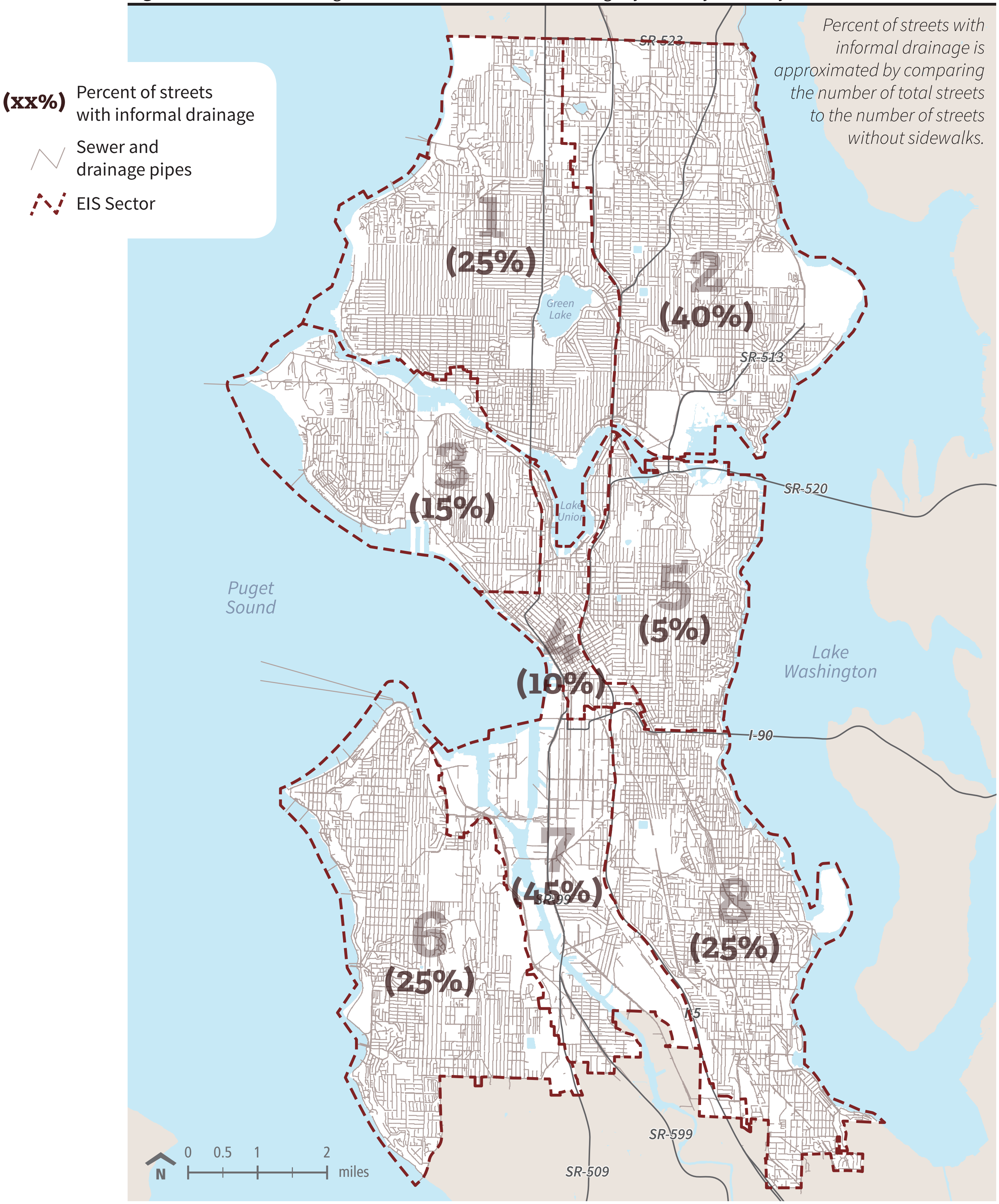
Impacts Common to all Alternatives

There are no significant variations in adverse impacts between the alternatives. The citywide demand for utilities would be similar for all of the alternatives including Alternative 1 (No Action). Impacts to utility services that could be expected to result from any of the alternatives are described below.

SPU—WATER

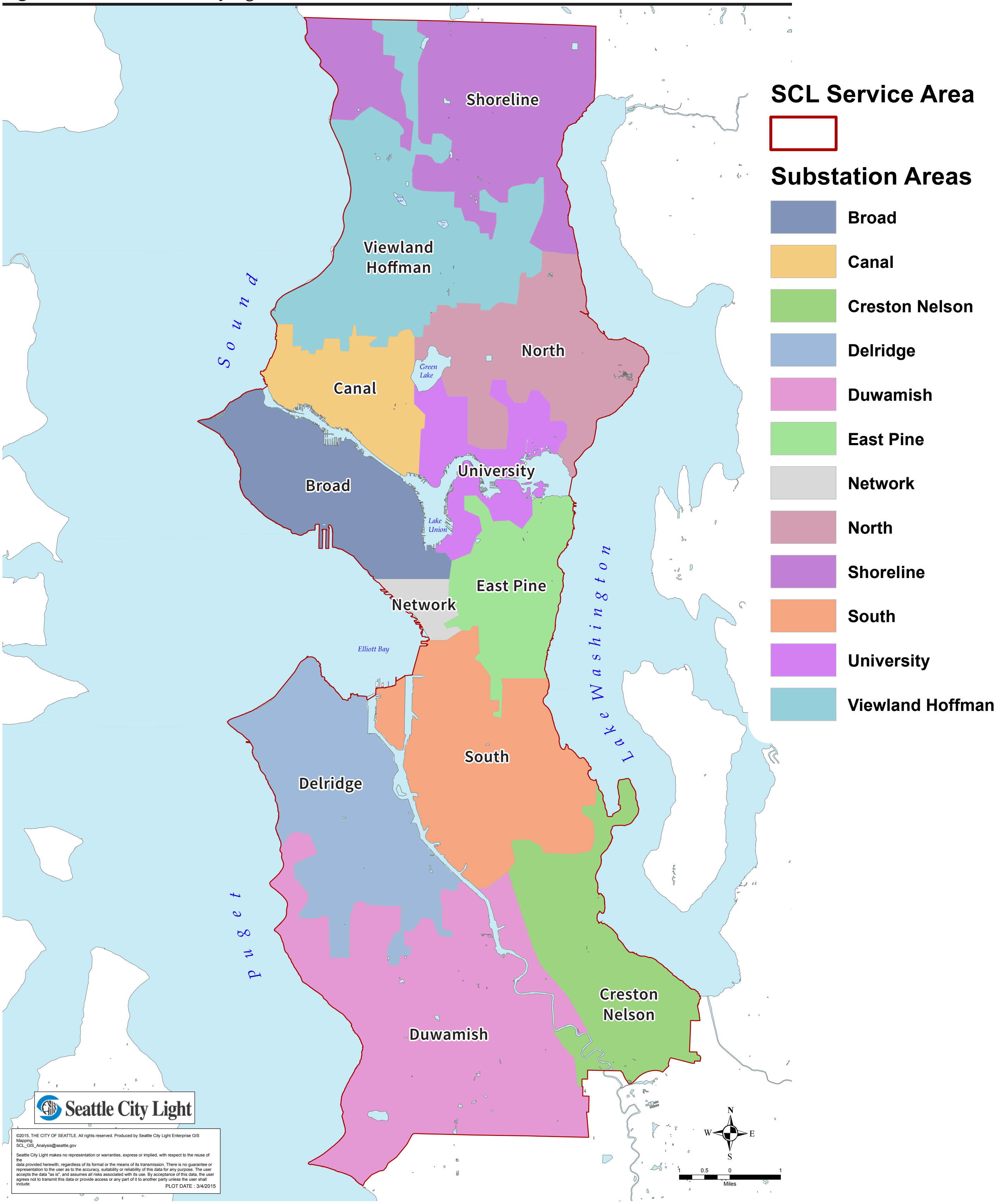
SPU uses Puget Sound Regional Council and Washington Office of Financial Management growth forecasts to develop long-range (at least 20 years) water demand forecasts and determine if new supplies or additional system capacity are needed. These water demand forecasts, supply analyses, water rights evaluations and capacity analyses are updated with each water system plan update, but may be updated more frequently if new information results in a significant change. The sensitivity of these forecasts to various factors, including updated

Figure 3.9–5 Percentage of streets without formal drainage systems by EIS analysis sector



Source: City of Seattle, 2002.

Figure 3.9–6 Seattle City Light substation service areas



Source: City of Seattle, 2015.

growth projections, is also examined. It should be noted that currently total water system usage is declining and the water system has excess capacity.

New developments and redevelopments must meet the current fire code and any new services are connected to adjacent water mains. Water supply requirements for fire flow can be much greater than the average daily usage for single buildings. Under all scenarios, including the No Action Alternative, future development would result in greater demands on localized areas of the water supply and distribution system. There is no significant variation in impacts between the alternatives.

SPU—SEWER AND DRAINAGE

Separated Sewers

Under all scenarios, including Alternative 1 (No Action), development could result in greater demands on the local sewer collection system, the downstream conveyance and the treatment facilities. Increased sewer flow is related to increased water consumption. There would be a greater overall need for sewage capacity with increased density, but no significant adverse location-specific impacting conditions are identified in this review.

Separated Drainage

Under all scenarios, including Alternative 1 (No Action), future development would result in increased flow and/or improvements to the drainage system. Increases in peak flow and total runoff caused by conversion of vegetated land area to impervious surfaces would create increased demand on drainage system capacity, but no significant adverse location-specific impacting conditions are identified in this review.

Combined Sewers and Partially Combined Sewers

In areas of combined sewers, impacts from water consumption and runoff would be cumulative. The potential variation in area-specific impacts between alternatives would therefore be comparable to what is predicted for the separated sewers and drainage described above.

SCL—ELECTRIC POWER

Under all scenarios, including the No Action Alternative, future growth and development would increase demand for electrical energy. For 50 years, electricity consumption grew well above Gross Domestic Product (GDP) growth (12 percent in 1950). Now it is growing at less than GDP, and Seattle City Light projects less than 0.5 percent annual growth. Despite recent population and economic growth, Seattle City Light's load is fairly stable since its service territory is well established and it has administered an aggressive energy conservation program for nearly 40 years. Tightened building codes, especially in Seattle are changing energy use. Some developers are going well beyond these codes—such as the Stone34

Building in Fremont, which is designed to reduce water and energy use by more than 75 percent compared to other similar buildings, and the Bullitt Center, a Living Building Challenge certified building which is required to be self-sufficient for energy and water for at least 12 continuous months and to meet rigorous standards for green materials and for the quality of its indoor environment.

At the same time, there are new efficiency standards for appliances as well as new technologies and software to better manage energy usage at home and office. Basic appliances, like televisions, are now 60 percent more efficient than just 3 years ago.

Impacts of the Alternatives

Although citywide demand for utility service would be similar for all of the alternatives, future development in concentrated areas could potentially result in cumulative impacts to localized portions of the utility system. However, both SPU and SCL currently employ a variety of strategies to anticipate and adjust to changing demands. Both potential impacts and strategies employed by the utilities to respond to changing demand are discussed in this section.

Alternative 1: Continue Current Trends (No Action)

Impacts resulting from Alternative 1 would be the same as described in the discussion of Impacts Common to All Alternatives.

Alternative 2: Guide Growth to Urban Centers

Alternative 2 would plan for focused growth in the City's six designated urban centers, with the greatest amount of growth focused in the Downtown, South Lake Union, Capitol Hill and Northgate urban centers. A concentration of growth in the urban centers would increase demand for utilities in these areas, with comparatively less demand for utility service in the hub and residential urban villages and outside of the urban villages. However, because the utilities are already planning for relatively high density and intensity development in the urban centers, Alternative 2 is not expected to result in any new impacts beyond those described under Impacts Common to All Alternatives.

Alternative 3: Guide Growth to Urban Villages near Light Rail

Alternative 3 would possibly create a new urban village around the NE 130th Street transit station and would amend the boundaries of other urban villages within a 10-minute walkshed of existing or planned light rail stations. The expansion and new urban village areas are currently primarily developed with single family residential uses.

Water. Increased development intensity in the new and expanded urban village areas would increase overall water demand, including fire flow demand. All new development would be required to meet the current fire code. However, SPU does not anticipate that developer required water improvements would differ from those described under Impacts Common to All Alternatives.

Drainage. The possible NE 130th Street/Interstate 5 urban village is located in an area where some streets have informal drainage. With future more intensive development, storm drains might need to be extended. A portion of this new urban village area is located in the Densmore drainage basin, which has more stringent requirements for mitigating runoff from redevelopment.

Sanitary Sewer. Impacts would be as described under Impacts Common to All Alternatives.

Electrical Power. Impacts would be as described under Impacts Common to All Alternatives.

Alternative 4: Guide Growth to Urban Villages near Transit

In addition to the residential urban village expansions described in Alternative 3, Alternative 4 would include additional expansions in the following urban villages: Ballard, Fremont, West Seattle Junction and Crown Hill. The potential for adverse impacts would be similar to those described for Alternative 3 above.

Existing Management Strategies

As noted above, both SPU and SCL currently employ a variety of mitigation strategies that allow them to anticipate and adjust to changing demands. Collectively, these measures will serve to minimize and mitigate the impacts of growth and development. A summary of existing practices employed by each utility are described below:

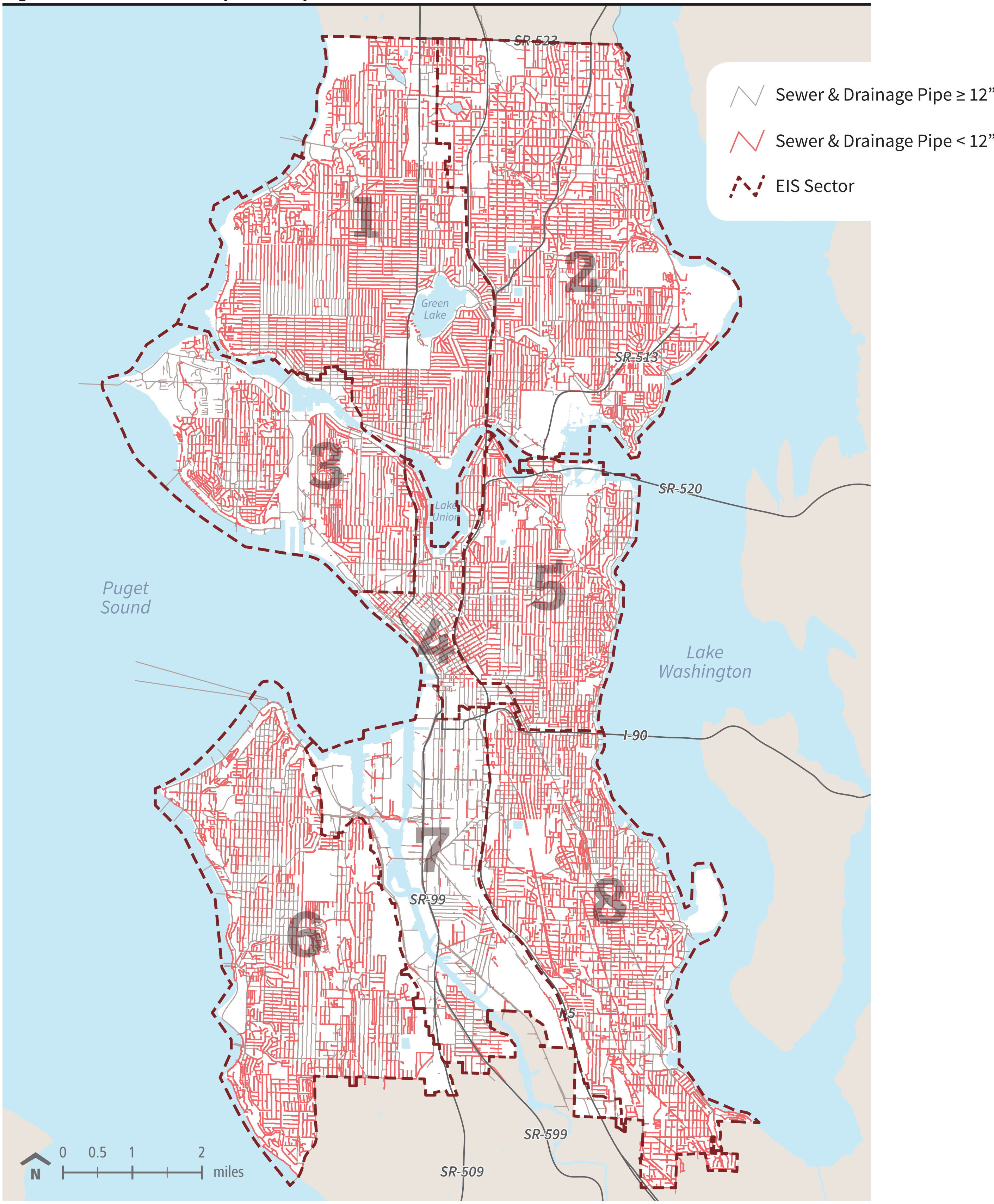
SPU—WATER

Water Availability Certificates and Conservation. SPU uses a hydraulic network model to evaluate capacity and make a determination of water availability. If there is a gap between what the existing system can provide and what a development needs, the developer is required to upgrade the existing system to meet demand (SPU 2012). New development and redevelopment is required by the plumbing code to include efficient plumbing fixtures. This requirement will reduce the overall impact to water demand resulting from the proposed alternatives.

SPU—SEWER AND DRAINAGE

Developer Sewer Improvements. In areas that are not designated as capacity constrained, developers are required to demonstrate that the downstream system has sufficient capacity for additional flow. Some parts of the City are served by sewers that are less than 12-inch

Figure 3.9–7 Areas of city served by sewers less than 12-inch diameter



Source: City of Seattle, 2002.

diameter, see Figure 3.9–7. These areas are likely at or near their capacity and downstream pipes from new development would have to be upgraded to a minimum 12-inch diameter. Redevelopments may also reduce per-capita sewer demand, as newer, low- or no-flow plumbing fixtures and equipment replaces older, less efficient, installations. These practices will help reduce the overall impact to the wastewater system.

Capital Projects. SPU also identifies candidate capital projects which the City implements independent of private development. SPU uses a hydrologic/hydraulic model and an asset management system to plan for development and address capacity constraints. A list of priority areas were identified in the 2006 Wastewater System Master Plan for Capital Improvement Projects. This list is updated and refined as additional data is available. Under the SPU Asset Management system, projects must be justified through a business case process that establishes that a problem or opportunity is timely and important, and that the proposed solution is superior to alternatives based on a triple bottom line analysis (economic, environmental and social) of life cycle costs and benefits.

Seattle Stormwater Code. Current stormwater regulations require new development and redevelopment to mitigate new impervious surfaces and pollution generating surfaces with flow control and/or water quality treatment. City of Seattle stormwater regulations protect people, property and the environment from damage caused by stormwater runoff. The stormwater codes satisfy the City's obligation to comply with Washington State Municipal Stormwater Permit—National Pollutant Discharge Elimination System (NPDES) Permit, issued by the Washington State Department of Ecology.

