APPENDIX B

Horizon 2040 Land Use Documentation and Planning Assumptions

HORIZON 2040

Spokane Metropolitan Transportation Plan

APPENDIX B

Horizon 2040 Land Use Documentation and Planning Assumptions

The model set used for the Horizon 2040 Metropolitan Transportation Plan (MTP) includes a base year of 2015 and a forecast year of 2040. Land use was interpolated for each interim year between 2015 and 2040 to be used as needed.

Federal transportation planning regulations require documentation of the input assumptions and methods used for developing forecasts. This documentation includes an inventory of the current state of transportation in the planning area, key planning assumptions used in developing forecasts, and descriptions of the methods used to develop forecasts of future travel demand.

INVENTORY OF CURRENT CONDITIONS

The foundation for any travel forecast is a comprehensive inventory of current conditions of transportation supply and demand. The current transportation network (including roadways, transit, nonmotorized and freight) and conditions (including Vehicle Miles Traveled, congestion, and land use) are documented in Chapter 2 - Where We're At.

PLANNING ASSUMPTIONS

The principal determinants of any long-range travel demand forecast are the planning assumptions about the growth and distribution of population, developed land, and individual travel preferences.

LAND USE

A key aspect of SRTC's travel demand model is land use. For SRTC's purposes, land use consists of housing units, employees, hotel rooms, and higher education commuter students (see illustration in Figure B.1). These land uses play an important role in development of the model as they are key inputs for the generation and distribution of trips.

Figure B.1 Generalized Land Use in the Travel Demand Model

Land Use Categories

For modeling purposes, these land uses are broken down into 12 detailed categories, which are associated with different travel behaviors. For example, a commercial establishment such as a drive through fast food restaurant is likely to generate more traffic than an office of the same size and number of employees. Significant research and sources detailing travel behavior exist. These

tools are used to predict the type of travel that will occur for any housing unit, business establishment, or other traffic generator. The type of trips and time of day they are taken differ as well. **Table B.1** lists the land use categories used in the SRTC model.

Table B.1 SRTC Land Use Categories

Land Use Type	Description	Unit Measurement
1	Single Family Residential	Housing units
2	Multi-Family Residential	Housing units
3	Hotel/Motel	Rooms or camp spaces
4	Agriculture, Forestry, Mining, Industrial, Manufacturing Wholesale	Employees
5	Retail Trade (Non-Central Business District)	Employees
6	Services and Offices	Employees
7	Finance, Insurance, and Real Estate Services (FIRES)	Employees
8	Medical	Employees
9	Retail Trade (CBD)	Employees
10	Higher Education Commuter Students	Higher education commuter students
11	Education Employees	Employees
12	University Employees	Employees

Traditionally, SRTC has used Standard Industrial Classification Codes (SIC) to determine the appropriate land use category for any given employer/establishment. SIC are four-digit codes created by the federal government. SIC is being replaced by the more modern, six-digit, North American Industry Classification System (NAICS) codes. SRTC's land use categories are SIC based. Staff devised a method to use the modern NAICS codes in SRTC's SIC based land use categories and outlined a process to convert all Employer data from SIC to NAICS. This allows for the assignment of NAICS based employers into SRTC's SIC based land use categories.

Transportation Analysis Zones

Each land use has a value for the number of housing units, employees, hotel/motel rooms, or higher education commuter students. Whatever the data source, all land uses are geocoded by SRTC staff. Geocoding assigns a point location to all data, based on tabular information such as an address. Using Geographic Information Systems (GIS), the land use totals are aggregated by Transportation Analysis Zone (TAZ), which are the primary units of analysis in the SRTC travel demand model.

The final product that is supplied to SRTC modeling staff is a table containing the total of each type of land use, for each of the 519 TAZ zones (see **Table B.1** for example).

Figure B.1 Generalized Land Use in the Travel Demand Model

TAZ Number	Single Family Housing	Multi-Family Housing	Hotels/ Motels	Industrial Employees	Retail Employees
227	295	0	0	9	27
228	371	0	0	6	1
229	318	0	0	10	9
230	326	254	0	158	86
231	490	86	0	4	27
232	451	5	0	13	2
233	217	5	0	12	70
234	323	0	0	0	0
235	29	762	0	60	287
236	404	0	0	34	13
237	274	331	0	4	85

In addition to being used for travel modeling, TAZs are also the geographic units for which specialized data products are

published, such as Census Transportation Planning Products (CTPP).

2015 LAND USE DEVELOPMENT

SRTC staff used numerous data sources to establish the land use values for the 2015 base year model (**Table B.3**). Several additional steps are taken to ensure the accuracy of the base land use data.

Table B.3 (2015) Land Use Values

Category	2015 Base
Population	488,310
Employment	206,232
Hotel Rooms	8,013
Higher Education Commuter Students	24,785

Housing Units

For travel demand modeling, the SRTC model uses single-family and multi-family housing units to represent where people live as part of the trip generation process. For Housing Unit (Single Family and Multi Family) categories, staff used the housing unit counts directly from the 2010 Decennial Census. Building permits from April 2, 2010 through April 30, 2015 were compiled and added to the 2010 housing unit data. Permits are acquired from the local jurisdictions. The building permits include new single family and multi-family housing, housing unit demolitions, and relocated housing units.

Housing Unit Vacancy Rates

SRTC staff apply a housing unit vacancy rate to each TAZ within the model. Occupied, vacant, and total housing unit counts are available in the 2010 decennial Census. SRTC staff used this data to calculate a vacancy rate for each TAZ in Spokane County. The rate was applied to the Single Family (SF) and Multi-Family (MF) housing units in each TAZ. This method allows the model to reflect the spatial difference in vacancy rates throughout Spokane County and the SRTC TAZ structure. For new housing units between 2010 and 2015, as well as forecasted housing unit growth to 2040, the 2010 county-wide vacancy rate is applied. Analysis of historical vacancy rates and trends was performed. Due to this review, it was determined that applying the 2010 rate to new and forecasted units best reflected the most likely future vacancy rates.

