URBAN GROWTH BOUNDARY REMAND — BEND

Meeting Agenda

Urban Growth Boundary Technical Advisory Committee – Meeting 11
Thursday, October 8, 2015   9:00 AM – 12:30 PM
Municipal Court Room – Bend Police Department
555 NE 15th Street
PLEASE NOTE THE 9 AM START TIME AND THE LOCATION

Meeting Purpose and What is Needed from the TAC

The purpose of this meeting is to begin the process of crafting a recommended UGB scenario. This is intended as an informational meeting to set the stage for recommendations by the TAC at the next meeting on October 22nd. In this meeting, the TAC will:

- Hear presentations by the project team regarding the scenario evaluation
- Discuss evaluation results, including draft recommendations
- Have a "roundtable" discussion regarding TAC member perspectives and where members are leaning regarding the elements to be included in the hybrid scenario

1. Welcome and Introductory Items	**9:00 AM**	
a. Convene and welcome	Co-chairs	
b. Approval of minutes (Meeting 10)		
c. Where we are in the process – a brief look back and look forward	Joe Dills, Brian Rankin	
2. Evaluation Briefings and Discussion *Briefing, TAC Discussion*	**9:10 AM**	
a. Overview of evaluation and approach to building the hybrid	Project Team members will make the presentations, and be available	
b. Topical presentations and TAC discussion. *Each presenter* will focus on *key findings, difference-makers, and preliminary conclusions about the best and worst performing parts of the*		

For additional project information, visit the project website at http://bend.or.us or contact Brian Rankin, City of Bend, at brankin@bendoregon.gov or 541-388-5584

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scenarios.   for questions.

- Factor 1 – Efficient accommodation of identified land needs
- Factor 2 – Orderly and economic provision of public facilities and services
- Factor 3 – Comparative environmental, social, economic and energy consequences
- Factor 4 – Compatibility of proposed urban uses with nearby agricultural and forest activities occurring of farm and forest land outside the UGB

c. Roll-up: summary of working recommendations

3. Break   11:00 AM

4. Public Comment   11:10 AM

Co-chairs

5. TAC Roundtable   11:40 AM

This will be an opportunity for TAC members to state their perspectives and where they are leaning regarding the elements to be included in the hybrid scenario. The goal here is to have a "bridge" discussion to the recommendations that will be the focus on October 22nd.

TAC

6. Project Information, Next Steps   12:25 PM

a. Project information
b. Next meeting – October 22, 2015

Brian Rankin, Joe Dills

7. Adjourn   12:30 PM

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City of Bend
Boundary & Growth Scenarios Technical Advisory Committee
Meeting Notes
Date: June 24, 2015

The Boundary & Growth Scenarios TAC held a follow-up meeting to their June 9th, 2015 meeting on Wednesday, June 24, 2015 in the Bend Municipal Court Hearing Room. The meeting was called to order at 9:00 am by Sharon Smith.

Roll Call (members present)

☐ Jim Bryant	☐ Nick Lelack	☐ Sharon Smith
☐ John Dotson	☐ Brian Meece	☐ Gary Timm
☐ Scott Edelman	☐ Wes Price	☐ Robin Vora
☐ Steve Hultberg	☐ John Russell	☐ Dale Van Valkenburg
☐ Tom Kemper	☐ Ron Ross	☐ Ruth Williamson

Agenda

1. Welcome and Introductory Items

a. Convene and Welcome
Sharon called the meeting to order at 9:00 am. Joe welcomed the TAC and visitors.

b. Approval minutes (Meeting 9)
Joe noted that Robin had provided some edits to the June 9, 2015 meeting minutes that clarified his comments. No other edits were proposed during the meeting. Joe asked and the TAC came to consensus on the 6/9/2015 meeting minutes, with Robin's edits to be included after this meeting (enclosed).

c. Where we are in the process – a brief look back and look forward
Joe noted that the UGB Steering Committee (USC) is scheduled to meet on June 25, 2015. We're on track to have the Boundary TAC make recommendations on a preferred alternative to the USC in January 2016. Brian followed by pointing out that the TAC has done some great work and provided a great legal foundation for the UGB. He noted that the TAC can rely on this work and we can discuss the refinements incorporated in the meeting packets. The TAC is being asked to make decisions within a certain period of time and need to do their best. If needed, another TAC meeting can be scheduled in the fall.

2. Documentation for Lands Being Screened

Mary Dorman of APG provided a brief overview on how the team started with the 18,000 acre study area and reduced it to the proposed study areas. For this presentation, Mary relied on a power point presentation, which is included in the record on remand. The study area started with all exception lands in the study area, per the Division 24 (Goal 14) administrative rules. This area was then refined after screening out unsuitable lands, in a manner consistent with the Court of Appeal's decision in the McMinnville UGB case. Then, remaining exception land was removed after removing the "annotations" land from the workshop map, which is also Step 3 from the McMinnville decision. This reduced the study area from 9,700 acres to 8,300 acres. This reduction focused on exception lands separated by resource lands to the east and northeast, and lands that would not address an identified land need. This step showed the difference between the Phase 1 and Phase 2 narrowing of lands under consideration. The final narrowing yielded a result of 5,400 acres under consideration.

Motion. After Mary's presentation, Joe asked for any questions for Mary. Dale asked if the TAC should make a motion. Joe directed the TAC to a recommendation on page 23 of the packet, which is incorporated below for reference:

> ### Recommendation
> *The project team recommends that the Boundary TAC approve, and forward to the USC, the lands to be screened from further consideration as described beginning on page 5 and shown on Figure 2: Phase 2 Narrowing of Exception Lands*

Dale moved approval of this recommendation, with Brian providing a 2nd to this motion. During the discussion on the motion, Robin raised an issue with the exception lands shown on the map. He pointed out that the west side is covered with ponderosa pine trees; the east side, such as the east side of Section 11 – is covered with dry sage brush. He argued that the west side should not be considered exception land because of the pine forest and stated a position that he saw a fundamental problem with the accuracy of this classification. Sharon replied that state law directs the city to look at zoning, which determines priorities under state statutes. Ron commented that he believed there is a significant amount of land that is zoned as resource land that should not be resource land. Nick commented that the Deschutes County Board of Commissioners has been interested in re-evaluating resource lands. He commented that when investigating how land was zoned in Deschutes County, he did not find that mistakes were made. Every property was looked at carefully and closely when zoning was applied. To change zoning is a separate process. Scott added that lands were intentionally zoned.

Joe asked if there any further comments or discussion on the motion. Wes called the question. The vote was 14 in favor, no votes against, and one vote in abstention.

3. Maintaining Flexibility: Approach to Further Analysis

Becky Hewitt of APG then continued the power point presentation with a focus on approaching the analysis of scenarios. Following Mary's presentation, the team had narrowed the pool of lands for consideration to 5,400 acres. This amount of acres was still too much to include in scenarios that should be within the land budget of around 2,000 acres. The proposed approach is to keep the same three scenarios with changes and remaining areas would be included for supplemental analysis areas. This approach would use the 3,000 acres of land already in one of the three scenarios and another 2,400 acres to potentially use based on the results of the infrastructure modeling. The purpose of identifying these supplemental areas is to ensure there are other lands to consider if some of the areas in the scenarios don't perform well due to infrastructure modeling. The TAC would need to affirmatively remove these areas (she referred the TAC to page 25 of the meeting packet). The map on page 25 showed the areas in scenarios in red and those included in the supplemental analysis area in blue.

Becky then summarized the differences between the Stage 2 boundary analysis and the analysis yet to be completed for Stage 4 indicators and performance measures. She referred the TAC to a table at page 61 of the packet that summarized the factors that will be used in the Stage 4 scenario evaluation. This analysis will focus on key issues in each subarea with the Optimization modeling for water and sewer. A qualitative sensitivity analysis and transportation demand modeling will be used for transportation. In October, the team will bring back data to evaluate the best performing elements.

Motion. Joe then referred the TAC to the motion presented on Page 28 of the meeting packet, which is reproduced below for reference.

> *Recommendation*
> *The project team recommends forwarding the approach described under "Recommended Approach: Overview and Rationale" starting on page 8 and the set of lands for scenarios and supplemental analysis on Figure 3 (page 10) to the USC for approval.*

Following the presentation of this motion, the TAC had a discussion of the motion that included the following topics:

- Using the five minute walk as a potential indicator
- Susan Brody's email to the TAC – considering the combination of uses inside the UGB with those proposed outside the UGB.
- Whether the three factors were connected (Goal 14), how to consider whether a proposed use is too close to resource lands, areas more developed, and with less development potential
- Scenarios are composites – each scenario modeled independently; each scenario will also be modeled with adjacent supplemental areas

- Some subareas are larger than others – will areas be analyzed as a unit or piece by piece
  - On transportation, team will use transportation analysis zones (TAZ's) for analysis
  - For sewer and water, team will use basins and pump stations
- Clarification of the recommendation – areas in blue and red combined are 5,400 acres in size, with areas in scenarios around 3,000 acres in size and a hard number of 2,000 acres in each scenario. What happens if we go to the USC with a scenario that has 3,000 acres?
  - Clarification – the land need is 2,000 acres; the total land area encompassed in all three of the scenarios is 3,000 acres, with each scenario containing 2,000 acres of land.
- The scenarios contain most of the areas that were mapped as dark green (highest performing quartile); some scenarios also include light green (2nd highest performing quartile) such as those south of Bend and north of Deschutes River Woods
- Wildfire assessments – what will these entail? Karen Swirsky provided a brief summary of what the assessments include; vegetation type, flame length, and topography
- Mike Riley provided the TAC with comments by email that were summarized
- Is there enough detail in the supplemental analysis areas to avoid appeals? Will the use of the supplemental map help make findings more legally defensible?
- How will lots that are, for example, two acres with a nice dwelling and land left-over be treated?
  - Developed parcels have adjustments made for them to adjust for capacity
  - Already completed and included in the number of units yielded
- As scenarios are created and supplemental areas "rise to the top," how will this be considered?
  - Revised scenarios will be created in the fall

Following the discussion, Wes moved approval of the motion as presented, and Tom provided a second to the motion.

Robin asked a question on the motion – does it include all three scenarios? Joe answered that the motion includes all of the land in mapped scenarios and those lands included in the supplemental areas. Robin proposed an amendment to exclude certain areas that were light green, such as Shevlin and Gopher Gulch. Exclude these for consistency. Gary requested clarification on the proposed amendment – Robin clarified that the amendment would pull out areas mapped as light green unless they are surrounded by areas in dark green. With that explanation, Gary provided a second to Robin's amendment.

Amendment to the Motion. Joe asked for the vote on the amendment, with four (4) TAC members voting for the amendment and eight (8) TAC members voting against the amendment. The amendment did not pass.

The TAC conducted some additional discussion on the motion that included questions on whether the City is applying Goal 14 by balancing among scenarios and supplemental areas. This discussion included questions on how findings will be developed on the light analysis versus the heavy analysis. The Stage 2 Goal 14 analysis was already completed with the scenario lands – those in dark green performed the best. The next analysis is to focus on the best performing dark green lands and explain why they were the best. The team will equalize the analysis between the red and the blue lands as much as possible.

Motion. Following the final discussion on this motion, Wes called for the question. Ten (10) TAC members voted for the motion, one voted against the motion, and one abstained. The motion passed.

4. Scenario Refinements *Briefing, TAC Discussion and Action*

Following a short break, Andrew Parrish of APG gave a power point presentation on proposed refinements to the three (3) scenarios. He also referred the TAC to pages 28 through 38 of the meeting packet.

Andrew presented Scenarios 1.1, 2.1, and 3.1, and identified the changes made in each scenario since the last TAC meeting. He also referred the TAC to page 30 of the packet for the discussion of changes in each scenario. He presented a slide for each scenario for which one half of the slide identified the lands in the scenario and their proposed land uses in each subarea (left side) and the other half identifying potential land use types that were painted using the Envision Tomorrow tool (right side). He also referred the TAC to Appendix G of the meeting packet which presented the side by side comparisons of each scenario presented at the June 9, 2015 TAC meeting with the version being presented at today's TAC meeting.

Following Andrew's presentation, the TAC conducted a discussion about the proposed scenarios and the changes made to the scenarios since the last meeting. This discussion addressed the following topics, questions, and comments:
- The number of needed acres, jobs, and housing units for each scenario
- Lines drawn on existing parcels – 3.5 acre grid is overlaid on property lines
- John Russell's letter regarding large lot industrial sites – in Scenario 1.1 in the Thumb; in Scenario 2.1 on OB Riley, and; in Scenario 3.1 in Juniper Ridge
- What about locating another large lot industrial site on the east half of Juniper Ridge? There is one site inside the boundary in Juniper Ridge and this would represent a 2nd large lot site on the each half of Juniper Ridge.
- Should large lot designations be placed on publicly owned land?
- Bat Cave on Section 11 – potential Goal 5 resource has to be protected according to deed/patent acquiring the land
    - The scenarios work for Section 11/Stevens Road Tract includes park land for that purpose
    - A master plan was created for the Stevens Road Tract in 2007

- o   Goal 5 protections were not applied to the Bat Cave on Section 11 when the County approved their zone change
- Let's not focus on picking winners today. Put forward scenarios for modeling.
- How will input from School District and Park District be incorporated? Will transportation analysis consider OSU Cascades?
  - o   OSU is included in one of the opportunity sites.

Public comment – Joe and Sharon then asked for those signed up to give public comments to come forward and provide their comments to the TAC.

1. Derek Hopp – letter included in public testimony packet. Referred to property currently zoned UAR and EFU. Owner pursuing a zoning amendment from County. See also letter from Carl Hopp submitted 6/23/2015.

2. Myles Conway – on behalf of Rio Lobo Investments. Submitted letter into the record 6/23/2015. Property a peninsula of undeveloped land. Skyline Ranch Road; varied topography of site, trails. Not included in a number of scenarios. Contrary to OAR 660-024 – public facilities and services. Support decision to expand study area in supplemental analysis. Rules do not allow a Goal 14 light analysis.

3. Jodie Ward – share ideas today. Submitted letter today. Don't put large lot industrial here on Thumb (Ward) property. Concerned about chopping up of Thumb. Couldn't master plan it unless it all comes in the UGB. Conceptual plans included with letter that include both the Thumb and Ward property on 15th Street.

4. Dean Wise – presented master plan of entire Ward property. School district expressed interest in school site (high school). The 15th Street piece includes 40 acres outside of UGB.

5. Mark Smuland – here on behalf of Curt Baney, who owns a 38-acre parcel near the Thumb. Supports Scenario 2.1. Abuts current UGB; zoned RR10; site is flat and buildable. Not near critical forest or EFU lands. Infrastructure challenges in the city.

6. Gardner Williams – presented the Riley Park master plan – represents the Elkins Family. Their property is 702 acres in size. Seller has possession of all the master plan materials. Elkins sold river bottom and part of upland to Parks and Recreation District. Master planning creates communities – see Northwest Crossing. Northwest Crossing is 480 acres and will be totally built out in about two years.

7. Wayne Purcell – it's all about sewer. Sewer requires lift stations. Sees a lot of holes and pockets that might affect connectivity. Need master plan – roads and sewer. There's millions of sewer infrastructure needed to bring land on line. Think about the whole process – need to bring in affordable land.

8. <u>Tia Lewis</u> – representing Coats Family– submitted map and letter 6/9/15. The Coats Family owns almost all land in the "Shevlin Area". Shown on one map; not shown on other maps. Encouraged by supplemental analysis map. Agrees with Myles and Steve. Coats property – surrounded by residential development. Submitted evidence that shows the light green should be dark green. Connections for streets, sewer, and water.

Straw Polls and Motions on each Scenario

Following the public comment on the scenarios, the TAC proceeded through a series of straw polls and motions on each scenario. These straw polls and motions are presented in the following table.

Scenario 1.1		
Proposed Changes	**Straw Poll**	**Vote**
Large lot industrial off DSL to Juniper Ridge (eastern in UGB) – swapping displaced employment General Comment John R – complete community for DSL – balance of land uses – take large lot and put in JR and make complete community at DSL Inside current UGB; outside of the Special Planned Area	Favor – 7 Oppose - 4	**Motion** to amend 1.1 Dale, Steve (2nd) – Favor: 7 Opposed: 3; 2 abstained
100 acres of residential out of NE and put it into Thumb put displaced employment in OB Riley or Triangle	Favor -9 Opposed - 3	
Residential moves to the Thumb and employment moves to NE	Favor – 3 Opposed - 5	
100 acres in residential from NE to the Thumb – put 50 acres employment to OB Riley and 50 acres to Northeast	Favor 11	**Motion** to amend 1.1: Move 100 acres in residential from NE to the Thumb – put 50 acres employment to OB Riley and 50 acres to Northeast

		Motion - Tom 2nd – Sharon Vote in favor of the motion was Unanimous.

Final Changes to Scenario 1.1:
- Large lot industrial site moved from DSL property and into Juniper Ridge. Employment land displaced by this move will be relocated to DSL property.
- 100 acres of residential from the Northeast Edge relocated to the Thumb property. Employment land displaced by this move will be relocated to the Northeast Edge and to the North Triangle/OB Riley (50 acres each).

Scenario 2.1		
Proposed Changes	**Straw Poll**	**Vote**
Taking large lot, moving to JR – from OB Riley to JR	Favor – 7 Oppose – 2 Abstained – 2	Motion – John 2nd - Tom Favor – 9 Oppose – 1 Abstain - 2
Pull out employment land off school and park ownership at eastern end of elbow – Move to the Thumb	Favor – 8 Oppose – 1 Abstain - 3	Motion – Dale 2nd - Tom Favor – 7 Oppose - 5

Final Changes to Scenario 2.1
- Large lot industrial site moved from OB Riley to Juniper Ridge. Employment land displaced by this move will be relocated to OB Riley Area
- Employment land from the eastern edge of the Elbow area (primarily in park district ownership) moved to the Thumb area.

Scenario 3.1		
Proposed Changes	**Straw Poll**	**Motions**
Remove areas in light green – two edge pieces next to Coats – this comes out of Shevlin; move school into dark green; displaced residential goes to the northeast	Favor – 1 Oppose - 10	Dies for lack of second
Large Lot Industrial (LLI)	Favor – 9	Motion – John, Tom

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should go into JR – take out of triangle and moved to JR (east side in UGB) trading for whatever is removed from JR.	Oppose – 1 Abstain – 2 (Gary and John)	Favor – 10 Oppose – 1 Abstain – 1
Commercial out of Shevlin Area and moved to northeast	Favor – 2 Oppose - 9	Motion dies for lack of second

Final Changes to Scenario 3.1:
- Large Lot Industrial site moved from North Triangle to Juniper Ridge. Employment land displaced by this move will be relocated to North Triangle.

Following the series of straw polls and motions on each scenario, Joe asked whether there was a motion to move the scenarios on to the USC with the amendments passed – as modified by the votes and supplemental analysis. He also recommended including the removed areas in the supplemental analysis.

Motion. Joe restated the motion to forward to the USC for their approval three scenarios as modified by green circles showing approved changes, and making one change to the supplemental map by including the Elbow property moved from a scenario. Tom moved approval of this motion, and Wes provided a second. Sharon called for the question with 10 TAC members voting for the motion and two voting against it.

Robin proposed an amendment to create a Scenario 4. This scenario would start with Scenario 2.1, remove the areas proposed on the West side due to wildfire and habitat concerns and move this land area into the supplemental analysis area on the east side. He based the recommendation on fewer potential Goal 14 conflicts and added that this area on the east side include the proposed Pacwest property and land to the northeast.

Robin moved approval of this motion, with John Dotson providing a second. The vote on this motion was four (4) in favor, seven (7) opposed, and one abstention. The amendment failed.

5. Project Information, Next Steps

Joe wrapped up the meeting by informing the TAC that their next meeting would be in October. The Residential and Employment TACs are meeting in July and August, with the meeting dates presented in this meeting's agenda.

Sharon asked that the TAC get a week to review the modeling results, one meeting to review these results, and then a second meeting to make decisions. The TAC might need a third meeting. We need to ask the City Council for two to three meetings for this work. John supported this idea. Wes commented that we should be efficient in these meetings.

6. Adjourn

Sharon adjourned the meeting at 11:57 am.

Action Items/Next Steps

Action	Assigned To
Approve and forward to the UGB Steering Committee the lands to be screened from further consideration as described beginning of page 5 and shown on Figure 2: Narrowing of Exception Lands	✓ **Done**
Forward the approach described under "Recommended Approach: Overview and Rationale" starting on page 8 and the set of lands for scenarios and supplemental analysis on Figure 3 (page 10 of packet) to the UGB Steering Committee for their approval	✓ **Done**
Forward the slate of scenarios, as revised by the TAC 6/24/2015, to the UGB Steering Committee for their approval	✓ **Done**

URBAN GROWTH BOUNDARY REMAND

MAKING BEND EVEN BETTER
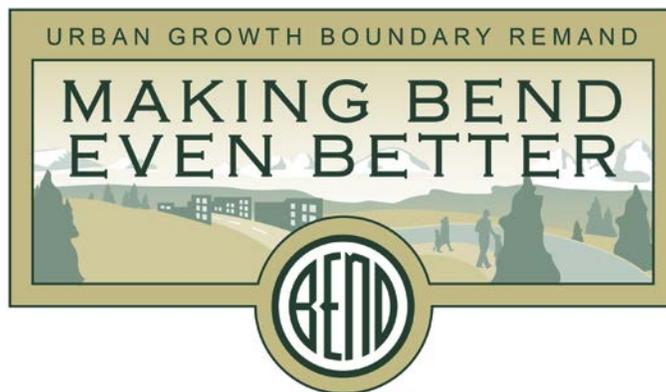
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Bend Urban Growth Boundary Expansion Scenarios Evaluation Report

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EXECUTIVE SUMMARY

The purposes of the Urban Growth Boundary (UGB) Expansion Scenarios Evaluation Report are to:

1. Summarize the results of the project team's evaluation of the UGB Expansion Scenarios and Supplemental Analysis Areas, including initial observations about which scenario and subareas appear to offer the greatest advantages relative to the performance measures analyzed;
2. Provide a factual and interpretive basis for the Boundary and Growth Scenarios Technical Advisory Committee (Boundary TAC) to use in directing the creation of a preferred scenario (which may be a hybrid of the best performing elements of several scenarios); and
3. Provide initial observations and draft recommendations about which scenario appears to offer the greatest advantages relative to the performance measures analyzed; and to suggest potential modifications that could improve its performance.

In June 2015, the Boundary TAC and the UGB Steering Committee (USC) approved three alternative UGB Expansion Scenarios for further evaluation, and directed the project team to evaluate additional land in "Supplemental Analysis Areas" in order to provide some flexibility when the proposed UGB is crafted. The UGB Expansion Scenarios and Supplemental Analysis Areas test different choices about where to accommodate future housing and employment growth outside the current UGB as a way to understand the trade-offs through the evaluation.

The Boundary TAC and USC, as well as the city's Legal Department, emphasized the importance of giving the Supplemental Analysis Areas a comparable level of analysis to the land included in UGB Expansion Scenarios. To achieve this, the team created three Supplemental Analysis Area Maps ("SAAMs") that collectively incorporate all the land in the Supplemental Analysis Areas in packages with roughly the same total levels of employment and residential growth and the same assumptions about development inside the UGB as the Expansion Scenarios. The areas tested by each of the SAAMs are listed in brief below; descriptions and maps of both the Scenarios and SAAMs are provided in the main report (the scenarios have not changed since their approval by the USC in June).

- SAAM-1: Full Shevlin Area and full Northeast Edge
- SAAM-2: Full OB Riley and Gopher Gulch Area
- SAAM-3: Full West Area

State statute and administrative rules govern how cities must evaluate potential UGB expansions. Local governments must consider and balance four factors listed in Statewide Planning Goal 14:

1. Efficient accommodation of identified land needs;
2. Orderly and economic provision of public facilities and services;
3. Comparative environmental, energy, economic and social consequences; and

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4. Compatibility of the proposed urban uses with nearby agricultural and forest activities occurring on farm and forest land outside the UGB.[1]

A local government must show that all the factors were considered and balanced, but state law and rules do not prescribe how or whether to weight specific factors or what should be included in the consideration of each factor. The city has an opportunity to consider and balance the factors based on community goals and priorities. The city is also obligated to base its UGB decision on substantial evidence and findings that are well documented, and to be clear about the facts, reasoning and balancing used for the decision.

About the Evaluation

This evaluation report uses the following terms and hierarchy of considerations in the comparison, evaluation and balancing of Bend's UGB expansion alternatives.

- **Performance Measures** – Detailed measures for each Goal 14 factor: the factual base for the evaluation. Some performance measures are quantitative and others are qualitative.
- **Community Outcomes** – Eight intended outcomes that provide a way to "roll up" performance measures, "see the forest for the trees", and state what Bend is trying to achieve with this UGB update. They mirror the applicable Project Goals that were approved by the USC in September, 2014.
- **Goal 14 Factors** – Oregon's requirements for what must be considered and balanced (see above).

The Community Outcomes **(bold type)** and a summary of the performance measures under each Goal 14 Factor are listed below.

Factor 1: Efficient accommodation of identified land needs
- **Complete Communities and Great Neighborhoods**: walkability to schools, parks, and businesses; jobs/housing balance, and opportunities for master planning
- **Efficient, Timely Growth:** total expansion, density, land contiguous to existing UGB, and vacant vs. developed land included

Factor 2: Orderly and economic provision of public facilities and services
- **Balanced Transportation System**: reliance on the automobile (vehicle miles traveled per capita or VMT, trip length, mode split, walk trips), congestion, safety and connectivity, proximity to transit, and intersection density
- **Cost Effective Infrastructure**: total cost and cost per acre of transportation and sewer improvements, new miles of local roads, water system improvements in city water service area, impervious surface area, and development in welded tuff geology and Drinking Water Protection Areas

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[1] ORS 197.298, effective 1999; and OAR 660-024-0060, effective April 16, 2009.

Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)
- **Quality Natural Environment** (Environmental and Energy Consequences): development in wildlife areas, development adjacent to riparian areas, wildfire hazard, greenhouse gas emissions, energy use, and water consumption
- **Housing Options and Affordability** (Social Consequences): cost and mix of new housing
- **Strong Diverse Economy** (Economic Consequences): site suitability for commercial and industrial uses and for the large lot special site need

Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occurring on farm and forest land outside the UGB
(1) **Compatibility with Farms and Forests**: farm practices on high value farm land adjacent to expansion areas, impact to irrigation districts, and proximity to forest land

In Phase 1, the Boundary TAC and USC directed the team to use an "unweighted" (or, more precisely, an equally-weighted) approach to combining results from different indicators used to identify overall suitability of different areas to be considered for inclusion in potential expansion areas. For the scenario evaluation, neither the Boundary TAC nor the USC provided specific guidance on how the performance measures should be weighed and balanced against one another. To help test the sensitivity of individual performance measures on the ranking of the scenarios, the project team has analyzed the performance measures and has evaluated overall results using *both* an equally-weighted and an unequally-weighted approach, including several variations of weighting. Because some of the performance measures showed little variation among the scenarios, others capture advantages or disadvantages that are easily modified through implementation (e.g. location of a park or school), and others showed relatively significant and meaningful differences between the scenarios, the project team recommends that the "difference makers" be given greater consideration in reaching a decision on the preferred UGB. These "difference makers" include total cost of transportation and sewer improvements, residential land efficiency, affordability, and VMT. Additional performance measures that are especially important at the subarea level include development in wildlife areas and adjacent to riparian areas, wildfire hazard, proximity to farms and forests, irrigation district impacts, and suitability for commercial and industrial uses. It is important to note that the update of Bend's UGB is not intended to be a numerical exercise and points-based decision. Rather, it is intended to be a determination of which choices, on balance, best meet the Goal 14 factors and Project Goals (as expressed in the Community Outcomes).

Summary of Results

Based on the body of work captured in this evaluation report, in considering and balancing the four Goal 14 Factors, Scenario 2.1 performed the best of the alternatives overall, regardless of whether and to what degree weighting is applied to distinguish between the more and less important performance measures. Scenario 2.1 was in the "top tier" relative to other alternatives on nearly all community outcomes, including:

(1) Complete Communities and Great Neighborhoods (because it was created with the intention of providing for complete communities in all quadrants of the city);

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(2) Efficient, Timely Growth (because of its efficient use of residential land and reliance on large, vacant parcels);

(3) Balanced Transportation System (because of the above advantages plus enhanced connectivity due to the extension of Murphy Road to 27th / Knott and keeping growth in the northeast focused to nodes along major east-west corridors);

(4) Cost-Effective Infrastructure (because of relatively low cost for both connectivity- and capacity-related transportation improvements and reasonable costs for sewer improvements);

(5) Quality Natural Environment (because it avoids riparian areas, limits expansion in wildlife areas, does not have any features that prevent mitigation of wildfire risk in any expansion areas, and has fairly low energy and water consumption and greenhouse gas emissions); and

(6) Housing Options and Affordability (because it has good housing mix in nearly all subareas and good housing affordability with significant housing growth in the southeast[2]).

The two Community Outcomes where Scenario 2.1 was not in the Top Tier were Strong Diverse Economy (because it places employment and commercial uses in some areas, such as the West Area, where they are somewhat less well suited) and Compatibility with Farms and Forests (because it has relatively more impact to Arnold Irrigation District from inclusion of full Elbow area and development adjacent to several commercial farms, including the greatest amount of development next to a feed lot south of Knott Road).

No other alternative had as strong performance on as many community outcomes, and each of the other alternatives has at least one important weakness identified through the evaluation:

- Scenario 1.2 performs poorly on cost-effective infrastructure, because heavy development in the Thumb triggers the need to widen Knott Road to three lanes.
- Scenario 3.1 performs poorly on cost-effective infrastructure, due to high transportation costs to connect growth areas and the need to widen US 20 from Robal Rd to 3rd Street. It also performs poorly on compatibility with farms and forests due to heavy impacts to Swalley Irrigation District in OB Riley / Gopher Gulch and forest proximity in the Shevlin Area and on Housing Options and Affordability because much of the residential development is focused on the west side of the city where land costs and housing prices are higher. It performs relatively poorly on Quality Natural Environment because including the Shevlin Area impacts wildlife areas, puts development in proximity to Tumalo Creek, and has topography that makes wildfire hazard difficult to mitigate.
- SAAM-1 performs poorly on multiple Community Outcomes. It performs poorly on Quality Natural Environment because including the full Shevlin Area impacts wildlife areas, puts development in proximity to Tumalo Creek has topography that makes wildfire hazard difficult to mitigate. It performs poorly on Cost-Effective Infrastructure

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[2] Housing costs for new construction were found to be roughly 30% lower in neighborhoods on the outer east side of the city relative to neighborhoods on the outer west side of the city. Housing in expansion areas is assumed to follow this trend.

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because development of the full Shevlin Area requires a costly new regional pump station for sanitary sewer, and it also has fairly high cost for new roads connecting growth areas and high costs for intersection improvements. SAAM-1 also rated relatively poorly on Complete Communities and Great Neighborhoods and Efficient, Timely Growth because the outer extents of the Shevlin Area and Northeast Edge are not well-suited to higher-density housing and have less proximity to commercial services, schools, and/or parks.

- SAAM-2 performs poorly on Balanced Transportation System, due to the lack of connectivity to the existing UGB from the Gopher Gulch area and the distance to reach key destinations inside the current UGB. It also performs relatively poorly on Compatibility with Farms and Forests due to heavy impacts to Swalley Irrigation District and proximity to the greatest number of working farms.
- SAAM-3 performs relatively poorly on Housing Options and Affordability because all of the residential development is focused in the West Area, which is more expensive (as noted above), and on Cost-Effective Infrastructure because including the full West Area (particularly the northwest portion) requires a costly new regional pump station.

The conclusion that Scenario 2.1 performed the best is only a starting point for crafting the proposed UGB update. The subarea evaluation provides a finer grain of analysis and insights into how to balance the Goal 14 factors and achieve the Community Outcomes. Additional evaluation at the subarea level shows that there is room for improvement of Scenario 2.1 through modifications to some of the subareas, as summarized in brief below.

- North Triangle: employment-focused rather than including residential
- Northeast Edge: drop the roughly 40-acre Bear Creek Road area, shifting that growth to create more complete neighborhoods around Butler Market Village and/or Neff Road, while retaining the focus on nodes along existing arterial corridors connecting to the city center
- DSL Property: include large lot industrial site at the southern end and refine land use assumptions
- The Elbow: refine arrangement of land uses along Knott Road to minimize impacts to the adjacent farms and feed lot operations
- The Thumb: refine land use assumptions and include a high school and a community park but reduce total expansion area somewhat
- West Area: reduce the amount of commercial and industrial use in this subarea
- Shevlin: none, follow Scenario 2.1 (area excluded)
- OB Riley / Gopher Gulch: remove large lot industrial use from this area (replace with other employment uses)

Next Steps

At the Boundary TAC meeting on October 8th, the project team will present a summary of this evaluation report and the Boundary TAC will have the opportunity to discuss and understand the body of work and the project team's preliminary recommendations. On October 22nd, the Boundary TAC will reconvene to discuss the creation of a preferred scenario and provide

direction for the preferred/hybrid scenario. The project team recommends that the Boundary TAC begin the process of creating the preferred scenario by agreeing on one of the alternatives evaluated as a starting point, and then identifying and agreeing on a list of refinements and improvements.

INTRODUCTION

Purpose and Background

The purposes of the Urban Growth Boundary (UGB) Expansion Scenarios Evaluation Report are to:

1. Summarize the results of the project team's evaluation of the UGB Expansion Scenarios and Supplemental Analysis Areas, including initial observations about which scenario and subareas appears to offer the greatest advantages relative to the performance measures analyzed;
2. Provide a factual and interpretive basis for the Boundary and Growth Scenarios Technical Advisory Committee (Boundary TAC) to use in directing the creation of a preferred scenario (which may be a hybrid of the best performing elements of several scenarios); and
3. Provide initial observations and draft recommendations about which scenario appears to offer the greatest advantages relative to the performance measures analyzed, and, potential modifications that could improve its performance.

In June 2015, the UGB Steering Committee (USC) for the Bend UGB Remand project approved three alternative UGB Expansion Scenarios for further evaluation, as recommended by Boundary TAC. The USC directed the project team to evaluate additional land in "Supplemental Analysis Areas" in order to provide some flexibility in crafting the final UGB . The UGB Expansion Scenarios and Supplemental Analysis Areas test different choices about where to accommodate future housing and employment growth outside the current UGB.

The evaluation included transportation analysis, water and sewer system optimization, and a variety of land use, economic, social, and environmental evaluations, described further on page 17. The evaluations have been structured to provide information about how the UGB Expansion Scenarios and Supplemental Analysis Areas perform relative to the factors required for consideration by the state, but also relative to the Project Goals, which capture local priorities. This is described further on page 17.

As a reminder, the scenario evaluation is "Stage 4" in the process of identifying the preferred UGB expansion, as shown on Figure 1.

Figure 1: Phase 2 Milestones Chart
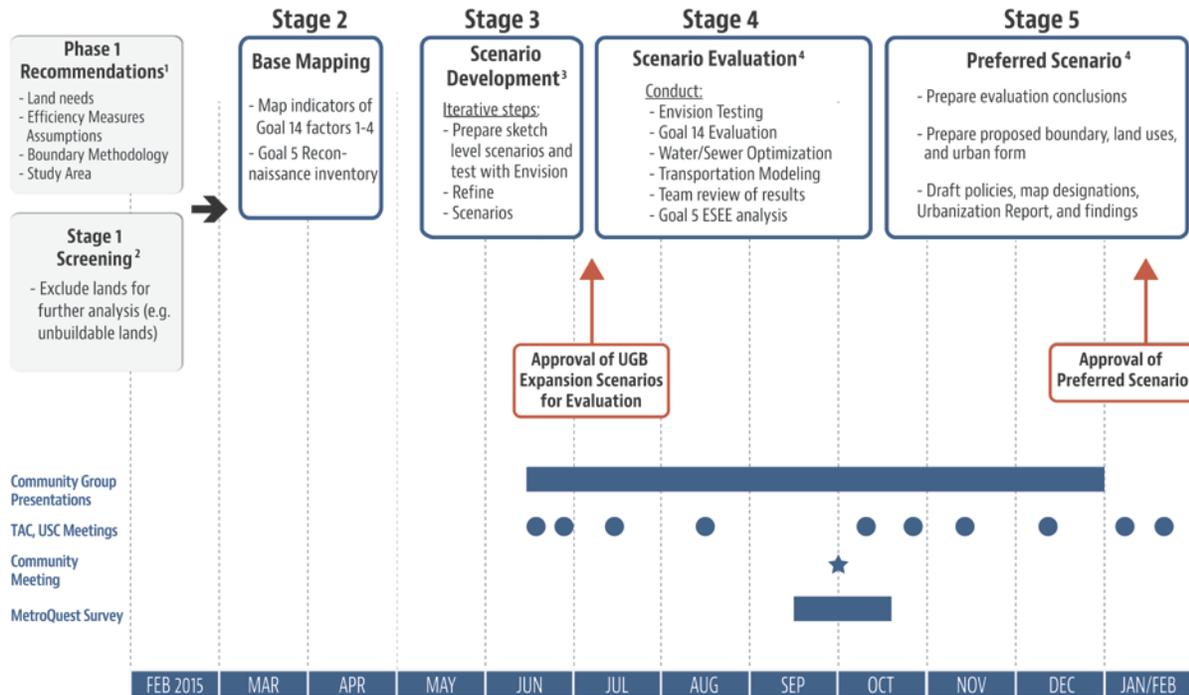
About the Scenarios & Supplemental Analysis Areas

Overview

As noted above, the Boundary TAC recommended and USC approved three specific UGB Expansion Scenarios for evaluation, but also asked the project team to evaluate all land that had been given the top rating (i.e. scored in the top quartile when all indicators were combined) during the "Stage 2" evaluation of exception land within the two-mile study area and had not been excluded by subsequent refinements and narrowing.[3] The areas that met those tests and were not included in one of the three UGB Expansion Scenarios were identified as "Supplemental Analysis Areas" by the project team in the June 2015 meetings. The Boundary TAC and USC, as well as the city's Legal Department, emphasized the importance of giving the Supplemental Analysis Areas a comparable level of analysis to the land included in UGB Expansion Scenarios.

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[3] "Stage 2" evaluation considered key indicators of the four factors of Goal 14 that could be assessed based on the land itself, without specific assumptions about the arrangement of land uses.

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Some of the models used for scenario evaluation (such as the transportation model) require "budgeted" land use assumptions in order to do a full evaluation and an "apples to apples" comparison against land included in the three UGB Expansion Scenarios. In order to respond to the direction for equal evaluation, the team created three Supplemental Analysis Area Maps ("SAAMs") that collectively incorporate all the land in the Supplemental Analysis Areas in packages with roughly the same total levels of employment and residential growth and the same assumptions about the amount and type of development that can be accommodated inside the UGB as the UGB Expansion Scenarios.

The SAAMs are intended to test full utilization of certain geographic areas rather than distributed growth across a variety of potential expansion areas. The arrangement of land uses in the SAAMs is more conceptual than in the UGB Expansion Scenarios. The land use assumptions for each SAAM are based on workshop input where possible, property owner conceptual plans if available, and general land suitability characteristics (i.e. whether the area is suitable for commercial, industrial or residential use based on transportation access, visibility, topography, adjacent land uses, etc.). These assumptions are summarized in brief on page 10; the descriptions of the UGB Expansion Scenarios are also provided on page 10 for ease of reference; these scenarios have not changed since their approval by the USC in June.

The UGB Expansion Scenarios and SAAMs are described and illustrated below. The categories shown on the generalized scenario maps are as follows:

- *Residential area with locally-serving employment*: Predominately residential uses, with supportive uses such as parks, schools, and local commercial centers.
- *Residential area with significant employment*: A full mix with residential uses, parks and/or schools, and commercial and employment areas.
- *Employment area*: Employment-focused area providing for a mix of jobs (retail, office, and/or industrial) with little or no residential use.

Note that these categories are used for communication purposes only, and do not necessarily reflect official land use plan designations that would be applied to expansion areas.

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UGB Expansion Scenarios

Scenario 1.2

Scenario 1.2 focuses large new employment districts in the "North Triangle" and "The Thumb" along Highway 97. "The Thumb" also includes housing development, while the "North Triangle" is employment-focused. A relatively small expansion in the West Area provides a mix of housing around a small commercial core. The DSL property offers a mix of housing and employment, including potential for a large-lot industrial user. A relatively large expansion on the Northeast Edge includes housing as well as commercial uses.

Expansion Scenario 1.2

Legend:
- Residential Area with Locally-Serving Employment
- Residential Area with Significant Employment
- Employment Area

North "Triangle"
Employment Focus
- 190 Acres Employment Land
- 1,900 Jobs

OB Riley / Gopher Gulch Area
Employment Focus
- 120 Acres Employment Land
- 950 Jobs

Northeast Edge
Residential Focus
- 1700 Housing Units /
  380 Acres Residential Land
- 500 Jobs /
  60 Acres Employment Land
- 30 Acres Civic Land

West Area
Residential Focus
- 900 Housing Units /
  100 Acres Residential Land
- 200 Jobs /
  10 Acres Employment Land
- 20 Acres Civic Land

DSL Property
Employment and Residential
- 1,000 Jobs /
  120 Acres Employment Land
- 450 Housing Units /
  50 Acres Residential Land
- 50 Acres Civic Land

"The Elbow"
Housing and Employment addition to existing urban area
- 500 Housing Units /
  50 Acres Residential Land
- 1,500 Jobs /
  112 Acres Employment Land
- 40 Acres Civic Land

"The Thumb"
Employment Focus
- 500 Housing Units /
  250 Acres Employment Land
- 2,100 Jobs /
  100 Acres Residential Land

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Scenario 2.1

Scenario 2.1 focuses on creating new "complete communities" with a broad mix of uses in all quadrants of the City. Nearly all expansion areas include housing, employment areas, shopping/services, and schools and parks. This scenario fully develops "The Elbow" and the DSL site as complete communities. It incorporates housing along with employment in the North "Triangle" and "The Thumb", and some industrial/professional office in the West Area along with residential. The OB Riley area is employment-focused, with a potential large lot industrial site.

Expansion Scenario 2.1

Legend:
- Residential Area with Locally-Serving Employment
- Residential Area with Significant Employment
- Employment Area

North "Triangle"
New Neighborhood and Employment
- 550 Housing Units / 70 Acres Residential Land
- 950 Jobs / 90 Acres Employment Land
- 20 Acres Civic Land

OB Riley / Gopher Gulch Area
Employment Focus
- 500 Jobs / 130 Acres Employment Land
- 25 Acres Civic Land

Northeast Edge
Commercial areas serving existing neighborhoods
- 400 Housing Units / 100 Acres Residential Land
- 250 Jobs / 30 Acres Employment Land

West Area
New Neighborhood with Small Office Area
- 750 Housing Units / 120 Acres Residential Land
- 700 Jobs / 40 Acres Employment Land
- 20 Acres Civic Land

DSL Property
Complete Community
- 900 Housing Units / 140 Acres Residential Land
- 1,500 Jobs / 110 Acres Employment Land
- 100 Acres Civic Land

"The Elbow"
New Neighborhood and Employment Area
- 800 Housing Units / 100 Acres Residential Land
- 2,500 Jobs / 240 Acres Employment Land
- 60 Acres Civic Land

"The Thumb"
Residential and Employment Focus
- 650 Housing Units / 100 Acres Residential Land
- 1,800 Jobs / 170 Acres Employment Land
- 40 Acres Civic Land

Rev. 9/14/15

0 0.5 1 2 Miles   NORTH

URBAN GROWTH BOUNDARY REMAND · BEND ·

Scenario 3.1

Scenario 3.1 focuses a larger amount of expansion to the north and west of the city. It includes a relatively large area along OB Riley adjacent to Gopher Gulch with a mix of employment and residential uses and a relatively large, mostly residential expansion in the West Area and the southern part of the Shevlin area. Only portions of the DSL Property, "The Elbow" and "The Thumb" are included. The "North Triangle" is employment focused, including a potential large lot industrial site.

Expansion Scenario 3.1

Residential Area with Locally-Serving Employment

Residential Area with Significant Employment

Employment Area

North "Triangle"
Employment Focus
- 1700 Jobs /
  250 Acres Employment Land

OB Riley / Gopher Gulch Area
New Neighborhood
- 1,100 Housing Units /
  200 Acres Employment Land
- 1900 Jobs /
  140 Acres Residential Land
- 110 Acres Civic Land

Shevlin Area
Residential and employment area
- 250 Housing Units /
  110 Acres Residential Land
- 250 Jobs /
  25 Acres Employment Land
- 30 Acres Civic Land

Northeast Edge
- 450 Housing Units /
  110 Acres Residential Land
- 300 Jobs /
  30 Acres Employment Land

West Area
New Neighborhood
- 1700 Housing Units /
  320 Acres Residential Land
- 200 Jobs /
  10 Acres Employment Land

DSL Property
- 400 Housing Units /
  40 Acres Residential Land
- 700 Jobs /
  60 Acres Employment Land
- 80 Acres Civic Land

"The Elbow"
Employment area completing new neighborhood inside UGB.
- 1700 Jobs /
  130 Acres Employment Land
- 40 Acres Civic Land

"The Thumb"
Employment Focus
- 1500 Jobs /
  180 Acres Employment Land

URBAN GROWTH BOUNDARY REMAND

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Supplemental Analysis Maps

Supplemental Analysis Area Map 1

SAAM-1 is designed to test the greatest residential growth in the Shevlin Area and in the Northeast Edge. Existing subdivisions in the Northeast Edge are included; these are expected to experience only a modest amount of infill after annexation. To meet the remaining growth needs, SAAM-1 retains employment growth in the north, south, and southeast.

Supplemental Analysis Areas Map 1
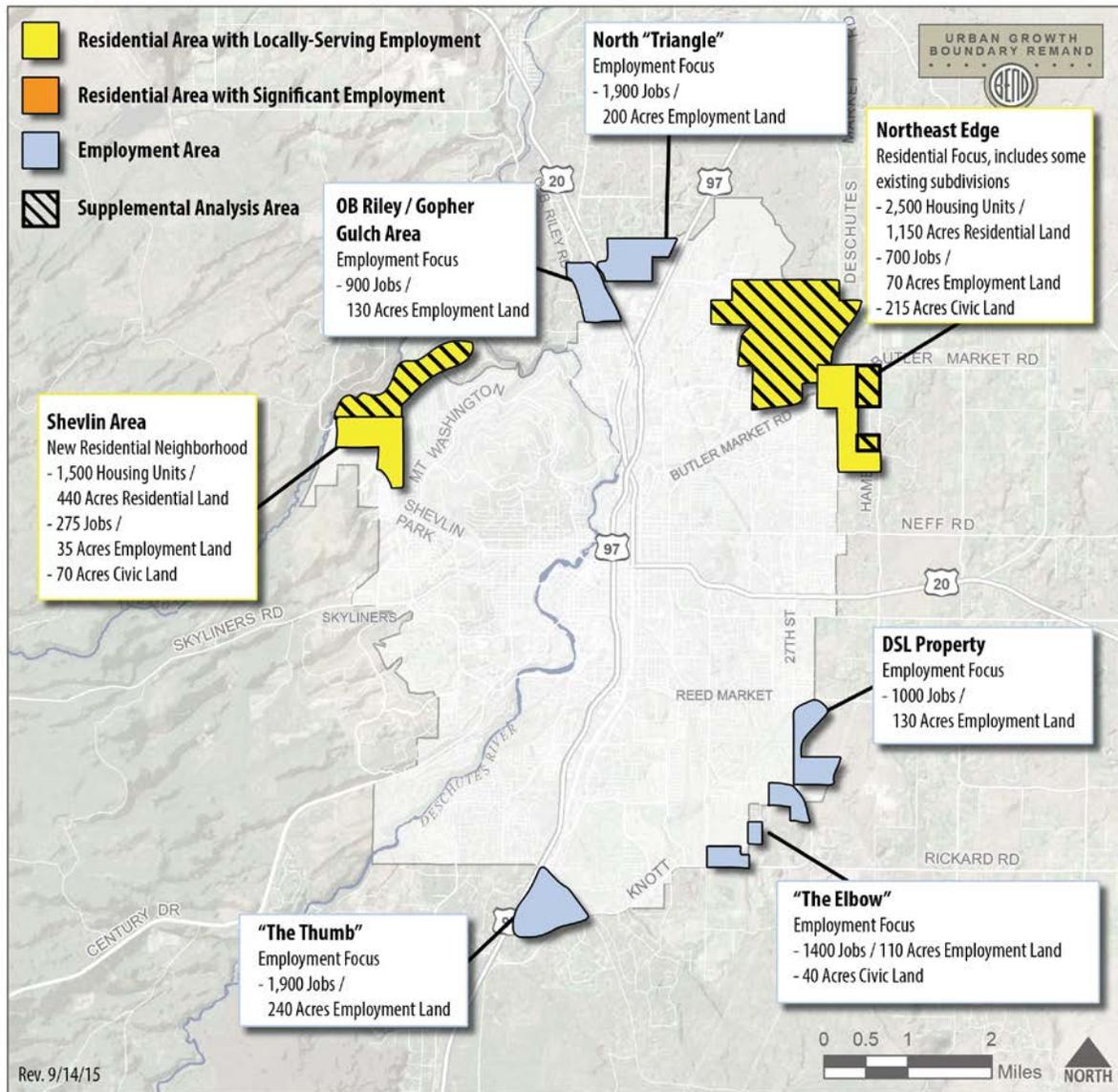
Supplemental Analysis Area Map 2

SAAM-2 is designed to test a large new residential neighborhood in the Gopher Gulch area, which accommodates nearly all of Bend's housing growth through the planning horizon. Remaining housing growth is accommodated in pockets of land along Stevens Rd. in the Southeast and Woodside Rd. in the South. Employment growth is located along the highways and in the Southeast.

Supplemental Analysis Areas Map 2
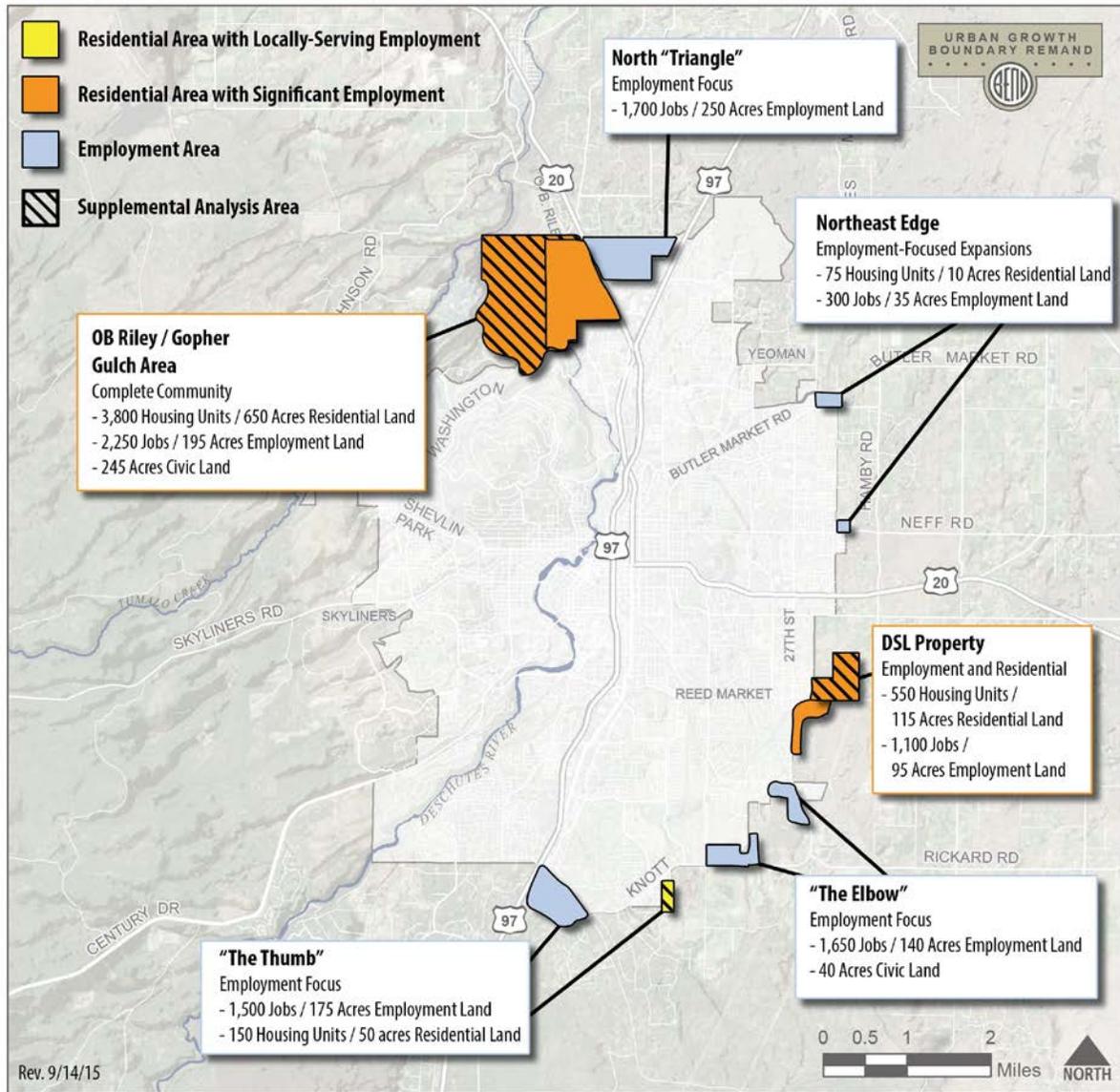
Supplemental Analysis Area Map 3

SAAM-3 is designed to test full buildout of the West Area, which accommodates most of Bend's housing growth through the planning horizon. (Some additional residential growth is located in the DSL property to meet the remaining growth projections.) Employment growth occurs in the north, south, and southeast.

Supplemental Analysis Areas Map 3

Legend:
- Residential Area with Locally-Serving Employment
- Residential Area with Significant Employment
- Employment Area
- Supplemental Analysis Area

North "Triangle"
Employment Focus
- 1,700 Jobs / 250 Acres Employment Land

OB Riley Area
Employment Focus
- 200 Housing Units / 10 Acres Residential Land
- 1,600 Jobs / 170 Acres Employment Land

Northeast Edge
Employment-Focused Expansions
- 100 Housing Units / 10 Acres Residential Land
- 275 Jobs / 35 Acres Employment Land

West Area
New Residential Neighborhood
- 3,000 Housing Units / 580 Acres Residential Land
- 600 Jobs / 45 Acres Employment Land
- 45 Acres Civic Land

DSL Property
Employment and Residential
- 800 Housing Units / 60 Acres Residential Land
- 700 Jobs / 65 Acres Employment Land

"The Thumb"
Employment Focus
- 2,000 Jobs / 220 Acres Employment Land

"The Elbow"
Employment Focus
- 1,650 Jobs / 140 Acres Employment Land
- 40 Acres Civic Land

Rev. 9/14/15

URBAN GROWTH BOUNDARY REMAND

0 0.5 1 2 Miles NORTH

LEGAL FOUNDATION AND CRITERIA FOR CREATING THE PREFERRED SCENARIO

State Statutes and Administrative Rules

The UGB is a key component of Oregon's land use planning program. Guidance and rules related to management of a UGB are provided in Statewide Planning Goal 14; Oregon Administrative Rule 660, Division 24; and in Oregon Revised Statutes (ORS) 197.298. The requirements that are most relevant to the task of evaluating UGB expansion alternatives are summarized in brief below.[4]

In considering locations for UGB expansions, local governments must determine which land to add by evaluating alternative boundary locations based on four priority categories of rural land (land outside UGBs) identified in ORS 197.298.[5] The Bend UGB alternatives analysis is only considering land in the same priority category (exception lands)[6]. To choose among lands in the same priority category, local governments must consider and balance four factors listed in Goal 14:

1. Efficient accommodation of identified land needs;

2. Orderly and economic provision of public facilities and services;

3. Comparative environmental, energy, economic and social consequences; and

4. Compatibility of the proposed urban uses with nearby agricultural and forest activities occurring on farm and forest land outside the UGB.[7]

The Goal 14 administrative rule clearly directs how the four factors should be applied: "The boundary location factors of Goal 14 are not independent criteria. When the factors are applied to compare alternative boundary locations and to determine the UGB location, a local government must show that all the factors were considered and balanced."[8] The "relative costs, advantages and disadvantages of alternative UGB expansion areas with respect to the provision of public facilities and services" must also be evaluated and compared.[9]

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[4] It is worth noting that the state requires local governments to demonstrate need and that needs cannot reasonably be accommodated on land already inside the urban growth boundary prior to expanding the UGB; complying with these requirements sets the amount and type of growth that the city must accommodate outside the UGB.

[5] Goal 14: OAR 660-015-0000(14), effective April 28, 2006; and OAR 660-024-0060(1), effective April 16, 2009.

[6] In Bend's situation, all urban area reserve lands on the Bend Area General Plan, and rural residential exception lands on the Deschutes County Comprehensive Plan, are Priority 2 lands under ORS 197.298.

[7] ORS 197.298, effective 1999; and OAR 660-024-0060, effective April 16, 2009.

[8] OAR 660-024-0060(3), effective April 16, 2009.

[9] OAR 660-024-0060(8), effective April 16, 2009.

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In general, the city has a great deal of flexibility in deciding *how* to consider and balance the location factors of Goal 14 in the evaluation of UGB alternatives within a given priority category. In other words, state law and the rules do not prescribe how and whether to weight specific factors (such as orderly and economic provision of public facilities and services); or what should be included in the consideration of comparative environmental, energy, economic and social consequences. The city has an opportunity to consider and balance the factors based on community goals and priorities. This analysis links the Project Goals to the Goal 14 Factors, as discussed under "Overview of Evaluation" on page 17.

Remand Considerations

The Remand[10] includes numerous issues and directives relating to the methodology for identifying a proposed UGB expansion. In brief, the Remand requires the city to:

- analyze the relative costs of lands in the same priority category, rather than aggregating its analysis into subareas without regard to the priorities;
- evaluate the expansion area where Goal 5 resources are identified and evaluate them for significance and possible protection; the city may use the county's Goal 5 inventory as a starting point, but it must also evaluate other information and make its own determination of significance;
- analyze the costs of providing transportation facilities to serve individual areas, including any extraordinary costs related to overcoming topographic barriers or rights of way; and
- comply with state rules on reducing reliance on the automobile and vehicle miles traveled (VMT).

The UGB Expansion Scenarios evaluated in this report are about one-quarter the size of the 8,462-acre expansion proposed in 2009. Unlike the 2009 proposal, only priority exception lands are being considered. Remand issues will be addressed in the findings, but the guidance in OAR 660-024-0060 (Boundary Location Alternatives Analysis) provides the more important legal foundation for the evaluation.

OVERVIEW OF EVALUATION

Linking the Evaluation to Criteria for Creating the Preferred Scenario

This evaluation report uses the following terms and hierarchy of considerations in the comparison, evaluation and balancing of Bend's UGB expansion alternatives.

- **Performance Measures** – Detailed measures for each Goal 14 factor: the factual base for the evaluation. Some performance measures are quantitative and others are qualitative.
- **Community Outcomes** – Eight intended outcomes that provide a way to "roll up" performance measures and state what Bend is trying to achieve with this UGB update.

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[10] The November 2, 2010 order from the Land Conservation and Development Commission (LCDC) that partially acknowledged and partially remanded Bend's 2008 proposed UGB expansion is referred to as "the Remand".

They mirror the applicable Project Goals that were approved by the USC in September, 2014.
- **Goal 14 Factors** – Oregon's requirements for what must be considered and balanced (see above description).

The performance measures and community outcomes are described in more detail below, along with their relationship to the Goal 14 Factors.

Performance Measures

In Phase 1 of the project, the Boundary TAC defined an approach to evaluate lands surrounding Bend for their relative strengths and weaknesses according to State laws pertaining to UGB expansions. A set of "performance measures" was identified for each of the Goal 14 factors for the "Stage 4" evaluation of UGB Expansion Scenarios by the Boundary TAC, and approved by the USC. The project team has operationalized these, incorporated thinking relative to SAAMs, and made refinements to enhance and efficiently conduct the evaluation. Changes to the list of performance measures include:

- Elimination of measures that do not vary among the scenarios and also do not provide useful information at a subarea level (e.g. amount of development inside vs. outside the UGB);
- Refinements to better reflect what the evaluation tools reveal; and
- New measures to reflect new ideas and interests from the TAC, USC, and public (e.g. site suitability of areas identified for commercial uses).

The full list of performance measures that have been analyzed is on page 21.

Community Outcomes

In organizing the evaluation of the UGB Expansion Scenarios and SAAMs, the project team sought a way to link the evaluation to the Project Goals and to capture why certain performance measures are important to the community. To this end, the project team has identified "community outcomes" that group related performance measures under a given Goal 14 Factor and that connect to the Project Goals. For example, one of the Project Goals is a Balanced Transportation System. There are a number of performance measures (e.g. VMT, walk trips, and congestion) that provide information to help evaluate whether that goal is being met. The goal of a Balanced Transportation System is one consideration under Goal 14 Factor 2: orderly and economic provision of public facilities and services. The community outcomes are described below. The performance measures used to evaluate each Community Outcome and Goal 14 Factor are listed in Table 1.

Factor 1: Efficient accommodation of identified land needs

Complete Communities and Great Neighborhoods
The city's goal is that Bend has a variety of great neighborhoods that promote a sense of community and are well-designed, safe, walkable, and include local schools and parks, and that small neighborhood centers provide local shops, a mix of housing types, and community

gathering places. The UGB expansion areas have the potential to both offer new complete neighborhoods outside the existing UGB and to help complete existing communities inside the existing UGB by providing needed amenities, employment opportunities and access to goods and services adjacent to existing neighborhoods.

Efficient, Timely Growth

Compact development helps to limit sprawl and reduce the amount of land needed to accommodate the same amount of housing and employment growth. Timely growth refers to development "readiness," i.e. the likelihood of development in the near term, and the degree of certainty that development will be feasible within the 2028 planning horizon. This has emerged as a frequent consideration in TAC discussions, especially because a portion of the 20-year planning horizon has already passed.

Factor 2: Orderly and economic provision of public facilities and services

Balanced Transportation System

The city's goal is that Bend's balanced transportation system incorporates an improved, well-connected system of facilities for walking, bicycling, and public transit, while also providing a reliable system for drivers, and that the transportation system emphasizes safety and convenience for users of all types and ages.

Cost-Effective Infrastructure

The city's goal is to plan and build water, wastewater, storm water, transportation, and green infrastructure in a cost-effective way that supports other project goals. Efficient use of existing and planned infrastructure is a top priority.

Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)

Quality Natural Environment (Environmental and Energy Consequences)

The city's goal is that, as Bend grows, it preserves and enhances natural areas and wildlife habitat and also provides access to nature by enhancing its network of parks, trails, greenbelts, recreational facilities, and scenic views inside and outside the city. Wildfire risk management is also a key consideration. The city will take a balanced approach to environmental protection and building a great city. Growth choices can also affect resource consumption (e.g. energy and water) and greenhouse gas emissions, all of which are local as well as global issues.

Housing Options and Affordability (Social Consequences)

The city's goal is that Bend residents have access to a variety of high quality housing options, including housing affordable to people with a range of incomes and housing suitable to seniors, families, people with special needs, and others. Housing affordability has emerged as a key concern of the Residential TAC and one of the important reasons behind the need for additional housing and the need to shift the housing mix to provide more affordable options that better match the income profile of existing residents and the projected demographic trends affecting the local housing market.

Strong Diverse Economy (Economic Consequences)

Bend needs a good supply of serviced land planned for employment growth to support the City's economic development goals, provide a range of diverse jobs and industries, and support innovation. Employment areas, large and small, should have excellent transportation access. Areas identified for commercial and industrial development must be suitable for those uses and attractive to the types of businesses anticipated to locate there. In addition, areas for employment growth will need adequate infrastructure to support their development.

Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occurring on farm and forest land outside the UGB

Compatibility with Farms and Forests

Protection of farms and forests from impacts of development is a key tenet of the Oregon land use system. As Bend expands, it is important to ensure that development in expansion areas will be compatible with nearby farm and forest practices so that those uses remain viable.

Combining Performance Measures

As would be expected, the evaluation results indicate different types of outcomes for the performance measures. Some of the performance measures showed little variation among the scenarios. Others capture advantages or disadvantages that are easily modified through implementation (e.g. location of a park or school). Others showed relatively wide differences between the scenarios. Table 1 identifies which performance measures the project team has identified as most and least important (relative to others within the same Community Outcome) and a rationale for why the team recommends they be given greater consideration in reaching a decision on the preferred UGB. The broad categories of reasons to give one performance measure more consideration than another include: (1) the significance of the differences among alternatives, (2) the magnitude of the advantage or disadvantage identified by the performance measure, and (3) how easily it could be improved through refinements to the arrangement of land uses within one or more expansion areas.

The Difference-Makers

Stepping back from the roll-up to the Community Outcome level, there are a handful of performance measures that identify truly significant differences between the alternatives – differences that will meaningfully affect the community in 2028 and/or that are critical to meeting the legal requirements for this UGB expansion. These "difference makers" include total cost of transportation improvements, efficiency of additional sanitary sewer improvements required, residential land efficiency, affordability, and VMT. They are identified as "Very High" relative importance in Table 1, indicating their importance beyond a single community outcome. Additional performance measures that are especially important at the subarea level include development in wildlife areas and adjacent to riparian areas, wildfire hazard, proximity to farms and forests, irrigation district impacts, suitability for commercial and industrial uses, and per acre costs for needed infrastructure extensions (framework roads and sewer lines).

Table 1: Goal 14 Factors, Community Outcomes, and Performance Measures

Goal 14 Factor	Community Outcome	Performance Measures	Relative Importance[11]	Rationale
Factor 1: Efficient accommodation of identified land needs	Complete Communities and Great Neighborhoods	Housing units within walking distance of schools	Moderate	Some differentiation among scenarios, but relatively easy to refine potential future school locations to improve walk access to schools (and also better match the School District's input on where they hope to provide future schools).
		Housing units within walking distance of parks and trails	Low	Little differentiation among the alternatives. Most of the existing city and most of the expansion areas have excellent access to parks; there are few residential or mixed use areas that do not have at least one park or trail within walking distance.
		Housing units within walking distance of commercial services	High	The hardest performance measure of this group to improve through refinement of land uses. This measure showed meaningful variations among the scenarios.
		Jobs/housing balance (by subarea)	Moderate	No meaningful variation at the scenario / SAAM level because all alternatives have roughly the same total housing and jobs. When evaluated by subarea, a greater degree of jobs/housing balance may make it possible for people to live and work in the same neighborhood, potentially reducing VMT.
		Opportunities for master planning	Moderate	Large properties that will be required to undergo master planning offer the potential for greater input from the city in the ultimate design of the new development; however, the master planning process does add time and expense to development.

[11] Relative importance is relative to other performance measures within a given Community Outcome. Weighting of Community Outcomes against one another may be assigned at a later time based on community, TAC and/or USC input, but has not been applied at this time. However, performance measures identified as "Very High" importance are considered "difference makers" with importance beyond a single community outcome.

Goal 14 Factor	Community Outcome	Performance Measures	Relative Importance[11]	Rationale
	Efficient, Timely Growth	Total acres of expansion	Low	Some of the variation among alternatives is attributable to the efficiency of the land included (based on topography and existing development patterns) and is not easy to change for a given area, but some of the variability is a function of the number of schools or parks included or the need to include an entire area for testing and are not indicative of efficiency of the land.
		Gross density for new housing	Very High	Gross residential densities vary among the alternatives, and factor in land with existing development that is assumed not to redevelop, making this measure a good indicator of residential efficiency, a key issue for compliance with state law and a key indicator of Bend's degree of sprawl.
		Net density for new jobs	Low	Little to no variation among the alternatives. More a function of nuances in the type of employment uses assumed than the efficiency of the land itself.
		Parcels under 20 acres and contiguous to the existing UGB	Moderate	Some variation among alternatives. Not a perfect measure of development readiness, but the best available measure of this.
		Vacant vs. developed land included	Low	Development on vacant land may be more likely to occur in a shorter amount of time because there are no existing land uses generating income or providing value for the property owner, but this is not always the case.
Factor 2: Orderly and economic provision of	Balanced Transportation	Total VMT per capita	Very High	Used for determining compliance with a key provision of the Transportation Planning Rule (TPR).[12] Shows meaningful variation among the alternatives.

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[12] Oregon Administrative Rule 660, Division 12, Section 0065.

Goal 14 Factor	Community Outcome	Performance Measures	Relative Importance[11]	Rationale
public facilities and services	System	Average trip length	Moderate	Shows meaningful variation among the alternatives; highly correlated with VMT, but informative at the subarea level.
		Household VMT per capita	Moderate	Highly correlated with Total VMT per capita; captures only travel to and from home.
		Congestion	High	Some areas rely heavily on congested corridors where increases in capacity either costly or are difficult or inappropriate. Increasing congestion on state highways is a primary issue both because of the impacts it can cause those who rely on the highways and because of regulations that require mitigation (which may be expensive, unlikely to be funded, and/or complex) if a change in land use will worsen congestion on a road that already does not meet standards.
		Walk/bike safety and connectivity	Moderate	Certain subareas have connectivity issues for integrating with the surrounding system that are difficult to overcome.
		System connectivity & progression of system hierarchy	Moderate	Certain subareas have connectivity and/or access issues that are difficult to overcome.
		Mode split	Moderate	Little variation at the full Scenario / SAAM level, though small differences in percentages can have a relatively large impact on the transportation system. Also informative at the subarea level.
		Average weekly walk trips per capita	Low	Correlated with mode split. Little variation at the Scenario / SAAM level. More informative at a subarea level.
		Proximity to transit corridors	Low	Minimal variation at the Scenario / SAAM level; more informative at the subarea level.

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Goal 14 Factor	Community Outcome	Performance Measures	Relative Importance[11]	Rationale
		Housing & jobs within ¼ mile of transit corridors	Low	Minimal variation at the Scenario / SAAM level, and since transit routing can and should be modified to respond to the final proposed UGB expansion, there is some ability to improve transit access for alternatives that scored lower.
		Intersection density	Moderate	Intersection density is an influential predictor of walking, and impacts VMT and bicycling as well. This performance measure is based on both existing intersection density and projected future intersection density (based on assumptions built into the development types), which makes it more hypothetical and somewhat less robust in the expansion areas.
	Cost-Effective Infrastructure	Total cost of transportation improvements required	Very High	Transportation costs are generally the single biggest expense associated with new development. Funding sources to cover anything not eligible for System Development Charges (SDCs) are limited and uncertain unless born directly by developers.
		Cost per acre of transportation improvements	Moderate	Rewards larger, less efficient expansions at the full scenario / SAAM level; more useful at the subarea level.
		New linear miles of local streets	Low	Based on assumptions built into the development types; city regulations and topography will influence what is ultimately built beyond what is captured in the development type assumptions.
		Efficiency of additional sewer system improvements required	Very High	Captures how well each alternative makes use of infrastructure that will be needed to serve growth inside the UGB and/or that can serve multiple expansion areas and how many improvements are needed that are not aligned with the preferred long-range system identified through optimization.

Goal 14 Factor	Community Outcome	Performance Measures	Relative Importance[11]	Rationale
		Initial capital cost of sewer system improvements required	Moderate	A financing strategy for sewer has not be established yet; however, some or all of the capital costs identified may affect rate-payers. The city has recently increased rates to pay for upgrades needed to serve the existing UGB, so rate-payers will be sensitive to additional increases in rates, which makes keeping costs low important. Long-term improvement strategies typically are the most cost-effective, but this measure does not include life-cycle or operations and maintenance costs.
		Initial capital cost of sewer system improvements per acre of development	Moderate	Primarily relevant at the subarea level. Certain sub-areas have fixed costs to extend service, so when smaller areas are identified for development, the costs can become disproportionate to the area served.
		Water system improvements required in city water service area	Low	This measure addresses only areas within the city's water service area. Some areas are more challenging to upgrade capacity than others, but differences are fairly minor and no major issues were discovered.
		Capacity of Avion Water system	N/A	Comments have been sought but have not yet been received.
		Total impervious area for new development	Low	Little meaningful variation at the full Scenario / SAAM level. Stormwater costs are not significant relative to other types of infrastructure.
		Acres of new development within Drinking Water Protection Areas (DWPA)	Low	DWPA can be protected through regulations; the primary concern is industrial uses.

Goal 14 Factor	Community Outcome	Performance Measures	Relative Importance[11]	Rationale
		Acres of new development with welded tuff geology	Low	While geology is an important factor in the cost of building new infrastructure, the available spatial data is not at a detailed enough resolution to allow for accurate prediction of where excavation costs will be affected.
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)	Quality Natural Environment (Environmental and Energy Consequences)	Development in wildlife areas	Moderate	The ODFW mapped wildlife winter range is broad and includes the existing city. The areas where ODFW indicated that elk and deer are more likely to congregate are, by their nature, imprecise; however, they are important to consider.
		Linear distance of riparian areas adjacent to development	Moderate	Riparian areas will be protected with buffers / setbacks and other regulations (such as Waterway Overlay Zone) that will limit impacts from adjacent development.
		Wildfire hazard	High	Wildfire risk is an important issue for the Bend area. Vegetation management can reduce wildfire hazard, and construction mitigation measures are possible in most areas. However, there are limited areas where steep slopes make certain types of mitigation infeasible.
		Greenhouse gas emissions	Low	Highly correlated with VMT and housing mix. The majority of variation among scenarios / SAAMs is due to transportation emissions.
		Energy Use	Low	Little variation among Scenarios / SAAMs; highly correlated with housing mix and patterns match closely with greenhouse gas emissions. Some variation at the Scenario / SAAM level may be due to nuances in the type of land uses assumed rather than the characteristics of the area itself.

Goal 14 Factor	Community Outcome	Performance Measures	Relative Importance[11]	Rationale
		Average Water Consumption per Household	Low	Little variation among Scenarios / SAAMs; highly correlated with housing mix. Some variation at the Scenario / SAAM level may be due to nuances in the type of land uses assumed rather than the characteristics of the area itself.
	Housing Options and Affordability (Social Consequences)	Average cost of new single family housing	Very High	Affordability is a key issue for Bend and for this UGB expansion. Enough variation at the scenario level for meaningful distinctions.
		Housing mix of new housing (subarea balance)	Low	Having a balanced mix of housing in most or all subareas helps prevent income segregation at the neighborhood level, but can fairly easily be adjusted through adjustments to land use assumptions.
	Strong Diverse Economy (Economic Consequences)	Site suitability for large lot industrial use	Low	Identifying an appropriate site for a large lot industrial use is important; however, the large lot site can fairly easily be incorporated into any of the scenarios, so it is not a differentiating measure.
		Site suitability for areas identified for industrial uses	High	This is important at a subarea level and for the creation of the preferred scenario.
		Site suitability for areas identified for commercial uses	High	This is important at a subarea level and for the creation of the preferred scenario.
Factor 4: Compatibility of proposed urban uses with nearby agricultural and	Compatibility with Farms and Forests	Farm practices & high value farm land adjacent to expansion areas	High	Protection of farms from impacts of development is a key tenet of the Oregon land use system, and greater distances betwee urbanizing areas and farms and forests reduces legal risk due to fewer or no compatibility issues. Some variation at the Scenario / SAAM level; more relevant at the subarea level.

Goal 14 Factor	Community Outcome	Performance Measures	Relative Importance[11]	Rationale
forest activities occurring on farm and forest land outside the UGB		Impact to irrigation districts	Moderate	Meaningful variation among alternatives, particularly at the subarea level. Irrigation districts are important to the agricultural economy of Central Oregon. Loss of water rights due to development will have a financial impact on the Irrigation Districts and possibly impact the delivery of water to agricultural operations that are not directly affected by the boundary expansion.
		Designated forest land adjacent to expansion areas	Moderate	Greater distances beween urbanizing landuses and forest operations helps reduce concerns about compatibility and associated legal rise. However, very little area is proximate to designated forest land (several subareas are located more than one mile from the closest forest lands). Adjacent forest land is generally managed for recreation rather than timber harvest, so there are fewer compatibility concerns with adjacent development.

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SCENARIO EVALUATION SUMMARY

The following evaluation summary rolls up the results from each of the performance measures to conclusions at the community outcome level, answering the question: How well does this Scenario (or SAAM) achieve this Community Outcome? This section offers a summary and synthesis of the evaluation results; detailed data sheets are provided in Appendix B. A summary of the methodology and further description of the evaluation for each performance measure are provided in Appendix D.

To Weight, or not to Weight?

In Phase 1, the Boundary TAC and USC directed the team to use an "unweighted" (or, more precisely, an equally-weighted) approach to combining results from different indicators evaluated in Stage 2 to identify overall performance of different areas. For Stage 4 scenario evaluation, neither the Boundary TAC nor the USC provided specific guidance on how the performance measures should be weighed and balanced against one another.

To help test the sensitivity of individual performance measures on the ranking of the scenarios, the project team has analyzed the performance measures and has evaluated overall results using <u>both</u> an equally-weighted and an unequally-weighted approach, including several variations of weighting. These are shown in Appendix C. Using or not using weighting and the degree of weighting had minimal impact on the overall results. The top performing scenarios were found to rank in the same order regardless of whether and how the performance measures are weighted, given the degree of importance assigned to each (as captured in Table 1).

The discussion that follows takes a "blended" approach on weighting – where the use of weighting matters, that is noted in the discussion.   The discussion was written after considering the results from both sides (both equally-weighted and unequally-weighted).

It is important to note that the update of Bend's UGB is not intended to be a numerical exercise and points-based decision.   Rather, it is intended to be a determination of which choices, on balance, best meet the Goal 14 factors and Project Goals (as expressed in the Community Outcomes).   This requires both a quantitative and a qualitative evaluation and set of decisions.

Factor 1: Efficient accommodation of identified land needs

Complete Communities and Great Neighborhoods

Top Tier
Scenario 2.1 performed the best overall on this Community Outcome, particularly on access to schools and commercial services, because it was created with the intention of providing for complete communities (neighborhoods with a mix of housing, jobs, commercial services, parks, and schools) in all quadrants of the city.

Middle Tier
Scenario 3.1 and, to a lesser extent, **Scenario 1.2** and **SAAM-2**, also performed well. These alternatives all have some subareas that are fairly complete, and others that are less so. Scenario 3.1 performed well on walk access to both schools and commercial; nearly all new

residential expansion areas in each include at least a small commercial center and many include a school.   Scenario 3.1 did the best at increasing the walk access of housing inside the existing UGB to commercial services. This appears to be due to the placement of commercial areas in a few key locations. For example, within "The Thumb", placing commercial adjacent to China Hat Road provides walkable access to neighborhoods at the southern edge of the city that currently lack it. In the Shevlin Area, placing commercial along Shevlin Park Road provides walk access to portions of Awbrey Butte.

Bottom Tier

SAAM-1 and **SAAM-3** had mixed results on this Community Outcome, with performance below that of the other alternatives. In part, this is because they include one or two large, primarily residential expansion areas and fragmented employment areas elsewhere. SAAM-1 was the only alternative that did not perform well on park/trail access, because the northernmost extent of the Northeast Edge would not have walkable park/trail access. SAAM-3 performed poorly on school and commercial access, because of the large amount of new housing in the outer portion of the west area, away from existing and future commercial uses and schools. Because of the nature of the areas included in SAAM-1 and SAAM-3, it would be difficult to improve their performance on these measures – there are few or no suitable locations for additional schools, parks, or commercial areas in either one.

Efficient, Timely Growth

Top Tier

Scenario 1.2 performed the best overall on this Community Outcome, with high ratings across the board, because it provides a mix of large, vacant properties and smaller parcels contiguous to the existing UGB. **Scenarios 2.1** and **SAAM-3** also performed well on this Community Outcome. Both do well on measures of density and efficiency because of their reliance on larger, vacant parcels, but both have a lower percentage of land under 20 acres and contiguous to the existing UGB.

Middle Tier

SAAM-2 and **Scenario 3.1** performed moderately well, though not as well as the others mentioned above. This is in part because lower residential densities were assumed in parts of the West Area and the Shevlin Area due to topography and the possible need for cluster development in order to allow for natural resource/wildlife habitat protection. Both also include a number of developed parcels between OB Riley Road and Gopher Gulch, which are less efficient to develop than vacant parcels.

Bottom Tier

SAAM-1 performed the worst on this Community Outcome, because the outer Northeast Edge and the Shevlin area both had lower residential densities; the outer Northeast edge includes quite a few developed properties, particularly in the subdivisions south of Juniper Ridge; and, while the parcels are smaller in the Northeast Edge, the outer portion is not contiguous to the current UGB.