Also called natural drainage, **Green Stormwater Infrastructure (GSI)** *uses plants, trees and soils to manage stormwater. It slows down, reduces and treats polluted runoff before it can harm waterways.*

The stormwater regulations address how stormwater from development needs to be controlled and treated using on-site stormwater management including green stormwater infrastructure (GSI) and other measures. The code also identifies erosion control requirements for construction and grading activities. The erosion control, flow control and treatment requirements help to maintain or improve the conditions of the downstream system and discharge location and reduce the overall impact of development. New development that complies with these regulations, standards and practices will help reduce the overall impact to the drainage system. Redevelopment that replaces existing impervious surface and provides flow control can reduce runoff rates even below current levels.

As with the sewer system, developers are required to demonstrate that the downstream system has sufficient capacity for changes in stormwater runoff. In areas of informal drainage the developer may be required to extend the drainage main, refer to Figure 3.9–4.

SCL—ELECTRIC POWER

Advanced Meter Infrastructure. In 2016, Seattle City Light will complete deployment of Advanced Meter Infrastructure to replace the existing manually read analog meters. Currently, customers receive a bill from City Light that shows their consumption for the previous sixty days with no context as to when the energy was used or what it was used by. Advanced Metering will give customers the option of seeing their energy use in near-real time. Not only can this help control energy use, it may be able to help customers identify problems with their electrical system, such as a malfunctioning electric water heater, that would only show up when they received an unusually high bill.

Energy Benchmarking. The Energy Benchmarking and Reporting Program adopted in 2010 and administered by the City's Office of Sustainability & Environment, requires owners of non-residential and multifamily buildings (20,000 square feet or larger) to track energy performance and annually report to the City of Seattle. This allows building owners to understand and better manage their building's energy usage.

Seattle Energy Code. Seattle's commercial and residential energy codes are some of the most advanced in the country. They set a baseline for energy efficiency in new construction and substantial alterations. Additionally, more buildings are exceeding energy code standards such as the Bullitt Center, the Stone34 Building and Amazon's planned data-center waste heat recovery system for the new South Lake Union campus.

Capital Project and Resource Planning. Seattle City Light's Six-Year Strategic Business Plan (updated every two years) and state-mandated Integrated Resource Plan (updated every two years) provides the utility the capacity to establish a roadmap for insuring adequate retail revenue, and necessary physical infrastructure and energy resources to meet the City's demand due to projected economic or population growth (SCL 2014).

3.9.3 Mitigation Strategies

The discussion above has identified comparative differences in the potential for adverse impacts related to increased demand for utility service under each alternative. However, none of these identified impacts are identified as significant adverse impacts. The continued application of the City's existing practices, including those described above, would help to avoid and minimize the potential for significant adverse impacts to utility service discussed in this section.

3.9.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to services provided by Seattle Public Utilities or Seattle City Light are anticipated.

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4.0 References

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Seattle 2035

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City of Seattle
Department of Planning & Development

APPENDICES FOR THE

DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE SEATTLE COMPREHENSIVE PLAN UPDATE

MAY 4, 2015

A.1 Air Quality and Greenhouse Gas Emissions Appendix

City of Seattle Comprehensive Plan 2004–2024

The existing City of Seattle Comprehensive Plan contains the following climate change-related goals and policies within its Environmental Element:

Goal EG7 Reduce emissions of carbon dioxide and other climate- changing greenhouse gases in Seattle by 30 percent from 1990 levels by 2020, and become carbon neutral by 2050.

Goal EG7.3 Seattle will act as a regional and national leader by becoming carbon neutral.

Goal EG7.5 Prepare for and adapt to the likely effects of climate change through the development, ongoing assessment, and implementation of the Climate Action Plan.

Goal EG9 Reduce fossil-fuel consumption in constructing new and renovating existing City-owned buildings to one-half the U.S. average for each building type.

Goal EG10 Reduce consumption of fossil fuels in all new City government buildings in the following increments (percent reduction from 2007 U.S. average for each building type):

- 60% in 2010;
- 70% in 2015;
- 80% in 2020;
- 90% in 2025; and
- Carbon Neutral by 2030 (meaning new buildings will use no fossil fuel or greenhouse gas-emitting energy to operate).

Policy E15 Work with private and public sector partners to achieve the goal of reducing climate-changing greenhouse gas emissions.

Policy E15.1 Build infrastructure and provide services for pedestrians, bicycles, electric vehicles and transit to facilitate movement around the city by means other than fossil-fueled automobiles.

Policy E15.2 Consider innovative measures that would encourage and facilitate use of alternatives to single-occupant vehicles, such as parking maximums for new development, parking taxes or fees.

Policy E15.3 Continue to recognize the value of planning for transportation facilities at the same time as for the location, type and density of future housing and jobs as a way to reduce the need for future residents and workers to travel by automobile.

Policy E15.4 Work to reduce greenhouse gas emissions through energy efficiency and low-carbon energy sources in buildings.

Policy E15.5 For itself and the general public, the City should anticipate the effects of climate change and make plans for adapting to those effects.

Policy E15.6 Establish energy efficiency standards for new buildings, consistent with applicable law, and encourage existing buildings to also achieve those standards.

Policy E15.7 Reduce emissions associated with solid waste by reducing the amount of waste generated and by operating efficient collection and disposal systems.

Policy E15.8 Encourage local food production as a way to decrease the environmental and climate impacts of the food production and distribution systems.

Transportation Related Greenhouse Gas Emissions: Affected Environment

In April 2014, the City of Seattle published its 2012 Seattle Community Greenhouse Gas Emissions Inventory. The inventory includes road transport related emissions. The City of Seattle uses an origin-destination approach to estimate citywide GHG emissions. The methodology calculates vehicle miles travelled (VMT) based on the forecasted number of trips as follows:

- All trips that begin and end within the City
- Half of trips that either begin or end within the City
- None of the trips that begin and end outside the City

The analysis completed for this EIS builds off of the findings in the 2014 report. This analysis calculates transportation GHG emissions at the citywide level.[1]

1 The Transportation Chapter (3.7) of this EIS generally summarizes transportation conditions at a sector or neighborhood level. However, given the amount of travel between sectors, accounting for sector-specific GHG emissions is not relevant. Therefore, only citywide GHG emissions are calculated. This approach is also consistent with the 2014 report.

The Seattle inventory estimates 2,389,000 metric tons of CO_2e ($MTCO_2e$) in 2012. Recent traffic growth trends were reviewed to determine if volumes should be factored up to approximate 2015 conditions, the base year of this study. That evaluation found that traffic volumes along major roads have remained relatively flat for the past five years. This pattern of stable traffic volumes despite growth has been observed in other cities in the region as well and is part of a larger national trend of reduced vehicle miles of travel.

Emissions factors were also reviewed to determine if they should be adjusted between the year 2012 and year 2015 analyses. The National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA) set a National Program to improve fuel economy and reduce GHG emissions for model years 2012 through 2016 passenger cars and light trucks. According to those standards, fuel economy for passenger cars and light trucks would improve from 30.1 miles per gallon (mpg) in 2012 to 33.8 mpg by 2015. This equates to a GHG emissions decrease of roughly 11 percent for new passenger cars and light trucks entering the vehicle fleet.[2] Given that those new vehicles would represent a relatively small proportion of the 2015 vehicle fleet, no reduction to emissions factors was assumed for the 2015 baseline.

Based on the traffic volume and fuel economy findings, the 2012 GHG emissions estimate is assumed to adequately represent 2015 conditions, and may be conservatively high given that traffic volumes have remained steady over the past five years, VMT per capita has been decreasing within the City[3], and EPA/NHTSA regulations will result in modestly improved fuel economy between 2012 and 2015. Figure 3.2-5 summarizes the 2015 road transportation greenhouse gas emissions.

2 USEPA, EPA-420-F-10-014, p. 4.
3 Stockholm Environment Institute, 2012 Seattle Community Greenhouse Gas Emissions Inventory, p. 10.

Table A.1–1 Road transportation pollutant emissions

	Emissions in Tons per Year				
Pollutant	**2012**	**2035 Alt. 1**	**2035 Alt. 2**	**2035 Alt. 3**	**2035 Alt. 4**
VOC	466.7	196.4	195.8	196.1	196.3
NO_x	4,945.6	1,663.9	1,661.0	1,662.7	1,663.6
CO	10,992.5	4,261.7	4,229.6	4,248.8	4,258.5
$PM_{2.5}$	58.5	42.23	42.44	42.51	42.54

Source: ESA, 2014.

Table A.1–2 GHG emissions summary

GHG Emissions	**2015***	**2035 Alt. 1**	**2035 Alt. 2**	**2035 Alt. 3**	**2035 Alt. 4**
Cars & Light Duty Trucks					
2015 to 2035 VMT Annual Growth Rate		0.47%	0.44%	0.46%	0.47%
Interim GHG Emissions (no improved fuel economy)		1,761,000	1,749,000	1,756,000	1,761,000
2015 to 2035 Emissions Reduction Factor		30%	30%	30%	30%
Final GHG Emissions Estimate	*1,603,000*	*1,233,000*	*1,224,000*	*1,229,000*	*1,233,000*
Truck					
2015 to 2035 VMT Annual Growth Rate		1.28%	1.28%	1.28%	1.28%
Interim GHG Emissions (no improved fuel economy)		929,000	929,000	929,000	929,000
2015 to 2035 Emissions Reduction Factor		4%	4%	4%	4%
Final GHG Emissions Estimate	*720,000*	*892,000*	*892,000*	*892,000*	*891,000*
Bus					
2015 to 2035 VMT Annual Growth Rate		0.39%	0.39%	0.39%	0.39%
Interim GHG Emissions (no improved fuel economy)		69,000	69,000	69,000	69,000
2015 to 2035 Emissions Reduction Factor		35%	35%	35%	35%
Final GHG Emissions Estimate	*64,000*	*42,000*	*42,000*	*42,000*	*42,000*
Vanpool					
2015 to 2035 VMT Annual Growth Rate		0.47%	0.44%	0.46%	0.47%
Interim GHG Emissions (no improved fuel economy)		2,000	2,000	2,000	2,000
2015 to 2035 Emissions Reduction Factor		30%	30%	30%	30%
Final GHG Emissions Estimate	*2,000*	*2,000*	*2,000*	*2,000*	*2,000*
Interim Total (no improved fuel economy)		***2,761,000***	***2,749,000***	***2,756,000***	***2,761,000***
Final Total	**2,389,000**	**2,169,000**	**2,160,000**	**2,165,000**	**2,168,000**

* 2015 data assumed to be equal to 2012 inventory from Seattle Community Greenhouse Gas Emissions Inventory.

Table A.1–3 Emissions factor data

Projected Fleet-wide Emissions Compliance Levels under the Footprint-Based CO2 Standards (g/mi) and Corresponding Fuel Economy (mpg)		
Year	**Combined Cars and Trucks (g/mi)**	**Combined Cars and Trucks (mpg)**
2012	295	30.1
2013	286	31.1
2014	276	32.2
2015	263	33.8
2016	250	35.5
2017	243	36.6
2018	232	38.3
2019	222	40.0
2020	213	41.7
2021	199	44.7
2022	190	46.8
2023	180	49.4
2024	171	52.0
2025	163	54.5
2012 to 2015 GHG Emissions Factor	-11%	
2015 to 2025 GHG Emissions Factor	-38%	

Sources:
United States Environmental Protection Agency, Office of Transportation and Air Quality, EPA-420-F-10-014, April 2010. EPA and NHTSA Finalize Historic National Program to Reduce Greenhouse Gases and Improve Fuel Economy for Cars and Trucks. Accessed September 9, 2014: http://www.epa.gov/otaq/climate/regulations/420f10014.pdf
United States Environmental Protection Agency, Office of Transportation and Air Quality, EPA-420-F-12-051, August 2012. EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks. Accessed September 9, 2014: http://www.epa.gov/otaq/climate/documents/420f12051.pdf

EMFAC 2011		
Year	**Cars/Light Trucks**	**Heavy Trucks**
2012	396.73	1163.37
2035	264.02	1114.19
2015	379.42	1156.96
2015 to 2035 GHG Emissions Factor	**-30%**	**-4%**

Source:
California Air Resources Board, EMFAC tool, 2011. Used Alameda County, 25-30mph, CO2 (Pavley I+LCFS).

King County Metro GHG Emissions Goals (compared to 2009 baseline)	
Year	**Goal**
2015	15%
2030	50%
2015 to 2030 Reduction	**-41%**

Source:
King County Metro Transit, Sustainability Plan, April 2014. Accessed September 10, 2014: http://metro.kingcounty.gov/am/reports/2014/metro-sustainability-plan-2014.pdf

Sound Transit GHG Emission Goal (compared to 2010 baseline)	
Year	**Goal**
2030	40%
2015 to 2030 Reduction	**-30%**

Source:
Sound Transit, Sustainability Plan, April 2014. Accessed September 10, 2014: http://www.soundtransit.org/Documents/pdf/about/environment/SustainabilityPlan.pdf

Table A.1–4 Auto VMT

Trip Type	2015	2035 Alt. 1	2035 Alt. 2	2035 Alt. 3	2035 Alt. 4
II	932,108	1,032,308	1,009,709	1,027,709	1,024,805
IX/XI	3,481,841	3,809,819	3,812,472	3,801,808	3,822,751
XX	15,441,729	18,070,080	18,050,993	18,079,784	18,052,289
Total	19,855,678	22,912,208	22,873,174	22,909,301,	22,899,845
Seattle VMT	2,673,029	2,937,218	2,915,945	2,928,613	2,936,181
External VMT	17,182,649	19,974,990	19,957,229	19,980,688	19,963,665
Seattle Annual Growth Rate		0.47%	0.44%	0.46%	0.47%

Table A.1–5 Medium and heavy truck VMT

Trip Type	2015	2035 Alt. 1	2035 Alt. 2	2035 Alt. 3	2035 Alt. 4
II	14,974	20,025	19,926	20,081	19,990
IX/XI	244,149	313,678	313,872	313,376	313,495
XX	624,124	844,338	878,742	877,203	877,959
Total	883,247	1,211,041	1,212,541	1,210,660	1,211,444
Seattle VMT	137,049	176,864	176,863	176,769	176,737
External VMT	746,199	1,034,177	1,035,678	1,033,891	1,034,707
Seattle Annual Growth Rate		1.28%	1.28%	1.28%	1.28%

Table A.1–6 Regional comparison

City of Seattle	2015	2035 Alt. 1	2035 Alt. 2	2035 Alt. 3	2035 Alt. 4
Households	302,220	368,464	368,473	368,480	368,475
Jobs	534,392	649,394	649,386	649,404	649,394
VMT	2,673,029	2,937,218	2,915,945	2,928,613	2,936,181
VMT per Pop+Job	2.3	2.1	2.1	2.1	2.1

Notes *Includes 100% of trips with at least one end in Seattle*
Assumes 2.06 average household size

Outside Seattle	2015	2035 Alt. 1	2035 Alt. 2	2035 Alt. 3	2035 Alt. 4
Households	1,232,266	1,640,356	1,640,356	1,640,356	1,640,356
Jobs	1,410,406	2,034,792	2,034,792	2,034,792	2,034,792
VMT	17,182,649	19,974,990	19,957,229	19,980,688	19,963,665
VMT per Pop+Job	3.7	3.2	3.2	3.2	3.2

Notes *Includes 100% of trips with at least one end outside Seattle*
Assumes 2.57 average household size

Table A.1–7 Operational GHG emissions of Alternative 1

Source	Metric Tons CO_2e per Year
Transportation	-220,000 (citywide)
Building Energy— Residential	45,793
Building Energy—Commercial	17,767
Solid Waste	36,958
Total	**-119,482**

Source: ESA, 2014; Fehr & Peers, 2014.

Table A.1–8 Operational GHG emissions of Alternative 2

Source	Metric Tons CO_2e per Year
Transportation	-229,000 (citywide)
Building Energy— Residential	41,949
Building Energy—Commercial	18,396
Solid Waste	36,958
Total	**-131,697**

Source: ESA, 2014; Fehr & Peers, 2014.

Table A.1–9 Operational GHG emissions of Alternative 3

Source	Metric Tons CO_2e per Year
Transportation	-224,000 (citywide)
Building Energy— Residential	41,670
Building Energy—Commercial	18,640
Solid Waste	36,958
Total	**-126,732**

Source: ESA, 2014; Fehr & Peers, 2014.

Table A.1–10 Operational GHG emissions of Alternative 4

Source	Metric Tons CO_2e per Year
Transportation	-221,000 (citywide)
Building Energy— Residential	39,023
Building Energy—Commercial	18,238
Solid Waste	36,958
Total	**-126,781**

Source: ESA, 2014; Fehr & Peers, 2014.