Employment

The primary source for employment data is Washington State's Employment Security Department (ESD). This dataset contains most of the employers and establishments in Spokane County. This includes their location, number of employees, and industrial classifications (NAICS Code), among numerous other attributes. Staff takes measures to ensure the confidentiality of individual establishments is maintained, per agreement with ESD. Staff research supplements the ESD data in cases where clarification or further detail is needed. For example, many employers report their information to ESD at a single location such as a headquarters, instead of the multiple office locations their employees report to. In these cases, staff refines the ESD data to account for the number of employees at each location. Significant research is performed to maintain a high level of accuracy as to the location, type, and number of employees for each establishment. Larger and medium size establishments are reviewed even more carefully to insure their accurate reflection in the travel demand model.

Hotel and Motel Rooms

For hotel, motel, and other temporary accommodations, SRTC uses data from the Washington State Department of Health (DOH) on transient accommodations. Staff research supplements the data provided by DOH and provides clarity in cases of absent or incomplete information. (**Table B.4)**

Higher Education Commuter Students

SRTC staff generates the higher education commuter student's category by contacting the higher education institutions throughout Spokane County. Generally, higher education establishments provide SRTC with their total enrollment, and their total resident student population. The resident student population is subtracted from total enrollment to determine the commuter student population. When applicable, other non-commuting populations such as online only students are removed from the commuter student population as well. (**Table B.4**)

Table B.4 Hotels and Higher Education 2040 Land Use Forecasts

Category	2040 Forecast	2015-2040 Growth
Hotel Rooms	11,273	3,260
Higher-Education Commuter Students	42,308	17,523

2040 LAND USE DEVELOPMENT

The first step in producing land use for 2040 was determining an appropriate forecast of population and employment for all of Spokane County.

SRTC Board and Committee Review

Staff briefed the SRTC Policy Board and Transportation Technical Committee (TTC) in 2016 on historical trends in population and employment growth, how other MPOs were forecasting, and current and recent forecasts from various agencies. In October of 2016 the SRTC Policy Board adopted the following forecast (**Table B.5**).

Population Forecast

In the Spring of 2012 Washington State's Office of Financial Management (OFM) Forecasting Division released their 2012 forecast series for Growth Management. This series is released by OFM every five years to allow counties to perform required planning under Washington State's Growth Management Act (GMA). In 2016, Spokane County adopted the medium range forecast developed by OFM to 2037. Also adopted were allocations of future population growth to each jurisdiction within and including Spokane County. As the lead planning agency under GMA, municipalities within Spokane County are required to use this forecast and associated allocations for their growth management planning. The OFM forecast is developed to the year 2040. In October of 2016, the SRTC Policy Board adopted OFM's medium series forecast for 2037 and 2040. This adoption positioned SRTC's forecast in line with forecasts used in local planning for Spokane County and municipalities within.

Employment Forecast

For forecasting employment in this update to Horizon 2040, SRTC staff recommended maintaining the employment forecast method used in the previous version of Horizon 2040. Staff adjusted the previously adopted employment forecast to reflect the lower population forecast being used in the region. While the total employment forecast was lowered, the percent of employment growth allocated to local jurisdictions was maintained. Change in employment totals between 2010 and 2015 were reflected in the updated based land use. The adjusted lower employment forecast as well as the maintained allocations to local jurisdictions, were brought before the SRTC policy board and adopted by the SRTC policy board in October of 2016.

Table B.5 Adopted 2040 Land Use Forecast

Category	2040 Forecast	2015-2040 Growth
Population	592,969	104,659
Employment	244,995	44,024

Sub-County Allocations

In addition to adopting a 2040 population and employment forecast, the SRTC Policy Board also adopted growth allocations for each jurisdiction in Spokane County. This process of allocating the future growth is equally as important as the forecast itself. Where growth occurs plays a major role in how the travel demand model reflects future travel patterns and demand.

Population

SRTC's Policy Board adopted the jurisdictional allocations of population that was regionally adopted for growth management purposes. The allocations were adjusted from OFM's 2037 forecast to reflect SRTC's adoption of OFM's medium forecast to the year 2040. Table B.6 illustrates the adopted population allocations.

Employment

SRTC's Policy Board adopted allocations of future employment growth for each jurisdiction. These employment allocations reflected the same distribution of employment growth adopted in the 2013 adoption of Horizon 2040. These allocations were uniformly lowered to reflect the lower overall population forecast to 2040. Adopted allocations of employment growth can be seen in table B.7. Further detail on the analysis and methods used to determine employment growth allocations in 2012 and 2013 are detailed below.

Analysis used to determine 2015 adopted employment allocations

To effectively allocate future employment growth SRTC staff felt a good understanding of historical employment growth trends was necessary. Unlike population, there is no comprehensive analysis on employment (commercial, industrial, etc.) capacity. The PTAC did complete an industrial and commercial LQA, to a degree of less detail than in the residential LQA report. Staff has consulted both the commercial and industrial LQA in this process. Essentially, there is excess capacity throughout Spokane County for both commercial and industrial acreage. There is difficulty in determining the exact capacity of employment as there are so many variables depending on the type of business or agency occupying a location. There is capacity for all the forecasted employment growth in any number of areas.

As a tool in determining where to allocate future employment, SRTC compiled a set of historical land use data used for agency modeling purposes. After review, the best quality datasets were from the years 1995 and 2000. Both sets of land use data used a TAZ structure known as *TAZ428*. They were added using GIS overlay to the *TAZ428* GIS based features so they could be compared. The 2010 employment based land use was also added to the *TAZ428* structure. The result was a TAZ structure that had three different time periods of land use. Certain land uses that did not exist in the older historical data were removed to compare the same datasets over time. Calculations were then made comparing the employment based land use from each time period to each other. The result was a TAZ structure where the historical land use could be compared: 1995, 2000, and 2010.

An approximation of jurisdictional growth during the same 1995, 2000, 2010 periods was made using the *TAZ428* analysis as well. TAZs that most closely reflected 2010 municipal boundaries have historical growth trends generated from the *TAZ428* analysis.

The US Census Bureau Program Local Employment Dynamics (LED) uses state employment agency data to share and analyze

employment related data. For Washington State, the LED program partners with Washington's Employment Security Department. SRTC used data from this program to track jurisdictional employment over time. Using SRTC's trends analysis as well as data from the Census Bureau's LED program allowed for comparison of employment trends. In general, the two data sources were consistent in reflecting the same employment trends by jurisdiction over time.

Due to the recent economic recession, most jurisdictions as well as the county have recently experienced a decrease in total employment. These decreases are temporary and should generally not be viewed as long term trends. In nearly all cases the economic effects of the recession can be sorted through, and the long-term trends can still be interpreted.