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Factor 2: Orderly and economic provision of public facilities and services

Balanced Transportation System

Top Tier

Across the various performance measures included in this Community Outcome, **Scenario 2.1** performed the best overall, with the lowest VMT per capita, the best overall walk/bike safety and connectivity, and the best system connectivity and progression of system hierarchy.

Middle Tier

Scenario 1.2, **Scenario 3.1**, **SAAM-1** and **SAAM-3** all performed moderately well – the relative ranking among these depends on which measures are given most importance, although differences are subtle. Scenario 1.2, SAAM-1 and SAAM-3 do fairly well on congestion, with relatively low overall congestion; they also do fairly well on walk/bike safety and connectivity, with no major barriers identified. It is worth nothing that SAAM-1 does poorly on VMT, but well on congestion (because there is relatively little existing congestion near the Shevlin area) and walk/bike safety and connectivity (because including the full extent of the Shevlin area provides for better connections to the existing road and trail system).

Bottom Tier

SAAM-2 does the worst on this Community Outcome overall, with poor performance on VMT, mode split, average trip length, and a number of other factors. It also performs less well on walk/bike safety and connectivity because the river forms a barrier with connections to the west.

Cost-Effective Infrastructure

Top Tier

Scenario 2.1 performed the best overall on this Community Outcome, in particular because of the low cost of transportation improvements required (low cost for connecting growth areas and low cost for projects to increase capacity). It also performed fair to well on measures of sewer system cost-effectiveness as well as new linear miles of local streets, water system improvements within the Bend water service area, and total impervious area for new development. It had only one negative rating, on new development within a Drinking Water Protection Area, because of the amount of development in The Thumb.

Middle Tier

SAAM-2 performed somewhat poorly on sewer, though it was not the worst performer; it takes advantage of major trunk infrastructure to the north but the DSL property and The Elbow are not cost-effective due to small area included and fixed costs to serve those areas. It had moderate transportation costs, with low costs for connecting growth areas but high costs for required capacity improvements (including the need to widen US 20 from Robal Rd to 3rd Street). It's only other drawback is having a relatively high proportion of development in areas with potentially challenging geology (welded tuff).

Bottom Tier

Scenarios 1.2 and **3.1, SAAM-1** and **SAAM-3** all had at least one significant drawback on transportation and/or sewer infrastructure, though most had mixed results overall. **Scenario 3.1**

performed acceptably across most performance measures in this group, but performed poorly on transportation costs due to high cost for connecting growth areas and the need to widen US 20 from Robal Rd to 3rd Street. **Scenario 1.2** also performed poorly on transportation infrastructure, due to high cost for connecting expansion areas and high cost for capacity improvements, but performed the best on sewer infrastructure, because it focuses more growth on the Northeast edge, which is efficient for sewer service. **SAAM-3** had high costs for sewer improvements because of the need for a new regional pump station to serve the northwest portion of the West Area, but low costs for transportation improvements due to low cost for connecting growth areas and moderate cost for congestion mitigations (including the need to widen US 20 from Robal Rd to 3rd Street). SAAM-3 also has the greatest amount of development in areas with welded tuff geology, which can add to the cost of excavation. **SAAM-1** had high costs for sewer because of the need for a new regional pump station to serve the Shevlin Area (though it does take advantage of cost-effective sewer in the Northeast edge), and also had relatively high transportation costs due to high costs for connecting expansion areas as well as high costs for intersection improvements.

Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)

Quality Natural Environment (Environmental and Energy Consequences)

Top Tier
Scenario 1.2 and **Scenario 2.1** are rated fair to very good across all performance measures under this Community Outcome. Neither has development adjacent to riparian areas, and both have limited total expansion in elk and deer range, with no expansion into ODFW areas of potential concern. Neither has features that prevent mitigation of wildfire hazard in any expansion areas. Both had reasonably good performance on energy consumption, greenhouse gas, and water consumption measures as well.

Middle Tier
Scenario 3.1, **SAAM-2** and **SAAM-3** had mixed results. SAAM-2 performed fair to well on all measures except greenhouse gas emissions and energy use. Scenario 3.1 rated poorly on development in wildlife areas and wildfire hazard due to the inclusion of the Shevlin area, which is both an ODFW area of potential concern and has topographic features that make it difficult to fully mitigate wildfire risk. SAAM-3 rated poorly on development in wildlife areas because so much growth was focused in the West area, but performed fairly or well on other performance measures.

Bottom Tier
SAAM-1 performed poorly on many of the performance measures, and did not perform well on any. It rated very low on development in wildlife areas and lower also on wildfire hazard because it includes the full Shevlin area (see reasons noted above). It also rated lower than other scenarios on development adjacent to riparian areas because of the inclusion of the upper portion of the Shevlin Area.

Housing Options and Affordability (Social Consequences)

Top Tier

Scenario 2.1 and **SAAM-1** performed the best on this Community Outcome, though there were only two performance measures. Scenario 2.1 had good housing mix in nearly all subareas and good housing affordability with significant housing growth in the southeast. SAAM-1 had good housing mix in both primary residential expansion areas and had moderately affordable housing due to the heavy expansion in the Northeast Edge.

Middle Tier

Scenario 1.2 performed well on affordability, but less well on housing mix, with most subareas somewhat imbalanced (too much single family or too little). **SAAM-2** performed well on housing mix, but less well on affordability, with growth focused on the northwestern side of the city.

Bottom Tier

Scenario 3.1 and **SAAM-3** performed poorly on affordability due to the heavy focus on the west side of the city. SAAM-3 also did not perform well on housing mix because there were small residual areas of almost exclusively multifamily housing.

Strong Diverse Economy (Economic Consequences)

Top Tier

Nearly all alternatives – **Scenario 1.2**, **Scenario 3.1**, **SAAM-1**, **SAAM-2**, and **SAAM-3** -- performed well or very well across all performance measures in this Community Outcome.

Middle Tier

Scenario 2.1 rated somewhat lower, because it places employment and commercial uses in more of the expansion areas (e.g. the West Area) where they are somewhat less well suited.

Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occurring on farm and forest land outside the UGB

Compatibility with Farms and Forests

Top Tier

Scenario 1.2 rated the highest on farm and forest compatibility because it affects the fewest irrigation district customers and has no forest land within a mile of any expansion area.

Middle Tier

Scenario 2.1, **SAAM-3**, and, to a lesser extent, **SAAM-1** also rated fair to good on this Community Outcome. SAAM-3 has less farm impacts but more forest adjacency than other alternatives. Scenario 2.1 and SAAM-1 both have moderate levels of farm impacts, moderate impacts to irrigation districts, and little to no forest land adjacency.

Bottom Tier

Scenario 3.1 and **SAAM-2** rated the lowest on farm and forest compatibility because they are proximate to the greatest number of working farms and also affect the greatest number of

irrigation district customers.   Scenario 3.1 also has some forest land between a mile and a quarter-mile away from the expansion in the West Area.

Conclusions and Recommendation

Scenario 2.1 was in the "top tier" relative to other alternatives on nearly all community outcomes, and performs the best on balance of all the alternatives. Scenario 2.1 excels in Complete Communities and Great Neighborhoods and Housing Options and Affordability and does not have any significant weaknesses identified through the evaluation. Each of the other alternatives has at least one important weakness that was identified through the evaluation, as summarized in brief below.

- Scenario 1.2 performs poorly on cost-effective infrastructure, because heavy development in the Thumb triggers the need to widen Knott Road to three lanes.
- Scenario 3.1 performs poorly on cost-effective infrastructure, due to high transportation costs to connect growth areas and the need to widen US 20 from Robal Rd to 3rd Street. It also performs poorly on compatibility with farms and forests due to heavy impacts to Swalley Irrigation District in OB Riley / Gopher Gulch and forest proximity in the Shevlin Area and on Housing Options and Affordability because much of the residential development is focused on the west side of the city where land costs and housing prices are higher. It performs relatively poorly on Quality Natural Environment because including the Shevlin Area impacts wildlife areas, puts development in proximity to Tumalo Creek, and has topography that makes wildfire hazard difficult to mitigate.
- SAAM-1 performs poorly on multiple Community Outcomes. It performs poorly on Quality Natural Environment because including the full Shevlin Area impacts wildlife areas, puts development in proximity to Tumalo Creek has topography that makes wildfire hazard difficult to mitigate. It performs poorly on Cost-Effective Infrastructure because development of the full Shevlin Area requires a costly new regional pump station for sanitary sewer, and it also has fairly high cost for new roads connecting growth areas and high costs for intersection improvements. SAAM-1 also rated relatively poorly on Complete Communities and Great Neighborhoods and Efficient, Timely Growth because the outer extents of the Shevlin Area and Northeast Edge are not well-suited to higher-density housing and have less proximity to commercial services, schools, and/or parks.
- SAAM-2 performs poorly on Balanced Transportation System, due to the lack of connectivity to the existing UGB from the Gopher Gulch area and the distance to reach key destinations inside the current UGB. It also performs relatively poorly on Compatibility with Farms and Forests due to heavy impacts to Swalley Irrigation District and proximity to the greatest number of working farms.
- SAAM-3 performs relatively poorly on Housing Options and Affordability because all of the residential development is focused in the West Area, which is more expensive (as noted above), and on Cost-Effective Infrastructure because including the full West Area (particularly the northwest portion) requires a costly new regional pump station.

The project team recommends that the Boundary TAC consider Scenario 2.1 as the starting point for crafting the preferred UGB Expansion Scenario. As described in the next section, the subarea evaluation provides insights into potential modifications of Scenario 2.1 that will improve it and are recommended for inclusion in the hybrid.

SUBAREA ADVANTAGES, DISADVANTAGES AND TRADE-OFFS

This section provides a summary of findings from the evaluation on the advantages and disadvantages of each subarea (those that are either inherent to the geography or that do not vary appreciably between the alternatives) and the trade-offs associated with the various land use choices in each of the alternatives. Its purpose is to illuminate which options perform the best for each subarea in order to inform the creation of the hybrid and the refinement of the top-performing scenario.

North Triangle

General advantages and disadvantages

Advantages	Disadvantages
- cost-effective to serve with sewer because it requires only an incremental extension of the Northeast Interceptor, which is also required to serve the OB Riley / Gopher Gulch area - Relatively close to existing transit lines at the southern edge (but over a quarter mile) - no issues for water service - generally well-suited to commercial uses - not in Welded Tuff geologic area; - minimal overlap with Drinking Water Protection Areas (DWPAs) - not in Elk/Deer Range or Oregon Department of Fish and Wildlife (ODFW) Areas of Potential Concern - Wildfire hazard is somewhat lower than other potential expansion areas - no commercial farms nearby; no forest land within 1 mile	- more growth in this area contributes to congestion on US 97 and US 20 - High cost per acre for transportation connectivity improvements - some compatibility concerns for industrial uses with rural residential area to the north - potential for significant impacts to Swalley Irrigation District - large format retail south of Cooley road reduces attractiveness for residential use

Trade-offs of land use options

Three main choices were tested for this area:

1. Scenario 1.2 and SAAM-1: an all-employment expansion <u>excluding</u> the smaller parcels on the western edge
2. Scenario 2.1: a mixed-use expansion <u>excluding</u> the smaller parcels on the western edge
3. Scenario 3.1, SAAM-2, and SAAM-3: an all-employment expansion <u>including</u> the smaller parcels on the western edge, with a large-lot industrial site designation on the eastern side

The trade-offs associated with these choices are summarized below.

- Including the sliver on the west side (as in Scenario 3.1, SAAM 2 and SAAM 3) so that the future UGB reaches Old Bend-Redmond Highway allows for completing the collector framework, but brings in smaller, developed rural residential parcels that are less suitable for commercial and industrial uses. This choice also increases the impact on Swalley Irrigation District.
- Including residential development in this area (as in Scenario 2.1) improves access to commercial services, but creates a potential compatibility concern for the abutting industrial uses. Including residential also slightly reduces average trip lengths, but only slightly, and not as much as including more substantial residential in the OB Riley / Gopher Gulch area.
- The area has some strengths as a large lot industrial site, but also has potential compatibility issues and not ideal lot configuration.

Draft recommendations for the hybrid

- This area is important and suitable for employment uses; however, including residential and the sliver on the west side appear to have more disadvantages than advantages. Therefore, an employment-focused expansion that excludes the sliver on the west, like Scenario 1.2 and SAAM-1, would be a good starting point for this area.
- Refine the arrangement of land uses to minimize compatibility issues with residential areas to the north and west (e.g. Light Industrial or Industrial Park as a transition).
- Explore the possibility of extending the collector to connect to US-20 across the smaller parcels on the western edge if they are not brought into the UGB.

Northeast Edge

General advantages and disadvantages

Advantages	Disadvantages
- Mid-size (4- to 10-acre) parcels contiguous to the UGB offer potential for near-term development - Portions of the area have good proximity to existing/planned parks & trails - Majority of the area is cost-effective to serve with sewer because it relies on the Hamby alignment and eastern	- Connectivity to existing UGB limited except for major roads - Over a half mile from existing and planned transit - small parcel size and adjacent residential uses limit suitability for larger/heavier industrial uses - small parcel sizes limit opportunities for master planning

Advantages	Disadvantages
portion of the Northeast Interceptor, which are needed regardless of expansion scenario choice • locations adjacent to major roads are generally well-suited to commercial uses • locations adjacent to major roads are moderately suitable for small industrial uses • not in Welded Tuff geologic area; • minimal overlap with DWPAs • not in Elk/Deer Range or ODFW Areas of Potential Concern • Wildfire hazard is somewhat lower than most potential expansion areas • housing likely to be more affordable in this part of the city • no forest land within 1 mile	• Some proximity to commercial farms • South of Butler Market Road, the land use pattern precludes a continuous north-south street that would parallel Hamby Road

Trade-offs of land use options

The scenarios and SAAMs encompass four discrete land use choices for the Northeast Edge:

1. Scenario 1.2: Fairly large, mostly residential expansion including most of the exception land between Yeoman Road and Bear Creek Road with commercial nodes at major roads
2. Scenarios 2.1 and 3.1: Limited expansion in three locations near major roads, with commercial nodes and adjacent residential
3. SAAM-1: Very large, mostly residential expansion including most of the exception land between Juniper Ridge and Neff Road with commercial nodes at major roads
4. SAAM-2 and SAAM-3: Very limited expansion – just commercial nodes at major roads with a small multifamily component.

The trade-offs associated with these choices are summarized below.

- Including the large rural subdivision south of Juniper Ridge (as in SAAM-1) significantly increases the acreage required to accommodate the housing need, since there is limited capacity for growth in that area.
- Including the area north of Yeoman Road (the northeastern-most part of the subarea, as in SAAM-1) makes more use of the proposed Hamby interceptor, but adds housing in a location that does not have good access to schools, parks, trails, or commercial services; increases congestion on nearby arterial corridors; and impacts Swalley Irrigation District.

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- Including more of the land between Butler Market Road and Neff Road (as in Scenario 1.2 and SAAM-1) makes more use of the proposed Hamby interceptor, but increases trip lengths and VMT because people must travel further to reach a main road and their destinations, and local connectivity is not conducive to direct and convenient routes for local trips.
- Including the land near Bear Creek road (as in all but SAAM-2 and SAAM-3) increases sewer costs because that area would require an interim lift station, and also includes a small area of the 500' buffer for Drinking Water Protection Areas.

Draft recommendations for the hybrid

- Amount of expansion that falls in between Scenarios 2.1 / 3.1 and Scenario 1.2, because most of this area is highly efficient for sewer, and performs well for transportation if largely focused where connectivity is good and around the major roads connecting towards the center of Bend (e.g., Butler Market Road). .Include somewhat more of the area near Butler Market Road and/or Neff Road than in Scenarios 2.1 and 3.1, but less than in Scenario 1.2 to try to balance these trade-offs.
- Exclude the Bear Creek Road area, because it is not cost-effective for sewer, reallocating that housing to the Butler Market Village area or the area north of Neff Road.

DSL Property & Darnell Estates

General advantages and disadvantages

Advantages	Disadvantages
- Large, single ownership offers opportunities for master planning on DSL Property (not Darnell Estates) - Good grid & trail connections on DSL Property (not Darnell Estates) - Relatively close to existing transit lines at the northeastern corner (but over a quarter mile) - DSL property relies on Hamby sewer alignment & Northeast Interceptor (NEI) - not in Welded Tuff geologic area; - minimal overlap with DWPAs - not in Elk/Deer Range or ODFW Areas of Potential Concern - housing likely to be more affordable in this part of the city - Portions of DSL property adjacent to major roads are generally relatively well-suited to commercial and industrial uses (not Darnell Estates)	- Localized pipeline required to connect DSL Property to Southeast Interceptor (SEI) - Darnell Estates requires additional extension of Hamby sewer alignment - Extreme fire hazard; hazard could be reduced to high with proper vegetation management - Low impact commercial farm(s) within ¼ mile of northeastern edge - Potential impacts to bat caves from adjacent urbanization

Advantages	Disadvantages
- no forest land within 1 mile - no irrigation district impacts - good potential for local routes that parallel 27th the entire length of the property	

Trade-offs of land use options

The scenarios and SAAMs encompass five different land use options for this area:

1. Scenario 1.2: roughly half the exception land on the DSL property included with a mix of uses; Darnell Estates excluded.
2. Scenario 2.1: all exception land on the DSL property included with a mix of uses; Darnell Estates excluded.
3. Scenario 3.1 and SAAM-3: roughly a third of the exception land on the DSL property included with residential and commercial uses; Darnell Estates excluded.
4. SAAM-1: small portions of the DSL property along the roads included for commercial and industrial uses; Darnell Estates excluded.
5. SAAM-2: small portions of the DSL property along the roads included for commercial uses and multifamily; Darnell Estates included for housing and a small amount of employment.

The trade-offs associated with these choices are summarized below.

- Including the full exception area on the DSL property (as in Scenario 2.1) allows for construction of a collector road running north/south, which improves connectivity.
- Including Darnell Estates (as in SAAM-2) is not cost-effective for sewer service and increases trip lengths, and offers few advantages.
- A larger residential expansion (as in Scenario 2.1 and Scenario 1.2) provides the opportunity to include a school, which helps make the area more walkable.
- Emphasizing multifamily housing (as in Scenario 3.1 and SAAM-3) reduces VMT/capita.

Draft recommendations for the hybrid

- The hybrid should be most similar to Scenario 2.1, because this area offers advantages across a range of performance measures, and because inclusion of the full exception area offers additional advantages and relatively few disadvantages.
- Include large lot industrial site at the southern end (as in Scenario 1.2) – the location preferred by the Employment TAC.
- Refine land uses to address bat cave locations (may reduce the amount of park land), and consider whether park land may be able to be managed to provide a fire buffer on the eastern edge rather than internal to the developed area.

"The Elbow"

General advantages and disadvantages

Advantages	Disadvantages
- Includes possible future park site and existing school - not in Welded Tuff geologic area; - no overlap with DWPAs - does not overlap with ODFW Areas of Potential Concern - housing likely to be more affordable in this part of the city - Portions adjacent to 27th / Knott are generally fairly well-suited to commercial and industrial uses - no forest land within 1 mile	- Bike/ped and vehicle connectivity are both limited unless a connection can be built between Rickard and 15th (e.g. a new extension of Murphy south and east from 15th to a point where it would connect with Rickard). - Over a half mile from existing and planned transit - Requires interim pump station that does not contribute to long-term solution and sewer infrastructure is unique to Elbow area - partially in Elk/Deer Range - Extreme wildfire hazard west of 27th/north of Knott Road; hazard could be reduced with proper management of vegetation. (Remainder of area is lower wildfire hazard.) 2 commercial farms within 1/4 mile, one which is an active operation that includes a feed lot for beef along Knott Rd. - Some impacts to Arnold Irrigation District deliveries

Trade-offs of land use options

The scenarios and SAAMs encompass three distinct land use options for this area:

1. Scenario 1.2: limited mixed use expansion along edge of existing UGB
2. Scenario 2.1: large mixed use expansion encompassing the full subarea (out to 27th / Knott)
3. Scenario 3.1 / SAAM-1 / SAAM-2 / SAAM-3: limited commercial / industrial expansion along the edge of the existing UGB (note that there are subtle variations among the alternatives in this group, but they are minor)

The trade-offs associated with these choices are summarized below.

- The large mixed use expansion in Scenario 2.1 provides the lowest average trip length for the area, in large part because it creates the potential for the extension of a collector road from 15th Street to 27th Street near Rickard Road (i.e., an extension of the Murphy

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Road corridor), which improves connectivity in the area, but also puts more land use adjacent to the commercial farm to the south, across Knott Road and increases impacts on the Arnold Irrigation District.

- A small expansion in this area (as in all alternatives except Scenario 2.1) makes the needed sewer improvements not cost-effective on a per acre basis.

Draft recommendations for the hybrid

- Because this area is relatively well-suited for employment uses and there is so much adjacent single family housing inside the existing UGB to the west, it makes sense to bring this in primarily as an employment area with either a small, mixed housing component or no residential component. It completes the southeast area by providing employment uses, and does not necessarily need to provide a full mix of uses internal to the subarea. Transportation access is good for employment uses via Knott Road and 27th Street..
- Full or nearly full use of this area (as in Scenario 2.1), in order to spread the cost of the needed pump station across more acres.
- Refine arrangement of land uses to provide a transition between employment and existing lower density residential and to minimize commercial and residential uses along Knott Road to reduce impacts to the feed lot south of Knott.

"The Thumb"

General advantages and disadvantages

Advantages	Disadvantages
- The Ward and Baney properties are both over 20 acres and provide opportunities for master planning. - One of the Woodside Road properties is under 20 acres and contiguous to the existing UGB. - South end of US 97 is relatively uncongested. - Possible community connector bus stop on west side of US 97 could provide limited transit access to the southern end of this area in the long term. - not in Welded Tuff geologic area; - no overlap with DWPAs - does not overlap with ODFW Areas of Potential Concern - Wildfire hazard has been reduced due to good vegetation management - housing likely to be more affordable in	- Bike/ped and vehicle connectivity are both limited unless a full collector system can be built from China Hat to Knott (due to highway and railroad barriers). - Heavily reliant on US 97 for connections to the rest of the city - Average trip lengths are long from this area (highest of all subareas) - Baney property has limited access to US 97, making it less suitable for commercial and employment uses - Some sewer capacity upsizing required from current design of the Southeast Interceptor - Baney property requires its own gravity sewer line extension - almost entirely within DWPAs, where certain industrial and commercial uses may be a concern

Advantages	Disadvantages
this part of the city • Ward property is generally well-suited to a wide range of uses: residential, commercial and industrial uses (Baney or Woodside Road properties not well suited to commercial or industrial)	• entirely within in Elk/Deer Range • 2 commercial farms within 1/4 mile of Woodside Road properties • Arnold Irrigation District water serves Ward property (but would likely continue to serve the golf course) • Southern extent of Ward property and Woodside Road properties are under a mile from designated forest land

Trade-offs of land use options

The scenarios and SAAMs provide five different land use options for this area:

1. Scenario 1.2: Full use of the Ward property with a mix of housing and employment
2. Scenario 2.1: Use of roughly 2/3rds of the Ward property plus the Bany property for a mix of housing and employment
3. Scenario 3.1 and SAAM-3: Use of roughly 1/3rd of the Ward property for commercial and industrial uses
4. SAAM-1: Use of roughly 2/3rds of the Ward property for commercial and industrial uses
5. SAAM-2: Use of roughly 1/3rd of the Ward property for commercial and industrial uses plus Woodside Road properties for housing

The trade-offs associated with these choices are summarized below.

- Bringing in the full extent of the Ward property (as in Scenario 1.2) provides the opportunity for a complete collector network on that property that improves bicycle, pedestrian, and vehicular connectivity but generates enough traffic volume that it requires expanding Knott Road to three lanes (at significant expense). It also means more growth in the DWPA and in the Elk/Deer Range.
- Including the Baney property (as in Scenario 2.1) requires an additional gravity sewer main and does not appear to provide substantial benefits in other performance measures.
- Incorporating residential on the Ward property (as in Scenarios 1.2 and 2.1) may create potential for compatibility issues between industrial and residential uses and appears to have only modest benefits for the transportation system.
- More growth in this area (as in Scenarios 1.2 and 2.1 and SAAM-1) hurts overall performance on VMT because of the long average trip lengths from this area.
- A relatively large expansion that extends from US 97 to Knott Road (as in Scenarios 1.2 and 2.1) provides more opportunity for internal site collector roads, even if they don't extend all the way through the property, and spreads cost of sewer improvements over more acres.

- Siting commercial uses adjacent to China Hat Road (as in Scenario 3.1, SAAM-1, SAAM-2 and SAAM-3) provides better access for existing neighborhoods to the north, though these are low density and may not provide much support for such commercial.

Draft recommendations for the hybrid

- Because this area is relatively well-suited for employment uses and there is so much adjacent single family housing inside the existing UGB to the north, and because growth in this area tends to increase VMT, it makes sense to bring this in primarily as an employment area with either a small housing component or no residential component.
- An amount of expansion between Scenario 2.1 (without the Baney property) and Scenario 3.1 / SAAM-1 may best balance the trade-offs for this property, especially if there remains enough area to provide a collector connection from China Hat to Knott.
- Refine arrangement of land uses to best utilize each area of the Ward property.
- Include a high school as identified by the School District and a community park.

West Area

General advantages and disadvantages

Advantages	Disadvantages
- Nearly all properties in the area are well over 20 acres and provide opportunities for master planning on a large scale - Some connections to existing/planned parks & trails - Relatively close to existing transit lines on the eastern edge (but over a quarter mile) - No issues identified for serving with City of Bend water - No overlap with ODFW Areas of Potential Concern - Reduced wildfire hazard due to good vegetation management; - No commercial farms within a quarter mile - No irrigation district water	- Few to no parcels under 20 acres and contiguous to the current UGB - Limited capacity in Awbrey Glen pump station and force main, which would serve the northwestern portion of this subarea - Limited trail system - Difficult to build connected local streets - Largely welded tuff geology - Entirely within Deer & Elk Winter Range - Housing is likely to be more expensive in this area - Topography, transportation access and residential proximity limit suitability for industrial uses - Relatively low visibility limits suitability for commercial uses - Under a mile from forest land - Some area adjacent to the current UGB is within a DWPA

Trade-offs of land use options

The scenarios and SAAMs provide four different land use options for this area:

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1. Scenario 1.2: Modest, primarily residential expansion that extends along the eastern edge of the subarea
2. Scenario 2.1: Modest mixed use expansion focused in the southern portion of the subarea
3. Scenario 3.1: Relatively large, primarily residential expansion that runs along the eastern side of the subarea
4. SAAM-3: Full use of the subarea for a primarily residential expansion

(Note that SAAM-1 and SAAM-2 exclude the West Area altogether.) The trade-offs associated with these choices are summarized below.

- Scenario 3.1 requires an additional sewer extension to connect to the Awbrey Glen pump station and upsizing of the pumps to serve the northern portion of the Day property (as well as the Shevlin area), which increases costs (though the cost per acre is similar to Scenarios 1.2 and 2.1).
- The full use of the sub-area (as in SAAM-3) exceeds the capacity of the Awbrey Glen pump station and force main and requires a new regional pump station and force main to serve the northwestern portion of the Day property. The same area (the northwestern portion of the Day property) would also bring in housing that is not within walking distance of commercial and that is within a quarter mile of designated forest land.
- Bringing in a larger area (as in Scenario 3.1 and SAAM-3) increases average trip length somewhat and also slightly increases reliance on congested corridors, but spreads the cost of connectivity improvements over a larger area, reducing the cost per acre.
- The southern portion of the West Area has good proximity to existing schools; extending further north (as in Scenario 1.2, Scenario 3.1 and SAAM-3 to varying degrees) puts more housing out of walking distance of schools.
- Incorporating employment uses (as in Scenario 2.1) puts those uses in a location that has some suitability concerns.
- A greater residential expansion (as in Scenario 3.1 and SAAM-3) may make the commercial component shared by all alternatives more viable.

Draft recommendations for the hybrid
- Expand primarily in the southern portion (Miller property), as in Scenario 2.1, where connectivity is good, transit and trails are closer, and sewer infrastructure is cost-effective to provide.
- Because this area has limited suitability for commercial and industrial uses, it makes sense to focus on residential uses, though retaining a small commercial area is appropriate and a very small amount of light industrial use may be appropriate.

Shevlin Area

General advantages and disadvantages

Advantages	Disadvantages
- Includes planned school site (currently in School District ownership) - Good proximity to existing/planned parks & trails - Large block of land in common ownership creates potential for master planning - Minimal congestion on roads in and serving this area - Relatively close to existing transit lines at the southeastern corner (but over a quarter mile) - No commercial farms within a quarter mile - No irrigation district water	- Few or no parcels under 20 acres and contiguous to the existing UGB - Average trip lengths are long from this area relative to other areas - Difficult to build connected local streets in much of this area - Limited capacity in Awbrey Glen pump station and force main, which would serve this subarea - Drinking water supply is through smaller infrastructure, which is more problematic to expand - Partially in welded tuff geology - Includes small areas of 500' buffer for Drinking Water Protection Areas - Entirely within Deer & Elk Winter Range - Largely within ODFW Areas of Potential Concern - Northwestern edge is adjacent to Tumalo Creek (but the Bend Metropolitan Parks & Recreation District has ownership of the property within roughly 500ft of the river) - Mix of High and Extreme fire hazard; outer portions of the subarea have topography and unmanaged adjacent lands that could make it difficult to reduce fire hazard - Housing is likely to be more expensive in this area - Topography, transportation access and residential proximity limit suitability for industrial uses - Low visibility limits suitability for commercial uses - Western corner within a quarter mile of forest land

Trade-offs of land use options

There are two development options tested in the Scenarios and SAAMS:

1. Scenario 3.1: Development of the southern half of the subarea with primarily residential uses and some commercial
2. SAAM-1: Development of the full subarea with primarily residential and some commercial

(Note that Scenario 1.2, Scenario 2.1, SAAM-2 and SAAM-3 exclude the Shevlin Area altogether.) The trade-offs associated with these choices are summarized below.

*   Bringing in the full area creates better connections to the existing city for bicycles and pedestrians and spreads the cost of transportation improvements over more acres, reducing the cost per acre (though not the total cost).
*   However, the full build option exceeds capacity at the Awbrey Glen pump station and force main, requiring a new regional pump station (at significant expense).[13] It also adds housing that is over a half-mile from the school and the commercial area in the southern part of this subarea; increases average trip length and per capita household VMT; puts development adjacent to Tumalo Creek; increases housing in an area where fire hazard may be difficult to mitigate; increases impacts on wildlife habitat areas; and puts more development within a quarter mile of designated forest land.

Draft recommendation for the hybrid

*   Exclude this subarea, as in Scenarios 2.1 and 1.2, because of its relatively poor transportation performance, its impacts on wildlife habitat, its relatively higher fire hazard that may be difficult to mitigate, and lack of advantages over other subareas suitable for residential uses.

OB Riley / Gopher Gulch Area

General advantages and disadvantages

Advantages	Disadvantages
- Good proximity to planned parks on the west side of the subarea - Western portion (Gopher Gulch) provides large single ownership with potential for master planning on a large scale; one other large ownership east of OB Riley	- Eastern and southern edges include many parcels under 20 acres and contiguous to the existing UGB, though many have development on them. - Western portion does not have connectivity to surrounding networks for bikes, pedestrians, or vehicles.

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[13] The peak flow excess capacity of the Awbrey Glen pumps and downstream force main for UGB expansion are approximately 60 gpm (15 gpm average flow) and 300 gpm (75 gpm average flow) respectively. This equates to approximately 120 additional equivalent dwelling units (EDUs) for the pumps and 580 additional EDUs for the force main. Peak and average flow estimates at the Awbrey Glen pump station should be confirmed with flow metering and pump testing prior to serving future UGB customers.

Advantages	Disadvantages
• Local grid opportunity with OB Riley as a spine roadway for the area. • No issues identified for serving with City of Bend water • Not in welded tuff geology • not in Elk/Deer Range or ODFW Areas of Potential Concern • Eastern portion is generally well-suited to industrial and commercial uses • Most of the area is not near commercial farms (but 2 commercial farms within 1/4 mile across canyon from the western edge) • Over a mile from designated forest lands • Southeastern corner is within a quarter mile of existing transit (a primary transit corridor)	• Requires extension of Northeast Interceptor west of US 20, which doesn't benefit any other areas unless a regional pump station is built to serve the West Area and/or Shevlin Area • Includes small areas of 500' buffer for Drinking Water Protection Areas • Western edge of Gopher Gulch property abuts the Deschutes River – some is public ownership, some is private ownership • High and extreme wildfire hazard, which could be reduced with proper management of vegetation except along steep slopes adjacent to river • Housing may be more expensive in this area (particularly western portions) • Impacts Swalley Irrigation District deliveries

Trade-offs of land use options

There are four different development options tested in the Scenarios and SAAMs:

1. Scenario 1.2, Scenario 2.1 and SAAM-1: Modest expansion east of OB Riley for employment uses only (note that Scenario 2.1 includes the large lot industrial site in this area, and has a slightly different arrangement of land uses)
2. Scenario 3.1: Development both east and west of OB Riley (but not into the Gopher Gulch area to the west) with a mix of housing and employment
3. SAAM-2: Inclusion of the full subarea with a very large residential expansion in the Gopher Gulch area and a mix of housing and employment (like Scenario 3.1) around OB Riley Road
4. SAAM-3: Inclusion of the full length of the subarea between US 20 and OB Riley for primarily employment uses, with a small amount of multifamily housing.

The trade-offs associated with these choices are summarized below.

- Including the rural residential areas in the southern part of the subarea (as in Scenario 3.1 and SAAM-2) provides more parcels under 20 acres and contiguous to the UGB, but many of these are developed and may be less efficient to accommodate future growth.
- Larger expansions with more commercial and residential (as opposed to industrial) development (as in Scenario 3.1, SAAM-2, and, to a lesser extent, SAAM-3) increase congestion and reliance on congested corridors. Larger expansions also increase impacts on Swalley Irrigation District.

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- Including the full Gopher Gulch property (as in SAAM-2) brings development adjacent to the Deschutes River and the steep slopes where fire hazard may be difficult to mitigate, puts development within a quarter mile of two commercial farms (though they are separated by the river) and significantly increases impacts on Swalley Irrigation District.
- Including the large lot industrial site in this subarea (as in Scenario 2.1) puts it on a difficult site that is oddly shaped and may not work for many users.

Draft recommendations for the hybrid

- An employment-focused expansion that is primarily or entirely east of OB Riley Road, like those shown in Scenarios 1.2 and 2.1 and SAAM-1, is concluded to be a good starting point for this area, because: (a) the eastern portion of this area is important and suitable for employment uses; (b) including the portion west of OB Riley appears to have more disadvantages than advantages (particularly congestion, impacts to Swalley Irrigation District, and expansion onto developed rural residential land); and (c) the Gopher Gulch area does not offer enough advantages relative to other potential residential expansion areas to focus all residential growth there.
- Because of the weaknesses of the potential site identified for large lot industrial use, that use should not be included in this subarea, consistent with the Employment TAC recommendation.

SYNTHESIS & RECOMMENDATIONS

Based on the body of work captured in this evaluation report, in considering and in balancing the four Goal 14 Factors, Scenario 2.1 performed the best of the alternatives overall, regardless of whether and to what degree weighting is applied to distinguish between the more and less important performance measures. However, the subarea analysis shows that there may be room for improvement through modifications to some of the subareas, as summarized in brief below.

- North Triangle: employment-focused rather than including residential
- Northeast Edge: drop the roughly 40-acre Bear Creek Road area, shifting that growth to create more complete neighborhoods around Butler Market Village and/or Neff Road, while retaining the focus on nodes along existing arterial corridors connecting to the city center
- DSL Property: include large lot industrial site at the southern end and refine land use assumptions
- The Elbow: refine arrangement of land uses along Knott Road to minimize impacts to feed lot
- The Thumb: refine land use assumptions and include a high school and a community park but reduce total expansion area somewhat
- West Area: reduce the amount of commercial and industrial use in this subarea
- Shevlin: none, follow Scenario 2.1 (area excluded)
- OB Riley / Gopher Gulch: remove large lot industrial use from this area (replace with other employment uses)

LIST OF APPENDICES

Appendix A   Goal 14 administrative rule (660-024-0060)

Appendix B   Scenario Evaluation Data Sheets

Appendix C   Performance Measure Weighting Examples and Results

Appendix D   Technical Documentation *(provided under separate cover)*

APPENDIX A: GOAL 14 ADMINISTRATIVE RULE (660-024-0060)

Boundary Location Alternatives Analysis

(1) When considering a UGB amendment, a local government must determine which land to add by evaluating alternative boundary locations. This determination must be consistent with the priority of land specified in ORS 197.298 and the boundary location factors of Goal 14, as follows:

(a) Beginning with the highest priority of land available, a local government must determine which land in that priority is suitable to accommodate the need deficiency determined under OAR 660-024-0050.

(b) If the amount of suitable land in the first priority category exceeds the amount necessary to satisfy the need deficiency, a local government must apply the location factors of Goal 14 to choose which land in that priority to include in the UGB.

(c) If the amount of suitable land in the first priority category is not adequate to satisfy the identified need deficiency, a local government must determine which land in the next priority is suitable to accommodate the remaining need, and proceed using the same method specified in subsections (a) and (b) of this section until the land need is accommodated.

(d) Notwithstanding subsection (a) to (c) of this section, a local government may consider land of lower priority as specified in ORS 197.298(3).

(e) For purposes of this rule, the determination of suitable land to accommodate land needs must include consideration of any suitability characteristics specified under section (5) of this rule, as well as other provisions of law applicable in determining whether land is buildable or suitable.

(2) Notwithstanding OAR 660-024-0050(4) and subsection (1)(c) of this rule, except during periodic review or other legislative review of the UGB, a local government may approve an application under ORS 197.610 to 197.625 for a UGB amendment proposing to add an amount of land less than necessary to satisfy the land need deficiency determined under OAR 660-024-0050(4), provided the amendment complies with all other applicable requirements.

(3) The boundary location factors of Goal 14 are not independent criteria. When the factors are applied to compare alternative boundary locations and to determine the UGB location, a local government must show that all the factors were considered and balanced.

(4) In determining alternative land for evaluation under ORS 197.298, "land adjacent to the UGB" is not limited to those lots or parcels that abut the UGB, but also includes land in the vicinity of the UGB that has a reasonable potential to satisfy the identified need deficiency.

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(5) If a local government has specified characteristics such as parcel size, topography, or proximity that are necessary for land to be suitable for an identified need, the local government may limit its consideration to land that has the specified characteristics when it conducts the boundary location alternatives analysis and applies ORS 197.298.

(6) The adopted findings for UGB adoption or amendment must describe or map all of the alternative areas evaluated in the boundary location alternatives analysis. If the analysis involves more than one parcel or area within a particular priority category in ORS 197.298 for which circumstances are the same, these parcels or areas may be considered and evaluated as a single group.

(7) For purposes of Goal 14 Boundary Location Factor 2, "public facilities and services" means water, sanitary sewer, storm water management, and transportation facilities.

(8) The Goal 14 boundary location determination requires evaluation and comparison of the relative costs, advantages and disadvantages of alternative UGB expansion areas with respect to the provision of public facilities and services needed to urbanize alternative boundary locations. This evaluation and comparison must be conducted in coordination with service providers, including the Oregon Department of Transportation with regard to impacts on the state transportation system. "Coordination" includes timely notice to service providers and the consideration of evaluation methodologies recommended by service providers. The evaluation and comparison must include:

(a) The impacts to existing water, sanitary sewer, storm water and transportation facilities that serve nearby areas already inside the UGB;

(b) The capacity of existing public facilities and services to serve areas already inside the UGB as well as areas proposed for addition to the UGB; and

(c) The need for new transportation facilities, such as highways and other roadways, interchanges, arterials and collectors, additional travel lanes, other major improvements on existing roadways and, for urban areas of 25,000 or more, the provision of public transit service.

Stat. Auth.: ORS 197.040, Statewide Planning Goal 14
Stats. Implemented: ORS 195.036, 197.015, 197.295 - 197.314, 197.610 - 197.650, 197.764
Hist.: LCDD 8-2006, f. 10-19-06, cert. ef. 4-5-07; LCDD 2-2009, f. 4-8-09, cert. ef. 4-16-09

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APPENDIX B: SCENARIO EVALUATION DATA SHEETS

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Factor 1: Efficient accommodation of identified land needs

A. Complete Communities and Great Neighborhoods

(1)   Housing units within walking distance of existing & planned schools in 2028
(2)   Housing units within walking distance of existing & planned parks and trails in 2028
(3)   Housing units within walking distance of commercial services in 2028
(4)   Jobs/housing balance (subarea balance)
(5)   Potential for master planning

B. Efficient, Timely Growth

(1)   Total acres of expansion
(2)   Gross density for new housing in 2028
(3)   Net density for new jobs in 2028
(4)   Percent of urbanized acres on parcels under 20 acres and contiguous to the existing UGB
(5)   Vacant vs. developed land included

Factor 2: Orderly and economic provision of public facilities and services

A. Balanced Transportation System

(1)   Total VMT per capita
(2)   Average trip length
(3)   Household VMT per capita
(4)   Congestion
(5)   Walk/bike safety and connectivity
(6)   System connectivity & progression of system hierarchy
(7)   Mode split
(8)   Average Daily walk trips
(9)   Proximity to transit corridors
(10) Housing & jobs within ¼ mile of transit corridors
(11) Intersection density

B. Cost Effective Infrastructure

Transportation Infrastructure

(1)   Total cost of transportation improvements required
(2)   Cost per acre of transportation improvements
(3)   New linear miles of roadway

Sanitary Sewer Infrastructure

(4)   Efficiency of additional sewer system improvements required
(5)   Initial capital cost of sewer system improvements required

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(6) Initial capital cost of sewer system improvements per acre of development

Drinking Water Infrastructure

(7) Water system improvements required in city water district

(8) Capacity of Avion Water system

Storm Water Infrastructure

(9) Total impervious area for new development

(10) Acres of new development within Drinking Water Protection Areas (DWPA)

(11) Acres of new development with welded tuff geology

Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)

A. Quality Natural Environment (Environmental and Energy Consequences)

(1) Development in wildlife areas

(2) Linear distance of riparian areas adjacent to development

(3) Wildfire hazard

(4) Greenhouse gas emissions

(5) Energy Use

(6) Average Water Consumption per Household

B. Housing Options and Affordability (Social Consequences)

(1) Average cost of new single family housing

(2) Housing mix of new housing (subarea balance)

C. Strong Diverse Economy (Economic Consequences)

(1) Site suitability for large lot industrial use

(2) Site suitability for areas identified for industrial uses

(3) Site suitability for areas identified for commercial uses

Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occurring on farm and forest land outside the UGB

A. Compatibility with Farms and Forests

(7) Farm practices & high value farm land adjacent to expansion areas

(8) Impact to irrigation districts

(9) Designated forest land adjacent to expansion areas

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Factor 1: Efficient Accommodation of Identified Land Needs				Author:	Andrew Parish		APG	

Community Outcome A — **Complete Communities and Great Neighborhoods**

Date: 8/28/2015

Performance Measure 1	**Housing Units within Walking Distance of Schools**
Brief Description of Evaluation:	This is an update to performance measure 1.A.1 using feedback from the Bend-La Pine School District about placement of schools within the scenario and SAAMs.
Data Sources	Existing school locations from City of Bend, Deschutes County. Additional information provided at School District meeting, August 2015
Interpretation and Key	Grey are areas that have no significant housing (minor amounts are projected even though employment designations are used, based on existing development in employment designations). Red areas have significant housing but few homes within walking distance of schools. Yellow areas have between 70 and 80% of housing units within walking distance of a school. Green areas have greater than 80% of their housing units within walking distance of a school.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	60%	Housing Units	62%	Housing Units	61%	Housing Units	60%	Housing Units	59%	Housing Units	58%	Housing Units
Total Expansion Area (excluding current UGB)	69%	Housing Units	82%	Housing Units	75%	Housing Units	82%	Housing Units	75%	Housing Units	66%	Housing Units
Subareas												
North Triangle	0%	Housing Units	100%	Housing Units	18%	Housing Units	0%	Housing Units	18%	Housing Units	0%	Housing Units
NE Edge	68%	Housing Units	19%	Housing Units	15%	Housing Units	**87%**	Housing Units	0%	Housing Units	0%	Housing Units
DSL Property	0%	Housing Units	100%	Housing Units	100%	Housing Units	27%	Housing Units	**0%**	Housing Units	0%	Housing Units
The "Elbow"	93%	Housing Units	71%	Housing Units	46%	Housing Units	33%	Housing Units	46%	Housing Units	46%	Housing Units
The "Thumb"	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	**24%**	Housing Units	100%	Housing Units
West Area	84%	Housing Units	85%	Housing Units	73%	Housing Units	0%	Housing Units	0%	Housing Units	**94%**	Housing Units
Shevlin Area	0%	Housing Units	0%	Housing Units	92%	Housing Units	**84%**	Housing Units	0%	Housing Units	0%	Housing Units
OB Riley / Gopher Gulch Area	0%	Housing Units	46%	Housing Units	98%	Housing Units	0%	Housing Units	**90%**	Housing Units	0%	Housing Units
Existing UGB (if applicable)	59%	Housing Units	60%	Housing Units	60%	Housing Units	58%	Housing Units	58%	Housing Units	57%	Housing Units
Overall Score	2 ●		5 ◉		3 ○		5 ◉		4 ◓		2 ●	
	School district recommended a school in the Thumb area, increasing its score over the original scenario. The school in the DSL property was removed in this scenario, contributing to its low score.		This scenario performs very well due to the mixed and "complete neighborhood" character of expansion areas. The NE edge is the only residential expansion without a new school.		This scenario includes some expansion to the West that does not include a school. The District also removed a school from the NE Edge, compared to the original scenario.		This scenario performs very well due to the concentrated residential expansions around a planned school in the Shevlin Area and the addition of two schools in the Northeast Edge.		School district recommended an additional two elementary schools in the Gopher Gulch area, increasing its score over the original scenario.		This scenario includes modest residential expansion in the DSL property, which does not include a school. The West Area is adjacent to existing schools and one proposed school.	

For more information about this performance measure, see accompanying technical memorandum from Angelo Planning Group

06687

Factor 1: Efficient Accommodation of Identified Land Needs

Author: Analysis by Fregonese Associates; interpretation by Angelo Planning Group

Community Outcome A — **Complete Communities and Great Neighborhoods**

Date: 9/10/2015

Performance Measure 2	**Housing Units within Walking Distance of Parks & Trails**
Brief Description of Evaluation:	The share of the total (existing and future) housing units within one half mile of existing and proposed parks and existing trails.
Data Sources	Existing parks, open space and trails locations from Deschutes County, City of Bend and US Forest Service. City Officials were consulted about the location of new parks.
Interpretation and Key	Over 95% of housing units within walking distance of a park or trail was rated as "Good", 75-95% of housing units within walking distance of a park or trail was rated "Fair"; less than 75% was rated "Poor". Grey cells with N/A indicate subareas that are not included in the alternative; grey cells with values are indicate subareas with trivial amounts of housing assumed in commercial areas.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 Value	Units	Scenario 2.1 Value	Units	Scenario 3.1 Value	Units	SAAM-1 Value	Units	SAAM-2 Value	Units	SAAM-3 Value	Units
Total Future UGB (Including Current UGB)	100%	Housing Units	100%	Housing Units	100%	Housing Units	99%	Housing Units	100%	Housing Units	100%	Housing Units
Total Expansion Area (excluding current UGB)	97%	Housing Units	98%	Housing Units	100%	Housing Units	91%	Housing Units	99%	Housing Units	99%	Housing Units
Subareas												
North Triangle	39%	Housing Units	95%	Housing Units	76%	Housing Units	39%	Housing Units	76%	Housing Units	76%	Housing Units
NE Edge	98%	Housing Units	99%	Housing Units	100%	Housing Units	88%	Housing Units	98%	Housing Units	98%	Housing Units
DSL Property	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units
The "Elbow"	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units
The "Thumb"	89%	Housing Units	89%	Housing Units	99%	Housing Units	63%	Housing Units	90%	Housing Units	78%	Housing Units
West Area	100%	Housing Units	100%	Housing Units	100%	Housing Units	N/A	Housing Units	N/A	Housing Units	100%	Housing Units
Shevlin Area	N/A	Housing Units	N/A	Housing Units	100%	Housing Units	100%	Housing Units	N/A	Housing Units	N/A	Housing Units
OB Riley / Gopher Gulch Area	62%	Housing Units	98%	Housing Units	100%	Housing Units	67%	Housing Units	100%	Housing Units	100%	Housing Units
Existing UGB (if applicable)	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units
Overall Score	5 ◉		5 ◉		5 ◉		4 ◖		5 ◉		5 ◉	
	The only subarea with a residential component that doesn't have nearly 100% of housing units within walking distance of a park or trail is The Thumb, where it would be easy to plan a future park.		The only subarea with a residential component that doesn't have nearly 100% of housing units within walking distance of a park or trail is The Thumb, where it would be easy to plan a future park.		All subareas with residential neighborhoods planned have nearly 100% of housing units within walking distance of a park or trail.		The Northeast edge includes some areas that are not within walking distance of a park or trail; it would not be easy to provide a park to serve those areas.		The only subarea with a residential component that doesn't have nearly 100% of housing units within walking distance of a park or trail is The Thumb, where it would be easy to plan a future park.		All subareas with residential neighborhoods planned have nearly 100% of housing units within walking distance of a park or trail.	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06688

Factor 1: Efficient Accommodation of Identified Land Needs			Author:	Analysis by Fregonese Associates; interpretation by Angelo Planning Group

Community Outcome A: Complete Communities and Great Neighborhoods   Date: 9/10/2015

Performance Measure 3: Housing Units within Walking Distance of Commercial Services

Brief Description of Evaluation:	The share of the total housing units within one half mile of existing and commercial areas.
Data Sources	Existing commercial area was based existing on parcel (Field GENPLAN) data from the Deschutes County Assessor's office, via the City of Bend. Future commercial areas were determined as development types that contained commercial services.
Interpretation and Key	Over 90% of housing units within walking distance of commercial was rated as "Good", 70-90% of housing units within walking distance of commercial was rated "Fair"; less than 70% was rated "Poor". Grey cells with N/A indicate subareas that are not included in the alternative; grey cells with values are indicate subareas with trivial amounts of housing assumed in commercial areas.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	82%	Housing Units	84%	Housing Units	87%	Housing Units	83%	Housing Units	84%	Housing Units	82%	Housing Units
Total Expansion Area (excluding current UGB)	92%	Housing Units	99%	Housing Units	96%	Housing Units	57%	Housing Units	90%	Housing Units	71%	Housing Units
Subareas												
North Triangle	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units
NE Edge	83%	Housing Units	96%	Housing Units	97%	Housing Units	**65%**	Housing Units	64%	Housing Units	64%	Housing Units
DSL Property	100%	Housing Units	100%	Housing Units	100%	Housing Units	89%	Housing Units	**100%**	Housing Units	99%	Housing Units
The "Elbow"	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units	100%	Housing Units
The "Thumb"	100%	Housing Units	100%	Housing Units	100%	Housing Units	95%	Housing Units	**16%**	Housing Units	65%	Housing Units
West Area	97%	Housing Units	97%	Housing Units	93%	Housing Units	N/A	Housing Units	N/A	Housing Units	**62%**	Housing Units
Shevlin Area	N/A	Housing Units	N/A	Housing Units	99%	Housing Units	**37%**	Housing Units	N/A	Housing Units	N/A	Housing Units
OB Riley / Gopher Gulch Area	70%	Housing Units	64%	Housing Units	96%	Housing Units	60%	Housing Units	**95%**	Housing Units	93%	Housing Units
Existing UGB (if applicable)	81%	Housing Units	83%	Housing Units	86%	Housing Units	85%	Housing Units	83%	Housing Units	83%	Housing Units
Overall Score	4 ⬤		5 ◉		5 ◉		1 ⬤		3 ○		2 ⬤	
	All expansion areas except for the Northeast Edge have over 90% of housing units within walking distance of commercial. The areas of the Northeast edge that are not proximate to commercial cannot easily be provided with walkable commercial services.		All expansion areas have over 90% of housing units within walking distance of commercial		All expansion areas have over 90% of housing units within walking distance of commercial		Neither of the two SAAs tested in SAAM 1 provide good access to commercial for many housing units.		The OB Riley / Gopher Gulch Area and the Darnell Estates / DSL area both score well; but the small SAA near The Thumb does not perform well in this analysis.		The West Area, which is the focus of this SAAM, does not score well in this analysis. There are not other locations for commercial that would be appropriate within that area, so it would be hard to improve its score.	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

| Factor 1: Efficient Accommodation of Identified Land Needs | | | | | | Author: | Analysis by Fregonese Associates; interpretation by Angelo Planning Group | | | | | |

Community Outcome A — **Complete Communities and Great Neighborhoods**

Date: 9/10/2015

Performance Measure 4 — **Job-Housing Balance**

Brief Description of Evaluation: The ratio of total jobs to total housing units.

Data Sources: Envision Tomorrow Scenario Builder output.

Interpretation and Key: Jobs/housing balance is fairly constant at the Scenario / SAAM level and variations are not meaningful at that level. Interpretation and rating is at the subarea level. Subareas are considered "balanced" if their ratio of jobs to housing units is between 1:6 and 6:1 (0.17 to 6). Subareas are considered moderately balanced if their ratio of jobs to housing units is between 1:12 and 12:1 (0.08 to 12). Subareas are considered imbalanced if their ratio of jobs to housing units is less than 1:12 or more than 12:1. Overall scores are based on how many of the subareas are balanced, moderately balanced, and imbalanced.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 Value	Units	Scenario 2.1 Value	Units	Scenario 3.1 Value	Units	SAAM-1 Value	Units	SAAM-2 Value	Units	SAAM-3 Value	Units
Total Future UGB (Including Current UGB)	1.10	Jobs:HU	1.10	Jobs:HU	1.10	Jobs:HU	1.10	Jobs:HU	1.09	Jobs:HU	1.10	Jobs:HU
Total Expansion Area (excluding current UGB)	1.96	Jobs:HU	1.94	Jobs:HU	1.97	Jobs:HU	1.79	Jobs:HU	1.69	Jobs:HU	1.89	Jobs:HU
Subareas												
North Triangle	37.08	Jobs:HU	1.64	Jobs:HU	32.63	Jobs:HU	37.08	Jobs:HU	32.63	Jobs:HU	32.63	Jobs:HU
NE Edge	0.31	Jobs:HU	0.62	Jobs:HU	0.55	Jobs:HU	0.27	Jobs:HU	0.90	Jobs:HU	0.90	Jobs:HU
DSL Property	2.28	Jobs:HU	1.63	Jobs:HU	1.68	Jobs:HU	17.87	Jobs:HU	2.09	Jobs:HU	0.89	Jobs:HU
The "Elbow"	2.89	Jobs:HU	3.04	Jobs:HU	32.11	Jobs:HU	24.22	Jobs:HU	32.11	Jobs:HU	32.11	Jobs:HU
The "Thumb"	4.33	Jobs:HU	2.76	Jobs:HU	52.20	Jobs:HU	25.08	Jobs:HU	8.54	Jobs:HU	45.85	Jobs:HU
West Area	0.24	Jobs:HU	0.90	Jobs:HU	0.13	Jobs:HU	N/A	Jobs:HU	N/A	Jobs:HU	0.20	Jobs:HU
Shevlin Area	N/A	Jobs:HU	N/A	Jobs:HU	0.94	Jobs:HU	0.19	Jobs:HU	N/A	Jobs:HU	N/A	Jobs:HU
OB Riley / Gopher Gulch Area	15.16	Jobs:HU	7.94	Jobs:HU	1.64	Jobs:HU	13.03	Jobs:HU	0.58	Jobs:HU	6.20	Jobs:HU
Existing UGB (if applicable)	1.12	Jobs:HU	1.12	Jobs:HU	1.12	Jobs:HU	1.12	Jobs:HU	1.12	Jobs:HU	1.12	Jobs:HU
Overall Score	3 ○		5 ◉		4 ◖		1 ●		4 ◖		2 ◗	
	Just under half of subareas are well-balanced; two are imbalanced.		Most areas are well balanced or moderately well balanced, with the exception of the employment-only expansion in OB Riley		Half of subareas are well-balanced; three are imbalanced.		Most areas are imbalanced, with only two moderately well-balanced and none well-balanced.		Half of subareas are well-balanced; two are imbalanced.		Few areas are well-balanced; three are imbalanced.	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06690

Factor 1: Efficient Accommodation of Identified Land Needs				Author:	CJ Doxsee, Andrew Parish		APG

Community Outcome A — **Complete Communities and Great Neighborhoods** Date: 10/1/2015

Performance Measure 5	**Opportunity for master planning**
Brief Description of Evaluation:	Percent of developed area (excluding Schools) on land that is greater than 20 acres in common ownership.
Data Sources	Deschutes County assessors data.
Interpretation and Key	This measure looks at how much of the expansion area will be subject to master planning requirements. Large properties that will be required to undergo master planning offer the potential for greater input from the city in the ultimate design of the new development (however, the master planning process does add time and expense to development). Subareas and Scenarios / SAAMs that have more than 70% of the developed area on sites over 20 acres in common ownership are rated "Good"; 50-70% is rated "Fair"; under 50% is rated "Poor".

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 Value / Units	Scenario 2.1 Value / Units	Scenario 3.1 Value / Units	SAAM-1 Value / Units	SAAM-2 Value / Units	SAAM-3 Value / Units
Total Future UGB (Including Current UGB)	> 20 acres	> 20 acres	> 20 acres	> 20 acres	> 20 acres	> 20 acres
	< 20 acres	< 20 acres	< 20 acres	< 20 acres	< 20 acres	< 20 acres
Total Expansion Area (excluding current UGB)	61% > 20 acres	76% > 20 acres	66% > 20 acres	38% > 20 acres	59% > 20 acres	79% > 20 acres
	39% < 20 acres	24% < 20 acres	34% < 20 acres	62% < 20 acres	41% < 20 acres	21% < 20 acres
Subareas						
North Triangle	74% > 20 acres	76% > 20 acres	61% > 20 acres	74% > 20 acres	61% > 20 acres	61% > 20 acres
	26% < 20 acres	24% < 20 acres	39% < 20 acres	26% < 20 acres	39% < 20 acres	39% < 20 acres
NE Edge	12% > 20 acres	0% > 20 acres	0% > 20 acres	**4%** > 20 acres	0% > 20 acres	0% > 20 acres
	88% < 20 acres	100% < 20 acres	100% < 20 acres	**96%** < 20 acres	100% < 20 acres	100% < 20 acres
DSL Property	100% > 20 acres	100% > 20 acres	100% > 20 acres	100% > 20 acres	**37%** > 20 acres	100% > 20 acres
	0% < 20 acres	0% < 20 acres	0% < 20 acres	0% < 20 acres	**63%** < 20 acres	0% < 20 acres
The "Elbow"	67% > 20 acres	69% > 20 acres	68% > 20 acres	69% > 20 acres	69% > 20 acres	76% > 20 acres
	33% < 20 acres	31% < 20 acres	32% < 20 acres	31% < 20 acres	31% < 20 acres	24% < 20 acres
The "Thumb"	100% > 20 acres	100% > 20 acres	100% > 20 acres	100% > 20 acres	99% > 20 acres	100% > 20 acres
	0% < 20 acres	0% < 20 acres	0% < 20 acres	0% < 20 acres	1% < 20 acres	0% < 20 acres
West Area	97% > 20 acres	100% > 20 acres	95% > 20 acres	- > 20 acres	- > 20 acres	**92%** > 20 acres
	3% < 20 acres	0% < 20 acres	5% < 20 acres	- < 20 acres	- < 20 acres	**8%** < 20 acres
Shevlin Area	- > 20 acres	- > 20 acres	100% > 20 acres	**63%** > 20 acres	- > 20 acres	- > 20 acres
	- < 20 acres	- < 20 acres	0% < 20 acres	**37%** < 20 acres	- < 20 acres	- < 20 acres
OB Riley / Gopher Gulch Area	40% > 20 acres	37% > 20 acres	24% > 20 acres	40% > 20 acres	**57%** > 20 acres	30% > 20 acres
	60% < 20 acres	63% < 20 acres	76% < 20 acres	60% < 20 acres	**43%** < 20 acres	70% < 20 acres
Existing UGB (if applicable)						
Overall Score	3 ○	5 ◉	3 ○	1 ●	3 ○	5 ◉
	Am emphasis on growth in the Northeast Edge, which has smaller parcels, results less of the expansion that would be subject to master planning than most other alternatives.	Relatively large developments in DSL, West area, and The Thumb make this scenario mostly (over 75%) large property owners.	The inclusion of the area between OB Riley Road and Gopher Gulch reduces the percent of expansion that would be subject to master planning relative to some other alternatives.	A significant expansion in the Northeast Edge, which has smaller parcels, makes this the lowest amount of expansion that would be subject to master planning.	The inclusion of Darnell Estates with the DSL Property and the inclusion of the area between OB Riley Road and Gopher Gulch reduce the percent of expansion that would be subject to master planning, despite the inclusion of the large ownership in Gopher Gulch.	A significant expansion in the West area and smaller expansions on other large sites make this scenario mostly (over 75%) large property owners.

For more information about this performance measure, see accompanying technical memorandum from Angelo Planning Group

06691

Factor 1: Efficient Accommodation of Identified Land Needs　　　　　**Author:** Andrew Parish　　**APG**

Community Outcome B　　**Efficient, Timely Growth**　　　　　　　　　　**Date:** 10/1/2015

Performance Measure 1	Urbanized Acres
Brief Description of Evaluation:	Current urbanized land was based on plan designations inside the existing UGB (all of the existing UGB is considered "urbanized" for the purposes of this performance measure). Future urbanized land is the total acres of expansion, categorized based on the development type.
Data Sources	Envision Tomorrow Scenario Builder GIS inputs.
Interpretation and Key	The amount of land for civic uses (parks & schools) in each alternative is preliminary - further refinement of school land needs has already occurred with the school district and park land needs may also be refined further. This is provided for information, but does not contribute to the scoring. Minor variations in the amount of employment land are also not especially meaningful, and do not contribute to the scoring. The primary differentiation among the alternatives is the amount of residential land, which varies based on where it is accommodated. The total residential acres for the scenario is the measure that drives the overall score. Alternatives with under 700 acres of residential expansion are rated "good", those with 700-900 acres are rated "fair", and those with over 900 acres are rated "poor".

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units
Total Future UGB (Including Current UGB)	31615	Total acres	31749	Total acres	31828	Total acres	32764	Total acres	31938	Total acres	31608	Total acres
	8773	Res Acres	8803	Res Acres	8835	Res Acres	9687	Res Acres	8926	Res Acres	8761	Res Acres
	16837	Emp Acres	16799	Emp Acres	16834	Emp Acres	16874	Emp Acres	16849	Emp Acres	16884	Emp Acres
	6005	Civic Acres	6147	Civic Acres	6159	Civic Acres	6203	Civic Acres	6163	Civic Acres	5963	Civic Acres
Total Expansion Area (excluding current UGB)	1681	Total acres	1815	Total acres	1894	Total acres	2830	Total acres	2004	Total acres	1674	Total acres
	676	Res Acres	706	Res Acres	738	Res Acres	1590	Res Acres	829	Res Acres	664	Res Acres
	878	Emp Acres	840	Emp Acres	875	Emp Acres	915	Emp Acres	890	Emp Acres	925	Emp Acres
	127	Civic Acres	269	Civic Acres	281	Civic Acres	325	Civic Acres	285	Civic Acres	85	Civic Acres
Subareas												
North Triangle	193	Total acres	187	Total acres	231	Total acres	200	Total acres	250	Total acres	250	Total acres
	0	Res Acres	78	Res Acres	0	Res Acres	0	Res Acres	0	Res Acres	0	Res Acres
	193	Emp Acres	92	Emp Acres	231	Emp Acres	200	Emp Acres	250	Emp Acres	250	Emp Acres
	0	Civic Acres	17	Civic Acres	0	Civic Acres	0	Civic Acres	0	Civic Acres	0	Civic Acres
NE Edge	455	Total acres	131	Total acres	161	Total acres	1435	Total acres	45	Total acres	45	Total acres
	383	Res Acres	102	Res Acres	117	Res Acres	1150	Res Acres	10	Res Acres	10	Res Acres
	58	Emp Acres	29	Emp Acres	30	Emp Acres	70	Emp Acres	35	Emp Acres	35	Emp Acres
	14	Civic Acres	0	Civic Acres	14	Civic Acres	215	Civic Acres	0	Civic Acres	0	Civic Acres
DSL Property	222	Total acres	363	Total acres	192	Total acres	130	Total acres	210	Total acres	125	Total acres
	39	Res Acres	142	Res Acres	39	Res Acres	0	Res Acres	115	Res Acres	60	Res Acres
	128	Emp Acres	115	Emp Acres	65	Emp Acres	130	Emp Acres	95	Emp Acres	65	Emp Acres
	55	Civic Acres	106	Civic Acres	88	Civic Acres	0	Civic Acres	0	Civic Acres	0	Civic Acres
The "Elbow"	202	Total acres	431	Total acres	178	Total acres	150	Total acres	184	Total acres	184	Total acres
	48	Res Acres	89	Res Acres	3	Res Acres	0	Res Acres	4	Res Acres	4	Res Acres
	114	Emp Acres	278	Emp Acres	135	Emp Acres	110	Emp Acres	140	Emp Acres	140	Emp Acres
	40	Civic Acres	64	Civic Acres	40	Civic Acres	40	Civic Acres	40	Civic Acres	40	Civic Acres
The "Thumb"	350	Total acres	395	Total acres	176	Total acres	240	Total acres	225	Total acres	220	Total acres
	106	Res Acres	180	Res Acres	0	Res Acres	0	Res Acres	50	Res Acres	0	Res Acres
	244	Emp Acres	172	Emp Acres	176	Emp Acres	240	Emp Acres	175	Emp Acres	220	Emp Acres
	0	Civic Acres	43	Civic Acres	0	Civic Acres	0	Civic Acres	0	Civic Acres	0	Civic Acres
West Area	132	Total acres	173	Total acres	329	Total acres	0	Total acres	0	Total acres	670	Total acres
	100	Res Acres	115	Res Acres	313	Res Acres	0	Res Acres	0	Res Acres	580	Res Acres
	14	Emp Acres	41	Emp Acres	14	Emp Acres	0	Emp Acres	0	Emp Acres	45	Emp Acres
	18	Civic Acres	17	Civic Acres	2	Civic Acres	0	Civic Acres	0	Civic Acres	45	Civic Acres
Shevlin Area	0	Total acres	0	Total acres	176	Total acres	545	Total acres	0	Total acres	0	Total acres
	0	Res Acres	0	Res Acres	119	Res Acres	440	Res Acres	0	Res Acres	0	Res Acres
	0	Emp Acres	0	Emp Acres	28	Emp Acres	35	Emp Acres	0	Emp Acres	0	Emp Acres
	0	Civic Acres	0	Civic Acres	29	Civic Acres	70	Civic Acres	0	Civic Acres	0	Civic Acres
OB Riley / Gopher Gulch Area	127	Total acres	135	Total acres	451	Total acres	130	Total acres	1090	Total acres	180	Total acres
	0	Res Acres	0	Res Acres	147	Res Acres	0	Res Acres	650	Res Acres	10	Res Acres
	127	Emp Acres	113	Emp Acres	196	Emp Acres	130	Emp Acres	195	Emp Acres	170	Emp Acres
	0	Civic Acres	22	Civic Acres	108	Civic Acres	0	Civic Acres	245	Civic Acres	0	Civic Acres
Existing UGB (if applicable)	29934	Total acres	29934	Total acres	29934	Total acres	29934	Total acres	29934	Total acres	29934	Total acres
	8097	Res Acres	8097	Res Acres	8097	Res Acres	8097	Res Acres	8097	Res Acres	8097	Res Acres
	15959	Emp Acres	15959	Emp Acres	15959	Emp Acres	15959	Emp Acres	15959	Emp Acres	15959	Emp Acres
	5878	Civic Acres	5878	Civic Acres	5878	Civic Acres	5878	Civic Acres	5878	Civic Acres	5878	Civic Acres
Overall Score	5 ◉		4 ●		4 ●		3 ○		4 ●		5 ◉	
	Despite including some developed portions of the Northeast edge, the inclusion of multifamily housing in parts of that subarea means that this scenario still performs quite well overall.		A focus on large, vacant parcels keeps this scenario fairly efficient.		Less efficient development in the northeast edge and Shevlin area increase the total residential expansion.		Inclusion of the large existing rural subdivision south of Juniper Ridge significantly increases the total residential acres.		This scenario fills up the OB Riley / Gopher Gulch Area, which pushes the acreage (and total housing units) up beyond what's truly needed; it is not penalized for that.		Focusing residential development in the West Area allows for efficient residential development.	

For more information about this performance measure, see accompanying technical memorandum from Angelo Planning Group.

Factor 1: Efficient Accommodation of Identified Land Needs						Author: Andrew Parish				APG
Community Outcome B	**Efficient, Timely Growth**						Date:	9/9/2015		

Performance Measure 2	Gross Residential Density
Brief Description of Evaluation:	The gross density (inclusive of roads, or other land reductions) of housing units on residential land only.
Data Sources	Envision Tomorrow Scenario Builder output. Based on building type, and unit size.

Interpretation and Key

Gross housing density is the number of residential units divided by the residential acreage for each evaluation geography. This does not include residential units in commercial areas (e.g. an apartment above a storefront). Gross densities equal to or greater than the overall gross density of new housing inside the UGB were rated "good"; densities below 3.0 units per gross acre were rated "Poor".

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	4.7	HU / Gross Residential Acre	4.7	HU / Gross Residential Acre	4.7	HU / Gross Residential Acre	3.8	HU / Gross Residential Acre	4.7	HU / Gross Residential Acre	4.8	HU / Gross Residential Acre
Total Expansion Area (excluding current UGB)	6.0	HU / Gross Residential Acre	5.8	HU / Gross Residential Acre	5.5	HU / Gross Residential Acre	2.6	HU / Gross Residential Acre	5.7	HU / Gross Residential Acre	6.2	HU / Gross Residential Acre
Subareas												
North Triangle	N/A	HU / Gross Residential	7.3	HU / Gross Residential Acre	N/A	HU / Gross Residential	N/A	HU / Gross Residential	N/A	HU / Gross Residential	N/A	HU / Gross Residential
NE Edge	4.4	HU / Gross Residential Acre	3.7	HU / Gross Residential Acre	3.9	HU / Gross Residential Acre	**2.2**	HU / Gross Residential Acre	8.3	HU / Gross Residential Acre	8.3	HU / Gross Residential Acre
DSL Property	11.7	HU / Gross Residential Acre	6.4	HU / Gross Residential Acre	10.9	HU / Gross Residential Acre	N/A	HU / Gross Residential Acre	4.8	HU / Gross Residential Acre	13.3	HU / Gross Residential Acre
The "Elbow"	10.6	HU / Gross Residential Acre	9.2	HU / Gross Residential Acre	9.7	HU / Gross Residential	N/A	HU / Gross Residential	7.3	HU / Gross Residential	7.3	HU / Gross Residential Acre
The "Thumb"	4.6	HU / Gross Residential Acre	3.6	HU / Gross Residential Acre	N/A	HU / Gross Residential	N/A	HU / Gross Residential	3.2	HU / Gross Residential Acre	N/A	HU / Gross Residential Acre
West Area	8.9	HU / Gross Residential Acre	6.7	HU / Gross Residential Acre	5.4	HU / Gross Residential Acre	N/A	HU / Gross Residential	N/A	HU / Gross Residential	5.1	HU / Gross Residential Acre
Shevlin Area	N/A	HU / Gross Residential Acre	N/A	HU / Gross Residential Acre	2.3	HU / Gross Residential Acre	**3.4**	HU / Gross Residential Acre	N/A	HU / Gross Residential Acre	N/A	HU / Gross Residential Acre
OB Riley / Gopher Gulch Area	N/A	HU / Gross Residential	N/A	HU / Gross Residential	7.6	HU / Gross Residential Acre	N/A	HU / Gross Residential	5.9	HU / Gross Residential Acre	19.0	HU / Gross Residential
Existing UGB (if applicable)	4.5	HU / Gross Residential	4.5	HU / Gross Residential	4.5	HU / Gross Residential Acre	4.5	HU / Gross Residential Acre	4.5	HU / Gross Residential	4.5	HU / Gross Residential
Overall Score	5 ◉		5 ◉		3 ○		1 ●		4 ◠		5 ◉	
	All expansion areas have high residential density, and the overall average density is among the highest.		While the northeast edge is somewhat less efficient than other areas, overall this alternative has the highest net residential density for expansion areas.		The Shevlin Area is somewhat less efficient than other areas in this scenario, but overall net residential density for expansion areas is still good.		Due to the inclusion of the large residential subdivision south of Juniper Ridge, which has limited redevelopment capacity, the gross residential density of this SAAM is low.		The OB Riley/Gopher Gulch area scores well in this SAAM, and the overall net housing density is good. The small piece near the Thumb property is a low density, but its size is small.		The West Area scores fairly well in this SAAM, and the overall net housing density is good. There is a small piece of exclusively multifamily designation in the OB Riley Area, which is the cause if its high density.	

For more information about this performance measure, see accompanying technical memorandum from Angelo Planning Group.

06693

Factor 1: Efficient Accommodation of Identified Land Needs											**Author:**	Analysis by Fregonese Associates; interpretation by Angelo Planning Group

Community Outcome B	**Efficient, Timely Growth**										**Date:**	9/10/2015

Performance Measure 3	**Net Density for New Jobs in 2028**

Brief Description of Evaluation:	The net density (not inclusive of roads, or other land reductions) of new jobs on employment land only.
Data Sources	Envision Tomorrow Scenario Builder output. Based on building type, and employees per sqft.

Interpretation and Key

Net density for new employment areas is higher for all new employment areas than for existing employment areas in Bend, indicating that all alternatives have significantly improved employment land use efficiency. Net employment densities rate as "Good" in all subareas and for all scenarios.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	22	Jobs per Net Employment Acre	22	Jobs per Net Employment Acre	22	Jobs per Net Employment Acre	22	Jobs per Net Employment Acre	22	Jobs per Net Employment Acre	22	Jobs per Net Employment Acre
Total Expansion Area (excluding current UGB)	19	Jobs per Net Employment Acre	20	Jobs per Net Employment Acre	19	Jobs per Net Employment Acre	19	Jobs per Net Employment Acre	19	Jobs per Net Employment Acre	20	Jobs per Net Employment Acre
Subareas												
North Triangle	18	Jobs per Net Employment Acre	20	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre
NE Edge	20	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	21	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre
DSL Property	21	Jobs per Net Employment Acre	21	Jobs per Net Employment Acre	19	Jobs per Net Employment Acre	21	Jobs per Net Employment Acre	20	Jobs per Net Employment Acre	19	Jobs per Net Employment Acre
The "Elbow"	22	Jobs per Net Employment Acre	20	Jobs per Net Employment Acre	21	Jobs per Net Employment Acre	22	Jobs per Net Employment Acre	21	Jobs per Net Employment Acre	21	Jobs per Net Employment Acre
The "Thumb"	18	Jobs per Net Employment Acre	21	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	17	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	19	Jobs per Net Employment Acre
West Area	25	Jobs per Net Employment Acre	26	Jobs per Net Employment Acre	25	Jobs per Net Employment Acre	N/A	Jobs per Net Employment Acre	N/A	Jobs per Net Employment Acre	23	Jobs per Net Employment Acre
Shevlin Area	N/A	Jobs per Net Employment Acre	N/A	Jobs per Net Employment Acre	25	Jobs per Net Employment Acre	25	Jobs per Net Employment Acre	N/A	Jobs per Net Employment Acre	N/A	Jobs per Net Employment Acre
OB Riley / Gopher Gulch Area	18	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	20	Jobs per Net Employment Acre	18	Jobs per Net Employment Acre	21	Jobs per Net Employment Acre	20	Jobs per Net Employment Acre
Existing UGB (if applicable)	23	Jobs per Net Employment Acre	23	Jobs per Net Employment Acre	23	Jobs per Net Employment Acre	23	Jobs per Net Employment Acre	23	Jobs per Net Employment Acre	23	Jobs per Net Employment Acre
Overall Score	5 ◉		5 ◉		5 ◉		5 ◉		5 ◉		5 ◉	
	Net employment densities rate as "Good" in all subareas and for all scenarios.		Net employment densities rate as "Good" in all subareas and for all scenarios.		Net employment densities rate as "Good" in all subareas and for all scenarios.		Net employment densities rate as "Good" in all subareas and for all scenarios.		Net employment densities rate as "Good" in all subareas and for all scenarios.		Net employment densities rate as "Good" in all subareas and for all scenarios.	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

Factor 1: Efficient Accommodation of Identified Land Needs								Author:	CJ Doxsee		APG	
Community Outcome B	**Efficient, Timely Growth**											
								Date:	8/20/2015			

Performance Measure 4: Percent of urbanized acres on parcels under 20 acres and contiguous to the existing UGB

Brief Description of Evaluation: Percent of acres in each geography that have a lot size under 20 acres and are contiguous to the existing UGB. Note: Sewer capacity is an issue in all areas. 50' buffer was used for adjacency to UGB.

Data Sources: Deschutes County Assessor's Data, City of Bend data.

Interpretation and Key: Smaller parcels that are adjacent to the UGB may face fewer barriers to development within the first few years after the UGB expansion is adopted. For this performance measure, more land that is on parcels under 20 acres and adjacent to the UGB is considered better. (Note: this performance measure captures roughly the inverse of measure 1.A.5 - potential for master planning. Master planning provides opportunities for complete, well-designed communities but also takes more time for planning and permitting.) At a subarea level, subareas with less than 25% of acreage in this category rated as "Poor"; those with 25-50% rated as "Fair", and those with more than 50% rated as "Good". Overall ratings are relative to the other alternatives.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Expansion Area (excluding current UGB)	18.9%	Acres/Total Scenario Acres	14.2%	Acres/Total Scenario Acres	13.4%	Acres/Total Scenario Acres	11.3%	Acres/Total Scenario Acres	10.4%	Acres/Total Scenario Acres	9.5%	Acres/Total Scenario Acres
Subareas												
North Triangle	14%	Acres/Total Subarea Acres Included in UGB	14%	Acres/Total Subarea Acres Included in UGB	14%	Acres/Total Subarea Acres Included in UGB	11%	Acres/Total Subarea Acres Included in UGB	13%	Acres/Total Subarea Acres Included in UGB	10%	Acres/Total Subarea Acres Included in UGB
NE Edge	42%	Acres/Total Subarea Acres Included in UGB	63%	Acres/Total Subarea Acres Included in UGB	57%	Acres/Total Subarea Acres Included in UGB	93%	Acres/Total Subarea Acres Included in UGB	2%	Acres/Total Subarea Acres Included in UGB	76%	Acres/Total Subarea Acres Included in UGB
DSL Property	0%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB	7%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB
The "Elbow"	31%	Acres/Total Subarea Acres Included in UGB	19%	Acres/Total Subarea Acres Included in UGB	11%	Acres/Total Subarea Acres Included in UGB	25%	Acres/Total Subarea Acres Included in UGB	32%	Acres/Total Subarea Acres Included in UGB	26%	Acres/Total Subarea Acres Included in UGB
The "Thumb"	0%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB	1%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB
West Area	2%	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB	5%	Acres/Total Subarea Acres Included in UGB	N/A		N/A		0%	Acres/Total Subarea Acres Included in UGB
Shevlin Area	N/A	Acres/Total Subarea Acres Included in UGB	N/A	Acres/Total Subarea Acres Included in UGB	0%	Acres/Total Subarea Acres Included in UGB	21%	Acres/Total Subarea Acres Included in UGB	N/A	Acres/Total Subarea Acres Included in UGB	N/A	Acres/Total Subarea Acres Included in UGB
OB Riley / Gopher Gulch Area	27%	Acres/Total Subarea Acres Included in UGB	26%	Acres/Total Subarea Acres Included in UGB	53%	Acres/Total Subarea Acres Included in UGB	8%	Acres/Total Subarea Acres Included in UGB	56%	Acres/Total Subarea Acres Included in UGB	3%	Acres/Total Subarea Acres Included in UGB
Existing UGB (if applicable)	N/A		N/A		N/A		N/A		N/A		N/A	
Overall Score	5 ◉		3 ◯		3 ◯		2 ◖		2 ◖		1 ●	
	Scenario 1.2 includes several parcels in the NE, North, OB Riley, and Elbow areas that are adjacent to the UGB and under 20 acres. Scenario 1.2 has the highest percentage of acreage that falls into this category, due to the inclusion of the highly parcelized NE Edge area		Scenario 2.1 performs slightly worse than Scenario 1.2 due to inclusion of significant acreage on large parcels in DSL, Elbow, and Thumb, and West.		Scenario 3.1 performs roughly the same as scenario 2.1, as it includes large parcels in the West, Shevlin area, and areas of OB Riley / Gopher Gulch that are nonadjacent to the UGB		SAAMs generally perform worse than the first three scenarios due to inclusion of large parcels and large expansions away from the UGB		SAAMs generally perform worse than the first three scenarios due to inclusion of large parcels and large expansions away from the UGB		SAAMs generally perform worse than the first three scenarios due to inclusion of large parcels and large expansions away from the UGB	

For more information about this performance measure, see accompanying technical memorandum from APG

06695

Factor 1: Efficient Accommodation of Identified Land Needs													Author:	Analysis by Fregonese Associates; interpretation by Angelo Planning Group

Community Outcome B — Efficient, Timely Growth

Date: 10/1/2015

Performance Measure 5 — Growth on vacant versus developed land

Brief Description of Evaluation:	Percent of urbanized acres on land that is vacant versus areas that are already developed
Data Sources	Envision Tomorrow Scenario builder output; Buildable Lands Inventory and developed area outside the UGB by Fregonese Associates

Interpretation and Key

Development on vacant land may be more likely to occur in a shorter amount of time because there are no existing land uses generating income or providing value for the property owner. For the purposes of this performance measure, more of the expansion on vacant land rather than developed land is considered positive. (Note that data is not available at the subarea level at this time.)