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A.2 Noise Appendix

Table A.2–1 Existing roadway noise inputs

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: Seattle Comp Plan
Description: Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Interstate 5	At Albro (Sectors 7 & 8)	183,000	83		17	4	4	65	150	
2	Interstate 5	At Union (Sector 4)	206,000	83		17	3	3	65	150	
3	Interstate 5	At 45th Street (Sector 2)	170,000	83		17	3	3	65	150	
4	Interstate 5	At 130th Street (Sector 2)	193,000	83		17	3	3	65	150	
5	Interstate 90	At Lakeside Sve. (Sectors 5 & 8)	133,000	85		15	2	1	60	150	
6	SR 99	At 82nd Street (Sector 1)	42,000	85		15	3	1	60	150	
7	SR99	At 40th Street (Sector 3)	42,000	85		15	3	1	60	150	
8	SR 99	At Cloverdale (Sector 7)	29,000	85		15	3	1	60	150	
9	SR 513	At 45th (Sector 2)	27,000	85		15	3	1	35	150	
10	SR 520	At SR 513 (Sector 5)	42,000	85		15	3	1	50	150	
11	SR 522	At 98th (Sector 2)	33,000	85		15	5	2	35	150	
12	SR 523	At 30th (Sector 2)	27,000	85		15	3	1	35	150	

Table A.2–2 Existing roadway noise outputs

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Output Summary Sheet

Project #: Seattle Comp Plan
Description: Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

				------- Distances to Traffic Noise Contours -------				
Segment	Roadway Name	Segment Description	Ldn	75	70	65	60	55
1	Interstate 5	At Albro (Sectors 7 & 8)	78.1	243	523	1126	2426	5226
2	Interstate 5	At Union (Sector 4)	78.3	249	536	1154	2487	5359
3	Interstate 5	At 45th Street (Sector 2)	77.5	219	471	1016	2188	4714
4	Interstate 5	At 130th Street (Sector 2)	78.0	238	513	1105	2381	5131
5	Interstate 90	At Lakeside Sve. (Sectors 5 & 8)	74.5	139	299	643	1386	2986
6	SR 99	At 82nd Street (Sector 1)	69.6	66	141	304	656	1413
7	SR99	At 40th Street (Sector 3)	69.6	66	141	304	656	1413
8	SR 99	At Cloverdale (Sector 7)	68.0	51	110	238	512	1104
9	SR 513	At 45th (Sector 2)	62.0	21	44	95	205	442
10	SR 520	At SR 513 (Sector 5)	67.6	48	104	224	483	1041
11	SR 522	At 98th (Sector 2)	64.0	28	60	130	279	602
12	SR 523	At 30th (Sector 2)	62.0	21	44	95	205	442

Table A.2–3 Alternatives 1 and 4 roadway noise inputs

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: Seattle Comp Plan
Description: 2035 Alt 1 and Alt 4
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Interstate 5	At Albro (Sectors 7 & 8)	198,210	83		17	4	4	65	150	
2	Interstate 5	At Union (Sector 4)	223,122	83		17	3	3	65	150	
3	Interstate 5	At 45th Street (Sector 2)	184,129	83		17	3	3	65	150	
4	Interstate 5	At 130th Street (Sector 2)	209,041	83		17	3	3	65	150	
5	Interstate 90	At Lakeside Sve. (Sectors 5 & 8)	144,054	85		15	2	1	60	150	
6	SR 99	At 82nd Street (Sector 1)	45,491	85		15	3	1	60	150	
7	SR99	At 40th Street (Sector 3)	45,491	85		15	3	1	60	150	
8	SR 99	At Cloverdale (Sector 7)	31,410	85		15	3	1	60	150	
9	SR 513	At 45th (Sector 2)	29,244	85		15	3	1	35	150	
10	SR 520	At SR 513 (Sector 5)	45,491	85		15	3	1	50	150	
11	SR 522	At 98th (Sector 2)	35,743	85		15	5	2	35	150	
12	SR 523	At 30th (Sector 2)	29,244	85		15	3	1	35	150	

Table A.2–4 Alternatives 1 and 4 roadway noise outputs

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Output Summary Sheet

Project #: Seattle Comp Plan
Description: 2035 Alt 1 and Alt 4
Ldn/CNEL: Ldn
Hard/Soft: Soft

				------- Distances to Traffic Noise Contours -------				
Segment	Roadway Name	Segment Description	Ldn	75	70	65	60	55
1	Interstate 5	At Albro (Sectors 7 & 8)	78.5	256	551	1187	2558	5512
2	Interstate 5	At Union (Sector 4)	78.6	262	565	1218	2623	5651
3	Interstate 5	At 45th Street (Sector 2)	77.8	231	497	1071	2308	4972
4	Interstate 5	At 130th Street (Sector 2)	78.4	251	541	1166	2512	5411
5	Interstate 90	At Lakeside Sve. (Sectors 5 & 8)	74.8	146	315	678	1462	3149
6	SR 99	At 82nd Street (Sector 1)	70.0	69	149	321	692	1490
7	SR99	At 40th Street (Sector 3)	70.0	69	149	321	692	1490
8	SR 99	At Cloverdale (Sector 7)	68.3	54	116	251	540	1164
9	SR 513	At 45th (Sector 2)	62.4	22	47	100	216	466
10	SR 520	At SR 513 (Sector 5)	68.0	51	110	236	509	1098
11	SR 522	At 98th (Sector 2)	64.4	29	63	137	295	635
12	SR 523	At 30th (Sector 2)	62.4	22	47	100	216	466

Table A.2–5 Alternative 2 roadway noise inputs

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: Seattle Comp Plan
Description: 2035 Alt 2
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Interstate 5	At Albro (Sectors 7 & 8)	196,637	83		17	4	4	65	150	
2	Interstate 5	At Union (Sector 4)	221,350	83		17	3	3	65	150	
3	Interstate 5	At 45th Street (Sector 2)	182,668	83		17	3	3	65	150	
4	Interstate 5	At 130th Street (Sector 2)	207,382	83		17	3	3	65	150	
5	Interstate 90	At Lakeside Sve. (Sectors 5 & 8)	142,911	85		15	2	1	60	150	
6	SR 99	At 82nd Street (Sector 1)	45,130	85		15	3	1	60	150	
7	SR99	At 40th Street (Sector 3)	45,130	85		15	3	1	60	150	
8	SR 99	At Cloverdale (Sector 7)	31,161	85		15	3	1	60	150	
9	SR 513	At 45th (Sector 2)	29,012	85		15	3	1	35	150	
10	SR 520	At SR 513 (Sector 5)	45,130	85		15	3	1	50	150	
11	SR 522	At 98th (Sector 2)	35,459	85		15	5	2	35	150	
12	SR 523	At 30th (Sector 2)	29,012	85		15	3	1	35	150	

Table A.2–6 Alternative 2 roadway noise outputs

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Output Summary Sheet

Project #: Seattle Comp Plan
Description: 2035 Alt 2
Ldn/CNEL: Ldn
Hard/Soft: Soft

				------- Distances to Traffic Noise Contours -------				
Segment	Roadway Name	Segment Description	Ldn	75	70	65	60	55
1	Interstate 5	At Albro (Sectors 7 & 8)	78.4	254	548	1181	2545	5483
2	Interstate 5	At Union (Sector 4)	78.6	261	562	1211	2609	5622
3	Interstate 5	At 45th Street (Sector 2)	77.8	230	495	1066	2296	4946
4	Interstate 5	At 130th Street (Sector 2)	78.3	250	538	1160	2498	5382
5	Interstate 90	At Lakeside Sve. (Sectors 5 & 8)	74.8	145	313	675	1454	3132
6	SR 99	At 82nd Street (Sector 1)	69.9	69	148	319	688	1482
7	SR99	At 40th Street (Sector 3)	69.9	69	148	319	688	1482
8	SR 99	At Cloverdale (Sector 7)	68.3	54	116	249	537	1158
9	SR 513	At 45th (Sector 2)	62.3	22	46	100	215	464
10	SR 520	At SR 513 (Sector 5)	67.9	51	109	235	507	1092
11	SR 522	At 98th (Sector 2)	64.4	29	63	136	293	631
12	SR 523	At 30th (Sector 2)	62.3	22	46	100	215	464

Table A.2–7 Alternative 3 roadway noise inputs

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: Seattle Comp Plan
Description: 2035 Alt 3
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Interstate 5	At Albro (Sectors 7 & 8)	197,422	83		17	4	4	65	150	
2	Interstate 5	At Union (Sector 4)	222,234	83		17	3	3	65	150	
3	Interstate 5	At 45th Street (Sector 2)	183,397	83		17	3	3	65	150	
4	Interstate 5	At 130th Street (Sector 2)	208,210	83		17	3	3	65	150	
5	Interstate 90	At Lakeside Sve. (Sectors 5 & 8)	143,481	85		15	2	1	60	150	
6	SR 99	At 82nd Street (Sector 1)	45,310	85		15	3	1	60	150	
7	SR99	At 40th Street (Sector 3)	45,310	85		15	3	1	60	150	
8	SR 99	At Cloverdale (Sector 7)	31,285	85		15	3	1	60	150	
9	SR 513	At 45th (Sector 2)	29,128	85		15	3	1	35	150	
10	SR 520	At SR 513 (Sector 5)	45,310	85		15	3	1	50	150	
11	SR 522	At 98th (Sector 2)	35,601	85		15	5	2	35	150	
12	SR 523	At 30th (Sector 2)	29,128	85		15	3	1	35	150	

Table A.2–8 Alternative 3 roadway noise outputs

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Output Summary Sheet

Project #: Seattle Comp Plan
Description: 2035 Alt 3
Ldn/CNEL: Ldn
Hard/Soft: Soft

				------- Distances to Traffic Noise Contours -------				
Segment	Roadway Name	Segment Description	Ldn	75	70	65	60	55
1	Interstate 5	At Albro (Sectors 7 & 8)	78.5	255	550	1184	2552	5497
2	Interstate 5	At Union (Sector 4)	78.6	262	564	1214	2616	5636
3	Interstate 5	At 45th Street (Sector 2)	77.8	230	496	1068	2302	4959
4	Interstate 5	At 130th Street (Sector 2)	78.3	250	540	1163	2505	5397
5	Interstate 90	At Lakeside Sve. (Sectors 5 & 8)	74.8	146	314	677	1458	3141
6	SR 99	At 82nd Street (Sector 1)	69.9	69	149	320	690	1486
7	SR99	At 40th Street (Sector 3)	69.9	69	149	320	690	1486
8	SR 99	At Cloverdale (Sector 7)	68.3	54	116	250	539	1161
9	SR 513	At 45th (Sector 2)	62.4	22	46	100	216	465
10	SR 520	At SR 513 (Sector 5)	67.9	51	109	236	508	1095
11	SR 522	At 98th (Sector 2)	64.4	29	63	136	294	633
12	SR 523	At 30th (Sector 2)	62.4	22	46	100	216	465

A.3 Population, Employment and Housing Appendix

Table A.3–1 Urban centers: demographic profile, 2010

Urban Center	White	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Pacific Islander	Other Race	Two or More Races
Downtown	58.7%	12.6%	2.1%	20.2%	0.3%	2.0%	4.1%
First/Capitol Hill	67.7%	9.4%	1.2%	13.6%	0.5%	2.6%	5.1%
University District	61.5%	2.5%	0.4%	27.1%	0.4%	1.8%	6.4%
Northgate	56.5%	9.1%	1.4%	21.2%	1.1%	4.7%	6.0%
South Lake Union	70.6%	10.4%	1.0%	10.9%	0.5%	1.7%	5.0%
Uptown	79.8%	3.5%	0.8%	9.9%	0.2%	1.8%	4.1%
Total Urban Centers	65.8%	7.9%	1.1%	17.1%	0.5%	2.4%	5.1%
Seattle	*69.5%*	*7.9%*	*0.8%*	*13.8%*	*0.4%*	*2.4%*	*5.1%*

Source: City of Seattle, Census 2010.

Table A.3–2 Urban centers: housing characteristics, 2010

Urban Center	Total Units	% Occupied	% Vacant	% Renter Occupied	% Owner Occupied	Average HH Size	Density (persons/ acre)
Downtown	20,022	84%	16%	83%	17%	1.47	27.34
First/Capitol Hill	25,480	89.0%	11.1%	83.3%	16.7%	2.48	37.2
University District	8,269	91.3%	8.7%	94.8%	5.2%	1.73	30.2
Northgate	4,238	86.7%	13.3%	82.7%	17.3%	1.72	14.3
South Lake Union	2,781	88.4%	11.6%	12.5%	67.5%	1.42	10.7
Uptown	5,799	88.0%	12.0%	77.6%	22.2%	1.41	21.5
Total Urban Centers	66,589	87.9%	12.1%	72.3%	24.3%	1.70	23.5
Seattle	*306,694*	*91.9%*	*8.1%*	*51.9%*	*48.1%*	*2.06*	*11.4*

Source: City of Seattle, Census 2010.

Table A.3–3 Urban centers: employment by sector

Urban Center	Construction & Resources	Education	FIRE	Government	Manufacturing	Retail	Services	Wholesale Trade, Transp., Utilities	Total
Downtown	1,270	91	20,010	23,390	2,929	7,396	83,867	4,722	143,675
First/ Capitol Hill	64	1,067	937	6,389	311	1,838	32,610	216	43,432
University District	34	25,626	529	129	47	2,829	4,754	219	34,167
Northgate	—	27	765	82	—	2,201	8,232	82	11,387
South Lake Union	1,619	0	1,174	343	—	—	16,203	343	19,680
Uptown	—	34	1,033	1,295	—	—	7,998	1,295	11,652
Total Urban Centers	3,186	26,845	24,448	31,682	4,247	23,980	153,664	8,831	276,883
Seattle Total	*16,485*	*35,204*	*31,615*	*46,681*	*25,644*	*41,497*	*257,398*	*28,794*	*483,318*
% of Seattle Sector	*19%*	*76%*	*77%*	*68%*	*17%*	*58%*	*60%*	*3%*	*57%*

Source: Washington State Employment Security Department, 2012.

Table A.3–4 Hub urban villages: demographic profile, 2010

Hub Urban Village	White	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Pacific Islander	Other Race	Two or More Races
Ballard	84.8%	2.2%	0.9%	5.7%	0.3%	1.6%	4.4%
Bitter Lake	61.8%	12.2%	1.1%	14.7%	0.8%	2.9%	6.5%
Fremont	82.0%	2.6%	0.6%	8.2%	0.2%	1.5%	4.8%
Lake City	54.1%	11.8%	1.6%	19.6%	0.7%	5.0%	7.2%
Mount Baker	27.9%	26.1%	1.2%	33.3%	0.3%	4.7%	6.5%
West Seattle Junction	79.0%	3.7%	1.0%	6.9%	0.7%	3.0%	5.8%
Avg. Hub Urban Villages	64.9%	9.8%	1.1%	14.7%	0.5%	3.1%	5.9%
City of Seattle	*69.5%*	*7.9%*	*0.8%*	*13.8%*	*0.4%*	*2.4%*	*5.1%*

Source: City of Seattle, Census 2010.

Table A.3–5 Hub urban villages: housing characteristics, 2010

Hub Urban Village	Total Units	% Occupied	% Vacant	% Renter Occupied	% Owner Occupied	Average HH Size	Density (persons/ acre)
Ballard	6,963	88.7%	11.3%	71.1%	28.9%	1.68	24.5
Bitter Lake	3,074	82.7%	17.3%	22.5%	77.5%	1.77	10.8
Fremont	2,558	92.6%	7.4%	71.2%	28.8%	1.66	18.6
Lake City	2,419	90.0%	10.0%	82.1%	17.9%	1.83	25.2
Mount Baker	2,201	93.2%	6.8%	35.0%	65.0%	2.41	10.6
West Seattle Junction	2,544	91.4%	8.6%	67.6%	32.4%	1.68	17
Avg. Hub Urban Villages	19,759	89.8%	10.2%	58.3%	41.8%	1.84	17.8
Seattle	*306,694*	*91.9%*	*8.1%*	*51.9%*	*48.1%*	*2.06*	*11.4*

Source: City of Seattle, Census 2010.

Table A.3–6 Hub urban villages: employment by sector

Hub Urban Village	Construction & Resources	Education	FIRE	Government	Manufacturing	Retail	Services	Wholesale Trade, Transp., Utilities	Total
Ballard	223	52	228	76	112	999	3,527	117	5,334
Bitter Lake	582	103	152	113	47	1,172	1,135	91	3,394
Fremont	249	49	126	59	632	526	5,083	253	6,977
Lake City	52	0	121	174	28	172	1,117	30	1,692
Mount Baker	136	49	162	70	770	653	2,295	164	4,298
West Seattle Junction	15	0	181	116	65	539	1,933	28	2,878
Avg. Hub Urban Villages	1,257	254	970	608	1,653	4,060	15,089	683	245,73
Seattle Total	*16,485*	*35,204*	*31,615*	*46,681*	*25,644*	*41,497*	*257,398*	*28,794*	*483,318*
% of Seattle Sector	*8%*	*1%*	*3%*	*1%*	*6%*	*10%*	*6%*	*2%*	*5%*

Source: Washington State Employment Security Department, 2012.

Table A.3–7 Residential urban villages: demographic profile, 2010

Residential Urban Village	White	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Pacific Islander	Other Race	Two or More Races
23rd & Union-Jackson	44.3%	27.6%	0.8%	15.1%	0.4%	4.9%	6.9%
Admiral	82.5%	3.7%	1.2%	5.8%	0.2%	1.0%	5.7%
Aurora-Licton Springs	65.8%	7.6%	0.9%	13.7%	0.3%	5.3%	6.4%
Columbia City	32.3%	30.7%	0.7%	25.5%	0.3%	4.6%	5.8%
Crown Hill	78.6%	3.9%	9.0%	5.1%	0.1%	4.7%	6.6%
Eastlake	82.1%	2.5%	0.4%	9.0%	0.3%	1.6%	4.1%
Green Lake	81.3%	1.8%	0.5%	10.1%	0.1%	1.2%	5.0%
Greenwood-Phinney Ridge	76.3%	6.1%	0.9%	7.8%	0.2%	3.8%	4.9%
Madison-Miller	66.3%	16.2%	0.4%	8.0%	0.2%	3.1%	5.8%
Morgan Junction	78.0%	6.0%	0.9%	5.8%	0.2%	2.3%	6.8%
North Beacon Hill	37.2%	7.2%	1.5%	32.1%	0.3%	16.8%	4.9%
Othello	12.5%	38.4%	0.5%	40.3%	1.3%	2.1%	4.9%
Upper Queen Anne	84.4%	2.2%	0.5%	6.9%	0.1%	0.9%	0.5%
Rainier Beach	17.6%	45.2%	1.5%	20.5%	1.3%	9.4%	4.6%
Roosevelt	82.4%	2.1%	0.4%	8.7%	0.1%	1.5%	4.8%
South Park	44.0%	11.2%	1.8%	17.3%	1.5%	17.9%	6.4%
Wallingford	82.9%	2.8%	0.4%	7.8%	0.1%	1.2%	4.7%
Westwood-Highland Park	47.7%	11.8%	2.7%	16.8%	0.7%	13.2%	7.0%
Avg. Res Urban Villages	60.9%	12.6%	1.4%	14.2%	0.4%	5.3%	5.3%
City of Seattle	*69.5%*	*7.9%*	*0.8%*	*13.8%*	*0.4%*	*2.4%*	*5.1%*

Source: City of Seattle, Census 2010.

Table A.3–8 Residential urban villages: demographic profile by gender and median age, 2010

Residential Urban Village	Male Population	Male Median Age	Female Population	Female Median Age
23rd & Union-Jackson	4,770	33.7	4,698	35.1
Admiral	689	38.5	839	41.0
Aurora-Licton Springs	3,189	31.0	2,990	30.6
Columbia City	1,902	36.4	2,035	37.7
Crown Hill	1,195	35.4	1,264	37.3
Eastlake	2,647	33.5	2,437	32.0
Green Lake	1,341	31.8	1,563	31.8
Greenwood-Phinney Ridge	1,410	35.0	1,517	33.9
Madison-Miller	2,026	32.7	2,040	31.7
Morgan Junction	969	37.3	1,077	36.5
North Beacon Hill	1,520	36.1	1,380	33.9
Othello	3,422	31.1	3,845	32.6
Upper Queen Anne	998	36.3	1,145	33.9
Rainier Beach	1,746	31.3	1,837	32.1
Roosevelt	1,199	32.1	1,185	31.6
South Park	1,876	33.4	1,572	32.7
Wallingford	2,626	32.2	2,724	32.0
Westwood-Highland Park	2,251	32.6	2,355	33.7
Total/Avg. Res Urban Villages	35,776	33.9	36,503	33.9

Source: City of Seattle, Census 2010.

Table A.3–9 Residential urban villages: housing characteristics, 2010

Residential Urban Village	Total Units	% Occupied	% Vacant	% Renter Occupied	% Owner Occupied	Average HH Size	Density (persons/ acre)
23rd & Union-Jackson	5,058	87.4%	12.6%	61.5%	38.5%	2.09	27.3
Admiral	1,054	91.3%	8.7%	73.1%	26.9%	1.59	22.4
Aurora-Licton Springs	3,267	92.4%	7.6%	62.8%	37.2%	2.04	26.6
Columbia City	1,885	92.5%	7.5%	68.3%	31.7%	2.25	18.3
Crown Hill	1,193	95.6%	4.4%	45.0%	55.0%	2.13	20.0
Eastlake	3,543	88.0%	12.0%	71.8%	28.2%	1.54	47.8
Green Lake	2,008	91.8%	8.2%	80.4%	19.6%	1.56	50.6
Greenwood-Phinney Ridge	1,729	94.5%	5.5%	62.3%	37.7%	1.77	46.3
Madison-Miller	2,414	93.9%	6.1%	72.9%	27.1%	1.75	42.9
Morgan Junction	1,267	92.2%	7.8%	61.2%	38.8%	1.75	27.4
North Beacon Hill	1,380	92.7%	7.3%	73.2%	26.8%	2.23	36.6
Othello	2,435	94.8%	5.2%	69.0%	31.0%	3.05	26.2
Upper Queen Anne	1,570	91.6%	8.4%	75.6%	24.4%	1.49	67.4
Rainier Beach	1,486	89.6%	10.4%	74.8%	25.2%	2.61	16.3
Roosevelt	1,198	94.0%	6.0%	58.2%	41.8%	2.10	24.6
South Park	1,282	89.2%	10.8%	49.9%	50.1%	2.93	18.8
Wallingford	2,940	94.6%	5.4%	66.4%	33.6%	1.92	34.0
Westwood-Highland Park	2,123	91.6%	8.4%	59.1%	40.9%	2.37	23.7
Total/Avg. Res Urban Villages	37,832	92.1%	7.9%	65.9%	34.1%	2.07	27.6
Seattle	*306,694*	*91.9%*	*8.1%*	*51.9%*	*48.1%*	*2.06*	*11.4*

Source: City of Seattle, Census 2010.

