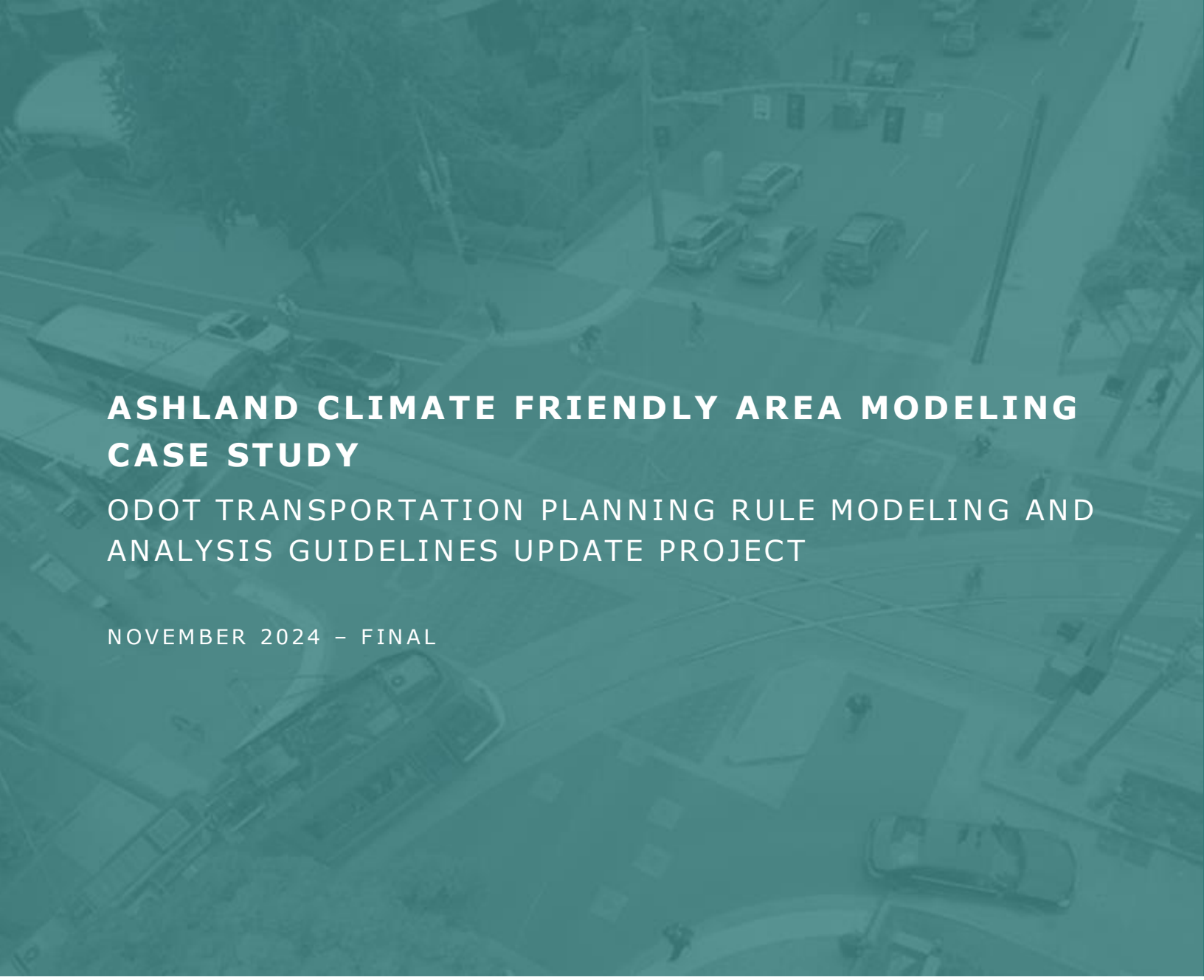

ASHLAND CLIMATE FRIENDLY AREA MODELING CASE STUDY

ODOT TRANSPORTATION PLANNING RULE MODELING AND ANALYSIS GUIDELINES UPDATE PROJECT

NOVEMBER 2024 – FINAL

PREPARED FOR:

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

PREPARED FOR ODOT

Zachary Horowitz, PE

Tara Weidner, PE

Peter Schuytema, PE

PREPARED BY RSG AND ODOT

Jeff Frkonja, RSG

Ted Lin, RSG

Alex Bettinardi, PE, ODOT

Jin Ren, PE, ODOT

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BACKGROUND

THE RULEMAKING

The Land Conservation and Development Commission initiated the 2023 rulemaking for the Climate-Friendly and Equitable Communities (CFEC) program on April 20, 2023, and finalized it on November 2, 2023. The 2023 rulemaking process updated the previously adopted 2022 rules. Through the 2022 rulemaking, OAR 660-012-0310 describes out the creation and designation of Climate Friendly Areas (CFA).

A CFA supports development that is consistent with high-density residential uses, a high concentration of employment opportunities, and is served by high-quality pedestrian, bicycle, and transit services. The concept of Climate Friendly Areas was developed to help meet Oregon's climate pollution reduction and equity goals by facilitating the development of urban areas in which residents are less dependent on single occupancy vehicles.

To be in accordance with the CFEC rulemaking, a city must designate one or more CFAs sufficient to accommodate at least 30 percent of the total identified number of housing units necessary to meet all current and future housing needs by calculating zoned building capacity. Total housing units are determined through the local government's most recently adopted Housing Needs Assessment. The housing units counts and locations are vital to CFEC analysis since the rules define household-based Vehicle-Miles Traveled (VMT) as defined in OAR 660-012-0005(64) as a key performance measure.

Under the new rules, cities must adopt specific strategies in their comprehensive plans and Transportation System Plans (TSPs, an element of comprehensive plans) that reduce future vehicle-miles traveled (VMT) per capita (OAR 660-012-0160). To adopt effective comprehensive plans, cities need to perform travel forecast analysis that meaningfully informs their strategy choices.

Thus, as a supporting activity to the CFEC rule and their CFA requirements, the Oregon Department of Transportation is updating its Analysis Procedures Manual (APM) document. The APM seeks to provide technical "how to" information that helps local jurisdictions do technical work in compliance with all state Transportation Planning Rules (TPRs), including CFEC.

CITY OF ASHLAND

The City of Ashland volunteered to perform a case study to support understanding the needs of CFEC-supportive future transportation forecast analysis. The city's presence within the Southern Oregon Activity-Based Model (SOABM) geography, and the ongoing Ashland CFA study conducted by the Rogue Valley Council of Governments (RVCOG) in cooperation with the City make Ashland an ideal test bed. The SOABM is an activity-based model, unlike the trip-based models now operational in all other Oregon Metropolitan Planning Organizations (MPOs). Note that this forecasting case study is *not* intended to make any technical findings specific to Ashland's policy decisions *nor* is it meant to suggest planned land use or transportation strategies; rather, it demonstrates a "sample problem" the lessons from which will aid the development of useful modeling analysis guidance by ODOT.

CONCEPTUAL APPROACH TO ASHLAND CASE STUDY

The Ashland case study team used the SOABM toolkit which includes the SOABM model itself, a population synthesis module via PopulationSim, and an existing household spatial allocation tool from RVCOG. In addition, the Ashland team conducted the CFA forecasts in two rounds: a first pass testing the effects of only household spatial re-allocation and a second pass testing the effects of employment re-allocation and other policy changes atop the household re-allocation. This allows some understanding of the relative impacts of different CFA strategies in the form of a sensitivity test. In addition, a Place Type tool was used to review the CFAs for opportunities beyond housing density that support creation of mixed-use neighborhoods and associated reductions in daily vehicle travel by residents.

EXECUTIVE SUMMARY

The TPR Modeling and Analysis Guides Update (the "Project") provides modeling and transportation analysis procedural guidance to address recent changes to the Oregon Administrative Rules (OAR) sections 660-012 and 660-044 related to the Climate-Friendly and Equitable Community (CFEC) program. To help develop modeling guidance, the Project includes two sample case studies, one using activity-based travel demand models and the other using trip-based travel demand models (Milwaukie, OR). The purpose of this case study in Ashland is to serve as a "sample problem" of activity-based travel demand models to:

- Test and refine new modeling procedures related to CFEC requirements, and
- Demonstrate technical approaches in alignment with the Transportation Planning Rules (TPR).

The case study is not intended to make any technical findings specific to the jurisdiction and is not intended to suggest planned land use or transportation actions. Rather, the intent of this case study analysis is to include a reasonable range of potential "actions" (investments, programs, or policies that could be placed into Transportation System Plans) that cities could contemplate implementing as part of addressing CFEC requirements. The intent of the case study is to provide a reasonable example that demonstrates the methodology, data needs, and potential results that can be used as technical guidance and as a future reference to inform upcoming TSPs.

The following report is organized around the steps listed in *Technical Memorandum #5: CFA Framework*. *Table 1* below summarizes the key steps and outcomes from the case study for each step that may influence future analysis guidance.

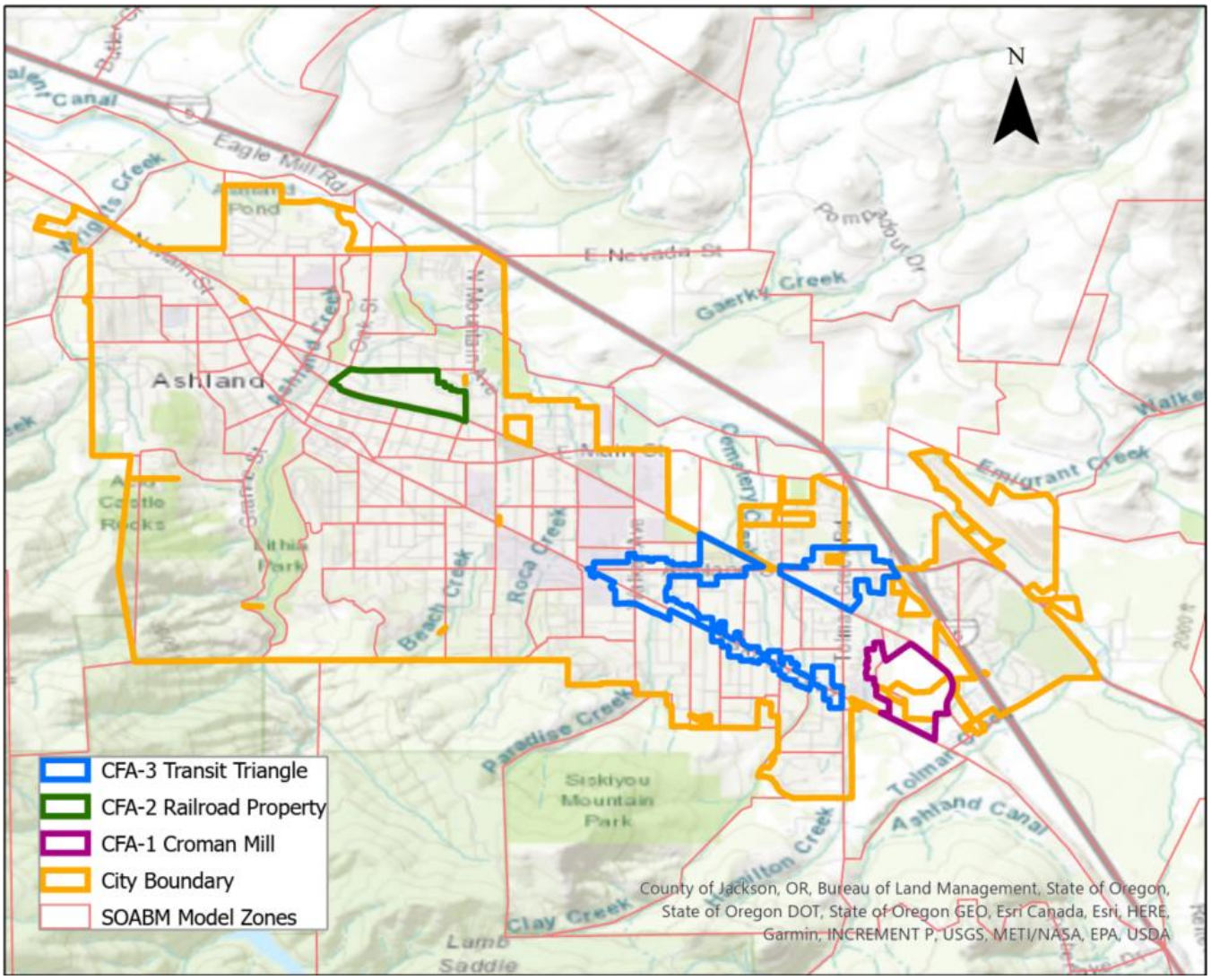
TABLE 1: KEY ANALYSIS STEPS AND CASE STUDY OUTCOMES

STEP	CASE STUDY OUTCOME
STEP 1: REFERENCE INPUTS	The Ashland Case Study used the adopted regional transportation plan for the year 2045 modeling as the future reference input.