The employment allocations used in the SRTC forecast model are based on current (2012) municipal boundaries. Jurisdictional planning staffs in coordination with SRTC staff distributed their land use allocations based on 2012 jurisdictional boundaries without assumption or speculation as to future municipal boundaries and annexations.

Analysis for Jurisdictional Employment Allocations

The following section outlines the general employment trends by jurisdiction from the two separate data sources listed above. A generalization of the recent trends and development in employment using these two sources is summarized in the comments for each jurisdiction. As SRTC and agency staff determined the most appropriate employment forecast for each jurisdiction, both sources of historical employment trends (Census LED, SRTC Trends Analysis) were a valuable supplement used in determining future growth. Tables of these employment trends are included for each jurisdiction. See **Table B.6** for jurisdictional employment trends.

Airway Heights:

SRTC trends analysis for the City of Airway Heights shows very strong employment growth, as well as a larger and larger share of total employment in Spokane County. LED data show the same trend from 2002-2010. SRTC would expect these trends to continue. The West Plains has seen significant development in recent history and this trend is expected to continue. The potential for continued development along Highway 2, industrial and aerospace development, and tribal trust lands development suggest the City of Airway Heights will continue to grow and have a larger share of total employment in 2040 than it does now. The City also has a significant population capacity of 3,944 listed in the May 2011 LQA report. It is also expected that some non-residential development in the area will occur to support the local population growth. The City of Airway Heights has considerable acreage of undeveloped land to support its continued growth. SRTC suggests a share of total employment at three percent of countywide total in 2040.

Cheney:

Based on LED data, Cheney is slowly increasing its total share of employment in Spokane County. SRTC trends analysis suggests this as well. Cheney has seen healthy employment growth over the last ten to fifteen years. Cheney is unique in that a major portion of its employment and residences are due to Eastern Washington University (EWU). Cheney has capacity for over 3,300 persons according to the May 2011 LQA report. Growth of EWU, the general population, and a continued healthy employment base in the area are expected. Cheney has a larger portion of non-working population since there are several thousand resident university students. The employment growth in Cheney has not been as rapid as Airway Heights or Liberty Lake; however, it is expected that Cheney's share of total county employment will increase to 2.5 to 3 percent of the countywide total.

Deer Park:
Both LED data and SRTC trends show a small but steady increase in the City of Deer Park's share of total employment in Spokane County. There is population capacity of 2,405 according to the May 2011 LQA report. SRTC expects continued moderate but steady employment growth in Deer Park to support its growing residential population. In SRTC's allocations the current ratio between population and employment is forecasted to remain the same over the forecast period.

Liberty Lake:
Liberty Lake has had major growth in employment according to the SRTC trends analysis. LED data also suggests significant growth; however total employment is somewhat erratic. There is much evidence of employment growth in Liberty Lake from other sources. Large increases in population over the last ten years have also been measured. Based on the May 2011 LQA report, Liberty Lake has population capacity for 8,460. With the potential for large population growth, and major undeveloped acreage for all types of development, Liberty Lake is expected to see continued significant employment growth. While SRTC expects significant growth in both population and employment, population growth is expected to outpace employment growth slightly, therefore the number of employees per residents will see a decrease over the forecast period.

Medical Lake:
SRTC trends analysis show the City of Medical Lake has a continual decrease in its share of total employment in Spokane County. LED data shows the same, with a large spike in total employment for 2010. Other than this anomaly, the trend of very limited employment growth and/or decline is quite clear. The spike in 2010 may be due to the way ESD reports state employees in the medical profession in the city. The SRTC employment count for Medical Lake in 2010 is 1,959. Medical Lake is primarily a bedroom community, with a limited amount of services that support the local population; the exception being a major share of employment in the health sector with Eastern State Hospital and other medical facilities. SRTC expects very limited employment growth in Medical Lake to 2040. The population capacity for Medical Lake is 1,261 persons, based on a recently completed update of Medical Lake's LQA by Spokane County staff. With the potential for that population growth, SRTC expects smaller employment gains in support of the local population. This limited growth produces a small decrease in the total share of county employment the City of Medical Lake would have in 2040.

Millwood:
The Town of Millwood is a relatively small municipality with a 2010 Census population of 1,786. Both SRTC trends analysis and LED data show employment in the Town of Millwood relatively stable over time. The town is more or less built out as there is almost no vacant land available. SRTC expects slight growth as continued growth in surrounding areas will place more demand on services in Millwood. There is no expectation the Town of Millwood will increase its share of total employment in Spokane County. According to the May 2011 LQA report, Millwood has capacity for 258 persons. A small degree of employment growth in Millwood is likely to occur in support of area populations. Established businesses and a limited amount of available lands can also contribute to the slight employment growth expected in Millwood to 2040.

Spokane:
Both LED and SRTC trends analysis suggest slow and steady growth over time in the City of Spokane. They both also show a decreasing share of total employment, as areas outside of Spokane are growing faster. The majority of employment in Spokane County is within the City of Spokane. Spokane's population capacity based on the May 2011 LQA report is just over 38,000.

SRTC expects continued growth in the City of Spokane; but a continued slight decrease in the total overall share of countywide employment. There are less available lands in Spokane than elsewhere in the County, and the data shows that growth outside the city has clearly outpaced growth inside the city. Developments in already established areas, as well as development in the West Plains and along the North-South Corridor are likely to continue Spokane's steady growth over time. Spokane has the majority of employment in 2010 and is expected to have the most employment of any jurisdiction into the year 2040. SRTC's allocation of employment to Spokane essentially maintains the ratio between population and employment through the 2040 forecast period.

Spokane Valley:

Based on SRTC trends analysis, no jurisdiction has had greater total employment growth than the City of Spokane Valley. Other cities have had greater percentage increases, but Spokane Valley has had the greatest total growth. According to SRTC trends analysis, much of this growth was during the 1990's. LED data suggests that this strong growth has continued through the last decade. Most jurisdictions have the capacity for significant employment growth, and Spokane Valley is included as it has a large amount of vacant and undeveloped land and has shown steady employment growth throughout the analyses periods. There is population capacity for 16,493 in Spokane Valley according to the May 2011 LQA report.[1] SRTC expects continued strong employment growth in Spokane Valley. The rate of employment growth is expected to outpace that of population. Accordingly, the number of employees per residents will increase a small degree over time.