Table A.3–10 Residential urban villages: employment by sector

Residential Urban Village	Construction & Resources	Education	FIRE	Government	Manufacturing	Retail	Services	Wholesale Trade, Transp., Utilities	Total
23rd & Union-Jackson	92	300	102	167	-1	413	3127	-1	4,624
Admiral	11	179	55	20	-1	446	556	-1	1,275
Aurora-Licton Springs	303	0	42	477	100	181	689	233	2,025
Columbia City	45	0	-1	183	154	141	1808	-1	2,419
Crown Hill	-1	21	75	35	-1	267	549	39	1,003
Eastlake	63	76	994	1	45	69	3432	36	4,716
Green Lake	8	45	24	26	27	209	1094	5	1,439
Greenwood-Phinney Ridge	61	0	50	61	-1	369	1083	-1	1,678
Madison-Miller	-1	54	20	9	32	-1	847	-1	1,142
Morgan Junction	-1	67	29	0	0	53	270	-1	455
North Beacon Hill	56	69	-1	14	0	67	297	-1	537
Othello	14	0	275	147	66	197	859	12	1,570
Upper Queen Anne	14	0	79	0	0	416	1200	28	1,737
Rainier Beach	-1	267	61	28	0	206	444	-1	1,026
Roosevelt	29	176	61	0	0	583	702	66	1,618
South Park	42	57	-1	23	15	-1	959	27	1,138
Wallingford	108	354	90	77	17	340	1737	55	2,779
Westwood-Highland Park	99	0	63	110	20	569	484	22	1,366
Total Res Urban Villages	1,063	1666	2081	1379	931	4636	20137	654	32,547
Seattle Total	*16,485*	*35,204*	*31,615*	*46,681*	*25,644*	*41,497*	*257,398*	*28,794*	*483,318*
% of Seattle Sector	*6.4%*	*4.7%*	*6.6%*	*3.0%*	*3.6%*	*11.2%*	*7.8%*	*2.3%*	*6.7%*

Note: "-1" represents data that is suppressed due to confidentiality. As a result, the total estimates for all residential urban villages is higher than the sum of estimated employment for individual residential urban villages.

Source: City of Seattle, 2012 Covered Employment Estimates (ESD)

Table A.3–11 Manufacturing-industrial centers: employment by sector

Mfg/Industrial Center	Construction & Resources	Education	FIRE	Government	Manufacturing	Retail	Services	Wholesale Trade, Transp., Utilities	Total
Ballard-Interbay-Northend	1,369	0	350	328	3,969	1,013	6,771	1,662	15,462
Greater Duwamish	5,870	540	1,067	5,748	12,065	3,036	16,510	13,504	58,339
Total Mfg/Industrial Centers	7,239	540	1,417	6,076	16,033	4,049	23,282	15,166	73,802
Seattle Total	*16,485*	*35,204*	*31,615*	*46,681*	*25,644*	*41,497*	*257,398*	*28,794*	*483,318*
% of Seattle Sector	*43.9%*	*1.5%*	*4.5%*	*13.0%*	*62.5%*	*9.8%*	*9.0%*	*52.7%*	*15.3%*

Source: City of Seattle, Census 2010.

A.4 Transportation Appendix

Table A.4–1 2015 PM peak period auto travel times

		Urban Centers		
Sector	**Urban Village Used for Analysis**	**Downtown**	**U District**	**Northgate**
Northwest Seattle	Ballard HUV	20	18	20
Northeast Seattle	Northgate UC	16	14	—
Queen Anne/Magnolia	Upper Queen Anne RUV	13	23	24
Downtown/Lake Union	Downtown UC	—	14	16
Capitol Hill/Central District	Capitol Hill UC	11	16	30
West Seattle	West Seattle Junction HUV	15	33	44
Duwamish	South Park RUV	16	31	44
Southeast Seattle	Othello RUV	18	31	44

Note: I-5 travel times include travel on the express lanes whenever possible.

Source: Google Maps, 2014.

Table A.4–2 2015 PM peak period transit travel times

		Urban Centers		
Sector	**Urban Village Used for Analysis**	**Downtown**	**U District**	**Northgate**
Northwest Seattle	Ballard HUV	32	21	30
Northeast Seattle	Northgate UC	18	23	—
Queen Anne/Magnolia	Upper Queen Anne RUV	18	45	54
Downtown/Lake Union	Downtown UC	—	17	18
Capitol Hill/Central District	Capitol Hill UC	15	26	50
West Seattle	West Seattle Junction HUV	21	54	62
Duwamish	South Park RUV	34	79	78
Southeast Seattle	Othello RUV	21	49	59

Source: Sound Transit trip planner, 2014.

Table A.4–3 2015 PM peak period transit travel times

Sector	Intersection Used for Analysis	2015 Households	2015 Retail Employment
Northwest Seattle	NW Market St & 15th Ave NW	7,900	1,500
Northeast Seattle	NE 103rd St & 1st Ave NE	2,700	1,800
Queen Anne/Magnolia	Queen Anne Ave N & W Galer St	9,300	700
Downtown/Lake Union	University St & 3rd Ave	17,900	7,600
Capitol Hill/Central District	Broadway & E John St	20,700	2,000
West Seattle	California Ave SW & SW Alaska St	5,500	700
Duwamish	S Cloverdale St & 8th Ave S	1,100	100
Southeast Seattle	S Othello St & MLK Jr Way S	4,000	100

Source: Fehr & Peers, 2014.

Table A.4–5 2015 PM peak period average trip length in minutes

Sector	Average PM Peak Period Trip Length in Minutes
Northwest Seattle	20
Northeast Seattle	22
Queen Anne/Magnolia	23
Downtown/Lake Union	24
Capitol Hill/Central District	22
West Seattle	21
Duwamish	27
Southeast Seattle	22
City of Seattle	**23**

Source: Project travel demand model, 2014.

Table A.4–6 2015 PM peak period vehicle miles traveled per capita

Sector	PM Peak Period Vehicle Miles Traveled per Capita
Northwest Seattle	4.0
Northeast Seattle	4.5
Queen Anne/Magnolia	4.0
Downtown/Lake Union	2.7
Capitol Hill/Central District	3.2
West Seattle	4.6
Duwamish	5.3
Southeast Seattle	4.7
City of Seattle	**3.3**

Source: Project travel demand model, 2014.

Table A.4–4 2035 auto travel time

	Auto Travel Times in Minutes (Downtown / University District / Northgate)				
Sector (Urban Village)	**2015 Existing**	**2035 Alt. 1**	**2035 Alt. 2**	**2035 Alt. 3**	**2035 Alt. 4**
Northwest Seattle (Ballard)	20 / 18 / 20	25 / 19 / 22	25 / 19 / 22	25 / 19 / 22	24 / 19 / 22
Northeast Seattle (Northgate)	16 / 14 / —	21 / 17 / —	21 / 17 / —	21 / 17 / —	21 / 16 / —
Queen Anne/Magnolia (Upper Queen Anne)	13 / 23 / 24	16 / 25 / 28	16 / 25 / 29	16 / 25 / 29	16 / 25 / 28
Downtown/Lake Union (Downtown)	— / 14 /16	— / 18 / 21	— / 18 / 21	— / 18 / 21	— / 17 / 21
Capitol Hill/Central District (Capitol Hill)	11 / 16 / 30	12 / 20 / 34	12 / 20 / 35	12 / 20 / 35	12 / 20 / 35
West Seattle (West Seattle Junction)	15 / 33 / 44	25 / 38 / 49	25 / 38 / 50	24 / 38 / 49	25 / 38 / 49
Duwamish (South Park)	16 / 31 / 44	27 / 37 / 50	27 / 37 / 51	27 / 37 / 50	27 / 37 / 50
Southeast Seattle (Othello)	18 / 31 / 44	25 / 36 / 48	25 / 36 / 49	25 / 36 / 49	25 / 36 / 49

Source: Fehr & Peers, 2014.

Table A.4–7 2035 transit travel time

	Transit Travel Times in Minutes (Downtown / University District / Northgate)				
Sector (Urban Village)	**2015 Existing**	**2035 Alt. 1**	**2035 Alt. 2**	**2035 Alt. 3**	**2035 Alt. 4**
Northwest Seattle (Ballard)	32 / 21 / 30	14 / 23 / 31	14 / 23 / 31	14 / 22 / 32	14 / 22 / 32
Northeast Seattle (Northgate)	18 / 23 / —	16 / 5 / —	16 / 5 / —	16 / 5 / —	16 / 5 / —
Queen Anne/Magnolia (Upper Queen Anne)	18 / 45 / 54	19 / 30 / 35	19 / 30 / 35	19 / 30 / 35	19 / 30 / 35
Downtown/Lake Union (Downtown)	— / 17 /18	— / 11 / 16	— / 11 / 16	— / 11 / 16	— / 11 / 16
Capitol Hill/Central District (Capitol Hill)	15 / 26 / 50	5 / 6 / 11	5 / 6 / 11	5 / 6 / 11	5 / 6 / 11
West Seattle (West Seattle Junction)	21 / 54 / 62	26 / 37 / 42	26 / 37 / 42	25 / 36 / 41	26 / 36 / 41
Duwamish (South Park)	34 / 79 / 78	40 / 51 / 56	39 / 50 / 55	39 / 50 / 55	39 / 50 / 55
Southeast Seattle (Othello)	21 / 49 / 59	21 / 32 / 37	21 / 32 / 37	21 / 32 / 37	21 / 32 / 37

Source: Fehr & Peers, 2014.

Table A.4–8 2035 households within 20-minute walkshed

Sector (Urban Village)	**2015 Existing**	**2035 Alt. 1**	**2035 Alt. 2**	**2035 Alt. 3**	**2035 Alt. 4**
Northwest Seattle (Ballard)	7,900	10,200	9,000	9,000	10,100
Northeast Seattle (Northgate)	2,700	4,800	7,300	5,800	5,800
Queen Anne/Magnolia (Upper Queen Anne)	9,300	10,700	10,100	10,100	10,000
Downtown/Lake Union (Downtown)	17,900	24,300	27,300	25,000	25,000
Capitol Hill/Central District (Capitol Hill)	20,700	24,200	25,800	24,000	23,900
West Seattle (West Seattle Junction)	5,500	6,800	6,600	6,600	7,900
Duwamish (South Park)	1,100	1,300	1,300	1,300	1,300
Southeast Seattle (Othello)	4,000	4,900	4,400	5,100	5,000

Source: Fehr & Peers, 2014.

Table A.4–9 2035 retail employment within 20-minute walkshed

Sector (Urban Village)	**2015 Existing**	**2035 Alt. 1**	**2035 Alt. 2**	**2035 Alt. 3**	**2035 Alt. 4**
Northwest Seattle (Ballard)	1,500	3,100	2,500	2,500	4,100
Northeast Seattle (Northgate)	1,800	4,900	8,200	6,300	6,300
Queen Anne/Magnolia (Upper Queen Anne)	700	1,100	1,100	1,000	1,000
Downtown/Lake Union (Downtown)	7,600	17,800	19,400	15,900	17,900
Capitol Hill/Central District (Capitol Hill)	2,000	4,200	5,500	4,100	4,300
West Seattle (West Seattle Junction)	700	1,300	1,100	1,300	2,300
Duwamish (South Park)	100	200	300	300	200
Southeast Seattle (Othello)	100	300	200	500	500

Source: Fehr & Peers, 2014.

Table A.4–10 2035 mode share by sector

	Mode Share (%)				
Sector (Urban Village)	**SOV**	**HOV**	**Transit**	**Walk**	**Bike**
Northwest Seattle (Ballard)					
2015 Existing	50	36	7	5	1
2035 Alternative 1	48	35	9	6	2
2035 Alternative 2	48	35	9	5	2
2035 Alternative 3	48	35	9	5	2
2035 Alternative 4	48	35	9	6	2
Northeast Seattle (Northgate)					
2015 Existing	46	36	10	6	2
2035 Alternative 1	44	35	12	6	3
2035 Alternative 2	44	35	12	6	2
2035 Alternative 3	44	35	12	6	3
2035 Alternative 4	44	35	12	6	3
Queen Anne/Magnolia (Upper Queen Anne)					
2015 Existing	45	33	11	9	2
2035 Alternative 1	41	32	14	12	3
2035 Alternative 2	40	32	14	12	3
2035 Alternative 3	41	33	13	11	3
2035 Alternative 4	41	33	13	11	3
Downtown/Lake Union (Downtown)					
2015 Existing	31	24	22	21	2
2035 Alternative 1	22	25	27	23	3
2035 Alternative 2	21	25	26	24	3
2035 Alternative 3	22	25	27	23	3
2035 Alternative 4	21	25	27	23	3
Capitol Hill/Central District (Capitol Hill)					
2015 Existing	35	30	14	19	2
2035 Alternative 1	30	28	18	22	3
2035 Alternative 2	30	28	17	22	3
2035 Alternative 3	30	28	17	21	3
2035 Alternative 4	30	28	18	22	3
West Seattle (West Seattle Junction)					
2015 Existing	45	41	7	5	1
2035 Alternative 1	43	42	8	5	2
2035 Alternative 2	43	42	8	5	2
2035 Alternative 3	44	41	8	5	2
2035 Alternative 4	43	41	8	5	2
Duwamish (South Park)					
2015 Existing	53	32	9	5	1
2035 Alternative 1	50	33	10	5	2
2035 Alternative 2	50	33	10	5	2
2035 Alternative 3	50	33	10	5	2
2035 Alternative 4	50	33	10	5	2
Southeast Seattle (Othello)					
2015 Existing	45	40	9	5	2
2035 Alternative 1	43	39	10	5	3
2035 Alternative 2	42	40	11	5	3
2035 Alternative 3	42	39	11	5	3
2035 Alternative 4	42	39	11	5	3

Source: Project travel demand model, 2014.

Table A.4–11 2035 average trip length in minutes

Sector	2015 Existing	2035 Alt. 1	2035 Alt. 2	2035 Alt. 3	2035 Alt. 4
Northwest Seattle	20	22	22	22	22
Northeast Seattle	22	23	23	23	23
Queen Anne/Magnolia	23	25	25	25	25
Downtown/Lake Union	24	26	26	26	26
Capitol Hill/Central District	22	23	23	23	23
West Seattle	21	25	24	24	24
Duwamish	27	31	31	30	31
Southeast Seattle	22	25	25	24	24
Seattle	**23**	**25**	**25**	**25**	**25**

Source: Project travel demand model, 2014.

Table A.4–12 2035 vehicle miles traveled per capita

Sector	2015 Existing	2035 Alt. 1	2035 Alt. 2	2035 Alt. 3	2035 Alt. 4
Northwest Seattle	4.0	3.6	3.7	3.7	3.7
Northeast Seattle	4.5	4.1	4.1	4.1	4.1
Queen Anne/Magnolia	4.0	3.6	3.6	3.6	3.6
Downtown/Lake Union	2.7	2.2	2.1	2.1	2.1
Capitol Hill/Central District	3.2	2.6	2.7	2.7	2.7
West Seattle	4.6	4.4	4.5	4.5	4.4
Duwamish	5.3	5.1	5.2	5.2	5.2
Southeast Seattle	4.7	4.4	4.4	4.2	4.2
Seattle	**3.3**	**2.9**	**2.9**	**2.9**	**2.9**

Source: Project travel demand model, 2014.

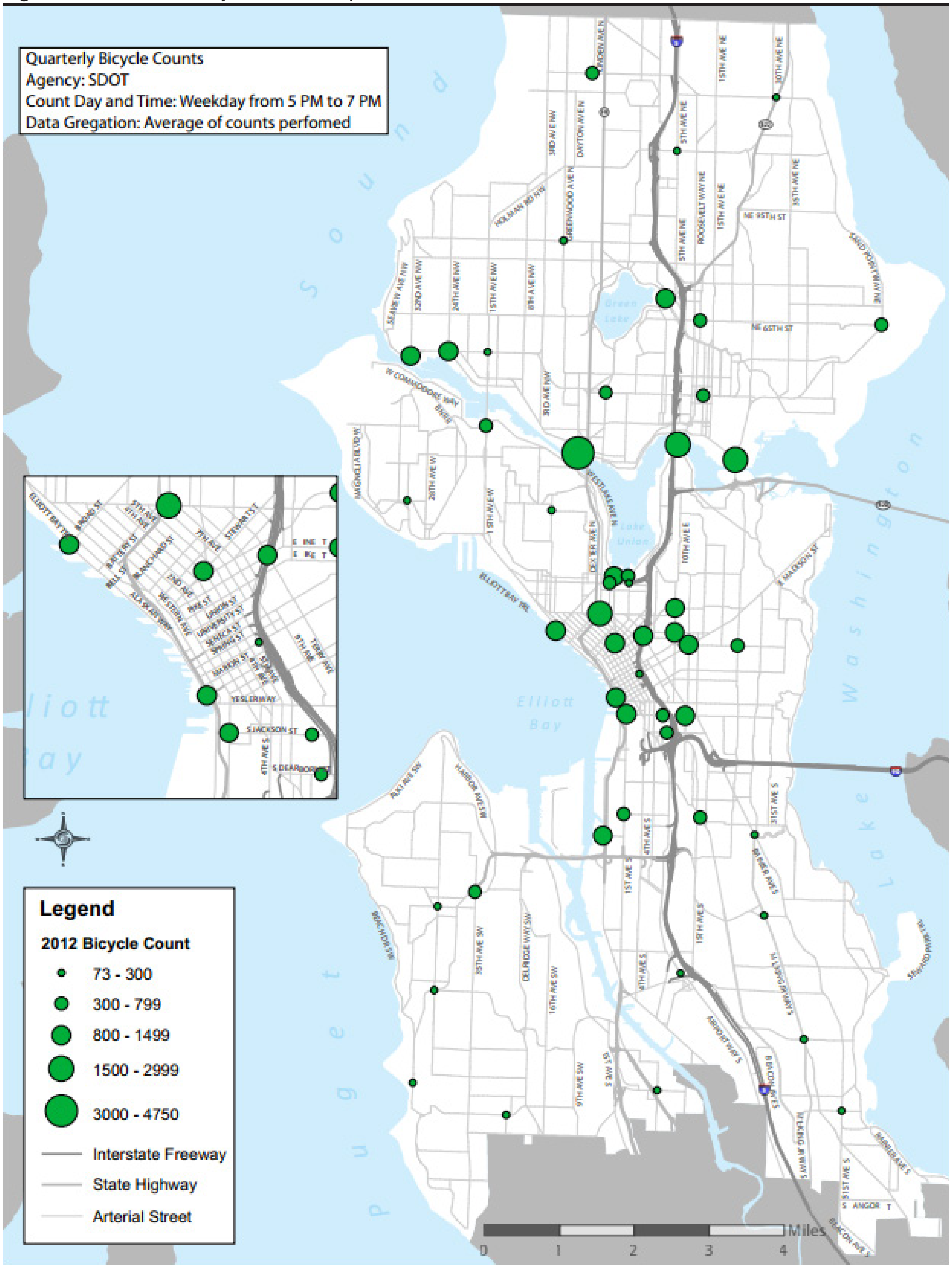
Existing Conditions Data

Two additional maps are included here as reference. The maps on the following two pages summarize high bicycle count locations (Figure A.4–1) and the frequent transit network (Figure A.4–2).