STEP	CASE STUDY OUTCOME
STEP 2: LAND USE STEPS	The regional travel model (SOABM) TAZ structure did not align perfectly with the designated CFA boundaries, requiring some sub-allocation. Future analysis should anticipate having to do such sub-allocation. City planning data combined with CFEC requirements informed a relatively straightforward mathematical derivation on the number of added housing units each CFA would have to take on for the future "CFA scenario", and the SOABM toolkit has the means to produce added alterations to household demographics if needed.
STEP 3: OTHER ZONAL DATA	The Ashland Case Study tested increased parking charges in the CFAs which had a noticeable, if small, effect on VMT.
STEP 4: NETWORK EDITS	While the Case Study did not explicitly test Active Transportation, Transit, and Roadway network edits it clearly identified that the SOABM provides the opportunity to do so should cities elect to test such strategies. The SOABM is sensitive to supply and performance changes for all three modal areas. Note that a complementary finding is that to reasonably test Active Transportation investments the model would need added zonal and network detail; future analysis should anticipate the potential need to make such refinements.
STEP 5: MODEL RUN	Running the model across multiple scenarios that "layered" additional VMT-reduction strategies into the mix across several passes was both tractable and useful.
STEP 6: MODEL OUTPUT – VMT PER CAPITA	The SOABM, as an Activity-Based model, provides relatively straightforward and accurate means of forecasting household VMT. Accounting for "external" VMT outside the model area, as with any model, requires additional thought and care and the use of the Statewide Integrated Model (SWIM).

STEP 1. REFERENCE INPUTS

Figure 1 shows Ashland's boundaries within the SOABM TAZ geography. There are 197 different Transportation Analysis Zones (TAZ) within the City of Ashland in the model. Twenty-six of these TAZs would reside entirely or partially in Ashland's CFAs.



Source: ODOT, SOABM, RSG

FIGURE 1: CITY OF ASHLAND TRANSPORTATION ANALYSIS ZONES

The SOABM covers two MPOs along I-5 in an area roughly 60 miles across, contains 2,500 total TAZs (197 for Ashland), and operates on 30-minute time slices for a 24-hour day (with five aggregate assignment time periods for skimming). Its population segments include residents (general population living as households), group quarters inhabitants, and visitors. Compared to traditional trip-based models, the activity-based model system has more detailed and accurate representation of space, time, and travel patterns; and significantly more person and context-based explanatory variables. It includes intra-household travel decisions and interactions, tracks trips made by each household and person in a geographic area of interest (e.g., CFA), and responds to demographic information such as household structure, aging, and changes in wealth.

Table 2 lists key reference inputs from the SOABM used for this analysis. Note that the 2017 SOABM base year was used for this case study as it was the most current validated base year available.

TABLE 2: REFERENCE INPUTS

REFERENCE INPUTS	NOTES
MODEL BASE AND FUTURE YEAR	2017 base year; 2045 future year
STARTING NETWORK ASSUMPTIONS	2045 Regional Transportation Plan Model Network
FUTURE (2045) POPULATION TOTALS	23,668 (within Ashland City Limits)
AUTO OPERATING COSTS	Auto Operating costs consist of fuel, oil, tires and general maintenance costs per mile basis. This cost was $0.18 per mile in 2010 dollars. For future year forecasts, the model assumes that this operating cost per mile will rise with inflation
INFLATION ADJUSTED INPUTS	Auto Operating Costs, Parking Costs [based Bureau of Labor Statistics (BLS) Consumer Price Index (CPI) Inflation Calculator]
FLEET ELECTRIFICATION ASSUMPTIONS	Within the current version of the ABM, the fleet mix and vehicle age distributions do not change over time, so base-year assumptions were maintained in these tests. Hybrid and/or electric vehicles are not currently accounted for and assumptions regarding average fuel economy were limited to standards and policies set forth in existing federal and state legislation. With respect to future estimates, EPA conformity-related guidance requires assumed increases in market penetration of vehicles powered by "alternate fuels" to be driven by specific regulatory requirements; Oregon's new rules should permit future CFEC analysis to do so.
INCOME GROWTH	Not investigated for purposes of this case study (future exploration could be useful).
VALUE OF TIME	Not investigated for purposes of this case study (future exploration could be useful).

STEP 2. LAND USE AND DEMOGRAPHIC STEPS

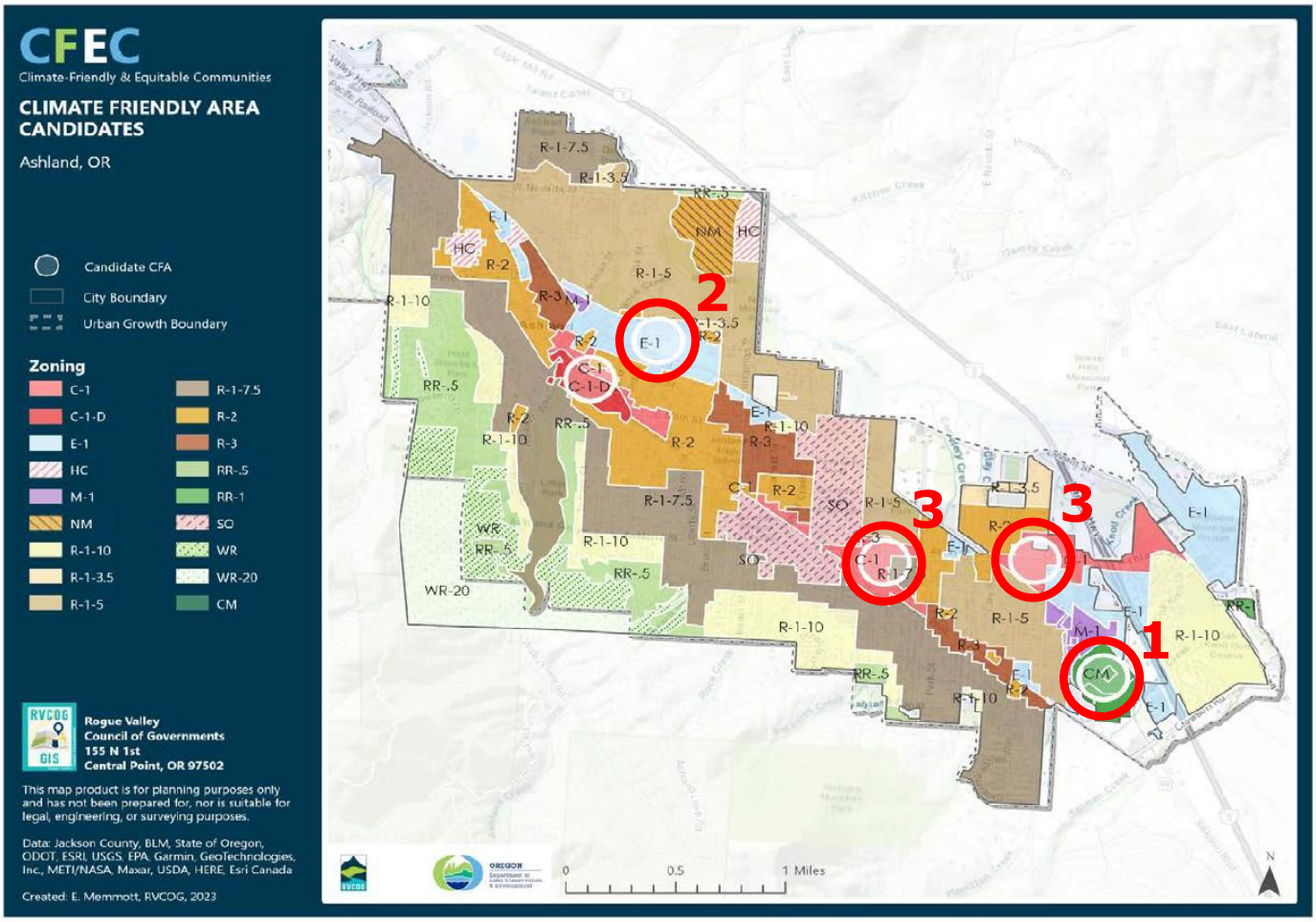
The land use step defines the CFA land use assumptions including the strategy of concentrating future housing and employment growth within the CFA boundaries. This generally will involve modifying the travel model's future analysis year land use inputs from a "no action" or "non-CFA" state to represent the presence of the CFA, its expected land uses, and the number of households and jobs the CFA is likely to hold in the analysis year. Step 2 thus includes the following tasks:

- Identify Representative TAZs
- Gather Planning Information
- Review Existing Model Land Use Assumptions, including application of the Place Types tool
- Propose Updated Model Land Use Assumptions

IDENTIFY REPRESENTATIVE TAZS

The SOABM has two spatial systems: micro-analysis zones (MAZs) for modeling non-motorized travel such as walk, bike, and transit access/egress, and Transportation Analysis Zones (TAZs) for auto travel. MAZs are smaller than TAZs and nest perfectly within the TAZs. Socioeconomic inputs, synthetic population, transit access/egress time, and walk and bike time are prepared and calculated at the MAZ level. Auto travel time is skimmed (calculated) at the TAZ level. The more disaggregate MAZ system provides better accuracy, while the more aggregate TAZ system allows better computational efficiency when there is minimal impact on the accuracy.