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 Value	Units	Scenario 2.1 Value	Units	Scenario 3.1 Value	Units	SAAM-1 Value	Units	SAAM-2 Value	Units	SAAM-3 Value	Units
Total Future UGB (Including Current UGB)												
Total Expansion Area (excluding current UGB)	95%	Vacant	92%	Vacant	93%	Vacant	81%	Vacant	88%	Vacant	96%	Vacant
	5%	Developed	8%	Developed	7%	Developed	19%	Developed	12%	Developed	4%	Developed
Subareas												
North Traingle												
NE Edge												
DSL Property												
The "Elbow"												
The "Thumb"												
West Area												
Shevlin Area												
OB Riley / Gopher Gulch Area												
Existing UGB (if applicable)												
Overall Score	5	◉	4	▲	4	▲	2	▬	3	○	5	◉
	Includes some existing development in the Northeast Edge, but mostly large vacant parcels.		Includes some existing development in The Elbow and some in the Northeast Edge, but mostly large, vacant parcels.		Includes some existing development west of OB Riley Road and some in the Northeast Edge, but mostly large, vacant parcels.		Includes much existing development in the northern portion of the Northeast Edge.		Includes some existing development west of OB Riley Road and some north of DSL Property, but mostly large, vacant parcels.		Includes very little existing development in the Northeast Edge and the Elbow; mostly large, vacant parcels.	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06696

Factor 2: Orderly and Economic Provision of Public Facilities and Services				**Author:** CSM **DKS Associates**		
Community Outcome A	**Balanced Transportation System**			**Date:** 9/9/2015		

Performance Measure 1	**Vehicle Miles Traveled per Capita**					
Brief Description of Evaluation:	Calculated from output from the travel demand model run by TPAU for trips internal to the City (both ends of the trip are within the proposed UGB boundary).					
Data Sources	ODOT/MPO 2028 Regional Travel Demand Model, Daily Trips					
Interpretation and Key	VMT results are relative to a base year target for VMT/Capita reduction (e.g., less than 9.64 VMT/Capita from the 2010 year model).* Good would be a reduction in VMT/Capita. Fair is an increase of less than 4%. Poor is an increase of more than 4%.					

	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	**Scenario 1.2** *Value Units*	**Scenario 2.1** *Value Units*	**Scenario 3.1** *Value Units*	**SAAM-1** *Value Units*	**SAAM-2** *Value Units*	**SAAM-3** *Value Units*
Total Future UGB (Including Current UGB)	10.11 Daily Vehicle Miles Traveled per capita	9.92 Daily Vehicle Miles Traveled per capita	9.99 Daily Vehicle Miles Traveled per capita	10.13 Daily Vehicle Miles Traveled per capita	10.11 Daily Vehicle Miles Traveled per capita	10.09 Daily Vehicle Miles Traveled per capita
	4.9% Percent Increase relative to 2010	2.9% Percent Increase relative to 2010	3.6% Percent Increase relative to 2010	5.1% Percent Increase relative to 2010	4.9% Percent Increase relative to 2010	4.7% Percent Increase relative to 2010
	10.1% Percent increase relative to 2003	8.1% Percent increase relative to 2003	8.8% Percent increase relative to 2003	10.3% Percent increase relative to 2003	10.1% Percent increase relative to 2003	9.9% Percent increase relative to 2003
Total Expansion Area (excluding current UGB)						
Subareas						
North Triangle						
NE Edge						
DSL Property						
The "Elbow"						
The "Thumb"						
West Area						
Shevlin Area						
OB Riley / Gopher Gulch Area						
Existing UGB (if applicable)						
Overall Score	2 ⬤	3 ○	3 ○	2 ⬤	2 ⬤	2 ⬤
	See Measure 2.A.2 for more detailed findings.	See Measure 2.A.2 for more detailed findings.	See Measure 2.A.2 for more detailed findings.	See Measure 2.A.2 for more detailed findings.	See Measure 2.A.2 for more detailed findings.	See Measure 2.A.2 for more detailed findings.

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

* The project team is working with DLCD to determine whether Bend may use the base 2010 model for the VMT analysis, given that the Remand specifies 2003 as the baseline year, but the 2010 model is a better reflection of 2008 and includes other important updates and improvements. The distinction is important because VMT increased by nearly 5% between 2003 and 2010 (VMT per capita in 2003 was estimated at 9.18, versus 9.64 in 2010). For purposes of analysis, the project team is evaluating both 2003 and 2010 as baseline years.

06697

Factor 2: Orderly and Economic Provision of Public Facilities and Services		Author:	CSM	DKS Associates

Community Outcome A — **Balanced Transportation System**

Date: 9/9/2015

Performance Measure 2	**Average Trip Length**
Brief Description of Evaluation:	Calculated from output from the travel demand model run by TPAU for trips internal to the City (both ends of the trip are within the proposed UGB boundary, calculated per round-trip).
Data Sources	ODOT/MPO 2028 Regional Travel Demand Model, Daily Trips

Interpretation and Key

Average trip length results (a proxy for VMT/Capita for subareas) are expected to be higher in fringe growth areas of the City. Areas performing more closely to the existing UGB (i.e., average trip length below 9.0 miles), are colored as good.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 *Value*	*Units*	Scenario 2.1 *Value*	*Units*	Scenario 3.1 *Value*	*Units*	SAAM-1 *Value*	*Units*	SAAM-2 *Value*	*Units*	SAAM-3 *Value*	*Units*
Total Future UGB (Including Current UGB)	7.64	Average Daily Round-Trip Length	7.51	Average Daily Round-Trip Length	7.57	Average Daily Round-Trip Length	7.68	Average Daily Round-Trip Length	7.66	Average Daily Round-Trip Length	7.62	Average Daily Round-Trip Length
Total Expansion Area (excluding current UGB)	9.79	Average Daily Round-Trip Length	9.47	Average Daily Round-Trip Length	9.32	Average Daily Round-Trip Length	9.89	Average Daily Round-Trip Length	9.61	Average Daily Round-Trip Length	9.47	Average Daily Round-Trip Length
Subareas												
North Triangle	9.83	Average Daily Round-Trip Length	9.64	Average Daily Round-Trip Length	9.59	Average Daily Round-Trip Length	9.77	Average Daily Round-Trip Length	9.29	Average Daily Round-Trip Length	9.81	Average Daily Round-Trip Length
NE Edge	9.17	Average Daily Round-Trip Length	8.93	Average Daily Round-Trip Length	8.95	Average Daily Round-Trip Length	9.21	Average Daily Round-Trip Length	9.05	Average Daily Round-Trip Length	9.15	Average Daily Round-Trip Length
DSL Property	8.41	Average Daily Round-Trip Length	8.53	Average Daily Round-Trip Length	8.65	Average Daily Round-Trip Length	8.77	Average Daily Round-Trip Length	9.02	Average Daily Round-Trip Length	8.77	Average Daily Round-Trip Length
The "Elbow"	9.16	Average Daily Round-Trip Length	8.82	Average Daily Round-Trip Length	9.10	Average Daily Round-Trip Length	9.11	Average Daily Round-Trip Length	9.47	Average Daily Round-Trip Length	9.12	Average Daily Round-Trip Length
The "Thumb"	11.97	Average Daily Round-Trip Length	11.34	Average Daily Round-Trip Length	10.94	Average Daily Round-Trip Length	11.46	Average Daily Round-Trip Length	12.15	Average Daily Round-Trip Length	11.54	Average Daily Round-Trip Length
West Area	9.27	Average Daily Round-Trip Length	9.31	Average Daily Round-Trip Length	9.41	Average Daily Round-Trip Length	N/A	Average Daily Round-Trip Length	N/A	Average Daily Round-Trip Length	9.44	Average Daily Round-Trip Length
Shevlin Area	N/A	Average Daily Round-Trip Length	N/A	Average Daily Round-Trip Length	10.23	Average Daily Round-Trip Length	11.47	Average Daily Round-Trip Length	N/A	Average Daily Round-Trip Length	N/A	Average Daily Round-Trip Length
OB Riley / Gopher Gulch Area	9.24	Average Daily Round-Trip Length	9.67	Average Daily Round-Trip Length	9.27	Average Daily Round-Trip Length	9.16	Average Daily Round-Trip Length	9.51	Average Daily Round-Trip Length	9.05	Average Daily Round-Trip Length
Existing UGB (if applicable)	7.08	Average Daily Round-Trip Length	7.09	Average Daily Round-Trip Length	7.08	Average Daily Round-Trip Length	7.08	Average Daily Round-Trip Length	7.08	Average Daily Round-Trip Length	7.07	Average Daily Round-Trip Length
Overall Score	2 ⬤		5 ◉		4 ◓		2 ⬤		2 ⬤		3 ◯	
	Significant magnitude of growth in the "Thumb" area, the worst performing sub-area, increased overall average scenario trip length.		Less growth in the "Thumb" and more in the better performing areas on the east-side improve overall average scenario trip-length. Bringing in the entire "Elbow" area to allow a connection from 15th/Murphy area to Rickard Rd. significantly improved the scenario.		Increased growth in the "Shevlin" area increased overall average scenario trip-length. More mixed-use development in OB Riley/Gopher Gulch helps this scenario.		Increased growth in the "Shevlin" area increased overall average scenario trip-length.		Less growth in the eastside, combined with the lack of connection from Rickard to 15th, increases the overall average scenario trip length.		More employment focus in the "North Triangle", the lack of connection from Rickard to 15th, and more growth in the West Area increases the overall average scenario trip length.	

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

06698

Factor 2: Orderly and Economic Growth		Author:	Fregonese Associates

Community Outcome A — **Balanced Transportation System**   Date: 10/1/2015

Performance Measure 3	Household Vehicle Miles Traveled per Capita (7D Model)
Brief Description of Evaluation:	The average number of vehicle miles travel (VMT) per person, per day. Output from 7D transportation model within Envision Tomorrow.
Data Sources	
Interpretation and Key	The color coding was applied in two ways. At the Total Future UGB and the Expansion Area level, the colors are applied only across the same geography and help distinguish differences between scenarios at the same geography. The color coding does not compare the Total Future UGB against the Expansion Area, the value of the indicator itself does provide some insights into those differences, however. The subarea outputs, on the other hand, were coded relative to all subareas in all scenarios to highlight differences across subareas within one scenario but also across scenarios. In this way, we can identify which the best and worst performing subareas across all scenarios. Where the subarea cells are greyed out, the amount of housing within that subarea is not significant (less than 100 new units) and thus the result is not significant.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units
Total Future UGB (Including Current UGB)	9.40	VMT/capita	9.32	VMT/capita	9.42	VMT/capita	9.62	VMT/capita	9.62	VMT/capita	9.57	VMT/capita
Total Expansion Area (excluding current UGB)	12.66	VMT/capita	12.56	VMT/capita	14.24	VMT/capita	14.57	VMT/capita	13.82	VMT/capita	13.79	VMT/capita
Subareas												
North Triangle	12.09	VMT/capita	12.25	VMT/capita	11.74	VMT/capita	12.11	VMT/capita	11.96	VMT/capita	12.03	VMT/capita
NE Edge	12.43	VMT/capita	10.88	VMT/capita	10.97	VMT/capita	13.51	VMT/capita	11.48	VMT/capita	11.04	VMT/capita
DSL Property	9.17	VMT/capita	10.76	VMT/capita	12.98	VMT/capita	12.59	VMT/capita	9.52	VMT/capita	9.63	VMT/capita
The "Elbow"	13.53	VMT/capita	13.67	VMT/capita	13.61	VMT/capita	13.21	VMT/capita	13.60	VMT/capita	13.60	VMT/capita
The "Thumb"	11.16	VMT/capita	12.34	VMT/capita	12.37	VMT/capita	16.53	VMT/capita	16.44	VMT/capita	16.48	VMT/capita
West Area	15.26	VMT/capita	14.93	VMT/capita	16.13	VMT/capita	11.98	VMT/capita	11.93	VMT/capita	15.22	VMT/capita
Shevlin Area	15.46	VMT/capita	14.07	VMT/capita	14.97	VMT/capita	17.37	VMT/capita	18.75	VMT/capita	19.11	VMT/capita
OB Riley / Gopher Gulch Area	11.83	VMT/capita	11.83	VMT/capita	14.08	VMT/capita	11.84	VMT/capita	14.37	VMT/capita	12.91	VMT/capita
Existing UGB (if applicable)	8.13	VMT/capita	8.11	VMT/capita	8.12	VMT/capita	8.16	VMT/capita	8.20	VMT/capita	8.20	VMT/capita
Overall Score	4		5		3		1		2		2	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

Factor 2: Orderly and Economic Provision of Public Facilities and Services						**Author:** CSM	**DKS Associates**		

Community Outcome A — **Balanced Transportation System** — **Date:** 9/9/2015

Performance Measure 4 — Congestion: Miles of roadway that exceed mobility standards & relative contribution to congested roadways

Brief Description of Evaluation: The global measure indicates the overall congestion impact of each scenario. The subarea measures indicate the percentage of travel generated by each subarea (in VMT) contributes to congestion on over-capacity facilities

Data Sources ODOT/MPO 2028 Regional Travel Demand Model, Weekday Peak Hour Trip Assignments

Interpretation and Key Good scores represent less impact on congested roadway areas. Impact to highway corridors (US 97 or US 20) that do not have planned improvements are more significant than congested City corridors that can be mitigated if needed. For the overall proposed UGB Boundary, the values are not VMT and just total miles of congested roadways.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 Value	Scenario 1.2 Units	Scenario 2.1 Value	Scenario 2.1 Units	Scenario 3.1 Value	Scenario 3.1 Units	SAAM-1 Value	SAAM-1 Units	SAAM-2 Value	SAAM-2 Units	SAAM-3 Value	SAAM-3 Units
Total Future UGB (Including Current UGB)	14.12	Peak Hour miles of roadway with volume > capacity	14.30	Peak Hour miles of roadway with volume > capacity	14.66	Peak Hour miles of roadway with volume > capacity	13.43	Peak Hour miles of roadway with volume > capacity	14.24	Peak Hour miles of roadway with volume > capacity	14.12	Peak Hour miles of roadway with volume > capacity
Total Expansion Area (excluding current UGB)	11.5%	% of Total Peak Hour VMT on roadway with volume>capacity	11.4%	% of Total Peak Hour VMT on roadway with volume>capacity	18.3%	% of Total Peak Hour VMT on roadway with volume>capacity	11.3%	% of Total Peak Hour VMT on roadway with volume>capacity	14.8%	% of Total Peak Hour VMT on roadway with volume>capacity	13.2%	% of Total Peak Hour VMT on roadway with volume>capacity

Subareas

Evaluation Geography	Scenario 1.2 Value	Units	Scenario 2.1 Value	Units	Scenario 3.1 Value	Units	SAAM-1 Value	Units	SAAM-2 Value	Units	SAAM-3 Value	Units
North Triangle	13.2%	% of Total Peak Hour VMT on roadway with volume>capacity	12.7%	% of Total Peak Hour VMT on roadway with volume>capacity	17.1%	% of Total Peak Hour VMT on roadway with volume>capacity	12.1%	% of Total Peak Hour VMT on roadway with volume>capacity	17.0%	% of Total Peak Hour VMT on roadway with volume>capacity	15.1%	% of Total Peak Hour VMT on roadway with volume>capacity
NE Edge	10.2%	% of Total Peak Hour VMT on roadway with volume>capacity	9.8%	% of Total Peak Hour VMT on roadway with volume>capacity	10.5%	% of Total Peak Hour VMT on roadway with volume>capacity	11.2%	% of Total Peak Hour VMT on roadway with volume>capacity	9.0%	% of Total Peak Hour VMT on roadway with volume>capacity	9.1%	% of Total Peak Hour VMT on roadway with volume>capacity
DSL Property	14.9%	% of Total Peak Hour VMT on roadway with volume>capacity	14.9%	% of Total Peak Hour VMT on roadway with volume>capacity	18.3%	% of Total Peak Hour VMT on roadway with volume>capacity	17.5%	% of Total Peak Hour VMT on roadway with volume>capacity	16.4%	% of Total Peak Hour VMT on roadway with volume>capacity	18.4%	% of Total Peak Hour VMT on roadway with volume>capacity
The "Elbow"	13.7%	% of Total Peak Hour VMT on roadway with volume>capacity	15.6%	% of Total Peak Hour VMT on roadway with volume>capacity	15.5%	% of Total Peak Hour VMT on roadway with volume>capacity	14.8%	% of Total Peak Hour VMT on roadway with volume>capacity	16.6%	% of Total Peak Hour VMT on roadway with volume>capacity	15.0%	% of Total Peak Hour VMT on roadway with volume>capacity
The "Thumb"	11.0%	% of Total Peak Hour VMT on roadway with volume>capacity	8.7%	% of Total Peak Hour VMT on roadway with volume>capacity	9.1%	% of Total Peak Hour VMT on roadway with volume>capacity	12.0%	% of Total Peak Hour VMT on roadway with volume>capacity	8.0%	% of Total Peak Hour VMT on roadway with volume>capacity	8.7%	% of Total Peak Hour VMT on roadway with volume>capacity
West Area	4.8%	% of Total Peak Hour VMT on roadway with volume>capacity	4.7%	% of Total Peak Hour VMT on roadway with volume>capacity	7.6%	% of Total Peak Hour VMT on roadway with volume>capacity	N/A	% of Total Peak Hour VMT on roadway with volume>capacity	N/A	% of Total Peak Hour VMT on roadway with volume>capacity	9.8%	% of Total Peak Hour VMT on roadway with volume>capacity
Shevlin Area	N/A	% of Total Peak Hour VMT on roadway with volume>capacity	N/A	% of Total Peak Hour VMT on roadway with volume>capacity	4.6%	% of Total Peak Hour VMT on roadway with volume>capacity	2.6%	% of Total Peak Hour VMT on roadway with volume>capacity	N/A	% of Total Peak Hour VMT on roadway with volume>capacity	N/A	% of Total Peak Hour VMT on roadway with volume>capacity
OB Riley / Gopher Gulch Area	12.6%	% of Total Peak Hour VMT on roadway with volume>capacity	11.6%	% of Total Peak Hour VMT on roadway with volume>capacity	15.3%	% of Total Peak Hour VMT on roadway with volume>capacity	11.2%	% of Total Peak Hour VMT on roadway with volume>capacity	16.1%	% of Total Peak Hour VMT on roadway with volume>capacity	16.9%	% of Total Peak Hour VMT on roadway with volume>capacity
Existing UGB (if applicable)	12.7%	% of Total Peak Hour VMT on roadway with volume>capacity	13.2%	% of Total Peak Hour VMT on roadway with volume>capacity	12.6%	% of Total Peak Hour VMT on roadway with volume>capacity	12.3%	% of Total Peak Hour VMT on roadway with volume>capacity	11.7%	% of Total Peak Hour VMT on roadway with volume>capacity	12.2%	% of Total Peak Hour VMT on roadway with volume>capacity

Overall Score	4 ◗		3 ○		2 ◗		5 ◉		3 ○		4 ◗	
					This scenario has the most growth in the North Triangle and OB Riley/Gopher Gulch, causing significant impact on state highways.		Less growth in the North Triangle and OB Riley Area, combined with more growth in the Shevlin Area, reduces overall corridor congestion.					

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

06700

Factor 2: Orderly and Economic Provision of Public Facilities and Services				Author:	CSM	DKS Associates
Community Outcome A	**Balanced Transportation System**			Date:	9/9/2015	

Performance Measure 5	**Walk/Bike Safety and Connectivity**					
Brief Description of Evaluation:	Qualitative evaluation of pedestrian/bicycle that included: connectivity to adjacent areas, connectivity within the subarea, and safety barriers within the subarea.					
Data Sources	Existing and planned multimodal roadway network and trail network based on the Bend MPO MTP Update compared to GoogleEarth imagery and City facility plans.					
Interpretation and Key	Good areas are locations with good connectivity to the adjacent transportation infrastructure and few barriers within the site. Fair areas have either worse connectivity or some site barriers. No internal roadways are planned to be larger than 3-lanes, so significant safety barriers within the sites were not a key differentiator.					

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 *Qualitative Evaluation*	Scenario 2.1 *Qualitative Evaluation*	Scenario 3.1 *Qualitative Evaluation*	SAAM-1 *Qualitative Evaluation*	SAAM-2 *Qualitative Evaluation*	SAAM-3 *Qualitative Evaluation*
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)						
Subareas						
North Triangle	No trails connecting to the area, but decent grid system for roadways.	No trails connecting to the area, but decent grid system for roadways.	No trails connecting to the area, but decent grid system for roadways.	No trails connecting to the area, but decent grid system for roadways.	No trails connecting to the area, but decent grid system for roadways.	No trails connecting to the area, but decent grid system for roadways.
NE Edge	Trail connections to a portion of the area.	Trail connections to the area.	Trail connections to the area.	Trail connections to a portion of the area.	Trail connections to the area.	Trail connections to the area.
DSL Property	Good grid and trail connections.	Good grid and trail connections.	Good grid and trail connections.	Good grid and trail connections.	Good grid and trail connections.	Good grid and trail connections.
The "Elbow"	Partial collector grid	Full collector grid in the subarea with extension of Murphy Road.	Partial collector grid	Partial collector grid	Partial collector grid	Partial collector grid
The "Thumb"	Full build allows connection south to Knott	Partial collector grid	Partial collector grid	Partial collector grid	Partial collector grid	Partial collector grid
West Area	Good collector grid, limited trail system.	Good collector grid, limited trail system.	Good collector grid, limited trail system.	N/A	N/A	Good collector grid, limited trail system.
Shevlin Area	N/A	N/A	Limited connections	Larger growth area creates better connections	N/A	N/A
OB Riley / Gopher Gulch Area	Connections via OB Riley	Connections via OB Riley	Growth further west does not have connectivity to surrounding networks	Connections via OB Riley	Growth further west does not have connectivity to surrounding networks	Connections via OB Riley
Existing UGB (if applicable)	N/A					
Overall Score	4 ◗	5 ◉	3 ○	4 ◗	3 ○	4 ◗

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

06701

Factor 2: Orderly and Economic Provision of Public Facilities and Services

		Author:	CSM	**DKS Associates**

Community Outcome A — **Balanced Transportation System**

Date: 9/9/2015

Performance Measure 6	**System connectivity & progression of system hierarchy**
Brief Description of Evaluation:	Ability to provide a well-spaced base roadway network of arterials and collectors
Data Sources	Base roadway network for subareas

Interpretation and Key

Good areas have the ability to provide access to development areas via a hierarchy of local, collector, and arterial roadways. Poor areas would likely provide access directly to higher class roadways. Overall results are for variations of sub-areas, not combined scenario results.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 *Qualitative Evaluation*	Scenario 2.1 *Qualitative Evaluation*	Scenario 3.1 *Qualitative Evaluation*	SAAM-1 *Qualitative Evaluation*	SAAM-2 *Qualitative Evaluation*	SAAM-3 *Qualitative Evaluation*
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)						
Subareas						
North Traingle	Area on west remaining outside UGB creates challenges for connectivity	Area on west remaining outside UGB creates challenges for connectivity	West side reaches to Old Bend-Redmond Highway to complete the collector framework	Area on west remaining outside UGB creates challenges for connectivity	West side reaches to Old Bend-Redmond Highway to complete the collector framework	West side reaches to Old Bend-Redmond Highway to complete the collector framework
NE Edge	Direct access onto major roadways.	Direct access onto major roadways.	Direct access onto major roadways.	Direct access onto major roadways.	Direct access onto major roadways.	Direct access onto major roadways.
DSL Property	Inclusion of only a portion of the property does not allow for a complete N/S collector connection	Complete N/S collector to Stevens Rd.	Inclusion of only a portion of the property does not allow for a complete N/S collector connection	Inclusion of only a portion of the property does not allow for a complete N/S collector connection	Inclusion of only a portion of the property does not allow for a complete N/S collector connection	Inclusion of only a portion of the property does not allow for a complete N/S collector connection
The "Elbow"	Inclusion of only a portion of the subarea does not allow for a complete E/W collector connection	Inclusion of full subarea makes connection rom Rickard over to 15th near Murphy possible	Inclusion of only a portion of the subarea does not allow for a complete E/W collector connection	Inclusion of only a portion of the subarea does not allow for a complete E/W collector connection	Inclusion of only a portion of the subarea does not allow for a complete E/W collector connection	Inclusion of only a portion of the subarea does not allow for a complete E/W collector connection
The "Thumb"	Inclusion of full property allows full collector system from China Hat to Knott	Inclusion of only a portion of the property does not allow for a complete collector system from China Hat to Knott	Inclusion of only a portion of the property does not allow for a complete collector system from China Hat to Knott	Inclusion of only a portion of the property does not allow for a complete collector system from China Hat to Knott	Inclusion of only a portion of the property does not allow for a complete collector system from China Hat to Knott	Inclusion of only a portion of the property does not allow for a complete collector system from China Hat to Knott
West Area	Some ability to provide local collectors, difficult to build connected local streets.	Some ability to provide local collectors, difficult to build connected local streets.	Some ability to provide local collectors, difficult to build connected local streets.	N/A	N/A	Some ability to provide local collectors, difficult to built connected local streets.
Shevlin Area	N/A	N/A	Some ability to provide local collectors, difficult to build connected local streets.	Some ability to provide local collectors, difficult to build connected local streets.	N/A	N/A
OB Riley / Gopher Gulch Area	Local grid opportunity with OB Riley as a spine roadway for the area.	Local grid opportunity with OB Riley as a spine roadway for the area.	Local grid opportunity with OB Riley as a spine roadway for the area.	Local grid opportunity with OB Riley as a spine roadway for the area.	Local grid opportunity with OB Riley as a spine roadway for the area.	Local grid opportunity with OB Riley as a spine roadway for the area.
Existing UGB (if applicable)	N/A	N/A	N/A	N/A	N/A	N/A
Overall Score	3 ○	4 🟢	3 ○	3 ○	3 ○	4 🟢

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

06702

Factor 2: Orderly and Economic Growth
Community Outcome A   **Balanced Transportation System**

Author:	Analysis by Fregonese Associates; interpretation by Angelo Planning Group
Date:	9/10/2015

Performance Measure 7 — **Mode Split (% by Mode)**

Brief Description of Evaluation: The % of household based daily external trips by mode.

Data Sources: Output from 7D transportation model.

Interpretation and Key: Under 90% auto (the approximate mode split for the current UGB) = Good; 90% to 95% auto = Fair; over 95% auto = Poor

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 Value	Units	Scenario 2.1 Value	Units	Scenario 3.1 Value	Units	SAAM-1 Value	Units	SAAM-2 Value	Units	SAAM-3 Value	Units
Total Future UGB (Including Current UGB)	90.9%	% Auto	90.9%	% Auto	90.9%	% Auto	90.9%	% Auto	91.0%	% Auto	90.9%	% Auto
	6.9%	% Walk	6.9%	% Walk	6.9%	% Walk	6.8%	% Walk	6.7%	% Walk	6.9%	% Walk
	0.7%	% Bike	0.7%	% Bike	0.7%	% Bike	0.7%	% Bike	0.7%	% Bike	0.7%	% Bike
	1.6%	% Transit	1.6%	% Transit	1.6%	% Transit	1.6%	% Transit	1.6%	% Transit	1.6%	% Transit
Total Expansion Area (excluding current UGB)	95.1%	% Auto	95.3%	% Auto	95.3%	% Auto	95.9%	% Auto	96.4%	% Auto	95.0%	% Auto
	3.5%	% Walk	3.4%	% Walk	3.4%	% Walk	2.9%	% Walk	2.5%	% Walk	3.5%	% Walk
	0.5%	% Bike	0.5%	% Bike	0.5%	% Bike	0.5%	% Bike	0.4%	% Bike	0.6%	% Bike
	0.9%	% Transit	0.9%	% Transit	0.8%	% Transit	0.7%	% Transit	0.7%	% Transit	0.9%	% Transit
Subareas												
North Traingle	96.4%	% Auto	96.4%	% Auto	96.9%	% Auto	96.3%	% Auto	96.2%	% Auto	96.2%	% Auto
	2.5%	% Walk	2.6%	% Walk	2.2%	% Walk	2.6%	% Walk	2.6%	% Walk	2.6%	% Walk
	0.3%	% Bike	0.4%	% Bike	0.3%	% Bike	0.3%	% Bike	0.3%	% Bike	0.4%	% Bike
	0.8%	% Transit	0.7%	% Transit	0.6%	% Transit	0.8%	% Transit	0.8%	% Transit	0.8%	% Transit
NE Edge	95.2%	% Auto	95.2%	% Auto	94.7%	% Auto	95.4%	% Auto	95.7%	% Auto	95.4%	% Auto
	3.5%	% Walk	3.5%	% Walk	3.9%	% Walk	3.3%	% Walk	3.0%	% Walk	3.3%	% Walk
	0.6%	% Bike	0.6%	% Bike	0.6%	% Bike	0.6%	% Bike	0.6%	% Bike	0.6%	% Bike
	0.7%	% Transit	0.7%	% Transit	0.8%	% Transit	0.7%	% Transit	0.7%	% Transit	0.7%	% Transit
DSL Property	93.5%	% Auto	95.0%	% Auto	93.9%	% Auto	94.4%	% Auto	92.9%	% Auto	93.3%	% Auto
	4.4%	% Walk	3.5%	% Walk	4.1%	% Walk	3.7%	% Walk	4.6%	% Walk	4.5%	% Walk
	0.4%	% Bike	0.4%	% Bike	0.4%	% Bike	0.4%	% Bike	0.4%	% Bike	0.4%	% Bike
	1.7%	% Transit	1.2%	% Transit	1.6%	% Transit	1.6%	% Transit	2.1%	% Transit	1.7%	% Transit
The "Elbow"	95.9%	% Auto	95.6%	% Auto	95.7%	% Auto	96.3%	% Auto	96.2%	% Auto	96.2%	% Auto
	2.8%	% Walk	3.1%	% Walk	3.0%	% Walk	2.5%	% Walk	2.6%	% Walk	2.6%	% Walk
	0.4%	% Bike	0.4%	% Bike	0.4%	% Bike	0.4%	% Bike	0.4%	% Bike	0.4%	% Bike
	0.9%	% Transit	0.9%	% Transit	0.8%	% Transit	0.7%	% Transit	0.7%	% Transit	0.7%	% Transit
The "Thumb"	95.4%	% Auto	95.1%	% Auto	95.4%	% Auto	95.9%	% Auto	96.2%	% Auto	96.0%	% Auto
	3.2%	% Walk	3.4%	% Walk	3.2%	% Walk	2.8%	% Walk	2.6%	% Walk	2.7%	% Walk
	0.5%	% Bike	0.5%	% Bike	0.5%	% Bike	0.5%	% Bike	0.5%	% Bike	0.5%	% Bike
	0.9%	% Transit	0.9%	% Transit	0.9%	% Transit	0.8%	% Transit	0.7%	% Transit	0.7%	% Transit
West Area	94.1%	% Auto	94.1%	% Auto	94.8%	% Auto	93.7%	% Auto	94.0%	% Auto	94.8%	% Auto
	4.1%	% Walk	4.3%	% Walk	3.7%	% Walk	4.7%	% Walk	4.4%	% Walk	3.7%	% Walk
	0.6%	% Bike	0.6%	% Bike	0.6%	% Bike	0.6%	% Bike	0.6%	% Bike	0.6%	% Bike
	1.1%	% Transit	1.1%	% Transit	0.8%	% Transit	1.0%	% Transit	0.9%	% Transit	0.8%	% Transit
Shevlin Area	97.6%	% Auto	97.7%	% Auto	96.7%	% Auto	96.6%	% Auto	97.6%	% Auto	97.6%	% Auto
	1.6%	% Walk	1.6%	% Walk	2.3%	% Walk	2.3%	% Walk	1.7%	% Walk	1.6%	% Walk
	0.3%	% Bike	0.3%	% Bike	0.5%	% Bike	0.5%	% Bike	0.3%	% Bike	0.3%	% Bike
	0.4%	% Transit	0.4%	% Transit	0.6%	% Transit	0.6%	% Transit	0.4%	% Transit	0.4%	% Transit
OB Riley / Gopher Gulch Area	96.3%	% Auto	96.0%	% Auto	96.2%	% Auto	96.2%	% Auto	96.7%	% Auto	96.3%	% Auto
	2.8%	% Walk	2.9%	% Walk	2.8%	% Walk	2.8%	% Walk	2.3%	% Walk	2.7%	% Walk
	0.3%	% Bike	0.3%	% Bike	0.3%	% Bike	0.3%	% Bike	0.4%	% Bike	0.3%	% Bike
	0.7%	% Transit	0.8%	% Transit	0.7%	% Transit	0.7%	% Transit	0.6%	% Transit	0.8%	% Transit
Existing UGB (if applicable)	89.9%	% Auto	89.9%	% Auto	89.8%	% Auto	89.7%	% Auto	89.8%	% Auto	89.8%	% Auto
	7.7%	% Walk	7.7%	% Walk	7.7%	% Walk	7.7%	% Walk	7.7%	% Walk	7.7%	% Walk
	0.7%	% Bike	0.7%	% Bike	0.7%	% Bike	0.7%	% Bike	0.7%	% Bike	0.7%	% Bike
	1.8%	% Transit	1.8%	% Transit	1.8%	% Transit	1.8%	% Transit	1.8%	% Transit	1.8%	% Transit
Overall Score	3 ○		3 ○		3 ○		2 ●		2 ●		3 ○	
	Most expansion areas have typical suburban transportation behaviours, with a higher proportion vehicle trips, relative to the existing city.		Most expansion areas have typical suburban transportation behaviours, with a higher proportion vehicle trips, relative to the existing city.		Most expansion areas have typical suburban transportation behaviours, with a higher proportion vehicle trips, relative to the existing city.		Most expansion areas have typical suburban transportation behaviours, with a higher proportion vehicle trips, relative to the existing city.		Most expansion areas have typical suburban transportation behaviours, with a higher proportion vehicle trips, relative to the existing city.		Most expansion areas have typical suburban transportation behaviours, with a higher proportion vehicle trips, relative to the existing city.	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06703

Factor 2: Orderly and Economic Growth

Community Outcome A	**Balanced Transportation System**			**Author:**	Analysis by Fregonese Associates; interpretation by Angelo Planning Group
				Date:	9/10/2015

Performance Measure 8	**Average Weekly Walk Trips**
Brief Description of Evaluation:	The total number of household based walk trips per week.
Data Sources	Output from 7D transportation model.

Interpretation and Key

Over 2 = Good (more similar to existing UGB); 1-2 = Fair; under 1 = Poor. (Subareas with trivial amounts of housing generated by commercial areas are shown in grey.) Overall distinctions are subtle; however, there are meaningful differences at a subarea level.

"Good"	"Fair"	"Poor"	No Data / Minimal housing	Not appropriate to rank

Evaluation Geography	**Scenario 1.2**		**Scenario 2.1**		**Scenario 3.1**		**SAAM-1**		**SAAM-2**		**SAAM-3**	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	1.98	Average weekly walk trips per capita	1.99	Average weekly walk trips per capita	2.00	Average weekly walk trips per capita	1.98	Average weekly walk trips per capita	1.96	Average weekly walk trips per capita	2.00	Average weekly walk trips per capita
Total Expansion Area (excluding current UGB)	0.48	Average weekly walk trips per capita	0.47	Average weekly walk trips per capita	0.51	Average weekly walk trips per capita	0.44	Average weekly walk trips per capita	0.39	Average weekly walk trips per capita	0.52	Average weekly walk trips per capita
Subareas												
North Traingle	0.70	Average weekly walk trips per capita	0.75	Average weekly walk trips per capita	0.60	Average weekly walk trips per capita	0.72	Average weekly walk trips per capita	0.73	Average weekly walk trips per capita	0.72	Average weekly walk trips per capita
NE Edge	1.27	Average weekly walk trips per capita	1.85	Average weekly walk trips per capita	1.89	Average weekly walk trips per capita	**0.97**	Average weekly walk trips per capita	0.83	Average weekly walk trips per capita	0.91	Average weekly walk trips per capita
DSL Property	1.24	Average weekly walk trips per capita	0.97	Average weekly walk trips per capita	1.47	Average weekly walk trips per capita	1.20	Average weekly walk trips per capita	1.37	Average weekly walk trips per capita	**1.37**	Average weekly walk trips per capita
The "Elbow"	0.76	Average weekly walk trips per capita	0.89	Average weekly walk trips per capita	0.85	Average weekly walk trips per capita	0.68	Average weekly walk trips per capita	0.73	Average weekly walk trips per capita	0.73	Average weekly walk trips per capita
The "Thumb"	1.06	Average weekly walk trips per capita	1.22	Average weekly walk trips per capita	2.81	Average weekly walk trips per capita	0.81	Average weekly walk trips per capita	0.75	Average weekly walk trips per capita	0.78	Average weekly walk trips per capita
West Area	1.29	Average weekly walk trips per capita	1.31	Average weekly walk trips per capita	1.23	Average weekly walk trips per capita	1.29	Average weekly walk trips per capita	1.22	Average weekly walk trips per capita	**1.12**	Average weekly walk trips per capita
Shevlin Area	5.98	Average weekly walk trips per capita	7.61	Average weekly walk trips per capita	0.82	Average weekly walk trips per capita	**0.73**	Average weekly walk trips per capita	1.40	Average weekly walk trips per capita	1.37	Average weekly walk trips per capita
OB Riley / Gopher Gulch Area	0.75	Average weekly walk trips per capita	0.80	Average weekly walk trips per capita	0.89	Average weekly walk trips per capita	0.74	Average weekly walk trips per capita	**0.68**	Average weekly walk trips per capita	0.72	Average weekly walk trips per capita
Existing UGB (if applicable)	2.23	Average weekly walk trips per capita	2.24	Average weekly walk trips per capita	2.24	Average weekly walk trips per capita	2.26	Average weekly walk trips per capita	2.25	Average weekly walk trips per capita	2.25	Average weekly walk trips per capita
Overall Score	3 ○		3 ○		3 ○		3 ○		2 ◕		3 ○	
	Adding more housing in the NE Edge that is not immediately adjacent to commercial appears to degrade that area's walk trip rates somewhat.		Filling the exception land portion of the DSL property appears to degrade its walk trip rates, presumably because it puts housing further from services. Other subareas perform better than under most other alternatives.		The NE Edge, DSL, Shevlin, and OB Riley / Gopher Gulch all perform somewhat better than under other alternatives.		Focusing growth in the outer portions of the NE Edge and Shevlin area, neither of which has very good walk trip rates, makes SAAM-1 somewhat worse than most of the others.		The Gopher Gulch area did not fair well by this performance measure. Focusing growth there makes SAAM-2 have somewhat worse performance than others.		Focusing growth in the West Area & DSL, both of which have somewhat better walk trip rates, makes SAAM-3 slightly better than the others

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

Factor 2: Orderly and Economic Growth				Author:	Becky Hewitt	APG	
Community Outcome A	**Balanced Transportation System**			Date:	9/18/2015		
Performance Measure 9	**Proximity to Transit**						
Brief Description of Evaluation:	Approximate distance to future transit corridors.						
Data Sources	Bend MPO Public Transit Plan, March 2013; 2015 proposed system map.						
Interpretation and Key	Subareas that include some development within a quarter mile of an existing or planned transit corridor = "Good" because people are likely to walk up to about a quarter mile to access transit; those including some development over 1/4 mile but under 1/2 mile from an existing or planned transit corridor = "Fair" because some people will walk up to a half mile to access transit; all development over 1/2 mile from an existing or planned transit corridor = "Poor" because few people will walk over a half mile to access transit.						

"Good"	"Fair"	"Poor"	No Data / Minimal housing or jobs	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)												
Total Expansion Area (excluding current												
Subareas												
North Triangle	>1/4 mile to >1/2 mile from primary transit corridor (mostly over 1/2 mile)		>1/4 mile to >1/2 mile from primary transit corridor (mostly over 1/2 mile)		>1/4 mile to >1/2 mile from primary transit corridor (mostly over 1/2 mile)		>1/4 mile to >1/2 mile from primary transit corridor (mostly over 1/2 mile)		>1/4 mile to >1/2 mile from primary transit corridor (mostly over 1/2 mile)		>1/4 mile to >1/2 mile from primary transit corridor (mostly over 1/2 mile)	
NE Edge	>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor; possible future extension could serve western edge of subdivision south of Juniper Ridge		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor	
DSL Property	1/4-mile to over 1/2 mile from primary transit corridor (roughly half of development within 1/2 mile)		1/4-mile to over 1/2 mile from primary transit corridor (mostly over 1/2 mile)		1/4-mile to >1/2 mile from primary transit corridor (mostly within 1/2 mile)		1/4-mile to over 1/2 mile from primary transit corridor (roughly half of development within 1/2 mile)		1/4-mile to >1/2 mile from primary transit corridor (mostly within 1/2 mile)		1/4-mile to >1/2 mile from primary transit corridor (mostly within 1/2 mile)	
The "Elbow"	>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor	
The "Thumb"	>1/2 mile from primary transit corridor; possible community connector stop on west side of US 97 could provide limited transit access to the southern end of this area in the long-term		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor		>1/2 mile from primary transit corridor	
West Area	1/4-mile to over 1/2 mile from existing transit corridor (mostly within 1/2 mile)		1/4-mile to >1/2 mile from existing transit corridor (roughly a third of development within 1/2 mile)		1/4-mile to >1/2 mile from existing transit corridor (roughly a third of development within 1/2 mile)		N/A		N/A		1/4-mile to over 1/2 mile from existing transit corridor (mostly over 1/2 mile)	
Shevlin Area	N/A		N/A		1/4-mile to >1/2 mile from existing transit corridor (roughly a third of development within 1/2 mile)		1/4-mile to over 1/2 mile from existing transit corridor (mostly over 1/2 mile)		N/A		N/A	
OB Riley / Gopher Gulch Area	<1/4-mile to >1/2 mile from primary transit corridor (roughly half within 1/4 mile; mostly within 1/2 mile)		<1/4-mile to >1/2 mile from primary transit corridor (roughly half within 1/4 mile; mostly within 1/2 mile)		<1/4-mile to >1/2 mile from primary transit corridor (small percentage within 1/4 mile; roughly a third of development within 1/2 mile)		<1/4-mile to >1/2 mile from primary transit corridor (roughly half within 1/4 mile; mostly within 1/2 mile)		<1/4-mile to >1/2 mile from primary transit corridor (small percentage within 1/4 mile; mostly over 1/2 mile)		<1/4-mile to >1/2 mile from primary transit corridor (about a quarter of development within 1/4 mile; roughly half of development within 1/2 mile)	
Existing UGB (if applicable)	N/A		N/A		N/A		N/A		N/A		N/A	
Overall Score	3 ○		3 ○		3 ○		3 ○		3 ○		3 ○	
	Includes 1 subarea with good transit adjacency and 3 with fair transit adjacency; remainder with poor transit adjacency.		Includes 1 subarea with good transit adjacency and 3 with fair transit adjacency; remainder with poor transit adjacency.		Includes 1 subarea with good transit adjacency and 4 with fair transit adjacency; remainder with poor transit adjacency.		Includes 1 subarea with good transit adjacency and 3 with fair transit adjacency; remainder with poor transit adjacency.		Includes 1 subarea with good transit adjacency in a portion of the subarea, but extending out to Gopher Gulch puts most of the development over a 1/2 mile from transit		Includes 1 subarea with good transit adjacency and 3 with fair transit adjacency; remainder with poor transit adjacency.	

For more information about this performance measure, see accompanying technical memorandum from Angelo Planning Group.

Factor 2: Orderly and Economic Growth						Author:	Analysis by Fregonese Associates; interpretation by Angelo Planning Group					

Community Outcome A — Balanced Transportation System

Date: 9/10/2015

Performance Measure 10 — Housing & Jobs within 1/4 Mile of Future Transit Corridors

Brief Description of Evaluation: The share of the total housing units, and total jobs within one quarter mile of future transit corridors.

Data Sources: Current transit lines, and future planned transit lines from Cascade East Transit.

Interpretation and Key: Over 20% of housing or jobs adjacent to transit was rated "Good"; 1-20% was rated "Fair", and 0% was rated "Poor". Subareas with trivial amounts of housing or jobs are shown in grey. Note that transit access could be improved through routing adjustments for all scenarios and SAAMs.

"Good"	"Fair"	"Poor"	No Data / Minimal housing or jobs	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	38%	Housing Units	38%	Housing Units	38%	Housing Units	38%	Housing Units	37%	Housing Units	38%	Housing Units
	55%	Jobs	54%	Jobs	55%	Jobs	55%	Jobs	55%	Jobs	55%	Jobs
Total Expansion Area (excluding current UGB)	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units
	5%	Jobs	0%	Jobs	6%	Jobs	5%	Jobs	6%	Jobs	6%	Jobs
Subareas												
North Traingle	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units
	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs
NE Edge	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units
	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs
DSL Property	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units
	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs
The "Elbow"	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units
	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs
The "Thumb"	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units	0%	Housing Units
	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs	0%	Jobs
West Area	0%	Housing Units	0%	Housing Units	0%	Housing Units	N/A	Housing Units	N/A	Housing Units	0%	Housing Units
	0%	Jobs	0%	Jobs	0%	Jobs	N/A	Jobs	N/A	Jobs	0%	Jobs
Shevlin Area	N/A	Housing Units	N/A	Housing Units	0%	Housing Units	0%	Housing Units	N/A	Housing Units	N/A	Housing Units
	N/A	Jobs	N/A	Jobs	0%	Jobs	0%	Jobs	N/A	Jobs	N/A	Jobs
OB Riley / Gopher Gulch Area	3%	Housing Units	3%	Housing Units	0%	Housing Units	3%	Housing Units	0%	Housing Units	1%	Housing Units
	40%	Jobs	0%	Jobs	28%	Jobs	39%	Jobs	24%	Jobs	33%	Jobs
Existing UGB (if applicable)	41%	Housing Units	41%	Housing Units	41%	Housing Units	41%	Housing Units	41%	Housing Units	41%	Housing Units
	62%	Jobs	62%	Jobs	62%	Jobs	62%	Jobs	62%	Jobs	62%	Jobs
Overall Score	3 ○		3 ○		3 ○		3 ○		3 ○		3 ○	
Notes about Overall Score			The differnece here is that the OB Riley / Gopher Gulch area includes the "Large lot Industrial" designation, which does not have a certain number of jobs associated with it, but still makes sense to be included for these purposes.									

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06706

Factor 2: Orderly and Economic Growth			**Author:**	Analysis by Fregonese Associates; interpretation by Angelo Planning Group
Community Outcome A	**Balanced Transportation System**		**Date:**	9/18/2015

Performance Measure 11	**Total Intersection Density per Sq Mi**
Brief Description of Evaluation:	The density (intersections per square mile) of intersections.
Data Sources	Current intersections were dervied from centerline files from Deschutes County. New intersections are an output of Envision Tomorrow, based off of road network assumptions for each development type. Generally, higher density residential and more urban commercial types have higher intersection densities, while lower density residential and industrial types have lower intersection densities.
Interpretation and Key	A higher intersection density makes an area more walkable and reduces out of direction travel. Ratings are relative to the existing UGB: similar to the existing UGB (within 5 intersections / sq mi) = Fair; better/higher than the existing UGB (by more than 5 intersections / sq mi) = Good; worse/lower than the existing UGB (by more than 5 intersections / sq mi) = Poor.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)		Intersections/SqMI		Intersections/SqMI		Intersections/SqMI		Intersections/SqMI		Intersections/SqMI		Intersections/SqMI
Total Expansion Area (excluding current UGB)	77	Intersections/SqMI	69	Intersections/SqMI	73	Intersections/SqMI	83	Intersections/SqMI	76	Intersections/SqMI	78	Intersections/SqMI
Subareas												
North Traingle	77	Intersections/SqM	79	Intersections/SqM	62	Intersections/SqM	77	Intersections/SqM	62	Intersections/SqM	62	Intersections/SqM
NE Edge	80	Intersections/SqM	85	Intersections/SqM	84	Intersections/SqM	86	Intersections/SqM	107	Intersections/SqM	107	Intersections/SqM
DSL Property	61	Intersections/SqM	62	Intersections/SqM	60	Intersections/SqM	70	Intersections/SqM	93	Intersections/SqM	105	Intersections/SqM
The "Elbow"	90	Intersections/SqM	68	Intersections/SqM	78	Intersections/SqM	91	Intersections/SqM	78	Intersections/SqM	78	Intersections/SqM
The "Thumb"	81	Intersections/SqM	77	Intersections/SqM	78	Intersections/SqM	92	Intersections/SqM	77	Intersections/SqM	74	Intersections/SqM
West Area	88	Intersections/SqM	82	Intersections/SqM	79	Intersections/SqM	-	Intersections/SqM	-	Intersections/SqM	76	Intersections/SqM
Shevlin Area	-	Intersections/SqM	-	Intersections/SqM	79	Intersections/SqM	79	Intersections/SqM	-	Intersections/SqM	-	Intersections/SqM
OB Riley / Gopher Gulch Area	63	Intersections/SqM	33	Intersections/SqM	27	Intersections/SqM	63	Intersections/SqM	75	Intersections/SqM	85	Intersections/SqM
Existing UGB (if applicable)	80	Intersections/SqM	80	Intersections/SqM	80	Intersections/SqM	80	Intersections/SqM	80	Intersections/SqM	80	Intersections/SqM
Overall Score	3 ○		2 ●		2 ●		3 ○		3 ○		3 ○	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06707

Factor 2: Orderly and Economic Provision of Public Facilities and Services		Author:	CSM	DKS Associates
Community Outcome B. **Cost Effective Infrastructure**		Date:	10/1/2015	

Performance Measure 2	**Transportation Infrastructure Improvements**
Brief Description of Evaluation:	Cost of Transportation Improvements for serving the expansion area and mitigating impacts in the City system. Cost for expansion areas include new roadway network only (not congestion mitigation)
Data Sources	Bend SDC Unit Costs, Travel Demand Model link congestion plots

Interpretation and Key

Lower overall costs perform better. The overall scenario cost includes new arterials and collectors to serve expansion areas and capacity improvements in the system to mitigate congestion impacts. The Expansion area total excludes improvements identified as needed to serve growth inside the existing UGB. Costs at the subarea level (excluding the existing UGB) include the new arterial and collector grid system only.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	$212.6	Million	$165.2	Million	$210.0	Million	$199.1	Million	$175.4	Million	$169.4	Million
Total Expansion Area (excluding current UGB)	$206.1	Million	$158.6	Million	$203.5	Million	$192.6	Million	$168.9	Million	$162.8	Million
Subareas												
North Triangle	27.8	Millions $	27.8	Millions $	27.8	Millions $	27.8	Millions $	27.8	Millions $	27.8	Millions $
NE Edge	49.1	Millions $	20.2	Millions $	26.9	Millions $	33.3	Millions $	0.0	Millions $	0.0	Millions $
DSL Property	17.6	Millions $	18.5	Millions $	16.5	Millions $	9.1	Millions $	12.1	Millions $	19.6	Millions $
The "Elbow" *	48.2	Millions $	58.3	Millions $	41.8	Millions $	39.4	Millions $	39.4	Millions $	39.4	Millions $
The "Thumb"	19.7	Millions $	10.5	Millions $	10.5	Millions $	4.3	Millions $	4.3	Millions $	4.3	Millions $
West Area	5.8	Millions $	9.7	Millions $	24.9	Millions $	0	Millions $	0	Millions $	39.3	Millions $
Shevlin Area	0	Millions $	0	Millions $	16.3	Millions $	20.9	Millions $	0	Millions $	0	Millions $
OB Riley / Gopher Gulch Area	2.7	Millions $	2.7	Millions $	26.9	Millions $	2.7	Millions $	52.4	Millions $	2.7	Millions $
Existing UGB (if applicable)	$6.5	Millions $	$6.5	Millions $	$6.5	Millions $	$6.5	Millions $	$6.5	Millions $	$6.5	Millions $

Overall Score	1 🔴	5 🟢	1 🔴	2 🔴	3 ⚪	4 🟢
	High cost for connecting The Elbow and NE Edge, costly corridor improvement required to Knott Road, and a high number of required intersection capacity improvements.	High cost for connecting The Elbow but low connectivity costs elsewhere; lowest cost for congestion mitigations.	Highest cost for connecting growth areas due to distributed growth; requires widening of US 20 from Robal Rd to 3rd Street.	High cost for connecting growth areas, low cost for roadway widening, high cost for intersection improvements.	Low cost for connecting growth areas, high cost for required intersection capacity improvements; requires widening of US 20 from Robal Rd to 3rd Street.	Low cost for connecting growth areas and moderate cost for congestion mitigations; requires widening of US 20 from Robal Rd to 3rd Street.

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

* Note: Costs for The Elbow include new roads needed to connect through vacant land inside the existing UGB as well as extensions outside the current UGB in The Elbow subarea. Roughly $32 million of this cost would likely be needed even without UGB expansion.

06708

Factor 2: Orderly and Economic Provision of Public Facilities and Services		Author:	CSM	**DKS Associates**
Community Outcome B. **Cost Effective Infrastructure**		Date:	10/1/2015	

Performance Measure 1	**Transportation Infrastructure Improvements**
Brief Description of Evaluation:	Cost of Transportation Improvements for serving the expansion area (collector and arterial grid).
Data Sources	Bend SDC Unit Costs, Travel Demand Model link congestion plots

Interpretation and Key

Growth areas and scenarios that have the lowest cost/acre rank the best, with "good" rating given where costs are $50K/acre or less, "fair" for $50-$100K/acre, and "poor" for >$100K/acre

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 Value Units	Scenario 2.1 Value Units	Scenario 3.1 Value Units	SAAM-1 Value Units	SAAM-2 Value Units	SAAM-3 Value Units
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)	102 $1,000/Acre	81 $1,000/Acre	101 $1,000/Acre	62 $1,000/Acre	75 $1,000/Acre	88 $1,000/Acre
Subareas						
North Triangle	143.8 $1,000/Acre	148.5 $1,000/Acre	120.2 $1,000/Acre	138.8 $1,000/Acre	111.1 $1,000/Acre	111.1 $1,000/Acre
NE Edge	108.0 $1,000/Acre	154.3 $1,000/Acre	166.8 $1,000/Acre	18.7 $1,000/Acre	0.0 $1,000/Acre	0.0 $1,000/Acre
DSL Property	79.2 $1,000/Acre	51.1 $1,000/Acre	86.2 $1,000/Acre	69.7 $1,000/Acre	57.6 $1,000/Acre	156.6 $1,000/Acre
The "Elbow"	238.8 $1,000/Acre	135.2 $1,000/Acre	234.8 $1,000/Acre	262.9 $1,000/Acre	214.3 $1,000/Acre	214.3 $1,000/Acre
The "Thumb"	56.2 $1,000/Acre	26.5 $1,000/Acre	59.4 $1,000/Acre	17.8 $1,000/Acre	19.0 $1,000/Acre	19.4 $1,000/Acre
West Area	43.8 $1,000/Acre	55.9 $1,000/Acre	75.8 $1,000/Acre	- $1,000/Acre	- $1,000/Acre	58.7 $1,000/Acre
Shevlin Area	- $1,000/Acre	- $1,000/Acre	92.6 $1,000/Acre	38.3 $1,000/Acre	- $1,000/Acre	- $1,000/Acre
OB Riley / Gopher Gulch Area	20.9 $1,000/Acre	19.7 $1,000/Acre	59.7 $1,000/Acre	20.4 $1,000/Acre	48.1 $1,000/Acre	14.7 $1,000/Acre
Existing UGB (if applicable)	$1,000/Acre	$1,000/Acre	$1,000/Acre	$1,000/Acre	$1,000/Acre	$1,000/Acre
Overall Score	2 ⬤	3 ○	2 ⬤	4 ▲	3 ○	3 ○

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

* Note: Costs for The Elbow include new roads needed to connect through vacant land inside the existing UGB as well as extensions outside the current UGB in The Elbow subarea. Roughly $32 million of this cost would likely be needed even without UGB expansion.

06709

Factor 2: Orderly and Economic Provision of Public Facilities and Services													Author:	**Fregonese Associates**
Community Outcome B.	**Cost Effective Infrastructure**												Date:	9/10/2015

Performance Measure 3	**New Linear Miles of Local Roadway**											
Brief Description of Evaluation:	The number of new road miles required to service the expansion areas. This is internal roadways only, not roadways aridly in the TPR.											
Data Sources	New lineal roadways miles are an output of Envision Tomorrow, based on road network assumptions for each development type.											

Interpretation and Key	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank							

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	266	Road Lane Miles	260	Road Lane Miles	270	Road Lane Miles	301	Road Lane Miles	274	Road Lane Miles	269	Road Lane Miles
Total Expansion Area (excluding current UGB)	83	Road Lane Miles	76	Road Lane Miles	86	Road Lane Miles	117	Road Lane Miles	90	Road Lane Miles	85	Road Lane Miles
Subareas												
North Triangle	13	Road Lane Mil	10	Road Lane Miles	12	Road Lane Mil	13	Road Lane Mil	12	Road Lane Mil	12	Road Lane Miles
NE Edge	18	Road Lane Miles	6	Road Lane Miles	7	Road Lane Miles	48	Road Lane Miles	3	Road Lane Miles	3	Road Lane Miles
DSL Property	8	Road Lane Miles	15	Road Lane Miles	7	Road Lane Miles	6	Road Lane Miles	11	Road Lane Miles	8	Road Lane Miles
The "Elbow"	10	Road Lane Miles	18	Road Lane Miles	9	Road Lane Mil	7	Road Lane Mil	9	Road Lane Mil	9	Road Lane Miles
The "Thumb"	20	Road Lane Miles	16	Road Lane Miles	11	Road Lane Mil	17	Road Lane Mil	13	Road Lane Miles	13	Road Lane Miles
West Area	6	Road Lane Miles	8	Road Lane Miles	16	Road Lane Miles	N/A	Road Lane Mil	N/A	Road Lane Mil	30	Road Lane Miles
Shevlin Area	N/A	Road Lane Miles	N/A	Road Lane Miles	7	Road Lane Miles	19	Road Lane Miles	N/A	Road Lane Miles	N/A	Road Lane Miles
OB Riley / Gopher Gulch Area	7	Road Lane Mil	3	Road Lane Mil	18	Road Lane Miles	7	Road Lane Mil	42	Road Lane Miles	10	Road Lane Miles
Existing UGB (if applicable)	183	Road Lane Mil	183	Road Lane Mil	183	Road Lane Miles	183	Road Lane Miles	183	Road Lane Mil	183	Road Lane Miles
Overall Score	3		4		3		2		3		3	
							Model overestimates new road needed in NE Edge					

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06710

Factor 2: Orderly and Economic Provision of Public Facilities and Services			Author:		Murray Smith Associates	
Community Outcome B. **Cost Effective Infrastructure**			Date:	10/1/2015		

Performance Measure 4 — Efficiency of Additional Sanitary Sewer Infrastructure Improvements

Brief Description of Evaluation: Efficiency of sanitary sewer infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP.

Data Sources

Interpretation and Key: Ratings for subareas are assigned based on the following considerations: "Good" means the subarea takes advantage of improvements needed to serve the existing UGB (e.g. Northeast Interceptor and Hamby alignment); "Fair" means there is somewhat costly localized infrastructure needed and/or that the amount of growth in the subarea doesn't take advantage of the improvements needed to serve the existing UGB; "Poor" means that costly new regional infrastructure (not a gravity system) is required that would not otherwise be needed.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 *Qualitative Evaluation*	Scenario 2.1 *Qualitative Evaluation*	Scenario 3.1 *Qualitative Evaluation*	SAAM-1 *Qualitative Evaluation*	SAAM-2 *Qualitative Evaluation*	SAAM-3 *Qualitative Evaluation*
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)						
Subareas						
North Triangle	Incremental extension of NEI west of US 97; needed to serve OB Riley / Gopher Gulch Area as well	Incremental extension of NEI west of US 97; needed to serve OB Riley / Gopher Gulch Area as well	Incremental extension of NEI west of US 97; needed to serve OB Riley / Gopher Gulch Area as well	Incremental extension of NEI west of US 97; needed to serve OB Riley / Gopher Gulch Area as well	Incremental extension of NEI west of US 97; needed to serve OB Riley / Gopher Gulch Area as well	Incremental extension of NEI west of US 97; needed to serve OB Riley / Gopher Gulch Area as well
NE Edge	Relies primarily on Hamby alignment & NEI (very efficient), but Bear Creek area requires interim lift station	Relies primarily on Hamby alignment & NEI (very efficient), but Bear Creek area requires interim lift station; limited development does not take full advantage of Hamby and NEI	Relies primarily on Hamby alignment & NEI (very efficient), but Bear Creek area requires interim lift station; limited development does not take full advantage of Hamby and NEI	Relies entirely on Hamby alignment & NEI	Relies primarily on Hamby alignment & NEI (very efficient); limited development does not take full advantage of Hamby and NEI	Relies primarily on Hamby alignment & NEI (very efficient); limited development does not take full advantage of Hamby and NEI
DSL Property	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI	Requires additional extension of Hamby alignment to serve Darnell Estates area	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI
The "Elbow"	Requires interim pump station that does not contribute to long-term solution and infrastructure is unique to Elbow area	Requires interim pump station that does not contribute to long-term solution and infrastructure is unique to Elbow area	Requires interim pump station that does not contribute to long-term solution and infrastructure is unique to Elbow area	Requires interim pump station that does not contribute to long-term solution and infrastructure is unique to Elbow area	Requires interim pump station that does not contribute to long-term solution and infrastructure is unique to Elbow area	Requires interim pump station that does not contribute to long-term solution and infrastructure is unique to Elbow area
The "Thumb"	Requires pipe improvement on Parrell Road adjacent to SEI, then uses SEI / Hamby alignment & NEI	Pipe improvement on Parrell Road adjacent to SEI, Additional gravity main required to serve Baney property	Requires pipe improvement on Parrell Road adjacent to SEI, then uses SEI / Hamby alignment & NEI	Requires pipe improvement on Parrell Road adjacent to SEI, then uses SEI / Hamby alignment & NEI	Requires pipe improvement on Parrell Road adjacent to SEI, then uses SEI / Hamby alignment & NEI	Requires pipe improvement on Parrell Road adjacent to SEI, then uses SEI / Hamby alignment & NEI
West Area	Requires only incremental expansion & extension of existing lines	Requires only incremental expansion & extension of existing lines	requires expansion & extension of existing lines & connection to existing pump station	N/A	N/A	Exceeds capacity at Awbrey Glen & requires new regional pump station
Shevlin Area	N/A	N/A	Requires only extension of existing lines	Exceeds capacity at Awbrey Glen & requires new regional pump station	N/A	N/A
OB Riley / Gopher Gulch Area	Requires extension of NEI west of US 20	Requires extension of NEI west of US 20	Requires extension of NEI west of US 20 plus pipe extension to south	Requires extension of NEI west of US 20; shares infrastructure with new regional pump station triggered by Shevlin Area	Requires extension of NEI west of US 20	Requires extension of NEI west of US 20; shares infrastructure with new regional pump station triggered by West Area
Existing UGB (if applicable)	N/A	N/A	N/A	N/A	N/A	N/A
Overall Score	4 🟢	3 ⚪	3 ⚪	2 🔴	2 🔴	1 🔴
	Scenario takes advantage of Hamby and NEI	Scenario takes advantage of NEI, but does not take full advantage of Hamby by developing NE Edge	Scenario takes advantage of NEI, but does not take full advantage of Hamby by developing NE Edge	Scenario takes advantage of Hamby and NEI; however requires regional pump station for Shevlin	Scenario takes advantage of NEI, but does not take full advantage of Hamby by developing NE Edge	Scenario takes advantage of NEI; does not take full advantage of Hamby developing NE Edge; requires regional pump station for West

For more information about this performance measure, see accompanying technical memorandum from Murray Smith Associates.

06711

Factor 2: Orderly and Economic Provision of Public Facilities and Services		Author:		Murray Smith Associates	

Community Outcome B. **Cost Effective Infrastructure**

Date: 10/1/2015

Performance Measure 5	Initial Capital Cost of Sanitary Sewer Infrastructure Improvements
Brief Description of Evaluation:	Initial capital cost (millions of dollars) of sanitary sewer infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP. Note that operational and maintenance costs and lifecycle costs for pump stations are not included.
Data Sources	

Interpretation and Key

Better ranking fields have lower total cost of improvements needed. At the subarea level, costs under $6 million are rated "Good", $6-12 million is "Fair", over $12 million is "Poor". For Scenario / SAAM totals, under $46 million is rated "Good", $46-52 million is rated "Fair" and over $52 million is rated "Poor".

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)												
Total Expansion Area (excluding current UGB)	38.0	$M	39.5	$M	45.4	$M	54.3	$M	41.0	$M	54.3	$M
Subareas												
North Triangle	2.6	$M	2.5	$M	1.9	$M	0.8	$M	1.4	$M	1.8	$M
NE Edge	5.2	$M	2.6	$M	3.5	$M	8.2	$M	0.5	$M	0.6	$M
DSL Property	6.4	$M	7.8	$M	6.5	$M	5.5	$M	11.7	$M	5.5	$M
The "Elbow"	7.7	$M	10.0	$M	8.6	$M	7.9	$M	9.4	$M	9.5	$M
The "Thumb"	6.8	$M	7.1	$M	5.4	$M	6.1	$M	7.4	$M	6.9	$M
West Area	2.8	$M	2.8	$M	7.0	$M	N/A		N/A		27.2	$M
Shevlin Area	N/A		N/A		4.0	$M	24.1	$M	N/A		N/A	
OB Riley / Gopher Gulch Area	6.5	$M	6.6	$M	8.5	$M	1.6	$M	10.5	$M	2.7	$M
Existing UGB (if applicable)	N/A		N/A		N/A		N/A		N/A		N/A	
Overall Score	4	🟢	3	◯	3	◯	1	🔴	3	◯	1	🔴
	Initial capital costs are low to moderate in all subareas, and the lowest overall.		Initial capital costs are low to moderate in all subareas, and relatively low overall.		Initial capital costs are low to moderate in all subareas, and relatively low overall.		Need for new regional pump station significantly increases costs for the Shevlin Area and overall.		Initial capital costs are low to moderate in all subareas, and relatively low overall.		Need for new regional pump station significantly increases costs for the West Area and overall.	

For more information about this performance measure, see accompanying technical memorandum from Murray Smith Associates.

06712

Factor 2: Orderly and Economic Provision of Public Facilities and Services												Author:		Murray Smith Associates
Community Outcome B.	Cost Effective Infrastructure											Date:		10/1/2015

Performance Measure 6	Initial capital cost of Sanitary Sewer Infrastructure Improvements per developed acre													
Brief Description of Evaluation:	Cost of infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP, divided by the urbanized acres													
Data Sources														
Interpretation and Key	Ratings are assigned based primarily on the performance of the subareas and less on the overall average cost per acre at the Scenario / SAAM level; under $25,000 per acre is rated as "Good", $25,000-40,000 is rated as Fair; over $40,000 is rated as "Poor"													
	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank									

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units
Total Future UGB (Including Current UGB)												
Total Expansion Area (excluding current UGB)	22,646	$/Acre	23,253	$/Acre	22,593	$/Acre	22,864	$/Acre	24,731	$/Acre	33,520	$/Acre
Subareas												
North Triangle	13,473	$/Acre	13,258	$/Acre	8,116	$/Acre	4,268	$/Acre	5,853	$/Acre	7,742	$/Acre
NE Edge	11,534	$/Acre	20,000	$/Acre	22,062	$/Acre	7,338	$/Acre	12,944	$/Acre	14,831	$/Acre
DSL Property	29,140	$/Acre	21,846	$/Acre	33,816	$/Acre	44,343	$/Acre	61,882	$/Acre	43,233	$/Acre
The "Elbow"	37,671	$/Acre	24,779	$/Acre	48,338	$/Acre	52,029	$/Acre	53,094	$/Acre	53,692	$/Acre
The "Thumb"	19,432	$/Acre	22,834	$/Acre	30,655	$/Acre	26,217	$/Acre	34,714	$/Acre	32,918	$/Acre
West Area	21,361	$/Acre	16,422	$/Acre	18,812	$/Acre	N/A		N/A		41,327	$/Acre
Shevlin Area	N/A		N/A		12,556	$/Acre	56,235	$/Acre	N/A		N/A	
OB Riley / Gopher Gulch Area	51,293	$/Acre	49,176	$/Acre	18,840	$/Acre	12,501	$/Acre	13,102	$/Acre	15,448	$/Acre
Existing UGB (if applicable)	N/A		N/A		N/A		N/A		N/A		N/A	
Overall Score	3 ○		4 🟢		3 ○		2 🔴		2 🔴		1 🔴	
	DSL property and The Elbow are moderately cost-effective due to moderate area included and fixed costs to serve the area; OB Riley has cost per acre, but needed infrastructure to serve that area may in the very long term serve additional growth		Most subareas are cost-effective to serve; OB Riley has cost per acre, but needed infrastructure to serve that area may in the very long term serve additional growth		The Elbow is not cost-effective due to small area included and fixed costs to serve the area, DSL property and The Thumb are moderately cost-effective due to moderate area included and fixed costs to serve the area		DSL property and The Elbow are not cost-effective due to small area included and fixed costs to serve the area; also requires regional pump station for Shevlin which increases cost in that area significantly		DSL property and The Elbow are not cost-effective due to small area included and fixed costs to serve the area		DSL property and The Elbow are not cost-effective due to small area included and fixed costs to serve the area; also requires regional pump station for West, which increases cost in that area significantly; also has high overall cost per acre	

For more information about this performance measure, see accompanying technical memorandum from Murray Smith Associates.

06713

Factor 2: Orderly and Economic Provision of Public Facilities and Services

Community Outcome B.   **Cost Effective Infrastructure**

Author: **Murray Smith Associates**

Date: 9/8/2015

Performance Measure 7	**Drinking Water Infrastructure Improvements**
Brief Description of Evaluation:	Drinking water infrastructure improvements within city water service area required to serve new growth, beyond what is already planned
Data Sources	

Interpretation and Key

Better ranking fields are easier to expand / upgrade infrastructure.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 *Qualitative Evaluation*	Scenario 2.1 *Qualitative Evaluation*	Scenario 3.1 *Qualitative Evaluation*	SAAM-1 *Qualitative Evaluation*	SAAM-2 *Qualitative Evaluation*	SAAM-3 *Qualitative Evaluation*
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)						
Subareas						
North Triangle	Zone 6 expansion	Zone 6 expansion	Zone 6 expansion	Zone 6 expansion	Zone 6 expansion	Zone 6 expansion
NE Edge						
DSL Property						
The "Elbow"						
The "Thumb"						
West Area	Zone 3 expansion	Zone 3 expansion	Zone 3 expansion	N/A	N/A	Zone 3 expansion
Shevlin Area	N/A	N/A	Zone 4E, 5B, 6B expansion: supply through smaller zones and PRVs	Zone 4E, 5B, 6B expansion: supply through smaller zones and PRVs	N/A	N/A
OB Riley / Gopher Gulch Area	Zone 6 expansion	Zone 6 expansion	Zone 6 expansion	Zone 6 expansion	Zone 6 expansion	Zone 6 expansion
Existing UGB (if applicable)	N/A	N/A	N/A	N/A	N/A	N/A
Overall Score	5 ◉	5 ◉	4 ◠	4 ◠	5 ◉	5 ◉
	Favors expansion in Zones 3 and 6	Favors expansion in Zones 3 and 6	More problematic to expand into Zones 4E, 5B, 6B	More problematic to expand into Zones 4E, 5B, 6B	Favors expansion in Zones 3 and 6	Favors expansion in Zones 3 and 6

For more information about this performance measure, see accompanying technical memorandum from Murray Smith Associates.

| **Factor 2: Orderly and Economic Growth** | | | | | | | | | | | Author: | Name | **Fregonese Associates** |

Community Outcome B Cost Effective Infrastructure　　　　　　　　　　　　　　Date:　9/10/2015

Performance Measure 9	**Total Impervious Area from New Development**

Brief Description of Evaluation:	The amount of impervious area for each scenario. Includes impervious amounts of buildings, surface parking lots, and roadways.
Data Sources	Impervious area is an Envision Tomorrow output, based off building/prototype assumptions. Note that certain land uses, including the large lot industrial site and schools, do not have specific impervious surface assumptions built in, and do not contribute to the totals.

Interpretation and Key

Variations are subtle at the full scenario level and for the expansion areas total.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	3,315	Acres	3,291	Acres	3,393	Acres	3,526	Acres	3,405	Acres	3,311	Acres
Total Expansion Area (excluding current UGB)	1,047	Acres	1,022	Acres	1,122	Acres	1,251	Acres	1,130	Acres	1,043	Acres
Subareas												
North Triangle	153	Acres	130	Acres	138	Acres	153	Acres	138	Acres	138	Acres
NE Edge	237	Acres	72	Acres	91	Acres	452	Acres	29	Acres	29	Acres
DSL Property	115	Acres	210	Acres	93	Acres	72	Acres	127	Acres	102	Acres
The "Elbow"	126	Acres	233	Acres	113	Acres	92	Acres	113	Acres	113	Acres
The "Thumb"	239	Acres	219	Acres	130	Acres	180	Acres	151	Acres	158	Acres
West Area	92	Acres	118	Acres	181	Acres	N/A	Acres	N/A	Acres	377	Acres
Shevlin Area	N/A	Acres	N/A	Acres	98	Acres	216	Acres	N/A	Acres	N/A	Acres
OB Riley / Gopher Gulch Area	85	Acres	41	Acres	279	Acres	85	Acres	573	Acres	126	Acres
Existing UGB (if applicable)	2,268	Acres	2,268	Acres	2,268	Acres	2,268	Acres	2,268	Acres	2,268	Acres
Overall Score	4		4		3 ○		3 ○ Model overestimates impervious surface area for NE Edge		3 ○		4	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06715

Factor 2: Orderly and Economic Provision of Public Facilities and Services			**Author:**	Laura Krull, Andrew Parish		**APG**

Community Outcome B — **Cost Effective Infrastructure** — **Date:** 8/25/2015

Performance Measure 10	**Acres of new development with welded tuff geology**					
Brief Description of Evaluation:	Acres of new development in areas with geology of "Welded Tuff", which is more difficult to build stormwater infrastructure upon.					
Data Sources	Welded Tuff Geology, United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Service Geographic (SSURGO) data set					

Interpretation and Key — Areas with < 100 acres of development in welded tuff ranked green, areas with 100 - 200 acres ranked yellow, areas with > 200 acres ranked red.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	**Scenario 1.2** *Value Units*	**Scenario 2.1** *Value Units*	**Scenario 3.1** *Value Units*	**SAAM-1** *Value Units*	**SAAM-2** *Value Units*	**SAAM-3** *Value Units*
Total Future UGB (Including Current UGB)	1269 acres	1310 acres	1478 acres	1409 acres	1143 acres	1666 acres
Total Expansion Area (excluding current UGB)	133 acres	173 acres	341 acres	272 acres	6 acres	529 acres
Subareas						
North Triangle	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres
NE Edge	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres
DSL Property	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres
The "Elbow"	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres
The "Thumb"	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres
West Area	132 acres	171 acres	309 acres	0 acres	0 acres	529 acres
Shevlin Area	0 acres	0 acres	26 acres	272 acres	0 acres	0 acres
OB Riley / Gopher Gulch Area	0 acres	0 acres	0 acres	0 acres	6 acres	0 acres
Existing UGB (if applicable)	1137 acres	1137 acres	1137 acres	1137 acres	1137 acres	1137 acres
Overall Score	3 ○	3 ○	2 ▬	2 ▬	5 ◉	1 ●
	Moderate development in West area, which has Welded Tuff geology	Moderate development in West area, which has Welded Tuff geology	Significant development in West and Shevlin areas, which have Welded Tuff geology	Significant development in West and Shevlin areas, which have Welded Tuff geology	Little to no development in areas with Welded Tuff geology	Significant development in West area, which has Welded Tuff geology

For more information about this performance measure, see accompanying technical memorandum from APG

06716

Factor 2: Orderly and Economic Provision of Public Facilities and Services				**Author:**	Laura Krull, Andrew Parish	**APG**

Community Outcome B — **Cost Effective Infrastructure**   **Date:**   8/25/2015

Performance Measure 6	**Acres of new development within DWPA**
Brief Description of Evaluation:	Acres of development within identified Drinking Water Protection Areas
Data Sources	Scenario and SAAM GIS layers, Bend UGB Remand Project; Drinking Water Protection Areas, City of Bend.

Interpretation and Key

All scenarios develop on land within DWPA. Most drinking water protection areas are in the South of the city. Scenarios with greater than 300 acres ranked "Poor" and scenarios with less than 300 ranked "Fair".

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 *Value Units*	Scenario 2.1 *Value Units*	Scenario 3.1 *Value Units*	SAAM-1 *Value Units*	SAAM-2 *Value Units*	SAAM-3 *Value Units*
Total Future UGB (Including Current UGB)	1273 acres	1222 acres	1121 acres	1121 acres	1064 acres	1135 acres
Total Expansion Area (excluding current UGB)	403 acres	352 acres	250 acres	250 acres	193 acres	265 acres
Subareas						
North Triangle	2 acres	2 acres	2 acres	2 acres	2 acres	2 acres
NE Edge	6 acres	6 acres	6 acres	0 acres	0 acres	0 acres
DSL Property	3 acres	3 acres	3 acres	2 acres	2 acres	3 acres
The "Elbow"	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres
The "Thumb"	335 acres	296 acres	161 acres	231 acres	182 acres	196 acres
West Area	56 acres	44 acres	64 acres	0 acres	0 acres	65 acres
Shevlin Area	0 acres	0 acres	6 acres	16 acres	0 acres	0 acres
OB Riley / Gopher Gulch Area	0 acres	0 acres	8 acres	0 acres	8 acres	0 acres
Existing UGB (if applicable)	871 acres	871 acres	871 acres	871 acres	871 acres	871 acres
Overall Score	1 ●	2 ◕	3 ○	3 ○	5 ◉	3 ○
	Significant development in the Thumb drive this ranking.	Significant development in the Thumb drive this ranking.	Less development in The Thumb drives this ranking.	Less development in the Thumb and West areas drive this ranking.	Less development in the Thumb and West areas drive this ranking.	Less development in The Thumb drives this ranking.

For more information about this performance measure, see accompanying technical memorandum from APG

Factor 3: ESEE		**Author:** CJ Doxsee		**APG**		
Community Outcome A	**Quality Natural Environment**		**Date:** 8/20/2015			

Performance Measure 1	**Development near Goal 5 Resources**
Brief Description of Evaluation:	Acres of development outside the UGB within identified elk/deer winter range and acres of development within "ODFW Areas of Potential Concern".
Data Sources	ODFW Winter Range GIS, Scenario and SAAM GIS

Interpretation and Key

Areas with no development in wildlife corridor or "ODFW areas of potential concern" are identified in green. Subareas that are partially included in these categories are identified in yellow, and subareas that are wholly encompassed by winter range/"ODFW areas of potential concern" are red. At the whole-UGB roll-up, Scenarios/SAAMs with 300-500 acres in these Goal 5 areas are marked yellow, Scenarios/SAAMs with > 500 acres are marked red.