Travel Demand Model

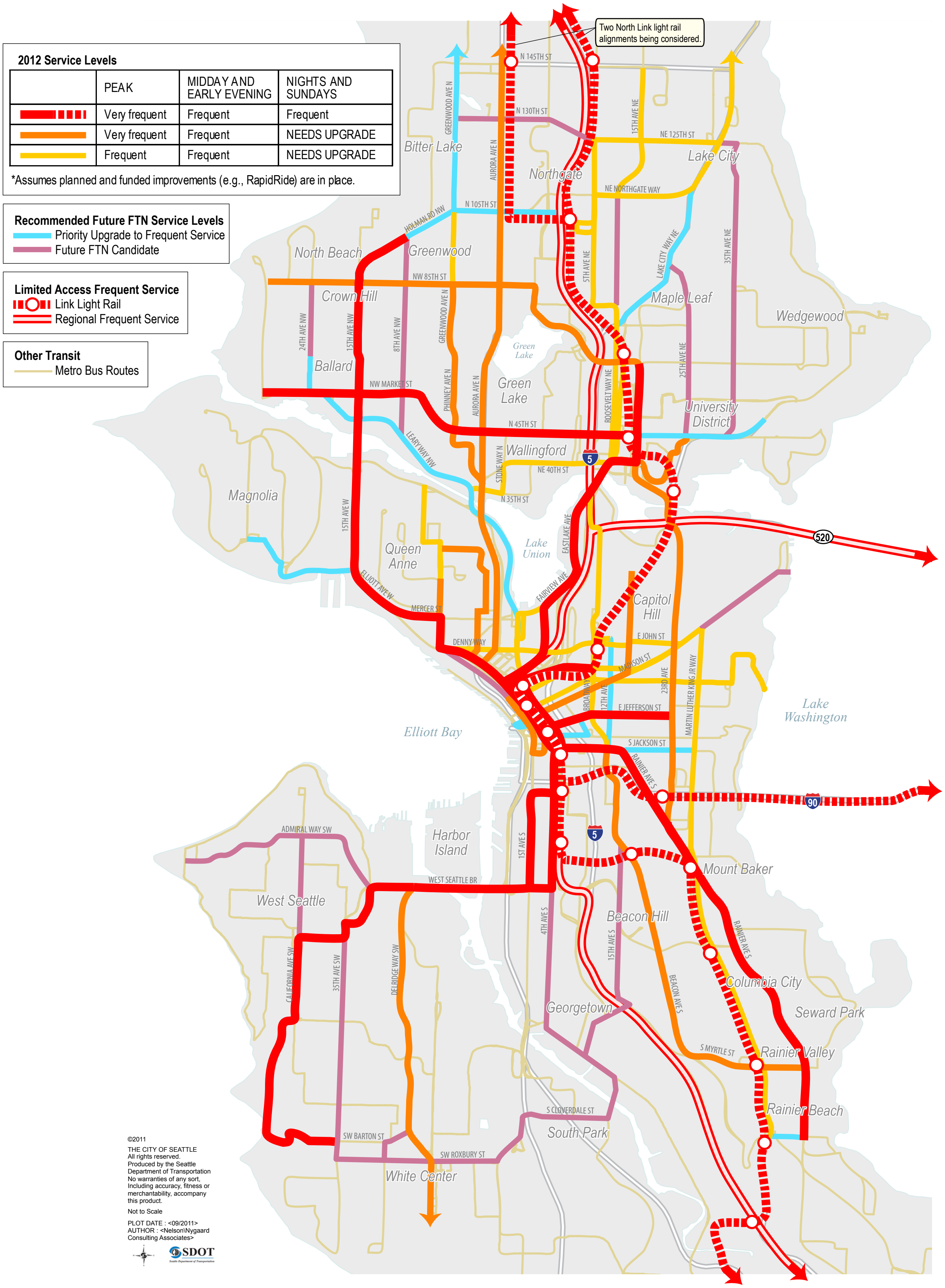
The City of Seattle updated its travel demand model in 2007 to be reflective of the Puget Sound Regional Council's (PSRC) Regional Travel Demand Model, Version 1.00b. The PSRC model has a relatively coarse TAZ structure since the model is regional in nature and is focused on generating travel forecasts across all of Snohomish, King, Pierce and Kitsap Counties. To provide more refined travel forecasts in Seattle, the PSRC zones were split as part of the citywide model development (Seattle went from 218 zones to 517 zones). The finer TAZ structure allows for traffic forecasts to be generated on a denser roadway network, improves the estimates of non-auto trips and provides the ability to extract turning movement forecasts at key intersections.

Figure A.4–1 2012 bicycle counts map



Source: SDOT. Quarterly Bicycle Counts. 2012. Average of Weekday Counts from 5PM to 7PM.

Figure A.4–2 Frequent transit network (reproduced from TMP Figure 4-1)



The City's model was initially used for the Seattle Surface and Transit Project and the Alaskan Way Viaduct Replacement Project. During the course of those projects, a team of consultants updated key aspects of the model to improve its performance, including:

- Arterial speeds
- Development of a parking cost model
- Modifications to the trip distribution and mode choice models to better reflect active transportation modes

Since that time, Fehr & Peers has used the model on subsequent City of Seattle projects including Elliott Bay Seawall Project, South Lake Union Height and Density Rezone EIS, University District Urban Design EIS and now the Seattle Comprehensive Plan EIS. With each of these projects, the model roadway, transit and non-motorized networks were revised to correct errors carried over from the PSRC model and to reflect updated conditions (e.g., road diet projects, revised transit routing, etc.) as appropriate. Future year assumptions have also been reviewed with City staff throughout the course of each project to incorporate the latest knowledge of upcoming transportation projects, such as the SR 99 Tunnel, the City's modal master plans and major regional projects.

Trip generation rates and mode split output in 12 sample locations throughout the City were examined by evaluating TAZ-level trip generation by mode and by land use category. The results of the trip generation/mode split analysis followed expected trends based on research and travel behavior theory. For example, urban centers have lower vehicle trip generation and higher bike/pedestrian/transit trip generation when compared to less dense areas of the City. Based on the analysis, one change was made to apply the Central Business District mode choice factors to the Lower Queen Anne area. This adjustment increased non-auto mode share to a level that is closer to observed conditions. Trip generation rates and mode choice in areas that have had recent subarea plans such as South Lake Union and the U District were also reviewed and found to be appropriate for this citywide analysis.

Modeling Assumptions

The assumptions for the 2015 and 2035 travel demand models were determined in conjunction with City staff using the best knowledge available at the time. Table A.4–13 summarizes key projects and their inclusion in the 2015 and/or 2035 models.

SR 99 TOLLING

The 2035 travel demand model includes tolling on the SR 99 tunnel. Since the actual toll has not yet been set, the most recent recommendations of the Advisory Committee on Tolling and Traffic Management (ACTT) were consulted. A toll was added on the SR 99 tunnel to match the PM diversion rates published for the recommended Scenario 7 identified in ACTT's "Advisory Recommendations for Tolling the SR 99 Tunnel" (March 2014). The PM diversion for Scenario 7 is 19 percent, while the travel demand models showed a 21 percent diversion. Tolls were also added to other time periods such that the relative scale of the tolls over the course of the day matched those used in the ACTT's Scenario 7.

Table A.4–13 Travel demand model network assumptions

Project	2015	2030
SR 99 tunnel (with tolls)		x
Mercer Corridor Project (east/west)	x	x
SR 520 HOV lanes to Montlake	x	x
Second Montlake Bascule Bridge		
SR 520 Tolling	x	x
I-90 HOV lanes	x	x
I-405 Widening (SR 167 to SR 527)		x
Buses in DT Seattle 3rd Avenue Tunnel	x	
Passenger-only Ferries (Kingston, Southworth, Juanita)		
South Lander Street Overpass		x
Montlake Blvd NE HOV Lane and ITS Improvements		x

TRANSIT

Transit routing assumptions were made to align with the Transit Master Plan (TMP). Table A.4–14 and Table A.4–15 outlines the changes made to routes in each transit priority corridor and the center city corridors. Per the TMP, all transit priority corridors should have transit service frequency of 15 minutes or better all day.

Table A.4–14 2035 transit priority corridors

Corridor	Name	Route Modification
1	West Seattle–Downtown	Head west on Columbia to Alaskan Way.
2	Burien–White Center–Delridge–Downtown	NA
3	Othello–U District	Rt 36 extended to Rainier Ave on Myrtle.
4	Mount Baker–Downtown via Rainier and 23rd	NA
5	Rainier Valley–U District–via Rainier and 23rd	Rt 7 re-routed to Rainier Beach LRT stop.
6	Central Area–First Hill–Downtown	Add BRT on Madison—5 min headways. Rt 11 and 12 truncated at Madison BRT. Re-channelization from I-5 to 23rd Ave for transit lanes.
7	Queen Anne–S Lake Union–Capitol Hill	NA
8	SLU–Eastlake–U District–Roosevelt	Add BRT from Westlake to NE 65th via Eastlake, headway=5min. Rt 70/66 eliminated. Rt 67 headway changed to every 15 min.
9	Aurora Village–Downtown via Aurora Ave	NA
10	Northgate–Ballard–Downtown via Northgate Way	NA
11	Ballard–Downtown rail	Add rail following Corridor D (NW Market St to DT Seattle via tunnel). No other changes to KCM routes were assumed to provide local service.
12	Lake City–Northgate–U District	Rt 41 extended north on Lake City Way to NE 145th St.
13	Ballard–U District–Laurelhurst	NA
14	Crown Hill–Greenlake–U District	NA
15	Phinney Ridge–Greenwood–Broadview	NA

Table A.4–15 Center city priority bus corridors

Corridor	Modification
Pike/Pine	NA
Jefferson/Yesler	Rt 3, 4 re-routed west of 9th Ave to Yesler and 3rd Ave Transit Mall
Seattle Center East	All-day transit-only restrictions on the 3rd Ave Transit Mall extended north to Denny Way
Jackson	Added BAT lanes on Jackson St

THE DIFFERENCE METHOD

To reduce model error, a technique known as the difference method was applied for traffic volumes and travel times. Rather than take the direct output from the 2035 model, the difference method calculates the growth between the base year and 2035 models, and adds that growth to an existing count or travel time. For example, assume a road has an existing travel time of 20.5 minutes. If the base year model showed a travel time of 22.5 minutes and the future year model showed a travel time of 28.0 minutes, 5.5 minutes would be added to the existing travel time for a future expected travel time of 26.0 minutes.

Screenline Analysis

EXISTING SCREENLINE VOLUME-TO-CAPACITY (V/C) RESULTS

The PM peak hour volume for each arterial crossing each screenline is listed below in Table A.4–16. For locations without recent traffic counts, older counts were factored to reflect the expected growth to the base year by comparing the growth of nearby comparable arterials. The PM capacity by direction was developed to reflect current (2015) conditions using a methodology based on nationally accepted standards. Details of the methodology may be found in the Seattle Screenline Capacity Methodology technical memorandum at the end of this appendix. These updated capacities are anticipated to be adopted into a DPD Director's Rule to supersede Director's Rule 5-2009 which is based on the 2008 transportation system.

Table A.4–16 Existing PM screenline results

LOS Screen Line #	Location	Arterial Crossing Screenline	2015 Capacity		PM Peak Volume	
			EB/NB	WB/SB	EB/NB	WB/SB
	North City Limit - 3rd Ave NW to Aurora Ave N	3rd Ave NW, s/o NW 145th St	770	770	470	380
		Greenwood Ave N, s/o N 145th St	1940	1940	1220	840
		Aurora Ave N, s/o N 145th St	2100	2000	1680	1220
1.11	Screenline V/C Ratio		4810	4710	0.70	0.52
	North City Limit - Meridian Ave N to 15th Ave NE	Meridian Ave N, s/o NE 145th ST	770	770	310	160
		1st Ave NE, s/o 145th St	770	770	230	390
		5th Ave NE, s/o I-5 145th St offramp	770	770	370	200
		15th Ave NE, s/o 145th St	2040	2040	890	640
1.12	Screenline V/C Ratio		4350	4350	0.41	0.32
	North City Limit - 30th Ave NE to Lake City Way NE	30th Ave NE, s/o 145th St	770	770	430	370
		Lake City Way NE, s/o NE 145th St	2150	2040	1700	1390
1.13	Screenline V/C Ratio		2920	2810	0.73	0.63
	Magnolia	Magnolia Br, w/o Garfield St offramp	770	1540	450	870
		W Dravus St, e/o 20th Ave W	1540	1540	760	920
		W Emerson Pl, se/o 21st Ave W	1540	1540	820	760
2	Screenline V/C Ratio		3850	4620	0.53	0.55
	Duwamish River - W Seattle Fwy and Spokane St	SW Spokane Br, w/o SW Spokane E st	770	770	480	680
		EB West Seattle Bridge, w/o Alaskan Way Viaduct NB on ramp	6380		3860	NA
		WB West Seattle Br., w/o Alaskan Way Viaduct NB on ramp		5380	NA	4680
3.11	Screenline V/C Ratio		7150	6150	0.61	0.87
	Duwamish River - 1st Ave S and 16th Ave S	1st Ave S Br, S/O Point A	8220	8220	2930	4320
		16th Ave S, N/O 16th Ave S BR	1540	1540	480	730
3.12	Screenline V/C Ratio		9760	9760	0.35	0.52
	South City Limit - M L King Jr Wy to Rainier Ave S	Martin Luther King Jr Way S, s/o Norfolk	2040	2040	1080	1300
		51st Ave S, s/o Bangor St	770	770	220	350
		Renton Ave S, se/o Bangor St	770	770	390	570
		Rainier Ave S, se/o 75th Ave SE	1460	1460	660	970
4.11	Screenline V/C Ratio		5040	5040	0.47	0.63
	South City Limit - Marine Dr SW to Meyers Wy S	Marine View Drive SW, N/O 46th Ave SW	770	770	190	190
		35th Ave SW, N/O SW Roxbury St	1940	1940	660	750
		26th Ave SW, N/O SW Roxbury St	770	770	340	400
		Delridge Wy, NW/o SW cambridge st	770	770	490	340
		16th Ave SW, n/o SW cambridge st	770	770	220	290
		8th Ave SW, N/O SW Roxbury St	770	770	310	280
		Olson Pl SW, SW/o 1st Ave S	2040	2040	1070	1440
		Myers Way S, S/O Olson Pl SW	1540	1540	190	260
4.12	Screenline V/C Ratio		9370	9370	0.37	0.42

Table A.7–20 Existing PM screenline results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2015 Capacity		PM Peak Volume	
			EB/NB	WB/SB	EB/NB	WB/SB
	South City Limit - SR 99 to Airport Wy S	SR 99 (W Marginal Way S, NB - SE/O Cloverdale St onramp; SB - SE/O Kenyon onramp)	2000	2000	1840	1700
		8th Ave S, s/o Director St	770	770	100	90
		East Marginal Way S, SE/O S 81st	2040	2040	700	700
		14th Ave S, n/o Director St	1540	1540	390	500
		Airport Way S, N/O S Norfolk St	2000	2000	360	760
4.13	Screenline V/C Ratio		8350	8350	0.41	0.45
	Ship Canal Ballard Bridge	Ballard Bridge	2870	3410	2850	1760
5.11	Screenline V/C Ratio		2870	3410	0.99	0.52
	Ship Canal Fremont Bridge	Fremont Bridge	2210	2210	1570	1200
5.12	Screenline V/C Ratio		2210	2210	0.71	0.54
	Ship Canal Aurora Ave N	Aurora Bridge	5380	5380	4360	3330
5.13	Screenline V/C Ratio		5380	5380	0.81	0.62
	Ship Canal University and Montlake Bridges	University Bridge, SW/O Point A	2210	2210	1320	1720
		Montlake Bridge, S/O Point A	2210	2210	2220	2130
5.16	Screenline V/C Ratio		4420	4420	0.80	0.87
	South of NW 80th St - Seaview Ave NW to 15th Ave NW	Seaview Ave NW, N/O NW 67th St	1010	1010	250	130
		32nd Ave NW, S/O NW 80th St	770	770	90	350
		24th Ave NW, S/O NW 80th St	1010	1010	630	440
		15th Ave NW, S/O NW 80th St	3070	2040	1640	1140
6.11	Screenline V/C Ratio		5860	4830	0.45	0.43
	South of NW 80th St - 8th Ave NW to Greenwood Ave N	8th Ave NW, S/O NW 80th St	1010	1010	700	440
		3rd Ave NW, S/O NW 80th St	770	770	520	430
		Greenwood Ave N, S/O N 80th St	1010	1010	610	500
6.12	Screenline V/C Ratio		2790	2790	0.66	0.49
	South of NE 80th St - Linden Ave N to 1st Ave NE	Linden Ave N, S/O N 80th St	770	770	210	160
		Aurora Ave N, S/O N 80th St	2150	2150	1710	790
		Green Lake Drive N, SE/O N 80th St	1010	1010	250	170
		Wallingford Ave N, S/O N 80th St	770	770	260	260
		Stroud Ave N, SW/O N 80th St	770	770	220	150
		1st Ave NE, S/O NE 80th St	770	770	70	160
6.13	Screenline V/C Ratio		6240	6240	0.44	0.27
	South of NE 80th St - 5th Ave NE to 15th Ave NE	5th Ave NE, S/O NE 78th St	770	770	430	290
		Roosevelt Way NE (one-way), N/O NE 73rd St		1840	NA	1180
		Lake City Way NE, SW/O NE 80th St	2040	2040	1820	930
		15th Ave NE, S/O NE 75th St	1540	770	590	470
6.14	Screenline V/C Ratio		4350	5420	0.65	0.53
	South of NE 80th St - 20th Ave NE to Sand Point Way NE	20th Ave NE, S/O NE 75th St	770	770	150	150
		25th Ave NE, S/O NE 75th St	1540	770	760	440
		35th Ave NE, S/O NE 75th St	1540	770	790	620
		40th Ave NE, S/O NE 75th St	770	770	400	270
		Sand Point Way NE, S/O NE 74th St	1540	1540	910	670
6.15	Screenline V/C Ratio		6160	4620	0.49	0.47