The candidate Climate Friendly Area Analysis began with initial candidate location suggestions from City Staff, calculating housing capacity of the proposed CFA boundaries, and readjusting the CFA sizes as needed to accommodate the housing unit capacity. City staff highlighted several priority CFA candidates, circled in *Figure 2* below. The City selected these areas not only for their designated zoning's alignment to the CFA requirements, but also their development and re-development potential. The Croman Mill and Railroad Property sites are largely undeveloped and present strong cases for rapid CFA-related changes. The Transit Triangle is one of the priority CFA options within the city and has the potential to be improved through redevelopment and development of vacant properties. The prior approval of the Transit Triangle code amendments is largely compatible with CFA because this transit served area has considerable redevelopment potential supporting the CFA goals. Conversely, the Downtown area is largely built out and is a National Registered Historic District, suggesting that it would have some barriers to potential redevelopment. However, the current built environment is similar to what is expected of CFAs and the C1-D (downtown Commercial) zone could be adapted to comply with CFA guidelines with little trouble. The City indicated that the C1-D area could provide useful tracts for CFA expansion in the future.



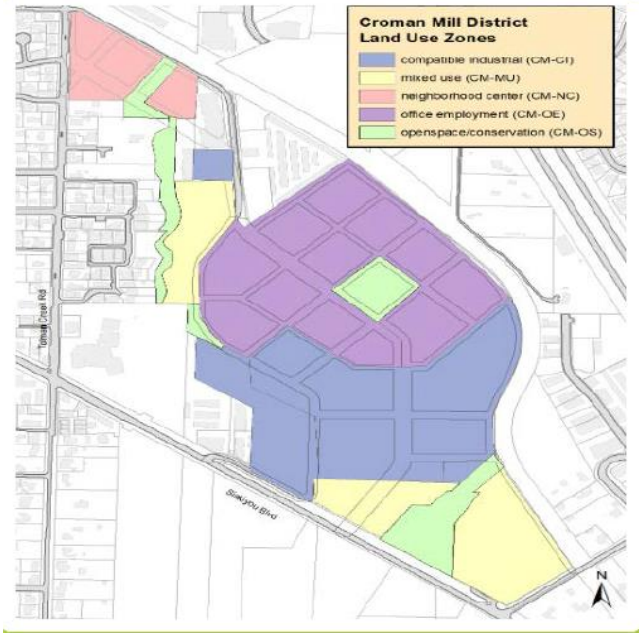
Source: RVCOG, City of Ashland

FIGURE 2: ASHLAND ZONING SHOWING CFA CANDIDATES

The general location of the three CFAs in Ashland is designated by the circles in the reference map in *Figure 2* above, along with the city boundary and the City's zoning. CFA 1 (Croman Mill) is in the southeast portion of Ashland, CFA 2 (Railroad Property) is northeast of downtown Ashland, and CFA 3 (Transit Triangle) is in the middle comprised of two sections. *Sources:* ODOT, City of Ashland, Google

Figure 3 zooms in on the planned CFAs using aerial imagery or planning sketches.

CFA 1: CROMAN MILL



CFA 2: RAILROAD PROPERTY

CFA 3: TRANSIT TRIANGLE

Sources: ODOT, City of Ashland, Google

FIGURE 3: ASHLAND DESIGNATED CFAS

As is common in travel models, the SOABM TAZ boundaries do not align exactly with the Ashland CFAs. As is also typical, the Ashland case study team proportionally allocated TAZ households and jobs to the CFAs based on the percent area of each TAZ with its containing CFA. These percentages by TAZ are documented in *Table 3* below.

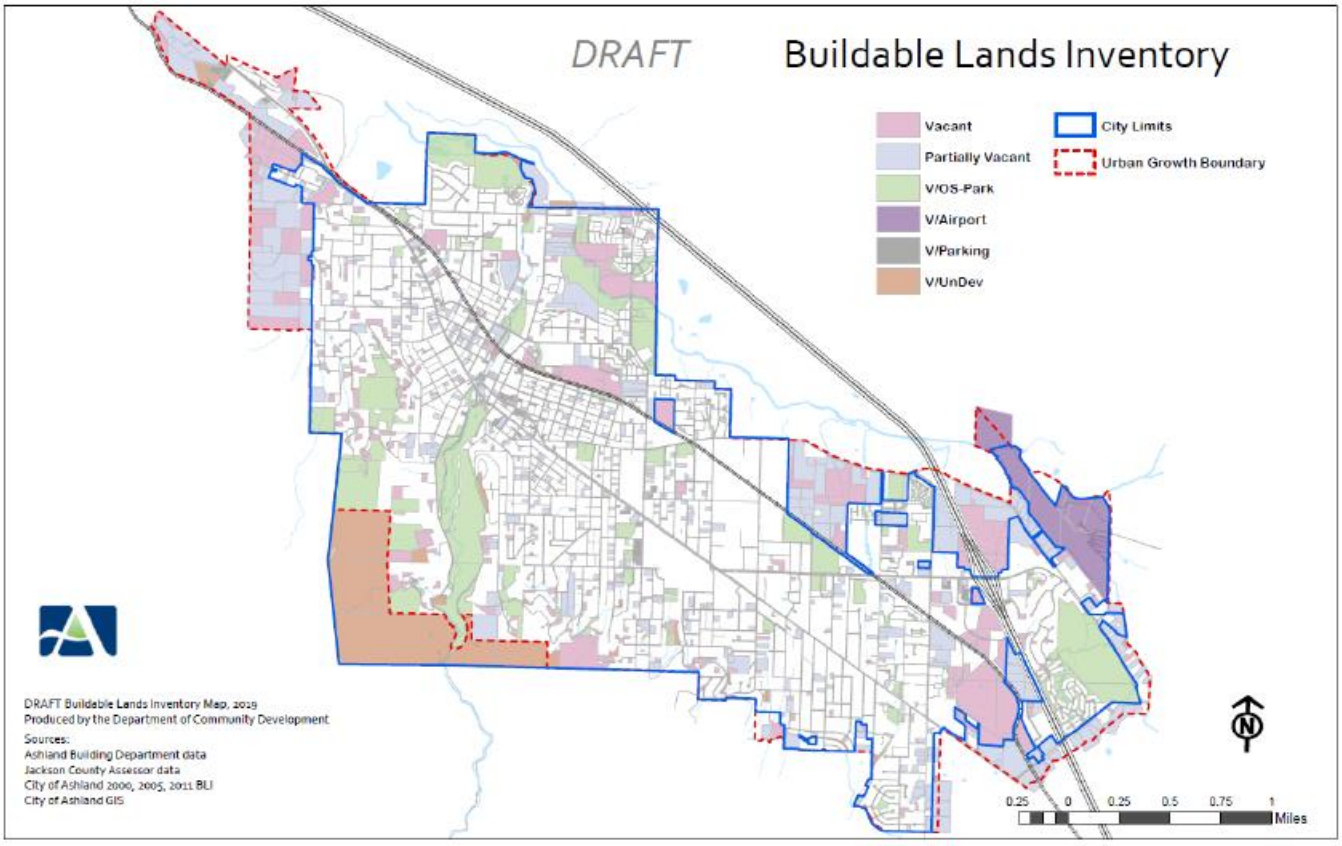
TABLE 3: APPLICABLE TAZS IN CFAS

LIST OF APPLICABLE TAZS FOR ANALYSIS	CFA	PERCENTAGE WITHIN CFA	TAZ ACRE
729	1	31.0%	19
732	1	84.5%	63
733	1	25.6%	58
762	2	6.0%	21
763	2	0.5%	8
772	2	63.7%	85
773	2	7.3%	26
721	3	11.8%	46
722	3	7.0%	79
723	3	2.7%	43
724	3	19.3%	41
726	3	19.5%	23
727	3	8.7%	46
731	3	16.6%	95
734	3	30.9%	29
736	3	95.0%	19
738	3	6.4%	47
739	3	24.9%	43
740	3	63.6%	35
741	3	100.0%	7
742	3	29.0%	18
743	3	31.0%	25
744	3	80.3%	22
745	3	1.2%	100
746	3	13.8%	82
747	3	27.1%	45

Source: ODOT, RSG

GATHER RELEVANT PLANNING INFORMATION

The following section summarizes findings within the CFA-supportive Ashland planning documents. These include a Buildable Lands Inventory (BLI), a Housing Production Strategy, the Ashland Climate Friendly Area Study (which includes Housing Capacity Analysis, Zoning Analysis, and the identification and selection of CFAs) by RVCOG. *Figure 4* shows the draft BLI, including large vacant land supply with development potential in two of the three CFAs.



Source: City of Ashland

FIGURE 4. 2019 ASHLAND DRAFT BUILDABLE LAND INVENTORY

HOUSING CAPACITY ANALYSIS

The most recent Housing Capacity Analysis for the City of Ashland was published in May 2021 and projects housing needs and trends out to the year 2041. This analysis estimates there are currently 10,705 dwellings in the city, with a projected need of 858 units more by the year 2041. Based on these estimates, the City of Ashland would need to locate and size CFA(s) that would have enough zoned housing capacity to encapsulate 30 percent of 11,563 dwellings, or 3,469 units. To meet the 30 percent zoned capacity requirement, Ashland would need to mandate a minimum density of at least 15 dwelling units/acre.

CURRENT ZONING

There are currently 18 types of zoning code in Ashland, as shown in *Figure 5*. Ten of the 18 zoning types are in the CFAs:

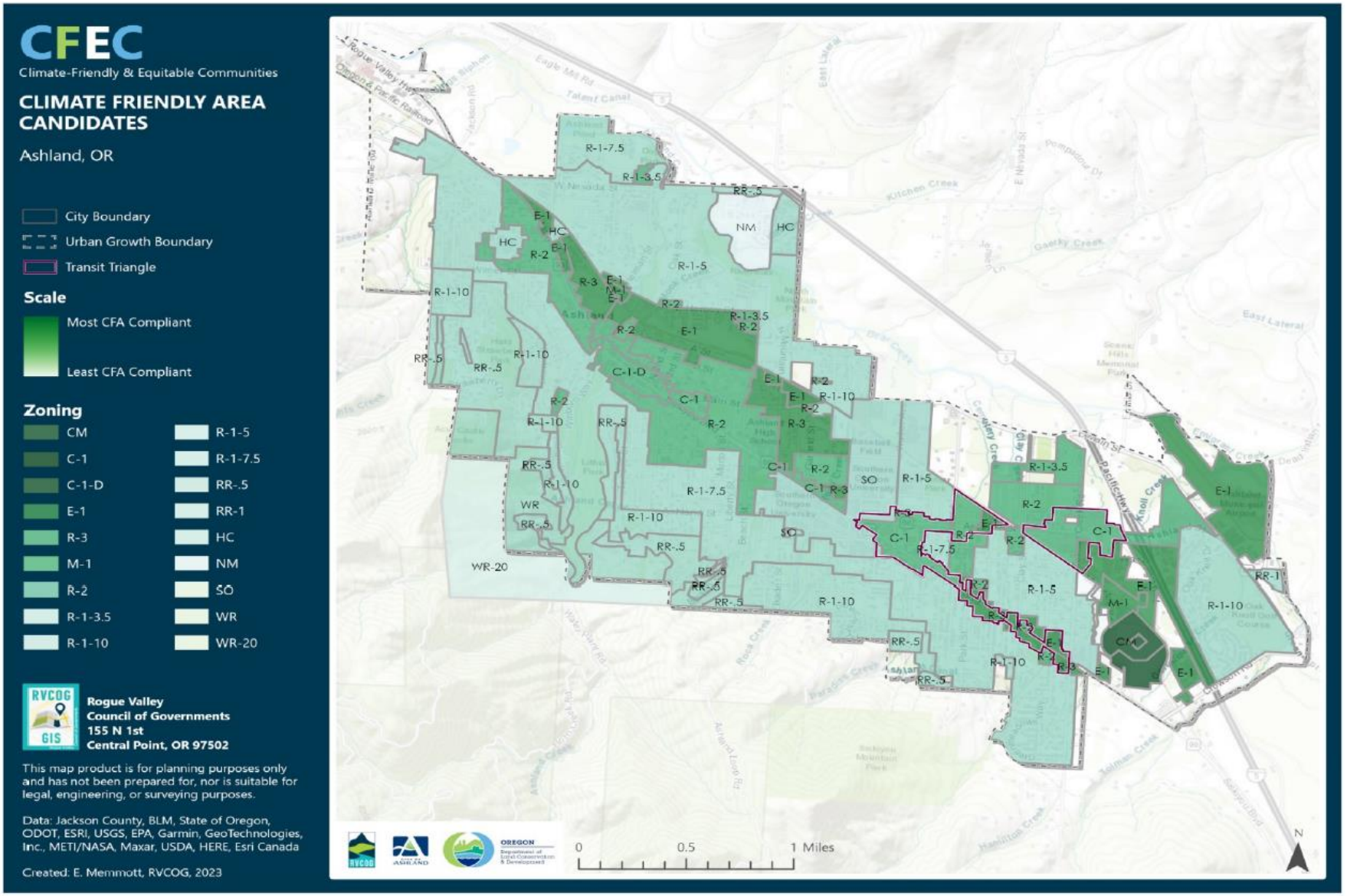
- Single Family (R-1)
- Suburban (R-1-3.5)
- Low Density Multi-Family (MF) (R-2)
- High Density MF (R-3)
- Rural (RR)
- Woodland (WR)