Good	Fair	Poor	No Data	

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)												
Total Expansion Area (excluding current UGB)	546	Acres in Elk/Deer Range	679	Acres in Elk/Deer Range	778	Acres in Elk/Deer Range	855	Acres in Elk/Deer Range	325	Acres in Elk/Deer Range	990	Acres in Elk/Deer Range
	0	Acres in "Potential Elk/Deer Range"	0	Acres in "Potential Elk/Deer Range"	176	Acres in "Potential Elk/Deer Range"	545	Acres in "Potential Elk/Deer Range"	0	Acres in "Potential Elk/Deer Range"	0	Acres in "Potential Elk/Deer Range"
Subareas												
North Triangle	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range
	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"
NE Edge	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range
	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"
DSL Property	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range
	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"
The "Elbow"	64	Acres in Elk/Deer Range	111	Acres in Elk/Deer Range	97	Acres in Elk/Deer Range	70	Acres in Elk/Deer Range	100	Acres in Elk/Deer Range	100	Acres in Elk/Deer Range
	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"
The "Thumb"	350	Acres in Elk/Deer Range	395	Acres in Elk/Deer Range	176	Acres in Elk/Deer Range	240	Acres in Elk/Deer Range	225	Acres in Elk/Deer Range	220	Acres in Elk/Deer Range
	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"
West Area	132	Acres in Elk/Deer Range	173	Acres in Elk/Deer Range	329	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	670	Acres in Elk/Deer Range
	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"
Shevlin Area	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	176	Acres in Elk/Deer Range	545	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range
	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	176	Acres in "ODFW Areas of Potential Concern"	545	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"
OB Riley / Gopher Gulch Area	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range	0	Acres in Elk/Deer Range
	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"	0	Acres in "ODFW Areas of Potential Concern"
Existing UGB (if applicable)												
Overall Score	4		3		2		1		5		2	
	Significant expansion in elk/deer range (Thumb and West areas)		Significant expansion in elk/deer range (Thumb and West areas)		Scenario has significant development in both habitat corridor and "ODFW Areas of Potential Concern."		Scenario has significant development in both habitat corridor and "ODFW Areas of Potential Concern."		Only modest development in elk/deer range (Thumb and portion of Elbow).		Large amount of expansion in elk/deer range (Thumb and West areas)	

For more information about this performance measure, see accompanying technical memorandum from APG

Factor 3: ESEE		Author: Andrew Parish	APG
Community Outcome A	**Quality Natural Environment**	Date: 9/2/2015	

Performance Measure 2	**Linear feet of property along Deschutes River and Tumalo Creek**
Brief Description of Evaluation:	Linear feet (not in parks ownership) along identified Goal 5 areas of the Deschutes River and Tumalo Creek, in the Shevlin Area and the Gopher Gulch Area.
Data Sources	Deschutes County Assessor's Data, City of Bend data.

Interpretation and Key	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Expansion Area (excluding current UGB)	-	Feet	-	Feet	1,100	Feet	6,000	Feet	8,100	Feet	-	Feet
Subareas												
North Triangle	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet
NE Edge	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet
DSL Property	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet
The "Elbow"	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet
The "Thumb"	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet
West Area	-	Feet	-	Feet	0	Feet	0	Feet	-	Feet	-	Feet
Shevlin Area	0	Feet	0	Feet	-	Feet	6,000	Feet	0	Feet	0	Feet
OB Riley / Gopher Gulch Area	-	Feet	-	Feet	1,100	Feet	-	Feet	8,100	Feet	-	Feet
Existing UGB (if applicable)	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet	-	Feet

Overall Score	5 ◉	5 ◉	4 ◕	3 ○	3 ○	5 ◉
	No expansion areas abut Tumalo Creek or the Deschutes River.	No expansion areas abut Tumalo Creek or the Deschutes River.	The southern portion of the OB Riley / Gopher Gulch area abuts the Deschutes River for roughly 1100 feet.	Shevlin Area abuts Tumalo Creek, but the Bend Metropolitan Parks & Recreation District has ownership of the property within roughly 500ft of the river.	Gopher Gulch property abuts the Deschutes River - though State of Oregon Parks and Recreation owns much of the riverfront from about 50ft to 200ft from the river and roughly 7,000 feet of riverfront is owned by the Bend Parks & Recreation District. Open space buffers will likely be required in a few areas that are privately owned and within 100' of the river. Roughly 1300 feet of property is in private ownership and abuts the river.	West area does not abut Tumalo Creek.

06719

Factor 3: ESEE				Author:	Karen Swirsky & Craig Letz	City of Bend & Letz Consulting

Community Outcome A — Quality Natural Environment — Date: 9/3/2015

Performance Measure 3	**Wildfire Hazard**
Brief Description of Evaluation:	Based on wildfire hazard as determined by vegetation, slope, and levels of existing management.
Data Sources	Greater Bend Community Wildfire Protection Plan, Deschutes Co Fire Risk Index Map, Fire Risk Assessment for Bend UGB, Fire Behavior Analysis for Bend UGB Investigation (draft).
Interpretation and Key	By sub-area, "Good" means that fire hazard was determined to be low (1). "Fair" means that the fire hazard was determined to be "High (2)." "Poor" means that the fire hazard was determined to be "Extreme (3)." Areas with a mix of "High" and "Extreme" hazard were classified as "Poor." NOTE: These rankings are based on the hazard evaluation only. Employment land is protected by existing building code. Mitigation measures are being developed which will reduce hazard to residential areas if adopted into code.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)						

Subareas

Evaluation Geography	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
North Triangle	*Mosaic high fire hazard: there is hazard of fire due to vegetation type, but it would be relatively easy to control because of the patchy nature of the High fire hazard areas*					
	No residential development. Current building codes require fire protection for commercial buildings	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings
NE Edge	*Mosaic high fire hazard: there is hazard of fire due to vegetation type, but it would be relatively easy to control because of the patchy nature of the High fire hazard areas*					
	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings
DSL Property	*Extreme fire hazard: unmanaged and unirrigated. Hazard could be reduced to high with proper management of vegetation.*					
	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas	No residential development. Current building codes require fire protection for commercial buildings	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas
The "Elbow"	*Extreme fire hazard west of 27th/north of Knott Road; hazard could be reduced to high with proper management of vegetation. Remainder of area is mosaic High fire hazard*					
	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings
The "Thumb"	*well-managed High fire hazard*					
	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings
West Area	*Miller property : well-managed High hazard; Day property: managed High hazard*					
	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	N/A	N/A	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas
Shevlin Area	*mosaic of managed High and Extreme fire hazard; portions of the subarea have topography and unmanaged adjacent lands that could make it difficult to reduce fire hazard*					
	N/A	N/A	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas	N/A	N/A
OB Riley / Gopher Gulch Area	*managed High fire hazard, with pockets of Extreme (hazard could be reduced to high with proper management of vegetation except along steep slopes adjacent to river)*					
	No residential development. Current building codes require fire protection for commercial buildings	No residential development. Current building codes require fire protection for commercial buildings	Residential development in high fire hazard area. New regulations / mitigation strategies needed for residential areas	No residential development. Current building codes require fire protection for commercial buildings	Residential development in extreme fire hazard area. New regulations / mitigation strategies needed for residential areas	No residential development. Current building codes require fire protection for commercial buildings
Existing UGB (if applicable)	N/A	N/A	N/A	N/A	N/A	N/A
Overall Score	3 ○	3 ○	2 ◔	2 ◔	3 ○	3 ○
	Includes four subareas with a High hazard rating and three with an Extreme hazard rating. The three subareas rated Extreme in this scenario could be reduced to High with proper management of vegetation.	Includes four subareas with a High hazard rating and three with an Extreme hazard rating. The three subareas rated Extreme in this scenario could be reduced to High with proper management of vegetation.	includes four subareas with a High hazard rating and four with an Extreme hazard rating. Most of the subareas rated Extreme in this scenario would likely to be reduced to High with proper management of vegetation; however, portions of the Shevlin subarea have topography and unmanaged adjacent lands that could make it more difficult to reduce fire hazard.	includes three subareas with a High hazard rating and four with an Extreme hazard rating. Most of the subareas rated Extreme in this scenario would likely to be reduced to High with proper management of vegetation; however, portions of the Shevlin subarea have topography and unmanaged adjacent lands that could make it more difficult to reduce fire hazard.	includes three subareas with a High hazard rating and three with an Extreme hazard rating. Most of the subareas rated Extreme in this scenario would likely to be reduced to High with proper management of vegetation (area adjacent to river with steep slopes would make it harder to reduce fire hazard on the western edge, but this is largely park land).	includes four subareas with a High hazard rating and three with an Extreme hazard rating. Most of the subareas rated Extreme in this scenario would likely to be reduced to High with proper management of vegetation

For more information about this performance measure, see accompanying technical memorandum from City of Bend.

Footnotes:	(1) No areas were determined to be low hazard in the onsite assessment. Areas are shown as low hazard because existing building codes require fire protection measures (i.e. materials and
	(2) High hazard means that there is brush, healthy conifers, and open sage and juniper on terrain of less than 25% slope. Variability in the Bend area was addressed by modifying "high" as
	(3) Extreme hazard means that the areas have grasses, heavy brush, and mature timber with slash. With proper management, all Extreme areas can be modified to High.

Factor 3: ESEE

Author: Analysis by Fregonese Associates; interpretation by Angelo Planning Group

Community Outcome A   **Quality Natural Environment**

Date: 9/10/2015

Performance Measure 4		Carbon Dioxide Emissions

Brief Description of Evaluation:	The average number of tons of CO2 emitted per household, per year, for household based, and transportation based emissions.
Data Sources	Household CO2 is an output of the Envision Tomorrow Scenario Builder, based on regional averages for different housing types, and seasonality. Transportation CO2 is the output from 7D transportation model, based on national averages for vehicle emissions.
Interpretation and Key	Smaller, and more compact homes are more energy efficient, and have lower emissions. Larger homes emit more carbon than smaller units, and contain additional people, both of which result in increased emissions per household. As a result, this performance measure is highly correlated with housing mix. This also means that distinctions at the total expansion area and total future UGB level are very subtle, and that there is more variability at the subarea level, depending on the type of housing assumed in each. Transportation emissions reflect the amount and distance of auto trips (see 2.A.1). Color coding relative to average for existing UGB: better than existing UGB (by more than 0.2 tons/yr)= "Good"; within 0.2 tons/yr of existing UGB = "Fair"; worse than existing UGB (by more than 0.2 tons/yr) = "Poor". Subareas with trivial amounts of housing shown in grey since emissions are normalized per household. Overall ratings are based more on the transportation carbon emissions, because these have more meaningful variations at the scenario level, though they are highly correlated with VMT.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units
Total Future UGB (Including Current UGB)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)	4.3	Housing Carbon Emissions Per HH (Ton/Yr)	4.3	Housing Carbon Emissions Per HH (Ton/Yr)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)	3.5	Housing Carbon Emissions Per HH (Ton/Yr)
	3.7	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.7	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.7	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.8	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.8	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.7	Trasnportation Carbon Emissions Per HH (Ton/Yr)
Total Expansion Area (excluding current UGB)	4.7	Housing Carbon Emissions Per HH (Ton/Yr)	4.6	Housing Carbon Emissions Per HH (Ton/Yr)	4.7	Housing Carbon Emissions Per HH (Ton/Yr)	4.9	Housing Carbon Emissions Per HH (Ton/Yr)	4.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.9	Housing Carbon Emissions Per HH (Ton/Yr)
	6.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)	6.4	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.4	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.9	Trasnportation Carbon Emissions Per HH (Ton/Yr)	8.1	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.5	Trasnportation Carbon Emissions Per HH (Ton/Yr)
Subareas											3.7	
North Traingle	3.5	Housing Carbon Emissions Per HH (Ton/Yr)	3.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.5	Housing Carbon Emissions Per HH (Ton/Yr)	3.5	Housing Carbon Emissions Per HH (Ton/Yr)	3.5	Housing Carbon Emissions Per HH (Ton/Yr)	3.1	Housing Carbon Emissions Per HH (Ton/Yr)
	7.8	Trasnportation Carbon Emissions Per HH (Ton/Yr)	4.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.7	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.8	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.8	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)
NE Edge	5.4	Housing Carbon Emissions Per HH (Ton/Yr)	6.0	Housing Carbon Emissions Per HH (Ton/Yr)	5.7	Housing Carbon Emissions Per HH (Ton/Yr)	5.1	Housing Carbon Emissions Per HH (Ton/Yr)	3.9	Housing Carbon Emissions Per HH (Ton/Yr)	54.6	Housing Carbon Emissions Per HH (Ton/Yr)
	6.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	9.1	Trasnportation Carbon Emissions Per HH (Ton/Yr)	8.5	Trasnportation Carbon Emissions Per HH (Ton/Yr)	5.9	Trasnportation Carbon Emissions Per HH (Ton/Yr)	12.1	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.4	Trasnportation Carbon Emissions Per HH (Ton/Yr)
DSL Property	3.5	Housing Carbon Emissions Per HH (Ton/Yr)	4.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.8	Housing Carbon Emissions Per HH (Ton/Yr)	3.4	Housing Carbon Emissions Per HH (Ton/Yr)	5.1	Housing Carbon Emissions Per HH (Ton/Yr)	45.3	Housing Carbon Emissions Per HH (Ton/Yr)
	3.1	Trasnportation Carbon Emissions Per HH (Ton/Yr)	4.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	4.4	Trasnportation Carbon Emissions Per HH (Ton/Yr)	2.0	Trasnportation Carbon Emissions Per HH (Ton/Yr)	1.1	Trasnportation Carbon Emissions Per HH (Ton/Yr)	5.3	Trasnportation Carbon Emissions Per HH (Ton/Yr)
The "Elbow"	3.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.6	Housing Carbon Emissions Per HH (Ton/Yr)	3.4	Housing Carbon Emissions Per HH (Ton/Yr)	3.6	Housing Carbon Emissions Per HH (Ton/Yr)	6.0	Housing Carbon Emissions Per HH (Ton/Yr)
	9.0	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	55.9	Trasnportation Carbon Emissions Per HH (Ton/Yr)	47.8	Trasnportation Carbon Emissions Per HH (Ton/Yr)	54.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)	4.0	Trasnportation Carbon Emissions Per HH (Ton/Yr)
The "Thumb"	6.5	Housing Carbon Emissions Per HH (Ton/Yr)	4.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.0	Housing Carbon Emissions Per HH (Ton/Yr)	3.2	Housing Carbon Emissions Per HH (Ton/Yr)	6.0	Housing Carbon Emissions Per HH (Ton/Yr)	249.8	Housing Carbon Emissions Per HH (Ton/Yr)
	8.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)	66.9	Trasnportation Carbon Emissions Per HH (Ton/Yr)	27.0	Trasnportation Carbon Emissions Per HH (Ton/Yr)	16.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.3	Trasnportation Carbon Emissions Per HH (Ton/Yr)
West Area	3.8	Housing Carbon Emissions Per HH (Ton/Yr)	4.2	Housing Carbon Emissions Per HH (Ton/Yr)	4.9	Housing Carbon Emissions Per HH (Ton/Yr)	N/A	Housing Carbon Emissions Per HH (Ton/Yr)	N/A	Housing Carbon Emissions Per HH (Ton/Yr)	5.6	Housing Carbon Emissions Per HH (Ton/Yr)
	5.3	Trasnportation Carbon Emissions Per HH (Ton/Yr)	5.5	Trasnportation Carbon Emissions Per HH (Ton/Yr)	6.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	N/A	Trasnportation Carbon Emissions Per HH (Ton/Yr)	N/A	Trasnportation Carbon Emissions Per HH (Ton/Yr)	4.4	Trasnportation Carbon Emissions Per HH (Ton/Yr)
Shevlin Area	N/A	Housing Carbon Emissions Per HH (Ton/Yr)	N/A	Housing Carbon Emissions Per HH (Ton/Yr)	6.8	Housing Carbon Emissions Per HH (Ton/Yr)	4.8	Housing Carbon Emissions Per HH (Ton/Yr)	N/A	Housing Carbon Emissions Per HH (Ton/Yr)	N/A	Housing Carbon Emissions Per HH (Ton/Yr)
	N/A	Trasnportation Carbon Emissions Per HH (Ton/Yr)	N/A	Trasnportation Carbon Emissions Per HH (Ton/Yr)	9.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)	7.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	N/A	Trasnportation Carbon Emissions Per HH (Ton/Yr)	N/A	Trasnportation Carbon Emissions Per HH (Ton/Yr)
OB Riley / Gopher Gulch Area	3.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.9	Housing Carbon Emissions Per HH (Ton/Yr)	4.9	Housing Carbon Emissions Per HH (Ton/Yr)	3.3	Housing Carbon Emissions Per HH (Ton/Yr)
	10.6	Trasnportation Carbon Emissions Per HH (Ton/Yr)	10.5	Trasnportation Carbon Emissions Per HH (Ton/Yr)	5.3	Trasnportation Carbon Emissions Per HH (Ton/Yr)	9.0	Trasnportation Carbon Emissions Per HH (Ton/Yr)	5.7	Trasnportation Carbon Emissions Per HH (Ton/Yr)		Trasnportation Carbon Emissions Per HH (Ton/Yr)
Existing UGB (if applicable)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)	4.4	Housing Carbon Emissions Per HH (Ton/Yr)
	3.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)	3.2	Trasnportation Carbon Emissions Per HH (Ton/Yr)
Overall Score	3 ○		4 ●		3 ○		2 ●		2 ●		3 ○	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

Factor 3: ESEE

Community Outcome A   Quality Natural Environment

Author: Analysis by Fregonese Associates; interpretation by Angelo Planning Group

Date: 9/10/2015

Performance Measure 5	Energy Use
Brief Description of Evaluation:	The average number of BTUs used per household, per year.
Data Sources	Household energy usage is an output of the Envision Tomorrow Scenario Builder, based on regional averages for energy efficiency of different housing types.
Interpretation and Key	Smaller, and more compact homes are more efficient, and require less energy. Larger homes simply occupy more area, and require more energy to operate. As a result, this performance measure is highly correlated with housing mix. This also means that distinctions at the total expansion area and total future UGB level are very subtle, and that there is more variability at the subarea level, depending on the type of housing assumed in each. Color coding is assigned relative to the performance of growth in the existing UGB. "Good" means does better than the existing UGB by 0.5 Million BTU/yr. "Poor" means does worse than the existing UGB by more than 0.5 Million BTU/yr; Fair is within 0.5 Million BTU/yr of the existing UGB.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	68.1	Energy Use per HH (Million BTU/yr)	67.9	Energy Use per HH (Million BTU/yr)	68.0	Energy Use per HH (Million BTU/yr)	68.3	Energy Use per HH (Million BTU/yr)	68.4	Energy Use per HH (Million BTU/yr)	68.1	Energy Use per HH (Million BTU/yr)
	21.2	Energy Use per Employee (Million BTU/yr)	21.0	Energy Use per Employee (Million BTU/yr)	21.3	Energy Use per Employee (Million BTU/yr)	20.9	Energy Use per Employee (Million BTU/yr)	20.9	Energy Use per Employee (Million BTU/yr)	21.0	Energy Use per Employee (Million BTU/yr)
Total Expansion Area (excluding current UGB)	74.2	Energy Use per HH (Million BTU/yr)	71.2	Energy Use per HH (Million BTU/yr)	73.0	Energy Use per HH (Million BTU/yr)	76.0	Energy Use per HH (Million BTU/yr)	76.2	Energy Use per HH (Million BTU/yr)	73.4	Energy Use per HH (Million BTU/yr)
	17.6	Energy Use per Employee (Million BTU/yr)	15.9	Energy Use per Employee (Million BTU/yr)	17.9	Energy Use per Employee (Million BTU/yr)	17.7	Energy Use per Employee (Million BTU/yr)	18.0	Energy Use per Employee (Million BTU/yr)	18.3	Energy Use per Employee (Million BTU/yr)
Subareas												
North Triangle	54.2	Energy Use per HH (Million BTU/yr)	60.7	Energy Use per HH (Million BTU/yr)	54.2	Energy Use per HH (Million BTU/yr)	54.2	Energy Use per HH (Million BTU/yr)	54.2	Energy Use per HH (Million BTU/yr)	54.2	Energy Use per HH (Million BTU/yr)
	14.2	Energy Use per Employee (Million BTU/yr)	14.1	Energy Use per Employee (Million BTU/yr)	14.8	Energy Use per Employee (Million BTU/yr)	14.2	Energy Use per Employee (Million BTU/yr)	14.8	Energy Use per Employee (Million BTU/yr)	14.8	Energy Use per Employee (Million BTU/yr)
NE Edge	84.4	Energy Use per HH (Million BTU/yr)	93.7	Energy Use per HH (Million BTU/yr)	89.3	Energy Use per HH (Million BTU/yr)	**79.0**	Energy Use per HH (Million BTU/yr)	60.9	Energy Use per HH (Million BTU/yr)	60.9	Energy Use per HH (Million BTU/yr)
	23.5	Energy Use per Employee (Million BTU/yr)	22.9	Energy Use per Employee (Million BTU/yr)	23.0	Energy Use per Employee (Million BTU/yr)	22.9	Energy Use per Employee (Million BTU/yr)	22.8	Energy Use per Employee (Million BTU/yr)	22.8	Energy Use per Employee (Million BTU/yr)
DSL Property	55.0	Energy Use per HH (Million BTU/yr)	77.1	Energy Use per HH (Million BTU/yr)	59.4	Energy Use per HH (Million BTU/yr)	52.4	Energy Use per HH (Million BTU/yr)	**79.4**	Energy Use per HH (Million BTU/yr)	57.7	Energy Use per HH (Million BTU/yr)
	18.5	Energy Use per Employee (Million BTU/yr)	14.9	Energy Use per Employee (Million BTU/yr)	25.0	Energy Use per Employee (Million BTU/yr)	18.4	Energy Use per Employee (Million BTU/yr)	22.3	Energy Use per Employee (Million BTU/yr)	25.0	Energy Use per Employee (Million BTU/yr)
The "Elbow"	60.8	Energy Use per HH (Million BTU/yr)	61.6	Energy Use per HH (Million BTU/yr)	57.0	Energy Use per HH (Million BTU/yr)	52.7	Energy Use per HH (Million BTU/yr)	57.0	Energy Use per HH (Million BTU/yr)	57.0	Energy Use per HH (Million BTU/yr)
	16.3	Energy Use per Employee (Million BTU/yr)	16.1	Energy Use per Employee (Million BTU/yr)	14.7	Energy Use per Employee (Million BTU/yr)	16.4	Energy Use per Employee (Million BTU/yr)	14.7	Energy Use per Employee (Million BTU/yr)	14.7	Energy Use per Employee (Million BTU/yr)
The "Thumb"	101.4	Energy Use per HH (Million BTU/yr)	76.0	Energy Use per HH (Million BTU/yr)	46.9	Energy Use per HH (Million BTU/yr)	49.3	Energy Use per HH (Million BTU/yr)	93.6	Energy Use per HH (Million BTU/yr)	52.5	Energy Use per HH (Million BTU/yr)
	19.6	Energy Use per Employee (Million BTU/yr)	16.5	Energy Use per Employee (Million BTU/yr)	17.6	Energy Use per Employee (Million BTU/yr)	19.6	Energy Use per Employee (Million BTU/yr)	17.6	Energy Use per Employee (Million BTU/yr)	19.0	Energy Use per Employee (Million BTU/yr)
West Area	59.0	Energy Use per HH (Million BTU/yr)	65.8	Energy Use per HH (Million BTU/yr)	75.9	Energy Use per HH (Million BTU/yr)	62.4	Energy Use per HH (Million BTU/yr)	62.6	Energy Use per HH (Million BTU/yr)	**82.4**	Energy Use per HH (Million BTU/yr)
	21.3	Energy Use per Employee (Million BTU/yr)	16.1	Energy Use per Employee (Million BTU/yr)	21.4	Energy Use per Employee (Million BTU/yr)	21.0	Energy Use per Employee (Million BTU/yr)	21.4	Energy Use per Employee (Million BTU/yr)	19.7	Energy Use per Employee (Million BTU/yr)
Shevlin Area		Energy Use per HH (Million BTU/yr)		Energy Use per HH (Million BTU/yr)	106.0	Energy Use per HH (Million BTU/yr)	**74.9**	Energy Use per HH (Million BTU/yr)	62.6	Energy Use per HH (Million BTU/yr)	62.6	Energy Use per HH (Million BTU/yr)
		Energy Use per Employee (Million BTU/yr)		Energy Use per Employee (Million BTU/yr)	20.8	Energy Use per Employee (Million BTU/yr)	21.4	Energy Use per Employee (Million BTU/yr)		Energy Use per Employee (Million BTU/yr)		Energy Use per Employee (Million BTU/yr)
OB Riley / Gopher Gulch Area	61.4	Energy Use per HH (Million BTU/yr)	61.0	Energy Use per HH (Million BTU/yr)	60.7	Energy Use per HH (Million BTU/yr)	61.6	Energy Use per HH (Million BTU/yr)	**77.2**	Energy Use per HH (Million BTU/yr)	51.8	Energy Use per HH (Million BTU/yr)
	15.3	Energy Use per Employee (Million BTU/yr)	14.6	Energy Use per Employee (Million BTU/yr)	18.7	Energy Use per Employee (Million BTU/yr)	15.3	Energy Use per Employee (Million BTU/yr)	19.6	Energy Use per Employee (Million BTU/yr)	19.6	Energy Use per Employee (Million BTU/yr)
Existing UGB (if applicable)	68.1	Energy Use per HH (Million BTU/yr)	68.1	Energy Use per HH (Million BTU/yr)	68.1	Energy Use per HH (Million BTU/yr)	68.1	Energy Use per HH (Million BTU/yr)	68.1	Energy Use per HH (Million BTU/yr)	68.1	Energy Use per HH (Million BTU/yr)
	21.5	Energy Use per Employee (Million BTU/yr)	21.5	Energy Use per Employee (Million BTU/yr)	21.5	Energy Use per Employee (Million BTU/yr)	21.5	Energy Use per Employee (Million BTU/yr)	21.5	Energy Use per Employee (Million BTU/yr)	21.5	Energy Use per Employee (Million BTU/yr)
Overall Score	3 ○		3 ○		3 ○		3 ○		3 ○		3 ○	
	Differences are not significant when comparing full expansion areas against one another.		Differences are not significant when comparing full expansion areas against one another.		Differences are not significant when comparing full expansion areas against one another.		Differences are not significant when comparing full expansion areas against one another.		Differences are not significant when comparing full expansion areas against one another.		Differences are not significant when comparing full expansion areas against one another.	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06722

Factor 3: ESEE		**Author:**	Analysis by Fregonese Associates; interpretation by Angelo Planning Group
Community Outcome A	Quality Natural Environment	**Date:**	9/10/2015

Performance Measure 6	**Household Water Usage**
Brief Description of Evaluation:	The average number of gallons of water used per household, per day, for both internal consumption, and landscaping.
Data Sources	Household water usage is an output of the Envision Tomorrow Scenario Builder, based off the number of people per household, and the amount of landscaped area per household, and regional averages for water consumption rates.
Interpretation and Key	More compact homes have less users, and lower consumption rates. Smaller homes and apartment also have less external landscaped area, requiring less water. Large homes have more users, and higher consumption rates. Larger properties with larger yards also require additional water for lawn maintenance. Color coding relative to average for existing UGB: better than existing UGB (by more than 5 G/Day)= "Good"; within 5 G/Day of existing UGB = "Fair"; worse than existing UGB (by more than 5 G/Day) = "Poor". Subareas with trivial amounts of housing shown in grey since emissions are normalized per household.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	113	Landscaping Water Use (G/Day)	111	Landscaping Water Use (G/Day)	113	Landscaping Water Use (G/Day)	117	Landscaping Water Use (G/Day)	112	Landscaping Water Use (G/Day)	112	Landscaping Water Use (G/Day)
	144	Internal Water Consumption (G/Day)	143	Internal Water Consumption (G/Day)	143	Internal Water Consumption (G/Day)	145	Internal Water Consumption (G/Day)	145	Internal Water Consumption (G/Day)	143	Internal Water Consumption (G/Day)
Total Expansion Area (excluding current UGB)	83	Landscaping Water Use (G/Day)	74	Landscaping Water Use (G/Day)	84	Landscaping Water Use (G/Day)	101	Landscaping Water Use (G/Day)	83	Landscaping Water Use (G/Day)	79	Landscaping Water Use (G/Day)
	129	Internal Water Consumption (G/Day)	123	Internal Water Consumption (G/Day)	123	Internal Water Consumption (G/Day)	134	Internal Water Consumption (G/Day)	134	Internal Water Consumption (G/Day)	126	Internal Water Consumption (G/Day)
Subareas												
North Triangle	6	Landscaping Water Use (G/Day)	68	Landscaping Water Use (G/Day)	6	Landscaping Water Use (G/Day)	6	Landscaping Water Use (G/Day)	6	Landscaping Water Use (G/Day)	6	Landscaping Water Use (G/Day)
	53	Internal Water Consumption (G/Day)	102	Internal Water Consumption (G/Day)	53	Internal Water Consumption (G/Day)	53	Internal Water Consumption (G/Day)	53	Internal Water Consumption (G/Day)	53	Internal Water Consumption (G/Day)
NE Edge	115	Landscaping Water Use (G/Day)	139	Landscaping Water Use (G/Day)	128	Landscaping Water Use (G/Day)	118	Landscaping Water Use (G/Day)	56	Landscaping Water Use (G/Day)	56	Landscaping Water Use (G/Day)
	149	Internal Water Consumption (G/Day)	174	Internal Water Consumption (G/Day)	165	Internal Water Consumption (G/Day)	140	Internal Water Consumption (G/Day)	103	Internal Water Consumption (G/Day)	103	Internal Water Consumption (G/Day)
DSL Property	39	Landscaping Water Use (G/Day)	81	Landscaping Water Use (G/Day)	45	Landscaping Water Use (G/Day)	7	Landscaping Water Use (G/Day)	93	Landscaping Water Use (G/Day)	34	Landscaping Water Use (G/Day)
	93	Internal Water Consumption (G/Day)	132	Internal Water Consumption (G/Day)	97	Internal Water Consumption (G/Day)	55	Internal Water Consumption (G/Day)	130	Internal Water Consumption (G/Day)	86	Internal Water Consumption (G/Day)
The "Elbow"	47	Landscaping Water Use (G/Day)	56	Landscaping Water Use (G/Day)	45	Landscaping Water Use (G/Day)	8	Landscaping Water Use (G/Day)	45	Landscaping Water Use (G/Day)	45	Landscaping Water Use (G/Day)
	103	Internal Water Consumption (G/Day)	107	Internal Water Consumption (G/Day)	71	Internal Water Consumption (G/Day)	56	Internal Water Consumption (G/Day)	71	Internal Water Consumption (G/Day)	71	Internal Water Consumption (G/Day)
The "Thumb"	115	Landscaping Water Use (G/Day)	65	Landscaping Water Use (G/Day)	9	Landscaping Water Use (G/Day)	6	Landscaping Water Use (G/Day)	105	Landscaping Water Use (G/Day)	9	Landscaping Water Use (G/Day)
	174	Internal Water Consumption (G/Day)	130	Internal Water Consumption (G/Day)	57	Internal Water Consumption (G/Day)	54	Internal Water Consumption (G/Day)	164	Internal Water Consumption (G/Day)	57	Internal Water Consumption (G/Day)
West Area	49	Landscaping Water Use (G/Day)	64	Landscaping Water Use (G/Day)	87	Landscaping Water Use (G/Day)	36	Landscaping Water Use (G/Day)		Landscaping Water Use (G/Day)	97	Landscaping Water Use (G/Day)
	102	Internal Water Consumption (G/Day)	115	Internal Water Consumption (G/Day)	130	Internal Water Consumption (G/Day)	87	Internal Water Consumption (G/Day)		Internal Water Consumption (G/Day)	143	Internal Water Consumption (G/Day)
Shevlin Area		Landscaping Water Use (G/Day)		Landscaping Water Use (G/Day)	165	Landscaping Water Use (G/Day)	81	Landscaping Water Use (G/Day)		Landscaping Water Use (G/Day)		Landscaping Water Use (G/Day)
		Internal Water Consumption (G/Day)		Internal Water Consumption (G/Day)	171	Internal Water Consumption (G/Day)	132	Internal Water Consumption (G/Day)		Internal Water Consumption (G/Day)		Internal Water Consumption (G/Day)
OB Riley / Gopher Gulch Area	6	Landscaping Water Use (G/Day)	6	Landscaping Water Use (G/Day)	60	Landscaping Water Use (G/Day)	6	Landscaping Water Use (G/Day)	82	Landscaping Water Use (G/Day)	25	Landscaping Water Use (G/Day)
	53	Internal Water Consumption (G/Day)	53	Internal Water Consumption (G/Day)	100	Internal Water Consumption (G/Day)	53	Internal Water Consumption (G/Day)	135	Internal Water Consumption (G/Day)	65	Internal Water Consumption (G/Day)
Existing UGB (if applicable)	122	Landscaping Water Use (G/Day)	122	Landscaping Water Use (G/Day)	122	Landscaping Water Use (G/Day)	122	Landscaping Water Use (G/Day)	122	Landscaping Water Use (G/Day)	122	Landscaping Water Use (G/Day)
	149	Internal Water Consumption (G/Day)	149	Internal Water Consumption (G/Day)	149	Internal Water Consumption (G/Day)	149	Internal Water Consumption (G/Day)	149	Internal Water Consumption (G/Day)	149	Internal Water Consumption (G/Day)
Overall Score	3 ○		4 ▲ Better performance due to higher housing densities.		3 ○		2 ▼ Worse performance due to more low-density housing.		3 ○		3 ○	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

Factor 3: ESEE		**Author:**	Analysis by Fregonese Associates; interpretation by Angelo Planning Group

Community Outcome B	**Housing Options, Affordability, and Equity**		
		Date:	9/10/2015

Performance Measure 1	**Average Cost of New Single Family Housing**
Brief Description of Evaluation:	The average cost a new, single family detached house. Does not include townhomes, condominiums, or rental products.
Data Sources	The base price is based on simple construction costs, determined by the size and quality of the house. Further price adjustments were made based off real estate trends identified using multiple listing service (MLS) data.
Interpretation and Key	Color coding is relative to the existing UGB: similar to existing UGB average ($425-475k) = "Fair"; less than existing UGB average (<$425k) = "Good"; more than existing UGB average (>$475k) = "Poor"

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	$ 436,000	Dollars	$ 435,000	Dollars	$ 461,000	Dollars	$ 449,000	Dollars	$ 459,000	Dollars	$ 461,000	Dollars
Total Expansion Area (excluding current UGB)	$ 398,000	Dollars	$ 394,000	Dollars	$ 503,000	Dollars	$ 454,000	Dollars	$ 491,000	Dollars	$ 500,000	Dollars
Subareas												
North Triangle	$ -	Dollars	$ 347,000	Dollars	$ -	Dollars	$ -	Dollars	$ -	Dollars	$ -	Dollars
NE Edge	$ 385,000	Dollars	$ 404,000	Dollars	$ 389,000	Dollars	$ 409,000	Dollars	$ 269,000	Dollars	$ 269,000	Dollars
DSL Property	$ 336,000	Dollars	$ 378,000	Dollars	$ 349,000	Dollars	$ 342,000	Dollars	$ 403,000	Dollars	$ 372,000	Dollars
The "Elbow"	$ 343,000	Dollars	$ 328,000	Dollars	$ 602,000	Dollars	$ 342,000	Dollars	$ 602,000	Dollars	$ 602,000	Dollars
The "Thumb"	$ 372,000	Dollars	$ 358,000	Dollars	$ 357,000	Dollars	$ 357,000	Dollars	$ 372,000	Dollars	$ 357,000	Dollars
West Area	$ 507,000	Dollars	$ 539,000	Dollars	$ 566,000	Dollars	$ 523,000	Dollars	$ -	Dollars	**$ 554,000**	Dollars
Shevlin Area	$ -	Dollars	$ -	Dollars	$ 694,000	Dollars	**$ 547,000**	Dollars	$ -	Dollars	$ -	Dollars
OB Riley / Gopher Gulch Area	$ 496,000	Dollars	$ 931,000	Dollars	$ 478,000	Dollars	$ 496,000	Dollars	**$ 515,000**	Dollars	$ 368,000	Dollars
Existing UGB (if applicable)	$ 448,000	Dollars	$ 448,000	Dollars	$ 448,000	Dollars	$ 448,000	Dollars	$ 448,000	Dollars	$ 448,000	Dollars
Overall Score	5 ◉		5 ◉		2 ◠		4 ◠		3 ○		2 ◠	
	Significant housing growth in the northeast and south (where home prices are anticipated to be lower) drives lower overall costs.		Significant housing growth in the southeast (where home prices are anticipated to be lower) drives lower overall costs.		More development in the West Area and the Shevlin Area, where home prices are anticipated to be higher, drives the higher overall cost.		More development in the Shevlin Area (anticipated to have higher home prices) is balanced out somewhat by development in the Northeast Edge (anticipated to have somewhat lower home prices).		More development in Gopher Gulch, where home prices are anticipated to be somewhat higher, drives the overall cost up a bit relative to other alternatives.		More development in the West Area, where home prices are anticipated to be higher, drives the higher overall cost.	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

Factor 3: ESEE		Author:	Analysis by Fregonese Associates; interpretation by Angelo Planning Group
Community Outcome B	**Housing Options, Affordability, and Equity**		
		Date:	9/17/2015

Performance Measure 2	**Housing Mix of New Housing**
Brief Description of Evaluation:	The % of new housing, by type of house.
Data Sources	Housing mix is an output of Envision Tomorrow, based on the types of buildings that go into each development type, and the amount of each development type applied.
Interpretation and Key	If less than 30% of new housing is single family detached in a given subarea, or if single family attached and multifamily together represent less than 30% of the new housing in a subarea, this is considered a moderately unbalanced mix for that area; if those percentages are below 15%, that is considered a highly unbalanced mix. Ratings for the overall scenario are based on how many subareas are internally balanced, rather than on the overall housing mix, which is constant across scenarios. For SAAMs, more consideration was given to the mix in the SAAs that were being tested, with less consideration to the mix in the areas used to accommodate the residual growth.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank	

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	55%	Detached SF	54%	Detached SF	54%	Detached SF	55%	Detached SF	55%	Detached SF	54%	Detached SF
	9%	Attached SF	9%	Attached SF	9%	Attached SF	9%	Attached SF	9%	Attached SF	10%	Attached SF
	36%	Multifamily	37%	Multifamily	37%	Multifamily	36%	Multifamily	35%	Multifamily	36%	Multifamily
Total Expansion Area (excluding current UGB)	45%	Detached SF	40%	Detached SF	40%	Detached SF	46%	Detached SF	48%	Detached SF	40%	Detached SF
	12%	Attached SF	14%	Attached SF	13%	Attached SF	12%	Attached SF	13%	Attached SF	16%	Attached SF
	43%	Multifamily	46%	Multifamily	47%	Multifamily	42%	Multifamily	39%	Multifamily	45%	Multifamily
Subareas												
North Triangle		Detached SF	30%	Detached SF		Detached SF		Detached SF		Detached SF		Detached SF
		Attached SF	9%	Attached SF		Attached SF		Attached SF		Attached SF		Attached SF
	100%	Multifamily	61%	Multifamily	100%	Multifamily	100%	Multifamily	100%	Multifamily	100%	Multifamily
NE Edge	60%	Detached SF	74%	Detached SF	70%	Detached SF	51%	Detached SF	42%	Detached SF	42%	Detached SF
	8%	Attached SF	8%	Attached SF	8%	Attached SF	8%	Attached SF	6%	Attached SF	6%	Attached SF
	32%	Multifamily	19%	Multifamily	22%	Multifamily	41%	Multifamily	52%	Multifamily	52%	Multifamily
DSL Property	19%	Detached SF	45%	Detached SF	22%	Detached SF	2%	Detached SF	44%	Detached SF	12%	Detached SF
	16%	Attached SF	15%	Attached SF	14%	Attached SF		Attached SF	9%	Attached SF	20%	Attached SF
	64%	Multifamily	40%	Multifamily	65%	Multifamily	98%	Multifamily	47%	Multifamily	68%	Multifamily
The "Elbow"	27%	Detached SF	32%	Detached SF	9%	Detached SF	2%	Detached SF	9%	Detached SF	9%	Detached SF
	15%	Attached SF	13%	Attached SF		Attached SF		Attached SF		Attached SF		Attached SF
	58%	Multifamily	55%	Multifamily	91%	Multifamily	98%	Multifamily	91%	Multifamily	91%	Multifamily
The "Thumb"	75%	Detached SF	44%	Detached SF	3%	Detached SF	1%	Detached SF	69%	Detached SF	3%	Detached SF
	10%	Attached SF	13%	Attached SF	0%	Attached SF	0%	Attached SF	9%	Attached SF	0%	Attached SF
	15%	Multifamily	43%	Multifamily	97%	Multifamily	99%	Multifamily	22%	Multifamily	97%	Multifamily
West Area	24%	Detached SF	32%	Detached SF	41%	Detached SF	N/A	Detached SF	N/A	Detached SF	50%	Detached SF
	18%	Attached SF	19%	Attached SF	16%	Attached SF	N/A	Attached SF	N/A	Attached SF	16%	Attached SF
	58%	Multifamily	49%	Multifamily	42%	Multifamily	N/A	Multifamily	N/A	Multifamily	34%	Multifamily
Shevlin Area	N/A	Detached SF	N/A	Detached SF	60%	Detached SF	43%	Detached SF	N/A	Detached SF	N/A	Detached SF
	N/A	Attached SF	N/A	Attached SF	23%	Attached SF	20%	Attached SF	N/A	Attached SF	N/A	Attached SF
	N/A	Multifamily	N/A	Multifamily	17%	Multifamily	37%	Multifamily	N/A	Multifamily	N/A	Multifamily
OB Riley / Gopher Gulch Area	0%	Detached SF		Detached SF	28%	Detached SF	0%	Detached SF	48%	Detached SF	1%	Detached SF
		Attached SF		Attached SF	10%	Attached SF		Attached SF	14%	Attached SF	10%	Attached SF
	100%	Multifamily	100%	Multifamily	62%	Multifamily	100%	Multifamily	38%	Multifamily	89%	Multifamily
Existing UGB (if applicable)	58%	Detached SF	58%	Detached SF	58%	Detached SF	58%	Detached SF	58%	Detached SF	58%	Detached SF
	8%	Attached SF	8%	Attached SF	8%	Attached SF	8%	Attached SF	8%	Attached SF	8%	Attached SF
	34%	Multifamily	34%	Multifamily	34%	Multifamily	34%	Multifamily	34%	Multifamily	34%	Multifamily
Overall Score	3 ○		4 ◠		4 ◠		5 ●		5 ●		3 ○	
	Most subareas are rated fair, but not well-balanced.		Most subareas well-balanced, one rated fair.		Most subareas well-balanced, two rated fair.		Both SAAs well balanced.		All subareas and the main SAA well-balanced.		The main SAA is well-balanced, though the residual areas are not (which is less important).	

For more information about this performance measure, see accompanying technical memorandum from Fregonese Associates.

06725

Factor 3: ESEE				Author:	Andrew Parish	APG
Community Outcome C	Strong Diverse Economy			Date:	8/20/2015	
Performance Measure 1	Site suitability for large lot industrial use					
Brief Description of Evaluation:	Qualitative evaluation of the Large Lot Industrial Site location proposed in each scenario/supplemental map.					
Data Sources	Deschutes County Tax lot Data, Rough slope data from Google Earth.					
Interpretation and Key	All sites have positive and negative attributes.					
	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank	

Evaluation Geography	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Subareas						
North Triangle			Roughly 60 acres under common ownership in the North Triangle, but site as drawn spans two ownerships. Preliminary analysis shows slopes >5% in this area. Area under common ownership divided by a public right-of-way. Site is adjacent to existing commercial/industrial uses and is within 200 feet of Highway 97, though primary access point would likely be from Cooley Road, 1/2 mile to the South, via Berg Lane. The site is accessible to Bend residents, and its location at the northernmost part of the city makes it more accessible to Redmond and other communities to the North.		Same as Scenario 3.1	Same as Scenario 3.1
NE Edge						
DSL Property	Site is over 300 acres and under State of Oregon ownership. It has minimal slopes (below 2%) and is large enough to provide flexibility in layout. Site is adjacent to Humane Society and Public Works area to the South and planned employment to the West in this scenario. Site is not adjacent to either Highway 97 or Highway 20, but it has relatively direct access to US 97 via 27th / Knott rd. Site is in the southeast corner of the City, arguably less accessible to neighboring communities than other alternatives. Deed restrictions on the sale of the DSL property may be a concern.			Same as Scenario 1.2		
The "Elbow"						
The "Thumb"						
West Area						
Shevlin Area						
OB Riley / Gopher Gulch Area		Site is roughly 60 acres under common ownership. Some slopes in the area, overall below 5% grade. Irregularly shaped - though there is roughly 30 acres that is rectangular. Area to the south is residential and area to the West (Separated by a collector road) is rural residential. Adjacent to Highway 20; current access onto OB Riley Road on the West and Cooley Road to the North, potential future access via an extension of Robal Road. The site is accessible to Bend residents, and its location at the northernmost part of the city makes it more accessible to Redmond and other communities to the North.				
Existing UGB (if applicable)	One large lot site assumed inside UGB at Juniper Ridge					
Overall Score	4 🟢	3 ⚪	3 ⚪	4 🟢	3 ⚪	3 ⚪
	Each location has its pros and cons, detailed in the accompanying memorandum. The Employment TAC selected the DSL property as its preferred location.	Each location has its pros and cons, detailed in the accompanying memorandum.	Each location has its pros and cons, detailed in the accompanying memorandum.	Each location has its pros and cons, detailed in the accompanying memorandum. The Employment TAC selected the DSL property as its preferred location.	Each location has its pros and cons, detailed in the accompanying memorandum.	Each location has its pros and cons, detailed in the accompanying memorandum.

For more information about this performance measure, see accompanying technical memorandum from APG.

Factor 3: ESEE

			Author:	Andrew Parish		APG
Community Outcome C	**Strong Diverse Economy**					
Performance Measure 2	Site suitability for other industrial and mixed employment		Date:	8/25/2015		
Brief Description of Evaluation:	Comparison of site characteristics of the subarea with Table 15 and Table 16 in the Draft Economic Opportunity Analysis (EOA), which describe site characteristics needed by various industries.					
Data Sources	Deschutes County Assessor's Data, Draft EOA					
Interpretation and Key	Areas that meet the requirements of Tables 15 and 16 in the draft EOA are coded green. Areas that are somewhat outside of the recommendations of Tables 15 and 16 are coded yellow.					

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3

Subareas

North Triangle

	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Parcel Size	10 ac - 40 ac	10 ac - 40 ac	Some 1 ac - 10 ac, and 10 ac 40 ac	10 ac - 40 ac	Some 1 ac - 10 ac, and 10 ac 40 ac	Some 1 ac - 10 ac, and 10 ac 40 ac
Site Size	1 100 ac site, 1 35 ac site	1 50 ac site, 1 25 ac site	2 50 ac sites, 1 80 ac site	1 100 ac site, 1 35 ac site	2 50 ac sites, 1 80 ac site	2 50 ac sites, 1 80 ac site
Topography	Slopes below 5% overall	Slopes below 5% overall	Slopes below 5% overall	Slopes below 5% overall	Slopes below 5% overall	Slopes below 5% overall
Compatibility	Rural residential uses to North, existing employment to South	Residential within Expansion Area, rural residential uses to North, existing employment to South	Rural residential uses to North, existing employment to South	Rural residential uses to North, existing employment to South	Rural residential uses to North, existing employment to South	Rural residential uses to North, existing employment to South
Transportation Access	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East

NE Edge

	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Parcel Size	7-12 ac			7-12 ac		
Site Size	1 10-ac site			1 10-ac site		
Topography	Low slopes			Low slopes		
Compatibility	Adjacent to planned residential areas			Adjacent to planned residential areas		
Transportation Access	Cole Rd, near Butler Market Rd			Cole Rd, near Butler Market Rd		

DSL Property

	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Parcel Size	One large parcel	One large parcel		One large parcel		
Site Size	1 18 ac site, 1 7-ac site, 1 50-ac site	1 25-ac site, 1 50-ac site		1 18 ac site, 1 7-ac site, 1 50-ac site		
Topography	Low slopes	Low slopes		Low slopes		
Compatibility	Adjacent to employment/open space/public uses.	Adjacent to employment/open space/public uses. Also adjacent to planned residential to North.		Adjacent to employment/open space/public uses.		
Transportation Access	Access to 27th / Knott	Access to 27th / Knott		Access to 27th / Knott		

The "Elbow"

	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Parcel Size	5-50 acre sites	5-50 acre sites	5-50 acre sites	5-50 acre sites	5-50 acre sites	5-50 acre sites
Site Size	2 25-acre sites, I 8-ac site	4 40-plus acre sites.	2 25-acre sites, I 8-ac site	2 25-acre sites, I 8-ac site	2 25-acre sites, I 8-ac site	2 25-acre sites, I 8-ac site
Topography	Low slopes	Low slopes	Low slopes	Low slopes	Low slopes	Low slopes
Compatibility	Adjacent to existing and planned residential areas	Adjacent to existing and planned residential areas	Adjacent to existing and planned residential areas	Adjacent to existing and planned residential areas	Adjacent to existing and planned residential areas	Adjacent to existing and planned residential areas
Transportation Access	Access to 27th / Knott	Access to 27th / Knott	Access to 27th / Knott	Access to 27th / Knott	Access to 27th / Knott	Access to 27th / Knott

The "Thumb"

	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Parcel Size	One large parcel	One large parcel	One large parcel	One large parcel	One large parcel	One large parcel
Site Size	1 25-acre site, 1 75-acre site	1 100-acre site and 1 20-acre site	1 100-acre site	1 25-acre site, 1 75-acre site	1 100-acre site	1 30-acre site and 1 90-acre site
Topography	Low slopes	Low slopes	Low slopes	Low slopes	Low slopes	Low slopes
Compatibility	Adjacent to planned residential areas	Adjacent to planned residential	Across China Hat Rd. from residential area	Across China Hat Rd. from residential area	Across China Hat Rd. from residential area	Across China Hat Rd. from residential area
Transportation Access	Access to Knott and Highway 97	Access to Knott and Highway 97	Access to Knott and Highway 97	Access to Knott and Highway 97	Access to Knott and Highway 97	Access to Knott and Highway 97

West Area

	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Parcel Size		One large parcel				One large parcel
Site Size		20 acres				20 acres
Topography		Some topography				Some topography
Compatibility		Adjacent to planned residential and school				Adjacent to planned residential and school
Transportation Access		Limited access to major roads				Limited access to major roads

Shevlin Area

OB Riley / Gopher Gulch Area

	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Parcel Size	5-35 ac parcels	5-35 ac parcels	5-35 ac parcels	5-35 ac parcels	5-35 ac parcels	5-35 ac parcels
Site Size	1 70-ac site, 1 40-ac site	1 50-ac site, 2 20-ac sites	2 40-ac sites, 1 30-ac site	1 70-ac site, 1 40-ac site	2 40-ac sites, 1 30-ac site	1 30-ac site and 1 45-ac site
Topography	Some slopes	Some slopes	Some slopes	Some slopes	Some slopes	Some slopes
Compatibility	Adjacent to employment uses, rural residential	Adjacent to employment uses, rural residential	Adjacent to some planned residential, rural residential	Adjacent to employment uses, rural residential	Adjacent to some planned residential, rural residential	Adjacent to some planned residential, rural residential
Transportation Access	Access to US 20	Access to US 20	Access to US 20	Access to US 20	Access to US 20	Access to US 20

Existing UGB (if applicable)

Overall Score	4	3	5	5	5	4
	Scenario 1.2 locates industrial and mixed employment uses in the North Triangle, along OB Riley, on the DSL Property, in the Elbow, in the Thumb, and a small portion in the NE Edge. These are all fairly good areas for this use under these criteria - the main reason it didn't receive a score of green is adjacency to residential areas in the North and in the NE Edge	Scenario 2.1 locates industrial and mixed employment uses in the North Triangle, along OB Riley, on the DSL Property, in the Elbow, in the Thumb, and a small portion in the West Area These are all fairly good areas for this use under these criteria - the main reason it didn't receive a score of green is adjacency to residential areas in the North and in the West Area	Scenario 2.1 locates industrial and mixed employment uses in the North Triangle, along OB Riley, in the Elbow, and in the Thumb. These are all fairly good areas for this use under these criteria - the main reason this scenario received a green is that there are fewer areas of residential/industrial adjacency (and potential conflict)	SAAM 1 has a similar arrangement of industrial land to Scenario 1.2, with somewhat less adjacency to residential areas.	SAAM2 has similar arrangement of industrial land as Scenario 3.1, with similar amounts of residential adjacency.	SAAM3 has similar arrangement of industrial land as Scenario 3.1, with similar amounts of residential adjacency.

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Factor 3: ESEE											
Community Outcome C	**Strong Diverse Economy**				Author: Andrew Parish			APG			
					Date: 8/25/2015						
Performance Measure 3	**Site suitability of commercial uses**										
Brief Description of Evaluation:	Comparison of site characteristics of the subarea with Table 15 and Table 16 in the Draft Economic Opportunity Analysis (EOA), which describe site characteristics needed by various industries.										
Data Sources	Deschutes County Assessor's Data, Draft EOA										
Interpretation and Key	Areas that meet the requirements of Tables 15 and 16 in the draft EOA are coded green. Areas that are somewhat outside of the recommendations of Tables 15 and 16 are coded yellow.										
	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank						

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
Subareas												
North Triangle	Parcel Size	10 ac - 40 ac	Parcel Size	10 ac - 40 ac	Parcel Size	Some 1 ac - 10 ac, and 10 ac - 40 ac	Parcel Size	10 ac - 40 ac	Parcel Size	Some 1 ac - 10 ac, and 10 ac - 40 ac	Parcel Size	Some 1 ac - 10 ac, and 10 ac - 40 ac
	Site Size	2 30-ac sites	Site Size	2 10-ac sites	Site Size	2 30-ac sites	Site Size	2 30-ac sites	Site Size	2 30-ac sites	Site Size	2 30-ac sites
	Topography	Slopes below 5% overall	Topography	Slopes below 5% overall	Topography	Slopes below 5% overall	Topography	Slopes below 5% overall	Topography	Slopes below 5% overall	Topography	Slopes below 5% overall
	Compatibility	Rural residential uses to North, existing employment to South	Compatibility	Residential within Expansion Area, rural residential uses to North, existing employment to South	Compatibility	Rural residential uses to North, existing employment to South	Compatibility	Rural residential uses to North, existing employment to South	Compatibility	Rural residential uses to North, existing employment to South	Compatibility	Rural residential uses to North, existing employment to South
	Visibility	Yes, >10k ADT on Hwy 97, 500-5k ADT on Cooley	Visibility	Yes, > 10k ADT on Hwy 97, >5k ADT on Cooley	Visibility	Yes, > 10k ADT on Hwy 97, 500-5k adt on Cooley	Visibility	Yes, > 10k ADT on Hwy 97, 500-5k ADT on Cooley	Visibility	Yes, > 10k ADT on Hwy 97, >5k ADT on Cooley	Visibility	Yes, > 10k ADT on Hwy 97, >5k ADT on Cooley
	Transportation Access	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Transportation Access	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Transportation Access	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Transportation Access	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Transportation Access	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East	Transportation Access	Access to Cooley Rd to South, Highway 20 to West, Highway 97 to East
NE Edge	Parcel Size	7-12 ac	Parcel Size	7-12 ac	Parcel Size	7-12 ac	Parcel Size	7-12 ac	Parcel Size	7-12 ac	Parcel Size	7-12 ac
	Site Size	2 20-ac sites, 1 10-ac site	Site Size	1 20-ac site, 1 10-ac site	Site Size	1 20-ac site, 1 10-ac site	Site Size	2 20-ac sites, 1 10-ac site	Site Size	1 20-ac site, 1 10-ac site	Site Size	1 20-ac site, 1 10-ac site
	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes
	Compatibility	Adjacent to planned residential areas	Compatibility	Adjacent to planned residential areas	Compatibility	Adjacent to planned residential areas	Compatibility	Adjacent to planned residential areas	Compatibility	Adjacent to planned residential areas	Compatibility	Adjacent to planned residential areas
	Visibility	>5k ADT on Eagle, > 10 on Butler Market Road.	Visibility	>5k ADT on Eagle, > 10 on Butler Market Road.	Visibility	>5k ADT on Eagle, > 10 on Butler Market Road.	Visibility	>5k ADT on Eagle, > 10 on Butler Market Road.	Visibility	500-5000 ADT on Eagle, > 5000 on Butler Market	Visibility	500-5000 ADT on Eagle, > 5000 on Butler Market
	Transportation Access	Cole Rd, near Butler Market Rd	Transportation Access	Cole Rd, near Butler Market Rd	Transportation Access	Cole Rd, near Butler Market Rd	Transportation Access	Cole Rd, near Butler Market Rd	Transportation Access	Cole Rd, near Butler Market Rd	Transportation Access	Cole Rd, near Butler Market Rd
DSL Property	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel
	Site Size	1 40-ac site, 1 20-ac site	Site Size	1 40-ac site, 1 15-ac site	Site Size	1 40-ac site, 1 25-ac site	Site Size	1 18 ac site, 1 7-ac site, 1 50-ac site	Site Size	1 40-ac site, 1 20-ac site	Site Size	1 18 ac site, 1 7-ac site, 1 50-ac site
	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes
	Compatibility	Adjacent to employment/open space/public uses.	Compatibility	Adjacent to employment/open space/public uses.	Compatibility	Adjacent to employment/open space/public uses.	Compatibility	Adjacent to employment/open space/public uses.	Compatibility	Adjacent to employment/open space/public uses.	Compatibility	Adjacent to employment/open space/public uses.
	Visibility	>10k ADT on both SE 27th and Reed Market at west of site.	Visibility	>10k ADT on both SE 27th and Reed Market at west of site. >5k ADT on Stevens Rd at North of site.	Visibility	>10k ADT on both SE 27th and Reed Market at west of site.	Visibility	>10k ADT on both SE 27th and Reed Market at west of site.	Visibility	>10k ADT on both SE 27th and Reed Market at west of site.	Visibility	>10k ADT on both SE 27th and Reed Market at west of site.
	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott
The "Elbow"	Parcel Size	5-50 acre sites	Parcel Size	5-50 acre sites	Parcel Size	5-50 acre sites	Parcel Size	5-50 acre sites	Parcel Size	5-50 acre sites	Parcel Size	5-50 acre sites
	Site Size	1 25-ac site, 1 30-ac site	Site Size	1 15-ac site, 1 12-ac site, 1 25-ac site, 1 20-ac site	Site Size	1 25-ac site, 1 30-ac site	Site Size	2 25-acre sites, 1 8-ac site	Site Size	1 25-ac site, 1 20-ac site	Site Size	1 25-ac site, 1 20-ac site
	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes
	Compatibility	Adjacent to existing and planned residential areas	Compatibility	Adjacent to existing and planned residential areas	Compatibility	Adjacent to existing and planned residential areas	Compatibility	Adjacent to existing and planned residential areas	Compatibility	Adjacent to existing and planned residential areas	Compatibility	Adjacent to existing and planned residential areas
	Visibility	>10k ADT on Knott and 27th	Visibility	>10k ADT on Knott and 27th	Visibility	>10k ADT on 27th, >5k ADT on Knott	Visibility	>10k ADT on Knott and 27th	Visibility	>10k ADT on Knott and 27th	Visibility	>10k ADT on Knott and 27th
	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott	Transportation Access	Access to 27th / Knott
The "Thumb"	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel
	Site Size	1 130-ac site, a 7-ac site	Site Size	3 7-ac sites, 1 30-ac site	Site Size	1 35-ac site, 1 30-ac site	Site Size	1 7-ac site, 1 70-ac site, 1 55-ac site	Site Size	2 30-ac sites	Site Size	1 30-ac site, 1 65-ac site
	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes	Topography	Low slopes
	Compatibility	Adjacent to planned residential areas	Compatibility	Adjacent to planned residential	Compatibility	Across China Hat Rd. from residential area	Compatibility	Across China Hat Rd. from residential area	Compatibility	Across China Hat Rd. from residential area	Compatibility	Across China Hat Rd. from residential area
	Visibility	>10k ADT on Hwy 97, China Hat, Knott, and new interior road,	Visibility	>10k ADT on Hwy 97, Knott. >5k ADT on China Hat and new interior road.	Visibility	>10k ADT on Hwy 97. >5k ADT on Knott, China Hat and new interior road.	Visibility	>10k ADT on Hwy 97 and China Hat. >5k on Knott.	Visibility	Yes>10k on Hwy 97. >5k on China Hat an Knott.	Visibility	>10k ADT on Hwy 97, China Hat, Knott, and new interior road,
	Transportation Access	Access to Knott and Highway 97	Transportation Access	Access to Knott and Highway 97	Transportation Access	Access to Knott and Highway 97	Transportation Access	Access to Knott and Highway 97	Transportation Access	Access to Knott and Highway 97	Transportation Access	Access to Knott and Highway 97
West Area	Parcel Size	One large parcel	Parcel Size	One large parcel	Parcel Size	One large parcel					Parcel Size	One large parcel
	Site Size	1 15-ac site	Site Size	1 20-ac site	Site Size	1 15-ac site					Site Size	1 30-ac site
	Topography	Some topography	Topography	Some topography	Topography	Some topography					Topography	Some topography
	Compatibility	Adjacent to planned residential and school	Compatibility	Adjacent to planned residential and school	Compatibility	Adjacent to planned residential and school					Compatibility	Adjacent to planned residential and school
	Visibility	<500 ADT on nearby roads	Visibility	>5k ADT on new connection, <500 adt on other roads	Visibility	10k ADT on new connection, <500 ADT on other roads					Visibility	10k ADT on new connection, <500 ADT on other roads
	Transportation Access	Limited access to major roads	Transportation Access	Limited access to major roads	Transportation Access	Limited access to major roads					Transportation Access	Limited access to major roads
Shevlin Area	Parcel Size		Parcel Size		Parcel Size	28 ac	Parcel Size	28 ac	Parcel Size		Parcel Size	
	Site Size		Site Size		Site Size	28 ac	Site Size	28 ac	Site Size		Site Size	
	Topography		Topography		Topography	Low slopes	Topography	Low slopes	Topography		Topography	
	Compatibility		Compatibility		Compatibility	Adjacent to existing and planned residential	Compatibility	Adjacent to existing and planned residential	Compatibility		Compatibility	
	Visibility		Visibility		Visibility	500 - 5k ADT	Visibility	<500 ADT	Visibility		Visibility	
	Transportation Access		Transportation Access		Transportation Access	Access on Shevlin Park Rd	Transportation Access	Access on Shevlin Park Rd	Transportation Access		Transportation Access	
OB Riley / Gopher Gulch Area	Parcel Size	5-35 ac parcels	Parcel Size	5-35 ac parcels	Parcel Size	5-35 ac parcels	Parcel Size	5-35 ac parcels	Parcel Size	5-35 ac parcels	Parcel Size	5-35 ac parcels
	Site Size	2 12-ac sites	Site Size	1 5-ac site, 1 10-ac site	Site Size	2 20-ac sites, 3 10-ac sites, 1 35-ac site	Site Size	2 12-ac sites	Site Size	2 20-ac sites, 1 10-ac site, 1 35-ac site	Site Size	2 20-ac sites, 1 10-ac site, 1 35-ac site
	Topography	Some slopes	Topography	Some slopes	Topography	Some slopes	Topography	Some slopes	Topography	Some slopes	Topography	Some slopes
	Compatibility	Adjacent to employment uses, rural residential	Compatibility	Adjacent to employment uses, rural residential	Compatibility	Adjacent to some planned residential, rural residential	Compatibility	Adjacent to employment uses, rural residential	Compatibility	Adjacent to some planned residential, rural residential	Compatibility	Adjacent to some planned residential, rural residential
	Visibility	>10k ADT on Hwy 97	Visibility	>10k ADT on Hwy 97	Visibility	>10k ADT on Hwy 97 and southern portion of OB Riley	Visibility	>10k ADT on Hwy 97	Visibility	>10k ADT on Hwy 97 and southern portion of OB Riley, >5k ADT on other new interior roads	Visibility	>10k ADT on Hwy 97
	Transportation Access	Access to US 20	Transportation Access	Access to US 20	Transportation Access	Access to US 20	Transportation Access	Access to US 20	Transportation Access	Access to US 20	Transportation Access	Access to US 20
Existing UGB (if applicable)												
Overall Score	4		5		4		4		5		5	
	Commercial uses in Scenario 1.2 are generally supported by the surrounding land uses and transportation network, with the possible exception of the commercial node in the West Area (which lacks pass-by traffic in that area)		Commercial uses in Scenario 2.1 are generally supported by the surrounding land uses and transportation network, with the possible exception of the commercial node in the West Area (which lacks pass-by traffic in that area, though it has a slightly greater amount than in Scenario 1.2)		Commercial uses in Scenario 3.1 are generally supported by the surrounding land uses and transportation network, with the possible exception of the commercial nodes in the West Area and Shevlin Area (which lack pass-by traffic in that area)		Commercial uses in SAAM 1 are generally supported by the surrounding land uses and transportation network, with the possible exception of the commercial node in the Shevlin Area (which lacks pass-by traffic in that area)		Commercial uses in SAAM 2 are generally supported by the surrounding land uses and transportation network.		Commercial uses in SAAM 3 are generally supported by the surrounding land uses and transportation network.	

Factor 4: Farm and Forest Compatibility						Author:	Wendy	City of Bend
Community Outcome A	**Farm and Forest Compatibility**					Date:	10/1/2015	

Performance Measure 1	Farm uses adjacent to expansion areas
Brief Description of Evaluation:	proximity to farm uses occurring on lands designated for farm (EFU) within 1/4 mile of lands under consideration for UGB expansion
Data Sources	Deschutes County GIS, scenarios approved by USC, field check, etc.

Interpretation and Key	*"Good"* - property is not within 1/4 mile of farm land; *Fair"* - within 1/4 mile of farm land with low impact (hay production less than 20 ac)farm uses; *"Poor"* - within 1/4 mile of farm land with active farm uses.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 *Qualitative Evaluation*	Scenario 2.1 *Qualitative Evaluation*	Scenario 3.1 *Qualitative Evaluation*	SAAM-1 *Qualitative Evaluation*	SAAM-2 *Qualitative Evaluation*	SAAM-3 *Qualitative Evaluation*
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)	3 commercial farms (one is a feed lot), several low impact hay fields	4 commercial farms (one is a feed lot)	5 commercial farms (one is a feed lot), several low impact hay fields	3 commercial farms (one is a feed lot), several low impact hay fields	7 commercial farms (one is a feed lot)	2 commercial farms (one is a feed lot)
Subareas						
North Triangle	Good	Good	Good	Good	Good	Good
NE Edge	1 commercial farm and several low impact hay fields within 1/4 mile	Good	1 commercial farm and several low impact hay fields within 1/4 mile	1 commercial farm and several low impact hay fields within 1/4 mile	Good	Good
DSL Property	Good	North area along Bear Creek is adjacent to 2 low impact commercial farms	North area along Bear Creek is adjacent to 2 low impact commercial farms	Good	1 low impact Commercial farm within 1/4 mile	Good
The "Elbow"	2 commercial farms within 1/4 mile, one which is an active operation that includes a feed lot for beef along Knott Rd.	2 commercial farms within 1/4 mile, one which is an active operation that includes a feed lot for beef along Knott Rd.	2 commercial farms within 1/4 mile, one which is an active operation that includes a feed lot for beef along Knott Rd.	2 commercial farms within 1/4 mile, one which is an active operation that includes a feed lot for beef along Knott Rd.	2 commercial farms within 1/4 mile, one which is an active operation that includes a feed lot for beef along Knott Rd.	2 commercial farms within 1/4 mile, one which is an active operation that includes a feed lot for beef along Knott Rd.
The "Thumb"	Good	Good	Good	Good	2 commercial farms within 1/4 mile of Woodside Road properties	Good
West Area	Good	Good	Good	Not in Scenario	Not in Scenario	Good
Shevlin Area	Not in Scenario	Not in Scenario	Good	Good	Not in Scenario	Not in Scenario
OB Riley / Gopher Gulch Area	Good	Good	Good	Good	2 Commercial farms within 1/4 mile across canyon	Good
Existing UGB (if applicable)	N/A	N/A	N/A	N/A	N/A	N/A
Overall Score	3 ○	3 ○	2 ▬	3 ○	2 ▬	4 ▲
	Good = 66% Fair = 17% Poor = 17%	Good = 66% Fair = 17% Poor = 17%	Good = 57% Fair = 29% Poor = 14%	Good = 71% Fair = 14.5% Poor = 14.5%	Good = 50% Fair = 33% Poor = 17%	Good = 83% Fair = 00% Poor = 17%

For more information about this performance measure, see accompanying technical memorandum from City of Bend

06729

Factor 4: Farm and Forest Compatibility						Author:	Wendy	**City of Bend**	
Community Outcome A	**Farm and Forest Compatibility**					Date:	9/10/2015		

Performance Measure 2	**Expansion onto land with Irrigation District deliveries**
Brief Description of Evaluation:	Number of parcels in each scenario that has an irrigation delivery by district and amount of water conveyed to those parcels
Data Sources	Deschutes County GIS, scenarios approved by USC, field check, etc. Mapping provided by Andrew
Interpretation and Key	The irrigation districts receive a fee for each delivery to cover O & M costs plus an assessment for the acre foot of water delivered. For small districts, a significant loss of deliveries due to UGB expansion can be detrimental to their operation and mean increased assessments for remaining water patrons. The fewer the deliveries and the lesser the amount of water conveyed per scenario per district, the better the ranking. Generally, impacts to over 20 ac ft of water were rated "Poor"; impacts to 1-20 ac ft of water were rated "Fair"; and areas with no irrigation district water were rated "Good". However, each district will experience a different degree of impact based on the amount of water conveyed and details of how that particular delivery affects other customers. Swalley irrigation uses a value of $500/acre of water + the delivery assessment of $560 per delivery. Each district's fees will vary based on a number of factors.

"Good"	"Fair"	"Poor"	No Data / Not Applicable	Not appropriate to rank					

Evaluation Geography	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
	Qualitative Evaluation	*Qualitative Evaluation*	*Qualitative Evaluation*	*Qualitative Evaluation*	*Qualitative Evaluation*	*Qualitative Evaluation*
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)	Swalley Total Loss: 16 deliveries / 78.71 ac ft Arnold Total Loss: 7 deliveries / 19.25-168.98 ac ft COID: # & amount of deliveries unknown	Swalley Total Loss: 16 deliveries / 78.71 ac ft Arnold Total Loss: 10 deliveries / 38-150 ac ft COID: # & amount of deliveries unknown	Swalley Total Loss: 70 deliveries / 207.64 ac ft Arnold Total Loss: 6 deliveries / 13.3-88.3 ac ft COID: # & amount of deliveries unknown	Swalley Total Loss: 23 deliveries / 100.97 ac ft Arnold Total Loss: 6 deliveries / 13.3-88.3 ac ft COID: # & amount of deliveries unknown	Swalley Total Loss: 76 deliveries / 337.04 ac ft Arnold Total Loss: 8 deliveries / 17.3-69.45 ac ft COID: # & amount of deliveries unknown	Swalley Total Loss: 35 deliveries / 97.7 ac ft Arnold Total Loss: 6 deliveries / 17.3-72.3 ac ft COID: # & amount of deliveries unknown
Subareas						
North Triangle	Swalley - 16 / 78.71 ac ft*	Swalley -16/ 78.71*	Swalley - 35/ 97.71 ac ft*	Swalley - 16/ 78.71 ac ft*	Swalley - 35/ 97.71 ac ft*	Swalley - 35/ 97.71 ac ft*
NE Edge	COID - # & amount of deliveries unknown	COID - # & amount of deliveries unknown	COID - # & amount of deliveries unknown	Swalley - 8/ 99.67 ac ft (BMPRD water rights total 77.41 ac ft that would not be lost), COID - # & amount of deliveries unknown	COID - # & amount of deliveries unknown	COID - # & amount of deliveries unknown
DSL Property	No Irrigation Dist. Water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water
The "Elbow"	Arnold - 7/ 19.25 ac ft	Arnold -10 / 38 ac ft	Arnold - 6 / 17.3 ac ft	Arnold 6 /13.3 ac ft	Arnold - 8 / 15.75 ac ft***	Arnold - 6 / 17.3 ac ft
The "Thumb"	Arnold -1/ 149.73 ac ft**	Arnold - 1/ 112 ac ft**	Arnold 1 / 52.15 ac ft**	Arnold 1/ 75 ac ft**	Arnold - 1 / 52.15 ac ft**	Arnold - 1 / 55 ac ft**
West Area	No Irrigation Dist. Water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water
Shevlin Area	No Irrigation Dist. Water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water	No Irrigation Dist water
OB Riley / Gopher Gulch Area	Swalley *	Swalley *	Swalley - 35 / 109.93 ac ft*	Swalley *	Swalley - 42/ 295.63 ac ft* (BMPRD water rights total 56.3 ac ft that would not be lost)	Swalley *
Existing UGB (if applicable)	N/A	N/A	N/A	N/A	N/A	N/A
Overall Score	4 🟢	3 ○	2 🔴	3 ○	1 🔴	3 ○
	Relatively limited northern expansion limits impacts to Swalley ID; uncertain impact to Arnold ID due to questions about future water rights on the Thumb	Relatively limited northern expansion limits impacts to Swalley ID; greater impact to Arnold ID from inclusion of full Elbow area	Greater north / northwest expansion increases impact to Swalley ID; limited south/southeast expansion reduces impact to Arnold ID	Expansion into outer NE Edge increases impact to Swalley ID; limited south/southeast expansion reduces impacts to Arnold ID	Focusing growth in north/northwest and extending into Gopher Gulch results in greatest impact to Swalley ID; inclusion of Woodside Road properties slightly increases impact to Arnold ID	Moderate amount of northern expansion causes moderate impacts to Swalley ID; limited south/southeast expansion reduces impact to Arnold ID

For more information about this performance measure, see accompanying technical memorandum from City of Bend

* A portion of the OB Riley / Gopher Gulch area (between US 20 and OB Riley) was counted with the North Triangle in this analysis. At least 5 tax lots west of US 20 are included in the North Triangle numbers.

** The Thumb has a total water right of 149.73 acre ft. The use of this water is for the Back Nine Golf Course. Even if the Thumb were to develop, some or all of the water rights would likely continue to serve the golf course.

*** Includes 2 deliveries in the Woodside Road area, which is counted with "The Thumb" for other performance measures.

Factor 4: Farm and Forest Compatibility				**Author:**	Damian Syrnyk, AICP & Andrew Parish, AICP	**City of Bend Growth Management Angelo Planning Group**

Community Outcome A	**Farm and Forest Compatibility**				**Date:**	9/9/2015

Performance Measure 3	**Proximity of proposed UGB to designated forest lands**					
Brief Description of Evaluation:	Distance to designated forest lands and amount of land within 1/4 mile of designated forest land					
Data Sources	Deschutes County GIS, scenarios approved by USC					

Interpretation and Key	Those areas rated as Green are greater than one (1) mile from designated Forest lands. These areas abut areas designated as rural residential exception lands on the Deschutes County Comprehensive Plan . Those areas rated as "Fair" are those that are within one (1) mile of Forest Lands. There may be intervening lands that are designated exception lands. Those areas rated as "Poor" abut or are within one-quarter (1/4) mile of lands designated as Forest lands on the Deschutes County Comprehensive Plan.					
	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank	

Evaluation Geography	Scenario 1.2 *Qualitative Evaluation*	Scenario 2.1 *Qualitative Evaluation*	Scenario 3.1 *Qualitative Evaluation*	SAAM-1 *Qualitative Evaluation*	SAAM-2 *Qualitative Evaluation*	SAAM-3 *Qualitative Evaluation*
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)	2 areas within a mile of forest land; no areas within 1/4 mile of forest land	2 areas within a mile of forest land; no areas within 1/4 mile of forest land	1 area within a mile of forest land; 1 area (1 acre) within 1/4 mile of forest land	1 area within a mile of forest land; 1 area (7 acres) within 1/4 mile of forest land	All subareas over 1 mile from forest land	1 area within a mile of forest land; 1 area (6 acres) within 1/4 mile of forest land
Subareas						
North Triangle	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands
NE Edge	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands
DSL Property	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from DSL lands
The "Elbow"	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands
The "Thumb"	1/4 mile to 1 mile from forest lands	1/4 mile to 1 mile from forest lands	>1 mile from forest lands	1/4 mile to 1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands
West Area	1/4 mile to 1 mile from forest lands	1/4 mile to 1 mile from forest lands	1/4 mile to 1 mile from forest lands	Not included in this scenario	Not included in this scenario	6 acres within 1/4 mile of forest lands
Shevlin Area	Not included in this scenario	Not included in this scenario	1 acre within 1/4 mile of forest lands	7 acres within 1/4 mile of forest lands (separated by developed rural residential land)	Not included in this scenario	Not included in this scenario
OB Riley / Gopher Gulch Area	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands	>1 mile from forest lands
Existing UGB (if applicable)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Overall Score	4 ➖	4 ➖	3 ◯	3 ◯	5 ◉	3 ◯
	All subareas over 1/4 mile from forest land; most over 1 mile	All subareas over 1/4 mile from forest land; most over 1 mile	This scenario has a small amount of expansion into areas within 1/4 mile of forest zones; most areas are over a mile from forest land	This scenario has a small amount of expansion into areas within 1/4 mile of forest zones; most areas are over a mile from forest land	All subareas over 1 mile from forest land	This scenario has a small amount of expansion into areas within 1/4 mile of forest zones; most areas are over a mile from forest land

For more information about this performance measure, see accompanying technical memoranda from City of Bend and Angelo Planning Group

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APPENDIX C: PERFORMANCE MEASURE WEIGHTING EXAMPLES AND RESULTS

Index:

- Equally Weighted
- Lightly Weighted
- Heavily Weighted
- Focus on Difference-Makers

Weighting: **Equally Weighted**

Updated: 10/1/2015

Symbol key: VG = Very Good, G = Good, F = Fair, P = Poor, VP = Very Poor

Factor	Community Outcome	Performance Measure	Weighting*		Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Factor 1: Efficient accommodation of identified land needs										
	A. Complete Communities and Great Neighborhoods		H	1	3.4 F	5.0 VG	4.0 G	2.4 P	3.8 G	3.2 F
		(1) Housing units within walking distance of existing & planned schools in 2028	M	1	2 P	5 VG	3 F	5 VG	4 G	2 P
		(2) Housing units within walking distance of existing & planned parks and trails in 2028	L	1	5 VG	5 VG	5 VG	4 G	5 VG	5 VG
		(3) Housing units within walking distance of commercial services in 2028	H	1	4 G	5 VG	5 VG	1 VP	3 F	2 P
		(4) Jobs/housing balance (by subarea)	M	1	3 F	5 VG	4 G	1 VP	4 G	2 P
		(5) Opportunities for master planning	M	1	3 F	5 VG	3 F	1 VP	3 F	5 VG
	B. Efficient, Timely Growth		H	1	5.0 VG	4.2 G	3.8 G	2.6 F	3.6 G	4.2 G
		(1) Total urbanized acres	L	1	5 VG	4 G	4 G	3 F	4 G	5 VG
		(2) Gross density for new housing in 2028	VH	1	5 VG	5 VG	3 F	1 VP	4 G	5 VG
		(3) net density for new jobs in 2028	L	1	5 VG	5 VG	5 VG	5 VG	5 VG	5 VG
		(4) percent of urbanized acres on parcels under 20 acres and contiguous to existing UGB	M	1	5 VG	3 F	3 F	2 P	2 P	1 VP
		(5) vacant vs. developed land included	L	1	5 VG	4 G	4 G	2 F	3 F	5 VG
Factor 2: Orderly and economic provision of public facilities and services										
	A. Balanced Transportation System		H	1	3.1 F	3.7 G	3.0 F	2.9 F	2.5 F	3.1 F
		(1) Total VMT per capita	VH	1	2 P	3 F	3 F	2 P	2 P	2 P
		(2) Average trip length	M	1	2 P	5 VG	4 G	2 P	2 P	3 F
		(3) Household VMT per capita	M	1	4 G	5 VG	3 F	1 VP	2 P	2 P
		(4) Congestion	H	1	4 G	3 F	2 P	5 VG	3 F	4 G
		(5) walk/bike safety and connectivity	M	1	4 G	5 VG	3 F	4 G	3 F	4 G
		(6) System connectivity & progression of system hierarchy	M	1	3 F	4 G	3 F	3 F	3 F	4 G
		(7) Mode split	M	1	3 F	3 F	3 F	3 F	2 P	3 F
		(8) Average weekly walk trips per capita	L	1	3 F	3 F	3 F	3 F	2 P	3 F
		(9) Proximity to transit corridors	M	1	3 F	3 F	3 F	3 F	3 F	3 F
		(10) Percent of housing and jobs within 1/4 mile of transit	L	1	3 F	3 F	3 F	3 F	3 F	3 F
		(11) Intersection density	M	1	3 F	2 P	2 P	3 F	3 F	3 F
	B. Cost Effective Infrastructure		H	1	3.0 F	3.6 G	2.7 F	2.5 F	3.4 F	2.6 F
		Transportation Infrastructure								
		(1) Total cost of transportation improvements required	VH	1	1 VP	5 VG	1 VP	2 P	3 F	4 G
		(2) Cost per acre of transportation improvements	M	1	2 P	3 F	2 P	4 G	3 F	3 F
		(3) New linear miles of roadway	L	1	3 F	4 G	3 F	2 P	3 F	3 F
		Sanitary Sewer Infrastructure								
		(4) Efficiency of additional sewer system improvements required	VH	1	4 G	3 F	3 F	2 P	2 P	1 VP
		(5) Initial capital cost of sewer system improvements required	M	1	4 G	3 F	3 F	1 VP	3 F	1 VP
		(6) Initial capital cost of sewer system improvements per acre of development	M	1	3 F	4 G	3 F	2 P	2 P	1 VP
		Drinking Water Infrastructure								
		(7) Water system improvements required in city water district	L	1	5 VG	5 VG	4 G	4 G	5 VG	5 VG
		(8) Capacity of Avion Water system								
		Storm Water Infrastructure								
		(9) Total impervious area for new development	L	1	4 G	4 G	3 F	3 F	3 F	4 G
		(10) Acres of new development with welded tuff geology	L	1	3 F	3 F	2 P	2 P	5 VG	1 VP
		(11) Acres of new development within DWPA	L	1	1 VP	2 P	3 F	3 F	5 VG	3 F
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)										
	A. Quality Natural Environment (Environmental and Energy Consequences)		H	1	3.5 G	3.7 G	2.8 F	2.2 P	3.2 F	3.2 F
		(1) Development in wildlife areas	M	1	4 G	3 F	2 P	1 VP	5 VG	2 P
		(2) Linear distance of riparian areas adjacent to development	M	1	5 VG	5 VG	4 G	3 F	3 F	5 VG
		(3) Wildfire hazard	H	1	3 F	3 F	2 P	2 P	3 F	3 F
		(4) Greenhouse gas emissions	L	1	3 F	4 G	3 F	2 P	2 P	3 F
		(5) Energy Use	L	1	3 F	3 F	3 F	3 F	3 F	3 F
		(6) Average Water Consumption per Household	L	1	3 F	4 G	3 F	2 P	3 F	3 F
	B. Housing Options and Affordability (Social Consequences)		H	1	4.0 G	4.5 VG	3.0 F	4.5 VG	4.0 G	2.5 F
		(1) Average cost of new single family housing	VH	1	5 VG	5 VG	2 P	4 G	3 F	2 P
		(2) Housing mix of new housing (subarea balance)	L	1	3 F	4 G	4 G	5 VG	5 VG	3 F
	C. Strong Diverse Economy (Economic Consequences)		H	1	4.0 G	3.7 G	4.0 G	4.3 G	4.3 G	4.0 G
		(1) site suitability for large lot industrial use	L	1	4 G	3 F	3 F	4 G	3 F	3 F
		(2) site suitability for areas identified for industrial uses	H	1	4 G	3 F	5 VG	5 VG	5 VG	4 G
		(3) site suitability for areas identified for commercial uses	H	1	4 G	5 VG	4 G	4 G	5 VG	5 VG
Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occur										
	A. Compatibility with Farms and Forests		H	1	3.7 G	3.3 F	2.3 P	3.0 F	2.7 F	3.3 F
		(1) Farm practices & high value farm land adjacent to expansion areas	H	1	3 F	3 F	2 P	3 F	2 P	4 G
		(2) impact to irrigation districts	M	1	4 G	3 F	2 P	3 F	1 VP	3 F
		(3) Proximity of expansion areas to designated forest land	M	1	4 G	4 G	3 F	3 F	5 VG	3 F
Overall					3.7 G	4.0 G	3.2 F	3.1 F	3.4 F	3.3 F

Key: H = High Importance; M = Moderate Importance; L = Low Importance; N = Excluded.