Unincorporated Spokane County:

Rural Spokane County has seen very limited growth over the analyses periods, while urban Spokane County as seen moderate growth. Municipalities have annexed areas from the unincorporated county that will limit the county's potential for employment growth; most notably the West Plains annexation earlier this year. Compared to municipalities in the region, there is a very low ratio of employees per residents in the unincorporated county. This is no surprise as there are far more residents than jobs, especially in the rural areas. There is considerable population capacity in the unincorporated county, with an urban capacity of 43,023 persons. SRTC expects employment growth in the denser areas where significant population growth is possible. Very limited employment growth is expected in the rural areas. SRTC expects the ratio of employment to residents to decrease slightly as more employment growth will occur in denser areas and less land is available for county growth due to annexation.

The Five Palouse Towns (Waverly, Spangle, Latah, Rockford, and Fairfield):

The towns of Waverly, Spangle, Latah, Rockford, and Fairfield are often referred to as the Five Palouse towns. They are smaller municipalities located in Southeast Spokane County. These five places are unique in that there are multiples towns within single TAZs. As they are such small areas in both size and population, getting useful employment or other statistics for them can be challenging. They do vary in population and employment, and SRTC expects the potential for limited growth in both categories for each of them. Their individual population capacities can be found in the LQA report; they range from 67 persons in Latah to 350 in Spangle. They have been given a growth factor in magnitude reflective of their base year population and employment; the total employment and population allocations for each are comparatively quite small, and will be aggregated into the surrounding larger TAZ structure.

[1] http://www.spokanecounty.org/data/buildingandplanning/lrp/documents/PTC%20 LQA%20report%202010.pdf

Table B.6 Jurisdictional Employment Trends

Airways Heights Employment Growth Trends												
	Source: Census LED										Source: SRTC Trends Analysis	
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**		**2010**	**2000**	**1995**
Total Employment	3,700	3,700	3,230	2,798	2,576	2,425	1,933	1,666	1,547		3,932	2,212	981
Share of County Total	1.75%	1.77%	1.50%	1.30%	1.23%	1.20%	0.98%	0.87%	0.81%		2.22%	1.24%	0.67%
Cheney Employment Growth Trends												
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**		**2010**	**2000**	**1995**
Total Employment	3,938	3,848	3,813	3,675	3,661	3,497	3,393	3,265	3,218		1,684	1,695	595
Share of County Total	1.87%	1.84%	1.77%	1.71%	1.75%	1.72%	1.72%	1.70%	1.69%		0.95%	0.95%	0.40%
Deer Park Employment Growth Trends												
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**		**2010**	**2000**	**1995**
Total Employment	1,592	1,539	1,564	1,544	1,485	1,373	1,358	1,302	1,306		1,105	986	483
Share of County Total	0.75%	0.74%	0.72%	0.72%	0.71%	0.68%	0.69%	0.68%	0.68%		0.63%	0.55%	0.33%
Liberty Lake Employment Growth Trends												
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**		**2010**	**2000**	**1995**
Total Employment	6,895	7,016	8,287	8,396	7,653	7,238	6,185	6,523	6,673		4,625	4,182	2,177
Share of County Total	3.27%	3.35%	3.84%	3.90%	3.65%	3.57%	3.14%	3.39%	3.49%		2.62%	2.35%	1.48%
Medical Lake Employment Growth Trends												
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**		**2010**	**2000**	**1995**
Total Employment	1,869	475	469	466	495	488	509	553	533		1,652	1,901	2,700
Share of County Total	0.89%	0.23%	0.22%	0.22%	0.24%	0.24%	0.26%	0.29%	0.28%		0.93%	1.07%	1.84%
Millwood Employment Growth Trends												
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**		**2010**	**2000**	**1995**
Total Employment	933	960	1,033	1,040	1,043	1,016	1,091	993	906		835	979	398
Share of County Total	0.44%	0.46%	0.48%	0.48%	0.50%	0.50%	0.55%	0.52%	0.47%		0.47%	0.55%	0.27%
Spokane Employment Growth Trends												
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**		**2010**	**2000**	**1995**
Total Employment	117,735	117,995	119,479	118,029	117,001	113,364	112,086	110,016	109,996		98,182	105,691	94,034
Share of County Total	55.83%	56.40%	55.31%	54.81%	55.78%	55.88%	56.91%	57.15%	57.60%		55.54%	59.46%	63.95%
Spokane Valley Employment Growth Trends												
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**		**2010**	**2000**	**1995**
Total Employment	48,665	46,877	49,873	51,738	49,427	48,208	46,286	44,361	43,447		40,922	39,302	25,616
Share of County Total	23.08%	22.41%	23.09%	24.03%	23.56%	23.76%	23.50%	23.05%	22.75%		23.15%	22.11%	17.42%
Un-Incorporated Spokane County* Employment Growth Trends												
	2010	**2009**	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**			
Total Employment	25,545	26,806	28,274	27,659	26,431	25,249	24,121	23,811	23,338			
Share of County Total	12.11%	12.81%	13.09%	12.84%	12.60%	12.45%	12.25%	12.37%	12.22%			
Spokane County	**County Urban**			**County Rural**			**County Unincorporated**					
	2010	**2000**	**1995**	**2010**	**2000**	**1995**	**2010**	**2000**	**1995**			
Total Employment	18,420	15,819	9,993	5,423	4,981	10,057	23,842	20,800	20,050			
Share of County Total	10.42%	8.90%	6.80%	3.07%	2.80%	6.84%	13.49%	11.70%	13.64%			
	Source: SRTC Trends Analysis											

***Approximate Unincorporated boundary**

Jurisdiction Allocations

In the following tables are SRTC's allocations of population (**Table B.7**) and employment (**Table B.8**) growth, which were adopted by the SRTC Policy Board in October 2016. The figures for the allocations below area based on the 2040 population forecast of 592, 969.