- Commercial (C-1)
- Downtown (C-1-D)
- Employment (E-1)
- Industrial (M-1)

CURRENT PLANNING EFFORTS

The City of Ashland expects overall employment to grow between the year 2017 and the year 2045 RTP scenarios. During this time, employment within CFAs is forecast to grow faster than jobs located outside of CFAs. Despite an overall increase in employment, some job sectors may decrease in employment.

For the specific CFA areas in Ashland, future expectations vary. CFA1 (Croman Mill) now only has industrial jobs, which are expected to change to other employment types when the site redevelops. Croman has similar City planning goals to those of CFA2 (Railroad Property), so the case study team borrowed the employment category breakdown for the Railroad Property from the year 2045 RTP future and applied it to Croman Mill for the CFA future.



Source: City of Ashland

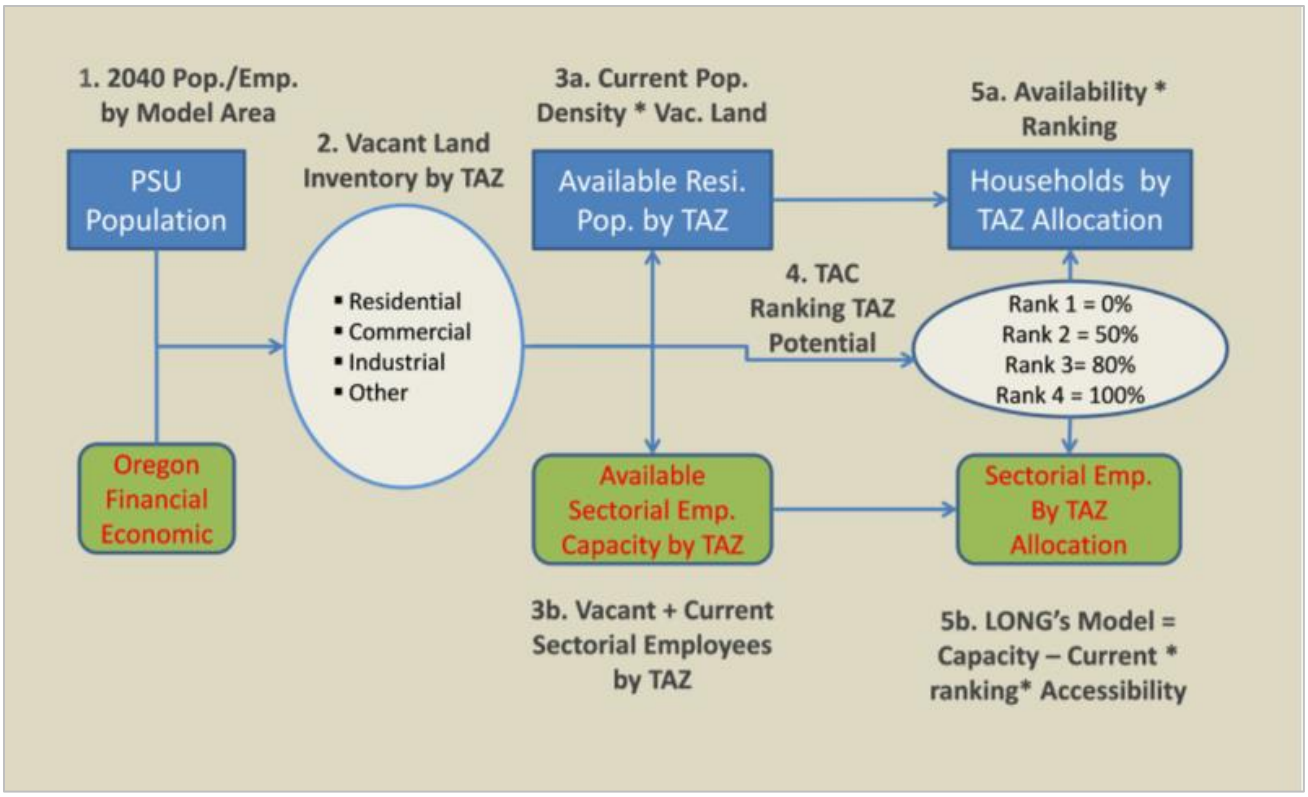
FIGURE 5. ZONING MAP OF ASHLAND CFA

EXISTING MODEL LAND USE ASSUMPTION REVIEW

This section documents household and employment assumptions in the year 2045 RTP "no action" or "baseline" scenario plus current planning factors that suggest strategies for the year 2045 CFA scenario. For modeling and guidance development purposes, it is important to note that while the City made clear policy, comprehensive plans, and CFA boundary decisions, the results of that work need to be translated to a year- and model-specific inputs to fully conduct the CFA forecast analysis.

HOUSEHOLD ASSUMPTIONS

Future households within the City's adopted future control total were spatially re-allocated based on an established household allocation process (Long's Model) used by the SOABM. The case study team identified the development potential within each partial CFA-TAZ combination based on buildable acres in each TAZ that were in the CFA given an average maximum capacity assumed to be 15 units per acre based on the City's information. The CFA area development potential, an input to the household allocation model, was assigned a higher value (higher development potential) than non-CFAs based on the City's policy choices. While time did not permit varying the future CFA scenario population demographics (which were taken from base year Census Public Use Microdata Area for the RTP no action future), this could be a legitimate choice to make in general for CFA analysis provided that it is based in achieved demographic distributions in the City in question or the larger region. Employment re-allocation within the City's future control totals was reallocated proportionally to the household reallocation (see next section). The RVCOG Long's model workflow appears in *Figure 6* for transparency's sake. The modeling guidance should acknowledge that cities within some areas (e.g., Portland Metro, RVCOG, and Lane Council of Governments) have access to different land use allocation models via their regional agencies, while other Oregon cities can use the Long's model if needed.



Source: RVCOG

FIGURE 6: HOUSEHOLD AND EMPLOYMENT ALLOCATION IN LONG'S MODEL

EMPLOYMENT ASSUMPTIONS

The employment growth rate in CFAs is assumed to be the same as the population growth (approximately 33 percent). Therefore, the new employment (28-year growth) in CFAs between the year 2017 and year 2045 CFA scenarios is 33 percent higher than the new employment in CFAs between the year 2017 and year 2045 RTP scenarios. This rate is applied uniformly across all NAICS employment categories, and therefore the distribution across different employment categories do not change (with the exception of the conversion from industrial to retail and service in Croman Mill as noted above).

The City expects a net increase of 27 percent in total employment in the year 2045, so the accelerated growth in CFAs (33 percent) needs to be offset by slower growth outside of CFAs. Note that other Oregon cities may expect net employment increases, so analysts should be prepared to handle either case. The employment growth (year 2017 to year 2045) outside all primary CFAs and downtown Ashland were proportionally decreased to maintain the same total employment in the City. Note also that when future analysis performs proportional increases or decreases, the final numbers need to be reviewed carefully to avoid non-sensical results.

For each NAICS employment category, if there was insufficient employment in non-CFAs to re-allocate to CFAs, the re-allocation was capped such that there were no net employment reductions outside CFAs. While this is a reasonable assumption, the guidance should note that there are other assumptions that would be equally viable (e.g., that employment outside the

CFAs would be drawn within them in a CFA future, perhaps in the form of restaurants, small offices, and upscale services firms) provided that a reasonable rationale is provided for such a choice.

DEMOGRAPHICS ASSUMPTIONS

A key outcome of the CFA scenarios was to increase the number of multi-family housing units in the CFA zones, thus increasing the households and population in the CFA scenario within those zones. The relative proportions of household and person characteristics such as household size, household income, person age, and occupation in the year 2045 CFA scenario were assumed to be the same as those in the year 2025 RTP scenario. However, if changes in these distributions are expected consistent with increased residential densities of CFAs, for example, a higher percentage of households with certain income levels, then they could easily be updated in the inputs to the population synthesis procedure to generate more households of a certain characteristic. The analysis and modeling guidance should give some attention to the fact that while it is entirely reasonable to assume different demographic profiles within the CFAs, doing so would generally require re-balancing the demographic distributions of all areas within the entire City during CFA analysis if City-wide control distributions are to be maintained. The PopulationSim tool (see below) used for the Ashland case study can do so, but other parts of Oregon lacking that capability currently would have to use techniques such as iterative proportional fitting (IPF).

CFA MODEL LAND USE AND DEMOGRAPHIC ASSUMPTIONS

Table 4 summarizes the total household, population, and employment in CFAs comparing the year 2045 RTP and year 2045 CFA scenarios, including the 2017 base year to illustrate the assumed growth. This basic spatial reallocation was performed using a spreadsheet operating at the TAZ level that assumed Net Residential Acres with a minimum density of 15 units per acre within the CFA TAZs, then re-balanced other TAZs to maintain the city-level population control total. Note from the table below that the net increase of assumed year 2045 CFA population over the same geography in the year 2045 RTP ("no action") scenario is 1,130 (5,361-4,231) people.

TABLE 4: SUMMARY OF TOTAL AND CFA POPULATION AND EMPLOYMENT

AREA	CFA	ASHLAND
2017 POP	3,532	21,472
2045 RTP POP	4,231	23,668
2045 CFA POP	5,361	23,709
2017 JOBS	3,102	10,024
2045 RTP JOBS	4,213	12,757
2045 CFA JOBS	4,984	12,762

Note: these population numbers may not match other summaries exactly due to the way that TAZ data was aggregated to CFAs. The population is shown here to indicate magnitude of change across the scenarios.

Once the households were reallocated to reflect the higher development potential in the CFAs, the synthetic population was updated to match the new spatial distribution of households and employment.