● Very Good ◗ Good ○ Fair ◖ Poor ◉ Very Poor

* Weighting for performance measures is relative to others within a single community outcome. Weighting for community outcomes is against other community outcomes. Weighting is provided as an example only and is subject to further refinement.

Weighting: **Lightly Weighted**

Updated: 10/1/2015

Factor	Community Outcome	Performance Measure	Weighting*		Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
Factor 1: Efficient accommodation of identified land needs																
	A. Complete Communities and Great Neighborhoods		H	1	3.3	Fair	5.0	Very Good	4.0	Good	2.1	Poor	3.6	Good	2.9	Fair
		(1) Housing units within walking distance of existing & planned schools in 2028	M	0.6	2	Poor	5	Very Good	3	Fair	5	Very Good	4	Good	2	Poor
		(2) Housing units within walking distance of existing & planned parks and trails in 2028	L	0.3	5	Very Good	5	Very Good	5	Very Good	4	Good	5	Very Good	5	Very Good
		(3) Housing units within walking distance of commercial services in 2028	H	1	4	Good	5	Very Good	5	Very Good	1	Very Poor	3	Fair	2	Poor
		(4) Jobs/housing balance (by subarea)	M	0.6	3	Fair	5	Very Good	4	Good	1	Very Poor	4	Good	2	Poor
		(5) Opportunities for master planning	M	0.6	3	Fair	5	Very Good	3	Fair	1	Very Poor	3	Fair	5	Very Good
	B. Efficient, Timely Growth		H	1	5.0	Very Good	4.5	Good	3.3	Fair	1.8	Poor	3.7	Good	4.3	Good
		(1) Total urbanized acres	L	0.3	5	Very Good	4	Good	4	Good	3	Fair	4	Good	5	Very Good
		(2) Gross density for new housing in 2028	VH	2	5	Very Good	5	Very Good	3	Fair	1	Very Poor	4	Good	5	Very Good
		(3) net density for new jobs in 2028	L	0.3	5	Very Good	5	Very Good	5	Very Good	5	Very Good	5	Very Good	5	Very Good
		(4) percent of urbanized acres on parcels under 20 acres and contiguous to existing UGB	M	0.6	5	Very Good	3	Fair	3	Fair	2	Poor	2	Poor	1	Very Poor
		(5) vacant vs. developed land included	L	0.3	5	Very Good	4	Good	4	Good	2	Fair	3	Fair	5	Very Good
Factor 2: Orderly and economic provision of public facilities and services																
	A. Balanced Transportation System		H	1	2.9	Fair	3.6	Good	2.9	Fair	2.8	Fair	2.4	Poor	2.9	Fair
		(1) Total VMT per capita	VH	2	2	Poor	3	Fair	3	Fair	2	Poor	2	Poor	2	Poor
		(2) Average trip length	M	0.6	2	Poor	5	Very Good	4	Good	2	Poor	2	Poor	3	Fair
		(3) Household VMT per capita	M	0.6	4	Good	5	Very Good	3	Fair	1	Very Poor	2	Poor	2	Poor
		(4) Congestion	H	1	4	Good	3	Fair	2	Poor	5	Very Good	3	Fair	4	Good
		(5) walk/bike safety and connectivity	M	0.6	4	Good	5	Very Good	3	Fair	4	Good	3	Fair	4	Good
		(6) System connectivity & progression of system hierarchy	M	0.6	3	Fair	4	Good	3	Fair	3	Fair	3	Fair	4	Good
		(7) Mode split	M	0.6	3	Fair	3	Fair	3	Fair	3	Fair	2	Poor	3	Fair
		(8) Average weekly walk trips per capita	L	0.3	3	Fair	3	Fair	3	Fair	3	Fair	2	Poor	3	Fair
		(9) Proximity to transit corridors	M	0.6	3	Fair	3	Fair	3	Fair	3	Fair	3	Fair	3	Fair
		(10) Percent of housing and jobs within 1/4 mile of transit	L	0.3	3	Fair	3	Fair	3	Fair	3	Fair	3	Fair	3	Fair
		(11) Intersection density	M	0.6	3	Fair	2	Poor	2	Poor	3	Fair	3	Fair	3	Fair
	B. Cost Effective Infrastructure		H	1	2.8	Fair	3.8	Good	2.4	Poor	2.2	Poor	2.9	Fair	2.4	Poor
	Transportation Infrastructure															
		(1) Total cost of transportation improvements required	VH	2	1	Very Poor	5	Very Good	1	Very Poor	2	Poor	3	Fair	4	Good
		(2) Cost per acre of transportation improvements	M	0.6	2	Poor	3	Fair	2	Poor	4	Good	3	Fair	3	Fair
		(3) New linear miles of roadway	L	0.3	3	Fair	4	Good	3	Fair	2	Poor	3	Fair	3	Fair
	Sanitary Sewer Infrastructure															
		(4) Efficiency of additional sewer system improvements required	VH	2	4	Good	3	Fair	3	Fair	2	Poor	2	Poor	1	Very Poor
		(5) Initial capital cost of sewer system improvements required	M	0.6	4	Good	3	Fair	3	Fair	1	Very Poor	3	Fair	1	Very Poor
		(6) Initial capital cost of sewer system improvements per acre of development	M	0.6	3	Fair	4	Good	3	Fair	2	Poor	2	Poor	1	Very Poor
	Drinking Water Infrastructure															
		(7) Water system improvements required in city water district	L	0.3	5	Very Good	5	Very Good	4	Good	4	Good	5	Very Good	5	Very Good
		(8) Capacity of Avion Water system														
	Storm Water Infrastructure															
		(9) Total impervious area for new development	L	0.3	4	Good	4	Good	3	Fair	3	Fair	3	Fair	4	Good
		(10) Acres of new development with welded tuff geology	L	0.3	3	Fair	3	Fair	2	Poor	2	Poor	5	Very Good	1	Very Poor
		(11) Acres of new development within DWPA	L	0.3	1	Very Poor	2	Poor	3	Fair	3	Fair	5	Very Good	3	Fair
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)																
	A. Quality Natural Environment (Environmental and Energy Consequences)		H	1	3.6	Good	3.6	Good	2.7	Fair	2.1	Poor	3.3	Fair	3.2	Fair
		(1) Development in wildlife areas	M	0.6	4	Good	3	Fair	2	Poor	1	Very Poor	5	Very Good	2	Poor
		(2) Linear distance of riparian areas adjacent to development	M	0.6	5	Very Good	5	Very Good	4	Good	3	Fair	3	Fair	5	Very Good
		(3) Wildfire hazard	H	1	3	Fair	3	Fair	2	Poor	2	Poor	3	Fair	3	Fair
		(4) Greenhouse gas emissions	L	0.3	3	Fair	4	Good	3	Fair	2	Poor	2	Poor	3	Fair
		(5) Energy Use	L	0.3	3	Fair	3	Fair	3	Fair	3	Fair	3	Fair	3	Fair
		(6) Average Water Consumption per Household	L	0.3	3	Fair	4	Good	3	Fair	2	Poor	3	Fair	3	Fair
	B. Housing Options and Affordability (Social Consequences)		H	1	4.7	Very Good	4.9	Very Good	2.3	Poor	4.1	Good	3.3	Fair	2.1	Poor
		(1) Average cost of new single family housing	VH	2	5	Very Good	5	Very Good	2	Poor	4	Good	3	Fair	2	Poor
		(2) Housing mix of new housing (subarea balance)	L	0.3	3	Fair	4	Good	4	Good	5	Very Good	5	Very Good	3	Fair
	C. Strong Diverse Economy (Economic Consequences)		H	1	4.0	Good	3.9	Good	4.3	Good	4.4	Good	4.7	Very Good	4.3	Good
		(1) site suitability for large lot industrial use	L	0.3	4	Good	3	Fair	3	Fair	4	Good	3	Fair	3	Fair
		(2) site suitability for areas identified for industrial uses	H	1	4	Good	3	Fair	5	Very Good	5	Very Good	5	Very Good	4	Good
		(3) site suitability for areas identified for commercial uses	H	1	4	Good	5	Very Good	4	Good	4	Good	5	Very Good	5	Very Good
Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occur																
	A. Compatibility with Farms and Forests		H	1	3.5	Good	3.3	Fair	2.3	Poor	3.0	Fair	2.5	Fair	3.5	Fair
		(1) Farm practices & high value farm land adjacent to expansion areas	H	1	3	Fair	3	Fair	2	Poor	3	Fair	2	Poor	4	Good
		(2) impact to irrigation districts	M	0.6	4	Good	3	Fair	2	Poor	3	Fair	1	Very Poor	3	Fair
		(3) Proximity of expansion areas to designated forest land	M	0.6	4	Good	4	Good	3	Fair	3	Fair	5	Very Good	3	Fair
Overall					3.7	Good	4.1	Good	3.0	Fair	2.8	Fair	3.3	Fair	3.2	Fair

Key: H = High Importance; M = Moderate Importance; L = Low Importance; N = Excluded.   ● Very Good   ◗ Good   ○ Fair   ◖ Poor   ◉ Very Poor

* Weighting for performance measures is relative to others within a single community outcome. Weighting for community outcomes is against other community outcomes. Weighting is provided as an example only and is subject to further refinement.

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Weighting: **Heavily Weighted**

Updated: 10/1/2015

Rating symbols (per Key): VG = Very Good (green filled), G = Good (green half), F = Fair (open circle), P = Poor (red half), VP = Very Poor (red filled).

Factor	Community Outcome	Performance Measure	Weighting*		Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
Factor 1: Efficient accommodation of identified land needs																
	A. Complete Communities and Great Neighborhoods		H	1	3.3	F	5.0	VG	4.0	G	1.9	P	3.5	F	2.7	F
		(1) Housing units within walking distance of existing & planned schools in 2028	M	0.5	2	P	5	VG	3	F	5	VG	4	G	2	P
		(2) Housing units within walking distance of existing & planned parks and trails in 2028	L	0.1	5	VG	5	VG	5	VG	4	G	5	VG	5	VG
		(3) Housing units within walking distance of commercial services in 2028	H	1	4	G	5	VG	5	VG	1	VP	3	F	2	P
		(4) Jobs/housing balance (by subarea)	M	0.5	3	F	5	VG	4	G	1	VP	4	G	2	P
		(5) Opportunities for master planning	M	0.5	3	F	5	VG	3	F	1	VP	3	F	5	VG
	B. Efficient, Timely Growth		H	1	5.0	VG	4.7	VG	3.1	F	1.3	VP	3.7	G	4.5	G
		(1) Total urbanized acres	L	0.1	5	VG	4	G	4	G	3	F	4	G	5	VG
		(2) Gross density for new housing in 2028	VH	3	5	VG	5	VG	3	VG	1	VP	4	G	5	VG
		(3) net density for new jobs in 2028	L	0.1	5	VG	5	VG	5	VG	5	VG	5	VG	5	VG
		(4) percent of urbanized acres on parcels under 20 acres and contiguous to existing UGB	M	0.5	5	VG	3	G	3	G	2	P	2	P	1	VP
		(5) vacant vs. developed land included	L	0.1	5	VG	4	G	4	G	2	P	3	F	5	VG
Factor 2: Orderly and economic provision of public facilities and services																
	A. Balanced Transportation System		H	1	2.8	F	3.5	F	2.9	F	2.7	F	2.4	P	2.8	F
		(1) Total VMT per capita	VH	3	2	P	3	F	3	F	2	P	2	P	2	P
		(2) Average trip length	M	0.5	2	P	5	VG	4	G	2	P	2	P	3	F
		(3) Household VMT per capita	M	0.5	4	G	5	VG	3	F	1	VP	2	P	2	P
		(4) Congestion	H	1	4	G	3	F	2	P	5	VG	3	F	4	G
		(5) walk/bike safety and connectivity	M	0.5	4	G	5	VG	3	F	4	G	3	F	4	G
		(6) System connectivity & progression of system hierarchy	M	0.5	3	F	4	G	3	F	3	F	3	F	4	G
		(7) Mode split	M	0.5	3	F	3	F	3	F	3	F	2	P	3	F
		(8) Average weekly walk trips per capita	L	0.1	3	F	3	F	3	F	3	F	2	P	3	F
		(9) Proximity to transit corridors	M	0.5	3	F	3	F	3	F	3	F	3	F	3	F
		(10) Percent of housing and jobs within 1/4 mile of transit	L	0.1	3	F	3	F	3	F	3	F	3	F	3	F
		(11) Intersection density	M	0.5	3	F	2	P	2	P	3	F	3	F	3	F
	B. Cost Effective Infrastructure		H	1	2.6	F	3.9	G	2.2	P	2.1	P	2.6	F	2.4	P
		Transportation Infrastructure														
		(1) Total cost of transportation improvements required	VH	3	1	VP	5	VG	1	VP	2	P	3	F	4	G
		(2) Cost per acre of transportation improvements	M	0.5	2	P	3	F	2	P	4	G	3	F	3	F
		(3) New linear miles of roadway	L	0.1	3	F	4	G	3	F	2	P	3	F	3	F
		Sanitary Sewer Infrastructure														
		(4) Efficiency of additional sewer system improvements required	VH	3	4	G	3	F	3	F	2	P	2	P	1	VP
		(5) Initial capital cost of sewer system improvements required	M	0.5	4	G	3	F	3	F	1	VP	3	F	1	VP
		(6) Initial capital cost of sewer system improvements per acre of development	M	0.5	3	F	4	G	3	F	2	P	2	P	1	VP
		Drinking Water Infrastructure														
		(7) Water system improvements required in city water district	L	0.1	5	VG	5	VG	4	G	4	G	5	VG	5	VG
		(8) Capacity of Avion Water system														
		Storm Water Infrastructure														
		(9) Total impervious area for new development	L	0.1	4	G	4	G	3	F	3	F	3	F	4	G
		(10) Acres of new development with welded tuff geology	L	0.1	3	F	3	F	2	P	2	P	5	VG	1	VP
		(11) Acres of new development within DWPA	L	0.1	1	VP	2	P	3	F	3	F	5	VG	3	F
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)																
	A. Quality Natural Environment (Environmental and Energy Consequences)		H	1	3.7	G	3.5	G	2.6	F	2.0	P	3.4	F	3.2	F
		(1) Development in wildlife areas	M	0.5	4	G	3	F	2	P	1	VP	5	VG	2	P
		(2) Linear distance of riparian areas adjacent to development	M	0.5	5	VG	5	VG	4	G	3	F	3	F	5	VG
		(3) Wildfire hazard	H	1	3	F	3	F	2	P	2	P	3	F	3	F
		(4) Greenhouse gas emissions	L	0.1	3	F	4	G	3	F	2	P	2	P	3	F
		(5) Energy Use	L	0.1	3	F	3	F	3	F	3	F	3	F	3	F
		(6) Average Water Consumption per Household	L	0.1	3	F	4	G	3	F	2	P	3	F	3	F
	B. Housing Options and Affordability (Social Consequences)		H	1	4.9	VG	5.0	VG	2.1	P	4.0	G	3.1	F	2.0	P
		(1) Average cost of new single family housing	VH	3	5	VG	5	VG	2	P	4	G	3	F	2	P
		(2) Housing mix of new housing (subarea balance)	L	0.1	3	F	4	G	4	G	5	VG	5	VG	3	F
	C. Strong Diverse Economy (Economic Consequences)		H	1	4.0	G	4.0	G	4.4	G	4.5	G	4.9	VG	4.4	G
		(1) site suitability for large lot industrial use	L	0.1	4	G	3	F	3	F	4	G	3	F	3	F
		(2) site suitability for areas identified for industrial uses	H	1	4	G	3	F	5	VG	5	VG	5	VG	4	G
		(3) site suitability for areas identified for commercial uses	H	1	4	G	5	VG	4	G	4	G	5	VG	5	VG
Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occur																
	A. Compatibility with Farms and Forests		H	1	3.5	G	3.3	F	2.3	P	3.0	F	2.5	F	3.5	G
		(1) Farm practices & high value farm land adjacent to expansion areas	H	1	3	F	3	F	2	P	3	F	2	P	4	G
		(2) impact to irrigation districts	M	0.5	4	G	3	F	2	P	3	F	1	VP	3	F
		(3) Proximity of expansion areas to designated forest land	M	0.5	4	G	4	G	3	F	3	F	5	VG	3	F
Overall					3.7	G	4.1	G	2.9	F	2.7	F	3.3	F	3.2	F

Key: H = High Importance; M = Moderate Importance; L = Low Importance; N = Excluded.

● Very Good   ⬤ Good   ○ Fair   ◖ Poor   ● Very Poor

* Weighting for performance measures is relative to others within a single community outcome. Weighting for community outcomes is against other community outcomes. Weighting is provided as an example only and is subject to further refinement.

Weighting:　**Focus on Difference-Makers**

Updated:　10/1/2015

Factor	Community Outcome	Performance Measure	Imp	Wt	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Factor 1: Efficient accommodation of identified land needs										
	A. Complete Communities and Great Neighborhoods		H	1	3.7 Good	5.0 Very Good	4.6 Very Good	1.3 Very Poor	3.2 Fair	2.2 Poor
		(1) Housing units within walking distance of existing & planned schools in 2028	M	0.1	2 Poor	5 Very Good	3 Fair	5 Very Good	4 Good	2 Poor
		(2) Housing units within walking distance of existing & planned parks and trails in 2028	L	0	5 Very Good	5 Very Good	5 Very Good	4 Good	5 Very Good	5 Very Good
		(3) Housing units within walking distance of commercial services in 2028	H	1	4 Good	5 Very Good	5 Very Good	1 Very Poor	3 Fair	2 Poor
		(4) Jobs/housing balance (by subarea)	M	0.1	3 Fair	5 Very Good	4 Good	1 Very Poor	4 Good	2 Poor
		(5) Opportunities for master planning	M	0.1	3 Fair	5 Very Good	3 Fair	1 Very Poor	3 Fair	5 Very Good
	B. Efficient, Timely Growth		H	1	5.0 Very Good	5.0 Very Good	3.0 Fair	1.0 Very Poor	4.0 Good	5.0 Very Good
		(1) Total urbanized acres	L	0	5 Very Good	4 Good	4 Good	3 Fair	4 Good	5 Very Good
		(2) Gross density for new housing in 2028	VH	10	5 Very Good	5 Very Good	3 Fair	1 Very Poor	4 Good	5 Very Good
		(3) net density for new jobs in 2028	L	0	5 Very Good	5 Very Good	5 Very Good	5 Very Good	5 Very Good	5 Very Good
		(4) percent of urbanized acres on parcels under 20 acres and contiguous to existing UGB	M	0.1	5 Very Good	3 Fair	3 Fair	2 Poor	2 Poor	1 Very Poor
		(5) vacant vs. developed land included	L	0	5 Very Good	4 Good	4 Good	2 Poor	3 Fair	5 Very Good
Factor 2: Orderly and economic provision of public facilities and services										
	A. Balanced Transportation System		H	1	2.2 Poor	3.1 Fair	2.9 Fair	2.3 Poor	2.1 Poor	2.2 Poor
		(1) Total VMT per capita	VH	10	2 Poor	3 Fair	3 Fair	2 Poor	2 Poor	2 Poor
		(2) Average trip length	M	0.1	2 Poor	5 Very Good	4 Good	2 Poor	2 Poor	3 Fair
		(3) Household VMT per capita	M	0.1	4 Good	5 Very Good	3 Fair	1 Very Poor	2 Poor	2 Poor
		(4) Congestion	H	1	4 Good	3 Fair	2 Poor	5 Very Good	3 Fair	4 Good
		(5) walk/bike safety and connectivity	M	0.1	4 Good	5 Very Good	3 Fair	4 Good	3 Fair	4 Good
		(6) System connectivity & progression of system hierarchy	M	0.1	3 Fair	4 Good	3 Fair	3 Fair	3 Fair	4 Good
		(7) Mode split	M	0.1	3 Fair	3 Fair	3 Fair	3 Fair	2 Poor	3 Fair
		(8) Average weekly walk trips per capita	L	0	3 Fair	3 Fair	3 Fair	3 Fair	2 Poor	3 Fair
		(9) Proximity to transit corridors	M	0.1	3 Fair	3 Fair	3 Fair	3 Fair	3 Fair	3 Fair
		(10) Percent of housing and jobs within 1/4 mile of transit	L	0	3 Fair	3 Fair	3 Fair	3 Fair	3 Fair	3 Fair
		(11) Intersection density	M	0.1	3 Fair	2 Poor	2 Poor	3 Fair	3 Fair	3 Fair
	B. Cost Effective Infrastructure		H	1	2.5 Fair	4.0 Good	2.0 Poor	2.0 Poor	2.5 Fair	2.5 Poor
	Transportation Infrastructure									
		(1) Total cost of transportation improvements required	VH	10	1 Very Poor	5 Very Good	1 Very Poor	2 Poor	3 Fair	4 Good
		(2) Cost per acre of transportation improvements	M	0.1	2 Poor	3 Fair	2 Poor	4 Good	3 Fair	3 Fair
		(3) New linear miles of roadway	L	0	3 Fair	4 Good	3 Fair	2 Poor	3 Fair	3 Fair
	Sanitary Sewer Infrastructure									
		(4) Efficiency of additional sewer system improvements required	VH	10	4 Good	3 Fair	3 Fair	2 Poor	2 Poor	1 Very Poor
		(5) Initial capital cost of sewer system improvements required	M	0.1	4 Good	3 Fair	3 Fair	1 Very Poor	3 Fair	1 Very Poor
		(6) Initial capital cost of sewer system improvements per acre of development	M	0.1	3 Fair	4 Good	3 Fair	2 Poor	2 Poor	1 Very Poor
	Drinking Water Infrastructure									
		(7) Water system improvements required in city water district	L	0	5 Very Good	5 Very Good	4 Good	4 Good	5 Very Good	5 Very Good
		(8) Capacity of Avion Water system								
	Storm Water Infrastructure									
		(9) Total impervious area for new development	L	0	4 Good	4 Good	3 Fair	3 Fair	3 Fair	4 Good
		(10) Acres of new development with welded tuff geology	L	0	3 Fair	3 Fair	2 Poor	2 Poor	5 Very Good	1 Very Poor
		(11) Acres of new development within DWPA	L	0	1 Very Poor	2 Poor	3 Fair	3 Fair	5 Very Good	3 Fair
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)										
	A. Quality Natural Environment (Environmental and Energy Consequences)		H	1	3.3 Fair	3.2 Fair	2.2 Poor	2.0 Poor	3.2 Fair	3.1 Fair
		(1) Development in wildlife areas	M	0.1	4 Good	3 Fair	2 Poor	1 Very Poor	5 Very Good	2 Poor
		(2) Linear distance of riparian areas adjacent to development	M	0.1	5 Very Good	5 Very Good	4 Good	3 Fair	3 Fair	5 Very Good
		(3) Wildfire hazard	H	1	3 Fair	3 Fair	2 Poor	2 Poor	3 Fair	3 Fair
		(4) Greenhouse gas emissions	L	0	3 Fair	4 Good	3 Fair	2 Poor	2 Poor	3 Fair
		(5) Energy Use	L	0	3 Fair	3 Fair	3 Fair	3 Fair	3 Fair	3 Fair
		(6) Average Water Consumption per Household	L	0	3 Fair	4 Good	3 Fair	2 Poor	3 Fair	3 Fair
	B. Housing Options and Affordability (Social Consequences)		H	1	5.0 Very Good	5.0 Very Good	2.0 Poor	4.0 Good	3.0 Fair	2.0 Poor
		(1) Average cost of new single family housing	VH	10	5 Very Good	5 Very Good	2 Poor	4 Good	3 Fair	2 Poor
		(2) Housing mix of new housing (subarea balance)	L	0	3 Fair	4 Good	4 Good	5 Very Good	5 Very Good	3 Fair
	C. Strong Diverse Economy (Economic Consequences)		H	1	4.0 Good	4.0 Good	4.5 Very Good	4.5 Very Good	5.0 Very Good	4.5 Very Good
		(1) site suitability for large lot industrial use	L	0	4 Good	3 Fair	3 Fair	4 Good	3 Fair	3 Fair
		(2) site suitability for areas identified for industrial uses	H	1	4 Good	3 Fair	5 Very Good	5 Very Good	5 Very Good	4 Good
		(3) site suitability for areas identified for commercial uses	H	1	4 Good	5 Very Good	4 Good	4 Good	5 Very Good	5 Very Good
Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occur										
	A. Compatibility with Farms and Forests		H	1	3.2 Fair	3.1 Fair	2.1 Poor	3.0 Fair	2.2 Poor	3.8 Good
		(1) Farm practices & high value farm land adjacent to expansion areas	H	1	3 Fair	3 Fair	2 Poor	3 Fair	2 Poor	4 Good
		(2) impact to irrigation districts	M	0.1	4 Good	3 Fair	2 Poor	3 Fair	1 Very Poor	3 Fair
		(3) Proximity of expansion areas to designated forest land	M	0.1	4 Good	4 Good	3 Fair	3 Fair	5 Very Good	3 Fair
Overall					3.6 Good	4.0 Good	2.9 Fair	2.5 Fair	3.1 Fair	3.2 Fair

Key: H = High Importance; M = Moderate Importance; L = Low Importance; N = Excluded.　● Very Good　◓ Good　○ Fair　◓ Poor　◉ Very Poor

* Weighting for performance measures is relative to others within a single community outcome. Weighting for community outcomes is against other community outcomes. Weighting is provided as an example only and is subject to further refinement.

APPENDIX D: TECHNICAL DOCUMENTATION (PARTIAL)

Index to Reports and Performance Measures covered:

- **Angelo Planning Group**: Land Use Analysis Technical Memorandum *(packet pages 3-18)*
  - Performance Measure 1.A.1: Housing Units within Walking Distance of Schools (School District Update)
  - Performance Measure 1.A.5: Opportunities for Master Planning
  - Performance Measure 1.B.1: Urbanized Acres
  - Performance Measure 1.B.2: Gross Residential Density
  - Performance Measure 1.B.4: Percent of Urbanized Acres on Parcels under 20 acres and Contiguous to Existing UGB
  - Performance Measure 2.A.9: Proximity to Transit Corridors
  - Performance Measure 2.B.10: Acres of new development with welded tuff geology
  - Performance Measure 2.B.11: Acres of new development within Drinking Water Protection Areas (DWPA)
  - Performance Measure 3.A.1: Development in Wildlife Areas
  - Performance Measure 3.A.2: Linear distance of riparian areas adjacent to development
  - Performance Measure 3.C.1: Site suitability for large lot industrial use
  - Performance Measure 3.C.2: Site suitability for other industrial and mixed employment
  - Performance Measure 3.C.3: Site suitability for other Commercial Uses
  - Performance Measure 4.A.3: Forest land within 1/4 mile of expansion areas
- **Fregonese Associates**: Envision Tomorrow Technical Memorandum *(packet pages 19-46)*
  - Performance Measure 1.A.1: Housing Units within Walking Distance of Schools
  - Performance Measure 1.A.2: Housing Units within Walking Distance of Parks and Trails
  - Performance Measure 1.A.3: Housing Units within Walking Distance of Commercial Services
  - Performance Measure 1.B.3: Net Density for New Jobs
  - Performance Measure 1.B.5: Vacant and Developed Acres
  - Performance Measure 2.A.3: Household VMT/Capita
  - Performance Measure 2.A.7: Mode Split
  - Performance Measure 2.A.8: Average Weekly Walk Trips
  - Performance Measure 2.A.10: Housing and Jobs within Walking Distance to Future Transit Corridors
  - Performance Measure 2.B.3: New Linear Miles of Local Roadway
  - Performance Measure 2.B.9: Total Impervious Area of New Development
  - Performance Measure 3.A.4: Greenhouse Gas Emissions
  - Performance Measure 3.A.5: Household Energy Use

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- o Performance Measure 3.A.6: Household Water Usage
  - o Performance Measure 3.B.1: Average Cost of New Single Family Housing
  - o Performance Measure 3.B.2: Housing Mix of New Housing
- **Murray Smith Associates**: Sanitary Sewer Analysis Technical Memorandum *(packet pages 47-87)*
  - o Performance Measure 2.B.4: Efficiency of Additional Sanitary Sewer Infrastructure Improvements
  - o Performance Measure 2.B.5: Initial Capital Cost of Sanitary Sewer Infrastructure Improvements
  - o Performance Measure 2.B.6: Initial capital cost of Sanitary Sewer Infrastructure Improvements per developed acre
- **City of Bend Growth Management Department**: Wildfire Evaluation Technical Memorandum *(packet pages 88-105)*
  - o Performance Measure 3.A.3: Wildfire Risk and Hazard
- **City of Bend Growth Management Department**: Factor 4 Evaluation Technical Memorandum *(packet pages 106-114)*
  - o Performance Measure 4.A.1: Farm practices & high value farm land adjacent to expansion areas
  - o Performance Measure 4.A.2: Impacts to Irrigation Districts
  - o Performance Measure 4.A.3: UGB Expansion Subareas Proximity to Forest Lands
- **DKS Associates**: Transportation Evaluation Technical Memorandum *(to be provided separately)*
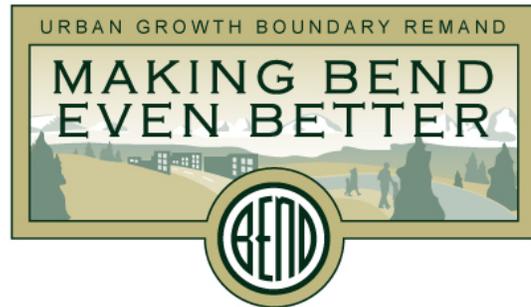
UGB Expansion Scenarios Evaluation Report　　　　　　　　　　　　　　　　　　*Appendix D*

Memorandum

October 2, 2015

To: Urban Growth Boundary and Growth Scenarios Technical Advisory Committee

Cc: Project Team

From: Angelo Planning Group

Re: Scenario Evaluation: Land Use Analysis Technical Memorandum

Introduction

Purpose

The purpose of this memorandum is to describe the data sources and methodology of various performance measure evaluations conducted in "Stage 4" of the Bend Urban Growth Boundary (UGB) Remand project, the evaluation of alternative UGB expansion scenarios. This memorandum addresses the performance measures evaluated by Angelo Planning Group (see Table 1). Details of the results of the analysis and interpretation are provided in the Bend UGB Scenario Evaluation Report.

Table 1. Performance Measures in this Technical Memorandum

Performance Measure	Description
Community Outcome: Complete Communities and Great Neighborhood	
1.A.1	Housing Units within Walking Distance of Schools (Update)
1.A.5	Opportunities for Master Planning
Community Outcome: Efficient, Timely Growth	
1.B.1	Developed Acres
1.B.2	Gross Housing Density
1.B.4	Percent of urbanized acres on parcels under 20 acres and contiguous to the existing UGB
Community Outcome: Balanced Transportation System	
2.A.9	Proximity to Transit Corridors
Community Outcome: Cost Effective Infrastructure	
2.B.10	Acres of new development with welded tuff geology
2.B.11	Acres of new development within DWPA
Community Outcome: Quality Natural Environment	
3.A.1	Development near ODFW Habitat Ranges
3.A.2	Linear feet of property along Deschutes River and Tumalo Creek
Community Outcome: Strong Diverse Economy	
3.C.1	Site suitability for large lot industrial use

Performance Measure	Description
3.C.2	Site suitability for other industrial and mixed employment
3.C.3	Site suitability of commercial uses
Community Outcome: Farm and Forest Compatibility	
4.A.3	Forest land within 1/4 mile of expansion areas

Evaluation Tools

The evaluations described in this memorandum were completed using ArcGIS mapping software and the Envision Tomorrow Scenario Planning Tool. ArcGIS is a geographic information system (GIS) for working with maps and geographic information. This analysis was completed primarily using simple tools such as buffers, measurement, and area calculations. The Envision Tomorrow tool is described in detail in the Fregonese Associates technical memorandum.

Scenarios Evaluated

A total of six sets of land use assumptions were evaluated (Scenario 1.2; Scenario 2.1; Scenario 3.1; Supplemental Analysis Area Map 1; Supplemental Analysis Area Map 2; Supplemental Analysis Area Map 3); their characteristics and rationale are described in detail in the evaluation report. Each UGB Expansion Scenario and Supplemental Analysis Area Map (SAAM) is comprised of a set of land use assumptions describing the type and amount of housing, employment, and other uses in polygons within the existing UGB and in various expansion subareas. They are all consistent with the City of Bend's overall housing and jobs need for the planning horizon, and use consistent assumptions for development on land inside the existing UGB.

Geographies

These performance measures were evaluated at the subarea level (see Figure 1), as well as for the entire expansion area (all areas that would be added to the UGB under a given scenario) and the City of Bend as a whole (the existing UGB plus the expansion area).

Figure 1. Subareas
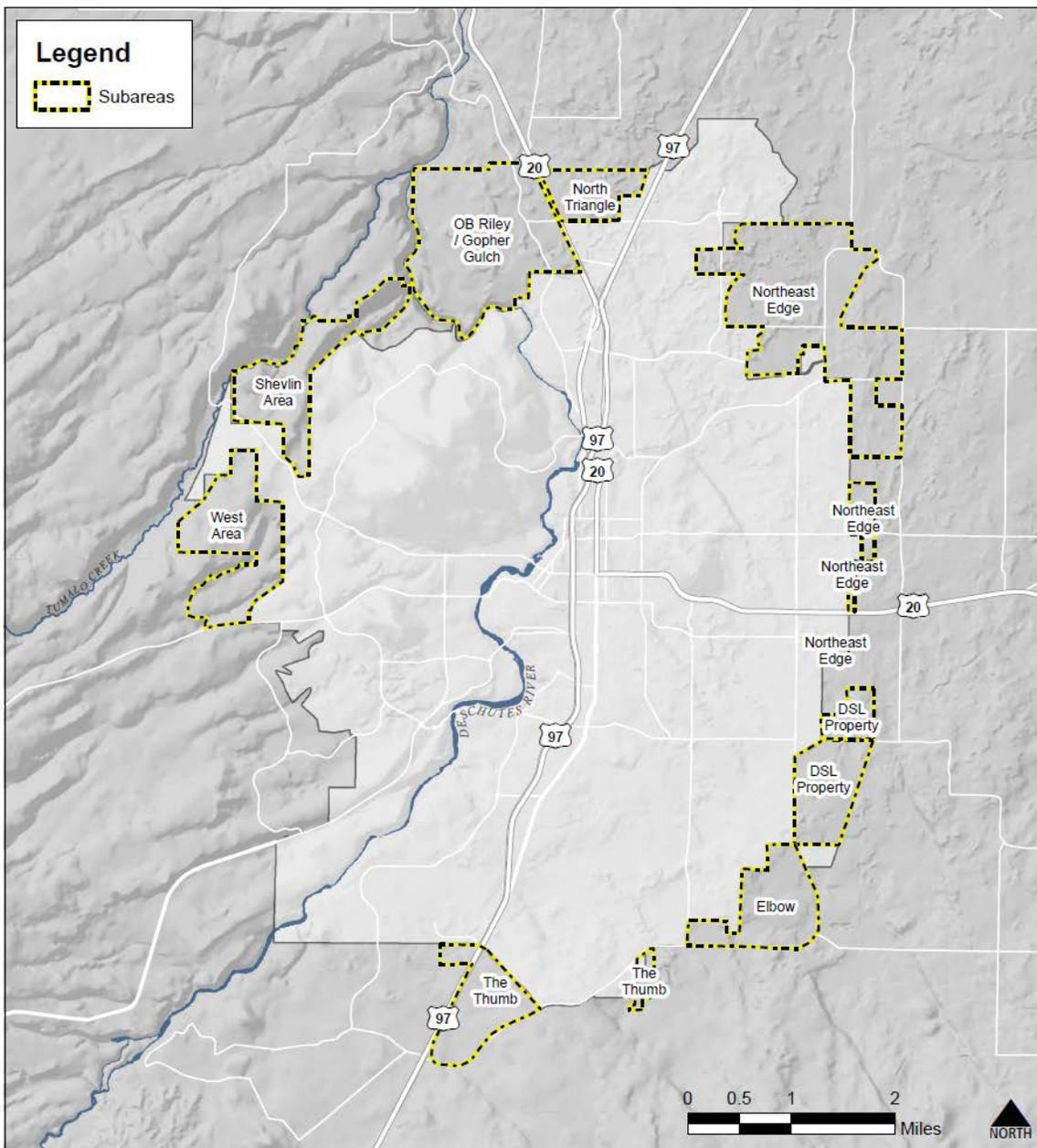
Complete Communities and Great Neighborhoods

Performance Measure 1.A.1: Housing Units within Walking Distance of Schools (School District Update)

Purpose

Schools are an important ingredient of a complete community. Having schools within walking distance supports great neighborhoods because schools are an important destination for many households, and they often provide recreational amenities (e.g. playgrounds and ball fields) that

are accessible to the public during non-school hours. Ability to walk also decreases reliance on the automobile; however, this is captured by other performance measures.

Data Sources

GIS data for locations of existing schools provided by City of Bend and Deschutes County. Proposed school locations drafted in scenarios approved by the UGB Steering Committee (USC). Refined school locations based on input from Bend-La Pine School District received in August 2015.

Methodology

Data on existing housing units comes from parcel inventory data provided by the City of Bend, based on a combination of Deschutes County Assessor's Office data, City building permit data, aerial photography, and existing City parcel inventory data. Future housing units for land inside and outside UGB were derived for each scenario using Envision Tomorrow and assumptions about various types of development (development types). "Walking Distance" buffers of ½ mile (as the crow flies, not accounting for barriers such as highways) were applied to the outer edge of parcels or areas identified as existing and future school sites. Total housing units within polygons intersecting this buffer were reported for each subarea and for the City as a whole, and then divided by the total housing units within each geography. Subareas and scenarios with the highest percentage of housing units within walking distance of schools were given higher ratings.

An analysis of Envision outputs was performed by APG to evaluate how well scenario assumptions lined up with School District input. Adjustments made in the following cases:

- School district desired high school in "The Thumb" subarea in all scenarios. Nearly all households in this subarea would be within walking distance in this case – adjusted accordingly. (Scenario 2.1 needed no change)
- Two schools desired in NE edge in SAM-1. Nearly all new homes and many existing homes in this subarea would be within walking distance in this case – adjusted accordingly.
- No school desired in NE Edge in Scenario 3.1 – removed housing units from "walking distance" buffer.
- No school desired in DSL Property in Scenario 1.2 - removed housing units from "walking distance" buffer.
- No school desired in West Area in Scenario 1.2. Proposed school was within ½ mile of two existing schools, no change needed to household proximity numbers.
- 1 school desired in Shevlin Area in Scenario 1.2. Very little housing in this scenario within walking distance – no change needed to household proximity numbers.
- Change of school location in West Area in SAAM 3 – almost all housing units in this subarea now within walking distance of school; changed accordingly.

Performance Measure 1.A.5: Opportunities for Master Planning

Purpose

The purpose of this performance measure is to evaluate the balance of property ownership in each scenario/SAAM between large property holders (greater than 20 acres in common ownership) and small property holders (less than 20 acres in common ownership). There has been concern expressed by TAC members about having the benefits of urban expansion accrue to a relatively small number of property owners, and this performance measure aims to quantify that metric.

Data Sources

Deschutes county tax lot data.

Methodology

Land ownership was examined in each expansion subarea and groups of parcels totaling 20 acres or greater in common ownership was identified (See map). Areas in school ownership that are anticipated to be developed as schools are not included, as inclusion in an expansion would not change ownership of land. Acreage of development in each scenario inside and outside these parcels were compared. Performance measure is reported as the percentage of total expansion acres in ownerships >20 acres and <20 acres. Figure 4 shows areas in common ownership of greater than 20 acres.

Figure 4. Ownership over 20 acres
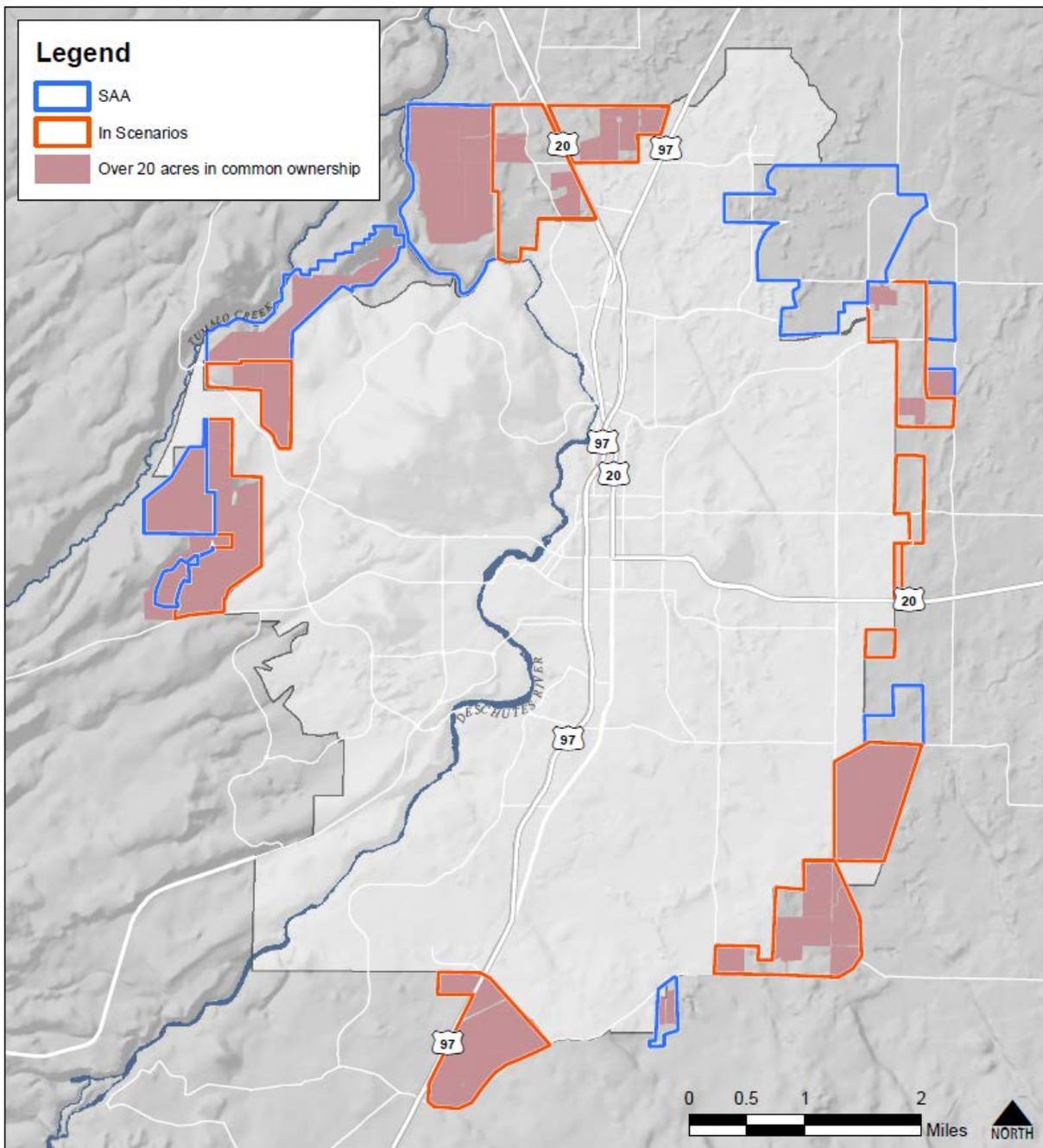
Efficient, Timely Growth

Performance Measure 1.B.1: Urbanized Acres

Purpose

The purpose of this performance measure is to provide basic information about the amount of development within each scenario / SAAM, broken down by subarea and by type of development.

APG Scenario Evaluation – Land Use Analysis Technical Memorandum   *Page 6 of 16*

Data Sources
Draft scenarios approved by the USC and SAAMs.

Methodology
Envision Tomorrow development types were grouped into three general categories – Residential Land, Employment Land, and Civic Land. Residential Land contains development types corresponding to residential plan designations (RL, RS, RS Masterplan, RS Hillside, RM, RM Masterplan, RH, and mixed use); Employment Land contains development types corresponding to employment plan designations (CC, CC2, CL, CG, IP, IL, IG, Large Lot Industrial), and Civic Land contains park and school land. These gross figures are the acres of designations placed in expansion subareas.

Performance Measure 1.B.2: Gross Residential Density

Purpose
The purpose of this performance measure is to provide basic information about the gross housing density of subareas and scenarios/SAAMs.

Data sources
Draft scenarios approved by the USC and SAAMs.

Methodology
Envision Tomorrow calculates residential units in new development. This measure of gross housing density is the number of residential units divided by the residential acreage for each evaluation geography. This does not include residential units in commercial areas (e.g. an apartment above a storefront), but those types of units make up a very small amount of residential development in scenario expansion areas.

Performance Measure 1.B.4: Percent of Urbanized Acres on Parcels under 20 acres and Contiguous to Existing UGB

Purpose
The purpose of this performance measure is to assess the "low hanging fruit" of smaller parcels (with no master-planning requirement that parcels > 20 acres have) that are adjacent to the UGB and presumed to be developable quickly. Originally this performance measure was intended to include only parcels where sewer capacity was not a large concern, but sewer analysis showed that sewer capacity requires significant improvements regardless of where the boundary expands.

Data Sources
Deschutes County assessor's data, City of Bend GIS data.

Methodology
GIS query was performed to select parcels less than 20 acres in size and that were adjacent to the existing Urban Growth Boundary. Performance measure was reported as the total acreage of these selected parcels as percent of total expansion acreage in each scenario/SAM. Figure 2

below shows the locations of these smaller tax lots (note: not all tax lots in Figure 2 are part of a Scenario/SAAM).

Figure 2. Taxlots under 20 acres and adjacent to existing UGB
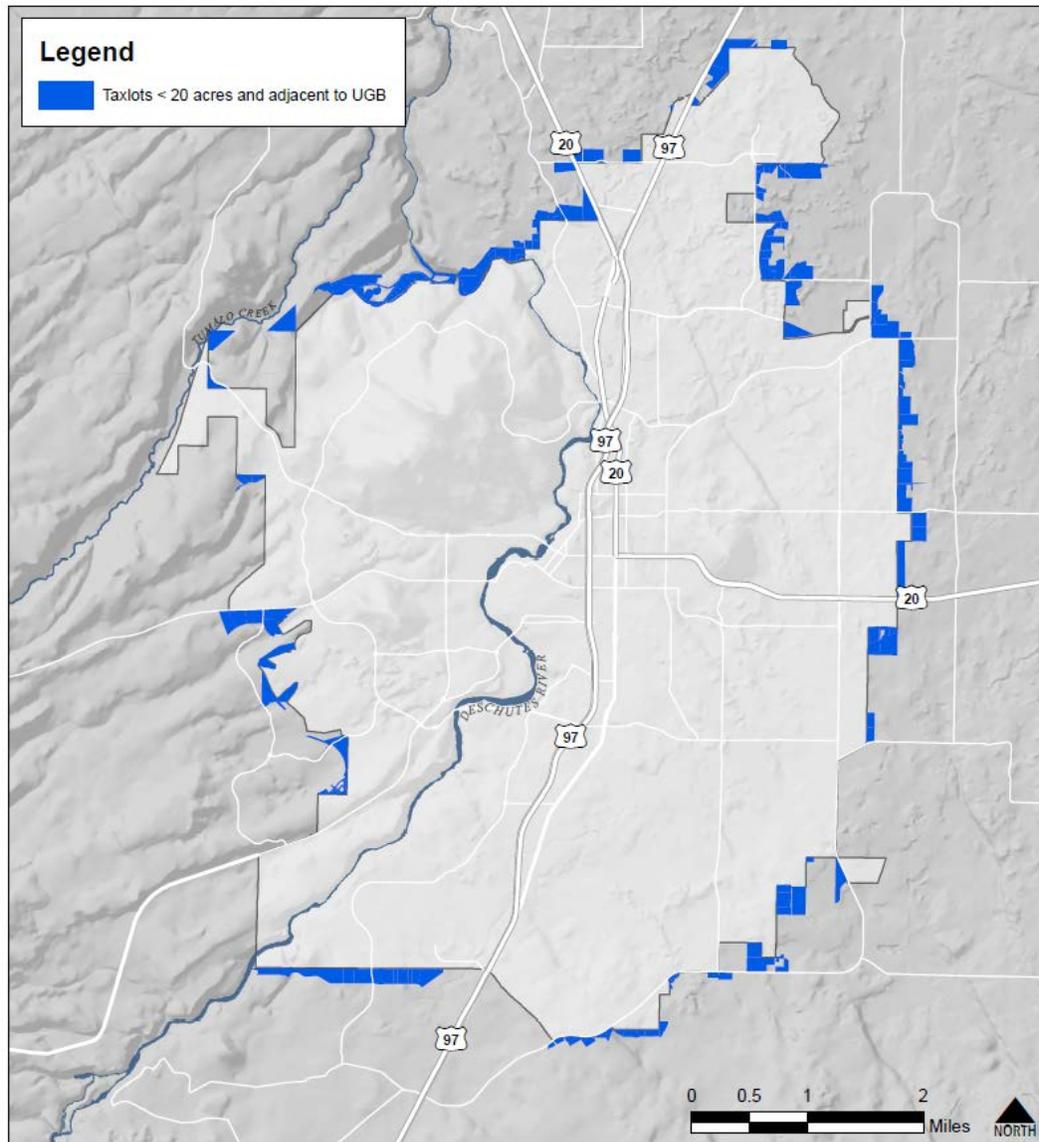
Balanced Transportation System

Performance Measure 2.A.9: Proximity to Transit Corridors

Purpose

Performance Measure 2.A.10 (Housing and Jobs within Walking Distance to Future Transit Corridors), which is described in the Fregonese Associates Technical Memorandum, captures development immediately adjacent to transit. However, given how little area within the potential UGB expansion areas lies within a quarter mile of transit, this performance measure was developed to offer a more qualitative look at how close each area is to existing and planned

APG Scenario Evaluation – Land Use Analysis Technical Memorandum   *Page 8 of 16*

transit. This matters because some people will walk over a quarter mile to access transit, particularly if the transit offers a convenient connection to their destination, and because there is some potential to modify transit routing in the future to better serve future expansion areas. Areas that lie closer to existing and already-planned transit lines may be easier extend service to in the future.

Data Sources
Bend MPO Public Transit Plan, March 2013; 2015 proposed transit system map; GIS data for transit corridors provided by Bend Metropolitan Planning Organization (MPO), scenarios approved by the USC and SAAMs.

Methodology
A visual inspection of the proposed future transit system from the Bend MPO Public Transit Plan was used to identify additional proposed service not included in the available GIS data. Manual distance calculation with GIS software was used to estimate the distance from the subarea to the nearest existing or proposed transit line or stop.

Cost-Effective Infrastructure

Performance Measure 2.B.10: Acres of new development with welded tuff geology

Purpose
The purpose of this performance measure is to evaluate the amount of development occurring within areas with Welded Tuff (QTst) geology, which is less suitable for "low impact development" techniques such as stormwater infiltration ponds. Stormwater infrastructure is expected to be somewhat greater in areas with this geology than elsewhere.

Data Sources
Deschutes County GIS, Surficial Geology data from City of Bend

Methodology
Welded Tuff surficial geology feature intersected with development in each scenario/SAAM. Total acreage reported by subarea. Figure 6 shows the surficial geology data – Welded Tuff designation is "QTst"

Figure 6. Surficial Geology
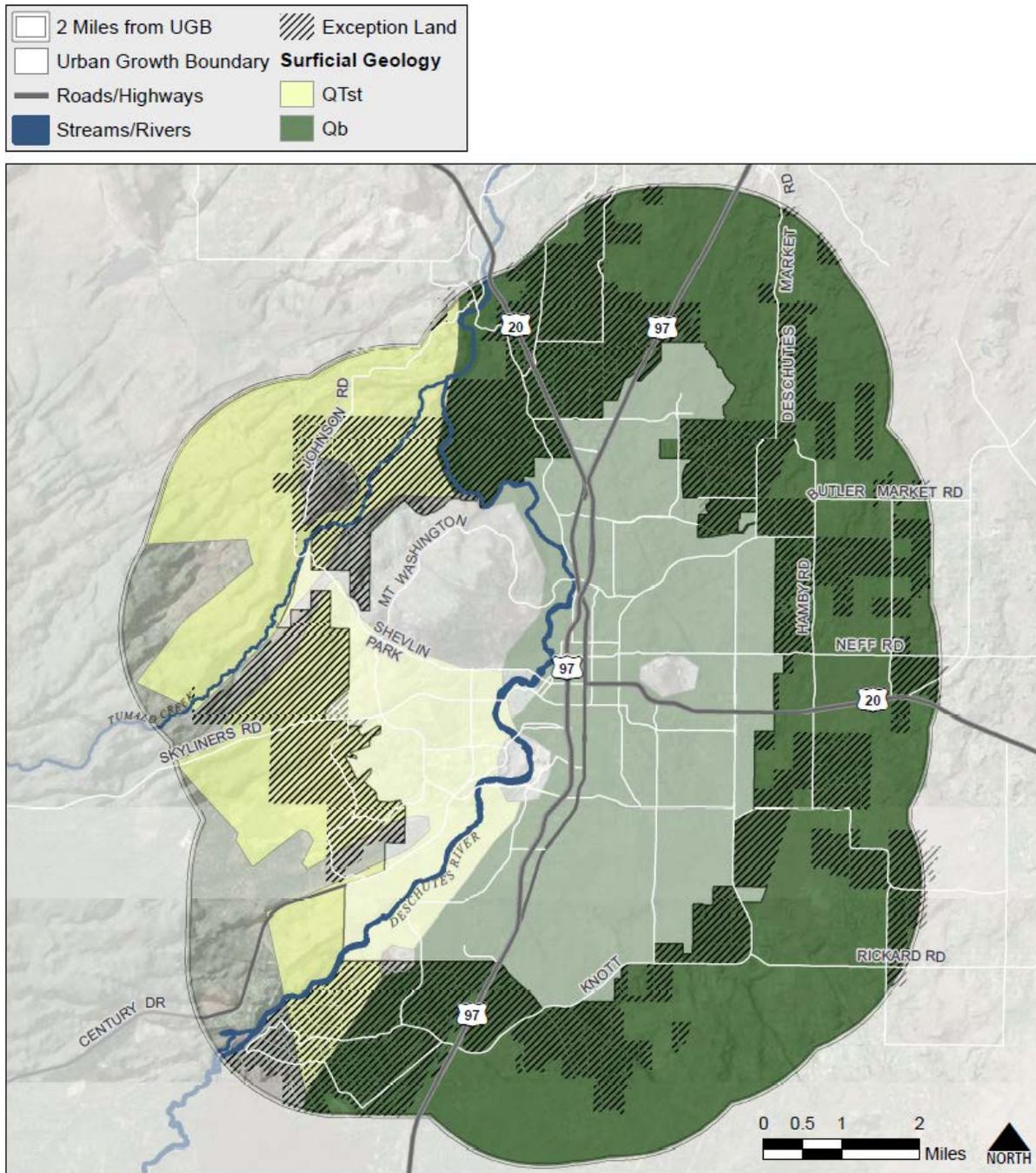
Performance Measure 2.B.11: Acres of new development within Drinking Water Protection Areas (DWPA)

Purpose

The purpose of this performance measure is to evaluate the amount of development occurring within identified Drinking Water Protection Areas (DWPA). Development in these areas has a greater risk of causing pollution and impacting drinking water for the City.

06748

Data Sources
2013 Bend Groundwater Assessment Data

Methodology
Drinking Water Protection Area features were intersected with development in each scenario/SAAM. Total acreage reported by subarea. Figure 5 shows a map of the drinking water protection areas.

Figure 5. Drinking Water Protection Areas (DWPA)
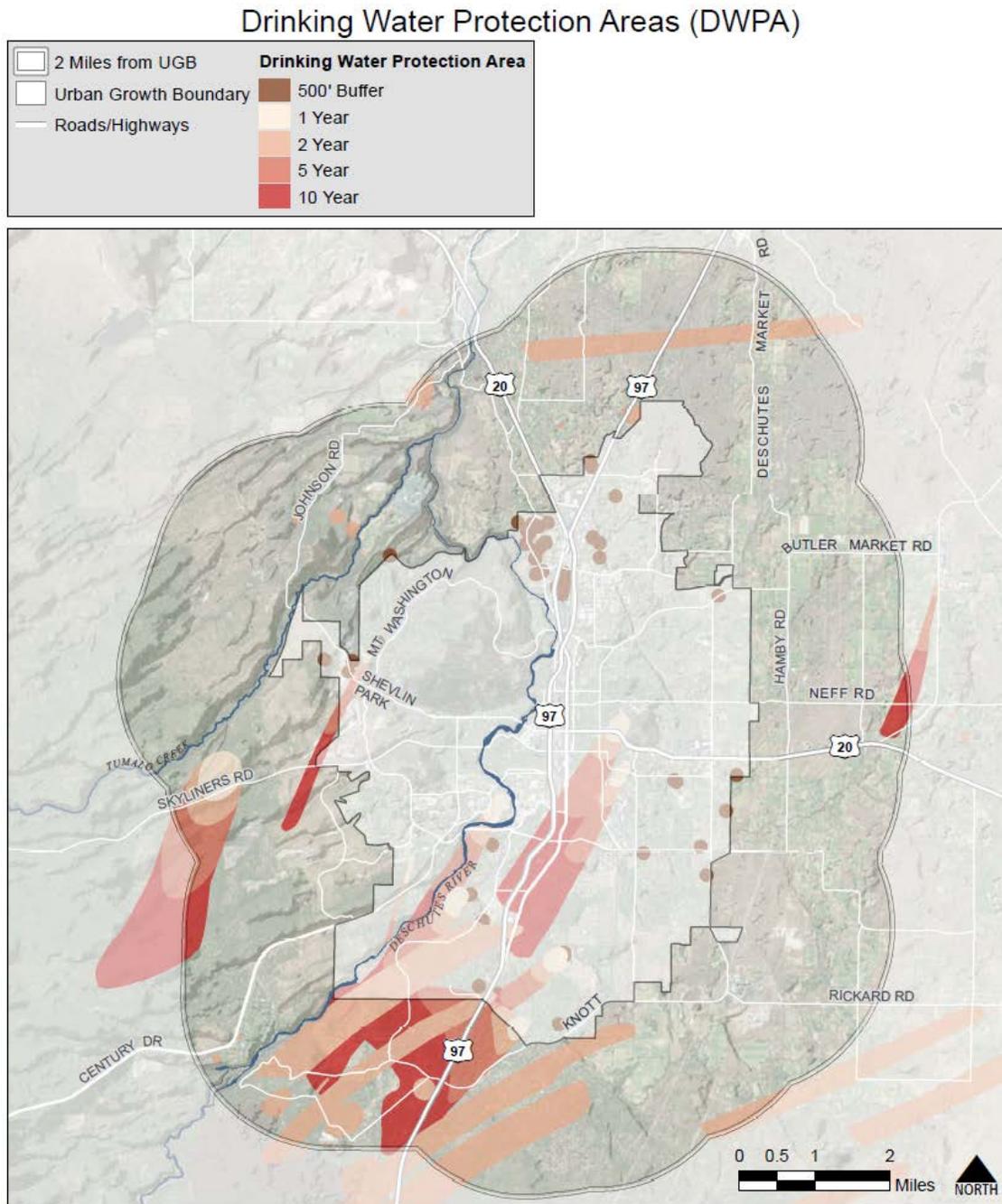
Quality Natural Environment

Performance Measure 3.A.1: Development in Wildlife Areas

Purpose

The purpose of this performance measure is to evaluate the acres of development that may impact wildlife areas identified by the Oregon Department of Forest and Wildlife (ODFW). Development at urban densities that makes efficient use of land is considered incompatible with high-quality wildlife habitat.

Data Sources

Deschutes County GIS, ODFW elk/deer range and "Areas of Potential Concern" data used in UGB Stage 2 mapping.

Methodology

ODFW "areas of potential concern" identified are loose ovals where elk/deer tend to rest. For the purposes of this evaluation they were not treated as geographically accurate features, but rather indicative of a general area within topographic boundaries. Where these areas overlap with an expansion subarea, they are assumed to encompass the entire subarea unless a topographic boundary is present.

Figure 3 depicts the ODFW data. Two calculations were performed for each subarea and each scenario/SAAM:

1. Calculated acres of development intersecting ODFW Elk/Deer ranges
2. Calculated acres of development within ODFW "Areas of Potential Concern."

Figure 3. Exception Land and Big Game Winter Ranges

Exception Land & Big Game Winter Ranges

	ODFW Deer & Elk Winter Range	ODFW Potential Winter Range
2 Miles from UGB	Elk	Elk
Urban Growth Boundary	Deer	Deer
Streams/Rivers	Elk & Deer	Wildlife Area Combining Zone
Roads/Highways		
Exception Land		

URBAN GROWTH
BOUNDARY REMAND
BEND

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Service Layer Credits: Oregon Department of Fish and Wildlife (2011-2012). Deschutes County GIS

Note: Areas of potential concern based on interviews with ODFW

Prepared 3/6/2015

Performance Measure 3.A.2: Linear distance of riparian areas adjacent to development

Purpose

Discussions during early phases of the UGB project have identified that Goal 5 protection of the Deschutes River and Tumalo Creek areas will require a fine-grained and site-specific evaluation of appropriate buffer distances. For this evaluation, we examined the linear feet along the Deschutes River and Tumalo Creek in the Shevlin Area and the Gopher Gulch Area. Some of this land is in Bend Parks & Recreation ownership, and some assumes a "clustered" development time that includes open space buffers, but these do not guarantee Goal 5 resource protection and are still measured for this performance measure.

Data Sources

Deschutes County assessor's data, City of Bend GIS data.

Methodology

Manual distance calculation of linear feet along riverfront. Results should not be interpreted as accurate to less than 100'.

Strong, Diverse Economy

Performance Measure 3.C.1: Site suitability for large lot industrial use

Purpose

The purpose of this performance measure is to evaluate the locations of a Large Lot Industrial Site identified in the various scenarios/SAAMs. This evaluation is the subject of a separate memorandum, presented to the Employment TAC in July 2015.

Data Sources

Deschutes County GIS, rough topographic data from Google Earth, aerial imagery from ESRI, criteria from the 2015 Draft Bend Employment Opportunities Analysis and the Regional Large Lot Industrial Need Program[1].

Methodology

Qualitative evaluation of sites with regard to criteria. Details in separate memorandum.

Performance Measure 3.C.2: Site suitability for other industrial and mixed employment

Purpose

The purpose of this performance measure is to evaluate the locations of industrial and mixed employment land identified in the various scenarios/SAAMs.

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[1] Available online at
http://www.deschutes.org/sites/default/files/fileattachments/community_development/page/808/central_oregon_large_lot_industrial_land_need_analysis_2.4mb_pdf.pdf

Data Sources

Deschutes County GIS, rough topographic data from Google Earth, aerial imagery from ESRI, criteria from the 2015 Draft Bend Employment Opportunities Analysis.

Methodology

Qualitative evaluation of identified areas of industrial/mixed employment use against the criteria (Parcel size, site size, topography, compatibility with adjacent uses, and transportation access).

Performance Measure 3.C.3: Site suitability for other Commercial Uses

Purpose

The purpose of this performance measure is to evaluate the locations of commercial land identified in the various scenarios/SAAMs.

Data Sources

Deschutes County GIS, rough topographic data from Google Earth, aerial imagery from ESRI, criteria from the 2015 Draft Bend Employment Opportunities Analysis.

Methodology

Qualitative evaluation of identified areas of industrial/mixed employment use against the criteria (Parcel size, site size, topography, compatibility with adjacent uses, visibility, and transportation access). Visibility evaluated using maps of Average Daily Trips along the future network of each scenario provided by DKS Associates.

Farm and Forest Compatibility

Performance Measure 4.A.3: Forest land within 1/4 mile of expansion areas

Purpose

Acreage of forest land within a 1/4 mile buffer of expansion scenarios. For "Existing UGB" subarea - used existing UGB.

Data Sources

Deschutes County GIS (Zoning Data, F-1 and F-2 zones)

Methodology

Calculated ¼ mile buffer from F-1 and F-2 zones, intersect with expansion areas/existing UGB. Figure 7 shows forest zones in the proximity of Bend and ¼ mile buffer.

Figure 7. Proximity to Forest Zones

Bend UGB
Proximity to Forest Zones

Prepared 9/17/2015
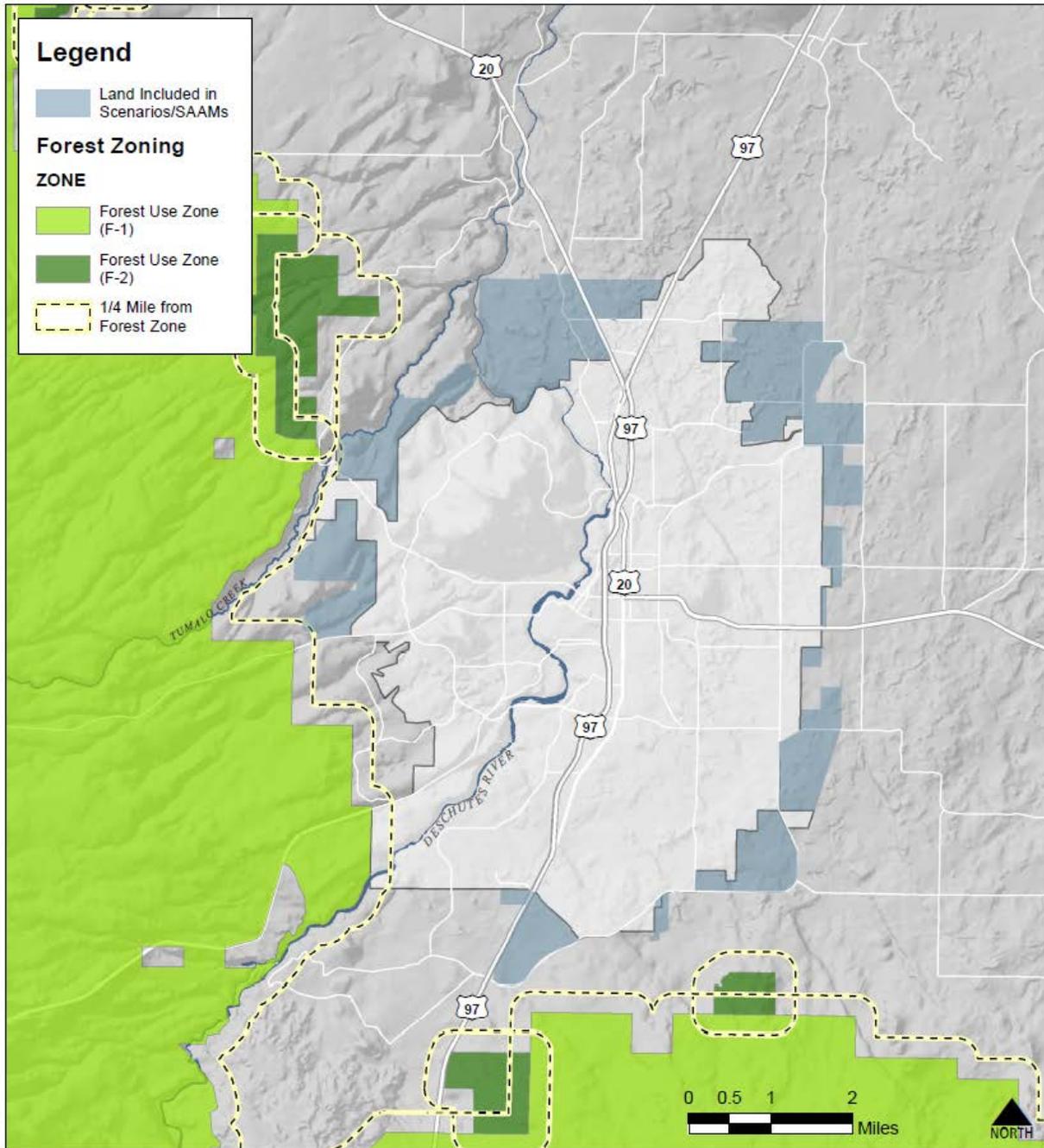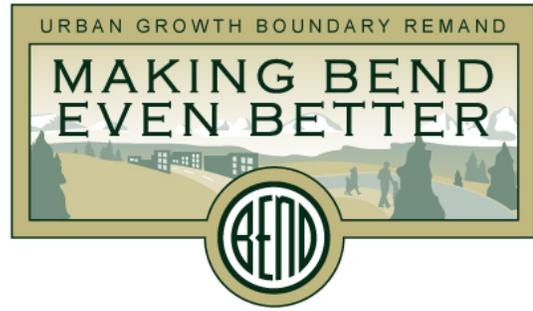
Legend

Land Included in
Scenarios/SAAMs

Forest Zoning

ZONE

Forest Use Zone
(F-1)

Forest Use Zone
(F-2)

1/4 Mile from
Forest Zone

Memorandum

October 2, 2015

To:	Urban Growth Boundary and Growth Scenarios Technical Advisory Committee
Cc:	Project Team
From:	Fregonese Associates, Inc.
Re:	Scenario Evaluation: Envision Tomorrow Technical Memorandum

Introduction

Purpose

The purpose of this memorandum is to describe the data sources and methodology of various performance measure evaluations conducted in "Stage 4" of the Bend Urban Growth Boundary (UGB) Remand project, the evaluation of alternative UGB expansion scenarios. This memorandum addresses the performance measures evaluated by Fregonese Associates Inc. (see Table 1). Details of the analysis and interpretation are provided in the Bend UGB Scenario Evaluation Report.

Table 1. Performance Measures in this Technical Memorandum

Performance Measure	Description
Community Outcome: Complete Communities and Great Neighborhood	
1.A.1	Housing Units within Walking Distance of Schools
1.A.2	Housing Units within Walking Distance of Parks and Trails
1.A.3	Housing Units within Walking Distance of Commercial Services
Efficient, Timely Growth	
1.B.3	Net Density for New Jobs
1.B.5	Vacant/Developed Acres
Balanced Transportation System	
2.A.1	VMT/Capita
2.A.7	Mode Split
2.A.8	Average Weekly Walk Trips
2.A.10	Housing and Jobs within Walking Distance to Future Transit Corridors
Cost-Effective Infrastructure	
2.B.3	New Linear Miles of Local Roadway

Performance Measure	Description
2.B.9	Total Impervious Area of New Development
Quality Natural Environment	
3.A.4	Greenhouse Gas Emissions
3.A.5	Household Energy Use
3.A.6	Household Water Use
Housing Options, Affordability, and Equity	
3.B.1	Average Cost of New Housing
3.B.2	Housing Mix of New Housing

Evaluation Tools

The evaluations described in this memorandum were completed using ArcGIS mapping software and the Envision Tomorrow Scenario Planning Tool. Envision Tomorrow is an innovative set of urban and regional planning tools that can be used to model development feasibility on a site-by-site basis as well as create and evaluate multiple land use scenarios, test and refine transportation plans, produce small-area concept plans, and model complex regional issues. The software also provides a real-time evaluation of relevant indicators such as land use, energy consumption, and financial impacts that measure a scenario's performance. It can also provide baseline carbon emissions analysis of different land use patterns, enabling planners to model the relationship between greenhouse gas emissions and land use and transportation decisions.

Envision Tomorrow consists of two primary tools: the Prototype Builder, an ROI model spreadsheet tool, and the Scenario Builder, an ArcGIS add-on.

The *Prototype Builder*, a return on investment (ROI) spreadsheet tool, can be used to model buildings and test the physical and financial feasibility of development. The tool allows the user to examine land use regulations in relation to the current development market and consider the impact of parking, height requirements, construction costs, rents and subsidies. Use this tool to see what is market feasible. Use it to see how preferred forms of development, such as mixed-use retail with housing above, might become more financially feasible within your existing code.

The *Scenario Builder* adds scenario-building functionality to ArcGIS. First, design a library of buildings in the Prototype Builder. Next, use the Scenario Builder to create development types and "paint the landscape" by allocating different development types across the study area to create unique land use scenarios. The tool then allows real-time evaluation of each scenario through a set of user-defined benchmarks or indicators. The indicators measure such things as the scenario's impact on land use, housing, sustainability, transportation, and economic conditions. It also allows communities and regions to monitor progress over the short-and long-terms.

Scenarios Evaluated

A total of six sets of land use assumptions were evaluated (Scenario 1.2; Scenario 2.1; Scenario 3.1; Supplemental Analysis Area Map 1; Supplemental Analysis Area Map 2; Supplemental Analysis Area Map 3); these are described in detail in the evaluation report. Each UGB Expansion Scenario and Supplemental Analysis Map (SAAM) is comprised of a set of land use assumptions describing the type and amount of housing, employment, and other uses in polygons within the existing UGB and in various expansion subareas. They are all consistent with the City of Bend's overall housing and jobs need for the planning horizon, and use consistent assumptions for development on land inside the UGB.

Geographies

These performance measures were evaluated at the subarea level, as well as for the entire expansion area (all areas that would be added to the UGB under a given scenario) and the City of Bend as a whole (the existing UGB plus the expansion area).

Complete Communities and Great Neighborhoods

Performance Measure 1.A.1: Housing Units within Walking Distance of Schools

Purpose

Schools are an important ingredient of a complete community. Having schools within walking distance supports great neighborhoods because schools are an important destination for many households, and they often provide recreational amenities (e.g. playgrounds and ball fields) that are accessible to the public during non-school hours. (Ability to walk also decreases reliance on the automobile; however, this is captured by other performance measures.)

Data Sources

GIS data for locations of existing schools provided by City of Bend and Deschutes County. Proposed school locations drafted in scenarios approved by the UGB Steering Committee (USC). (Note: refined school locations based on input from Bend-La Pine School District received in August 2015. See APG technical memorandum for details.)

Methodology

Data on existing housing units comes from parcel inventory data provided by the City of Bend, based on a combination of Deschutes County Assessor's Office data, City building permit data, aerial photography, and existing City parcel inventory data. Future housing units for land inside and outside UGB were derived for each scenario using Envision Tomorrow and assumptions about various types of development (development types). "Walking Distance" buffers of ½ mile (as the crow flies, not accounting for barriers such as highways) were applied to the outer edge of parcels or areas identified as existing and future school sites. Total housing units within polygons intersecting this buffer were reported for each subarea and for the City as a whole, and then divided by the total housing units within each geography. Subareas and scenarios with the highest percentage of housing units within walking distance of schools were given higher ratings.

Updates to Envision outputs were performed by APG to evaluate how well scenario assumptions lined up with School District input.   See APG technical memorandum for details.

Fregonese Associates Scenario Evaluation – Envision Tomorrow Technical Memorandum　　　　　　　　　　　　　　　　　　　　*Page 3 of 28*

Figure 1: Half-Mile Buffer from Schools (Scenario 1.2 example)
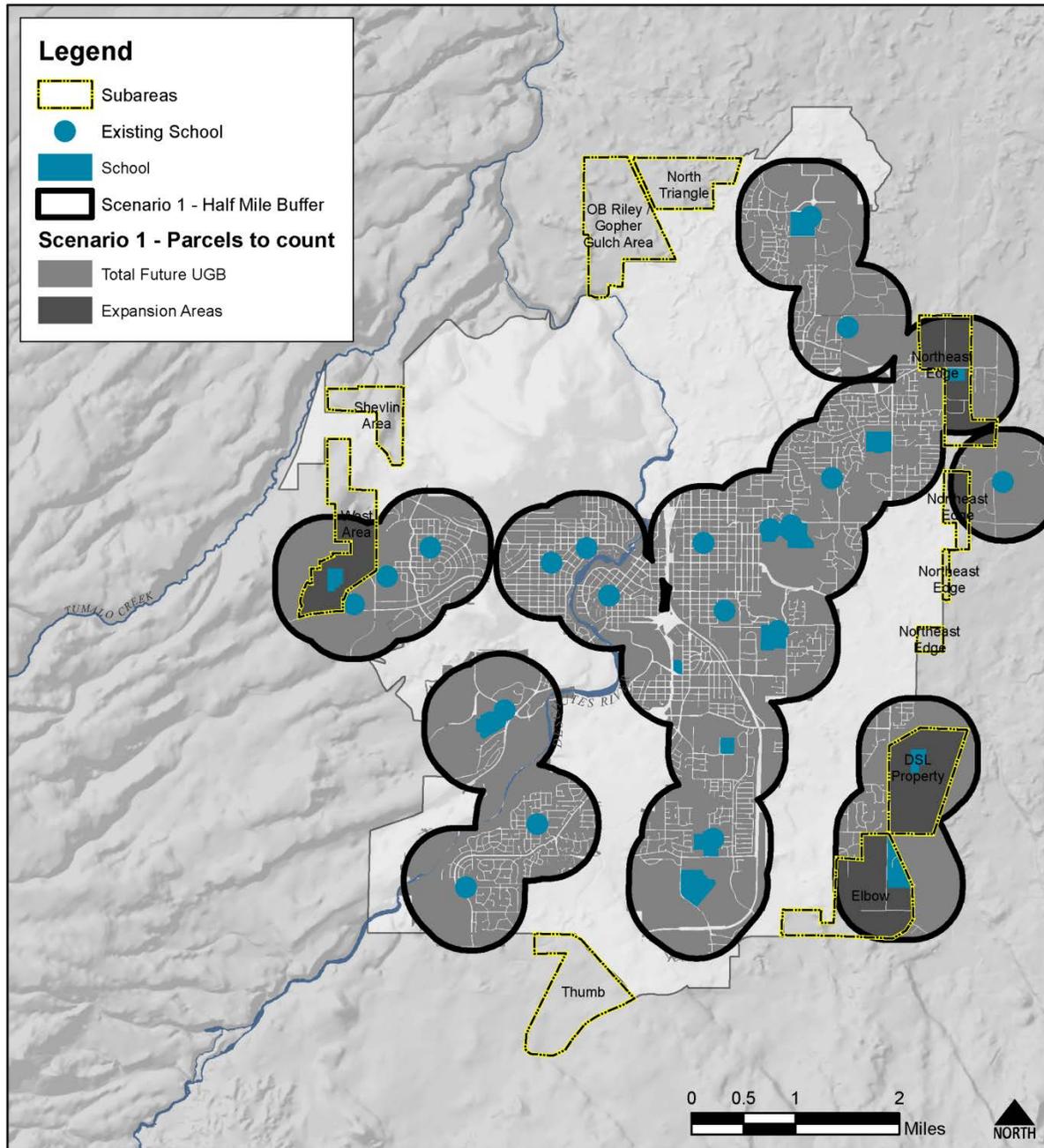
Performance Measure 1.A.2: Housing Units within Walking Distance of Parks and Trails

Purpose

Access to greenspace is an important aspect of a complete community. It allows residents to relax within nature, provides spaces to play and meet, and provides opportunities for exercise. Homes with greenspace within walking distance are more likely to have greater opportunity for transportation, which may reduce reliance on the automobile, and is inclusive of populations that do not drive.