Table A.7–20 Existing PM screenline results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2015 Capacity		PM Peak Volume	
			EB/NB	WB/SB	EB/NB	WB/SB
	West of Aurora Ave - Fremont Pl N to N 65th St	Fremont Pl N, NW/O Fremont Ave N	1940	1940	690	930
		N 39th St, W/O Fremont Ave N	770	770	570	680
		N 46th St, W/O Phinney Ave N.	1540	1540	890	850
		N 50th St, W/O Fremont Ave N	770	770	420	650
		N 65th St, W/O Linden Ave N	770	770	230	250
7.11	Screenline V/C Ratio		5790	5790	0.48	0.58
	West of Aurora Ave - N 80th St to N 145th St	N 80th St, W/O Linden Ave N	960	960	650	700
		N 85th St, W/O Linden Ave N	1540	1540	790	1000
		N 105th St w/o Evanston	1540	1540	760	930
		N 125th St, W/O Aurora Ave N	1010	1010	440	360
		N 130th St, W/O Linden Ave N	960	960	570	630
		N 145th St, W/O Linden Ave	1540	1540	530	650
7.12	Screenline V/C Ratio		7550	7550	0.50	0.57
	South of Lake Union	Valley St, W/O Fairview Ave N	770	770	270	2020
		Mercer St, EB -w/o Fairview Ave N; WB-e/o Boren Ave N	3070	3070	3460	1680
		Republican St, w/o Eastlake Ave	770	770	40	290
		Denny Way, E/O Minor Ave	1540	1540	1020	780
8	Screenline V/C Ratio		6150	6150	0.78	0.78
	South of Spokane St - Beach Dr SW to W Marginal Way SW	Beach Dr SW, SE/O 61st Ave SW	770	770	190	220
		55th Ave SW, S/O SW Charlestown St	770	770	110	80
		California Ave SW, S/O SW Charlestown St	1010	1010	590	850
		Fauntleroy Wy SW (NB - West Seattle Br, NE/O Fauntleroy Wy; SB - NE/O 35th Ave SW)	3590	3590	2580	2730
		SW Avalon Wy, N/O 30th Ave SW	1010	1010	480	770
		Delridge Wy, S/O SW Andover St	1010	1010	640	880
		W Marginal Way SW	2000	2000	640	330
9.11	Screenline V/C Ratio		10160	10160	0.51	0.58
	South of Spokane St - E Marginal Way S to Airport Way S	E Marginal Way SW, N/O Alaskan Wy Vi SB	1150	1150	480	970
		Alaskan Wy, N/O East Marginal Way S	3590	3590	1950	1830
		1st Ave S, S/O S Spokane SR St	2040	2040	630	1010
		4th Ave S, S/O S Spokane SR St	2040	2040	1440	1340
		6th Ave S, S/O S Forest St	1540	1940	750	760
		Airport Way S (NB - S/O S Spokane St, SB - N/O S Spokane St)	2040	2040	600	740
9.12	Screenline V/C Ratio		12400	12800	0.47	0.52
	South of Spokane St - 15th Ave S to Rainier Ave S	15th Ave S, S/O S Bradford St	2920	1540	1220	690
		Beacon Ave S, S/O S Spokane St	1010	1010	530	630
		Martin Luther King Jr Way S, N/O S Andover St	2040	2040	770	1020
		Rainier Ave S, SE/O M LK	2040	2040	1120	1490
9.13	Screenline V/C Ratio		8010	6630	0.45	0.58

Table A.7–20 Existing PM screenline results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2015 Capacity		PM Peak Volume	
			EB/NB	WB/SB	EB/NB	WB/SB
	South of S Jackson St - Alaskan Way S to 4th Ave S	Alaskan Wy S, N of S King St	1540	1540	430	680
		SR 99 – Alaskan Way Viaduct	6080	6080	5190	5440
		1st Ave S, N/O S King St	2040	2040	400	630
		2nd Ave S, N/O S King St	1540	1540	480	270
		4th Ave S, S/O 2nd Ave ET S	2920	1940	1350	1470
10.11	Screenline V/C Ratio		14120	13140	0.56	0.65
	South of S Jackson St - 12th Ave S to Lakeside Ave S	12th Ave S, S/O S Weller St	1540	1540	980	1030
		Rainier Ave S, SE/O Boren Ave S	2040	2040	1180	1130
		23rd Ave S, S/O S Jackson St	1540	1540	610	870
		Martin Luther King Jr Way S, S/O S Jackson St	1010	1010	610	790
		31st Ave S, S/O S Jackson St	960	960	180	300
		Lakeside Ave S	770	770	250	440
10.12	Screenline V/C Ratio		7860	7860	0.48	0.58
	East of CBD	S Jackson St, E/O 5th Ave S	1010	1010	760	450
		Yesler Way, W/O 6th Ave	770	770	180	310
		James St, NE/O 6th Ave	2040	2040	630	1690
		Cherry St, NE/O 6th Ave	1150		710	NA
		Madison St, SW/O 7th Ave	1540	1630	180	1630
		Spring St, SW/O 6th Ave	2760		1350	NA
		Seneca St, NE/O 6th Ave		2760	NA	870
		University, sw/o 6th	2330		700	NA
		Union St, NE of 7th Ave		3500	NA	710
		Pike St, SW/O Terry Ave	1540	1540	790	200
		Pine St, NE/O 9th Ave	770	960	110	520
		Olive Way, NE/0 9th Ave	3500		1030	NA
		Howell St, ne/o 9th ave	3940		940	NA
12.12	Screenline V/C Ratio		21350	14210	0.35	0.45
	East of I-5 NE Northgate Way to NE 145th St	NE Northgate Way, E/O 5th Ave NE	2040	2040	1260	980
		NE 125th St (Roosevelt Way NE, SE/O NE 130th St N)	1010	1010	620	810
		NE 145th St, E/O 5th Ave NE	1540	1540	1390	930
13.11	Screenline V/C Ratio		4590	4590	0.71	0.59
	East of I-5 NE 65th St to NE 80th St	NE 80th St, E/O 5th Ave NE	770	770	590	310
		NE 75th St, W/O Roosevelt Way NE	2040	2040	800	850
		NE 70th St, W/O Roosevelt Way NE	770	770	320	300
		NE 65th St, W/O Roosevelt Way NE	1540	1540	540	650
13.12	Screenline V/C Ratio		5120	5120	0.44	0.41
	East of I-5 NE Pacific St to NE Ravenna Blvd	NE Pacific St, NW/O NE Boat St	1010	1010	1020	750
		NE 40th St, E/O 7th Ave NE	770	770	510	290
		NE 42nd St, E/O 7th Ave NE	770	770	330	190
		NE 45th St W/O Roosevelt Way NE	2040	2040	1210	1210
		NE 50th St W/O Roosevelt Way NE	1540	1540	470	1010
		NE Ravenna Blvd, W/O Roosevelt Way	1010	1010	390	400
13.13	Screenline V/C Ratio		7140	7140	0.55	0.54

2035 SCREENLINE V/C RATIO RESULTS

The arterial volumes for each of the future year alternatives were calculated using the difference method. The capacities of some screenlines are different from the base year due to the completion of future roadway projects that add or remove capacity (e.g. new lanes, road diets). Capacity changes were based on the roadway capacities set in the travel model. Based on the Bicycle Master Plan's planned cycle track and bicycle lane locations, road diets were assumed on the following roadways:

- 15th Ave NE (NE 117th St–NE 145th St, Pacific Place)
- Pinehurst Way (Roosevelt Way NE–15th Ave NE)
- Sand Point Way NE (NE 65th St–NE 75th St)
- N 130th St (Linden Ave N–5th Ave NE)
- Harvard Ave E (E Roanoke St–E Shelby St)
- Westlake Ave N (Valley St–south of Aurora Ave N)
- Fairview Ave N (Valley St–Eastlake Ave E)
- Eastlake Ave (Stewart St–Fairview Ave)
- 1st Ave (Roy St–Broad St)
- Broad St (Alaskan Way–2nd Ave)
- Dexter Ave (Mercer St–Denny Way)
- 5th Ave N (Roy St–Denny Way, Seneca St–S Jackson St)
- S Jackson St (20th Ave S–ML King Jr Way S)
- S Dearborn St (7th Ave S to Rainier Ave S)
- 12th Ave S (S Dearborn St–E Yesler Way)
- 15th Ave S (S Oregon St–S Spokane St)
- Rainier Ave S (12th Ave S–S Massachusetts St, S McClellan St–ML King Jr Way S)
- ML King Jr Way S (Rainier Ave S–S Norfolk St)
- Airport Way S (4th Ave–S Norfolk St)
- East Marginal Way (1st Ave–S 81st Pl)
- SW Admiral Way (Fairmount Ave SW–Harbor Ave SW)
- Fauntleroy Way SW (SW Alaska St–36th Ave SW)
- 16th Ave SW (SW Roxbury St–SW Avalon Way)
- Delridge Way SW (SW Andover St–Chelan Ave SW)
- Olson Pl SW (SW Roxbury St–S Cloverdale St)

Table A.4–17 2035 screenline V/C ratio results

LOS Screen Line #	Location	Arterial Crossing Screenline	2035 Capacity		2035 Alt 1 Model		2035 Alt 2 Model		2035 Alt 3 Model		2035 Alt 4 Model	
			EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
	North City Limit - 3rd Ave NW to Aurora Ave N	3rd Ave NW, s/o NW 145th St	770	770	780	650	800	650	770	650	790	660
		Greenwood Ave N, s/o N 145th St	1940	1940	1740	1220	1760	1210	1740	1210	1750	1210
		Aurora Ave N, s/o N 145th St	2100	2000	2430	1880	2420	1850	2400	1830	2440	1870
1.11	Screenline V/C Ratio		4810	4710	1.03	0.80	1.04	0.79	1.02	0.78	1.04	0.79
	North City Limit - Meridian Ave N to 15th Ave NE	Meridian Ave N, s/o NE 145th ST	770	770	580	370	580	380	590	410	590	410
		1st Ave NE, s/o 145th St	770	770	490	590	500	570	500	580	520	590
		5th Ave NE, s/o I-5 145th St offramp	770	770	550	340	560	360	550	350	550	360
		15th Ave NE, s/o 145th St	1010	1010	890	730	890	700	890	720	890	710
1.12	Screenline V/C Ratio		3320	3320	0.76	0.61	0.76	0.61	0.76	0.62	0.77	0.62
	North City Limit - 30th Ave NE to Lake City Way NE	30th Ave NE, s/o 145th St	770	770	590	550	600	550	620	540	590	540
		Lake City Way NE, s/o NE 145th St	2150	2040	2220	1790	2260	1770	2180	1790	2230	1790
1.13	Screenline V/C Ratio		2920	2810	0.96	0.83	0.98	0.83	0.96	0.83	0.97	0.83
	Magnolia	Magnolia Br, w/o Garfield St offramp	770	1540	460	920	450	900	450	890	450	870
		W Dravus St, e/o 20th Ave W	1540	1540	840	940	830	920	850	930	830	920
		W Emerson Pl, se/o 21st Ave W	1540	1540	860	750	850	760	860	760	860	760
2	Screenline V/C Ratio		3850	4620	0.56	0.56	0.55	0.56	0.56	0.56	0.56	0.55
	Duwamish River - W Seattle Fwy and Spokane St	SW Spokane Br, w/o SW Spokane E St	770	770	730	1000	720	1000	750	1010	760	1000
		EB West Seattle Bridge, w/o Alaskan Way Viaduct NB on ramp	6380		4180	NA	4150	NA	4230	NA	4240	NA
		WB West Seattle Bridge, w/o Alaskan Way Viaduct NB on ramp		5380	NA	6050	NA	6050	NA	6000	NA	6050
3.11	Screenline V/C Ratio		7150	6150	0.69	1.15	0.68	1.15	0.70	1.14	0.70	1.15
	Duwamish River - 1st Ave S and 16th Ave S	1st Ave S Br, S/O Point A	8220	8220	2930	4320	2930	4320	2930	4320	2930	4320
		16th Ave S, N/O 16th Ave S BR	1540	1540	800	1060	810	1020	850	1020	820	1020
3.12	Screenline V/C Ratio		9760	9760	0.38	0.55	0.38	0.55	0.39	0.55	0.38	0.55

Table A.7–21 2035 screenline V/C ratio results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2035 Capacity		2035 Alt 1 Model		2035 Alt 2 Model		2035 Alt 3 Model		2035 Alt 4 Model	
			EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
	South City Limit - M L King Jr Wy to Rainier Ave S	Martin Luther King Jr Way S, s/o Norfolk	2040	2040	1080	1890	1080	1640	1080	1710	1080	1650
		51st Ave S, s/o Bangor St	770	770	310	700	260	700	280	690	280	680
		Renton Ave S, se/o Bangor St	770	770	500	950	490	930	520	940	500	930
		Rainier Ave S, se/o 75th Ave SE	1460	1460	990	1420	990	1400	1020	1400	1010	1410
4.11	Screenline V/C Ratio		5040	5040	0.57	0.98	0.56	0.93	0.58	0.94	0.57	0.93
	South City Limit - Marine Dr SW to Meyers Wy S	Marine View Drive SW, N/O 46th Ave SW	770	770	390	240	380	220	380	240	380	240
		35th Ave SW, N/O SW Roxbury St	1010	1010	810	920	780	920	800	920	790	940
		26th Ave SW, N/O SW Roxbury St	770	770	370	520	380	530	380	530	380	520
		Delridge Wy, NW/o SW Cambridge St	770	770	680	410	670	390	690	410	680	410
		16th Ave SW, n/o SW Cambridge St	770	770	250	520	250	540	250	560	250	570
		8th Ave SW, N/O SW Roxbury St	770	770	350	580	340	580	340	580	360	590
		Olson Pl SW, SW/o 1st Ave S	1010	1010	1070	1440	1070	1440	1070	1440	1070	1440
		Myers Way S, S/O Olson Pl SW	1540	1540	230	670	210	680	220	660	210	670
4.12	Screenline V/C Ratio		7410	7410	0.56	0.72	0.55	0.72	0.56	0.72	0.56	0.73
	South City Limit - SR 99 to Airport Wy S	SR 99 (W Marginal Way S, NB - SE/O Cloverdale St onramp; SB - SE/O Kenyon onramp)	2000	2000	1980	2220	1970	2270	1980	2320	1960	2300
		8th Ave S, s/o Director St	770	770	100	220	100	250	100	250	100	240
		East Marginal Way S, SE/O S 81st	2040	2040	780	990	760	1040	780	1040	770	1020
		14th Ave S, n/o Director St	1540	1540	580	850	590	840	610	820	600	830
		Airport Way S, N/O S Norfolk St	1000	1000	820	1120	800	1150	840	1130	820	1150
4.13	Screenline V/C Ratio		7350	7350	0.58	0.73	0.57	0.76	0.59	0.76	0.58	0.75
	Ship Canal Ballard Bridge	Ballard Bridge	2870	3410	3410	2450	3310	2370	3340	2380	3350	2490
5.11	Screenline V/C Ratio		2870	3410	1.19	0.72	1.15	0.70	1.16	0.70	1.17	0.73
	Ship Canal Fremont Bridge	Fremont Bridge	2210	2210	1750	1560	1720	1540	1720	1540	1710	1560

Table A.7–21 2035 screenline V/C ratio results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2035 Capacity		2035 Alt 1 Model		2035 Alt 2 Model		2035 Alt 3 Model		2035 Alt 4 Model	
			EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
5.12	Screenline V/C Ratio		2210	2210	0.79	0.71	0.78	0.70	0.78	0.70	0.77	0.71
	Ship Canal Aurora Ave N	Aurora Bridge	5380	5380	5040	4420	4950	4420	4910	4410	4880	4460
5.13	Screenline V/C Ratio		5380	5380	0.94	0.82	0.92	0.82	0.91	0.82	0.91	0.83
	Ship Canal University and Montlake Bridges	University Bridge, SW/O Point A	2210	2210	1630	2150	1620	2140	1590	2130	1580	2140
		Montlake Bridge, S/O Point A	2210	2210	2630	2540	2610	2530	2590	2500	2580	2520
5.16	Screenline V/C Ratio		4420	4420	0.96	1.06	0.96	1.06	0.95	1.05	0.94	1.05
	South of NW 80th St - Seaview Ave NW to 15th Ave NW	Seaview Ave NW, N/O NW 67th St	1010	1010	280	130	270	130	270	130	290	130
		32nd Ave NW, S/O NW 80th St	770	770	100	370	100	350	100	360	100	360
		24th Ave NW, S/O NW 80th St	1010	1010	690	500	680	470	680	480	700	520
		15th Ave NW, S/O NW 80th St	3070	2040	1990	1390	1920	1340	1950	1360	1990	1390
6.11	Screenline V/C Ratio		5860	4830	0.52	0.49	0.51	0.47	0.51	0.48	0.53	0.50
	South of NW 80th St - 8th Ave NW to Greenwood Ave N	8th Ave NW, S/O NW 80th St	1010	1010	1060	870	1020	810	1030	840	1050	890
		3rd Ave NW, S/O NW 80th St	770	770	660	570	650	560	650	570	660	580
		Greenwood Ave N, S/O N 80th St	1010	1010	720	710	710	710	710	710	710	710
6.12	Screenline V/C Ratio		2790	2790	0.87	0.77	0.85	0.75	0.86	0.76	0.87	0.78
	South of NE 80th St - Linden Ave N to 1st Ave NE	Linden Ave N, S/O N 80th St	770	770	350	290	340	250	330	270	340	280
		Aurora Ave N, S/O N 80th St	2150	2150	1930	1270	1910	1300	1890	1280	1880	1310
		Green Lake Drive N, SE/O N 80th St	1010	1010	330	170	320	170	310	170	300	170
		Wallingford Ave N, S/O N 80th St	770	770	340	340	340	340	320	350	320	350
		Stroud Ave N, SW/O N 80th St	770	770	280	190	280	200	280	180	300	200
		1st Ave NE, S/O NE 80th St	770	770	230	280	210	290	200	280	200	290
6.13	Screenline V/C Ratio		6240	6240	0.55	0.41	0.54	0.41	0.53	0.41	0.53	0.42
	South of NE 80th St - 5th Ave NE to 15th Ave NE	5th Ave NE, S/O NE 78th St	770	770	570	490	550	480	550	500	540	480
		Roosevelt Way NE (one-way), N/O NE 73rd St		1840	NA	1360	NA	1370	NA	1390	NA	1380
		Lake City Way NE, SW/O NE 80th St	2040	2040	2050	1160	2030	1090	2010	1160	1990	1150
		15th Ave NE, S/O NE 75th St	1540	770	670	600	650	600	650	610	650	610
6.14	Screenline V/C Ratio		4350	5420	0.76	0.67	0.74	0.65	0.74	0.68	0.73	0.67