Place Type Tool Review

The Appendix describes a process used to review the City's land use assumptions, with the intent to look for opportunities for small changes that could support creation of mixed-use neighborhoods. Mixed use neighborhoods are characterized by higher levels of the "5 Ds" - Density, Destinations (e.g., shopping), Diversity (e.g., mix of residential and commercial), Design (e.g., walkability), and Distance to Transit. Communities that are classified as "mixed-use" (which score high across all 5 Ds) tend to, on average, generate less auto travel and be more closely aligned with the state's climate goals.

A review of the Ashland CFAs with the Place Type tool (available to all Oregon jurisdictions) showed that both Croman Mill and the Railroad Properly are solidly in the "Mixed-Use" Place Type and therefore should be expected to produce outcomes that align well with climate goals. The Transit Triangle Overlay, while mostly "Mixed-Use," includes a middle section that has a "Residential" Place Type. This suggests that more land use diversity in that area could help realize much more of the shorter trip opportunities that come along with a "Mixed-Use" neighborhood. Additionally, CFA boundary proposals may start by being constrained to a narrow strip of land along a major road; cities may find it helpful in these cases to re-draw narrow boundaries by densifying a wider area of land to capture more "Mixed-Use" benefits. The review highlighted how a Place Type review serves as a diagnostic tool to help the region see where additional climate friendly opportunities may lie.

UPDATING THE CFA HOUSEHOLD CHARACTERISTICS USING POPULATIONSIM

PopulationSim is a software application used by ODOT and other activity-based model users to create the synthetic population required as an input to the ABM. Full documentation of the use of PopulationSim in the SOABM used for the Ashland case study is available online.[1] The key steps in applying PopulationSim to update the household demographics of the CFA household population described above appear below.

1. Note that because there was no group quarter population change, the Ashland case omitted the PopulationSim step of assigning group quarters population demographics. Other applications with changes to group quarters population should include this step.
2. For the 96 CFA TAZs (comprised of 197 MAZs in the SOABM structure), the household demographics were set in several sub-steps:
    a. Prepared the count of households from the CFA re-allocated population (Table 4).
    b. Prepared the housing type splits (SF, Duplex, MF, MH) by TAZ for the CFA TAZs. For the case study, the team assumed that the split proportions would follow the

[1] https://github.com/RSGInc/SOABM/wiki/Future-Year-Population

same patterns as the year 2045 RTP Forecasts, but other applications can change the proportions using appropriate planning assumptions from the city under analysis.

c. Prepared the input control distributions of household population demographics (Income, Size, Worker Size, w/without Child) by MAZ for the CFA MAZs. As with the housing type splits, the Ashland team assumed that these distributions would be the same as those used in the year 2045 RTP Forecasts by MAZ, but other applications can apply different assumptions based on the local CFA planning effort.
d. Verified the housing type and demographic distribution controls for the non-CFA TAZs and MAZs. The team preserved the year 2045 RTP assumptions for these inputs for all non-CFA TAZs and MAZs. This would probably be the standard assumption for other CFA applications, but it is not a requirement.
e. Prepared all PopulationSim TAZ and MAZ input files per steps (a-d) above.

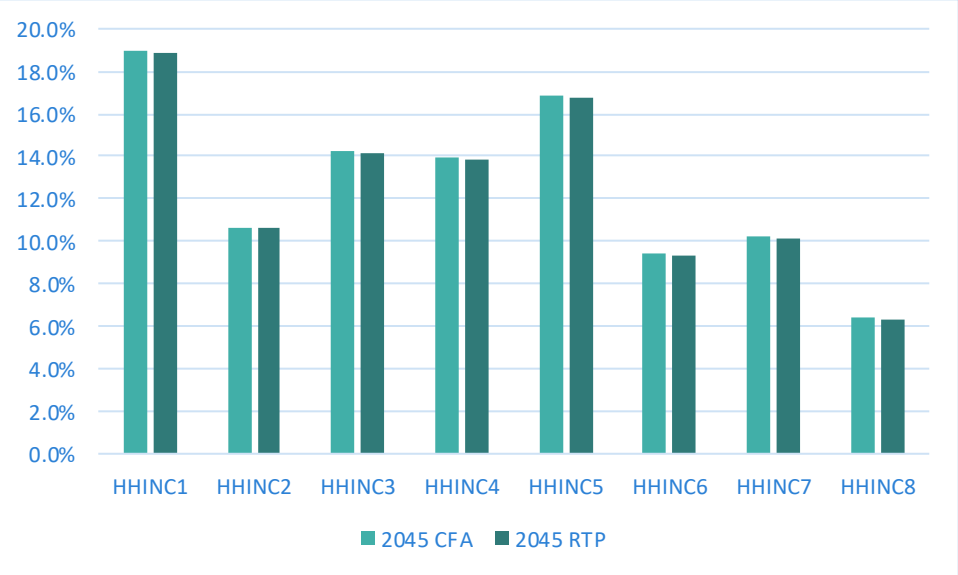
3. Because by design future households were moved from non-CFA TAZs/MAZs to CFA TAZs/MAZs, the visitors to these relocated households would change; therefore, the team applied the PopulationSim Visitor Model to develop the year 2045 synthetic visitors in terms of households and persons.
4. Finally, the team applied the respective GQ population (no change), household population, and visitor inputs described above and ran PopulationSim to produce the year 2045 CFA scenario synthetic population. Note that this is the population for the entire modeled geography, not just the CFA zones.

Table 5 on the following page compares the CFA areas' total population by household housing type splits. *Figure 7, Figure 8, Figure 9, and Figure 10* compare population demographics across various household attributes in the CFA scenario to the RTP future (the "no action" scenario). As *Table 5* shows, the CFA scenario would result in a net increase in population within the CFA boundary and a shift toward more multi-unit housing. The demographic distributions (one each for household income, household size, number of household workers, and whether the household has any children) generally follow the same pattern in the CFA and RTP scenarios (as intended) with some minor variations given the interaction of housing type with household demography during PopulationSim application. As mentioned above, other CFA analyses may choose to apply demographic and/or housing type changes—typically this would be done by "borrowing" the appropriate type or demographic distribution from a "donor TAZ" deemed to be representative of the future conditions planned for in the CFA.

TABLE 5: YEAR 2045 CFA VS. YEAR 2045 RTP HH POPULATION IN CFA ZONES--TOTAL AND BY TYPE

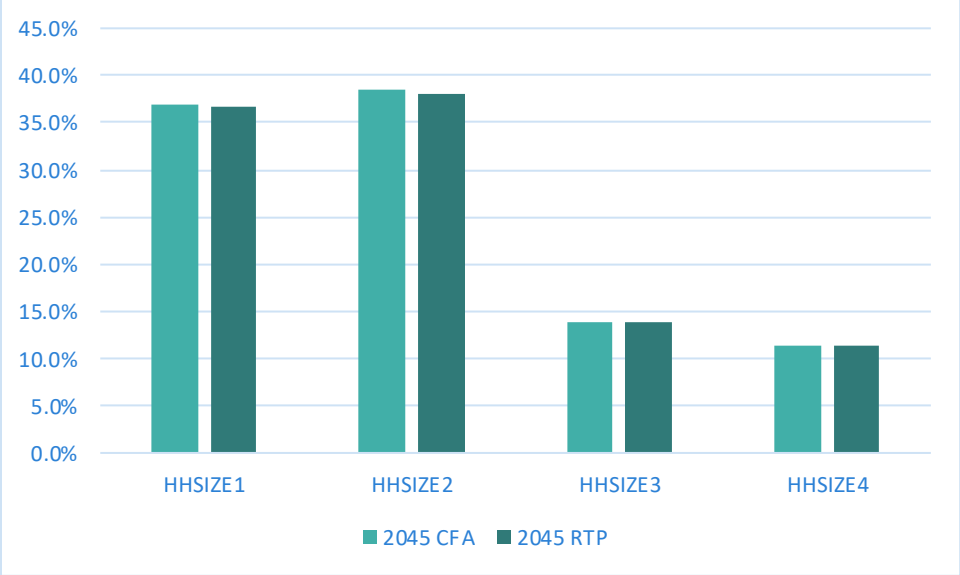
Source: ODOT

QUANTITY	2045 RTP	2045 CFA	CFA-RTP
TOTAL HH POPULATION	**10,985**	**11,269**	**284**
SINGLE-FAMILY HH POPULATION	7,092	7,047	(45)
NON-SINGLE-FAMILY HH POPULATION	3,893	4,222	329