Table B.7 SRTC Policy Board Adopted Population Allocation

Jurisdiction	2015 Population	Percent Growth Allocated	Total Population Growth	2040 Population
Airway Heights	8,385	6.22%	6,507	14,892
Cheney	11,440	3.51%	3,671	15,111
Deer Park	3,950	1.45%	1,513	5,463
Fairfield	615	0.05%	50	665
Latah	195	0.00%	0	195
Liberty Lake	8,975	7.29%	7,631	16,606
Medical Lake	4,945	1.15%	1,207	6,152
Millwood	1,790	0.17%	173	1,963
Rockford	470	0.00%	0	470
Spangle	280	0.01%	9	289
Spokane	213,100	24.81%	25,970	239,070
Spokane Valley	93,340	17.43%	18,239	111,579
Waverly	108	0.00%	0	108
Unincorporated Spokane County	140,717	37.92%	39,688	180,405

Table B.8 SRTC Policy Board Adopted Employment Allocation

Jurisdiction	2015 Employment	Percent Growth Allocated	Total Employment Growth	2040 Employment
Airway Heights	4,162	4.5%	1,981	6,143
Cheney	4275	4.5%	1,981	6,256
Deer Park	1,734	2%	880	2,615
Fairfield	98	0.08%	35	134
Latah	14	0.02%	9	23
Liberty Lake	6,194	8%	3,522	9,716
Medical Lake	2,132	0.75%	330	2,462
Millwood	940	0.4%	176	1,116
Rockford	94	0.08%	35	129
Spangle	65	0.05%	22	87
Spokane	114,983	36.6%	16,113	131,096
Spokane Valley	47,258	27%	11,886	59,144
Waverly	9	0.02%	9	18
Unincorporated Spokane County	19,013	16%	7,044	26,057

Hotel and Motel Accommodations

The land use for hotels, motels, and other transient accommodations is based on the number of rooms and not employees. Staff evaluated applying a flat rate of growth to this land use. After further review, Staff adjusted the flat rate approach to account for a faster rate of growth expected in some of the peripheral jurisdictions in employment and population. This method allocates this land use at a higher rate of growth for Cheney, Airway Heights, Liberty Lake, and the unincorporated Spokane County. The Cities of Spokane and Spokane Valley still share the super majority of this land use in 2040. Further analysis indicated the need for a hotel/motel land use category in Deer Park.

SRTC contacted the Kalispel and Spokane Indian Tribes for their projected growth for LU3 resulting in an additional 600 rooms being added. The Kalispel and Spokane tribal lands are located within the jurisdictional boundary of the City of Airway Heights and are therefore included in their total rooms count. (**Table B.9**).

Table B.9 SRTC LU3 Allocation

Jurisdiction	2015 Hotel Rooms	Percent Growth Allocated	Total Hotel Room Growth	2040 Hotel Rooms
Airway Heights	416	20.25%	660	1076
Cheney	130	4.60%	150	280
Deer Park	0	1.53%	50	50
Fairfield	0	0.00%	0	0
Latah	0	0.00%	0	0
Liberty Lake	146	4.60%	150	296
Medical Lake	0	0.00%	0	0
Millwood	0	0.00%	0	0
Rockford	0	0.00%	0	0
Spangle	0	0.00%	0	0
Spokane	5370	46.01%	1500	6870
Spokane Valley	1660	16.26%	530	2190
Waverly	0	0.00%	0	0
Unincorporated Spokane County	291	6.75%	220	511

Higher Education Commuter Students

Like hotel/motel rooms, the higher education commuter students land use is allocated separately from employees. SRTC defined a new approach to forecast Higher Education Commuter Students, LU10, from 2015 to 2040. Each University/College Master Plan was researched for their forecasted annual growth rates. When no Master Plan was available the institution was contacted directly to determine their expected growth rate.

Annualized growth rates varied from zero to 2% annual growth. Eastern Washington University and Washington State University Riverpoint Campus (EWU & WSU Spokane) forecasted growth of 2% annually. Whitworth and Gonzaga Universities forecasted zero growth, although Whitworth indicated they would reach their capacity by 2021 with 70% of their students residing on campus. Due to campus residency changes a 1% growth rate between 2015 and 2021 was applied. Gonzaga University's Institutional Research Dept., indicated "near-to actual-zero growth" for their campus. Community Colleges of Spokane, Spokane Falls Community College (SFCC) and Spokane Community College (SCC), forecasted a 1% annual growth rate. SRTC staff used this forecasting approach to provide a better reflection of the unique Institutional growth forecasts, based on their long-range master plans.

Staff expects continued university and higher education growth in the cities of Cheney and Spokane. Eastern Washington University has seen continued healthy growth over time while Spokane's continued development of their U-District will contribute to increase in LU10 as expected. The allocations of higher education commuter students can be seen in **Table B.10.**

Table B.10 SRTC Higher Education Commuter Student Allocation

Jurisdiction	2015 Commuter Students	Percent Growth Allocated	Total Commuter Student Growth	2040 Commuter Students
Airway Heights	0	0.0%	0	0
Cheney	7,778	66.6%	11,664	19,442
Deer Park	0	0.0%	0	0
Fairfield	0	0.0%	0	0
Latah	0	0.0%	0	0
Liberty Lake	0	0.0%	0	0
Medical Lake	0	0.0%	0	0
Millwood	0	0.0%	0	0
Rockford	0	0.0%	0	0
Spangle	0	0.0%	0	0
Spokane	15,036	29.5%	5,169	20,205
Spokane Valley	193	0.0%	0	193
Waverly	0	0.0%	0	0
Unincorporated Spokane County	1,778	3.9%	690	2,468

Fairchild Air Force Base

Fairchild Air Force Base (FAFB) plays an important role in Spokane County. It is a major regional employer and accounts for numerous residents in the area, both civilian and military. Regarding future land use, SRTC is carrying out the same process that was done in 2008. There is no distinctly clear expectation for the future of the base, as military missions can change over time. These changes are often based on factors outside of those occurring locally. The possibility for both increased or decreased land uses exist. Therefore, in consultation with FAFB planners and local jurisdictions, SRTC is not making any future year adjustments to the land use for TAZ 549 which encompasses FAFB. Opportunities for scenario planning regarding FAFB will allow SRTC to analyze potential future missions and base activities.

Tribal Land Uses

Within Spokane County are both Kalispel Tribe of Indians Reservation and Trust Land and Spokane Tribe of Indians Trust Lands. These lands are located on the west plains within the City of Airway Heights.