Table A.7–21 2035 screenline V/C ratio results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2035 Capacity		2035 Alt 1 Model		2035 Alt 2 Model		2035 Alt 3 Model		2035 Alt 4 Model	
			EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
	South of NE 80th St - 20th Ave NE to Sand Point Way NE	20th Ave NE, S/O NE 75th St	770	770	460	190	440	180	430	210	410	210
		25th Ave NE, S/O NE 75th St	1540	770	980	610	970	610	930	610	930	610
		35th Ave NE, S/O NE 75th St	1540	770	870	740	860	740	860	740	860	740
		40th Ave NE, S/O NE 75th St	770	770	500	290	490	280	490	290	490	290
		Sand Point Way NE, S/O NE 74th St	1540	1540	1160	840	1150	830	1110	840	1100	830
6.15	Screenline V/C Ratio		6160	4620	0.64	0.58	0.63	0.57	0.62	0.58	0.62	0.58
	West of Aurora Ave - Fremont Pl N to N 65th St	Fremont Pl N, NW/O Fremont Ave N	1940	1940	830	1060	810	1030	830	1030	870	1040
		N 39th St, W/O Fremont Ave N	770	770	600	740	580	730	590	730	620	730
		N 46th St, W/O Phinney Ave N.	1540	1540	930	1010	890	970	920	970	950	970
		N 50th St, W/O Fremont Ave N	770	770	600	750	580	730	590	720	620	730
		N 65th St, W/O Linden Ave N	770	770	230	270	230	260	230	250	230	270
7.11	Screenline V/C Ratio		5790	5790	0.55	0.66	0.53	0.64	0.55	0.64	0.57	0.65
	West of Aurora Ave - N 80th St to N 145th St	N 80th St, W/O Linden Ave N	960	960	750	780	710	750	730	750	750	770
		N 85th St, W/O Linden Ave N	1540	1540	860	1120	810	1090	850	1100	880	1120
		N 105th St w/o Evanston	1540	1540	760	1040	760	1060	760	1040	760	1060
		N 125th St, W/O Aurora Ave N	1010	1010	470	400	440	380	470	400	470	410
		N 130th St, W/O Linden Ave N	960	960	680	820	670	820	720	830	680	810
		N 145th St, W/O Linden Ave	1540	1540	700	820	730	820	710	810	690	810
7.12	Screenline V/C Ratio		7550	7550	0.56	0.66	0.55	0.65	0.56	0.65	0.56	0.66
	South of Lake Union	Valley St, W/O Fairview Ave N Mercer St, EB -w/o Fairview Ave N; WB- e/o Boren Ave N Republican St, w/o Eastlake Ave Denny Way, E/O Minor Ave	6150	6150	5660	5090	5620	4800	5650	4840	5470	4780
8	Screenline V/C Ratio		6150	6150	0.92	0.83	0.91	0.78	0.92	0.79	0.89	0.78
	South of Spokane St - Beach Dr SW to W Marginal	Beach Dr SW, SE/O 61st Ave SW	770	770	190	250	190	240	190	240	190	260
		55th Ave SW, S/O SW Charlestown St	770	770	170	80	160	80	170	80	170	80

Table A.7–21 2035 screenline V/C ratio results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2035 Capacity		2035 Alt 1 Model		2035 Alt 2 Model		2035 Alt 3 Model		2035 Alt 4 Model	
			EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
	Way SW	California Ave SW, S/O SW Charlestown St	1010	1010	630	960	630	950	640	960	670	980
		Fauntleroy Wy SW (NB - West Seattle Br, NE/O Fauntleroy Wy; SB - NE/O 35th Ave SW)	3590	3590	2780	3230	2750	3230	2790	3180	2820	3260
		SW Avalon Wy, N/O 30th Ave SW	1010	1010	600	950	560	920	590	950	630	960
		Delridge Wy, S/O SW Andover St	1010	1010	730	950	710	930	730	930	730	930
		W Marginal Way SW	2000	2000	850	820	830	820	860	860	840	850
9.11	Screenline V/C Ratio		10160	10160	0.59	0.71	0.57	0.71	0.59	0.71	0.60	0.72
	South of Spokane St - E Marginal Way S to Airport Way S	E Marginal Way SW, N/O Alaskan Wy Vi SB	1150	1150	520	1110	500	1100	520	1100	510	1130
		Alaskan Wy, N/O East Marginal Way S	3590	3590	2360	2540	2360	2580	2380	2520	2360	2550
		1st Ave S, S/O S Spokane SR St	2040	2040	1070	1460	1040	1470	1090	1460	1080	1450
		4th Ave S, S/O S Spokane SR St	2040	2040	1920	2070	1900	2080	1960	2090	1920	2080
		6th Ave S, S/O S Forest St	1540	1940	870	1130	910	1120	900	1120	900	1130
		Airport Way S (NB - S/O S Spokane St, SB - N/O S Spokane St)	2040	2040	680	740	670	740	680	740	670	740
9.12	Screenline V/C Ratio		12400	12800	0.60	0.71	0.60	0.71	0.61	0.71	0.60	0.71
	South of Spokane St - 15th Ave S to Rainier Ave S	15th Ave S, S/O S Bradford St	2920	1540	1220	800	1220	790	1220	810	1220	820
		Beacon Ave S, S/O S Spokane St	1010	1010	1030	1040	980	1040	1040	1050	1030	1050
		Martin Luther King Jr Way S, N/O S Andover St	1010	1010	770	1020	770	1020	770	1020	770	1020
		Rainier Ave S, SE/O M LK	2040	2040	1630	2150	1540	2150	1670	2190	1660	2190
9.13	Screenline V/C Ratio		6980	5600	0.67	0.89	0.65	0.89	0.67	0.91	0.67	0.91
	South of S Jackson St - Alaskan Way S to 4th Ave S	Alaskan Wy S, N of S King St	2140	2040	720	1740	730	1750	730	1690	730	1740
		SR 99 Tunnel	3940	3940	3960	3960	3960	3960	3960	3960	3960	3960
		1st Ave S, N/O S King St	2040	2040	1230	1690	1240	1730	1240	1670	1240	1700
		2nd Ave S, N/O S King St	1540	1540	820	530	830	520	830	510	820	510
		4th Ave S, S/O 2nd Ave ET S	2920	1940	1350	1770	1350	1790	1350	1760	1350	1800

Table A.7–21 2035 screenline V/C ratio results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2035 Capacity		2035 Alt 1 Model		2035 Alt 2 Model		2035 Alt 3 Model		2035 Alt 4 Model	
			EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
10.11	Screenline V/C Ratio		12580	11500	0.64	0.84	0.64	0.85	0.64	0.83	0.64	0.84
	South of S Jackson St - 12th Ave S to Lakeside Ave S	12th Ave S, S/O S Weller St	1010	1010	1160	1310	1150	1320	1190	1310	1180	1320
		Rainier Ave S, SE/O Boren Ave S	1010	1010	1300	1240	1330	1270	1300	1240	1310	1250
		23rd Ave S, S/O S Jackson St	1540	1540	670	870	670	870	710	870	700	870
		Martin Luther King Jr Way S, S/O S Jackson St	1010	1010	960	1090	940	1110	990	1090	980	1100
		31st Ave S, S/O S Jackson St	960	960	300	570	290	580	320	580	320	590
		Lakeside Ave S	770	770	270	630	260	640	270	630	270	630
10.12	Screenline V/C Ratio		6300	6300	0.74	0.91	0.74	0.92	0.76	0.91	0.76	0.91
	East of CBD	S Jackson St, E/O 5th Ave S	1010	1010	950	580	950	580	960	580	950	600
		Yesler Way, W/O 6th Ave	770	770	180	350	180	350	180	360	180	360
		James St, NE/O 6th Ave	2040	2040	630	1940	630	1940	630	1930	630	1940
		Cherry St, NE/O 6th Ave	1150		710	NA	720	NA	710	NA	730	NA
		Madison St, SW/O 7th Ave	1540	1630	180	1840	180	1860	180	1840	180	1850
		Spring St, SW/O 6th Ave	2760		1450	NA	1410	NA	1400	NA	1410	NA
		Seneca St, NE/O 6th Ave		2760	NA	980	NA	1000	NA	970	NA	990
		University, sw/o 6th	2330		830	NA	830	NA	810	NA	810	NA
		Union St, NE of 7th Ave		3500	NA	710	NA	710	NA	710	NA	710
		Pike St, SW/O Terry Ave	1540	1540	1010	340	1010	360	970	330	980	340
		Pine St, NE/O 9th Ave	770	960	200	630	190	660	180	620	180	630
		Olive Way, NE/0 9th Ave	3500		1310	NA	1300	NA	1250	NA	1260	NA
		Howell St, ne/o 9th ave	3940		950	NA	960	NA	940	NA	940	NA
12.12	Screenline V/C Ratio		21350	14210	0.39	0.52	0.39	0.52	0.38	0.52	0.39	0.52
	East of I-5 NE Northgate Way to NE 145th St	NE Northgate Way, E/O 5th Ave NE	2040	2040	1530	1220	1750	1360	1600	1260	1580	1250
		NE 125th St (Roosevelt Way NE, SE/O NE 130th St N)	1010	1010	730	1120	670	1070	720	1090	720	1100
		NE 145th St, E/O 5th Ave NE	1540	1540	1600	1250	1620	1220	1560	1260	1560	1250
13.11	Screenline V/C Ratio		4590	4590	0.84	0.78	0.88	0.80	0.85	0.79	0.84	0.78

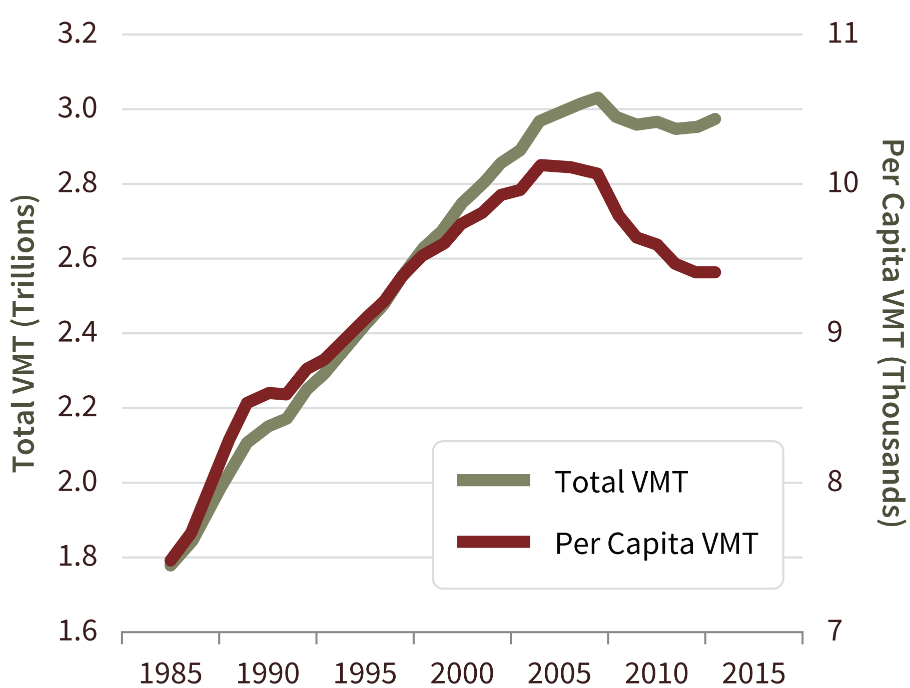
Table A.7–21 2035 screenline V/C ratio results (cont.)

LOS Screen Line #	Location	Arterial Crossing Screenline	2035 Capacity		2035 Alt 1 Model		2035 Alt 2 Model		2035 Alt 3 Model		2035 Alt 4 Model	
			EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
	East of I-5 NE 65th St to NE 80th St	NE 80th St, E/O 5th Ave NE	770	770	680	470	700	460	700	480	710	470
		NE 75th St, W/O Roosevelt Way NE	2040	2040	810	1080	800	1040	820	1090	800	1070
		NE 70th St, W/O Roosevelt Way NE	770	770	520	450	530	440	460	410	460	430
		NE 65th St, W/O Roosevelt Way NE	1540	1540	540	710	540	690	560	780	560	780
13.12	Screenline V/C Ratio		5120	5120	0.5	0.53	0.50	0.51	0.50	0.54	0.49	0.54
	East of I-5 NE Pacific St to NE Ravenna Blvd	NE Pacific St, NW/O NE Boat St	1010	1010	1180	1070	1180	1050	1180	1020	1180	1020
		NE 40th St, E/O 7th Ave NE	770	770	640	420	630	420	640	400	650	400
		NE 42nd St, E/O 7th Ave NE	770	770	330	220	330	210	330	200	330	210
		NE 45th St W/O Roosevelt Way NE	2040	2040	1300	1390	1300	1400	1310	1370	1300	1360
		NE 50th St W/O Roosevelt Way NE	1540	1540	520	1170	520	1160	550	1140	550	1140
		NE Ravenna Blvd, W/O Roosevelt Way	1010	1010	490	520	480	520	480	500	480	500
13.13	Screenline V/C Ratio		7140	7140	0.62	0.67	0.62	0.67	0.63	0.65	0.63	0.65

Potential Changes to VMT per Capita

After 50 years of steady growth, nationwide vehicle miles traveled (VMT) per capita leveled off in 2004 and declined by eight percent between 2004 and 2012. Whether travel will return to growth rates of past decades, remain static or continue to decline is of critical importance to decision-makers in government at all levels. VMT growth affects many areas of transportation ranging from fuel tax revenues, to modal investment decisions, to environ-

Figure A.4–3 VMT trends for the United States through 2013[1]



Source: FHWA; U.S. Census Bureau.

mental impacts, which is the focus of this document.

For this study, VMT is estimated using a travel demand model based on the PSRC's regional model. The model's estimate of VMT generation is based on a range of factors including trip generation rates, auto operating costs, household size and income and traffic congestion levels. With the exception of traffic congestion levels, PSRC does not project major changes in the factors listed above, which translates into a relatively static level of VMT per capita from the travel model.

To explore how variables beyond those considered in the travel demand model may affect VMT per capita in Seattle over the next 30 years, Fehr & Peers used its TrendLab+ tool.

1 McCahill, Chris. 2014. Per capita VMT drops for ninth straight year; DOTs taking notice. Accessed September 18, 2014: http://www.ssti.us/2014/02/vmt-drops-ninth-year-dots-taking-notice/.

TrendLab+ estimates 2040 VMT per capita based on predictions about future demographic and economic shifts. For this effort, the estimate was created with Seattle's local trends and characteristics in mind. In particular, the following trends were assumed:

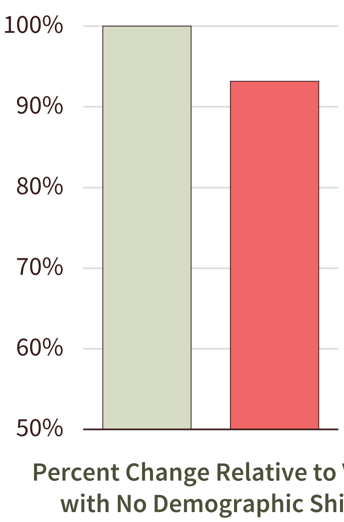
- Decrease in vehicle ownership—current trends indicate millennials are more focused on urban living and are foregoing car ownership in greater numbers or are buying fewer cars as they form families.
- Increase in gasoline prices—while gasoline prices tend to fluctuate substantially, general prices are projected to remain at the high levels that helped produce the VMT slowdown in the early 2000's.
- Increase in non-auto mode options—the expansion of light rail, pedestrian and bicycle options over the next 20 years is expected to increase the non-auto mode options available to Seattle's residents and workers. While the travel model is sensitive to increased transit levels, it does not have the detail related to the pedestrian or bicycle network.
- Increase in social networking—the sharing economy and web connectivity will continue to change human interaction potentially reducing solo travel and recreational driving.
- Increase in internet shopping—with the increase of internet shopping and same-day delivery, consumer VMT would decrease; this increase would be offset to some extent by the increase in VMT generated for goods delivery, but commercial delivery is generally more efficient than individuals driving to stores.

This scenario translates to an estimated VMT per capita decrease of nearly seven percent from 2015 to 2035. This estimate would bring the travel model's projection of 2.9 PM peak period VMT per capita down to 2.7 (compared to 3.3 PM peak period VMT per capita in 2015). On an aggregate basis, this reduction in VMT is roughly 300 million annual vehicle-miles and translates into several important outcomes:

- GHG emissions from transportation roughly track VMT generation and a seven percent decrease in VMT would translate into a seven percent decrease in transportation-related GHG emissions.
- Based on the predicted 2035 mode splits, the VMT reduction would translate into more than 30 million additional transit passenger miles traveled. This will increase demands on the transit system and strengthens the need for the improvements identified in the TMP.

Overall, trends are pointing to the continued decrease in VMT generation per capita, although at a slower pace than has been observed over the past several years. The overall evaluation prepared for this EIS is consistent with other environmental documents prepared in the region, since it is based on the regionally adopted (PSRC) model. However, based on the output from TrendLab+, the PSRC-based models may have a slight bias toward increased VMT generation that may be seen over the coming years. The TrendLab+ output supports the City's broad vision to better balance multimodal travel needs across Seattle.

Figure A.4–4
2035 VMT per capita



MEMORANDUM

Date: January 9, 2015

To: Gordon Clowers and Kristian Kofoed, City of Seattle DPD

From: Chris Breiland and Ariel Davis, Fehr & Peers

Subject: Seattle Screenline Capacity Methodology

SE14-0337

At the outset of the Seattle Comprehensive Plan update, DPD Director's Rule 5-2009 was used to provide total capacities at each of the City's designated screenlines. These capacities were developed to represent the transportation system in 2008. Over the course of analysis, it became clear that the capacities at various screenlines needed to be re-examined to reflect current (2015) conditions. Fehr & Peers, building from a foundation of nationally accepted standards, developed a methodology to estimate capacity across Seattle's screenlines. This memorandum describes that methodology.

The foundation of the capacity methodology is Florida Department of Transportation's (FDOT) generalized service volume tables which are based on the 2010 Highway Capacity Manual's capacity methodology. These tables use "typical" default values to determine the capacity of a roadway based on characteristics such as its number of lanes, presence of turn lanes, presence of medians, signal density etc. The typical process is described below. For each arterial crossing a screenline, the following information was collected for each direction of travel:

- Number of through lanes;
- Speed Limit – 40 mph or higher is categorized as a Class I roadway and 35 mph or slower is categorized as a Class II roadway, based on FDOT's definitions;
- Presence of median – this includes a physical barrier or a two-way left turn lane, either of which results in no obstructions of through lanes by left-turning vehicles;
- Presence of exclusive left turn lane or left turn pocket at major intersections;

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- Presence of exclusive right turn lane at major intersections – only applied if there was sufficient storage to accommodate all right turning vehicles such that the through lanes are not blocked, for example roadways with BAT lanes or right turn only lanes; and
- One-way or two-way operations.

This data was entered into a spreadsheet that calculates the capacity based on the "signalized arterials" section of FDOT's Generalized Service Volume Table 7, included as an attachment to this memotemp. Table 7 provides directional peak hour capacities for urbanized areas such as Seattle. As shown in Table 7, a base capacity is assigned depending on the number of lanes and speed limit, and standardized adjustments are applied based on the remaining characteristics: presence of median, presence of turn lanes, and directionality.

The vast majority of Seattle's arterials fall into the Class II signalized roadway category (roadways with a speed limit of 35 mph or less). However, for many of those roadways, we found that FDOT's typical capacities were below the observed counts collected by the Seattle Department of Transportation (SDOT) on Seattle arterials, indicating that SDOT's management of key arterial roadways (for instance, signal timing) results in higher capacities than predicted by FDOT's typical characteristics.

To calibrate to local conditions, we used Highway Capacity Software to adjust the parameters of the "typical" analysis such that most of the City's busiest arterials were operating below, but very near, capacity. This calibration was completed by adjusting the default "g/C ratio." The g/C ratio reflects the percentage of "green time" that is allocated to the arterial at intersections. This ratio was adjusted upward to reflect that SDOT allocates green traffic signal time to maximize vehicle throughput on key arterials during the PM peak hour. After testing a variety of values, the g/C ratio was adjusted from 0.44 to 0.52, which results in a 20 percent increase over FDOT's base capacities. Application of this factor more closely reflects local observed conditions (i.e. observed flow does not consistently exceed capacity). This "Typical Seattle g/C Factor" was applied to Class II roadways only.