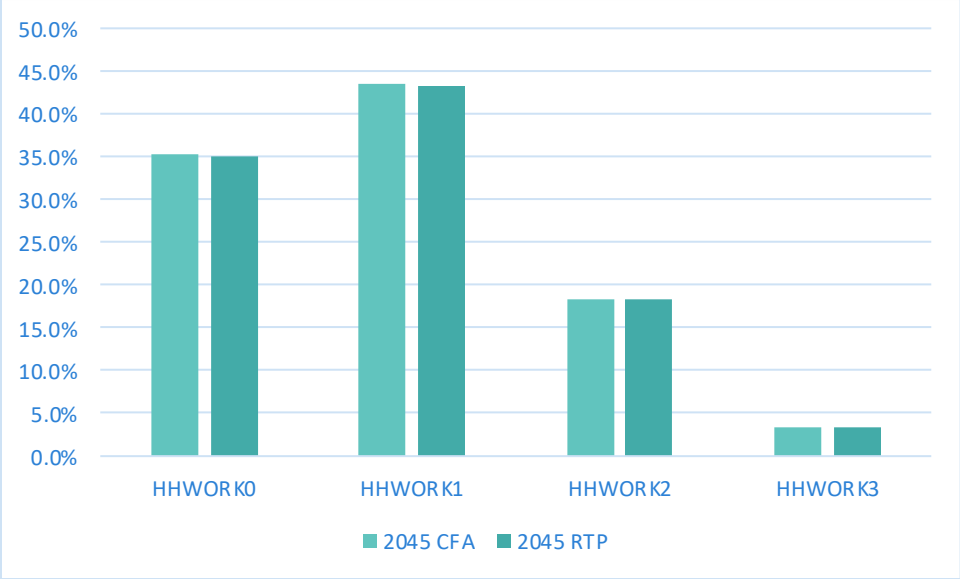
Source: ODOT

FIGURE 7: YEAR 2045 CFA VS. YEAR 2045 RTP HH POPULATION DISTRIBUTION IN THE CFA ZONES TOTAL BY HH INCOME BIN



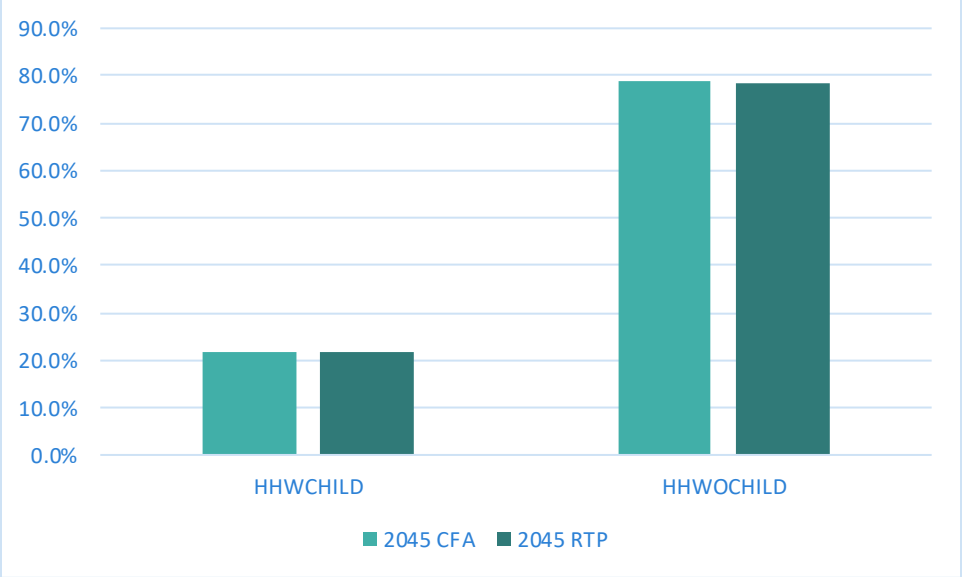
Source: ODOT

FIGURE 8: YEAR 2045 CFA VS. YEAR 2045 RTP HH POPULATION DISTRIBUTION IN THE CFA ZONES TOTAL BY HH SIZE BIN



Source: ODOT

FIGURE 9: YEAR 2045 CFA VS. YEAR 2045 RTP HH POPULATION DISTRIBUTION IN THE CFA ZONES TOTAL BY # HH WORKERS BIN



Source: ODOT

FIGURE 10: YEAR 2045 CFA VS. YEAR 2045 RTP HH POPULATION DISTRIBUTION IN THE CFA ZONES TOTAL BY HH WITH/WITHOUT CHILDREN

STEP 3. OTHER ZONAL DATA

The City of Ashland is considering changing parking policies for CFAs, but did not have specific decisions at the time of the case study. The case study team therefore chose to assume an ambitious parking policy to test how sensitive VMT per capita reduction is to parking costs. The team tested a policy of applying parking charges everywhere in the CFAs with the same cost as current downtown parking ($1/hr). This represents the approximate generalized cost of parking (parking fee, stall availability, convenience or inconvenience, etc.) for people going to CFAs for work/leisure, but not for resident overnight parking.

Note that TPR requirements include updates to reduce parking minimums along higher capacity transit lines. This serves to improve the feasibility of higher density residential construction in these areas (including CFAs). Public parking, such as in shopping areas, is not directly affected.

STEP 4. NETWORK EDITS

NETWORK REVIEW

The Ashland planning process identified desired future street grids within the CFAs that would provide for walkability. The case study team reviewed the relative size of that proposed grid system to the SOABM's current MAZ/TAZ system to determine if additional network resolution was required to reflect the new development's denser street network. In this case, no network changes were required as the current MAZs already had logical loading points onto the planned future road network. However, in general CFA analysis additional zone and network resolution

may be required to reflect denser development and street grids for models sensitive to such factors or sensitive to the so-called "4D/5D design variables"; the modeling and analysis guidance should allow for this possibility (see also the Appendix to this document for a discussion of the Place Types tool, especially the Design dimension. The tool is available to all Oregon jurisdictions).

Note that the future CFA scenario used the same transit system as the future baseline RTP scenario. Transit services are another "lever" that cities can choose to use in future analysis to achieve CFEC goals.

STEP 5. TWO ASHLAND MODEL RUNS AND FINDINGS FROM EACH STEP

Two year 2045 CFA Scenario runs were conducted in part due to (1) the delay in receiving approval from Oregon Employment Department (OED) to access employment data to conduct the employment reallocation in the first run, and (2) to assess the sensitivity of different input changes on the VMT impact. The need for OED permission to use the confidential employment data is a factor the modeling and analysis guidance should note, since it requires sending forms to OED and obtaining their approval.

On a more positive note, the two passes were also deliberately designed to test first only the population reallocation (higher population in CFAs), and second pass to layer atop the population changes the higher CFA employment and the presence of daytime parking fees in CFAs. The following sections describe the results of each pass in succession.

FIRST PASS

The first pass includes only the population reallocation process, so the VMT per capita changes were expected to be small.

Table 6 summarizes the VMT and VMT per capita for each scenario, segmented by CFA and non-CFA geographies in general. The VMT per capita in the CFAs was less than in non-CFAs, as expected. The decrease in VMT per capita in CFAs was larger than the decrease in non-CFAs; however, there is a small net reduction (1.0%-1.5%) in VMT per capita for the non-CFA areas and the entire city. The first pass did not alter the future-year baseline employment to isolate population effects. The results suggest that concentrating household growth within the CFAs beneficially affects VMT for both CFA and non-CFA residents.

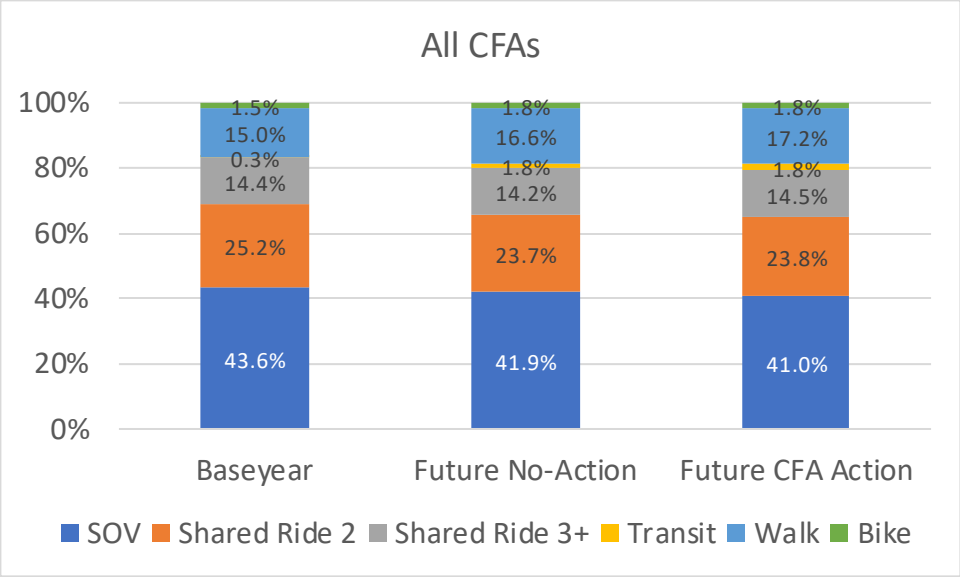
TABLE 6: FIRST PASS VMT FINDINGS

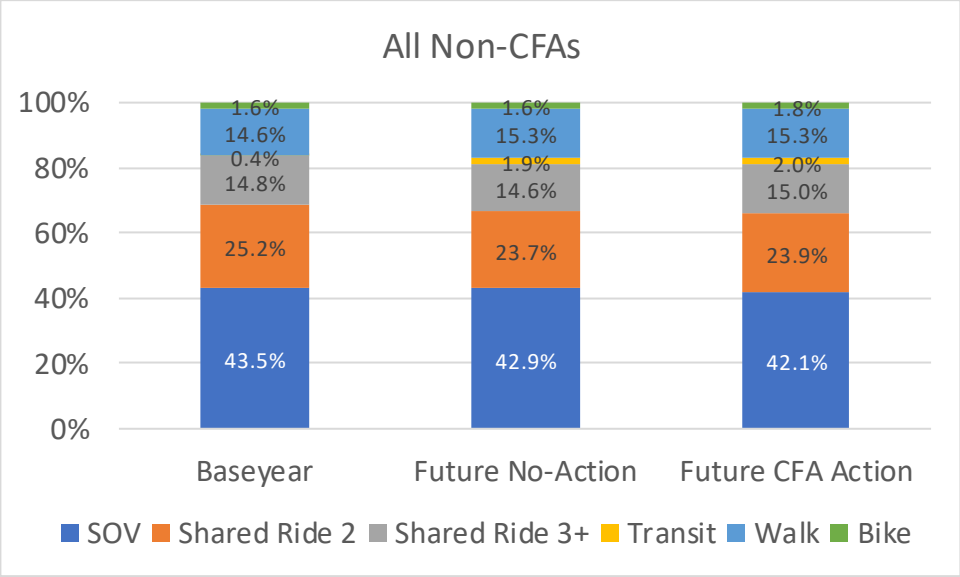
	2017 VMT	2017 VMT/CAPITA	2045 RTP VMT	2045 RTP VMT/CAPITA	2045 CFA VMT	2045 CFA VMT/CAPITA
CFA TOTAL	37,643	10.66	49,863	11.79	62,264	11.61
NON-CFA TOTAL	211,171	11.77	246,735	12.69	230,631	12.57
ASHLAND TOTAL	248,814	11.59	296,598	12.53	292,895	12.35

Table 7 on the following page shows the number of person trips by travel mode for each scenario, segmented by CFAs and non-CFAs, while *Figure 11* below presents that mode share in a graphical format. Key findings include:

- Similar mode share within and outside CFAs in the 2017 base year
- In CFAs, the future CFA scenario showed an 0.6% increase in walk mode share
- In non-CFAs, the CFA scenario showed an increase in transit (0.1%) and bike (0.2%) mode shares relative to the non-CFA future

The mode share conclusions illustrate the particular mechanisms by which the denser CFAs achieved the VMT reductions.





Source: ODOT

FIGURE 11: FIRST PASS MODE SHARE SUMMARY

TABLE 7: FIRST PASS MODE CHOICE FINDINGS

	Metric	2017 Base Year	2045 RTP (No-Action)	2045 CFA Action
Person-Trips for CFA Residents				
	SOV	20,080	22,265	24,315
	Shared Ride 2	11,605	12,568	14,077
	Shared Ride 3+	6,612	7,524	8,563
	Transit	151	959	1,055
	Walk	6,909	8,819	10,171
	Bike	680	945	1,056
	TNC/Taxi/Other			
	All modes summarized	46,037	53,080	59,237
Mode Shares for CFA Residents				
	SOV	43.6%	41.9%	41.0%
	Shared Ride 2	25.2%	23.7%	23.8%
	Shared Ride 3+	14.4%	14.2%	14.5%
	Transit	0.3%	1.8%	1.8%
	Walk	15.0%	16.6%	17.2%
	Bike	1.5%	1.8%	1.8%
	TNC/Taxi/Other	0.0%	0.0%	0.0%
	All modes summarized	100.0%	100.0%	100.0%
Person-Trips for non-CFA-Residents within the City				
	SOV	55,033	60,805	59,114
	Shared Ride 2	31,838	33,635	33,491
	Shared Ride 3+	18,795	20,689	20,979
	Transit	483	2,712	2,799
	Walk	18,462	21,691	21,453
	Bike	1,970	2,254	2,460
	TNC/Taxi/Other			
	All modes summarized	126,581	141,786	140,296
Mode Shares for non-CFA Residents within the City				
	SOV	43.5%	42.9%	42.1%
	Shared Ride 2	25.2%	23.7%	23.9%
	Shared Ride 3+	14.8%	14.6%	15.0%
	Transit	0.4%	1.9%	2.0%
	Walk	14.6%	15.3%	15.3%
	Bike	1.6%	1.6%	1.8%
	TNC/Taxi/Other	0.0%	0.0%	0.0%
	All modes summarized	100.0%	100.0%	100.0%

Source: RSG

SECOND PASS

This second pass included all changes described for the future CFAs, including population reallocation, employment reallocation, and parking policy changes. *Table 8* summarizes the VMT and VMT per capita for each scenario, segmented by CFAs versus non-CFAs and city-wide. The decrease in VMT per capita in CFAs was again larger than the decrease in non-CFAs, which is expected. The decrease in VMT per capita CFAs in the second pass (4.8%) was much higher than that in the first pass (1.5%), which suggests that the additional impacts in the second run assumptions (more concentrated employment in CFAs and parking policy in CFAs) contributed an additional 3.3% reduction in VMT per capita. This observation may help cities compose their CFA strategies.