To determine allocations for the Tribes, the follow process was used:

The Spokane Tribe of Indians allocation for employment was 18% of the total allocation for Spokane County, based on their development currently under construction on the West Plains. The Spokane Tribe determined they would grow a total 1,279 employees by 2040. SRTC worked with Spokane County to determine how the 1,279 employees would be extracted from their allocation of 7,044. After the initial placement of Spokane County employees by TAZ, Spokane County removed a total of 1,279 employees from the 7-different employee based land use categories throughout the County.

The Kalispel Tribe of Indians allocation came from the City of Airway Heights, and amounted to 40.6% of Airway Heights allocation of 1,981 employees or 804 employees. These employees were place according to the percentages used in the last land use update.

Table B.11 illustrates the future land use placed in 2040 for Tribal developments in their respective shared TAZs.

Table B.11 Tribal Reservation and Trust Lands 2040 Land Use (this is growth not 2040 numbers)

Spokane Tribe Trust Lands	Kalispel Tribe Trust Lands
TAZ 463	TAZ 461 & 462
1080 Commercial Employees	679 Commercial Employees
37 Office Employees	338 Office Employees
0 Industrial Employees	226 Industrial Employees
286 Hotel Rooms	100 Hotel Rooms

TAZ Allocation

After the process of forecasting and allocating growth to the jurisdictional level was complete, the final step was to distribute the allocated growth to the TAZ level. SRTC staff worked with local jurisdictions and provided research and materials to assist in the process of distributing the future growth to the TAZ level.

Available lands for continued development were reviewed to ensure the capacity for prospective growth. Many jurisdictions used their land quantity analyses (LQA) to assist in distributing their population growth and housing units. Jurisdictions were encouraged to incorporate local and regional plans as they located future growth. SRTC staff held numerous meetings with local agencies as they went about this process. The result was future land use growth determined for 2040 for all TAZs in Spokane County.

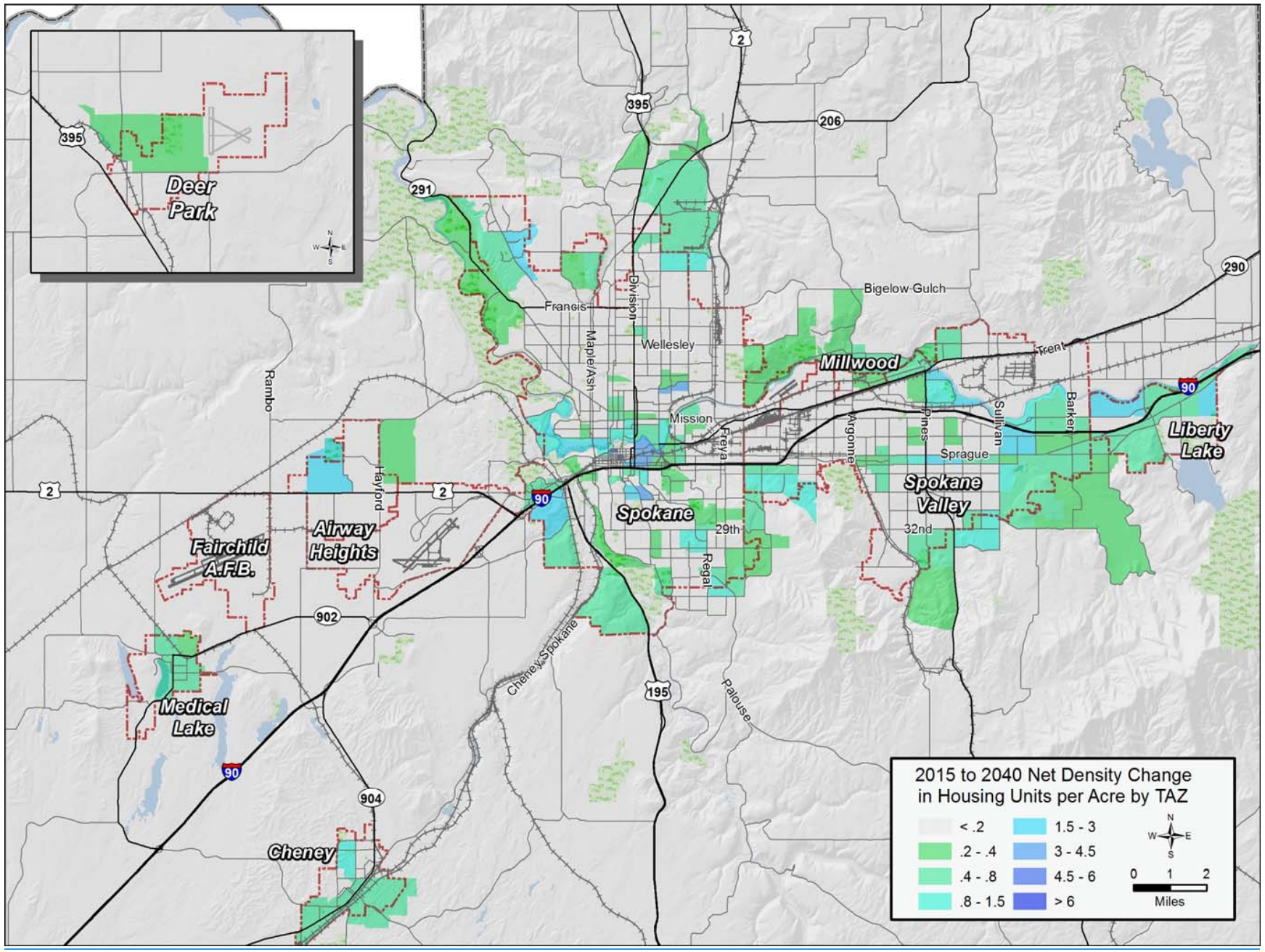
Application of Vacancy Rates

When the collaborative process of placing future growth was completed, SRTC staff made the necessary adjustments to account for vacant housing units in the new housing unit growth. All new housing units were adjusted by TAZ for vacant units by applying the occupancy rate from the 2010 Census for Spokane County to all new housing units by TAZ. This reflected standardized vacancy rates across Spokane County for all new units, while maintaining the spatial distribution of varying vacancy rates in the 2010 base year housing units.