Data Sources

GIS data for locations of existing trails and parks provided by City of Bend and Deschutes County. Proposed park locations drafted in scenarios approved by the USC, and SAAMs.

Methodology

The methodology for this indicator was to count the number of housing units within a 0.5 mile buffer from current and future parks and trails. The 0.5 mile buffer is consistent with the 0.5 mile buffer used for other proximity measures, as it is roughly equal to what most would consider a reasonable walk.

Existing parks and trails were buffered out by 0.5 mile from the edge of their boundary. That is to say, if a park encompassed a whole block, 0.5 miles were buffered out from each edge of the block, rather than a single point in the middle of the park. Future parks and trails were then buffered out by 0.5 miles, using the same technique. Future park locations varied across the different scenarios, based on the scenario layout and development types.

Finally, future total (existing plus new) housing units for each scenario were calculated within the buffer. A housing unit was considered within the buffer if the centroid of its parcel was within the buffer. This was done to eliminate small slivers of a parcels being included in the measure. The total number of housing units within the buffers were divided by the total number of housing units overall to find the percentage of units within walking distance to parks and trails.

Figure 2: Half-Mile Buffer from Parks and Trails (Scenario 1.2 example)

Bend UGB Remand Project
Walking Distance to Open Space System
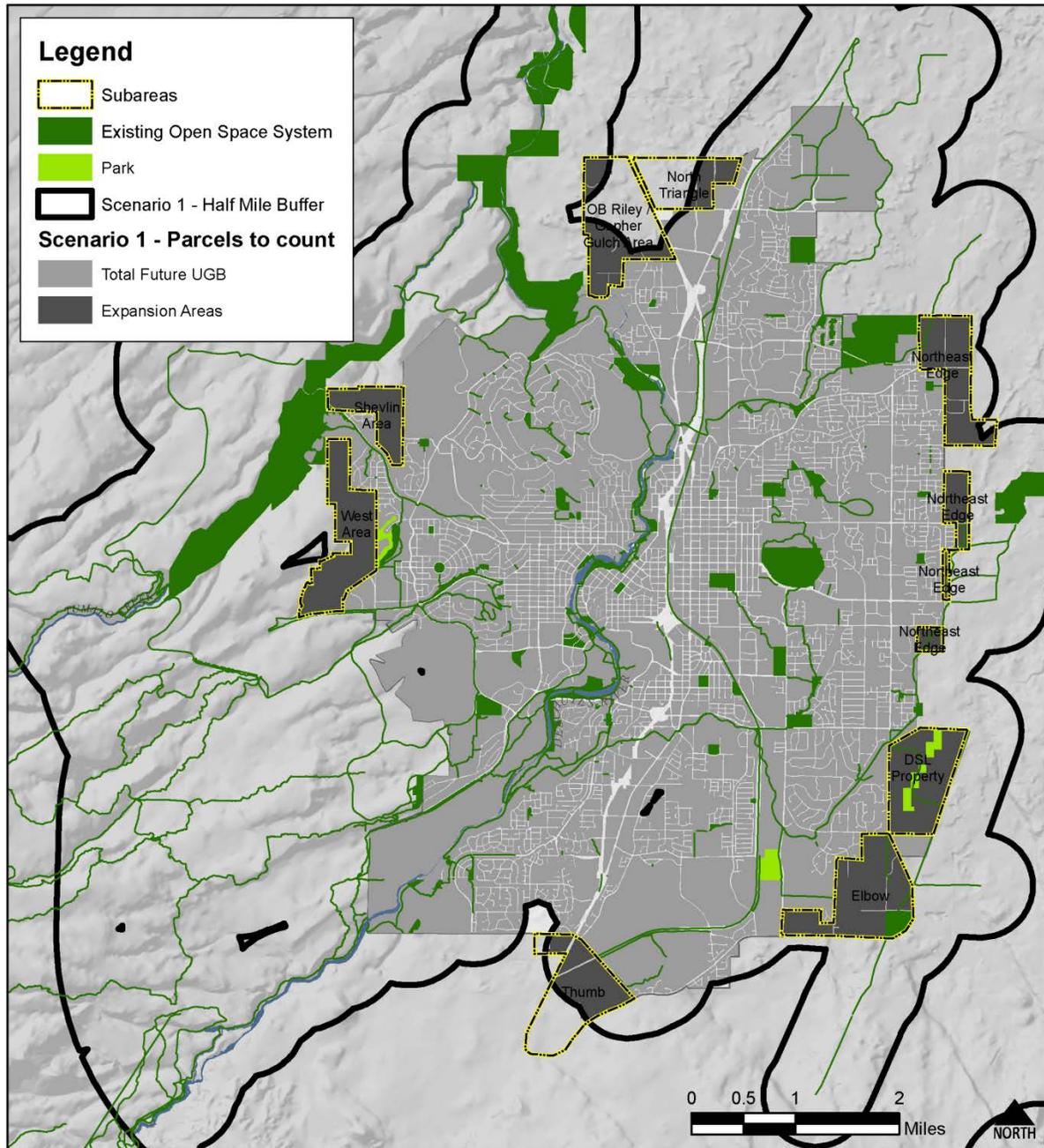
Performance Measure 1.A.3: Housing Units within Walking Distance of Commercial Services

Purpose

Close access to commercial services is an important aspect of a complete community. By having commercial services close by, residents can walk to reach them, which reduces automobile use, increase physical activity, and promotes more pedestrian activity and street life. Additionally, more dispersed community commercial locations can support smaller local businesses and offer additional third places for residents.

Data Sources

GIS data for locations of existing housing and zoning/general plan provided by City of Bend. Future housing and commercial locations drafted in scenarios approved by the USC and SAAMs.

Methodology

The methodology for this indicator was to count the number of housing units within a half mile buffer from current and future commercial services. The half mile buffer is consistent with the half mile buffer used for other proximity measures, as it is roughly equal to what most would consider a reasonable walk.

Existing commercial areas were identified based on their general plan designation. The designations used were: CB, CC, CG, CL and MR. Future commercial areas were based on the development types painted, which were: CB, CC, CC2, CG, CL, ME, MR, MU 1, and MU-2a. Once parcels with these designations were selected, they were buffered out by 0.5 miles, based on the edge of their parcel boundaries.

Finally, future total (existing plus new) housing units for each scenario were calculated within the buffer. A housing unit was considered within the buffer if the centroid of its parcel was within the buffer. This was done to eliminate small slivers of a parcels being included in the measure. The total number of housing units within the buffers were divided by the total number of housing units overall to find the percentage of units within walking distance to commercial services.

Figure 3: Half-Mile Buffer from Commercial Areas (Scenario 1.2 example)

Bend UGB Remand Project
Walking Distance to Commercial Services

Prepared 9/18/2015
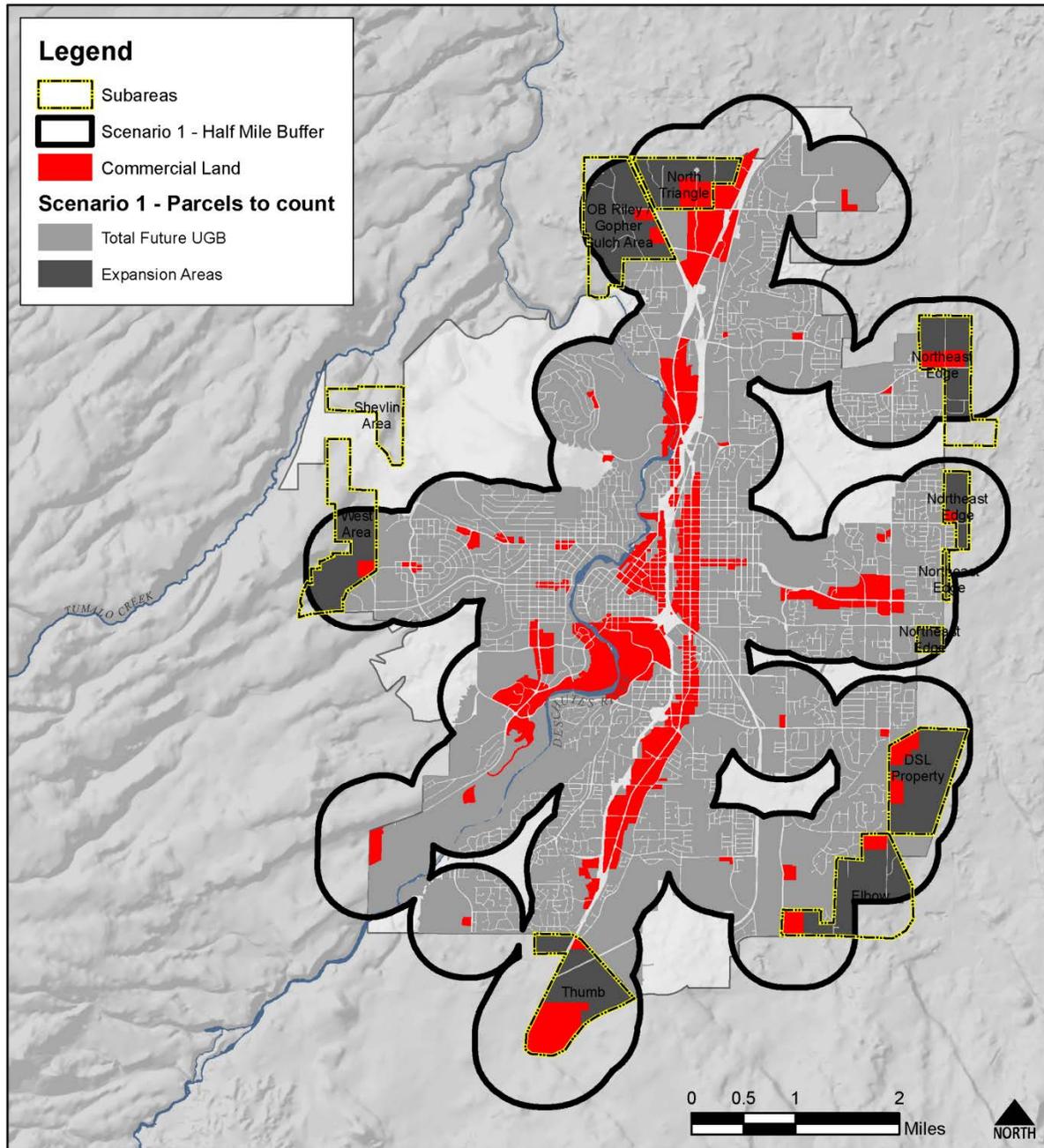
Legend

- Subareas
- Scenario 1 - Half Mile Buffer
- Commercial Land

Scenario 1 - Parcels to count
- Total Future UGB
- Expansion Areas

URBAN GROWTH
BOUNDARY REMAND

Disclaimer: This map represents land use assumptions for modeling purposes only.
This is not a proposal for specific comprehensive plan designations.

Service Layer Credits: Deschutes County GIS (2014)

Streams/Rivers
Urban Growth Boundary

Efficient, Timely Growth

Performance Measure 1.B.3: Net Density for New Jobs

Purpose

Tracking the net density of new employment areas allows for the evaluation of different scenarios and employment policies. The type of business affects the density of jobs, as some business types have more employees in less area. Tracking the density allows for the comparison of how efficiently land is being consumed for employment.

Data Sources

Scenarios approved by USC and SAAMs.

Methodology

Envision Tomorrow tracks gross employment density as part of the scenario process. Different buildings with different business types were created, with both the building form, and the type of business affecting the density. Similar to housing, multi-story, more compact buildings create higher densities relative to single-story buildings. In order to determine the amount of jobs per business type, the average employees per square foot was determined based on business type and building size. These assumptions are part of the model's development types, which were used to create the scenarios and SAAMs.

Performance Measure 1.B.5: Vacant and Developed Acres

Purpose

Development on vacant land may be more likely to occur in a shorter amount of time because there are no existing land uses generating income or providing value for the property owner, though this is not always the case. In addition, owners of developed rural residential properties sometimes prefer a rural lifestyle and prefer not to be annexed and not to have infill in their neighborhood.

Data Sources

Existing developed area for land outside the existing UGB was identified based on parcel data provided by the City of Bend. Parcels with an existing housing unit (based on county assessor's data) were assumed to have a quarter acre developed. Other development was identified through aerial photography.

Methodology

The number of acres identified as having existing development that were assigned a development type was divided by the total urbanized acres for each Scenario and SAAM.

Balanced Transportation System

Performance Measure 2.A.1: Household VMT/Capita

Purpose

VMT (vehicle miles traveled) is a common indicator of mobility and measures the distances people need to travel to meet daily needs. By tracking the distance a given person drives each day, VMT per capita shows how different community designs and spatial arrangements affect

driving behavior. For example, denser, more mixed land uses and transit rich communities tend to have less VMT, because people can walk, cycle, or take transit. On the other hand, mono-land use communities often have a higher VMT per capita, as there is less accessibility within the community itself, forcing residents to drive elsewhere to have their needs met.

VMT is an important measure to track, as travel behavior has numerous economic, environmental, and social impacts. Increased driving means additional resources are required for new roads and road maintenance, and it can mean more congestion and lost productivity. Additional driving means additional carbon and other GHG emissions (see 3.A.3), which have a negative environmental impact. Finally, increased driving (and lack of other transportation options) can proportionally impact populations that cannot drive, such as the elderly, those with disabilities, or those who simply cannot afford a vehicle.

VMT can be reduced through integrated land use and transportation planning. Innovative policies and plans can be made to help minimize the increase of VMT at the edge, and reduce VMT growth within the rest of the City.

Data Sources

TAZs (traffic analysis zones) provided by Deschutes County. Future traffic behavior based on drafted scenarios approved by the USC and SAAMs.

Methodology

The VMT per capita value is an output of the 7D Regional Household Travel Model, an element of Envision Tomorrow. The 7D model is a complex, linear regression travel model, with numerous inputs and outputs. This methodology section will only outline the theoretical level of how the 7D model computes the VMT. For a more detailed description of the model process within Envision Tomorrow, please visit EnvisionTomorrow.org/CityRegional-Travel-Model. For a more complex description of the model, read Ewing, Tan, Goates, Zhang, Greenwald, Joyce, Kircher, and Greene (2014) Varying influences of the built environment on household travel in 15 diverse regions of the United States, *Urban Studies* 1-19.

Initially, one major difference between the VMT indicator (and the other 7D model indicators) and other Envision Tomorrow indicators is that they occur at a different geography. Whereas the rest of the Envision Tomorrow model is parcel based (meaning that it considers what happens on each parcel, such as a single house or business), the VMT indicator is TAZ based. TAZs vary in size; they are as small as several city blocks in downtown areas, a small residential neighborhood in more urban areas, and larger subdivision in more suburban areas. Typically TAZ boundaries follow census block geographies and major arterial roads to make aggregation and analysis easier. However, TAZ boundaries are obviously coarser than parcel boundaries and sub-area boundaries are not followed precisely. See [insert map number] below for a comparison.

Figure 4: Household VMT/Capita, Scenario 1.2

Bend UGB Remand Project
VMT/Capita
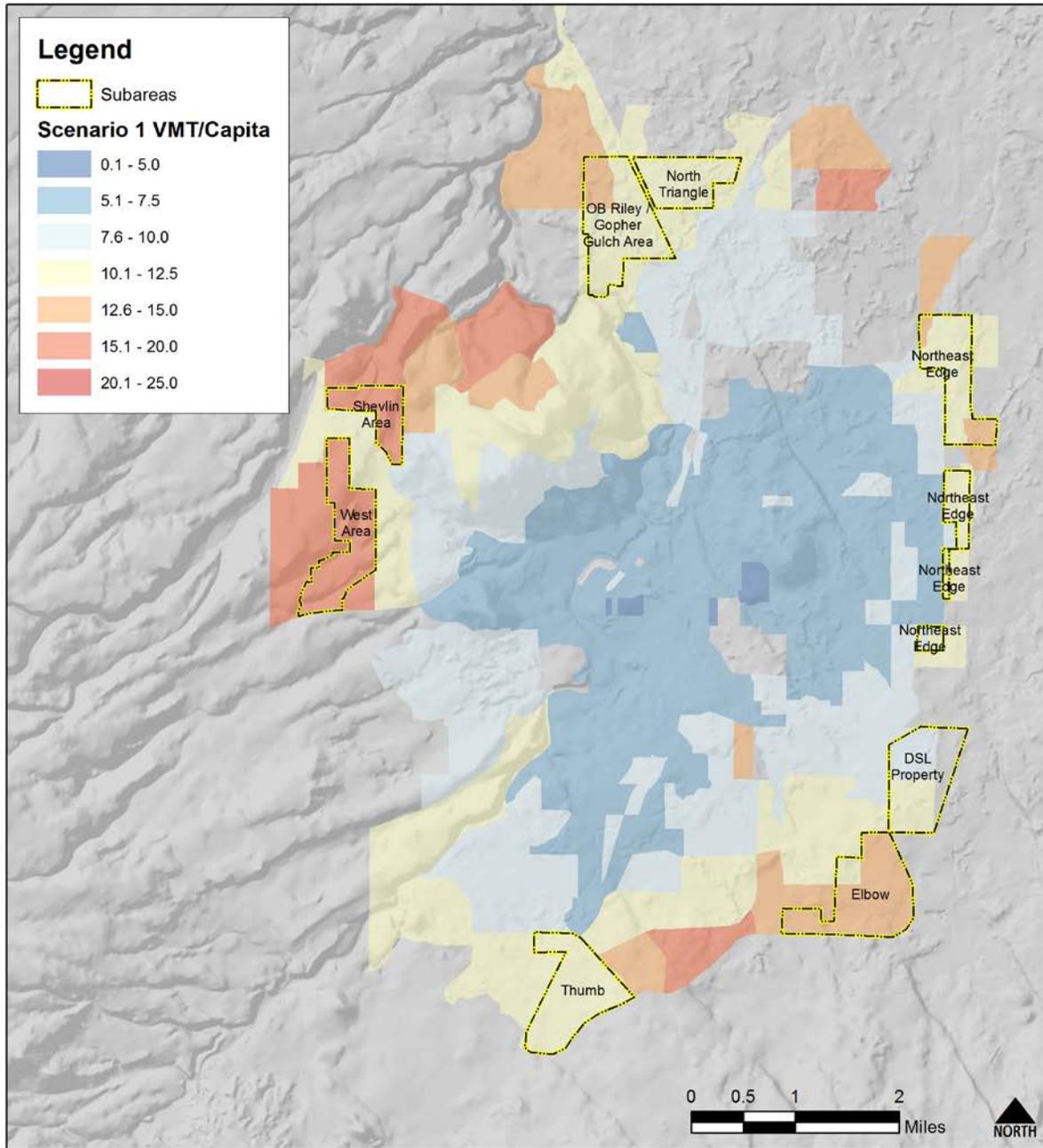
Prepared 18-Sep-15

Legend
Subareas
Scenario 1 VMT/Capita
0.1 - 5.0
5.1 - 7.5
7.6 - 10.0
10.1 - 12.5
12.6 - 15.0
15.1 - 20.0
20.1 - 25.0

Disclaimer: This map represents land use assumptions for modeling purposes only. This is not a proposal for specific comprehensive plan designations.

Service Layer Credits: Deschutes County GIS (2014)

URBAN GROWTH BOUNDARY REMAND
BEND

Fregonese Associates Scenario Evaluation – Envision Tomorrow Technical Memorandum   *Page 11 of 28*

Figure 5: Household VMT/Capita, Scenario 2.1

Bend UGB Remand Project
VMT/Capita
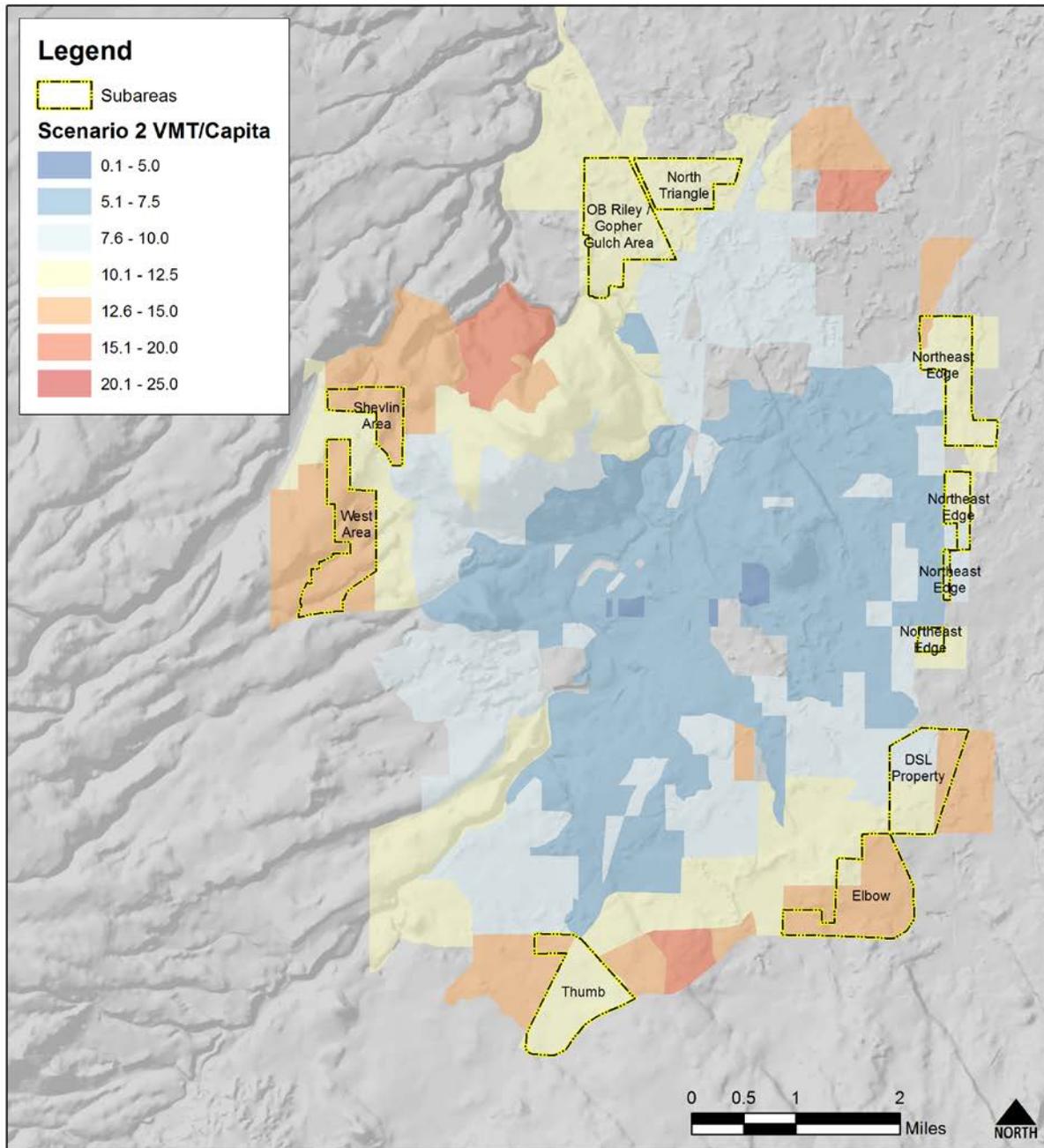
Prepared 18-Sep-15

Figure 6: Household VMT/Capita, Scenario 3.1
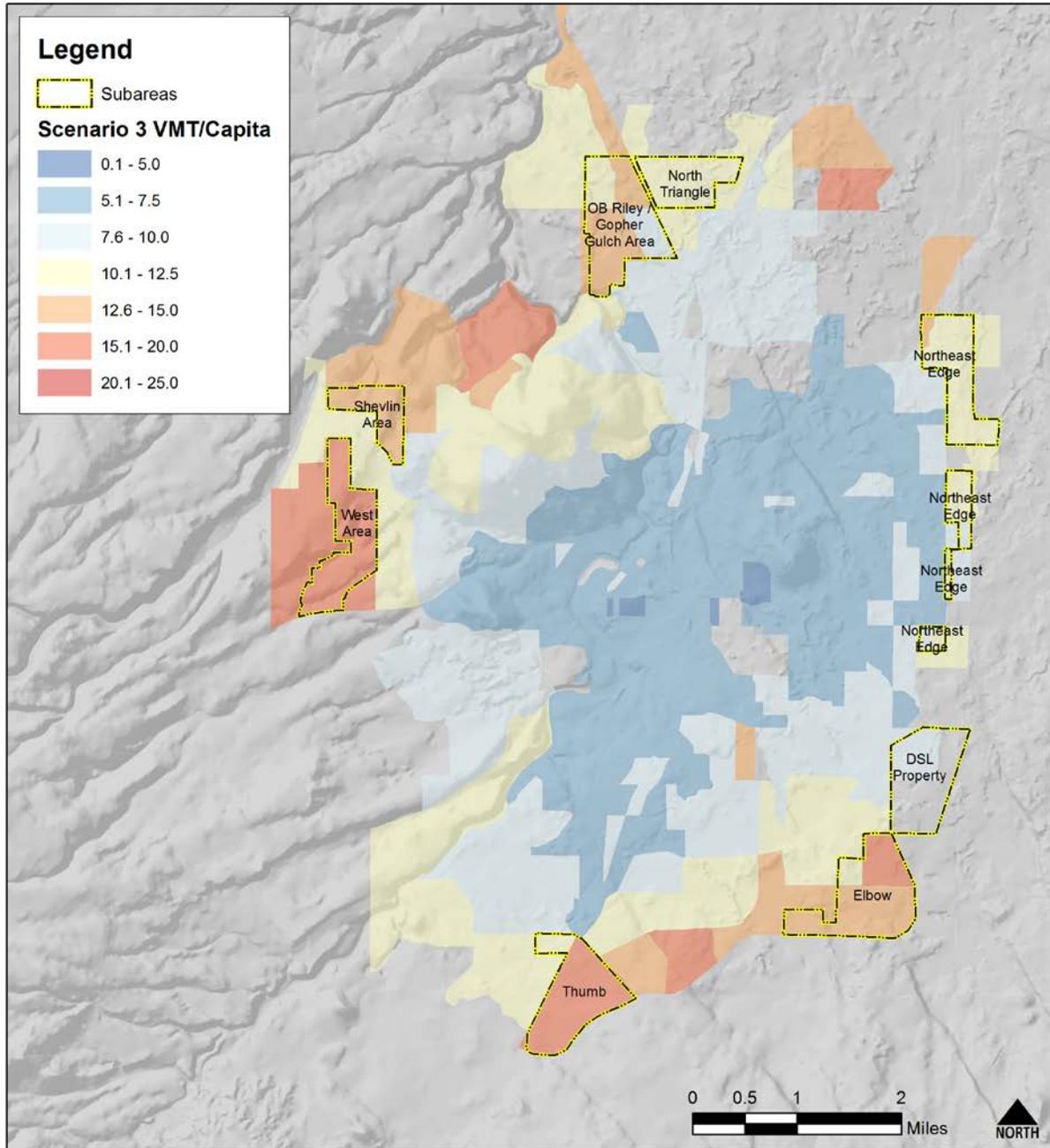
Figure 7: Household VMT/Capita, SAAM-1
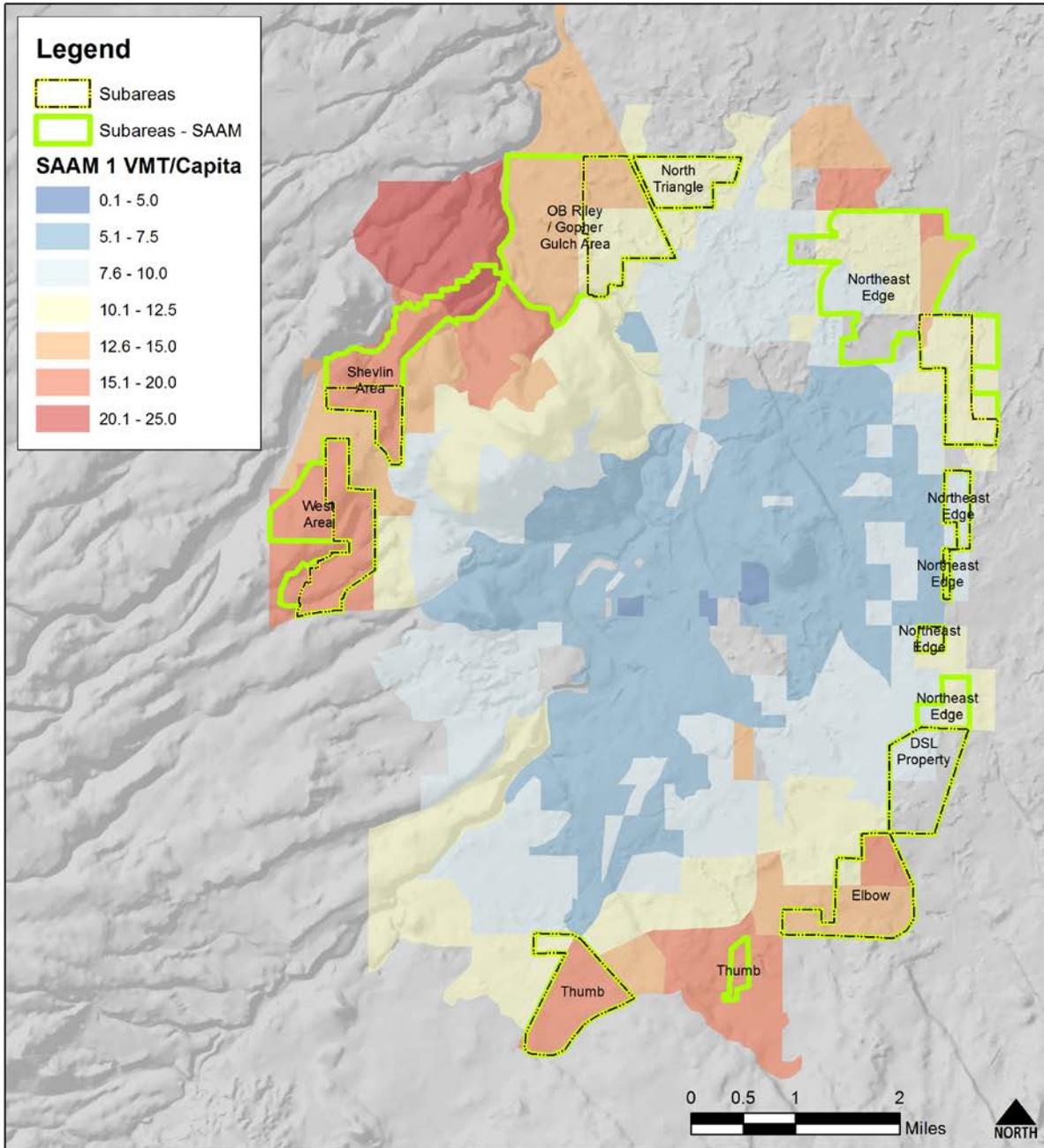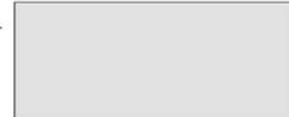
Figure 8: Household VMT/Capita, SAAM-2
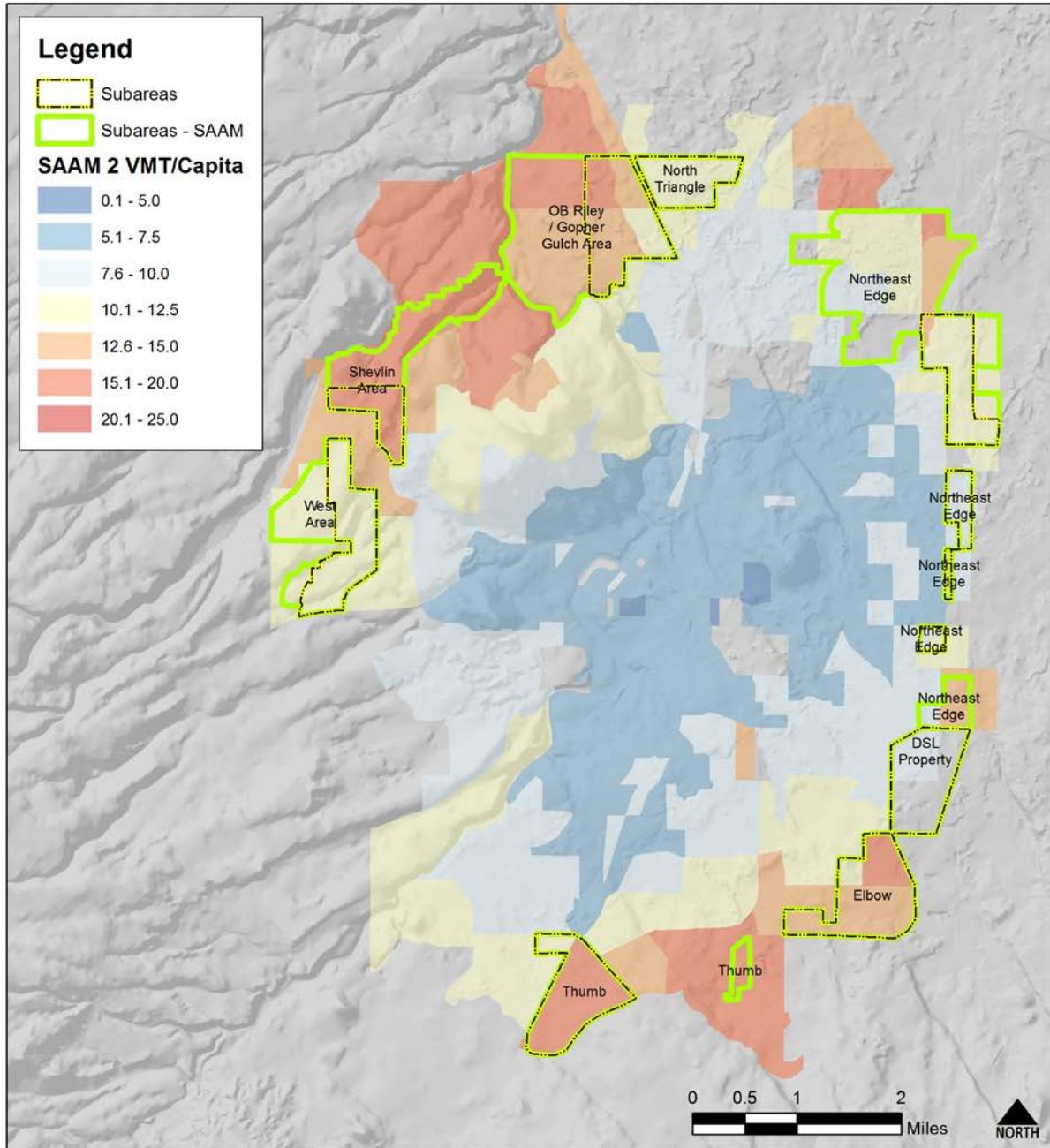
Figure 9: Household VMT/Capita, SAAM-3
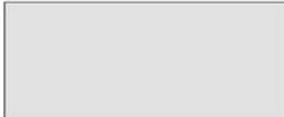
Figure 10: Subarea boundaries vs. TAZ boundaries

Bend UGB Remand Project
Subarea Boundaries

Prepared 17-Sep-15
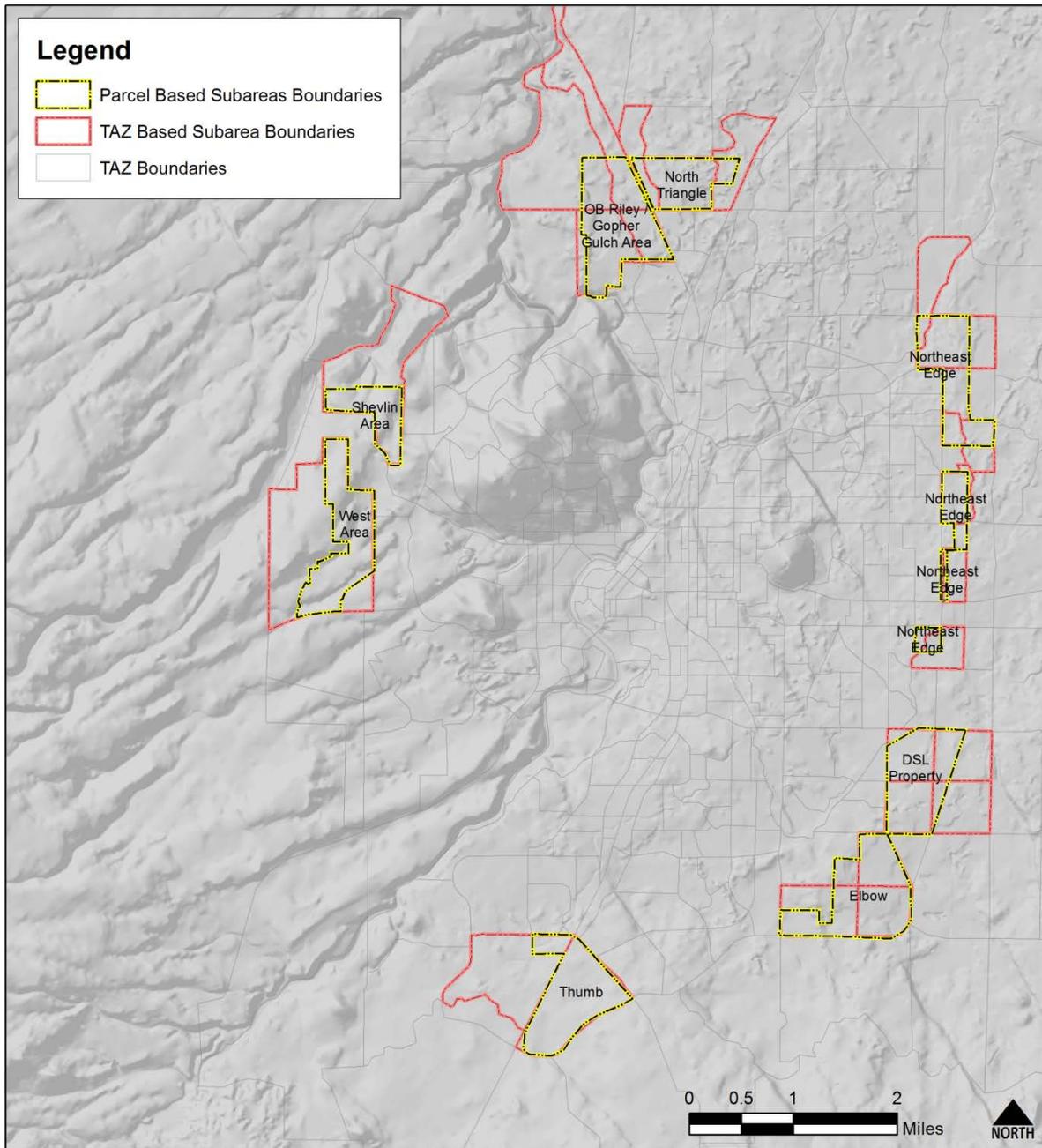
VMT is computed based on the following inputs. A "+" indicates that a higher value of this variable increases VMT, and a "-" indicates that a higher value of this variable decrease VMT.

- + average household size
- +average household workers
- + average household income
- - activity density within one mile
- - jobs and population within a quarter mile
- - land use mix within a quarter mile
- - percent of regional employment within a 10 minute drive

- - percent of regional employment within a 30 minute transit trip
- - intersection density within one mile
- - percent 4-way intersections within one mile
- - transit stop density within a quarter mile
- - regional population
- - compactness score

For a more detailed description of these variables, see the above paper by Ewing et al. (2014). All of the variables were computed for the base year and for the forecast year, with the exception of the compactness score.

The above variables computed two outputs: VMT probability and raw VMT. The VMT probability is the chance that a person will drive on a given day, and raw VMT is how many miles they drive in a day. Therefore to get total VMT, the raw VMT is multiplied by the VMT probability. Finally, this total VMT value for the entire TAZ is divided by the TAZ population in order to determine VMT per capita. Note that this is not a traditional four step travel model. A four step model requires many additional inputs, and differs in how it calculates how people choose to travel. However, the VMT results produced by the 7D Travel model were very similar to those produced by a traditional four step model (See evaluation memo by DKS).

Performance Measure 2.A.7: Mode Split

Purpose

Mode split refers to the breakdown of all household based trips by mode of transportation: automobile, walking, cycling, and transit. Household trips are all trips generated by a household, such as an adult driving to work, a child biking to school, or a family walking to the store. It is a way to measure how people choose to travel in their day-to-day habits, which is informed by various socio-economic and built environment characteristics. Often, the percentage of non-automobile trips are summed into one, leading to a mode split dichotomy of auto, and non-auto. Similar to VMT, denser mixed use communities tend to have higher percentages of non-automobile trips, while more suburban areas tend to have higher percentages of automobile trips.

Mode split is important to track, as it shows the breakdown of how people choose to move around their communities. Creating more complete communities can provide residents with destinations to walk and cycle to. Mixing jobs and housing can allow employees to take alternative modes to work. Expanding and enhancing transit service can increase transit mode share. All of these improvements could cut down on automobile mode share, which would have great environmental and social benefits.

Data Sources

TAZ (traffic analysis zone) provided by Deschutes County. Future traffic behavior based on Envision Tomorrow scenarios approved by the USC and SAAMs.

Methodology

Mode split is an output of the 7D Regional Travel Model, an element of Envision Tomorrow. The 7D model is a complex, linear regression travel model, with numerous inputs and outputs. For the purposes of this methodology section, it will only outline at a theoretical level how the 7D model computes mode split. For a more detailed description of the model process within Envision Tomorrow, please visit EnvisionTomorrow.org/CityRegional-Travel-Model. For a more complex description of the model, read Ewing, Tan, Goates, Zhang, Greenwald, Joyce, Kircher, and Greene (2014) Varying influences of the built environment on household travel in 15 diverse regions of the United States, *Urban Studies* 1-19.

Similar to VMT/capita, mode split is calculated at the TAZ level. See above for a description of this differentiation. A "+" indicates that a higher value of this variable increases individual mode share (more trips for the specific mode), and a "-" indicates that a higher value of this variable decrease mode share (less trips for the specific mode.)

Automobile trips:

- + average household size
- + average household workers
- + average household income
- - activity density within half a mile
- + jobs and population within one mile
- - land use mix within a quarter mile
- + percent of regional employment within a 20 minute drive
- + transit stop density within a half mile

Walking trips:

- + average household size
- - average household workers
- - average household income
- + activity density within a half mile
- + activity density within one mile
- + land use mix within a quarter mile
- + land use mix within half mile
- + percent of regional employment within a 30 minute transit trip
- + percent four way intersections within a quarter mile
- + percent four way intersections within one mile
- + transit stop density within a half mile
- + compactness score

Biking trips:

- + average household size
- + average household workers
- + jobs and population within a half mile
- + intersection density within one mile
- + percent four way intersections within one mile
- + transit stop density within one mile
- - regional population
- + compactness score

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Transit trips:

- + average household size
- + average household workers
- - average household income
- + jobs and population within one mile
- + land use mix within a quarter mile
- + land use mix within a half mile

- + percent of regional employment within a 30 minute transit trip
- + percent four way intersections within one mile
- + transit stop density within a quarter mile
- + regional population
- + compactness score

For a more detailed description of these variables, see the above paper by Ewing et al. (2014). All of the variables were computed for the base year and for the forecast year, with the exception of the compactness score, for which the same value was used, as it was not possible to re-compute compactness with the available resources.

The above variables computed two outputs: trip probability and raw trip counts. The trip probability is how likely it is for a household to use that method of transportation in a given day, and the raw trip count is how many trips are made by that mode of transportation each day. Therefore to obtain total trip counts, the probability of each trip is multiplied by the raw counts. The only exception to this is auto trips. There is no probability function for auto trips, so the raw counts are the total counts. Finally, once the total counts for all modes are known, they are summed, and the total number of trips per type is expressed as a percentage of total trips.

Performance Measure 2.A.8: Average Weekly Walk Trips

Purpose
Walkable communities are an integral part of a balanced transportation system. By making planning and design designs that foster walkable neighborhoods, unnecessary driving trips to local destinations can be minimized. Tracking how many walk trips are generated a day is a good measure of this, as it tracks not only how people make major trips like getting to work, but also captures smaller trips, such as walking to a local store, or park.

Data Sources
TAZ (traffic analysis zone) provided by Deschutes County. Future traffic behavior based on Envision Tomorrow scenarios approved by the USC and SAAMs.

Methodology
Average Daily Walk trips is an output of the 7D Regional Travel Model, an element of Envision Tomorrow. The average number of walk trips is actually the same output as the walk trip mode share (2.A.3), simply expressed differently. Instead of expressing the number of walk trips as a percentage of all trips, it is simply expressed as a total number of trips. For a deeper description of how the number of walk trips is calculated, see Methodology for 2.A.3.Performance Measure 2.A.10: New Lineal Miles of Roadway

Performance Measure 2.A.10: Housing and Jobs within Walking Distance to Future Transit Corridors

Purpose

Measuring the amount of housing and employment within walking distance to transit corridors indicates the accessibility to transit. Having transit access within walking distance of homes allows residents to take transit to work or other destinations, while having transit access to employment areas allows employees to take transit to work.

Data Sources

GIS data for transit corridors provided by Bend Metropolitan Planning Organization (MPO), scenarios approved by the USC and SAAMs.

Methodology

The methodology for this indicator was to count the number of housing units and jobs within a 0.25 mile buffer from existing and future transit corridors. The quarter mile buffer is less than the half mile buffer used for other proximity measures, as the distance that most people would walk to a transit stop is less.

Since the transit corridor buffer was provided, there were no additional buffers created. Additionally, the future corridor buffer was consistent across all scenarios.

Future total (existing plus new) housing units and jobs for each scenario were calculated within the buffer. A housing unit or place of employment was considered within the buffer if the centroid of its parcel was within the buffer. This was done to eliminate small slivers of a parcels being included in the measure. The total number of housing units and jobs within the buffers were divided by the total numbers of each to find the percentage within walking distance to the transit corridors.

Figure 11: Quarter Mile Transit Buffer

Bend UGB Remand Project
Walking Distance to Transit Corridors

Prepared 9/21/2015
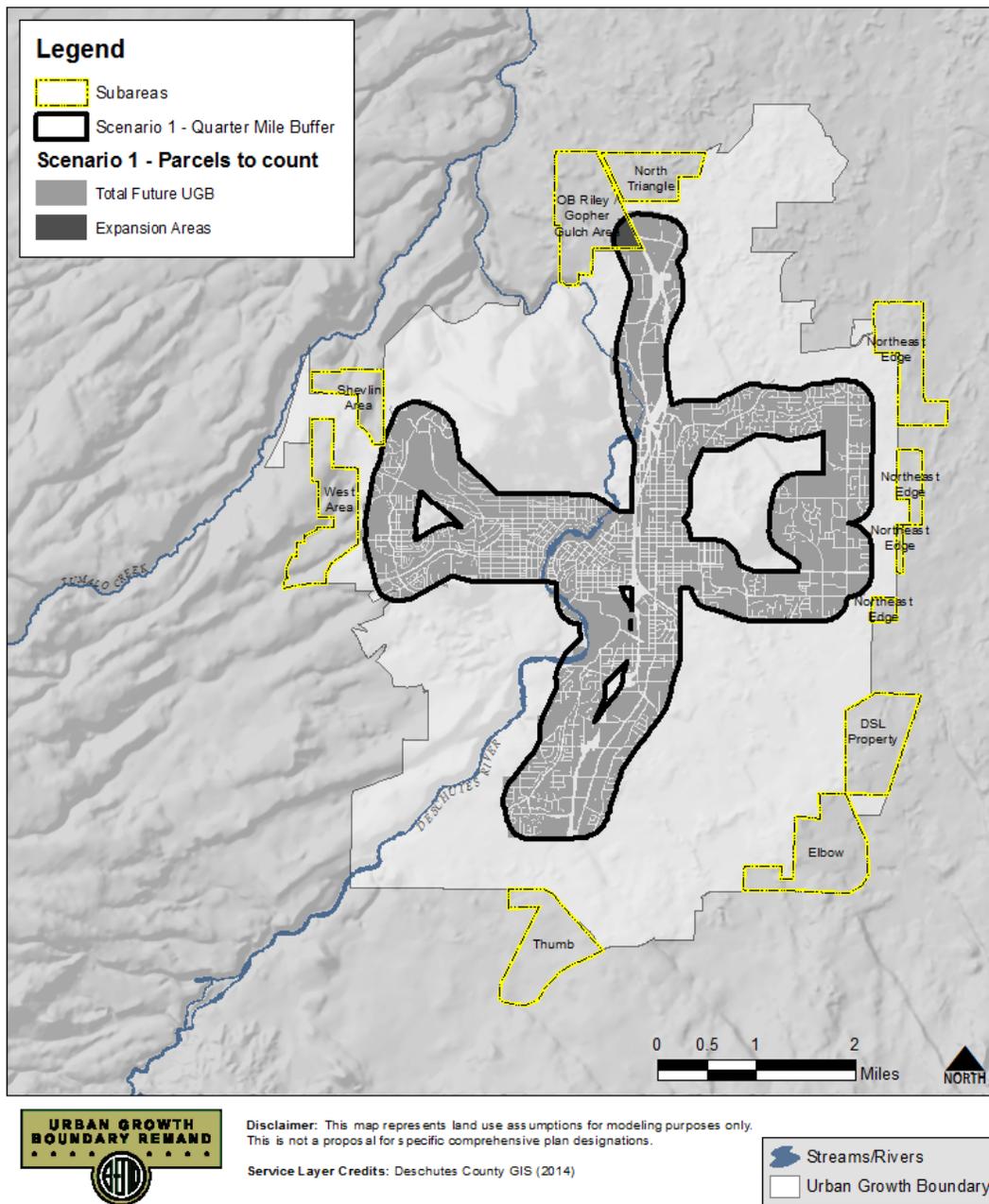
Cost-Effective Infrastructure

Performance Measure 2.B.3: New Linear Miles of Local Roadway

Purpose

While local roads are generally built by the developer, they can represent a substantial cost. In addition, once they are built and dedicated to the city, the city is responsible for maintenance of

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06776

those roads. More miles of roadway generally translates into more maintenance costs over the long term for the city.

Data Sources
Scenarios approved by the USC and SAAMs.

Methodology
New lineal miles of roadway is an automated output of the Envision Tomorrow Planning software. Development types within Envision Tomorrow have road characteristics including block size, percent cul-du-sacs, and right of way widths. When these development types are applied to vacant land, Envision Tomorrow calculates the amount of new roadways that would be needed to service these areas.

Performance Measure 2.B.9: Total Impervious Area of New Development

Purpose
Impervious surface area (buildings, parking lots, streets, and other paved/hard surfaces) do not absorb water, instead forcing it to run-off into storm water systems. This can increase the pressure on existing storm water infrastructure. By decreasing the amount of impervious area in new development through green design, this can be mitigated, reducing the burden on existing infrastructure, and minimizing the level of new infrastructure that needs to be constructed.

Data Sources
Scenarios approved by the USC and SAAMs.

Methodology
Amount of impervious surface is an output of the Envision Tomorrow modeling software. It calculates impervious surface area in two parts; at the building level, and then at the street level. The values for these two are added together in order to get total impervious surface area.

At the building level, the amount of impervious area is determined by the building prototype used. These buildings have the percentage of imperious surface, as determined by the building's physical form. Parking lots, and the building footprint itself are considered impervious, although it is possible to alter this through green design. With these percentages known, it is possible to calculate the total amount of impervious area, given the area of the building (or mix of buildings) within the sub area.

At the street level, the amount of impervious area is determined by street design and block layout. More paved area, resulting from either wider streets or simply more streets, results in a greater amount of impervious surface. The amount of park space assigned at the street level can also affect the impervious surface. Note that the street level impervious surface only comes into account when building on vacant land, as it is assumed that redeveloping existing parcels will be served by the existing street system.

Quality Natural Environment

Performance Measure 3.A.4: Greenhouse Gas Emissions

Purpose
Monitoring greenhouse gas emissions allows for the tracking of new development and transportation behaviors' impact on the environment. Different housing types and household size generates differing amounts of GHG, with larger, detached housing emitting more than smaller, more compact housing. Similarly, more auto oriented communities (see 2.A.3), produce more vehicle activity (see 2.A.1), which again, results in more emissions. Increased GHG emissions contribute to anthropogenic climate change, which in turn has massive environmental, social, and physical impacts.

Data Sources
Scenarios approved by the USC and SAAMs, and average emissions rates from the US Energy Information Administration.

Methodology
There are two aspects to the combined household greenhouse gas emissions: household emissions and transportation emissions. Both are outputs of the Envision Tomorrow modeling software.

Household based emissions are based on the building and development types within Envision Tomorrow. Each residential building prototype has certain assumptions about its emission rates, which is based on the assumed number of occupants, its heating and cooling needs, power source, and other energy efficiencies. The amount of emissions for each area as a whole is a blend of the housing types painted within that development type. Note that this measure is only examining household based emissions, as there is a great deal of variability in employment building emissions due to a variety of building forms and energy demands.

Transportation based emissions are an output of the Travel Model, an element of Envision Tomorrow. The emissions value is based on both the amount of driving, and the characteristics of the vehicles and average driving behavior. The amount of driving (VMT) is determined based on a variety of socio-economic and built form characteristics (see 2.A.1). Vehicles characteristics (i.e. vehicle type, fuel efficiency, and fuel type) are based on national averages. Finally, driving behavior, such as average speed impacts total emission. Again, these values are based on national averages.

Performance Measure 3.A.5: Household Energy Use

Purpose
Monitoring household energy usage allows for different residential configurations to be compared in terms of energy efficiency and usage. Different housing types use more energy depending on size, structure type, and household size. Household energy use is important, as it has environmental implications.

Data Sources

Scenarios approved by the USC and SAAMs, US Energy Information Administration.

Methodology

Household energy use is an automated output of Envision Tomorrow. Energy use is based on the building prototypes, which contain information about building size, type, average number of uses, and also assumptions about energy needs based on the above characteristics. Development types are comprised of these prototypes, and the average household energy use for an area is determined by the blend of prototypes that comprise it.

Performance Measure 3.A.6: Household Water Usage

Purpose

Monitoring household energy usage allows for different residential configurations to be compared in terms of water efficiency and usage. Different housing types use more energy depending on size, structure type, household size, and amount of landscaped area. Household water use is important, as it has environmental implications, given the current state of drought, and future climate instability.

Data Sources

Scenarios approved by the USC and SAAMs, Vickers, Amy. Handbook of Water Use and Conservation. (2001).

Methodology

Household water usage is comprised of two elements: internal water use, and landscaping water use, both of which are automated outputs of Envision Tomorrow.

Internal water use is based on the building prototypes, which contain information about building size, type, average number of uses, and also assumptions about water needs, based on the above characteristics. Development types are comprised of these prototypes, and the average household energy use for an area is determined by the blend of prototypes that comprise it. Landscaping water use is simply based on the amount of landscaped area that is modelled for each prototype. Larger landscaped areas require more water in order to maintain.

Housing Options, Affordability, and Equity

Performance Measure 3.B.1: Average Cost of New Single Family Housing

Purpose

Assessing housing cost allows for the evaluation of new expansion areas for affordability and equity. The type and size of new housing units impacts their costs, and different location premiums within Bend affect sales prices. By tracking those together, it is possible to see what the anticipated new cost of housing in different expansion areas will be under different scenarios, which determines who can afford to live in these new areas.

Data Sources

Scenarios approved by the USC and SAAMs. Housing construction costs per square foot based on RSMeans, calibrated to local conditions from local developer interviews conducted by Leland

Fregonese Associates Scenario Evaluation – Envision Tomorrow Technical Memorandum

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Consulting. Geographic variations in valuations of new, single family homes came from City of Bend building permit data.

Methodology

New housing cost only considers the cost of detached, single family homes. In order to determine this value, the home cost was first identified based on construction and other development costs, which were then converted to sales prices. Next these values were adjusted based on geographically specific real estate trends within the existing City of Bend.

Modeled housing cost was based on the physical characteristics of the house. These characteristics were modelled within the Envision Tomorrow prototype builder. The main characteristics that affect housing cost are the construction rate, and the overall building size. Larger homes cost more to build, as there is simply more house to build. Also, the quality of the construction (i.e. the $/sqft of home built) affects the overall cost. Additional factors that affect overall cost are system development charges and other permit fees and taxes, and other development costs, as insurance, and holding fees. The raw cost of the house is translated into a sales price, based on a desired return rate.

The second step in determining housing cost was to adjust the raw model output cost based on geographic location within Bend. To do this, City building permit valuation data for new single family housing was summarized by neighborhood association boundary (See Figure 1). Based on the patterns observed in average valuation at the neighborhood level, weighted averages were calculated for broad sections of the city: outer east and outer west. (Note: the observed pattern of higher home values in the western portion of the city than in the eastern portion was also evident in mapping land value of residential property based on Deschutes County Assessor's data and asking prices of recently-built homes for sale in online listings.)

Figure 12: Relative cost of new single family homes by neighborhood

Bend UGB Remand Project
Relative cost of new single family homes by neighborhood
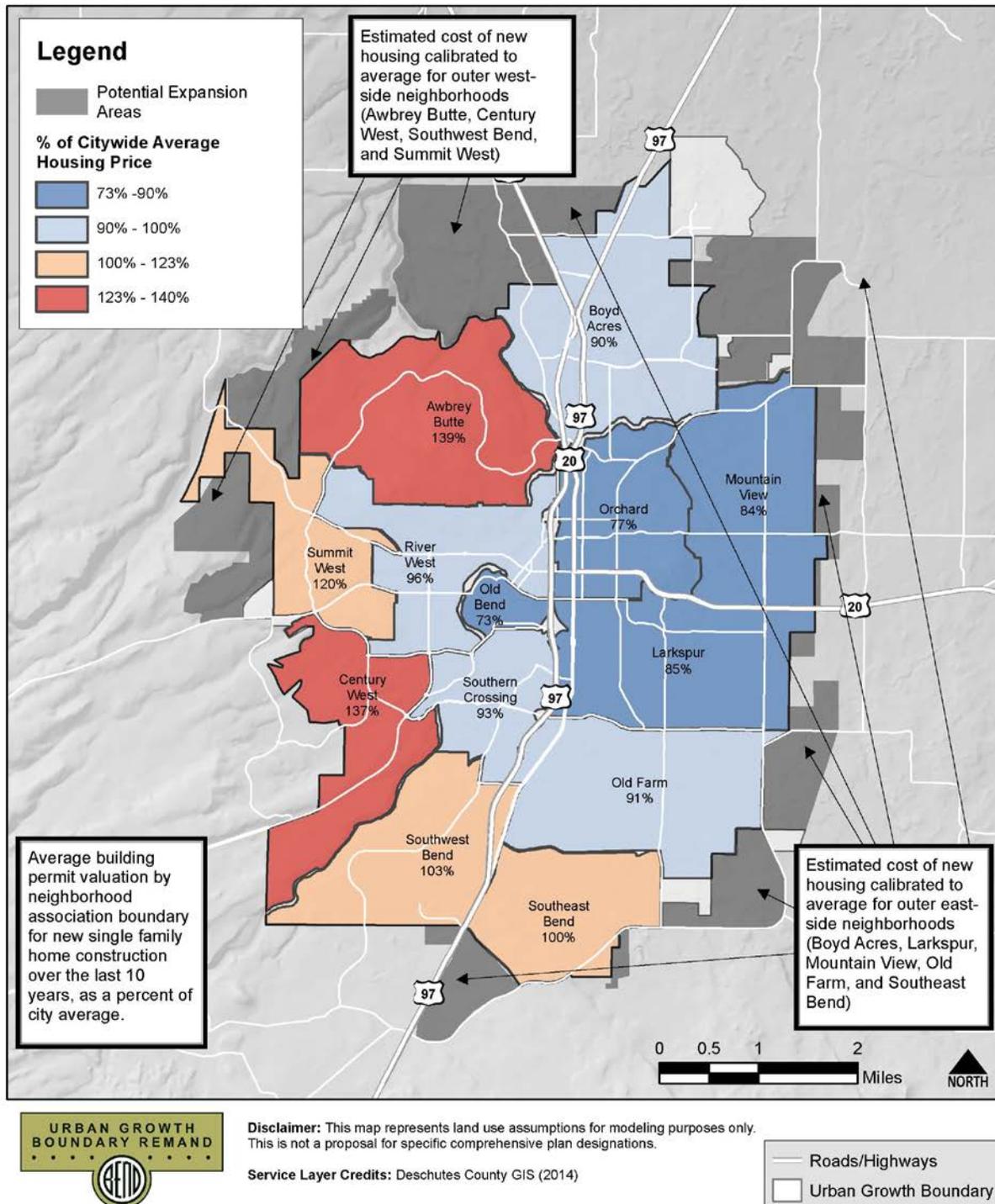
Since the building permit valuations often do not reflect full market values, the average value was converted to a percentage of the overall city average valuation. Then, based on the location of the sub-area, the unadjusted housing cost was adjusted to match the location premium of different areas within the City. Adjustments were as follows:

Table 1: Single family home value adjustment factors by subarea

Subarea	Price adjustment factor, relative to max (Outer West)	Reference Neighborhoods*
North Triangle	71%	Outer East
NE Edge	71%	Outer East
DSL Property	71%	Outer East
The "Elbow"	71%	Outer East
The "Thumb"	71%	Outer East
West Area	100%	Outer West
Shevlin Area	100%	Outer West
OB Riley / Gopher Gulch Area	100%	Outer West
Existing UGB	79%	City average

* "Outer East" includes Boyd Acres, Larkspur, Mountain View, Old Farm, and Southeast Bend; "Outer West" includes Awbrey Butte, Century West, Southwest Bend, and Summit West.

Performance Measure 3.B.2: Housing Mix of New Housing

Purpose

Tracking housing mix allows for the evaluation of housing demand vs new housing supply. Different populations have preferences for different housing types based on lifestyle preferences, affordability considerations, and household size. By tracking the mix of new housing being built both in the expansion areas and the existing City, this mix can be compared to these preferences to see if the different scenarios meet expected demand. In addition, at the subarea level, housing mix can be evaluated to ensure that a range of housing options is available in all areas of the city and that housing types are not being excessively segregated from one another.

Data Sources

Scenarios approved by the USC and SAAMs.

Methodology

Housing mix is an output of the Envision Tomorrow modeling software. Each housing prototype is assigned as either a single family, townhome, or multifamily, and the development types then contain a mix of these housing prototypes. As a result, it is possible to know the number of housing units of each type painted in an area. In order to determine the mix of units as a percentage, the number of each unit type is divided by the total number of new units.

MSA
Murray, Smith & Associates, Inc.
Engineers/Planners

121 S.W. Salmon, Suite 900 ▪ Portland, Oregon 97204-2919 ▪ PHONE 503.225.9010 ▪ FAX 503.225.9022

DRAFT TECHNICAL MEMORANDUM

DATE: October 1, 2015

PROJECT: Bend UGB Expansion

TO: City of Bend, Oregon

FROM: Murray, Smith & Associates, Inc.

RE: UGB Expansion – Sanitary Sewer Analysis

Background

The City of Bend (City) is studying the potential expansion of their existing Urban Growth Boundary (UGB) to facilitate future growth. As a follow on to collection system planning work that was completed in 2014, Murray, Smith & Associates, Inc. (MSA) was contracted to evaluate the potential sanitary sewer infrastructure impacts associated with long-term and incremental UGB expansion. In this UGB analysis, the initial analysis was performed to identify a long-term infrastructure plan within a two-mile buffer around the City's existing UGB. This allows the City to develop a much longer term view for infrastructure that has 100 year plus expected lifespan of modern pipe materials. This longer term view allows for better infrastructure planning to ensure that whatever is ultimately installed ends up being consistent with the long-term infrastructure needs and avoids the issues the City faces today of a sewer collection system that is piecemealed without a larger long-term vision. After understanding the infrastructure needs for the two mile buffer, the analysis then looked at the various incremental expansions that focused on solutions consistent with the longer term needs. Requirements were determined for two (2) generalized UGB expansion scenario packages. The generalized UGB expansion scenario packages were analyzed to select the least cost improvements consistent with the long-term infrastructure plan and a select set of short-term improvement alternatives. Finally, six (6) distinct UGB expansion scenarios were rated for relative cost that were consistent with the long-term infrastructure analysis. In most cases, portions of the long-term sewer infrastructure solutions were selected to serve the UGB expansion scenarios. This memorandum summarizes the results of the UGB expansion analysis for the sanitary sewer infrastructure.

Improvement Analysis

The primary objective of the improvement analysis is to determine the combination of system improvements that satisfy the specified hydraulic performance criteria while minimizing overall life-cycle costs for the potential UGB expansion scenarios. Optimization technology was used to identify the least cost improvement strategies. Additionally, the UGB expansion analysis builds on the optimization analysis performed for the City of Bend Collection System Master Plan (CSMP) completed in 2014.

To enable an exhaustive and objective evaluation of all feasible improvement alternatives, the optimization analysis was undertaken using Optimizer WCS™ and the EPASWMM 5 hydraulic engine. Optimizer WCS is a decision-support software program that integrates improvement alternatives, comprehensive life-cycle costs, design criteria and the calibrated hydraulic model of the collection system. In a single optimization analysis, the software evaluates over 100,000 possible solution configurations and assesses life-cycle cost and hydraulic performance simultaneously while sizing system improvements. EPASWMM 5 is an industry standard dynamic simulation software developed by the United States Environmental Protection Agency for evaluating sanitary and stormwater system capacity.

The UGB expansion analysis focuses on assessing additional improvement alternatives not considered in the CSMP that are required to serve growth outside of the existing UGB and re-evaluating alternatives that were considered in the CSMP that are likely to be affected by expanding the UGB.   Many of the detailed alternatives considered in the CSMP were not re-evaluated in the UGB expansion analysis if the outcome of the analysis of those alternatives was considered to not be affected significantly by the UGB expansion. Furthermore, improvements selected in the CSMP optimization that are committed for near-term construction (North Area Improvements, Colorado Diversion and Southeast Interceptor Phase 1) were locked in as committed projects in the UGB expansion analysis.

The optimization analysis for the UGB Expansion was completed in two key stages:

1. Long-term Infrastructure Analysis (Task 3): Comprehensive evaluation of sewer service alternatives that encompasses an area out to a 2 mile buffer from the current UGB. This evaluation encompasses an area that is anticipated to be significantly larger than what will be included in the next UGB expansion. This evaluation allows the City to identify long term infrastructure solutions consistent with the goal of having all new infrastructure provide effective capacity and function for 75 to 100 years and not require upsizing or paralleling in the near term.

2. UGB Expansion Infrastructure Analysis (Task 4): Determine the cost-effective capital improvement strategy to service population growth through the 2028 planning horizon within the existing UGB and through expansion of the existing UGB. The analysis included improvement options from the long-term infrastructure analysis (Task 3) and from a subset of short-term improvement alternatives that were focused on service to the UGB expansion areas. Two generalized UGB expansion growth

scenario packages (referred to as Task 4a and Task 4b) were evaluated in the optimization analysis.

The Initial Capital Cost and Equivalent Uniform Annual Cost (EUAC) methods were used for comparing various alternatives in the optimization analysis. The Initial Capital Cost method estimates capital investment, but excludes operation and maintenance costs. The EUAC calculates the cost per year of constructing, operating and maintaining an asset over its entire lifespan. As noted previously the goal of the optimization is to minimize the overall life cycle costs while identifying a solution that meets the identified hydraulic criteria. The EUAC approach allows for the comparison of different types of assets (eg lift stations, gravity mains, satellite treatment, etc) with varying design lives on an equivalent yearly basis.

Collection System Improvement Alternatives

Improvement alternatives include new alternatives to serve UGB expansion, CSMP improvements, and CSMP alternatives that were not previously selected, but may be appropriate considering the potential expansion area. The full set of system improvement alternatives that were considered in the Long-term Infrastructure Analysis are presented in Figure 1 and include the following categories:

- Gravity and force main improvements along existing alignments
- New gravity and force main alignment alternatives
- New lift stations, existing lift station upgrades, and existing lift station decommissioning alternatives
- Storage tank alternatives (restricted to wet-weather operation)
- Linear transport/storage alternatives (restricted to wet-weather operation)
- Satellite treatment alternatives

Planning level pipeline profiles were developed for new gravity alternatives from available United States Geologic Survey (USGS) contours. The profile development included a high level evaluation of minimum pipe cover (3 feet), extent of service area boundary by gravity, minimum pipe slope, and average pipeline depth (10 to 15 feet). In some critical locations, the gravity pipeline depths exceeded 20 feet.
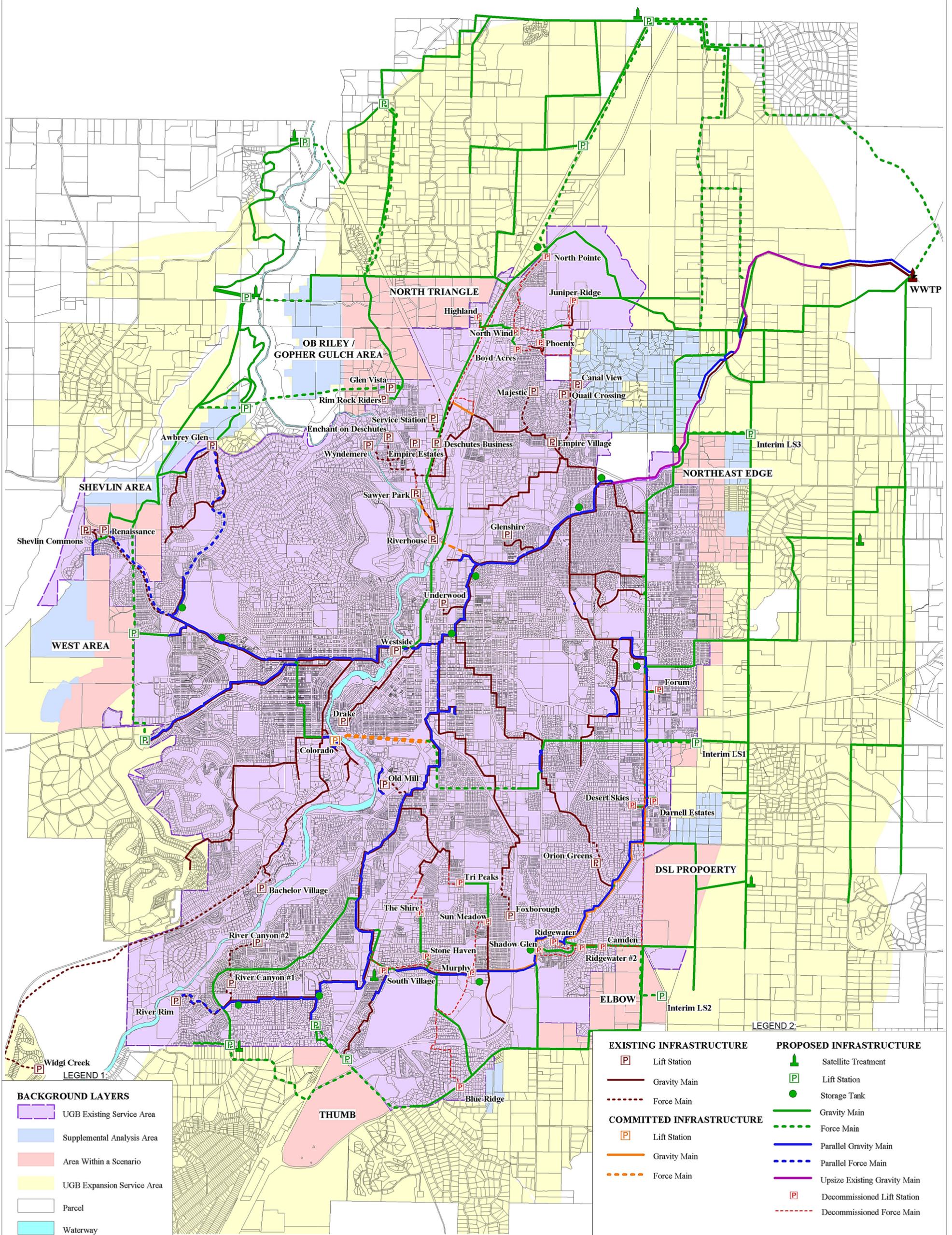
LEGEND 1:

BACKGROUND LAYERS

- UGB Existing Service Area
- Supplemental Analysis Area
- Area Within a Scenario
- UGB Expansion Service Area
- Parcel
- Waterway

LEGEND 2:

EXISTING INFRASTRUCTURE

- P Lift Station
- —— Gravity Main
- ---- Force Main

COMMITTED INFRASTRUCTURE

- P Lift Station
- —— Gravity Main
- ---- Force Main

PROPOSED INFRASTRUCTURE

- Satellite Treatment
- P Lift Station
- Storage Tank
- —— Gravity Main
- ---- Force Main
- —— Parallel Gravity Main
- ---- Parallel Force Main
- —— Upsize Existing Gravity Main
- P Decommissioned Lift Station
- ---- Decommissioned Force Main

NOTES:

1. THIS DRAWING IS CONCEPTUAL AND HAS BEEN PREPARED FOR DISCUSSION PURPOSES ONLY.

2. PROPOSED INFRASTRUCTURE IS CONCEPTUAL AND REMAIN SUBJECT TO DETAILED ENGINEERING DESIGN.

MSA — Murray, Smith & Associates, Inc. Engineers/Planners

WCS ENGINEERING

BEND OREGON

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PROJECT:
UGB EXPANSION SEWER SYSTEM ANALYSIS - OVERALL STUDY AREA

DRAWING NO: TASK3-GIS01   ISSUE: C

CLIENT:
CITY OF BEND

DRAWING TITLE: FIGURE 1
IMPROVEMENT ALTERNATIVES CONSIDERED

ISS	BY	CHK	DATE	DETAILS
A	AF	JW	06.23.15	DRAFT FIGURE
B	AF	JW	06.30.15	ISSUED FOR APPROVAL
C	AF	JW	09.14.15	FINAL DRAFT

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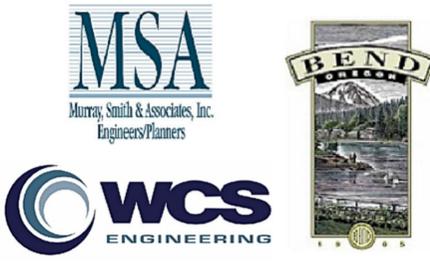
DRAFT – WORK IN PROGRESS – SUBJECT TO CHANGE

Design and Performance Criteria

The relevant design and performance criteria applied in the UGB expansion analysis are consistent with the criteria applied in the CSMP. These include; system surcharge, freeboard and overflow constraints, maximum and minimum velocity constraints, lift station firm capacity, and backup power. The criteria are summarized in Table 1 below and specific details are summarized in the CSMP Report Section 4 – "System Analysis."

Table 1| Summary of Design Criteria

Category	CSMP Standard
During peak dry weather flows, depth/Diameter (d/D)	≤ 0.8
During peak wet weather flows, d/D	Existing Pipe: Covered under freeboard requirements New Pipe: < 1.0
During peak wet weather flows, maximum surcharge (freeboard from water surface to manhole rim)	Existing Pipe: Minimum 2.0 feet of freeboard system wide for unsealed gravity pipes. Manholes with < 2.0 feet from crown to rim will be identified and evaluated individually as exceptions or required improvements. New Pipe: No manhole surcharging, piping will be sized to convey peak wet weather flows under full pipe conditions.
Shallow manhole (crown of pipe to rim < 2.5 ft), during peak wet weather flows, maximum surcharge (freeboard from water surface to manhole rim)	Existing Pipe: Covered under peak wet weather requirement New Pipe: No manhole surcharging, piping will be sized to convey peak wet weather flows under full pipe conditions.
Lift station firm capacity	Lift capacity to discharge the peak flow associated with the design wet weather event with largest unit out of service.
Maximum force main velocity	6 ft/s max under peak dry weather flows, 10 ft/s max under peak wet weather conditions with all pumps operating
Maximum gravity pipe velocity	10 ft/s to identify pipelines that may require anchoring and regular inspection
Minimum cleansing/scouring velocity, gravity pipe and force main	2 ft/s flow rate attained during peak dry weather flow to maintain cleansing or identify pipelines in need of flushing.
Minimum cleansing/scouring velocity, siphon	Existing: 3 ft/s (2 barrels required) New: No new siphons permitted

DRAFT – WORK IN PROGRESS – SUBJECT TO CHANGE

Category	CSMP Standard
Backup power (response time)	Onsite backup power or backup diesel pumps should be provided for any large or regional lift stations. On case-by-case basis, other lift stations (excluding private pumps) should comply with ODEQ guidelines for onsite storage, auxiliary power, etc. Standby power required for new lift stations or existing lift stations that go through a "material modification."

General note: ft/s = feet per second. ODEQ – Oregon Department of Environmental Quality.

Table 2 presents the design standards that were followed to determine slope of new pipelines. These criteria are based on:

- *City of Bend Standards and Specifications*, 2011 for pipes less than or equal to 24 inches in diameter.

- *Recommended Standards for Wastewater Facilities (10 States Standards, www.10statesstandards.com)*, 2004 edition, for pipes greater than 24 inches in diameter.

For pipe diameters greater than or equal to 48 inches, slopes should be designed to produce mean velocities, when flowing full, of not less than 3.0 feet per second (ft/s) based on Manning's formula using an "n" value of 0.013.

Table 2| Pipe Design Standards: Grade and Slope

Recommended Minimum Slopes							
Nominal Pipe Size (inch)	8[1]	12[1]	18[1]	24[1]	30[2]	36[2]	42[2]
Minimum Slope (ft per 100 ft)	0.4	0.19	0.11	0.08	0.058	0.046	0.037

[1] *Minimum Grade (City of Bend Standards and Specifications, 2011).*
[2] *Recommended minimum slopes (Recommended Standards for Wastewater Facilities [10 States Standards, 2004]).*

Unit Cost Rates

Unit cost rates used in the optimization analysis are planning-level estimates and are consistent with the approach used in the CSMP and have been updated to reflect 2015 conditions. The unit cost rates are summarized in the CSMP Report Section 5 – "Project Unit Costs and Cost Analysis" and Appendix 5A – "Supplemental Material for Unit Costs." The Engineering News Record Construction Cost Index (ENR CCI) basis is 9430 (Seattle, April 2013) for the CSMP and 10,386 (Seattle, February 2015) for the UGB expansion study. All CSMP unit costs were multiplied by a factor of 1.10138 for the UGB Expansion study based on the ENR CCI ratio (10,386/9430).

The EUAC approach utilized in the optimization includes capital costs, end-of-life replacement costs, applicable operations and maintenance costs, and electrical costs to evaluate improvement alternatives. Unit cost rates include markups for design and administration costs, mobilization, traffic control, erosion control, and contractor's overhead. Additionally, project costs include surface restoration for arterial, local, and dirt roadways; and trenchless or crossing construction costs associated with canal, railroad and highway crossings. Lower surface restoration costs were applied to those alignments outside of the current UGB due to their more rural nature and lack of curb and gutter or sidewalk.