TABLE 8: SECOND PASS VMT FINDINGS

	2017 VMT	2017 VMT/CAPITA	2045 RTP VMT	2045 RTP VMT/CAPITA	2045 CFA VMT	2045 CFA VMT/CAPITA
CFA TOTAL	37,643	10.66	49,863	11.79	60,135	11.22
NON-CFA TOTAL	211,171	11.77	246,735	12.69	230,631	12.57
ASHLAND TOTAL	248,814	11.59	296,598	12.53	290,766	12.26

Source: ODOT

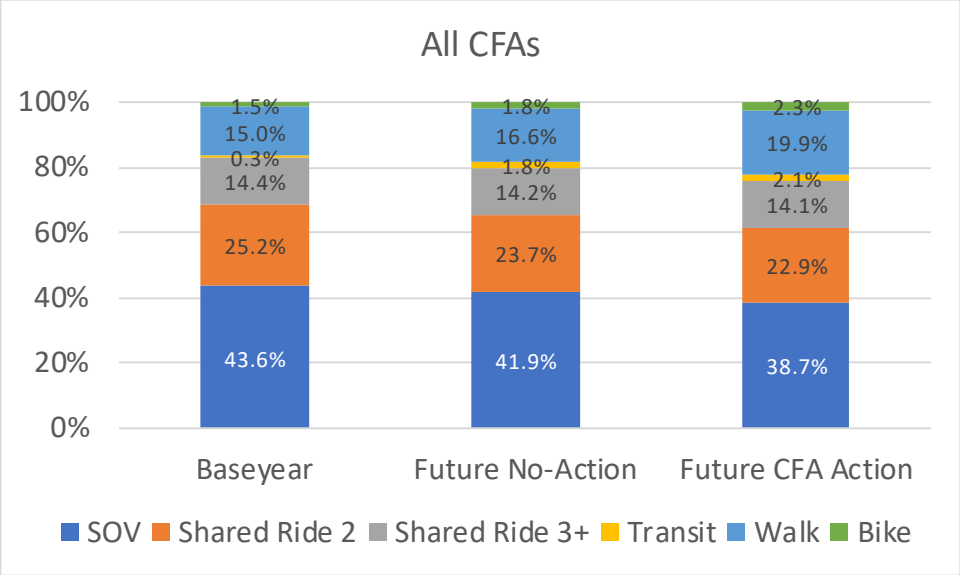
Table 9 shows the number of person trips by travel mode for each scenario, segmented by CFAs and non-CFAs, while *Figure 12* also presents the mode shares in a graphical format. Key findings include:

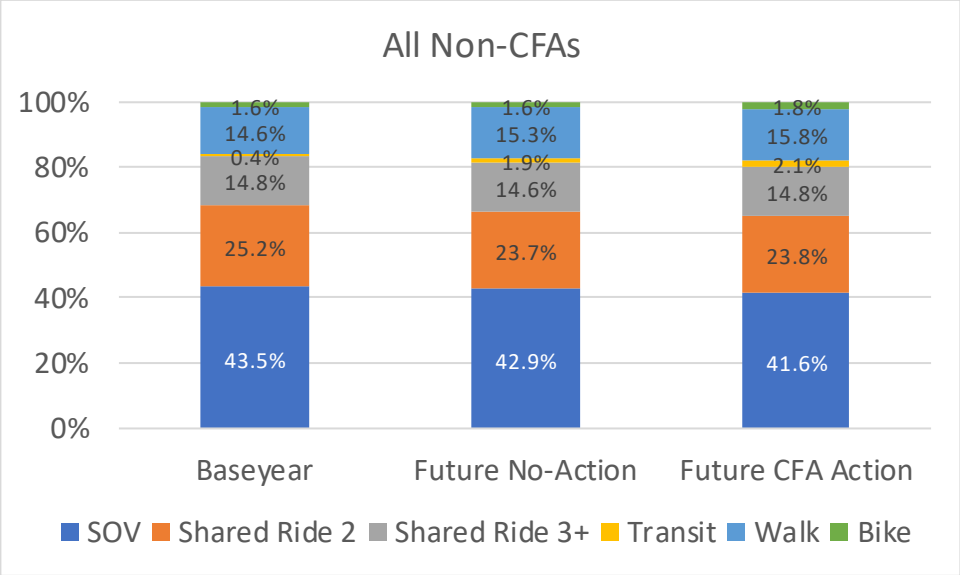
- There were similar mode shares within and outside CFAs in the 2017 base year
- In CFAs, the walk mode share in the CFA scenario in the second run (3.3%) was much higher than that in the first run (0.6%). Transit and bike mode share also increased in the second run.
- In non-CFAs, CFA scenario showed an increase in transit (0.2%), walk (0.5%), and bike (0.2%) mode shares

TABLE 9: SECOND PASS MODE CHOICE FINDINGS

	Metric	2017 Base Year	2045 RTP (No-Action)	2045 CFA Action
Person-Trips for CFA Residents				
	SOV	20,080	22,265	23,838
	Shared Ride 2	11,605	12,568	14,099
	Shared Ride 3+	6,612	7,524	8,667
	Transit	151	959	1,267
	Walk	6,909	8,819	12,238
	Bike	680	945	1,413
	TNC/Taxi/Other			
	All modes summarized	46,037	53,080	61,522
Mode Shares for CFA Residents				
	SOV	43.6%	41.9%	38.7%
	Shared Ride 2	25.2%	23.7%	22.9%
	Shared Ride 3+	14.4%	14.2%	14.1%
	Transit	0.3%	1.8%	2.1%
	Walk	15.0%	16.6%	19.9%
	Bike	1.5%	1.8%	2.3%
	TNC/Taxi/Other	0.0%	0.0%	0.0%
	All modes summarized	100.0%	100.0%	100.0%
Person-Trips for non-CFA-Residents within the City				
	SOV	55,033	60,805	56,966
	Shared Ride 2	31,838	33,635	32,529
	Shared Ride 3+	18,795	20,689	20,316
	Transit	483	2,712	2,850
	Walk	18,462	21,691	21,666
	Bike	1,970	2,254	2,497
	TNC/Taxi/Other			
	All modes summarized	126,581	141,786	136,824
Mode Shares for non-CFA Residents within the City				
	SOV	43.5%	42.9%	41.6%
	Shared Ride 2	25.2%	23.7%	23.8%
	Shared Ride 3+	14.8%	14.6%	14.8%
	Transit	0.4%	1.9%	2.1%
	Walk	14.6%	15.3%	15.8%
	Bike	1.6%	1.6%	1.8%
	TNC/Taxi/Other	0.0%	0.0%	0.0%
	All modes summarized	100.0%	100.0%	100.0%

Source: RSG





Source: ODOT

FIGURE 12: SECOND PASS MODE SHARE SUMMARY

CASE STUDY FINDINGS

The Ashland case study produced several key findings both for guidance documents ODOT may publish and regarding potential CFA strategy effectiveness:

- Guidance material is typically intended for a general audience so that it is applicable to small *and* large municipalities. However, some methods in the Ashland case study (e.g., the use of PopulationSim and its automatic handling of population demographics) might not work for all municipalities. Guidance may need to provide recommendations for different tools across different jurisdictions. Regardless of the tool, more demographic changes, where warranted by substantial changes in CFA density, can be considered in future analysis.
- Guidance materials could provide checklists or templates for documenting assumptions and findings; this would both help cities resource their analyses more quickly and allow state agencies including ODOT and DLCD to rapidly parse cities' findings.
- Meeting CFA targets will likely require a scenario planning approach (i.e., testing multiple different strategies packaged in different future scenarios) since city CFAs will differ and there is no one-size-fits all deterministic formula that can identify the most successful likely strategies for a given city.
- Different cities will have access to different forecast models and supporting tools; any guidance will need to acknowledge this and allow for multiple different tool (model and off-model) mixes, at least for the immediate future. This is doubly important since forecast models have different sensitivities to different inputs.
- Having CFA boundaries *not* matching model zone boundaries exactly is probably the norm rather than the exception. Some judgement may be required to determine which zones should be included in the CFA so that the results can be more accurate and not over- or under-predict VMT.
- It took the study team six weeks to obtain OED approval to use the confidential employment data. Guidance documents should make the possibility of similar delays known to Cities so that they allow adequate time for planning, resourcing, and conducting CFA studies.
- The case study shows that a combination of three policies (encouraging more housing development in CFAs, encouraging more employment concentration in CFAs, and introducing daytime parking pricing) changed the forecast VMT and per-capita VMT, but not by large amounts. Cities may need to consider additional actions relevant to their local situation (e.g., transit, more active transportation infrastructure) to meet ambitious CFA goals.
- The Place Types tool can be used to help identify opportunity areas for such changes that increase residents living in compact multi-modal mixed-use neighborhoods.

Appendix: Place Types Tool

This Appendix describes how a "place types" analysis can help further improve and refine CFA development and representation in travel forecast models.

Communities are looking to reduce VMT to reduce climate pollution, increase walkability, and create vibrant communities. A key strategy for reducing VMT is developing areas with a dense combination of residential and commercial uses ("mixed-use"), which have been shown to reduce VMT per capita. A "Place Types"[2] analysis can help further improve and refine mixed use development and representation within travel models. The Ashland case study described in this report and this appendix illustrates how Place Types can be used to suggest land use changes to enhance mixed-use areas that are likely to reduce VMT, with a focus on Transportation Analysis Zones (TAZ) within a designated Climate Friendly Area (CFA). CFAs are a type of a mixed-use zone that have an objective for reducing VMT per capita.

As context, Place Types are a way to categorize TAZs using the "5 Ds":

- Density (jobs plus households per acre within a ¼ mile)
- Destination Accessibility (share of regional jobs within five miles)
- Diversity (jobs/households ratio within a ¼ mile)
- Design (multi-modal and pedestrian-oriented street lane miles per square mile)
- Distance to transit (PM peak hour service within a ¼ mile)

Using behavior data from travel surveys, the State of Oregon has demonstrated a strong relationship between Place Types and travel outcomes[3]. In summary, communities that are classified as "mixed-use" (which score high across the 5 Ds) tend to, on average, generate less auto travel and therefore be closer aligned with the state's climate goals. (see **PLACE TYPES FLYER** bar charts & Chapter 6 of **OHAS REPORT**) Therefore, as a community is considering investments that enable mixed-use compact neighborhoods and support a reduction in VMT per capita, it is helpful to complete a Place Types assessment as part of the horizon year modeling process with the goal of recommending modifications that would further reduce VMT per capita.