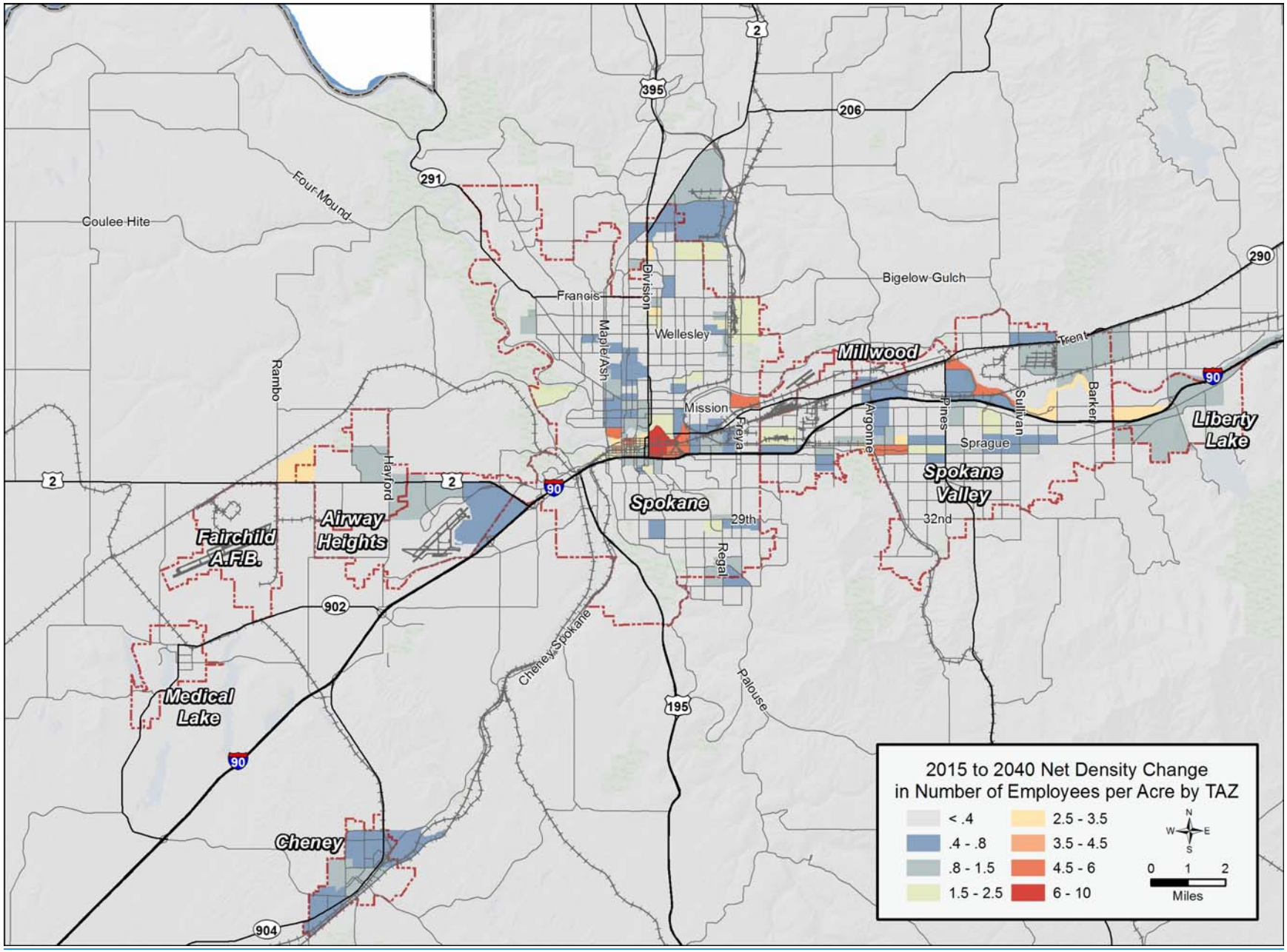
Application of Housing and Employment Density Changes 2015 to 2040

Housing (**Map B.1**) and employment (**Map B.2**) density changes from 2015 to 2040 address the need for strategies to address transportation issues. These strategies recognize the changes in housing, employment and other indicators that will shape the future transportation demand in our region. The forecasted issues identified in Chapter 3 and further emphasized in this Appendix set the table for the scenarios that were developed and evaluated in Chapter 4.

Map B.1 Housing Unit Density by TAZ Change 2015-2040



Map B.2 Employee Change by TAZ 2015-2040



DEMOGRAPHIC AND TRAVEL BEHAVIOR CHANGES

The Horizon 2040 models are based on the demographic characteristics and travel behaviors identified by the 2005 Spokane and Kootenai County Regional Travel Survey. The results of the survey can be found on SRTC's website.

Demographics currently utilized in the model include household income, household size (in persons), and number of workers per household. As described in Chapter 2 - Where We're At, demographic trends have fluctuated somewhat in recent decades. However, for modeling purposes, the demographic characteristics included in the model are presumed to remain stable through the planning horizon. With the completion of a new regional household travel survey, it may be possible to analyze historical trends and make reasonable assumptions about demographic changes for future horizon year models.

Travel behaviors are also discerned from the travel survey. Behaviors such as mode preference, number of trips per household per day, fluctuations in parking prices and/or gas prices, may be revealed with additional travel surveys over time. However, the current model sets do not presume any fundamental changes in household travel behaviors between the 2015 and 2040 models.

FORECASTING METHODS

The complexity of an MPO's forecasting methods can vary considerably, depending on current transportation conditions, and on the future transportation investments and policies being evaluated. Current forecasting methods and model details are described below.

NETWORK CHARACTERISTICS

Network characteristics vary slightly for each model in the Horizon 2040 model set. This is due to different projects and associated network changes that are present in each model. The network characteristics provided below are for the 2015 model.

The model includes 565 Transportation Analysis Zones (TAZs). Of the total, 12 are park and ride locations, 34 are external zones, and the remaining 519 are standard TAZs.

There are more than 17,000 active links, or roadway segments, in the model (approx. 66,000 in total). Active links include all roadways classified as collector or higher. In addition, numerous local roads are also activated for travel to better reflect local travel patterns. There are many inactive links that are included in the model for illustrative purposes; they are not utilized in the modeling process.

There are almost 8,300 active nodes in the model (more than 24,000 total). Many nodes represent intersections and may be classified as signalized, stop controlled, roundabouts, or uncontrolled.

The model uses zone connectors to emulate traffic generated on local roads, driveways or other local access. There are more than 5,300 connectors in the model; some of these connectors connect external zones or park and rides to the active links in the model network.