Project unit cost estimates were prepared in accordance with the guidelines of American Association of Cost Engineers (AACE) International, the Association for the Advancement of Cost Engineering. (*AACE International Recommended Practice No. 56R-08 Cost Estimate Classification System - As Applied for the Building and General Construction Industries - TCM Framework: 7.3 - Cost Estimating and Budgeting Rev. December 31, 2011*). AACE International's description of a Class 5 Estimate is quoted as follows:

> *Typical accuracy ranges for Class 5 estimates are -20% to -30% on the low side, and +30% to +50% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.*

The project cost estimates have been prepared for the purpose of evaluating project alternatives and budgeting for master plan implementation. Project cost estimates were prepared from information available at the time of the estimate, and are based on a low level of project definition. Project costs developed herein produce "rough cost estimates" consistent with the definition of Oregon Administrative Rules 660-011-0005(2) and 660-011-035. The true cost and resulting feasibility of a planned project will depend on the actual labor and material costs, competitive market conditions, site conditions, final project scope, implementation schedule, continuity of personnel, and other variable factors. Therefore, the actual project costs will vary from the estimates presented here. Because of these factors, project feasibility, benefit-to-cost ratios, risks and funding must be carefully reviewed prior to making specific financial decisions or establishing project-specific budgets.

UGB Expansion Scenarios

For all land use alternatives in the UGB expansion analysis, the existing UGB was assumed to be built-out based on model calibration and wastewater flow projections identified in the CSMP Report Section 3, "Wastewater Flow Projections" and Section 4, "System Analysis." The additional wastewater flow projections for the UGB expansion analysis applied specifically to potential UGB expansion areas and scenarios as outlined below and shown in Figure 2.

- Task 3 (<u>Long-term Infrastructure Analysis</u>) – Two-mile buffer around the existing UGB used to identify long-term improvement strategy. Includes all land within 2

miles of the existing UGB, excluding land identified as unbuildable.[1] Additionally, a net acreage factor of 79% was applied to the buildable lands to account for future right-of-way (ROW) requirements.[2]

- Task 4a (generalized UGB Expansion Scenarios) – Composite of UGB expansion scenarios approved by the UGB Steering Committee (USC), including all land included in scenarios. (Scenario Areas)

- Task 4b (generalized Supplemental Analysis Areas) – Composite of all supplemental analysis areas approved by the USC. (Supplemental Analysis Areas)

The scenario and supplemental expansion areas were grouped into eight (8) geographic sub-areas as shown in Figure 3. These areas became the basis for comparative ratings of potential expansion areas. A summary of area for the sanitary sewer study is provided in Table 3.

Table 3| UGB Expansion Study Area Buildable Acres

Category[1,2]	Buildable Area (net acres)[1,2,3]
Existing UGB[4]	16,155
Tetherow and Widgi Creek[4]	860
UGB Expansion Scenario Areas	
DSL Property	285
Elbow	337
Thumb	316
West	314
Shevlin	143
OB Riley/Gopher Gulch	387
North Triangle	195
Northeast Edge	368
Supplemental Analysis Areas	
DSL Property	92
Elbow	0
Thumb	34
West	208
Shevlin	200
OB Riley/Gopher Gulch	283
North Triangle	0
Northeast Edge	665
2 Mile Buffer	14,193
Total	40,555

Note 1. Within the study area, the following list of unbuildable land was excluded from the sewer analysis: State and Federal lands; Bend Parks and Recreation District ownership; 100 year FEMA Floodplain; Steep Slopes (greater than 25%); Riparian Areas; Federal and Scenic Rivers; Oregon Scenic Waterways. Note 2. Net acres based on 21% future ROW consistent with City planning criteria. Note 3. Incremental values, except for total.
Note 4. Obtained from the CSMP Buildable Land Inventory database.

I:\BOL_Projects\12\1354\416 - UGB Expansion Analysis\GIS\MXD\UGBExpansionLoadingTM\Figure2_UnbuildableArea_MSA11x17PDRAFT.mxd 5/4/2015 11:13:21 AM SAM
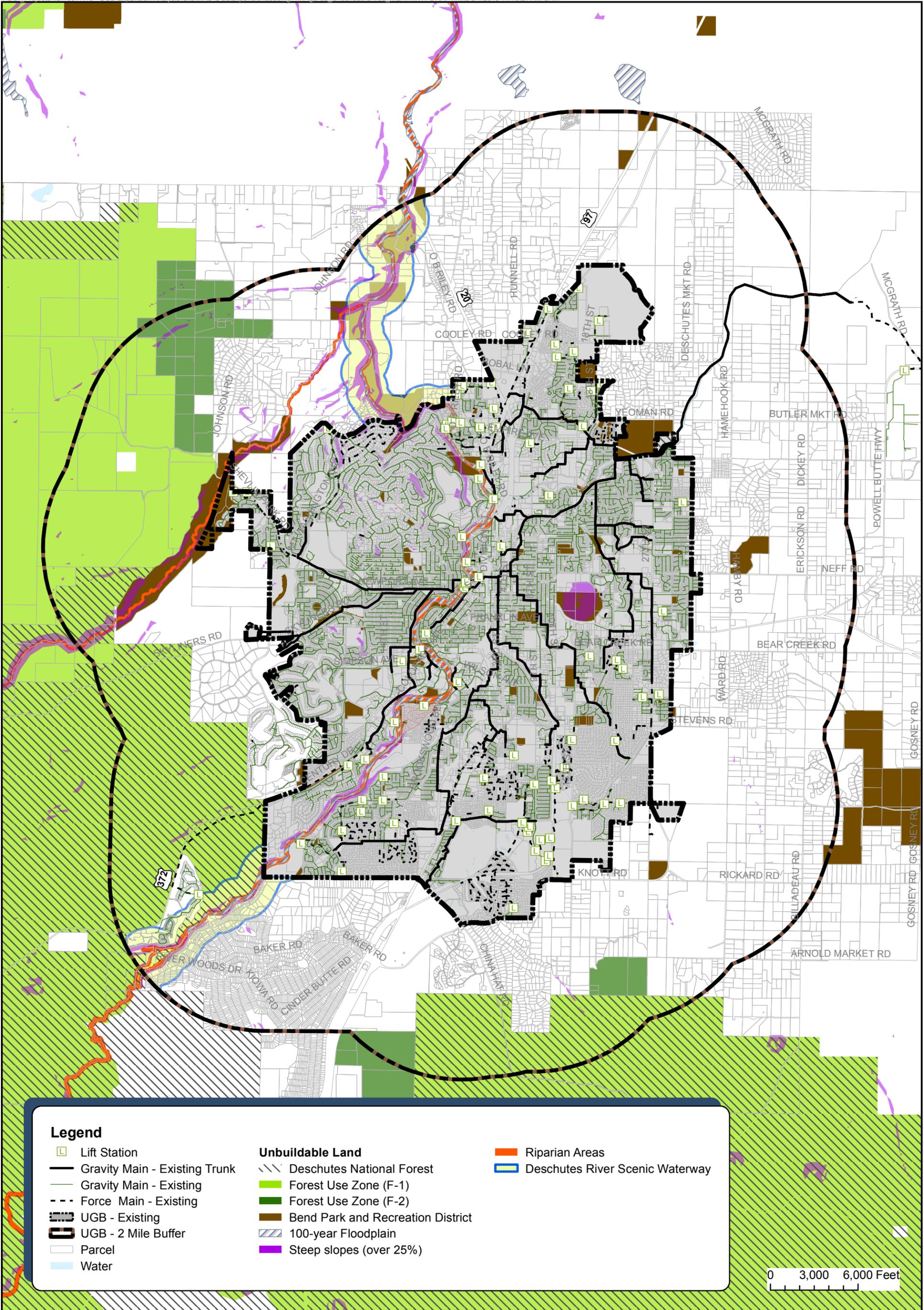
Legend

L	Lift Station
——	Gravity Main - Existing Trunk
——	Gravity Main - Existing
- - -	Force Main - Existing
▦	UGB - Existing
▬	UGB - 2 Mile Buffer
☐	Parcel
▨	Water

Unbuildable Land

⧄	Deschutes National Forest
▨	Forest Use Zone (F-1)
▨	Forest Use Zone (F-2)
▨	Bend Park and Recreation District
▨	100-year Floodplain
▨	Steep slopes (over 25%)

▬	Riparian Areas
▭	Deschutes River Scenic Waterway

0   3,000   6,000 Feet

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Figure 2
Unbuildable
Land

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Legend

- ☐ Existing Lift Station
- —— Gravity Main - Existing Trunk
- —— Gravity Main - Existing
- ---- Force Main - Existing
- ▨ Water
- ▨ Scenario Area
- ▨ Supplemental Area
- ▨ UGB - Existing
- ▨ UGB 2-Mile Buffer
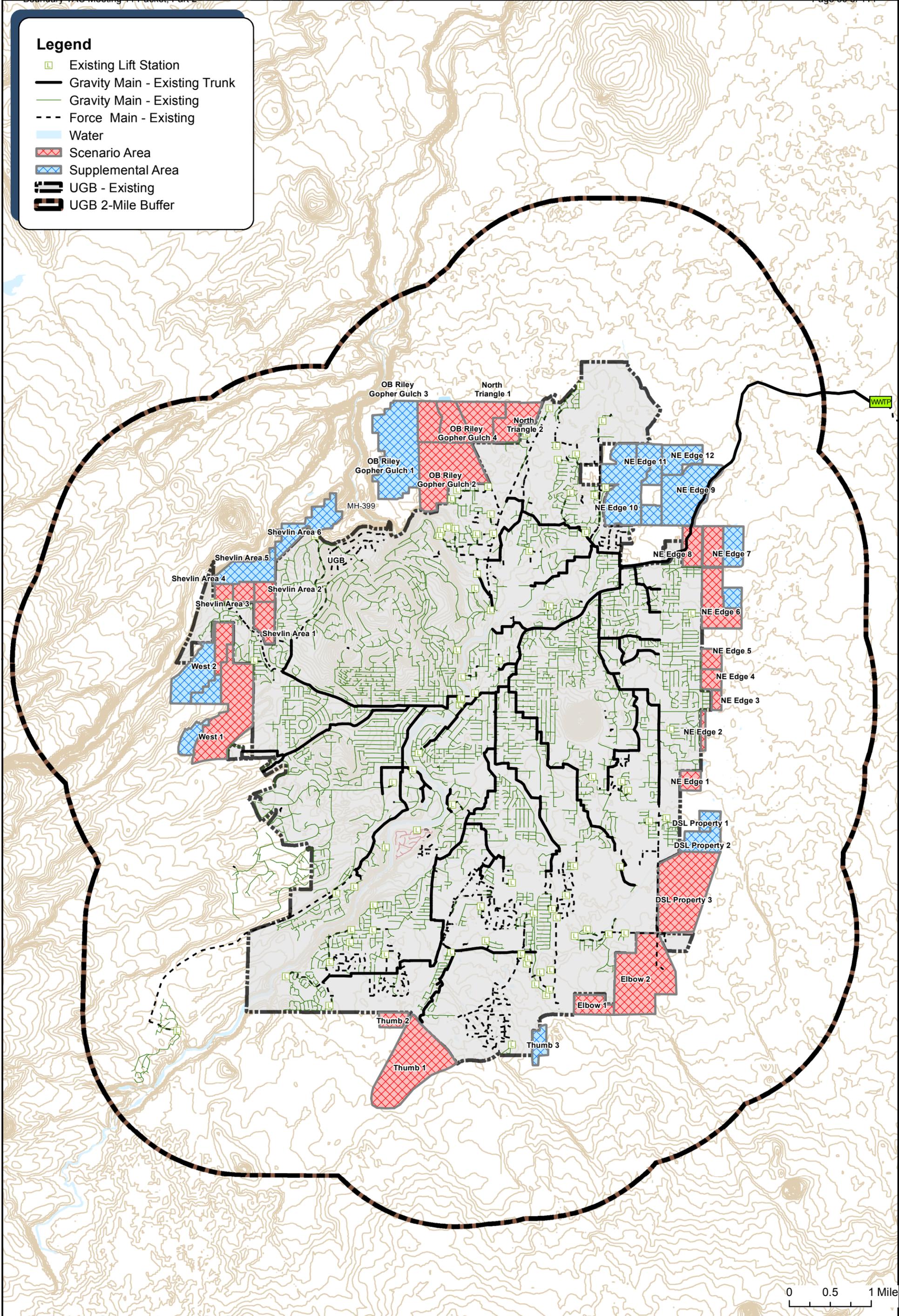
OB Riley Gopher Gulch 3
North Triangle 1
OB Riley Gopher Gulch 4
North Triangle 2
OB Riley Gopher Gulch 1
NE Edge 11
NE Edge 12
OB Riley Gopher Gulch 2
NE Edge 10
NE Edge 9
MH-399
NE Edge 8
NE Edge 7
Shevlin Area 6
Shevlin Area 5
UGB
Shevlin Area 4
NE Edge 6
Shevlin Area 2
Shevlin Area 3
NE Edge 5
Shevlin Area 1
NE Edge 4
West 2
NE Edge 3
NE Edge 2
West 1
NE Edge 1
DSL Property 1
DSL Property 2
DSL Property 3
Elbow 2
Elbow 1
Thumb 2
Thumb 3
Thumb 1
WWTP

0   0.5   1 Mile

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Figure 3
Growth Areas

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Flow Development

The sanitary sewer system was analyzed for capacity based on peak dry weather and wet weather flow estimates as defined below:

- Peak dry weather flow: highest flow during dry weather conditions (sanitary flows), corresponding to the day of maximum sewer use (no rainfall is contributing).

- Peak wet weather flow: peak flow during wet weather conditions, corresponding to the rainfall contribution from the design storm (rainfall derived infiltration and inflow, RDII) and dry weather flow conditions of the day of maximum sewer use. Dry and wet flow peaks are aligned to ensure that the peak dry weather flow and the peak RDII contribution occur at the same time.

Dry Weather Loading

As part of the recently completed CSMP, land use and loading rates (average dry weather flow) were attributed to all tax lots within the existing UGB based on available flow monitoring. Future loading within the existing UGB was extrapolated based on unit flow factors as presented in Table 4.

Table 4| Unit Loading Rates for Dry Weather Flow

Land Use Category	Units per Acre	Loading (gpad)[1, 2]
Very Low Density Residential	2	370
Low Density Residential	4	740
Medium Density Residential	6	1,110
High Density Residential	10	1,850
Non-Residential	-	490
Schools	-	347

Note 1. Gallons-per-acre-per-day (gpad)
Note 2. Residential loading based on 185 gallons-per-unit-per-day x number of units.

Dry weather loading was developed for the potential UGB expansion areas using the unit loading rates from the CSMP and assumptions shown in Table 4. Numbers of estimated units were applied to Scenario Areas and Supplemental Analysis Areas where unit projections were available. Based on the statistical analysis and input from City staff, a density of 4 units per acre was applied where unit projections or other land use data was unavailable (i.e. in the remainder of the 2-mile buffer area, outside the Scenario Areas and Supplemental Analysis Areas). The justification for the 4 units per acre assumption is further documented in the technical memorandum entitled, "UGB Expansion – Sewer Loading Assumptions [July 2015]." The total and existing loading estimates are summarized in Table 5.

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Table 5| Dry Weather Loading

Category	Loading (gpm)[1,2]
Existing, Tetherow, Widgi Creek	4,430
Future Growth within Existing UGB	3,490
UGB Expansion Scenario Areas[3]	
DSL Property	154
Elbow	186
Thumb	142
West	242
Shevlin	70
OB Riley/Gopher Gulch	216
North Triangle	132
Northeast Edge	259
Supplemental Analysis Areas (minus scenario areas)[3]	
DSL Property	63
Elbow	0
Thumb	31
West	185
Shevlin	131
OB Riley/Gopher Gulch	244
North Triangle	0
Northeast Edge	253
2 Mile Buffer (minus scenario and supplemental analysis areas)[4]	7,294
Total	17,522

Note 1. Gallons-per-minute (gpm)
Note 2. Incremental values, except for total.
Note 3. Based on specific land use, loading factors, and projected units x 185 gallons-per-unit-per-day where projected unit data is available. Based on 4 units/acre x 185 gallons-per-unit-per-day where projected unit data is unavailable.
Note 4. Based on 4 units/acre x 185 gallons-per-unit-per-day.

The selected loading rates do not imply that all residential development outside the existing UGB will be 4 units per acre. The assumption of 4 units per acre was selected because it approximates urban development observed in the existing UGB, but also accounts for the fact that build-out of all exception lands in the study area is unlikely, even in the very long-term future. The selected loading rate attempts to balance observed urban densities with the large study area.

Loading was distributed to manholes within the hydraulic model based on USGS contours, sub-basin delineation and pipeline profile review. The loading location map is presented in Figure 4.
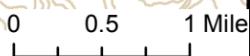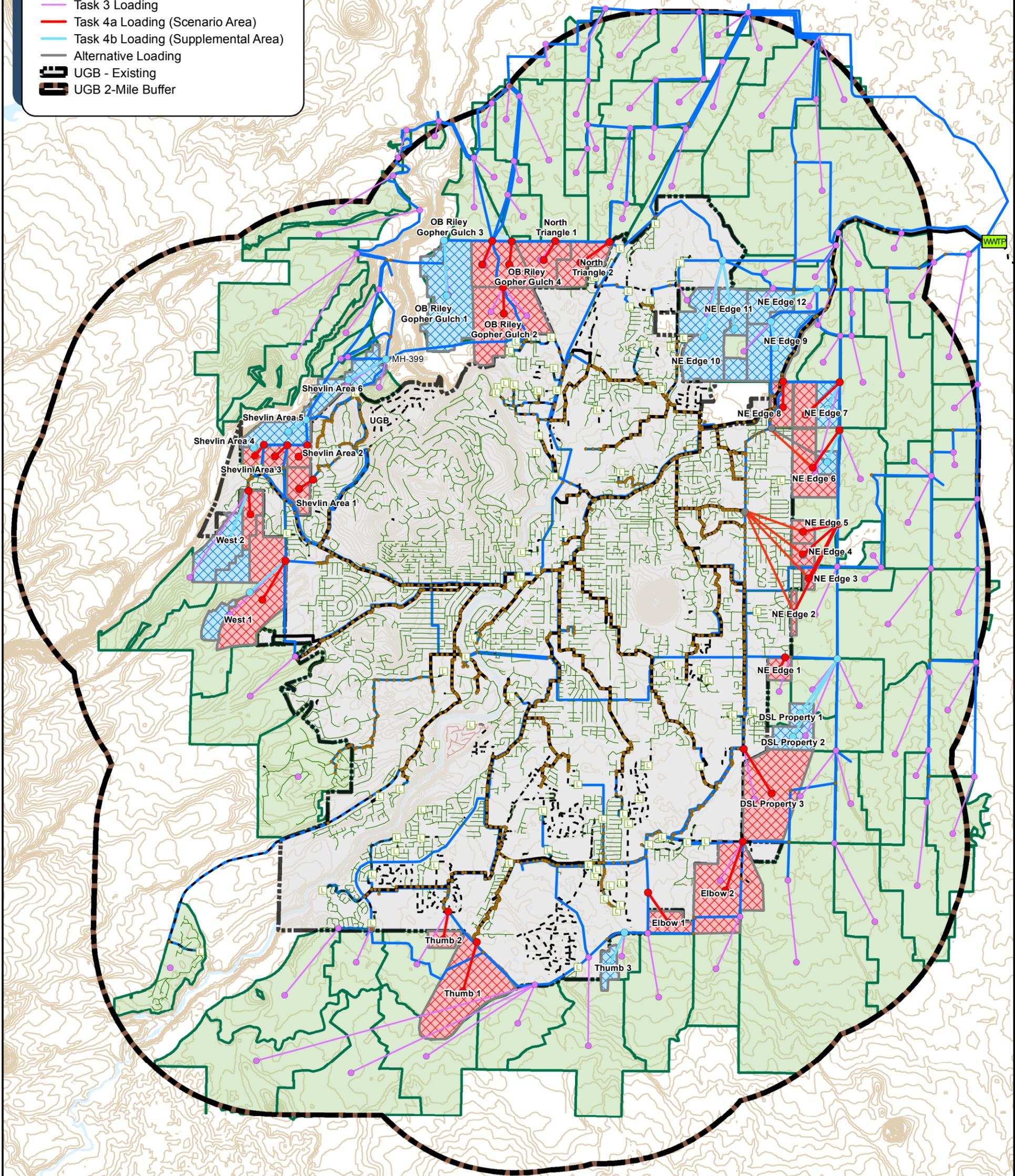
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Figure 4
Growth Areas
Full 2 Mile UGB Buffer Study Area

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Peak Flow Estimates

The flow values presented in Table 5 represent an average dry weather flow condition. Approximately 50 different diurnal patterns with peaking factors were developed for the existing collection system during the CSMP. These patterns are based on flow monitoring data and reflect the differences in development and land use within the UGB. In order to estimate a peak dry weather flow for the UGB expansion area, the 75th percentile peaking factor of 1.8 was applied to the average dry weather loading.

The design storm used to estimate existing peak wet weather flow within the collection system has a total rainfall volume of 1.3 inches and follows a National Resources Conservation Service (NRCS) Type II theoretical distribution (spring/summer thunderstorm). Based on the statistical analyses presented in the CSMP Report Appendix 4A-"Technical Memorandum - Design Storm Considerations for the City of Bend Sewer Collection System", the recommended annual storm depth and distribution historically has a 20% chance of occurring during the winter and a 10% chance of occurring during the summer. Peak wet weather flow estimates for future development potential inside and outside of the existing UGB were based on City development standards. These standards apply a dry average to peak wet peaking factor of three (3) to estimate peak wet weather flow during the design storm event.

Peak flow rate estimates for dry and wet weather conditions are presented in Table 6.

Table 6| Peak Flow Estimates

Category	Peak Dry Weather Flow (mgd)[1, 2, 3]	Peak Dry + Wet Weather Flow (mgd)[4]
Existing	11.5	19.1
Build-out Development, Existing UGB	9.0	15.1
Subtotal Existing UGB	20.5	34.2
UGB Expansion Scenario Areas	3.5	5.9
Supplemental Analysis Areas	2.4	4.1
Subtotal Existing UGB + Priority and Supplemental UGB Expansion	26.4	44.2
2 Mile Buffer	18.9	31.5
Total Existing UGB + Priority and Supplemental UGB Expansion + 2 Mile Buffer	45.3	75.7

Note 1. Incremental values, except for total.
Note 2. Million-gallons-per-day (mgd)
Note 3. Peak dry weather flow = average dry weather loading x peaking factor of 1.8.
Note 4. Peak dry + wet weather flow = average dry weather loading x peaking factor of 3.

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Optimization Results

Optimization results showing the identified improvements are summarized in Figures 5 thru 8 and Tables 7 thru 8 for the CSMP (build-out of existing UGB), Task 3 (build-out of existing UGB + full 2 mile study area), Task 4a (build-out of existing UGB + Scenario Areas), and Task 4b (build-out of existing UGB + Scenario Areas + Supplemental Analysis Areas). The results are followed by a discussion of key improvement differences between tasks and more detailed review of the infrastructure associated with Tasks 4a and 4b for UGB expansion. Table 7 includes a summary of Initial Capital Costs and Table 8 includes a summary of EUAC.

Table 7| Initial Capital Costs, Optimization Solution

Cost Item	Task[1]			
	CSMP	**Task 3**	**Task 4a**	**Task 4b**
Gravity Sewer	77.40	257.42	122.64	138.12
Force Main	7.10	31.81	6.33	12.04
Linear Storage	0.00	0.00	0.00	0.00
Storage Tank	0.00	1.10	0.00	0.00
Lift Station	4.48	41.96	6.68	9.73
Plant Interceptor Upsize	1.13	0.00	0.00	0.00
Exist Lift Station	7.58	8.25	10.85	8.25
TOTAL ($M)[2]	**97.70**	**340.55**	**146.49**	**168.15**

Table 8| EUAC, Optimization Solution

Cost Item	Task[1]			
	CSMP	**Task 3**	**Task 4a**	**Task 4b**
Gravity Sewer	2.11	8.11	3.85	4.31
Force Main	0.28	1.30	0.23	0.47
Linear Storage	0.00	0.00	0.00	0.00
Storage Tank	0.00	0.07	0.00	0.00
Lift Station	0.41	6.14	0.64	0.98
Plant Interceptor Upsize	0.05	0.00	0.00	0.00
Exist Lift Station	0.27	0.29	0.39	0.29
TOTAL ($M/year)[2]	**3.12**	**15.91**	**5.11**	**6.05**

Note 1. CSMP = build-out of existing UGB; Task 3 = build-out of existing UGB + full 2-mile study area; Task 4a = build-out of existing UGB + Scenario Areas; Task 4b = build-out of existing UGB + Scenario Areas + Supplemental Analysis Areas.

Note 2. Initial Capital Cost estimates in millions of dollars. EUAC estimates in millions of dollars per year. Cost estimates based on 2015, AACE Class 5 unit costs and exclude present value credits. Treatment plant costs excluded.

FIGURE 5

Bend CSMP Optimization - 20-Year Mid R Project Phasing

(Flow Rates Represent 20-Y Mid R Peak Wet Weather Flow)

July 30, 2014

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LEGEND:

EXISTING INFRASTRUCTURE

P	Lift Station
---	Gravity Main
-----	Force Main

COMMITTED INFRASTRUCTURE

P	Lift Station
---	Gravity Main
-----	Force Main

BACKGROUND LAYERS

UGB Existing Service Area
Supplemental Analysis Area
Area Within a Scenario
UGB Expansion Service Area

PROPOSED IMPROVMENTS

CSMP Improvements
Gravity Main
Force Main

CSMP Improvements (Amended)
Gravity Main
Force Main

UGB Required Improvments
Gravity Main
Force Main

| P | Lift Station |
Storage Tank
Decommissioned Lift Station
Decommissioned Force Main

NOTES:

1. THIS DRAWING IS CONCEPTUAL AND HAS BEEN PREPARED FOR DISCUSSION PURPOSES ONLY.

2. PROPOSED INFRASTRUCTURE DIAMETERS AND ALIGNMENTS ARE CONCEPTUAL AND REMAIN SUBJECT TO DETAILED ENGINEERING DESIGN.

3. ALL FLOW RATES SHOWN ARE PEAK WET WEATHER FLOW.

0   0.5   1
miles

N

PROJECT:
UGB EXPANSION SEWER SYSTEM ANALYSIS - OVERALL STUDY AREA

DRAWING NO:
TASK3-GIS02B-A3

ISSUE:
B

CLIENT:
CITY OF BEND

FIGURE 6

DRAWING TITLE:
TASK 3 OPTIMIZED SOLUTION UGB OVERALL STUDY AREA ANALYSIS

ISS	BY	CHK	DATE	DETAILS
A	AF	JW	08.24.15	DRAFT FIGURE
B	AF	JW	09.04.15	FINAL DRAFT

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OREGON

WCS
ENGINEERING

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FIGURE 7
TASK 4A OPTIMIZED SOLUTION
UGB COMBINED BASE SCENARIO ANALYSIS

PROJECT:
UGB EXPANSION SEWER SYSTEM
ANALYSIS - OVERALL STUDY AREA

CLIENT:
CITY OF BEND

DRAWING NO:
TASK4A-GIS01B-A3

ISSUE:
B

NOTES:
1. THIS DRAWING IS CONCEPTUAL AND HAS BEEN PREPARED FOR DISCUSSION PURPOSES ONLY.

2. PROPOSED INFRASTRUCTURE DIAMETERS AND ALIGNMENTS ARE CONCEPTUAL AND REMAIN SUBJECT TO DETAILED ENGINEERING DESIGN.

3. ALL FLOW RATES SHOWN ARE PEAK WET WEATHER FLOW.

ISS	BY	CHK	DATE	DETAILS
A	AF	JW	08.25.15	DRAFT FIGURE
B	AF	JW	09.24.15	FINAL DRAFT

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LEGEND:

EXISTING INFRASTRUCTURE

P — Lift Station

—— Gravity Main

---- Force Main

COMMITTED INFRASTRUCTURE

P — Lift Station

—— Gravity Main

---- Force Main

PROPOSED INFRASTRUCTURE

CSMP Improvements

—— Gravity Main

CSMP Improvements (Amended)

—— Gravity Main

UGB Expansion Required Improvements

—— Gravity Main

---- Force Main

P — Lift Station

P — Decommissioned Lift Station

---- Decommissioned Force Main

BACKGROUND LAYERS

UGB Existing Service Area

Supplemental Analysis Area

Area Within a Scenario

NOTES:

1. THIS DRAWING IS CONCEPTUAL AND HAS BEEN PREPARED FOR DISCUSSION PURPOSES ONLY.

2. PROPOSED INFRASTRUCTURE DIAMETERS AND ALIGNMENTS ARE CONCEPTUAL AND REMAIN SUBJECT TO DETAILED ENGINEERING DESIGN.

3. ALL FLOW RATES SHOWN ARE PEAK WET WEATHER FLOW.

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WCS
ENGINEERING

PROJECT:
UGB EXPANSION SEWER SYSTEM ANALYSIS - OVERALL STUDY AREA

DRAWING NO: ISSUE:
TASK4B-GIS02B-A3   **B**

CLIENT:
CITY OF BEND

DRAWING TITLE: FIGURE 8

TASK 4B OPTIMIZED SOLUTION
UGB SUPPLEMENTAL AREA ANALYSIS

ISS	BY	CHK	DATE	DETAILS
A	AF	JW	08.25.15	DRAFT FIGURE
B	AF	JW	09.14.15	FINAL DRAFT

miles
0   0.5   1

06801

<p style="color:red; text-align:center;">DRAFT – WORK IN PROGRESS – SUBJECT TO CHANGE</p>

Solution Discussion – CSMP Projects Affected by UGB Expansion

Major projects from the CSMP that are impacted by the UGB expansion include the Southeast Interceptor Phase 2 (north of Neff Road), the Northeast Interceptor, and the Plant Interceptor. The drivers for the changes to each of these projects are discussed below.

Southeast Interceptor

The optimal alignment of the Southeast Interceptor north of Neff Road changes from 27th Street in the CSMP to Hamby Road in the UGB expansion analysis. The primary drivers contributing to this change include the following.

1. The Hamby alignment allows for gravity service to be provided to properties east of 27th street. If the Southeast alignment was to be constructed along 27th Street, a second eastern gravity pipeline along an alignment such as Hamby would be required in the future. Alternately if the pipeline was constructed along 27th Street, lift stations would be required to serve any growth east of that alignment including the Northeast Edge.
2. The Hamby alignment parallels sections of the existing plant interceptor that would otherwise require significant capacity improvements to serve long-term growth.

West of South Village the proposed size of the Southeast Interceptor is amended to provide sufficient capacity for additional growth in the southern expansion area including a small portion of "The Thumb" (Bany property).

Northeast Interceptor and Plant Interceptor

The size of the Northeast Interceptor is amended to provide sufficient capacity for additional growth in the north and west expansion areas including the North Triangle, OB Riley/Gopher Gulch, Shevlin, and West areas.

The alignment of the Northeast Interceptor is also amended to connect directly to the Wastewater Treatment Facility (WWTF). The amended alignment bypasses the existing Plant Interceptor and connects with the Hamby alignment of the Southeast Interceptor. The proposed Northeast Interceptor extension eliminates the need for capacity improvements to the existing Plant Interceptor and siphon structure upstream of the WWTF that would otherwise be required to serve future growth. The Northeast Interceptor extension is also proposed to include a diversion structure where flows from the existing Plant Interceptor can be diverted and conveyed directly to the WWTF providing valuable redundancy for existing poor condition and near capacity interceptor piping.

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Solution Discussion –Projects Affected by Phasing

The generalized UGB expansion scenarios selected the least cost improvements from the long-term infrastructure plan and a select set of short-term improvement alternatives. The short-term improvements that were selected and that are different from the long-term infrastructure plan are discussed below.

Regional Gopher Gulch Lift Station vs Existing Awbery Glen Lift Station

In Task 3 and Task 4b (Supplemental Areas), the full extents of the Shevlin area, the northern portion of the West area, and the Awbrey Glen lift station service area are pumped to the Northeast Interceptor through a new regional lift station and force main (Gopher Gulch lift station). These areas are identified in Figure 3 as West 2 and Shevlin 1 thru 6. The Gopher Gulch lift station is more cost effective than upsizing the Awbrey Glen lift station, associated force main, and downstream gravity trunk sewer. The Awbrey Glen force main is approximately 1.7 miles long and represents the most significant alternate cost.

In Task 4a (Scenario Areas), the more limited Shevlin area and the northern portion of the West area are served through the Awbrey Glen lift station.. The Awbrey Glen pumps require upsizing for limited UGB expansion; however, the existing force main upsizing is not required. Pumps are assumed to be replaced on a 20-year schedule to account for mechanical lifespan and therefore the cost of pump replacement and incremental upsizing is relatively cost effective. The peak flow excess capacity (beyond build-out of the existing UGB) of the Awbrey Glen pumps and the downstream force main for UGB expansion are approximately 60 gpm (15 gpm average flow) and 300 gpm (75 gpm average flow) respectively. This equates to approximately 120 additional equivalent dwelling units (EDUs) for the pumps and 580 additional EDUs for the force main. Peak and average flow estimates at the Awbrey Glen lift station should be confirmed with flow metering and pump testing prior to serving future UGB customers.

When compared to gravity trunk sewer solutions serving other expansion areas, both the Awbrey Glen and Gopher Gulch lift stations present greater operational complexity and costs for the City.

Interim Lift Stations

In Task 4a (Scenario Areas) and Task 4b (Supplemental Areas), an interim lift station was selected in the optimization to serve a major portion of "The Elbow." The interim lift station delays the extension of major trunk lines along Hamby Road to this area, which was the alternative selected to serve the large 2 mile buffer in Task 3.

In Task 4a, an interim lift station was selected to serve a small portion of the Northeast Edge adjacent to Bear Creek Road. In Task 4b, the Hamby alignment was extended south to serve this same parcel of land by gravity plus additional northern areas of the DSL Property sub-area (near Darnell Estates).

Relative Capital Cost Summary by Sub-Area

The relative sewer infrastructure costs for the eight (8) sub-areas were compared for Tasks 4a (Scenario Areas) and 4b (Supplemental Areas) to identify the most cost effective areas for UGB expansion. The comparative cost analysis assumes the following:

1. All sewer improvements associated with 4a and 4b UGB expansion are sized to serve the full 2-mile study area identified in Task 3 (long-term growth). Alternate Task 4 solutions were developed with improvements sized only for the short-term growth; however, in most cases the infrastructure size differential was minimal.

2. The costs associated with the CSMP improvements were assumed to be contributed by the current and future customers within the existing UGB. All other costs were assumed to be contributed by future development in UGB expansion areas. The incremental cost to upsize the Northeast Interceptor, for example, was assumed to be contributed by UGB expansion areas served by the Northeast Interceptor. Additionally, Hamby alignment costs from future development within the existing UGB was limited to the cost of the Southeast Interceptor Phase 2 (27th Street alignment north of Neff Road). All other Hamby alignment costs were assumed to be contributed by UGB expansion areas within the Hamby alignment service area.

3. Improvements were implemented incrementally in UGB expansion areas, such that all costs associated with build-out size improvements to serve the Scenario areas in Task 4a were funded by Scenario areas associated with Task 4a. Incremental UGB expansion in Task 4b (Supplemental Areas) benefited from pre-existing infrastructure constructed in Task 4a. Likewise, supplemental area expansion in Task 4b funded additional pipeline extensions and lift stations as required to serve incremental UGB expansion areas associated with Task 4b. Areas served in the Task 3 UGB expansion benefited from pre-existing infrastructure from both Tasks 4a and Tasks 4b. UGB expansion for Tasks 4a and 4b was incremental in terms of area served, but both expansions were assumed to occur during the 2028 planning timeframe.

4. All UGB expansion areas associated with the same task were assumed to develop simultaneously such that all areas within the task contributing to an improvement received the same cost share on a per acre basis. For example, where two sub-areas such as North Triangle and OB Riley/Gopher Gulch are within the same task, the two areas are assumed to equally contribute to the Northeast Interceptor upsizing on a per acre basis.

The relative cost comparison for the eight (8) sub-areas is presented for Initial Capital and Initial Capital per acre in Figure 9 for Tasks 4a and 4b. EUAC and EUAC per acre costs establish similar trends.

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Figure 9| Capital Cost and Capital Cost per Acre for Sub-areas
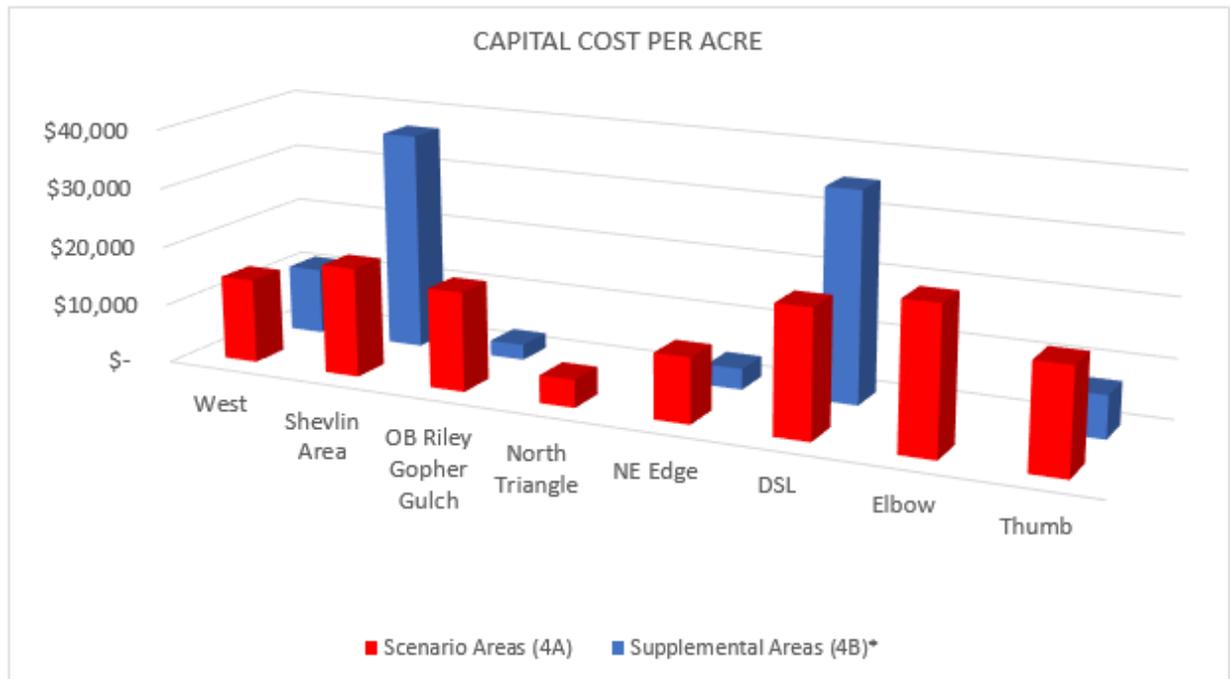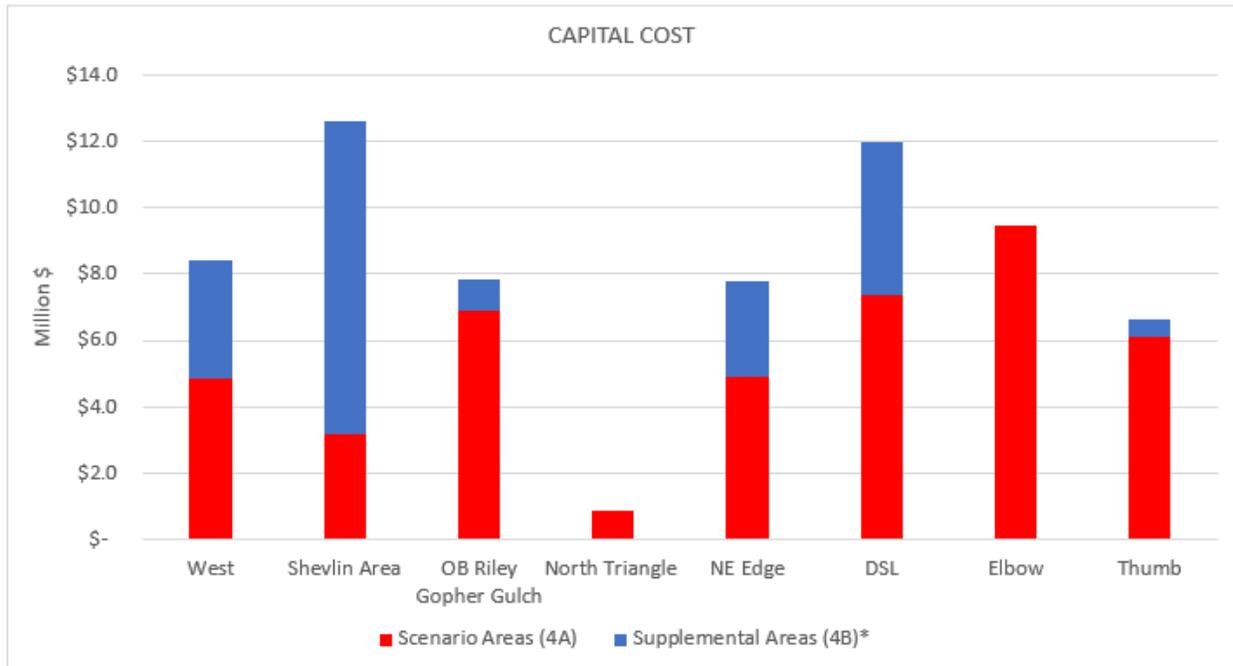
*Note. Incremental infrastructure cost to serve additional areas in Supplemental Area Analysis.

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Key findings from the relative cost comparison include:

1. Service to the Shevlin area and the West area is relatively cost effective for Scenario areas associated with Task 4a. The conveyance elements associated with the priority areas are limited to new trunk gravity piping, existing pipeline upsizing, and Awbrey Glen lift station pump upsizing. The supplemental analysis areas associated with Task 4b are significantly less cost effective because of the regional Gopher Gulch lift station, force main, and additional contributions to the Northeast Interceptor.

2. Service to sub-areas adjacent to the Hamby Alignment and the Northeast Interceptor (Northeast Edge, North Triangle) are relatively cost effective for both Scenario Areas and Supplemental Analysis Areas because the proposed infrastructure is required to serve future development within the existing UGB. Sub-areas furthest from the new trunk mains become less cost-effective because of trunk main extensions and additional localized improvements to convey wastewater to the new trunk mains. Specific sub-area notes include:

    a. North Triangle – Highly cost effective because of proximity to the Northeast Interceptor. Benefits from assumed simultaneous development of OB Riley/Gopher Gulch.

    b. OB Riley/Gopher Gulch – Cost effectiveness limited in Task 4a by required extension of the Northeast Interceptor. Highly cost effective for supplemental expansion in Task 4b because of pre-existing infrastructure.

    c. Northeast Edge – Cost effectiveness limited by small localized interim lift station to serve area adjacent to Bear Creek Road for Task 4a. Cost effectiveness impacted by contribution to the Hamby alignment and Northeast Interceptor. Cost effectiveness increases when considering that the associated trunk mains are required independent of development in the Northeast Edge. Cost effectiveness also improves when maximum acreage is developed for Task 4b.

    d. DSL Property – Cost effectiveness limited in Task 4a by localized sewer mains required to connect to the Southeast Interceptor. Cost effectiveness limited in Task 4b by extension of the Hamby alignment to serve the northern portion of the sub-area.

    e. Elbow – Cost effectiveness limited by localized interim lift station and localized gravity piping to convey wastewater to the Southeast Interceptor for both Tasks 4a and 4b.

    f. Thumb – Cost effectiveness limited by contribution to Southeast Interceptor improvements west of Parrell Road and localized pipeline improvements along Parrell Road adjacent to the Southeast Interceptor.

Another method for summarizing the findings of the relative cost comparison is to identify the primary improvements serving each sub-area and listing the other areas that also share the applicable infrastructure as shown in Table 9. The table also includes a rating for cost effectiveness with the following guidelines.

- "Good" – Relatively low capital cost and capital cost per acre. Infrastructure contributes to long-term infrastructure required to serve areas within the existing UGB. Sub-area is immediately adjacent to an existing trunk main, Northeast Interceptor, Southeast Interceptor, or Hamby alignment.

- "Fair" – Relatively moderate capital cost and capital cost per acre. Sub-area may require localized infrastructure or interim lift station to convey wastewater to existing trunk main, Northeast Interceptor, Southeast Interceptor, or Hamby alignment.

- "Poor" – Relatively high capital cost and capital cost per acre. Sub-area may require localized infrastructure or interim lift station to convey wastewater to existing trunk main, Northeast Interceptor, Southeast Interceptor, or Hamby alignment. Sub-area also requires regional lift station to convey wastewater to an existing or future trunk main.

Table 9| Summary of Relative Cost Comparison

Sub-area	Task 4a (Scenario Areas)		Task 4b (Scenario + Supplemental Areas)		Other Critical Dependent Areas[1]
	Critical Infrastructure	Cost Effective-ness	Critical Infrastructure	Cost Effective-ness	
North Triangle	NEI, NEI extension to WWTF	Good	NEI, NEI extension to WWTF	Good	OB Riley/Gopher Gulch Area is also served by the NEI
NE Edge	Hamby, NEI extension to WWTF, Interim lift station	Good	Hamby, Hamby extension, NEI extension to WWTF	Good	DSL Property, The "Elbow", The "Thumb" are also served by Hamby
DSL Property	Local pipe extensions, Hamby, NEI extension to WWTF	Fair	Local pipe extensions, Hamby, Hamby extension, NEI extension to WWTF	Fair-Poor	NE Edge, The "Elbow", The "Thumb" are also served by Hamby
The "Elbow"	Interim lift station, local pipe extensions	Fair-Poor	Interim lift station, local pipe extensions	Fair-Poor	NE Edge, DSL Property, The "Thumb" are also served by Hamby
The "Thumb"	Local pipe extensions, Hamby, NEI extension to WWTF	Fair	Local pipe extensions, Hamby, NEI extension to WWTF	Fair	NE Edge, DSL Property, The "Elbow" are also served by Hamby

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| Sub-area | Task 4a (Scenario Areas) | | Task 4b (Scenario + Supplemental Areas) | | Other Critical Dependent Areas[1] |
	Critical Infrastructure	Cost Effective-ness	Critical Infrastructure	Cost Effective-ness	
West Area	Local pipe extensions, incremental existing pipe upsizing or parallel piping	Good-Fair	Local pipe extensions, Gopher Gulch lift station, NEI, NEI extension to WWTF	Poor	Shevlin Area is also served by Gopher Gulch lift station and some common piping extensions
Shevlin Area	Local pipe extensions, incremental existing pipe upsizing or parallel piping	Good-Fair	Local pipe extensions, Gopher Gulch lift station, NEI, NEI extension to WWTF	Poor	West Area is also served by Gopher Gulch lift station and some common piping extensions
OB Riley / Gopher Gulch Area	NEI extension west and south, NEI, NEI extension to WWTF	Fair	NEI extension west and south, NEI, NEI extension to WWTF	Good	North Triangle is also served by the NEI

Note 1. All sub-areas are served by the Northeast Interceptor (NEI) extension to the WWTF for Task 4b. All areas except for the West and Shevlin areas are served by the NEI extension to the WWTF for Task 4a.

Unique Scenario Analysis

The City and TAC refined the scenario and supplemental analysis areas into six (6) distinct scenarios. The portion of the scenario evaluation process associated with analyzing individual scenarios was conducted on a compressed schedule. The time required to develop an infrastructure optimization analysis for each distinct scenario was not available within the project schedule. Additionally, the land use assumptions associated with the six (6) scenarios were in a state of flux during the critical time to complete the optimization analysis. Finally and most importantly, the approach to identify the optimum long term sewer solutions initially requires evaluating the entire potential future service area (Task 3) and then subsequently refining that solution to serve the individual expansion areas. As such, the City elected to move forward with the generalized analysis previously described for Tasks 4a and 4b.

Subsequent to the completion of the generalized analysis, the finalized six (6) scenarios were summarized by contributing area based on applicable infrastructure and costs identified in Tasks 4a and 4b. Three UGB Expansion scenarios (1.2, 2.1, and 3.1) were summarized based on the applicable infrastructure and costs identified in Task 4a; while three supplemental analysis area maps (SAAM-1, SAAM-2, and SAAM-3) were summarized based on the applicable infrastructure and costs identified in Task 4b.

Scenario Areas and Loading

Dry and wet weather flow generation for the individual scenarios followed the assumptions previously presented for Tasks 3, 4a, and 4b. Acreage and loading by sub-area are summarized in Table 10 for the six (6) scenarios.

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Table 10| Scenario Area and Loading by Sub-area

Sub-area	Buildable Area (acre)[1]					
	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
DSL Property	173	284	151	99	149	101
Elbow	161	318	140	121	140	140
Thumb	277	246	139	184	170	166
West	105	137	260	0	0	521
Shevlin	0	0	139	338	0	0
OB Riley/Gopher Gulch	100	107	356	100	636	136
North Triangle	152	147	183	152	183	183
Northeast Edge	359	104	127	881	32	32
Total	1,327	1,343	1,495	1,874	1,309	1,279

Sub-area	Average Dry Weather Loading (gpm)[2]					
	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
DSL Property	93	154	73	34	83	118
Elbow	102	182	47	40	47	47
Thumb	124	139	47	82	63	57
West	126	119	242	0	0	427
Shevlin	0	0	63	163	0	0
OB Riley/Gopher Gulch	34	31	216	34	356	65
North Triangle	52	103	62	52	62	62
Northeast Edge	259	61	76	475	17	17
Total	789	790	825	879	628	792

Note 1. Excludes unbuildable lands and 21% of gross area for ROW.
Note 2. Gallons-per-minute (gpm)

Scenario Results

The specific lands served for each of the six (6) scenarios and the applicable collection system improvements associated with each scenario from Tasks 4a and 4b are presented in Figures 9 thru 14. The improvements are identified by categories associated with cost: CSMP (funded by development within the existing UGB), UGB expansion (funded by development outside of the existing UGB), or shared (partially funded by development inside and partially funded by development outside of the existing UGB). Relative cost summaries by sub-area and scenario are presented for Initial Capital and Initial Capital per acre in Figure 15.

Existing Infrastructure
- Gravity Main - Existing Trunk
- Gravity Main - Existing
- Vacuum Main - Existing
- Force Main - Existing
- Parcel
- UGB - Existing
- UGB - 2 Mile Buffer
- Expansion Area

Pipe Improvement Category
- CSMP
- Expansion
- Shared

Lift Station Improvement Category
- Expansion
- Decommission
- CSMP

North Triangle

OB Riley Gopher Gulch

Northeast Interceptor

Hamby Alignment

Northeast Edge

West

Southeast Interceptor

Interim LS1

DSL Property

Interim LS2

Elbow

Thumb

0   0.5   1 Mile
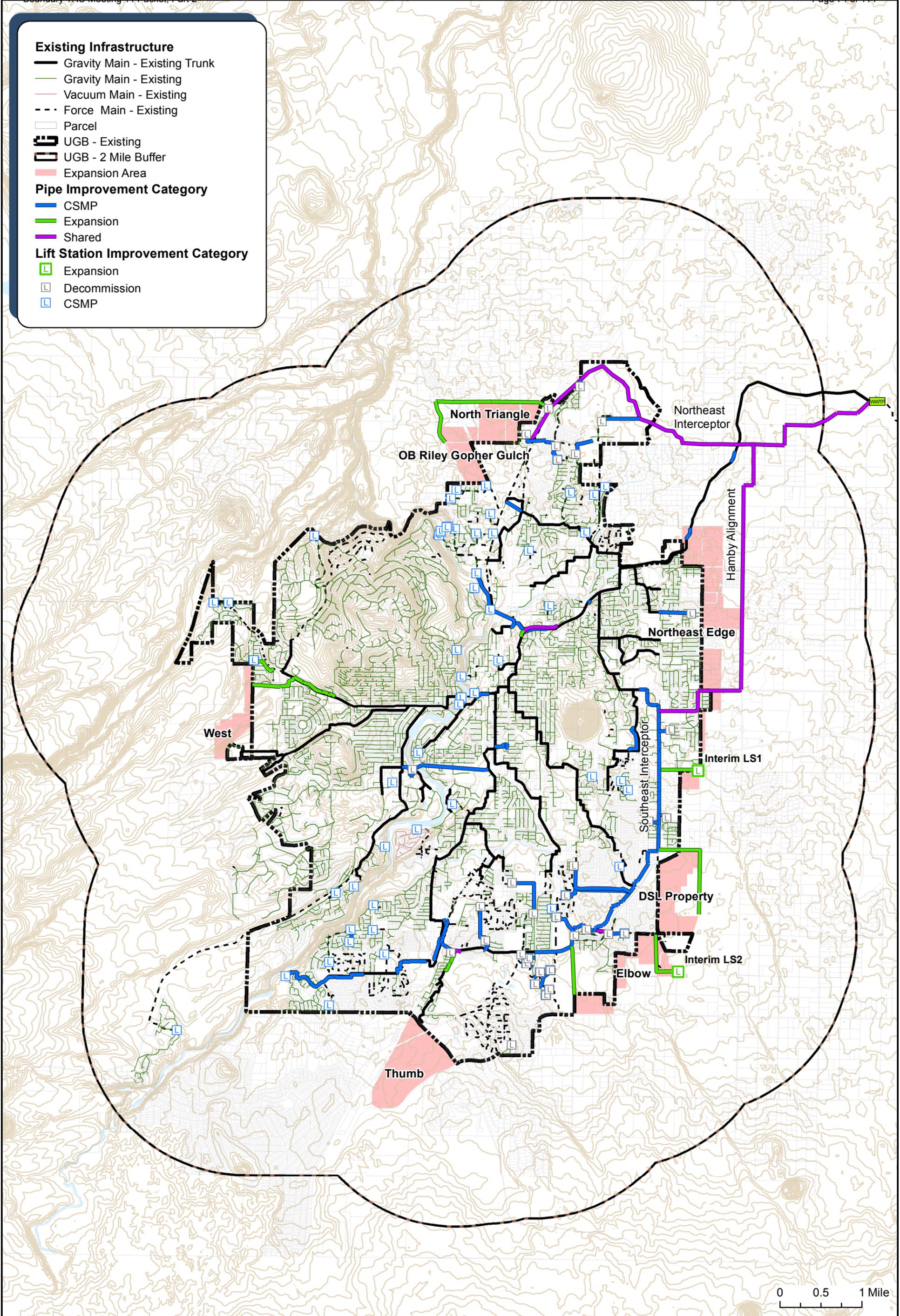
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Employment Analysis
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Figure 9
Scenario 1.2

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Existing Infrastructure
— Gravity Main - Existing Trunk
— Gravity Main - Existing
— Vacuum Main - Existing
- - - Force Main - Existing
☐ Parcel
⬚ UGB - Existing
▭ UGB - 2 Mile Buffer
▨ Expansion Area

Pipe Improvement Category
— CSMP
— Expansion
— Shared

Lift Station Improvement Category
▣ Expansion
▣ Decommission
▣ CSMP

North Triangle

OB Riley Gopher Gulch

Northeast Interceptor

Hamby Alignment

Northeast Edge

Interim LS1

Southeast Interceptor

DSL Property

Interim LS2

Elbow

West

Thumb

0   0.5   1 Mile
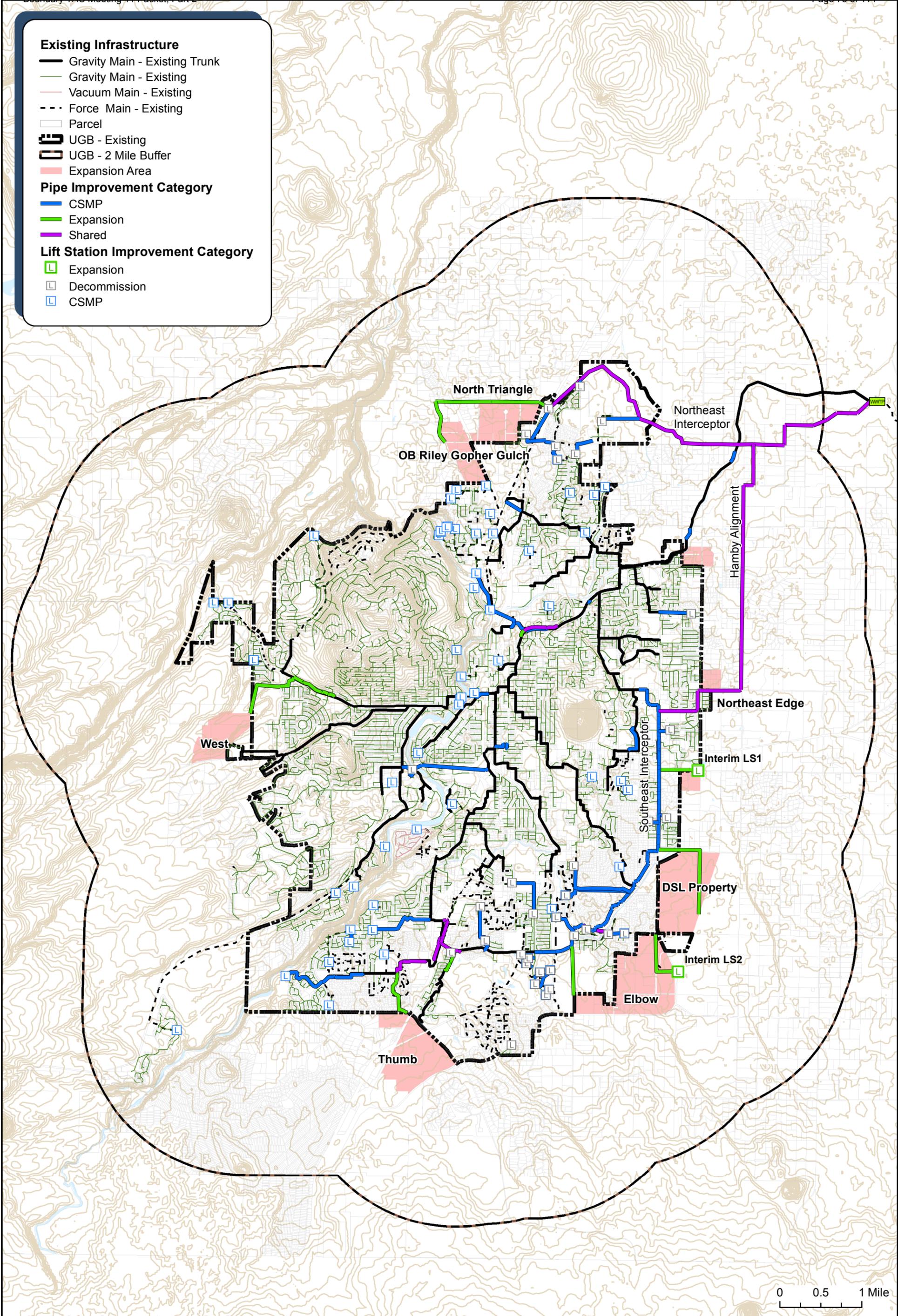
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Figure 10
Scenario 2.1
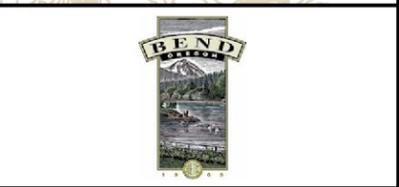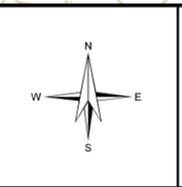
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Existing Infrastructure
— Gravity Main - Existing Trunk
— Gravity Main - Existing
— Vacuum Main - Existing
- - - Force Main - Existing
☐ Parcel
▨ UGB - Existing
▢ UGB - 2 Mile Buffer
▨ Expansion Area

Pipe Improvement Category
— CSMP
— Expansion
— Shared

Lift Station Improvement Category
Ⓛ Expansion
Ⓛ Decommission
Ⓛ CSMP

North Triangle
OB Riley Gopher Gulch
Awbrey Glen LS
Shevlin Area
West
Northeast Interceptor
Northeast Edge
Hamby Alignment
Interim LS1
Southeast Interceptor
DSL Property
Interim LS2
Elbow
Thumb
WWTF

0   0.5   1 Mile
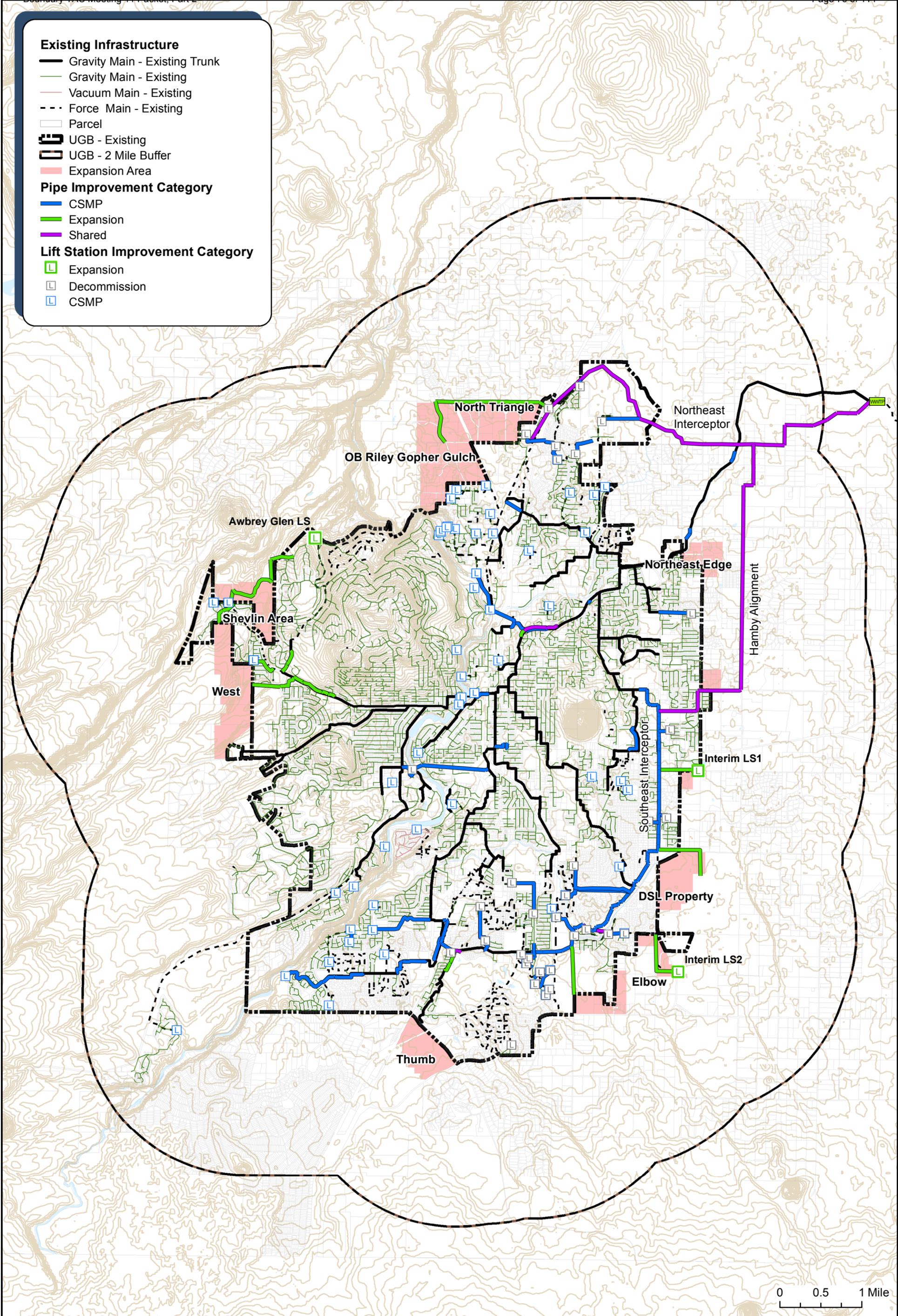
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Dry Weather Flow System Capacity
Employment Analysis
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Figure 11
Scenario 3.1
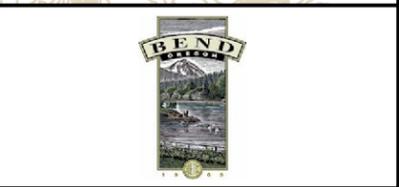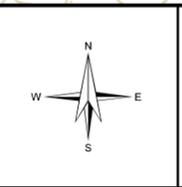
MSA
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Existing Infrastructure
- Gravity Main - Existing Trunk
- Gravity Main - Existing
- Vacuum Main - Existing
- Force Main - Existing
- Parcel
- UGB - Existing
- UGB - 2 Mile Buffer
- Expansion Area

Pipe Improvement Category
- CSMP
- Expansion
- Shared

Lift Station Improvement Category
- Expansion
- Decommission
- CSMP

North Triangle

Northeast Interceptor

OB Riley Gopher Gulch

Gopher Gulch LS

Shevlin Area

Northeast Edge

Hambylignment

Southeast Interceptor

DSL Property

Interim LS2

Elbow

Thumb

0   0.5   1 Mile
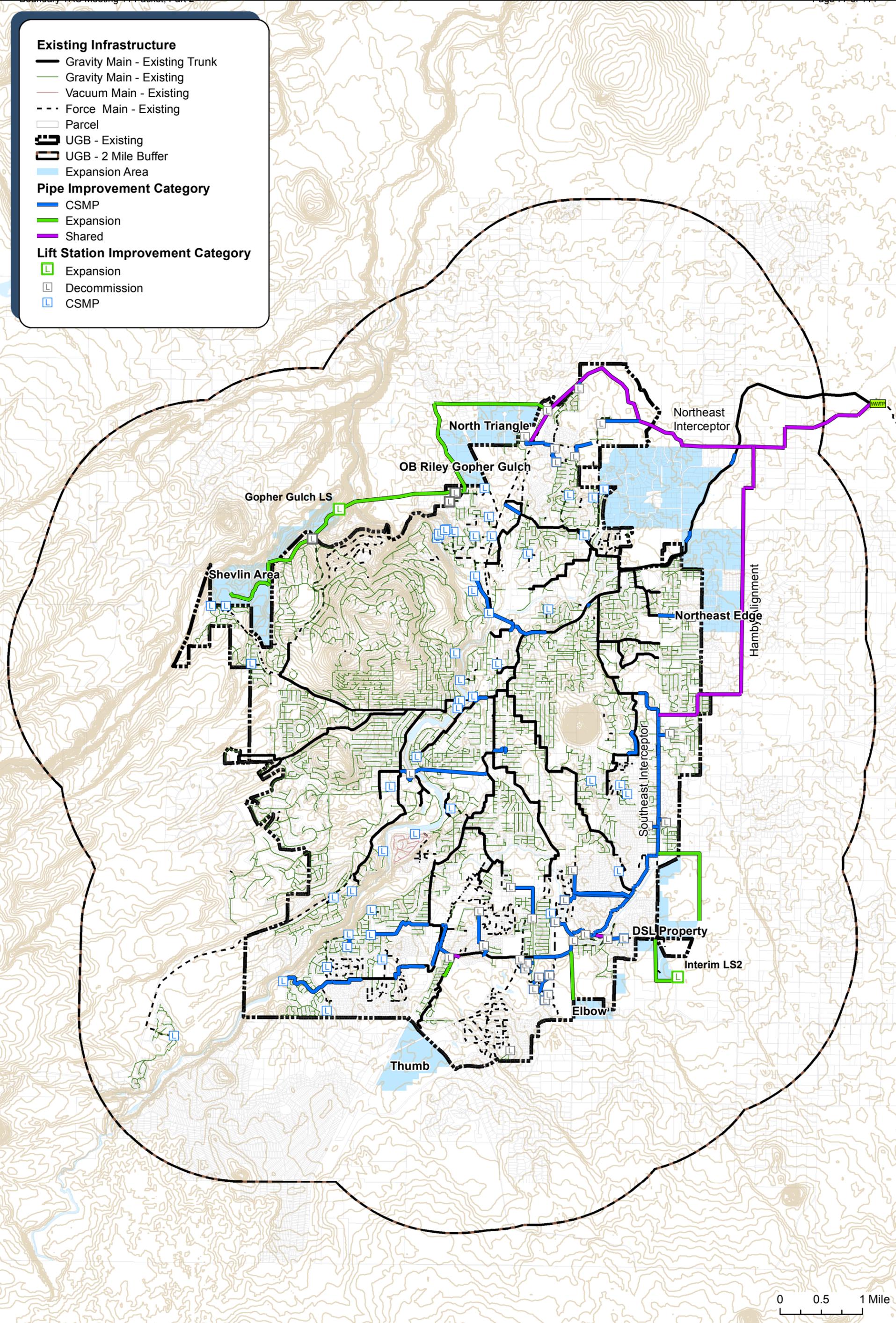
DRAFT
City of Bend
Dry Weather Flow System Capacity
Employment Analysis
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Figure 12
Supplemental Scenario 1
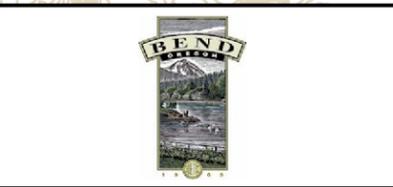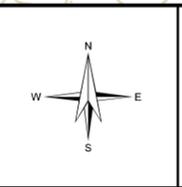
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Existing Infrastructure
— Gravity Main - Existing Trunk
— Gravity Main - Existing
— Vacuum Main - Existing
---- Force Main - Existing
☐ Parcel
☐ UGB - Existing
☐ UGB - 2 Mile Buffer
☐ Expansion Area

Pipe Improvement Category
— CSMP
— Expansion
— Shared

Lift Station Improvement Category
Ⓛ Expansion
Ⓛ Decommission
Ⓛ CSMP

North Triangle

OB Riley Gopher Gulch

Northeast Interceptor

Northeast Edge

Hamby Alignment

Southeast Interceptor

DSL Property

Interim LS2

Elbow

Thumb

WWTP

0   0.5   1 Mile

MSA
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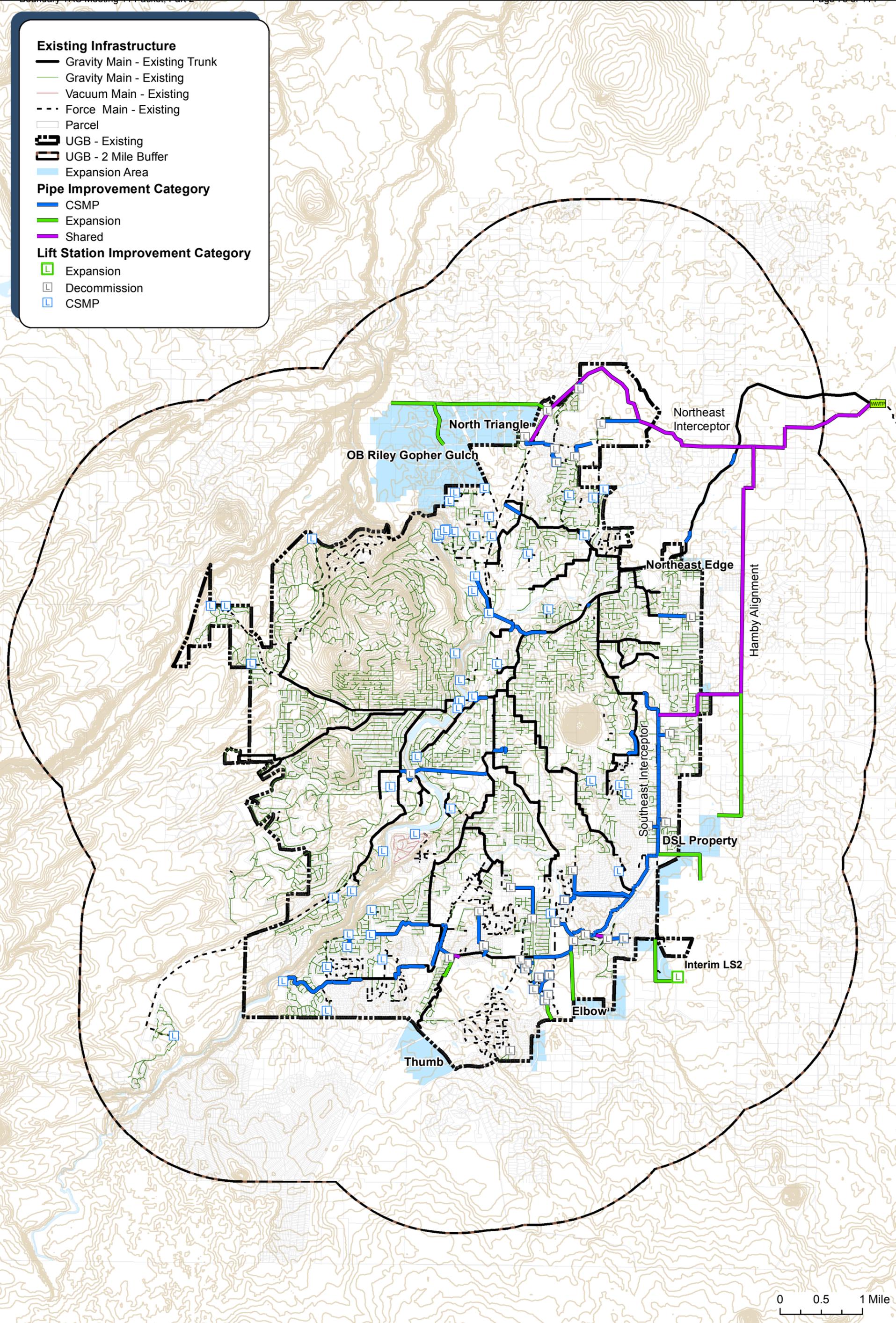
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City of Bend
Dry Weather Flow System Capacity
Employment Analysis
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Figure 13
Supplemental Scenario 2
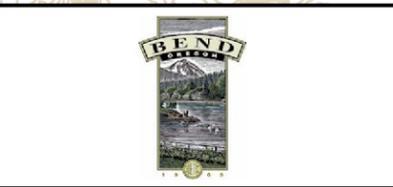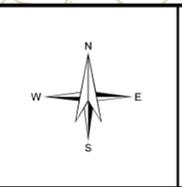
N
W   E
S

BEND

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Existing Infrastructure
— Gravity Main - Existing Trunk
— Gravity Main - Existing
— Vacuum Main - Existing
- - - Force Main - Existing
☐ Parcel
▦ UGB - Existing
▢ UGB - 2 Mile Buffer
▨ Expansion Area

Pipe Improvement Category
— CSMP
— Expansion
— Shared

Lift Station Improvement Category
Ⓛ Expansion
Ⓛ Decommission
Ⓛ CSMP

North Triangle

Northeast Interceptor

OB Riley Gopher Gulch

Gopher Gulch LS

Northeast Edge

Hamby Alignment

West

Southeast Interceptor

DSL Property

Interim LS2

Elbow

Thumb

0   0.5   1 Mile

MSA
Murray, Smith & Associates, Inc.
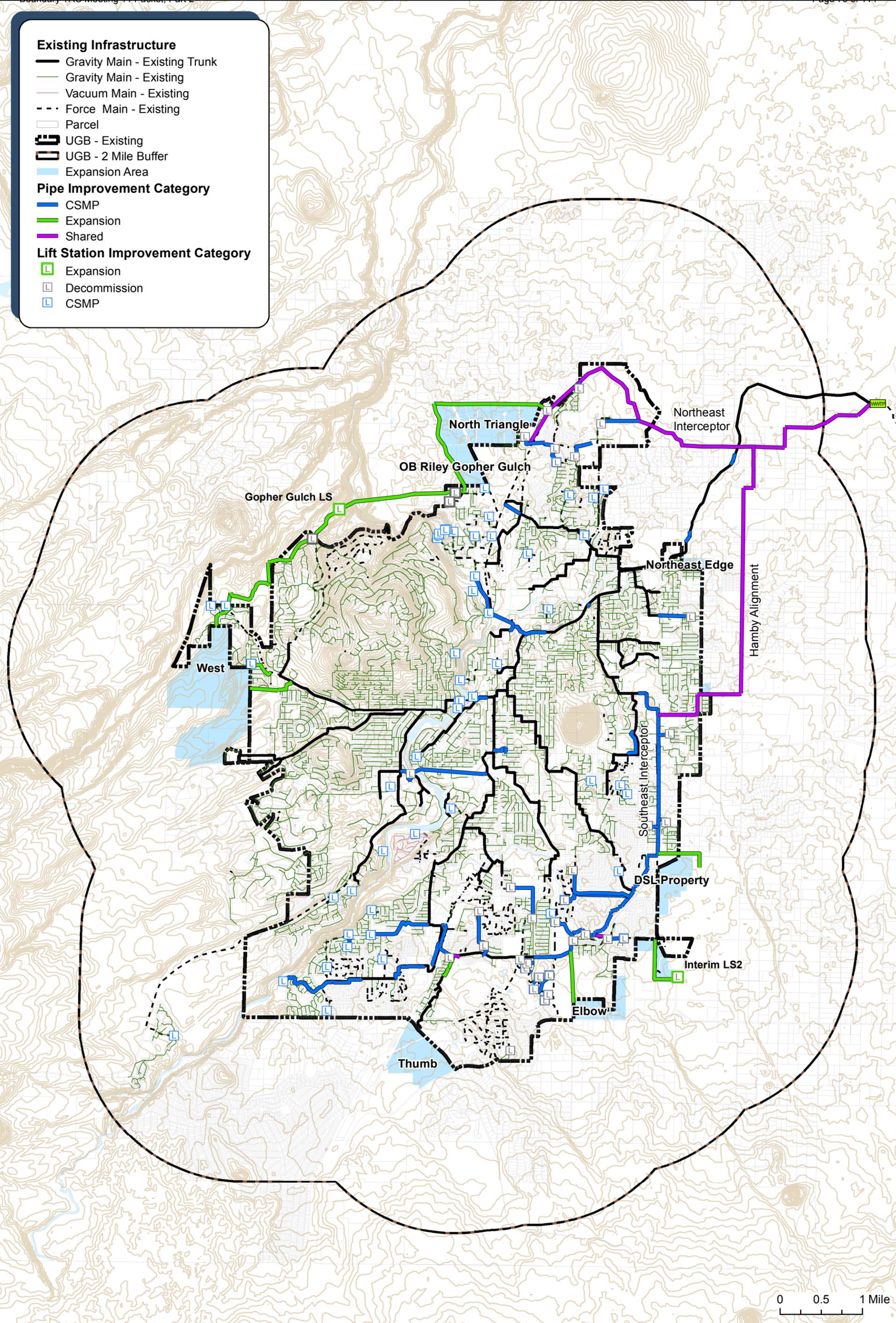
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City of Bend
Dry Weather Flow System Capacity
Employment Analysis
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Figure 14
Supplemental Scenario 3

N
W   E
S

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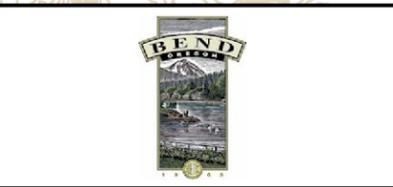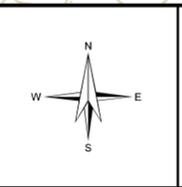
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Figure 15| Capital Cost and Capital Cost per Acre for Sub-areas
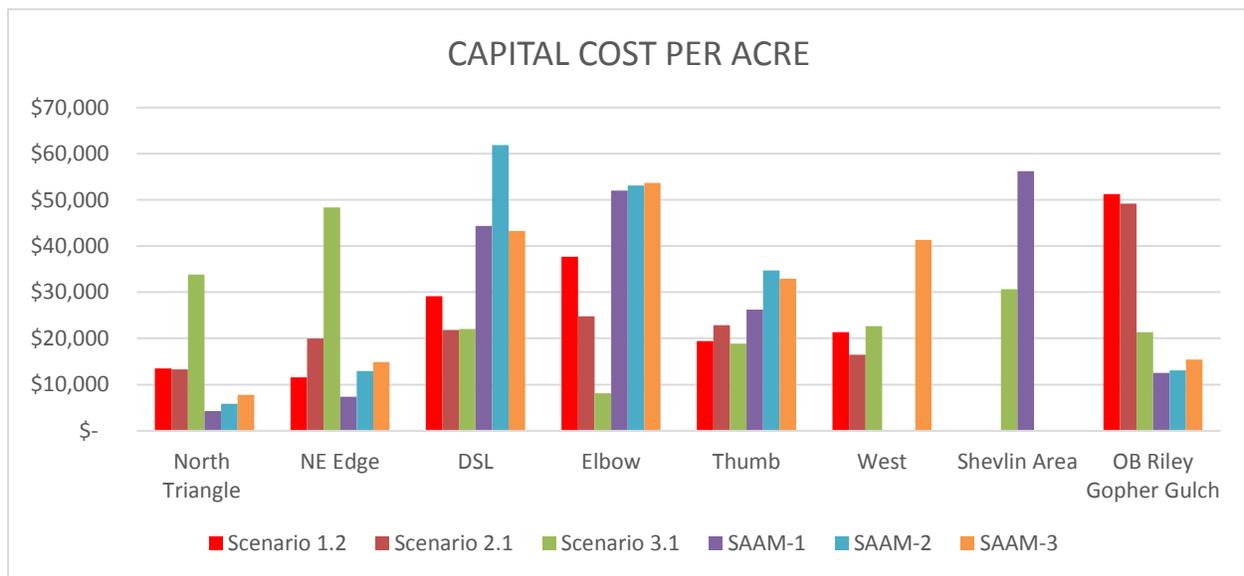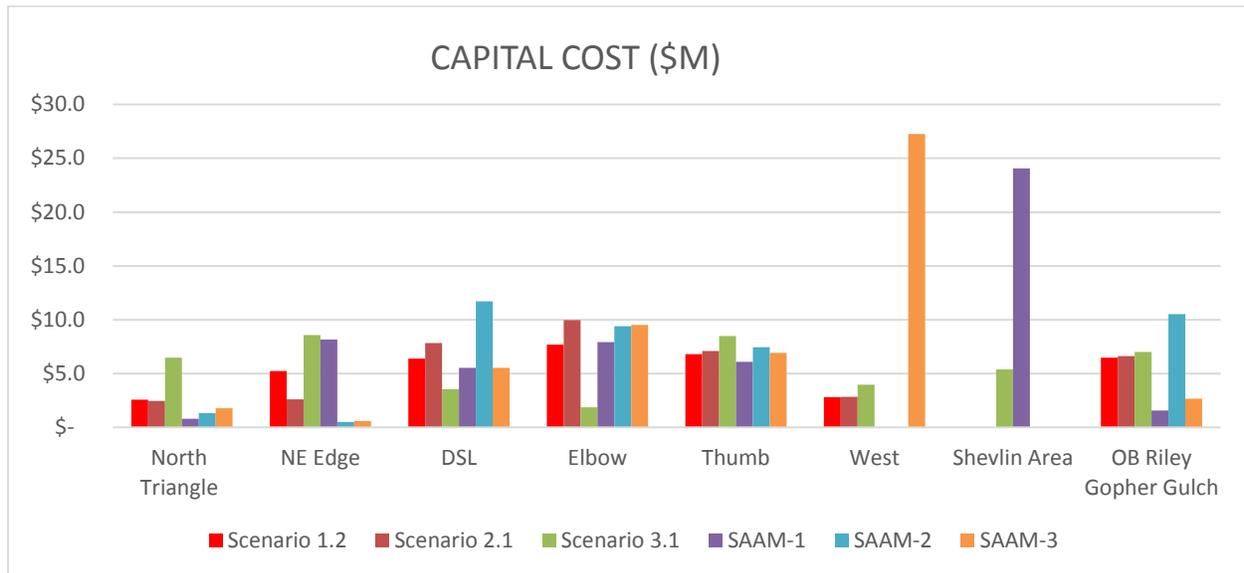
Key findings from the relative cost comparison by scenario are similar to the relative cost comparison for Tasks 4a and 4b with refinement for distinct areas of development within each sub-area. The key findings are summarized by sub-area below.