The adoption of CFAs in alignment with OAR 660-012 are expected to support a balanced level of mixed-use density that has been shown to enable reductions in driving per capita. If a Place Types review indicates that a CFA (or other area of a jurisdiction) is not expected to have a "high score" across the "5 Ds," in a future year scenario, that CFA would be much less likely to reduce driving when compared with a "mixed-use" Place Type. By reviewing a Place Types map to examine if the TAZs within CFAs that are intended to be "mixed-use" are actually identifying as "mixed-use," a community can better monitor progress towards realizing a walkable mixed-use neighborhood and are optimizing this VMT reduction strategy

The City of Ashland case study helps provide an example for how this could work. A Place Types layer was produced and reviewed for the City of Ashland. The maps show that Ashland in the year 2045 would have a strong foundation with mixed-use areas that allow density, diversity

[2] https://www.oregon.gov/odot/climate/Documents/PlaceType_Flyer.pdf

[3] https://www.oregon.gov/odot/Planning/Documents/OHAS-Daily-Travel-In-Oregon-Report.pdf

and design that enables lower VMT. As part of the CFEC work, the City of Ashland is proposing to potentially adopt three CFAs:

1. Croman Mill
2. Railroad Property
3. Transit Triangle Overlay

The proposed CFAs (bounded by white lines) shown in the following *Figure 13*, *Figure 14*, and *Figure 15*, show that the Croman Mill and the Railroad Property CFAs would be classified as the "Mixed-Use" Place Type and therefore would be expected to produce VMT per capita outcomes that align well with state climate goals. In addition, the CFAs are surrounded by other TAZs that are also classified as "Mixed-Use," which can further enhance the network effects of the mixed-use CFA.

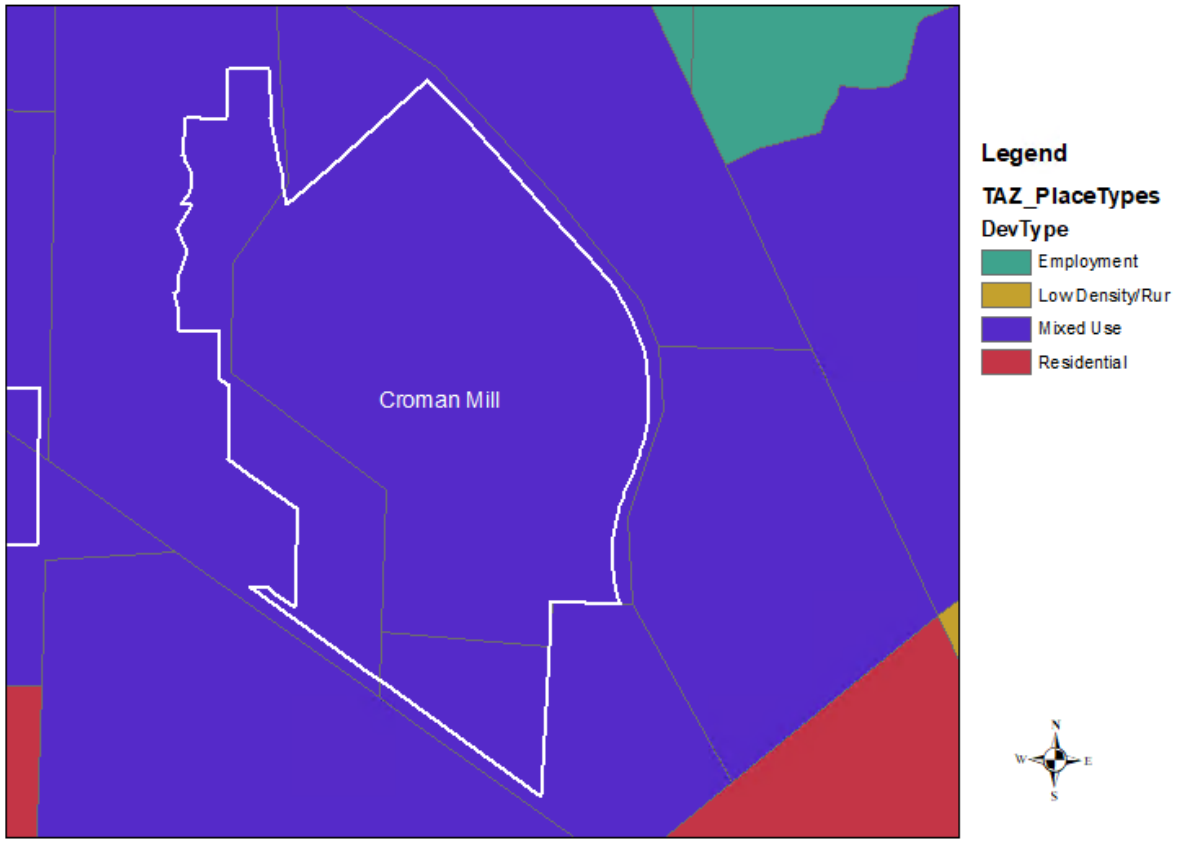


FIGURE 13. CROMAN MILL PLACE TYPE OVERLAY AFTER CFA SPECIFIC RE-ZONING AND DENSIFICATION (YEAR 2045)

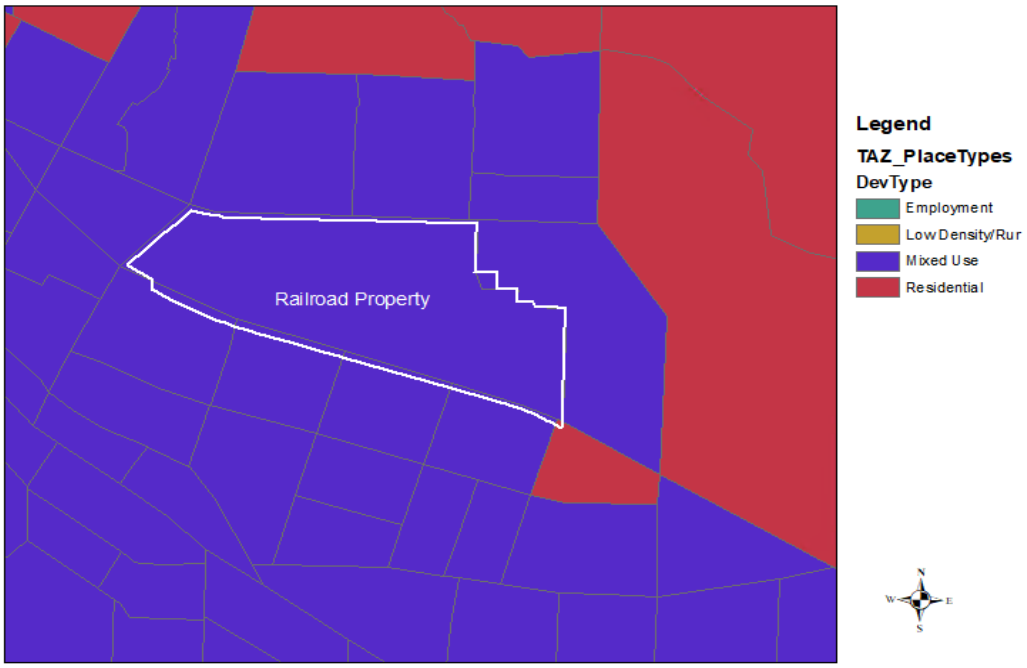


FIGURE 14. RAILROAD PROPERTY PLACE TYPE OVERLAY AFTER CFA SPECIFIC RE-ZONING AND DENSIFICATION (YEAR 2045)

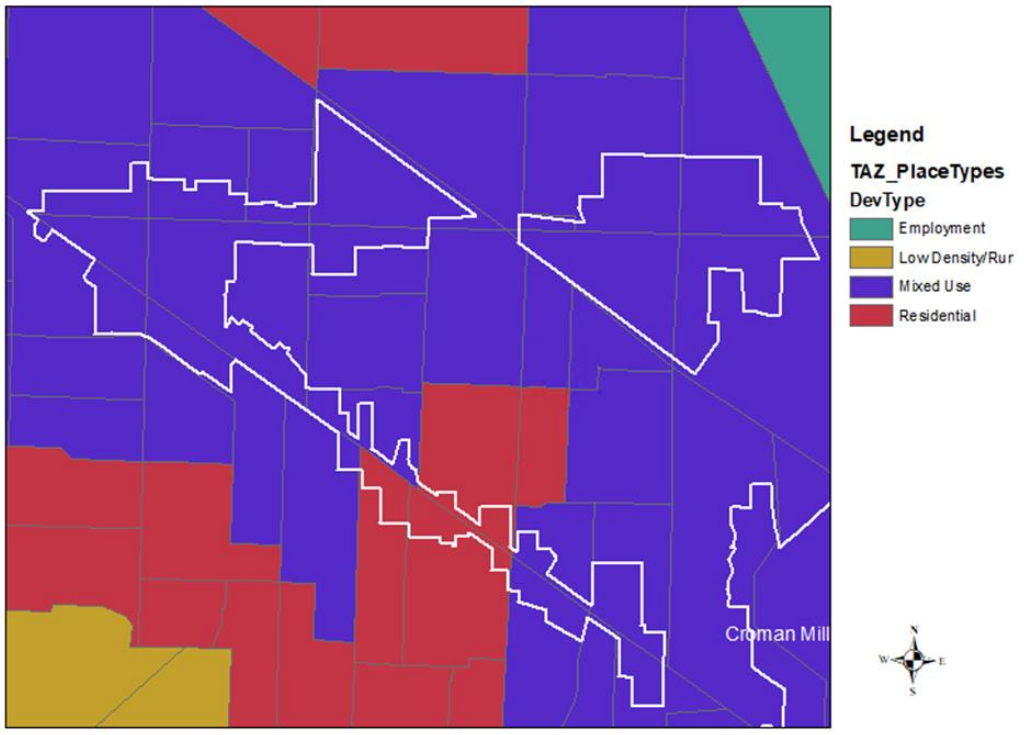


FIGURE 15. TRANSIT TRIANGLE OVERLAY AFTER CFA SPECIFIC RE-ZONING AND DENSIFICATION (YEAR 2045)

The third CFA, the Transit Triangle Overlay, shown above as *Figure 15*, is largely classified as Mixed-Use, but there is a small area in the middle of the CFA along the major road that is coded "Residential". Without specific information about which of the 5 Ds are involved, the lack of the

Mixed-Use classification indicates that there would be at least one factor that would remain at a level that is less supportive of the overall mix of characteristics to optimize all the shorter trip opportunities that come along with a "Mixed-Use" neighborhood. Therefore, it can be seen how this "Place Types" map analysis can serve as an interim diagnostic tool to help a jurisdiction or region identify where additional opportunities may be to improve the Mixed-Use characteristics of this CFA.

In the case of the City of Ashland case study, the future travel demand model forecast suggests a successful implementation of the CFA policies in OAR 660-012 regarding achieving a mixed-use Place Type for at least two of the CFAs, and a partial result in the third. In the case study example, the City designated CFAs would be expected to provide more development (households and employment) capacity than would have been expected to be built within the existing RTP year 2045 planning (modeling) horizon. Given that scenario, it might not be possible for all parcels in the three CFA boundaries to fully develop within that 20-year modeling/analysis time frame. But the seeds of the development pattern have been sown, and time may allow for the entirety of designation CFAs to fully meet their potential. While there is no "right" answer with how to use Place Types to inform land use development and planning, Place Types can help add useful context to the discussion and decision.