There remained a small number of Class II arterials for which the modified FDOT methodology described above is not well suited, such as the Ship Canal bridges which have substantially higher observed flows than most other roads in the City. For those locations, parameters were further calibrated to observed conditions to obtain a "High Capacity g/C Factor" that results in a 30 percent increase in the typical FDOT capacities, reflecting a g/C ratio of 0.56. This adjustment was applied at three locations: the Fremont Bridge, University Bridge, and Montlake Bridge.[1]

Capacities for high-speed arterials categorized as Class I roadways, freeways, or uninterrupted flow highways were calculated using FDOT's Table 7, with no further modifications. Those instances are described in the following table.

TABLE 1. HIGH SPEED ROADWAY CAPACITIES[2]

Screenline	Arterial	Methodology
1.11	Aurora Avenue N south of N 145th Street	Class I divided roadway with two through lanes in each direction and an exclusive right turn lane (BAT lane) in the northbound direction
3.11	West Seattle Bridge west of the Alaskan Way Viaduct on-ramp	Uninterrupted flow highway with three through lanes in each direction and an auxiliary lane (bus lane) in the eastbound direction
3.12	First Avenue S Bridge	Freeway with four lanes in each direction
4.11	Rainier Avenue S southeast of 75th Avenue SE	Due to its unusual characteristics (unsignalized arterial for over two miles), this location was analyzed within Highway Capacity Software to obtain an individualized capacity. The basic characteristics are one through lane in each direction with a two way left turn lane acting as both a median and exclusive left turn lane.
4.13	SR 99 southeast of Cloverdale Street on-ramp	Class I divided roadway with two through lanes in each direction
4.13	Airport Way S north of S Norfolk Street	Class I divided roadway with two through lanes in each direction
5.11	Ballard Bridge	Uninterrupted flow two-lane roadway in the southbound direction; the 5 percent reduction for an undivided roadway was applied rather than the 25 percent reduction since no left turns are permitted. Class I three-lane roadway with exclusive left turn lane in the northbound direction (approaching Market Street)
5.13	Aurora Bridge	Uninterrupted flow divided highway with three through lanes (a median was assumed since that is the prevailing condition along the segment beyond the bridge)

[1] The High Capacity g/C Factor was applied in the place of, not in addition to, the Typical Seattle g/C Factor.
[2] These include Class I roadways, freeways, and uninterrupted flow highways.

TABLE 1. HIGH SPEED ROADWAY CAPACITIES[2]

Screenline	Arterial	Methodology
9.11	Fauntleroy Way SW west of the Seattle Bridge	Uninterrupted flow divided highway with two through lanes in each direction
9.11	W Marginal Way SW south of Spokane Street	Class I divided roadway with two through lanes in each direction
9.12	Alaskan Way north of East Marginal Way	Uninterrupted flow divided highway with two through lanes in each direction
10.11	Alaskan Way Viaduct northwest of First Avenue ramp	Freeway with three through lanes (the condition at the time the count was taken)

Source: Fehr & Peers, 2015.

The same methodology was applied for the 2035 analysis. The vast majority of locations were assumed to retain the same capacity as existing conditions. Exceptions include roadways with planned cycletracks that may require road diets, and reasonably foreseeable projects such as the replacement of the Alaskan Way Viaduct, which results in changes to the capacity of Alaskan Way and SR 99.

The methodology was also applied for the twelve urban center screenlines with the prefix "A." Since these locations are located in urban centers that tend to have lower throughput, often due to congestion on I-5, the Typical Seattle g/C Factor of 20 percent was not universally applied, consistent with the lower traffic counts observed on these streets. However, there were two arterials where the Typical Seattle g/C Factor was applied since they have relatively high g/C ratios and little cross-street traffic: Montlake Blvd NE north of NE Pacific Place (Screenline A9) and Elliott Avenue W east of W Mercer Place (Screenline A4).

TABLE 7

Generalized **Peak Hour Directional** Volumes for Florida's **Urbanized Areas**[1]

12/18/12

INTERRUPTED FLOW FACILITIES

STATE SIGNALIZED ARTERIALS

Class I (40 mph or higher posted speed limit)

Lanes	Median	B	C	D	E
1	Undivided	*	830	880	**
2	Divided	*	1,910	2,000	**
3	Divided	*	2,940	3,020	**
4	Divided	*	3,970	4,040	**

Class II (35 mph or slower posted speed limit)

Lanes	Median	B	C	D	E
1	Undivided	*	370	750	800
2	Divided	*	730	1,630	1,700
3	Divided	*	1,170	2,520	2,560
4	Divided	*	1,610	3,390	3,420

Non-State Signalized Roadway Adjustments

(Alter corresponding state volumes by the indicated percent.)

Non-State Signalized Roadways - 10%

Median & Turn Lane Adjustments

Lanes	Median	Exclusive Left Lanes	Exclusive Right Lanes	Adjustment Factors
1	Divided	Yes	No	+5%
1	Undivided	No	No	-20%
Multi	Undivided	Yes	No	-5%
Multi	Undivided	No	No	-25%
–	–	–	Yes	+ 5%

One-Way Facility Adjustment

Multiply the corresponding directional volumes in this table by 1.2

BICYCLE MODE[2]

(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder/Bicycle Lane Coverage	B	C	D	E
0-49%	*	150	390	1,000
50-84%	110	340	1,000	>1,000
85-100%	470	1,000	>1,000	**

PEDESTRIAN MODE[2]

(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Sidewalk Coverage	B	C	D	E
0-49%	*	*	140	480
50-84%	*	80	440	800
85-100%	200	540	880	>1,000

BUS MODE (Scheduled Fixed Route)[3]

(Buses in peak hour in peak direction)

Sidewalk Coverage	B	C	D	E
0-84%	> 5	≥ 4	≥ 3	≥ 2
85-100%	> 4	≥ 3	≥ 2	≥ 1

UNINTERRUPTED FLOW FACILITIES

FREEWAYS

Lanes	B	C	D	E
2	2,260	3,020	3,660	3,940
3	3,360	4,580	5,500	6,080
4	4,500	6,080	7,320	8,220
5	5,660	7,680	9,220	10,360
6	7,900	10,320	12,060	12,500

Freeway Adjustments

Auxiliary Lane	Ramp Metering
+ 1,000	+ 5%

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
1	Undivided	420	840	1,190	1,640
2	Divided	1,810	2,560	3,240	3,590
3	Divided	2,720	3,840	4,860	5,380

Uninterrupted Flow Highway Adjustments

Lanes	Median	Exclusive left lanes	Adjustment factors
1	Divided	Yes	+5%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

[1] Values shown are presented as peak hour directional volumes for levels of service and are for the automobile/truck modes unless specifically stated. This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications of the Highway Capacity Manual and the Transit Capacity and Quality of Service Manual.

[2] Level of service for the bicycle and pedestrian modes in this table is based on number of motorized vehicles, not number of bicyclists or pedestrians using the facility.

[3] Buses per hour shown are only for the peak hour in the single direction of the higher traffic flow.

* Cannot be achieved using table input value defaults.

** Not applicable for that level of service letter grade. For the automobile mode, volumes greater than level of service D become F because intersection capacities have been reached. For the bicycle mode, the level of service letter grade (including F) is not achievable because there is no maximum vehicle volume threshold using table input value defaults.

Source:
Florida Department of Transportation
Systems Planning Office
www.dot.state.fl.us/planning/systems/sm/los/default.shtm

2012 FDOT QUALITY/LEVEL OF SERVICE HANDBOOK TABLES

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A.5 Public Services Appendix

Existing Policy Guidance

POLICE SERVICES

Seattle Comprehensive Plan

The City of Seattle Comprehensive Plan (City of Seattle 2005) is a 20-year policy plan containing goals and policies that articulate a vision for how the city will grow in ways that sustain its citizens' values. One of the plan's 12 elements—Human Development—contains policies to decrease crime per capita, increase perception of police presence and educate people about crime prevention and organized neighborhood safety activities. The Comprehensive Plan also identifies the following planning goal:

> *Patrol units allocated around-the-clock based on calls for service. Location and size of facilities not critical to service provision. Facilities planning is based on guidelines for public safety office space.*

Seattle Police Department Strategic Plan

The Seattle Police Department's most recent Strategic Plan (2004) identifies challenges and opportunities that the Department is likely to face during the planning period (2003-2010) and articulates major goals and strategies to help accomplish its mission.

Major issues and implications related to the provision of police services include:

Issue Added densities in urban centers and villages will create greater concentrations of people and jobs.

__Implication__ Need to review officer deployment strategies—foot and bike beats versus motor patrol; added emphasis on creative problem-solving [a police beat is a geographic area that is patrolled by a police officer].

Issue Transportation congestion likely to worsen with new construction projects, especially light rail and monorail, while the demand for officer hours to police special events is expected to grow.

__Implication__ Need to review adequacy of staffing for these purposes, consider creative alternatives.

The following goal and strategies address the provision of police services:

Goal 1 *Strengthen Geographic Integrity: Respectful, professional and dependable law enforcement is built from the "ground-up" by officers who have a strong connection to the people they serve. SPD is pursuing a set of strategies designed to ensure that officers identify with discrete geographic areas and are deployed in these areas in a manner that enhances their capacity to interact effectively with those who live, work, visit and attend school there. These strategies are, as follows:*

- *Redraw police beats to focus officer attention in limited geographic areas that they can come to know very well.*
- *Review call priorities and dispatch protocols to reduce unproductive deployment, ensure adequate coverage and free up officer time for community engagement and proactive and preventive enforcement actions.*
- *Develop resources and models for effective public engagement by officers.*

Seattle Police Department Neighborhood Policing Staffing Plan

The Seattle Police Department Neighborhood Policing Staffing Plan (2007) was developed in response to the variability of meeting the response time goal of 7 minutes, workload imbalance and limited time spent by patrol officers on proactive and problem solving activities. The Plan recommends the following approaches to resolve these issues:

- Addition of 154 patrol officers between 2005 and 2012, a 25 percent increase, to help meet the targets for faster response time and more time spent on proactive problem solving. Forty-five patrol officers were authorized for hire in advance of the plan.
- Revise patrol officers' work shifts to match the workload.
- Redraw patrol beats to allow for more balanced and effective deployment of patrol officers.

FIRE AND EMERGENCY MEDICAL SERVICES

Seattle Comprehensive Plan

The City of Seattle Comprehensive Plan (City of Seattle 2005) contains policies in the Human Development Element to reduce environmental threats and hazards to health in the community. The Comprehensive Plan also identifies the following planning goal:

Maintain a response time of 4 minutes or less to 90 percent of all fire and emergency medical service (EMS) emergencies.

Seattle Fire Department Strategic Plan

The Seattle Fire Department regularly evaluates their response times and forecasts workload demands consistent with Strategy 3 of their 2012 Strategic Plan (Seattle Fire Department 2012b):

Strategy 3 *Conduct periodic evaluations of the deployment model and revise the model as needed.*

Action Steps:

- *Establish a standing committee to review and annually evaluate the deployment model.*

- *Establish and prioritize deployment outcome objectives such as reducing response times and optimizing coverage to high risk areas and target populations.*
- *Compile historical data, perform trend analysis and forecast deployment workloads.*

PARKS AND RECREATION

Seattle Comprehensive Plan

The City of Seattle Comprehensive Plan (City of Seattle 2005) contains goals and policies that encourage the location and expansion of parks in urban villages and urban centers and a network of connections linking urban centers, urban villages and the regional open space system. Most neighborhood plans identified in the Neighborhood Planning Element also contain policies that address the need for preserving and expanding the parks and open space system. The following are key goals and policies from the Seattle Comprehensive Plan that address the provision of parks and open space:

Urban Village Element

Goal UVG39 *Enhance the urban village strategy through the provision of:*

1. *Amenities in more densely populated areas*
2. *Recreational opportunities for daytime populations in urban centers*
3. *Mitigation of the impacts of large scale development*
4. *Increased opportunities to walk regularly to open spaces by providing them close by*
5. *Connections linking urban centers and villages, through a system of parks, boulevards, community gardens, urban trails and natural areas*
6. *A network of connections to the regional open space system*
7. *Protected environmentally critical areas*
8. *Enhanced tree canopy and understory throughout the city*

Capital Facilities Element

Policy CF9 *Encourage the location of new community based capital facilities, such as schools, libraries, neighborhood service centers, parks and playgrounds, community centers, clinics and human services facilities, in urban village areas. The City will consider providing capital facilities or amenities in urban villages as an incentive to attract both public and private investments to an area.*

Cultural Resource Element

Policy CR4 *Continue Seattle's long tradition of providing a rich variety of public open spaces, community gardens and public facilities to provide residents with recreational and cultural opportunities, promote environmental stewardship and attract desirable economic development.*

Policy CR7 *Promote the development or expansion of cultural facilities, including libraries, schools, parks, performing arts and art exhibition facilities, museums and community centers, in areas designated as urban villages and urban centers.*

Seattle Department of Parks & Recreation Development Plan

The Seattle Department of Parks and Recreation (Parks) last updated its comprehensive plan in November 2011. The 2011 Development Plan is a revision of the original 1993 Parks

COMPLAN that addressed open space, park and recreation services for a 10– to 20–year time frame (Seattle Parks and Recreation 2011b). The document was revised in 2000 and again in 2006, and will be updated in 2016. The 2011 Development Plan describes Parks' acquisition and development goals and policies through 2017. The document also incorporates the City's 2011–2016 Capital Improvement Program for parks and recreation facilities. The following are key goals and objectives that address the provision of parks and open space:

> ***Goal 1*** *Provide recreation and learning opportunities by providing and maintaining an adequate balance of parks, open spaces, recreational facilities and programs tailored to their need to promote respite, socialization and education.*
>
> ***Objective 1.1*** *Provide for the number and distribution of park and recreation facilities based upon community demands and consideration of distribution guidelines as presented later in this document.*
>
> ***Objective 1.3*** *Provide and maintain a sufficient geographic distribution of facility and park amenities that support programming such as art, music and environmental education.*
>
> ***Goal 3*** *Acquire property for parks and open space to fill the identified gaps in usable open space and to manage future growth and change consistent with the City's growth management goals and policies as outlined in the City's Comprehensive Plan.*
>
> ***Objective 3.1*** *Plan for preservation and acquisition of other open space on a geographic basis. The quantity of open space will be based upon the following considerations:*
>
> 1. *Distribution guidelines presented later in this document.*
> 2. *Usable open space as identified in the Parks 2010 Open Space Gap Analysis report.*
> 3. *The open space functions of boulevard trails, green streets and public shoreline access in meeting open space needs shall be recognized. A distribution guideline for shorelines is presented later in this document.*
> 4. *Unique characteristics of properties, user patterns (local, citywide and regional) and densities in the analysis of open space needs shall be considered.*
> 5. *Available opportunities, long-term budget impacts and priorities as established in the City's Comprehensive Plan shall be considered in each potential acquisition.*
>
> ***Objective 3.4*** *In general, priority for the expansion of the open space network shall be given to areas of the City subject to population growth, including urban villages targeted for the largest share of residential growth and those areas not adequately served at present according to the population-based goals for open space.*

Seattle Parks Legacy Plan

The Seattle Parks Legacy Plan establishes a strategic direction for the future to ensure that Seattle parks and facilities are accessible, full of opportunity, and financially and environmentally sustainable for everyone who wants to use them. The Parks Legacy Plan includes a detailed data assessment of parks operations, recreation programs, maintenance costs, and public input on Seattle's park system. The Parks Legacy Plan also includes goal statements regarding planning and development, recreation, regional/specialty parks, maintenance, and department-wide policies.

Neighborhood Park Plans

Neighborhood park plans were developed for First Hill Urban Center, North Downtown and University District (Seattle Parks and Recreation 2004; 2005a; 2005b). These park plans identify approaches to addressing existing and projected open space deficits according to the standards of the Comprehensive Plan. The Downtown Parks Renaissance report is another neighborhood plan that provides recommendations to revitalize existing parks in downtown (Seattle Parks and Recreation 2006).

PUBLIC SCHOOLS

Seattle Comprehensive Plan

The City of Seattle Comprehensive Plan (City of Seattle 2005) contains goals and policies directing the City to encourage the location and expansion of schools in urban villages and urban centers and the improvement of the multi-modal transportation system to increase access to schools. In the Neighborhood Planning Element, most neighborhood plans have included policies that address the need for safe access to schools and, for a few neighborhoods, the need for new school facilities. The following are key goals and policies from the Seattle Comprehensive Plan that reference public school services:

Land Use Element

Goal LUG67 *Provide opportunities for residents of transit communities to lower their cost of living by providing safe and convenient walking or transit access to employment, education and goods and services to meet their daily needs.*

Goal TG13 *Provide mobility and access by public transportation for the greatest number of people to the greatest number of services, jobs, educational opportunities and other destinations.*

Policy T30 *Improve mobility and safe access for walking and bicycling, and create incentives to promote non-motorized travel to employment centers, commercial districts, transit stations, schools and major institutions and recreational destinations.*

Policy T33 *Accelerate the maintenance, development and improvement of pedestrian facilities, including public stairways. Give special consideration to: a) access to recommended school walking routes.*

Capital Facilities Element

Policy CF9 *Encourage the location of new community based capital facilities, such as schools, libraries, neighborhood service centers, parks and playgrounds, community centers, clinics and human services facilities, in urban village areas. The City will consider providing capital facilities or amenities in urban villages as an incentive to attract both public and private investments to an area.*

Policy CF15 *Work with the School District to encourage siting, renovation and expansion of school facilities in areas that are best equipped to accommodate growth.*

Human Development Element

Policy HD19 *Work with community colleges, universities and other institutions of higher learning to promote life-long learning opportunities for community members and encourage the broadest possible* *use of libraries, community centers, schools and other existing facilities throughout the city, focusing on development of these resources in urban village areas.*

Policy HD51 *Work to ensure equitable sharing and siting of facilities in ways that promote access and efficient use of community resources: b) Encourage use of existing facilities and co-location of services, including joint use of schools and City and community facilities, to make services more available in urban village areas.*

Cultural Resources Element

Policy CR7 *Promote the development or expansion of cultural facilities, including libraries, schools, parks, performing arts and art exhibition facilities, museums and community centers, in areas designated as urban villages and urban centers.*

Seattle Public Schools Facilities Master Plan

The Seattle Public Schools Facilities Master Plan (SPS 2012b) outlines planned improvements to existing facilities (renovations, additions and replacements) and new school construction. To guide long range facility planning, the Seattle School Board adopted the following list of priorities in descending order of importance, although no single factor is considered determinative:

1. All projects should align with the District's mission and vision.
2. The health, safety and security of students, staff and public are important and must be protected.
3. Capacity Management needs must be met to assure that short, intermediate and long-term enrollment are matched with available space, taking into account costs and educational adequacy of facilities.
4. Building condition scores for building systems, such as exterior, HVAC, plumbing, structural
5. Educational adequacy of buildings, focusing on raising student achievement.
6. Planning will take into account past capital projects and future levy plans.

Seattle Public Schools Guidelines for New or Modernized Schools

SPS does not establish minimum site size or acreage standards for schools of a certain grade level or enrollment range. The Board has adopted Educational Specifications to support specific types and sizes of schools. These specifications are used to guide the design of new and significantly modernized schools. For more information, see Design Standards and Educational Specifications.