MODEL SPECIFICATION

SRTC utilizes the software program VISUM to run a traditional four step trip-based model for travel forecasting. The four major steps of

the modeling process are trip generation, trip distribution, mode choice and network assignment.

Trip Generation
The model utilizes household characteristics and land use data to generate the demand for trips by trip purpose for each TAZ.

Trip Distribution
Trip demand that is generated in the trip generation step are distributed geographically throughout the region based on gravity model functions for the follow trip purposes: home-based work (HBW), home based retail (HBR), home-based school (HBSc), home-based college (HBColl), home-based other (HBO), non-home based (NHB), and commercial (COM). The trip distribution model is a combined gravity formulation.

Mode Choice
The mode choice model formulation uses a nested Logit structure. This structure takes into account that mode choice requires more than one decision point. Trip makers must first choose between auto, transit or walking/biking, and then they choose between drive alone or carpool (auto) or to walk or drive to transit (transit). The utility of a mode varies by household characteristics and trip purpose, and includes variables such as travel time, distance, and parking costs (auto); perceived journey time (transit), and fares (transit).

Highway and Transit Assignment
The current model is run for all time periods; however, the model is primarily validated for the PM peak hour and the daily total.

Assignment Validation
The 2015 model assignment results were validated against the most recent traffic counts available in a corridor screenline analysis. Transit Assignment is calibrated to 2015 ridership and park & ride usage data.

ASSUMPTIONS FOR TRANSPORTATION CONFORMITY (AIR QUALITY) ANALYSIS

Transportation Networks
The transportation networks for the conformity modeling include the existing transportation network and projects from Horizon 2040. The analysis years are 2010, 2020, 2030, and 2040.

Selecting Projects to be Modeled
Projects meeting SRTC's definition of regional significance are included in the transportation demand model and therefore included in the air quality conformity analysis.

SRTC classifies a transportation project as regionally significant if the project:

1. Cannot be grouped in the TIP and/or State TIP (STIP), and/or it is not listed as an exempt project type in the Environmental Protection Agency's (EPA's) regional transportation conformity regulation (40 C.F.R. part 93); and

2. Is on a facility which serves regional transportation needs (federally classified as a principal arterial or higher) and alters the number of through-lanes for motor vehicles, or impacts a freeway or freeway interchange (other than maintenance projects); or

3. Cannot be grouped in the TIP and/or State TIP (STIP), and/or it is not listed as an exempt project type in the Environmental Protection Agency's (EPA's) regional transportation conformity

regulation (40 C.F.R. part 93); and

4. Is on a facility which serves regional transportation needs (federally classified as a principal arterial or higher) and alters the number of through-lanes for motor vehicles, or impacts a freeway or freeway interchange (other than maintenance projects); or

5. Is a new or extended fixed guideway transit service (dedicated bus lanes, vehicle track or wires) or capital expenditures related to a new fixed-route transit service on a facility which serves regional transportation needs (federally classified as principal arterial or higher); or

6. Is determined by the SRTC Policy Board in consultation with the Interagency Consultation Group to be regionally significant or have the potential for adverse emissions impacts for any reason.

Emissions Modeling

For the CO air quality conformity analysis, EPA's MOVES model at the County-level in the emissions inventory mode was used. Many input files were provided by the Washington State Department of Ecology. Some of these files required additional post-processing by SRTC staff, and others were developed by SRTC staff. The key assumptions used in these input files are as follows:

- ***Source Type (vehicle) & Age Distribution data*** – was provided by the Washington State Department of Ecology
  - 2011 Vehicle registrations data was provided by the Department of Licensing.
  - The vehicle population was assumed to increase at the same rate as the modeled VMT (output from SRTC's travel demand models) increased.
  - The vehicle age distribution was assumed to remain constant in the future years, i.e., the same fraction of age 1, age 2, etc.

- ***Vehicle Type VMT***
  - VMT from SRTC's regional travel demand models was used for the VMT input files. Since MOVES requires VMT by source type and that level of detail is not included in SRTC's model, the MOVES default source type fractions for Spokane County was used.
  - MOVES default month, day, and hour VMT fractions for Spokane County were used.

- ***Fuel data*** – was provided to SRTC by the Washington State Department of Ecology
  - 10% ethanol was used for the current and future year runs.
  - Gasoline RVP was held constant for all years, and is based on recent estimates provided by Ecology.
  - Fuel sulfur content is consistent with current fuel regulations.

- ***Meteorology Data*** – was provided to SRTC by the Washington State Department of Ecology based on a combination of MOVES default data for Spokane County and actual temperature and humidity data.

- ***Ramp Fraction***
  - MOVES default ramp fraction of 8% was used.

- ***Road Type Distribution*** – was provided by the Department of Ecology; MOVES default data for Spokane County was used. SRTC's travel demand model does not include the required level

of detail on source types for this input.

- ***Ramp Fraction***
  - MOVES default ramp fraction of 8% was used.

- ***Road Type Distribution*** – was provided by the Department of Ecology; MOVES default data for Spokane County was used. SRTC's travel demand model does not include the required level of detail on source types for this input.

- ***Average Speed Distribution*** – MOVES default was used.

- ***I/M Program*** – was provided by the Washington State Department of Ecology; since the program will terminate in 2019 all runs after 2020 did not include the I/M program.

- ***California Low-Emission Vehicle (LEV II) Standards*** – Washington State adopted the California LEV II standards beginning with 2009 model year vehicle. Since the MOVES model uses federal emissions standards by default, an additional input database (mylevs) is required to inform the MOVES model of these lower standards.

Consistency with Motor Vehicle Emissions Budget

The 2002 motor vehicle emissions budget (MVEB) for the Spokane CO maintenance area is 279 tons per winter day, effective February 14, 2005. (Federal Register: January 28, 2005 (Volume 70, Number 18)).

More information on the air quality conformity determination and the results of the analysis are detailed in **Chapter 4, pages 4-34 through 4-36**.

Future Issues

While there is a large degree of uncertainty in projecting future transportation impacts to air quality in the region, SRTC will continue to track several issues including:

- Reductions in petroleum usage and greenhouse gases due to increased fuel economy as a result of CAFE and RFS2 standards;
- Enactment of strong public policies for requiring greater energy efficiency;
- Market forces that impact improvements in fuels and vehicle technologies; and,
- Travel behavioral changes resulting in less fuel use