1. Shevlin Area – Most cost effective for scenario 3.1 where development is limited to the capacity of the existing Awbrey Glen force main and improvements are limited to

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localized pipeline extensions to convey wastewater to the lift station and pump upsizing. Least cost effective for SAAM-1 where the additional development triggers high cost improvements including the regional Gopher Gulch lift station.

2. West Area – Most cost effective for scenarios 1.2 and 2.1 where development is limited to the southerly portion of the sub-area and improvements are limited to localized pipeline extensions to convey wastewater to the existing trunk main and upsizing of the existing trunk main. Scenario 3.1 is moderately cost effective; however, in addition to the localized pipeline extensions and existing trunk main upsizing, the northerly portion of the sub-area contributes to localized pipeline extensions to convey wastewater to the Awbery Glen lift station and pump upsizing. Least cost effective for SAAM-3 where the additional development triggers high cost improvements including the regional Gopher Gulch lift station.

3. North Triangle – Cost effective for all scenarios because of proximity to the Northeast Interceptor. Requires incremental extension of the interceptor west of US Highway 97.

4. OB Riley/Gopher Gulch - Moderately cost effective for all scenarios. Most cost effective on a per acre basis for scenarios where greater area is considered and contributing to infrastructure. All scenarios require incremental extension of the Northeast Interceptor west and south. SAAM-1 and SAAM-3 include shared infrastructure with the Shevlin or West areas to fund the Northeast Interceptor extension. Scenarios 3.1 and SAAM-2 most fully utilize the Northeast Interceptor extension by developing a larger portion of the sub-area without a reliance on the Shevlin and West areas and the regional Gopher Gulch lift station

5. Northeast Edge – Relatively cost effective for all scenarios because of proximity to the Hamby alignment and Northeast Interceptor extension to the WWTF. Scenario 1.2 and SAAM-1 include larger development of the sub-area and more fully take advantage of future trunk main infrastructure. Scenarios 1.2 and 2.1 are less cost effective than the other scenarios where development adjacent to Bear Creek Road requires and interim lift station to delay future extension of the Hamby alignment.

6. DSL Property - Moderately cost effective for all scenarios because of proximity to Southeast Interceptor and reliance on the Hamby alignment and Northeast Interceptor extension to the WWTF. All scenarios require existing pipeline upsizing to connect to the Southeast Interceptor. Additionally, SAAM-2 requires extension of the Hamby alignment to serve the northerly portion of the sub-area (near Darnell Estates). Scenarios 1.2 and 2.1 are most cost effective on a per acre basis because of development of a larger portion of the sub-area.

7. Elbow – Moderately cost effective for all scenarios because of proximity to Southeast Interceptor and reliance on the Hamby alignment and Northeast Interceptor extension to the WWTF. All scenarios require an interim lift station and localized pipeline

extensions to convey wastewater to the Southeast Interceptor delaying an extension of the Hamby trunk main. Scenario 2.1 is most cost effective on a per acre basis because of development of a larger portion of the sub-area.

8. <u>Thumb</u> - Moderately cost effective for all scenarios because of proximity to Southeast Interceptor and reliance on the Hamby alignment and Northeast Interceptor extension to the WWTF. All scenarios require existing pipeline upsizing on Parrell Road adjacent to the Southeast Interceptor and upsizing of the existing design, but unconstructed portion of the Southeast Interceptor immediately east of Parrell Road. Scenario 2.1 is less cost effective to serve as it requires contributions to additional upsizing of the Southeast Interceptor and other existing pipeline upsizing west of Parrell Road to serve the Bany property. Scenario 1.2 is most cost effective on a per acre basis because of development of a larger portion of the sub-area without development of the Bany property.

Scenario Ratings

Consistent with the approach for analyzing other infrastructure and land use data for the UGB Remand, the six (6) scenarios were rated as "Good", "Fair" or "Poor" by sub-area. These ratings were developed qualitatively for overall cost effectiveness based on Initial Capital Cost and Initial Capital Cost per acre. The qualitative ratings were combined with the key findings from the task and scenario summaries to provide an overall quantitative rating. Additionally, each scenario was given an overall rating on a scale of one (1) to five (5) to indicate overall cost effectiveness with five (5) being the most cost effective. The qualitative and quantitative ratings are shown in Tables 11 thru 13. For visual review a "Good," "Fair," and "Poor" rating are highlighted in green, yellow, and red respectively.

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Factor 2: Orderly and Economic Provision of Public Facilities and Services										Author:		Murray, Smith & Associates	
Community Outcome B.	Cost Effective Infrastructure									Date:		10/01/2015	
Performance Measure S2	**Table 11.** Initial Capital Cost of Sanitary Sewer Infrastructure Improvements												
Brief Description of Evaluation:	Initial Capital Cost (millions of dollars) of sanitary sewer infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP. Operation and maintenance costs are not included.												
Interpretation and Key	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank	Better ranking fields have lower total cost of improvements needed. At the sub-area level, costs under $6 million are rated "Good", $6-12 million are rated "Fair", and over $12 million are rated "Poor". For Scenario / SAAM totals, under $46 million are rated "Good", $46-50 million are rated "Fair" and over $50 million are rated "Poor".								
Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3			
	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units		
Initial Capital Cost (excluding current UGB)	38.0	$M	39.5	$M	45.4	$M	54.3	$M	41.0	$M	54.3	$M		
Subareas														
North Triangle	2.6	$M	2.5	$M	1.9	$M	0.8	$M	1.4	$M	1.8	$M		
NE Edge	5.2	$M	2.6	$M	3.5	$M	8.2	$M	0.5	$M	0.6	$M		
DSL Property	6.4	$M	7.8	$M	6.5	$M	5.5	$M	11.7	$M	5.5	$M		
The "Elbow"	7.7	$M	10.0	$M	8.6	$M	7.9	$M	9.4	$M	9.5	$M		
The "Thumb"	6.8	$M	7.1	$M	5.4	$M	6.1	$M	7.4	$M	6.9	$M		
West Area	2.8	$M	2.8	$M	7.0	$M	N/A		N/A		27.2	$M		
Shevlin Area	N/A		N/A		4.0	$M	24.1	$M	N/A		N/A			
OB Riley / Gopher Gulch Area	6.5	$M	6.6	$M	8.5	$M	1.6	$M	10.5	$M	2.7	$M		
Overall Score	4		3		3		1		3		1			

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Factor 2: Orderly and Economic Provision of Public Facilities and Services												Author:	Murray, Smith & Associates
Community Outcome B.	Cost Effective Infrastructure											Date:	10/01/2015
Performance Measure S3	**Table 12.** Initial Capital Cost of Sanitary Sewer Infrastructure Improvements per developed acre												
Brief Description of Evaluation:	Initial Capital Cost of infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP, divided by the developed acres.												
Interpretation and Key	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank	Ratings are assigned based primarily on the performance of the sub-areas and less on the overall average cost per acre at the Scenario / SAAM level; under $25,000 per acre are rated as "Good", $25,000-40,000 are rated as Fair; over $40,000 are rated as "Poor."							
Evaluation Geography	**Scenario 1.2**		**Scenario 2.1**		**Scenario 3.1**		**SAAM-1**		**SAAM-2**		**SAAM-3**		
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	
Initial Capital Cost per Acre (excluding current UGB)	22,646	$/Acre	23,253	$/Acre	23,966	$/Acre	22,864	$/Acre	24,731	$/Acre	33,520	$/Acre	
Subareas													
North Triangle	13,473	$/Acre	13,258	$/Acre	8,116	$/Acre	4,268	$/Acre	5,853	$/Acre	7,742	$/Acre	
NE Edge	11,534	$/Acre	20,000	$/Acre	22,062	$/Acre	7,338	$/Acre	12,944	$/Acre	14,831	$/Acre	
DSL Property	29,140	$/Acre	21,846	$/Acre	33,816	$/Acre	44,343	$/Acre	61,882	$/Acre	43,233	$/Acre	
The "Elbow"	37,671	$/Acre	24,779	$/Acre	48,338	$/Acre	52,029	$/Acre	53,094	$/Acre	53,692	$/Acre	
The "Thumb"	19,432	$/Acre	22,834	$/Acre	30,655	$/Acre	26,217	$/Acre	34,714	$/Acre	32,918	$/Acre	
West Area	21,361	$/Acre	16,422	$/Acre	21,332	$/Acre	N/A		N/A		41,327	$/Acre	
Shevlin Area	N/A		N/A		22,636	$/Acre	56,235	$/Acre	N/A		N/A		
OB Riley / Gopher Gulch Area	51,293	$/Acre	49,176	$/Acre	18,840	$/Acre	12,501	$/Acre	13,102	$/Acre	15,448	$/Acre	
Overall Score	3		4		3		2		2		1		

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Factor 2: Orderly and Economic Provision of Public Facilities and Services			Author:	Murray, Smith & Associates

Community Outcome B.	Cost Effective Infrastructure		Date:	10/01/2015

Performance Measure S1	Table 13. Sanitary Sewer Infrastructure Improvements

Brief Description	Efficiency of sanitary sewer infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP

Interpretation and Key	"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank	Ratings for sub-areas are assigned based on the following considerations: "Good" means the sub-area takes advantage of improvements needed to serve the existing UGB (e.g. Northeast Interceptor and Hamby alignment); "Fair" means there is somewhat costly localized infrastructure needed and/or that the amount of growth in the sub-area does not take advantage of the improvements needed to serve the existing UGB; "Poor" means that costly new regional infrastructure (not a gravity system) is required.

Evaluation Geography	Scenario 1.2 *Qualitative Evaluation*	Scenario 2.1 *Qualitative Evaluation*	Scenario 3.1 *Qualitative Evaluation*	SAAM-1 *Qualitative Evaluation*	SAAM-2 *Qualitative Evaluation*	SAAM-3 *Qualitative Evaluation*
Subareas						
North Triangle	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97
NE Edge	Relies primarily on Hamby alignment & NEI (very efficient), but Bear Creek Road area requires interim lift station	Relies primarily on Hamby alignment & NEI (very efficient), but Bear Creek Road area requires interim lift station; limited development does not take full advantage of Hamby alignment and NEI	Relies primarily on Hamby alignment & NEI (very efficient), but Bear Creek Road area requires interim lift station; limited development does not take full advantage of Hamby alignment and NEI	Relies entirely on Hamby alignment & NEI	Relies primarily on Hamby alignment & NEI (very efficient); limited development does not take full advantage of Hamby alignment and NEI	Relies primarily on Hamby alignment & NEI (very efficient); limited development does not take full advantage of Hamby alignment and NEI
DSL Property	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies primarily on Hamby alignment & NEI, localized pipeline required to connect to SEI; also requires additional extension of Hamby alignment to serve Darnell Estates area	Relies entirely on Hamby alignment & NEI, localized pipeline required to connect to SEI
The "Elbow"	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI
The "Thumb"	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI, Additional gravity main required to serve Bany property	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI
West Area	Requires incremental expansion & extension of existing pipelines	Requires incremental expansion & extension of existing pipelines	Requires expansion & extension of existing pipelines, connection to existing lift station, and pump upsizing at Awbrey Glen	N/A	N/A	Exceeds capacity at Awbrey Glen lift station/force main & requires new regional lift station
Shevlin Area	N/A	N/A	Requires expansion & extension of existing pipelines, connection to existing lift station, and pump upsizing at Awbrey Glen	Exceeds capacity at Awbrey Glen lift station/force main & requires new regional lift station	N/A	N/A
OB Riley / Gopher Gulch Area	Requires extension of NEI west of US 20	Requires extension of NEI west of US 20	Requires extension of NEI west of US 20 plus pipeline extension to south	Requires extension of NEI west of US 20; shares infrastructure with new regional lift station triggered by Shevlin Area	Requires extension of NEI west of US 20 plus pipeline extension to south	Requires extension of NEI west of US 20; shares infrastructure with new regional lift station triggered by West Area
Overall Score	4	3	3	2	2	1

Note 1. NEI = Northeast Interceptor, including extension to WWTF. SEI = Southeast Interceptor. Hamby = Hamby alignment of Southeast Interceptor.

DRAFT – WORK IN PROGRESS – SUBJECT TO CHANGE

Key rating considerations related to each scenario are described below. Positives (+) and negatives (-) are highlighted. Overall ratings are highest for scenarios that take advantage of gravity sewer improvements needed to serve the existing UGB (Northeast Interceptor and Hamby alignment).

1. Scenario 1.2 – Rated high (4) because the scenario takes advantage of the Hamby alignment and Northeast Interceptor by maximizing development in the Northeast Edge and North Triangle (+). The scenario minimizes development impacts in the West and avoids a regional lift station (+).

2. Scenario 2.1 – Rated medium (3) because the scenario takes advantage of the Northeast Interceptor by maximizing development in the North Triangle (+). The scenario does not take full advantage of the Hamby alignment by minimizing development in the Northeast Edge (-). The scenario minimizes development impacts in the West and avoids a regional lift station (+).

3. Scenario 3.1 – Rated medium (3) because the scenario takes advantage of the Northeast Interceptor by maximizing development in the North Triangle and OB Riley/Gopher Gulch (+). The scenario does not take full advantage of the Hamby alignment by minimizing development in the Northeast Edge (-). The scenario maximizes potential development in the West and Shevlin areas, while avoiding a new regional lift station (+).

4. SAAM-1 – Rated low (2) because the scenario requires a new regional lift station and force main to serve an expanded area of Shevlin (-). The scenario does takes advantage of the Hamby alignment and Northeast Interceptor by maximizing development in the Northeast Edge and North Triangle (+).

5. SAAM-2 – Rated low (2) because the scenario does not take full advantage of the Hamby alignment by minimizing development in the Northeast Edge (-). The scenario does take advantage of the Northeast Interceptor by maximizing development in the North Triangle and OB Riley/Gopher Gulch (+). The scenario requires a high cost extension of the Hamby alignment to serve the northern portion of the DSL Property (-).

6. *SAAM-3 – Rated very low (1) because the scenario requires a new regional lift station and force main to serve an expanded area of the West (-). The scenario does take advantage of the Northeast Interceptor by maximizing development in the North Triangle (+). The scenario does not take full advantage of the Hamby alignment by minimizing development in the Northeast Edge (-).*

From a sewer infrastructure planning perspective the City would prefer to leverage existing or planned infrastructure investments to their full potential where possible. The City is committed to constructing both the Northeast Interceptor and the Hamby alignment in the near future to serve customers within the existing UGB. These projects will require large

capital investments and should be leveraged where possible to serve areas outside the existing UGB as identified in this remand process. As noted above, Scenario 1.2 appears to be the best combination of areas relative to leveraging existing or planned infrastructure and minimizing new sewer investments. From a sewer infrastructure perspective a hybrid scenario would be recommended that prioritizes UGB expansion in the North Triangle and Northeast Edge.

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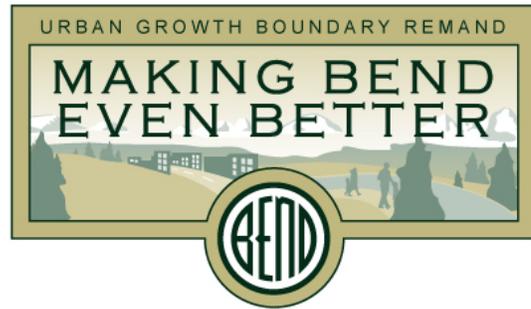
Memorandum

October 1, 2015

To:	Urban Growth Boundary and Growth Scenarios Technical Advisory Committee
Cc:	Project Team
From:	Karen Swirsky, City of Bend Growth Management
Re:	Scenario Evaluation: Wildfire Hazard Technical Memorandum

Introduction

Purpose

The purpose of this memorandum is to describe the data sources and methodology of performance measure evaluations conducted in "Stage 4" of the Bend Urban Growth Boundary (UGB) Remand project, the evaluation of alternative UGB expansion scenarios

Table 1. Performance Measures in this Technical Memorandum

Performance Measure	Description
Community Outcome: Quality Natural Environment	
3.A.3	Wildfire Risk[1] and Hazard[2]

Evaluation Tools

The wildfire evaluation was conducted using published maps and an on-the ground survey of lands under consideration for inclusion into the UGB by a group of wildfire experts[3].

Scenarios Evaluated

A total of six sets of land use assumptions were evaluated (Scenario 1.2; Scenario 2.1; Scenario 3.1; Supplemental Analysis Map 1; Supplemental Analysis Map 2; Supplemental Analysis Map 3); these are described in detail in the evaluation report. Each UGB Expansion Scenario and Supplemental Analysis Area Map (SAAM) is comprised of a set of land use assumptions describing the type and amount of housing, employment, and other uses in polygons within the existing UGB and in various expansion subareas. They are all consistent with the City of Bend's overall housing and jobs need for the planning horizon, and use consistent assumptions for development on land inside the UGB.

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[1] Risk" describes the likelihood of a fire occurring based on historical fire occurrence and ignition sources.

[2] "Hazard" describes resistance to control once a fire starts, based on weather, topography, and fuel (vegetation type). All areas in Central Oregon have the same climate rating; therefore, hazard was assessed by vegetation type and topography.

[3] Fire officials from the City of Bend, Deschutes County, Oregon Department of Forestry, and US Forest Service.

Geographies

Wildfire hazard was evaluated at the subarea level (see Figure 1).

Figure 1: Evaluation Subareas

Disclaimer: This map represents land use assumptions for modeling purposes only. This is not a proposal for specific comprehensive plan designations.

Service Layer Credits: Deschutes County GIS (2014)

City of Bend Scenario Evaluation – Wildfire Analysis Technical Memorandum *Page 2 of 8*
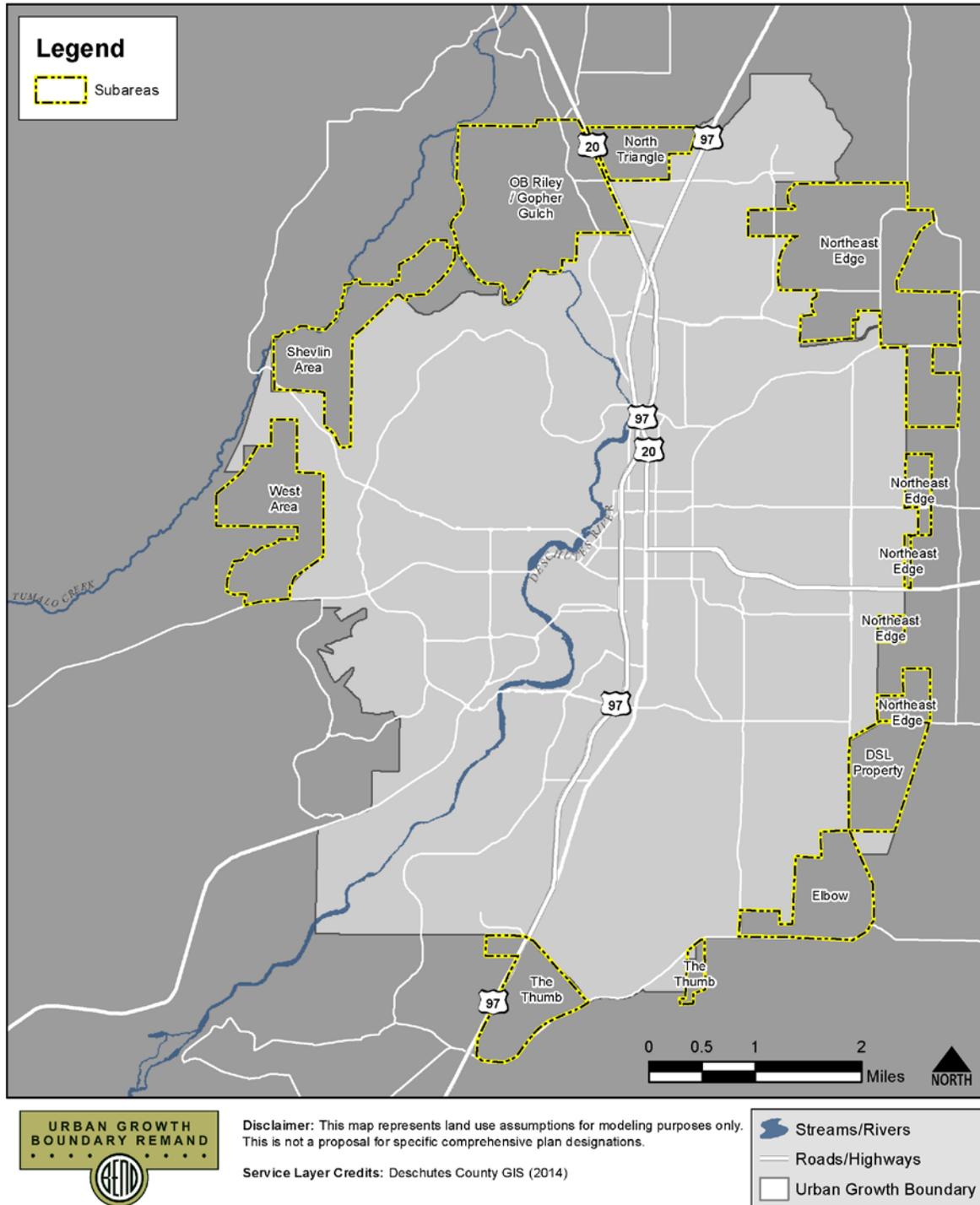
Quality Natural Environment

Performance Measure 3.A.3: Wildfire Risk and Hazard

Purpose

Statewide Planning Goal 14 Factor 3 requires the City to compare environmental, energy, economic, and social consequences of alternative boundary locations. The City has identified the risks and hazards of wildfire in the Wildland/Urban Interface (WUI)[4] as a component of the environmental, energy, economic and social consequences of the alternatives.[5]

Data Sources

General wildfire risk was identified by referring to the findings of the 2011 Greater Bend Area Community Wildfire Protection Plan (CWPP) and the Deschutes County Fire Risk Index Map. The CWPP used the ODF Assessment of Risk Factors and the classification ratings of individual areas under the Oregon Forestland-Urban Interface Fire Protection Act of 1997 (aka Senate Bill 360). These documents identified the fire risk in all areas adjacent to the existing UGB as ranging from "high" to "extreme." The Deschutes County Fire Risk Index Map created a regional map of the fire risk. The UGB Steering Committee approved the use of these resource documents at their June 2015 meeting. The classification ratings from the Oregon Forestland-Urban Interface Fire Protection Act were the basis for the on-the-ground fire hazard field assessment methodology, which is described further below.

Methodology

In order to further understand the wildfire hazard associated with lands proposed for potential inclusion into the Urban Growth Boundary, a group of wildfire experts conducted an on-the-ground survey on June 19, 2015. The survey consisted of lands under consideration for inclusion into the UGB, as well as a 1/4 mile buffer area.

The team used the format shown in Table 2 for hazard assessment, based on the Oregon Forestland-Urban Interface Fire Protection Act guidelines, with modifications as described in the following text.

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[4] Wildland-Urban Interface Area (WUI): That geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels (International Wildland-Urban Interface Code, 2012).

[5] Note that the LCDC concluded in the Remand that while "neither Goals 2 nor 7 requires the City to address wildfire risk... [it] is entirely appropriate and permissible for the City to consider relative risk of wildfire in alternate UGB expansion candidate areas in considering the environmental, energy, economic and social consequences of the alternatives under locational factor 3 of Goal 14." (Remand, page 93)

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Table 2: Classification of Hazard for Forestland-Urban Interface Lands

Natural Vegetative Fuel Hazard Factor Value	Fire Characteristics	Topographic Hazard Factor Value	
		1 (<25%)	2 (>25%)
1: Low brush & short needle timber litter	Typically produces a flame length of up to 5 ft, a wildfire which exhibits very little spotting, torching, or crowning, and which results in a burned area that can normally be entered within 15 minutes.	HIGH[6]	HIGH
2: Moderate brush, conifer reproduction, open sage & juniper	Typically produces a flame length of 5 to 8 ft, a wildfire which exhibits sporadic spotting, torching, or crowning, and which results in a burned area that can normally be entered within 1 hour.	HIGH	EXTREME
3: Grasses, heavy brush & mature timber with slash	Typically produces a flame length of over 8 ft, a wildfire that exhibits frequent spotting, torching, or crowning, and which results in a burned area that normally cannot be entered for over 1 hour.	EXTREME	EXTREME

This classification was interpreted and modified as follows for use in evaluating the potential UGB expansion areas:

- Well-managed High: Brush has been mowed within last 5 years, trees limbed up and thinned, junipers removed.
- Managed High: Close to well-managed but falling short of the complete package.
- Mosaic High: Pockets of High and Extreme but interspersed with irrigated or cleared land.
- Extreme: Unmanaged land with dense brush, unlimbed and/or unthinned trees.

The field data shown in Table 2 was used to evaluate the six scenarios. Subareas were evaluated as follows:

- "Good" means that fire hazard was determined to be low.
- "Fair" means that the fire hazard was determined to be "High".
- "Poor" means that fire hazard was determined to be "Extreme".
- Areas with a mix of "High" and "Extreme" hazard were classified as "Poor".

Ratings at the Scenario/SAAM level were based on the presence of subareas where extreme fire hazard due to topography or conditions in the buffer area that could make it more difficult to reduce fire hazard. The land uses identified for each area were noted, because employment uses are protected by existing building code, while mitigation measures are being developed

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[6] These classifications have been modified for the purposes of this assessment as described in the text and summarized at the end of this memorandum.

that will reduce risk to residential areas if adopted in to code[7]. However, it should be noted that the ratings were based on the hazard evaluation only and did not take into consideration the land uses identified in each area.

Results

Because of vegetation and climate, all areas surveyed were either High or Extreme fire hazard. Some areas have been subject to management processes (i.e., brush removal, removal of lower tree limbs, and stand thinning) which reduced of the hazard rating from Extreme to High. Similar management processes would reduce most areas identified as Extreme to High, with the exception of portions of the Shevlin area, which would remain extreme due to topography. Results of the field assessment are shown in Table 3 and on Figure 2.

Table 3. Summary of Wildfire Hazard Field Assessment

Geographic Area	Parcel Hazard	Buffer Hazard (1/4 mile)
West	well-managed & Managed High	well-managed & managed High
Shevlin	Extreme (topo & vegetation)	Extreme (topo & vegetation)
OB Riley/Gulpher Gulch	managed High	Extreme (topo & vegetation)
North Triangle	mosaic High	mosaic High
Northeast Edge	mosaic High	mosaic High
DSL	Extreme (vegetation)	Extreme (vegetation)
Elbow	Extreme (vegetation)	mosaic High
Thumb	well-managed High	well-managed High
Definitions:		

- Well-managed High: Brush has been mowed within last 5 years, trees limbed up and thinned, junipers removed.
- Managed High: Close to well-managed but falling short of the complete package.
- Mosaic High: Pockets of High and Extreme but interspersed with irrigated or cleared land.
- Extreme: Unmanaged land with dense brush, unlimbed and/or unthinned trees.

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[7] See attached memorandum*: Potential Wildfire Mitigation Approach.*

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Figure 2: Wildfire Hazard by Subarea

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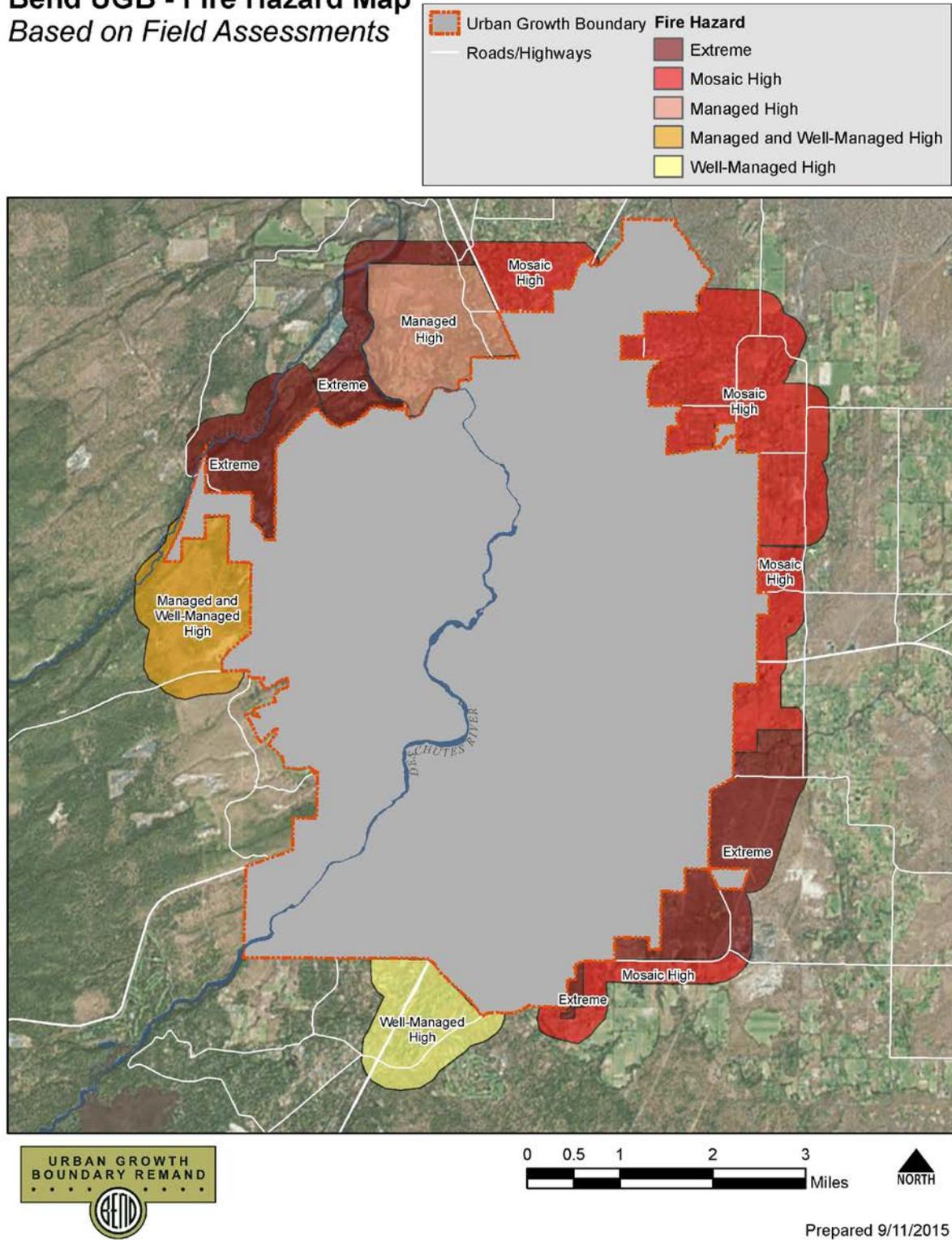
Scenario 1.2: Scenario 1.2 includes four subareas with a High hazard rating and three with an Extreme hazard rating. The three subareas rated Extreme in this scenario could be reduced to High with proper management of vegetation. Scenario 1.2 proposes residential uses, which will require new mitigation measures to reduce fire hazard, in the Northeast Edge, DSL Property, The "Elbow", The "Thumb", and the West Area.

Scenario 2.1: Scenario 2.1 includes four subareas with a High hazard rating and three with an Extreme hazard rating. The three subareas rated Extreme in this scenario could be reduced to High with proper management of vegetation. Scenario 2.1 proposes residential uses, which will require new mitigation measures to reduce fire hazard, in the North Triangle, Northeast Edge, DSL Property, The "Elbow", The "Thumb", and the West Area.

Scenario 3.1: Scenario 3.1 includes four subareas with a High hazard rating and four with an Extreme hazard rating. Most of the subareas rated Extreme in this scenario would likely to be reduced to High with proper management of vegetation; however, portions of the Shevlin subarea have topography and unmanaged adjacent lands that could make it more difficult to reduce fire hazard. Scenario 3.1 proposes residential uses, which will require new mitigation measures to reduce fire hazard, in the Northeast Edge, DSL Property, the West Area, the Shevlin Area, and the OB Riley / Gopher Gulch area.

SAAM-1: SAAM-1 includes three subareas with a High hazard rating and four with an Extreme hazard rating. Most of the subareas rated Extreme in this scenario would likely to be reduced to High with proper management of vegetation; however, portions of the Shevlin subarea have topography and unmanaged adjacent lands that could make it more difficult to reduce fire hazard. SAAM-1 proposes residential uses, which will require new mitigation measures to reduce fire hazard, in the Northeast Edge and the Shevlin Area.

SAAM-2: SAAM-2 includes three subareas with a High hazard rating and three with an Extreme hazard rating. Most of the subareas rated Extreme in this scenario would likely to be reduced to High with proper management of vegetation. SAAM-2 proposes residential uses, which will require new mitigation measures to reduce fire hazard, in the DSL Property and the OB Riley / Gopher Gulch area.

SAAM-3: SAAM-3 includes four subareas with a High hazard rating and three with an Extreme hazard rating. Most of the subareas rated Extreme in this scenario would likely to be reduced to High with proper management of vegetation. SAAM-3 proposes residential uses, which will require new mitigation measures to reduce fire hazard, in the DSL Property and the West Area.

Conclusion: Based on the wildfire *risk* as determined by the CWPP, and *hazards* as evaluated in the field, there are only subtle differences between the six proposed Scenarios/SAAMs. There are no areas under consideration for inclusion into the UGB that have a low fire risk or hazard due the Central Oregon's climate and the prevalent vegetation types. All areas under consideration have a high or extreme fire risk and hazard.

With the exception of portions of the Shevlin subarea, proper vegetation management and imposition of mitigation measures, such as the fire protective building codes shown in the

attached memorandum*: Potential Wildfire Mitigation Approach,* could minimize risk in all areas under consideration. Shevlin is the exception due to the combination of topography and adjacent vegetation. However, fire hazard to development in that area could be minimized with aggressive management, careful land use planning, and implementation of fire protective measures.

Memorandum
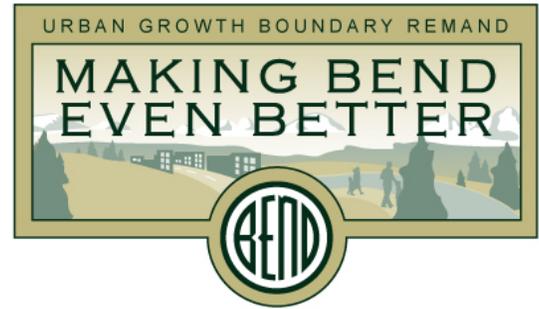
September 29, 2015

To: UGB Boundary TAC
From: City of Bend Planning Staff and Craig Letz, Wildfire consultant
Re: Potential Wildfire Mitigation Approach

Wildfire risk[1], as identified by the Greater Bend Community Wildfire Protection Plan, is high to extreme in the Bend area. The Urban Growth Boundary (UGB) Technical Advisory Committee requested a more area-specific examination of wildfire hazard[2] associated with adding lands to the City's Urban Growth Boundary. In response, the City performed an on the ground assessment, documenting topography, vegetation and management history (see Scenario Evaluation: Wildfire Hazard Technical Memorandum) for the detailed results of this assessment. In summary, the assessment concluded that, due to the climate and vegetation type prevalent in the Bend area, essentially all the lands in the wildland-urban interface (WUI) pose a wildfire hazard ranging from high to extreme. Management, such as thinning and brush removal, may reduce the hazard in some areas from extreme to high, but further mitigation measures will be needed to protect new and existing development in the WUI.

At the request of City staff, a group of local fire officials[3] met several times over the summer as a mitigation working group to advise the City on the best approach to codifying wildfire protection. After review of several options, the group concluded that the best approach was found in the 2012 International Wildland-Urban Interface Code (IWUIC). This code is an extension of the International Fire Code presently used by the City of Bend, with special provisions for assessing the mitigation of fire in the WUI.

The IWUIC was the recommended approach because it builds upon the City's existing building code while not adding unnecessarily to the cost of construction. The group also felt that the IWUIC would allow flexibility in the use of new development concepts, materials, and technology.

The attached code language is adapted from the IWUIC to meet the needs of the UGB expansion. The main difference between the draft language provided here and the IWUIC is the provision of a buffer zone. The IWUIC addresses the need for "defensible space" by requiring space around individual structures. While effective, this can lead to a relatively low density development pattern. The working group realized that there was a need to provide flexibility in order for the City to meet its land need and to provide a range of options for developers. The recommendation was to allow a developer to propose either a defensible space around individual structures *or* to allow an alternative of aggregating the defensible space into a buffer area.

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[1] Risk" describes the likelihood of a fire occurring based on historical fire occurrence and ignition sources.

[2] "Hazard" describes resistance to control once a fire starts, based on weather, topography, and fuel (vegetation type). All areas in Central Oregon have the same climate rating; therefore, hazard was assessed by vegetation type and topography.

[3] City of Bend, US Forest Service, Oregon Department of Forestry, Deschutes County, and the City's wildfire consultant

1

Additional work will be needed to fully formulate mitigation measures for the City. For example, the IWUIC assumes that a City has adopted a WUI map. For the purposes of the UGB discussion, it is assumed that all new lands brought into the UGB would be mapped as being within the WUI, but logically, there are other lands within the existing UGB that would potentially be mapped as WUI. That work is beyond the scope of the UGB expansion but is likely to be accomplished in the future.

The attached mitigation measures are provided in a matrix, followed by excerpted code language from the IWUIC so the TAC can see the types of approaches available. The matrix attached addresses three parameters:

1. Fire hazard severity
2. Water supply
3. Defensible space

Fire hazard severity is based on fuel (vegetation), weather (number of days during a year when fire weather is critical – a combination of low humidity and wind), and topography. For the Bend area, weather is the same in all parts of the area. Areas with steep slopes were eliminated during the consideration of lands to bring into the UGB. Therefore, fuel is the main consideration. In the on-site analysis, all areas were considered to be high or extreme because of the vegetation types. However, it is possible that some areas will be rated as moderate in the future, so this column was left in the table.

Water supply is defined in the IWUIC (Section 404, attached), but basically means that fire flows can be met.

Defensible space is an area, either natural or man-made, where material (vegetation and structures) capable of allowing a fire to spread unchecked has been treated, cleared, or modified to slow the rate and intensity of an advancing wildfire and to create an area for fire suppression operations to occur. Non-conforming means that the defensible space cannot be provided, and conforming means that it can be provided either by spacing of individual structures or with a buffer. If 1.5 times the required defensible space can be provided, less stringent building construction regulations can be applied.

The building construction regulations establish minimum standards for the location, design and construction of building and structures base on fire hazard severity. The construction provisions are intended to supplement the requirements of the International Building Code and address mitigation of the unique hazards posed to buildings by wildfire, and to reduce the hazards of building fires spreading to wildland fuels. This is accomplished by requiring ignition-resistant construction materials based on the hazard severity of the building site. Construction features regulated include underfloor areas, roof coverings, eaves and soffits, gutters and downspouts, exterior walls, doors and windows, ventilation openings, and accessory structures.

Construction regulations are divided into three categories of ignition resistance (IR):

- IR Class 1: A schedule of additional requirements for construction in WUI based on **extreme** fire hazard.
- IR Class 2: A schedule of additional requirements for construction in WUI based on **high** fire hazard.
- IR Class 3: A schedule of additional requirements for construction in WUI based on **moderate** fire hazard.

It should be noted, that where water supply and/or defensible space standards cannot be met, a higher construction regulation would be applied than the fire hazard would require if all requirement could be met. For example, an area of high fire hazard would require IR 2 construction if

2

the defensible space can be provided, but would jump to IR 1 if defensible space requirements could not be met. In some circumstances, a non-combustible exterior wall would be required. A worse case might be where the hazard is extreme and both water supply and defensible space requirements cannot be met, no construction would be allowed at all.

The following table and text are excerpted from the IWUIC.

IGNITION-RESISTANT CONSTRUCTION MATRIX

DEFENSIBLE SPACE[1]	FIRE HAZARD SEVERITY					
	Moderate hazard		High hazard		Extreme hazard	
	Water supply		Water supply		Water supply	
	Conforming[2]	Nonconforming[3]	Conforming[2]	Nonconforming[3]	Conforming[2]	Nonconforming[3]
Nonconforming	IR[4] 2	IR 1	IR 1	IR 1	IR 1 & N.C.[4]	Not Permitted
Conforming	IR 3	IR 2	IR 2	IR 1	IR 1	IR 1 & N.C.[5]
1.5 x Conforming	Not Required	IR 3	IR 3	IR 2	IR 2	IR 1

1. An area either natural or man-made, where material capable of allowing a fire to spread unchecked has been treated, cleared, or modified to slow the rate and intensity of an advancing wildfire and to create an area for fire suppression operation to occur. See Required Defensible Space, below.
2. Subdivisions shall have a conforming water supply. See IWUIC Section 404, attached, for the criteria for a conforming water supply.
3. A nonconforming water supply is any water system or source that does not comply with Section 404
4. I.R. means Ignition Resistant.

   IR 1, see IWUIC Section 504, attached.

   IR 2, see IWUIC Section 505, attached.

   IR 3, see IWUIC Section 506, attached.
5. N.C. means noncombustible, where exterior walls shall have a fire-resistance rating of not less than 1-hour, and the exterior surfaces of such walls shall be noncombustible.

REQUIRED DEFENSIBLE SPACE

Wildland-Urban Interface Area	Fuel Modification Distance
Moderate Hazard	30' between structures OR 100-foot buffer between structures and WUI
High Hazard	50' between structures OR 200-foot buffer between structures and WUI
Extreme Hazard	100' between structures OR300-foot buffer between structures and WUI

3

IWUIC SECTION 404
WATER SUPPLY

404.1 General. When provided in order to qualify as a conforming water supply for the purpose of Table 503.1 or as required for new subdivisions in accordance with Section 402.1.2[4], an *approved* water source shall have an adequate water supply for the use of the fire protection service to protect buildings and structures from exterior fire sources or to suppress structure fires within the *wildland-urban interface area* of the jurisdiction in accordance with this section.

> **Exception:** Buildings containing only private garages, carports, sheds and agricultural buildings with a floor area of not more than 600 square feet (56 m^2).

404.2 Water sources. The point at which a water source is available for use shall be located not more than 1,000 feet (305 m) from the building and be *approved* by the code official. The distance shall be measured along an unobstructed line of travel.

Water sources shall comply with the following:

1. Man-made water sources shall have a minimum usable water volume as determined by the adequate water supply needs in accordance with Section 404.5. This water source shall be equipped with an *approved* hydrant. The water level of the water source shall be maintained by rainfall, water pumped from a well, water hauled by a tanker or by seasonal high water of a stream or river. The design, construction, location, water level maintenance, access and access maintenance of man-made water

sources shall be *approved* by the code official.

2. Natural water sources shall have a minimum annual water level or flow sufficient to meet the adequate water supply needs in accordance with Section 404.5. This water level or flow shall not be rendered unusable because of freezing. This water source shall have an *approved* draft site with an *approved* hydrant. Adequate water flow and rights for access to the water source shall be ensured in a form acceptable to the code official.

404.3 Draft sites. *Approved* draft sites shall be provided at all natural water sources intended for use as fire protection for compliance with this code. The design, construction, location, access and access maintenance of draft sites shall be *approved* by the code official.

> **404.3.1 Access.** The draft site shall have emergency vehicle access from an access road in accordance with Section 402.

> **404.3.2 Pumper access points.** The pumper access point shall be either an emergency vehicle access area alongside a conforming access road or an *approved* driveway no longer than 150 feet (45 720 mm). Pumper access points and access driveways shall be designed and constructed in accordance with all codes and ordinances enforced by this jurisdiction. Pumper access points shall not require the pumper apparatus to obstruct a road or driveway.

404.4 Hydrants. All hydrants shall be designed and constructed in accordance with nationally recognized standards. The location and access shall be *approved* by the code official.

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[4] **402.1.2 Water supply.** New subdivisions as determined by this jurisdiction shall be provided with water supply in accordance with Section 404.

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404.5 Adequate water supply. Adequate water supply shall be determined for purposes of initial attack and flame front control as follows:

1. One- and two-family dwellings. The required water supply for one- and two-family dwellings having a fire flow calculation area that does not exceed 3,600 square feet (334 m^2) shall be 1,000 gallons per minute (63.1 L/s) for a minimum duration of 30 minutes. The required water supply for one- and two-family dwellings having a fire flow calculation area in excess of 3,600 square feet (334 m^2) shall be 1,500 gallons per minute (95 L/s) for a minimum duration of 30 minutes.

   > **Exception:** A reduction in required flow rate of 50 percent, as *approved* by the code official, is allowed when the building is provided with an *approved* automatic sprinkler system.

2. Buildings other than one- and two-family dwellings. The water supply required for buildings other than one- and two-family dwellings shall be as *approved* by the code official but shall not be less than 1,500 gallons per minute (95 L/s) for a duration of two hours.

   > **Exception:** A reduction in required flow rate of up to 75 percent, as *approved* by the code official, is allowed when the building is provided with an *approved* automatic sprinkler system. The resulting water supply shall not be less than 1,500 gallons per minute (94.6 L/s).

404.6 Fire department. The water supply required by this code shall only be approved when a fire department rated Class 9 or better in accordance with ISO Commercial Rating Service, 1995, is available.

404.7 Obstructions. Access to all water sources required by this code shall be unobstructed at all times. The code official shall not be deterred or hindered from gaining immediate access to water source equipment, fire protection equipment or hydrants.

404.8 Identification. Water sources, draft sites, hydrants and fire protection equipment and hydrants shall be clearly identified in a manner *approved* by the code official to identify location and to prevent obstruction by parking and other obstructions.

404.9 Testing and maintenance. Water sources, draft sites, hydrants and other fire protection equipment required by this code shall be subject to periodic tests as required by the code official. All such equipment installed under the provisions of this code shall be maintained in an operative condition at all times and shall be repaired or replaced where defective. Additions, repairs, alterations and servicing of such fire protection equipment and resources shall be in accordance with *approved* standards.

404.10 Reliability. Water supply reliability shall comply with Sections 404.10.1 through 404.10.3.

404.10.1 Objective. The objective of this section is to increase the reliability of water supplies by reducing the exposure of vegetative fuels to electrically powered systems.

404.10.2 Clearance of fuel. *Defensible space* shall be provided around water tank structures, water supply pumps and pump houses.

404.10.3 Standby power. Stationary water supply facilities within the wildland-*urban interface area* dependent on electrical power to meet adequate water supply demands shall provide

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standby power systems in accordance with Chapter 27 of the *International Building Code,* Section 604 of the *International Fire Code* and NFPA 70 to ensure that an uninterrupted water supply is maintained. The standby power source shall be capable of providing power for a minimum of two hours.

Exceptions:

1. When *approved* by the code official, a standby power supply is not required where the primary power service to the stationary water supply facility is underground.

2. A standby power supply is not required where the stationary water supply facility serves no more than one single-family dwelling.

IWUIC SECTION 504
CLASS 1 INGNITION-RESISTANT CONSTRUCTION

504.1 General. Class 1 ignition-resistant construction shall be in accordance with Sections 504.2 through 504.11.

504.2 Roof covering. Roofs shall have a Class A roof assembly. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D 3909 installed over the combustible decking.

504.2.1 Roof valleys. When provided, valley flashings shall be not less than 0.019 inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide (914 mm) underlayment consisting of one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D 3909 running the full length of the valley.

504.3 Protection of eaves. Eaves and soffits shall be protected on the exposed underside by ignition-resistant materials or by materials *approved* for a minimum of 1-hour fire-resistance-rated construction, 2-inch (51 mm) nominal dimension lumber, or 1-inch (25.4 mm) nominal fire-retardant-treated lumber or $^3/_4$-inch (19 mm) nominal fire-retardant-treated plywood, identified for exterior use and meeting the requirements of Section 2303.2 of the *International Building Code.* Fascias are required and shall be protected on the backside by ignition-resistant materials or by materials *approved* for a minimum of 1-hour fire-resistance-rated construction or 2-inch (51 mm) nominal dimension lumber.

504.4 Gutters and downspouts. Gutters and downspouts shall be constructed of *noncombustible* material. Gutters shall be provided with an *approved* means to prevent the accumulation of leaves and debris in the gutter.

504.5 Exterior walls. Exterior walls of buildings or structures shall be constructed with one of the following methods:

1. Materials *approved* for a minimum of 1-hour fire-resistance-rated construction on the exterior side.

2. *Approved noncombustible* materials.

3. Heavy timber or log wall construction.

4. Fire-retardant-treated wood on the exterior side. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the *International Building Code.*

5. Ignition-resistant materials on the exterior side.

   Such material shall extend from the top of the foundation to the underside of the roof sheathing.

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504.6 Unenclosed underfloor protection. Buildings or structures shall have all underfloor areas enclosed to the ground with exterior walls in accordance with Section 504.5.

> **Exception:** Complete enclosure may be omitted where the underside of all exposed floors and all exposed structural columns, beams and supporting walls are protected as required for exterior 1-hour fire-resistance-rated construction or heavy timber construction or fire-retardant-treated wood. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the *International Building Code.*

504.7 Appendages and projections. *Unenclosed accessory* structures attached to buildings with habitable spaces and projections, such as decks, shall be a minimum of 1-hour fire resistance-rated construction, heavy timber construction or constructed of one of the following:

1. *Approved noncombustible* materials;

2. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the *International Building Code;* or

3. Ignition-resistant building materials.

504.7.1 Underfloor areas. When the attached structure is located and constructed so that the structure or any portion thereof projects over a descending slope surface greater than 10 percent, the area below the structure shall have all underfloor areas enclosed to within 6 inches (152 mm) of the ground, with exterior wall construction in accordance with Section 504.5.

504.8 Exterior glazing. Exterior windows, window walls and glazed doors, windows within exterior doors, and skylights shall be tempered glass, multilayered glazed panels, glass block or have a fire protection rating of not less than 20 minutes.

504.9 Exterior doors. Exterior doors shall be *approved* noncombustible construction, solid core wood not less than $1^3/_4$ inches thick (45 mm), or have a fire protection rating of not less than 20 minutes. Windows within doors and glazed doors shall be in accordance with Section 504.8.

> **Exception:** Vehicle access doors.

504.10 Vents. Attic ventilation openings, foundation or underfloor vents, or other ventilation openings in vertical exterior walls and vents through roofs shall not exceed 144 square inches (0.0929 m^2) each. Such vents shall be covered with *noncombustible* corrosion-resistant mesh with openings not to exceed $^1/_4$ inch (6.4 mm), or shall be designed and *approved* to prevent flame or ember penetration into the structure.

504.10.1 Vent locations. Attic ventilation openings shall not be located in soffits, in eave overhangs, between rafters at eaves, or in other overhang areas. Gable end and dormer vents shall be located at least 10 feet (3048 mm) from lot lines. Underfloor ventilation openings shall be located as close to grade as practical.

504.11 Detached accessory structures. Detached accessory structures located less than 50 feet (15 240 mm) from a building containing habitable space shall have exterior walls constructed with materials *approved* for a minimum of 1-hour fire-resistance-rated construction, heavy timber, log wall construction, or constructed with *approved noncombustible* materials or fire-retardant-treated wood on the exterior side. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the *International Building Code.*

504.11.1 Underfloor areas. When the detached structure is located and constructed

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so that the structure or any portion thereof projects over a descending slope surface greater than 10 percent, the area below the structure shall have all underfloor areas enclosed to within 6 inches (152 mm) of the ground, with exterior wall construction in accordance with Section 504.5 or underfloor protection in accordance with Section 504.6.

Exception: The enclosure shall not be required where the underside of all exposed floors and all exposed structural columns, beams and supporting walls are protected as required for exterior 1-hour fire-resistance-rated construction or heavy-timber construction or fire-retardant-treated wood on the exterior side. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the *International Building Code.*

IWUIC SECTION 505
CLASS 2 IGNITION-RESISTANT CONSTRUCTION

505.1 General. Class 2 ignition-resistant construction shall be in accordance with Sections 505.2 through 505.11.

505.2 Roof covering. Roofs shall have at least a Class B roof assembly or an *approved noncombustible* roof covering. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D 3909 installed over the combustible decking.

505.2.1 Roof valleys. When provided, valley flashings shall be not less than 0.019 inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide (914 mm) underlayment consisting of one layer of 72-pound (32.4 kg) mineral-surfaced, nonperfo-

rated cap sheet complying with ASTM D 3909 running the full length of the valley.

505.3 Protection of eaves. Combustible eaves, fascias and soffits shall be enclosed with solid materials with a minimum thickness of $^3/_4$ inch (19 mm). No exposed rafter tails shall be permitted unless constructed of heavy timber materials.

505.4 Gutters and downspouts. Gutters and downspouts shall be constructed of *noncombustible* material. Gutters shall be provided with an *approved* means to prevent the accumulation of leaves and debris in the gutter.

505.5 Exterior walls. Exterior walls of buildings or structures shall be constructed with one of the following methods:

1. Materials *approved* for a minimum of 1-hour fire-resistance-rated construction on the exterior side.

2. *Approved noncombustible* materials.

3. Heavy timber or log wall construction.

4. Fire-retardant-treated wood on the exterior side. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the *International Building Code.*

5. Ignition-resistant materials on the exterior side.

Such material shall extend from the top of the foundation to the underside of the roof sheathing.

505.6 Unenclosed underfloor protection. Buildings or structures shall have all underfloor areas enclosed to the ground, with exterior walls in accordance with Section 505.5.

Exception: Complete enclosure shall not be required where the underside of all exposed floors and all exposed structural

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columns, beams and supporting walls are protected as required for exterior 1-hour fire-resistance-rated construction or heavy timber construction or fire-retardant-treated wood. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the *International Building Code.*

505.7 Appendages and projections. Unenclosed accessory structures attached to buildings with habitable spaces and projections, such as decks, shall be a minimum of 1-hour fire-resistance-rated construction, heavy timber construction or constructed of one of the following:

1. *Approved noncombustible* materials;

2. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the *International Building Code;* or

3. Ignition-resistant building materials.

505.7.1 Underfloor areas. When the attached structure is located and constructed so that the structure or any portion thereof projects over a descending slope surface greater than 10 percent, the area below the structure shall have all underfloor areas enclosed to within 6 inches (152 mm) of the ground, with exterior wall construction in accordance with Section 505.5.

505.8 Exterior glazing. Exterior windows, window walls and glazed doors, windows within exterior doors, and skylights shall be tempered glass, multilayered glazed panels, glass block or have a fire-protection rating of not less than 20 minutes.

505.9 Exterior doors. Exterior doors shall be *approved noncombustible* construction, solid core wood not less than $1^3/_4$-inches thick (45 mm), or have a fire protection rating of not less than 20 minutes. Windows within doors and glazed doors shall be in accordance with Section 505.8.

Exception: Vehicle access doors.

505.10 Vents. Attic ventilation openings, foundation or underfloor vents or other ventilation openings in vertical exterior walls and vents through roofs shall not exceed 144 square inches (0.0929 m^2) each. Such vents shall be covered with *noncombustible* corrosion-resistant mesh with openings not to exceed $^1/_4$ inch (6.4 mm) or shall be designed and *approved* to prevent flame or ember penetration into the structure.

505.10.1 Vent locations. Attic ventilation openings shall not be located in soffits, in eave overhangs, between rafters at eaves, or in other overhang areas. Gable end and dormer vents shall be located at least 10 feet (3048 mm) from lot lines. Underfloor ventilation openings shall be located as close to grade as practical.

505.11 Detached accessory structures. Detached accessory structures located less than 50 feet (15 240 mm) from a building containing habitable space shall have exterior walls constructed with materials *approved* for a minimum of 1-hour fire-resistance-rated construction, heavy timber, log wall construction, or constructed with *approved noncombustible* materials or fire-retardant-treated wood on the exterior side. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the *International Building Code.*

505.11.1 Underfloor areas. When the detached accessory structure is located and constructed so that the structure or any portion thereof projects over a descending slope surface greater than 10 percent, the area below the structure shall have all underfloor areas enclosed to within 6 inches (152 mm) of the ground, with exterior wall construction in accordance with Section 505.5 or un-

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derfloor protection in accordance with Section 505.6.

Exception: The enclosure shall not be required where the underside of all exposed floors and all exposed structural columns, beams and supporting walls are protected as required for exterior 1-hour fire-resistance-rated construction or heavy-timber construction or fire-retardant-treated wood on the exterior side. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the *International Building Code.*

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IWUIC SECTION 506
CLASS 3 IGNITION-RESISTANT
CONSTRUCTION

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506.1 General. Class 3 ignition-resistant construction shall be in accordance with Sections 506.2 through 506.4.

506.2 Roof covering. Roofs shall have at least a Class C roof assembly or an *approved noncombustible* roof covering. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D 3909 installed over the combustible decking.

506.2.1 Roof valleys. Where provided, valley flashings shall be not less than 0.019-inch (0.44 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide (914 mm) underlayment consisting of one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D 3909 running the full length of the valley.

506.3 Unenclosed underfloor protection. Buildings or structures shall have all under-

floor areas enclosed to the ground with exterior walls.

Exception: Complete enclosure may be omitted where the underside of all exposed floors and all exposed structural columns, beams and supporting walls are protected as required for exterior 1-hour fire-resistance-rated construction or heavy timber construction.

506.4 Gutters and downspouts. Gutters and downspouts shall be constructed of *noncombustible* material. Gutters shall be provided with an *approved* means to prevent the accumulation of leaves and debris in the gutter.

Memorandum
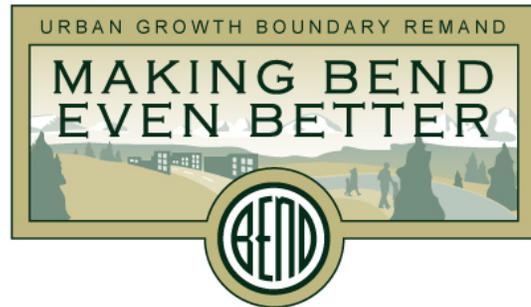
October 2, 2015

To:	Urban Growth Boundary and Growth Scenarios Technical Advisory Committee
Cc:	Project Team
From:	City of Bend Growth Management Staff
Re:	Scenario Evaluation – Factor 4 Analysis Technical Memorandum

Introduction

Purpose

The purpose of this memorandum is to describe the data sources and methodology of various performance measure evaluations conducted in "Stage 4" of the Bend Urban Growth Boundary (UGB) Remand project, the evaluation of alternative UGB expansion scenarios. This memorandum addresses the performance measures evaluated by City of Bend staff related to Goal 14 Factor 4 – Farm and Forest Compatibility (see Table 1). Details of the analysis and interpretation are provided in the Bend UGB Scenario Evaluation Report.

Table 1. Performance Measures in this Technical Memorandum

Performance Measure	Description	Page #
Community Outcome: Compatibility with Farms and Forests		
4.A.1	Farm practices on high value farm land adjacent to expansion areas	3
4.A.2	Impacts to irrigation districts	5
4.A.3	Proximity of expansion areas to designated forest land	6

Evaluation Tools

The evaluations described in this memorandum were completed using ArcGIS mapping software, analysis of tabular data, and visual analysis of additional geographic information. Specific data sources are listed for each performance measure.

Scenarios Evaluated

A total of six sets of land use assumptions were evaluated (Scenario 1.2; Scenario 2.1; Scenario 3.1; Supplemental Analysis Map 1; Supplemental Analysis Map 2; Supplemental Analysis Map 3); these are described in detail in the evaluation report. Each UGB Expansion Scenario and Supplemental Analysis Area Map (SAAM) is comprised of a set of land use assumptions describing the type and amount of housing, employment, and other uses in polygons within the existing UGB and in various expansion subareas. They are all consistent

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with the City of Bend's overall housing and jobs need for the planning horizon, and use consistent assumptions for development on land inside the UGB.

Geographies

These performance measures were evaluated at the subarea level (see Figure 1), as well as for the entire expansion area (all areas that would be added to the UGB under a given scenario) and the City of Bend as a whole (the existing UGB plus the expansion area).

Figure 1. Subareas

Farm and Forest Compatibility

Performance Measure 4.A.1: Farm practices & high value farm land adjacent to expansion areas

Purpose

State law protects farm lands for lawful farming practices. Under state law, cities are required to consider the compatibility of proposed urban uses that may be located within a UGB to ensure such uses are compatible with adjacent farm practices occurring on nearby farm lands. The purpose of doing so is to ensure that urbanization does not:

(a) Force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; or

(b) Significantly increase the cost of accepted farm or forest practices on surrounding lands devoted to farm or forest use.

Data Sources
- The Deschutes County Comprehensive plan map: Exclusive Farm Use (EFU) lands are those shown on the County Comprehensive Plan to comply with Statewide Planning Goal 3, Agricultural Land.
- Deschutes County inventory of Commercial Farms[1]
- Aerial photos.
- Irrigation District Boundary maps
- The UGB Scenarios and Supplemental Analysis Area Maps. Maps were prepared for each scenario and supplemental analysis area (SAAM) with a series of subarea maps to illustrate the location of EFU land within a ¼ mile buffer.

Methodology

A compilation of EFU lands from the Deschutes County Comprehensive Plan Map, the Arnold Irrigation District and Swalley Irrigation District, UGB Scenarios (3) maps, and SAAMs (3 maps) were used to identify properties within the different scenarios located within ¼ mile of farm lands. (Figure 1 identifies zoned EFU land and high value farm land adjacent to the potential UGB expansion areas that was further evaluated for this performance measure.) This is important because Factor 4 refers to farm uses and activities occurring on farm lands. This factor does not require the City to consider farm uses and activities occurring on exception lands.[2] Aerial photography was used to identify irrigated lands and potential active farm land. This was followed up with a windshield survey to verify actual use of farm land.

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[1] In 1992, Oregon State University (OSU) Extension service conducted a farm study for Deschutes County; one product of this work was an inventory of commercial farm tax lots. This research examined a combination of data sources, including county assessor's data and field work (observation).

[2] Exception lands includes those lands for which Deschutes County has adopted an exception to Goals 3 (Agriculture) and 4 (Forest Lands). In Deschutes County, exception lands include, but are not limited to, lands designated for rural residential development on the County Comprehensive Plan Map.

Figure 1: Exclusive Farm Use zones, High Value Farm Land, and Irrigation Water Rights

EFU Zoning, High Value Farm Land, and Irrigation Water Rights

Legend:
- 2 Miles from UGB
- Urban Growth Boundary
- Streams/Rivers
- Roads/Highways
- 1/4 Mile Buffer from Land in Scenarios / SAAMs
- EFU Zoning
- High Value EFU Lot (>30 Acres with water rights)
- Swalley Water Rights
- Arnold Water Rights
- Exception Land

Service Layer Credits: Deschutes County GIS (2014), Deschutes Count 1992 Farm Study

URBAN GROWTH BOUNDARY REMAND

Prepared 10/2/2015

City of Bend Scenario Evaluation – Factor 4 Analysis Technical Memorandum *Page 4 of 9*

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Note that this evaluation did not consider the potential uses that might be adjacent to the active farm use. State law does not differentiate between adjacent proposed uses. However, where farm activity is adjacent to an employment use, particularly an industrial use, the compatibility concerns with an adjacent farm activity may be less. Residential use is typically more sensitive to certain farm practices such as machinery/ equipment operation, spraying, and farm odors.

Summary of Results

The following summarizes the results in the Data Sheet for this performance measure.

- The majority of the farm activity occurs along the east and southeast areas. All scenarios included subareas within ¼ mile proximity to an active commercial farm activity south of Knott Road.
- Three of the scenarios had at least two thirds of the subareas rated as Good (over a quarter-mile from the nearest commercial farm), including Scenario 2.1, SAAM-1 and SAAM-3.
- The other scenarios had one additional subarea within ¼ mile proximity of low impact farm activities, such as hay production.

Performance Measure 4.A.2: Impacts to Irrigation Districts

Purpose

As stated above, Factor 4 refers to farm uses and recognized farm activities on nearby farms, not exception lands. The irrigation impacts captured in this performance measure would assume the elimination of irrigation water deliveries and water rights from exception lands within the different expansion scenarios as these exception lands develop to urban standards with a few exceptions where the water rights serve park land and recreational uses. This could impact farm uses on designated farm land within the affected irrigation district if the district's financial viability is compromised or if assessments are increased for patrons that remain. There is also potential for impact to farm uses downstream of these intervening exception lands, though that has not been evaluated specifically.

Data Sources

- Irrigation District Boundary maps
- Delivery and acre foot assessment information for each subarea provided by Arnold Irrigation and Swalley Irrigation (Central Oregon Irrigation District did not provide any delivery location or water conveyance information)

Methodology

The City of Bend has 4 irrigation districts that have delivery operations within the current UGB and adjacent areas. These include:

- Arnold Irrigation, located primarily in the southwest and south east
- Central Oregon Irrigation District, located in the east and north east
- North Unit Irrigation District, does not deliver in Bend but instead delivers water from the Deschutes River north to Madras
- Swalley Irrigation District serves the north and northeast

City of Bend Scenario Evaluation – Factor 4 Analysis Technical Memorandum *Page 5 of 9*

The identification of properties served with irrigation water within the different scenarios was used to determine potential impacts to the Irrigation Districts. (Figure 1 identifies properties with Swalley and Arnold Irrigation water rights in and adjacent to the potential UGB expansion areas.) In determining impact to irrigation district operations and maintenance, it is not an either/or assessment. The number of deliveries has a financial impact, however the volume of water loss per deliver has both a financial and operational impact. If too many water rights are removed from a system the ability to deliver water to the end of the system is impaired.

The fewer the deliveries and the lesser the amount of water conveyed per scenario per district, the better the ranking, as summarized below.

Good	An expansion subarea has no water deliveries
Fair	An expansion subarea has fewer than 10 water deliveries and 20 total acre feet of irrigation water rights within any single irrigation district
Poor	An expansion subareas has more than 20 water deliveries and greater than 20 total acre feet of irrigation water rights within any single irrigation district

Summary of Results

Across all scenarios, the DSL Property, the West Area, and the Shevlin Area subareas are either not within an irrigation district or do not receive irrigation deliveries (thus receiving a "good" ranking). Swalley Irrigation serves many properties in the North Triangle, OB Riley / Gopher Gulch, and a few in the northern-most portion of the Northeast Edge (around Yeoman Road). Also across all scenarios where Swalley Irrigation has deliveries, the ranking was poor due to either the number of deliveries affected or the amount of water loss. Arnold Irrigation serves a number of properties in "The Elbow" as well as the "Thumb". Every scenario includes a portion of the "Thumb", which has a total of 149.73 acre feet of water delivered.[3] COID encompasses the rest of the Northeast Edge and the Darnell Estates area that has been included with the DSL Property subarea, though its deliveries are unknown at this time. The ranking of the subareas within the COID boundary was a "best guess". The assumption is that most properties within a subarea scenario that is within the COID boundary will receive irrigation water.

Performance Measure 4.A.3: UGB Expansion Subareas Proximity to Forest Lands

Purpose

State law protects forest lands for lawful forest practices, including forest operations, uses to conserve soil and wildlife habitat, and non-resource uses that may be compatible with forest operations. Under state law, cities are required to consider the compatibility of proposed urban uses that may be located within a UGB to ensure such uses are compatible with adjacent forest

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[3] The Wards have a legal obligation to continue the operation of the Back Nine golf course, which would include irrigating the course. They could possibly use some of their water rights to irrigate common open space, new parks and school ball fields. However, the majority of the rights would be transferred elsewhere in the district or returned to the river which could impact Arnold irrigation operations significantly.

City of Bend Scenario Evaluation – Factor 4 Analysis Technical Memorandum *Page 6 of 9*

uses and practices occurring on nearby forest lands. The purpose of doing so is to ensure that urbanization does not interfere with or significantly increase the costs of conducting forest practices on designated forest lands. This serves the second purpose of not creating conditions in which a property owner subject to the Oregon Forest Practices Act needs to modify operations to satisfy the act due to increasing adjacent development[4].

Data Sources

The following data sources were used for conducting this analysis:

1. The Deschutes County Comprehensive Plan map; to identify those areas and parcels designated as Forest Lands under the Comprehensive Plan[5]
2. The March 2015 UGB Steering Committee packet; to identify how areas within the UGB study area were initially evaluated based on their distance from designated forest lands.
3. Deschutes County GIS data to measure the distance of a given parcel within a subarea from the closest designated Forest Lands.
4. The UGB Scenario and Supplemental Analysis Area Maps; to determine the distance of a given subarea from the closest designated Forest Lands.

Methodology

The County Comprehensive Plan Map, UGB Scenarios (3) maps, and SAAMs were used to measure the distance of land included in the scenarios and SAAMs from the closet designated Forest Lands. This is important because Factor 4 refers to forest uses and activities occurring on forest lands; it does not require the City to consider forest uses and activities occurring on exception lands. Ratings at the subarea level were assigned as follows:

Good	An expansion subarea is located more than one mile from designated forest lands
Fair	An expansion subarea is located within one mile, but more than ¼ mile from designated forest lands
Poor	An expansion subarea is located within ¼ of designated forest lands

Scenarios received a rating of 1 (Poor) to 5 (Good) based on the number of subareas that were more than one mile from designated forest lands. Figure 2 shows the Stage 2 map of proximity to Forest land.

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[4] For more information on the Oregon Forest Practices Act see http://www.oregon.gov/odf/privateforests/pages/fpakeys.aspx.

[5] The County complied with Goal 4 by inventorying and designating forest lands, and by creating and adopting policies in Section 2.3 of the County Comprehensive Plan. The County implements this designation of Forest Lands through the Forest Use 1 and 2 Zones under Chapters 18.36 and 18.40, respectively, of the Deschutes County Zoning Ordinance.

Figure 2: Distance to Designated Forest Land
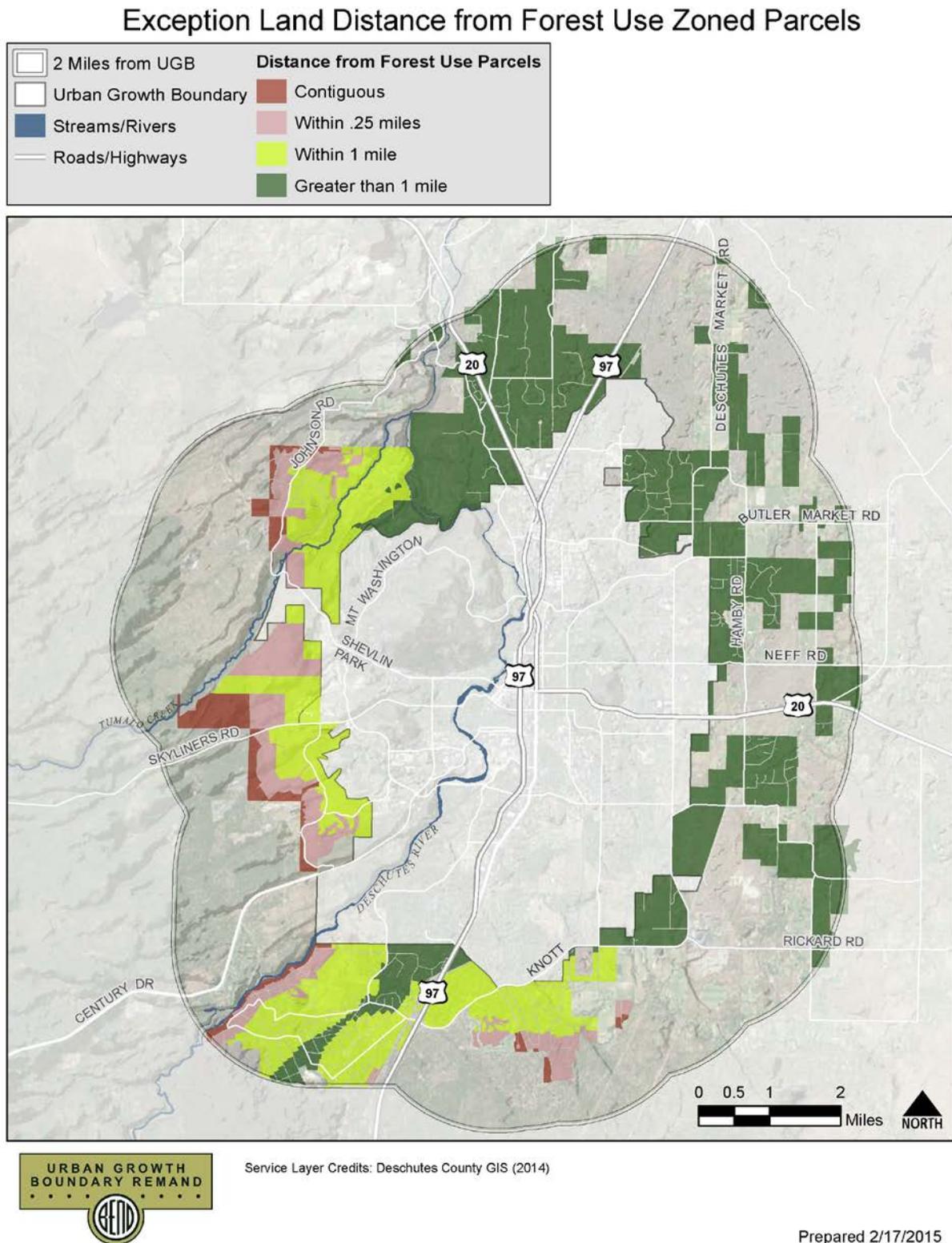
Exception Land Distance from Forest Use Zoned Parcels

Legend:
- 2 Miles from UGB
- Urban Growth Boundary
- Streams/Rivers
- Roads/Highways

Distance from Forest Use Parcels
- Contiguous
- Within .25 miles
- Within 1 mile
- Greater than 1 mile

Service Layer Credits: Deschutes County GIS (2014)

URBAN GROWTH BOUNDARY REMAND · BEND

Prepared 2/17/2015

City of Bend Scenario Evaluation – Factor 4 Analysis Technical Memorandum *Page 8 of 9*

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Summary of Results

The following summarizes the results in the Data Sheet for this performance measure.

- <u>One scenario, SAAM-2, received a score of 5</u>. All of the subareas included in this scenario were more than one mile from designated forest lands.
- <u>Two of the scenarios, Scenarios 1.2 and 2.1, received a score of 4</u>. Five of the seven subareas included in in these scenarios were more than one mile from designated forest lands. Two of the seven subareas were within one mile, and more than one quarter (1/4) mile from designated forest lands.
- <u>Three of the scenarios received a score of 3</u>. These scenarios included Scenarios 3.1, SAAM-1, and SAAM-3. Two of these scenarios, Scenario 3.1 and SAAM01, each had one subarea that was within one mile of forest lands, and a second subarea that was within ¼ mile of forest lands. SAAM-3 received a score of 3 because one of the subareas included is within ¼ mile of designated forest lands.

Memorandum

October 7, 2015

To:	Urban Growth Boundary and Growth Scenarios Technical Advisory Committee
Cc:	Project Team
From:	DKS Associates
Re:	Scenario Evaluation: Transportation Analysis Technical Memorandum

Introduction

Purpose

The purpose of this memorandum is to describe the data sources and methodology of various performance measure evaluations conducted in "Stage 4" of the Bend Urban Growth Boundary (UGB) Remand project, the evaluation of alternative UGB expansion scenarios. The planning/legal context for this analysis is also described, along with summaries of key results for the performance measures. This memorandum addresses the performance measures evaluated by DKS Associates (see Table 1). Further details of the analysis and interpretation are provided in the Bend UGB Scenario Evaluation Report.

Table 1. Performance Measures in this Technical Memorandum

Performance Measure	Description	Page #
Community Outcome: Balanced Transportation System		
2.A.1	Vehicle Miles Traveled (VMT) per Capita	6
2.A.2	Average Trip Length	7
2.A.4	Congestion: Miles of Roadway that Exceed Mobility Standards and Relative Contribution to Congested Roadways	9
2.A.5	Walk/Bike Safety and Connectivity	11
2.A.6	System Connectivity & Progression of System Hierarchy	12
Community Outcome: Cost-Effective Infrastructure		
2.B.1	Total Cost of Transportation Infrastructure Improvements	14
2.B.2	Cost per Acre of Transportation Infrastructure Improvements	17

Evaluation Tools

The evaluations described in this memorandum were completed using the following tools:

- ArcGIS mapping software – This tool was used to provide mapping resources, including to lay out the conceptual street system, measure the approximate distances of for new

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roadways, identify potential geographic properties (existing roads, rail, canals, etc.), and create map figures for presentation.

- Bend MPO Regional Travel Demand Model – This tool is the tool used to forecast future transportation growth and needs in Bend for the year 2028. The project team coordinated with Bend Metropolitan Planning Organization (MPO) staff and the Oregon Department of Transportation's (ODOT's) Transportation Planning Analysis Unit (TPAU), who manages the model, to prepare model scenarios that could be used to measure transportation system impacts for each growth configuration. A summary of key assumptions used in the transportation modeling is included on page 4.

Scenarios Evaluated

A total of six alternatives were evaluated (Scenario 1.2; Scenario 2.1; Scenario 3.1; Supplemental Analysis Area Map 1; Supplemental Analysis Area Map 2; Supplemental Analysis Area Map 3); these are described in detail in the evaluation report. Each UGB Expansion Scenario and Supplemental Analysis Area Map (SAAM) is comprised of a set of land use assumptions describing the type and amount of housing, household demographics, employment, and other uses in polygons within the existing UGB and in various expansion subareas. They are all consistent with the City of Bend's overall housing and jobs need for the planning horizon, and use consistent assumptions for development on land inside the UGB.

Geographies

These performance measures were evaluated at the subarea level (see Figure 1), as well as for the entire expansion area (all areas that would be added to the UGB under a given scenario) and the City of Bend as a whole (the existing UGB plus the expansion area).

Figure 1. Subareas
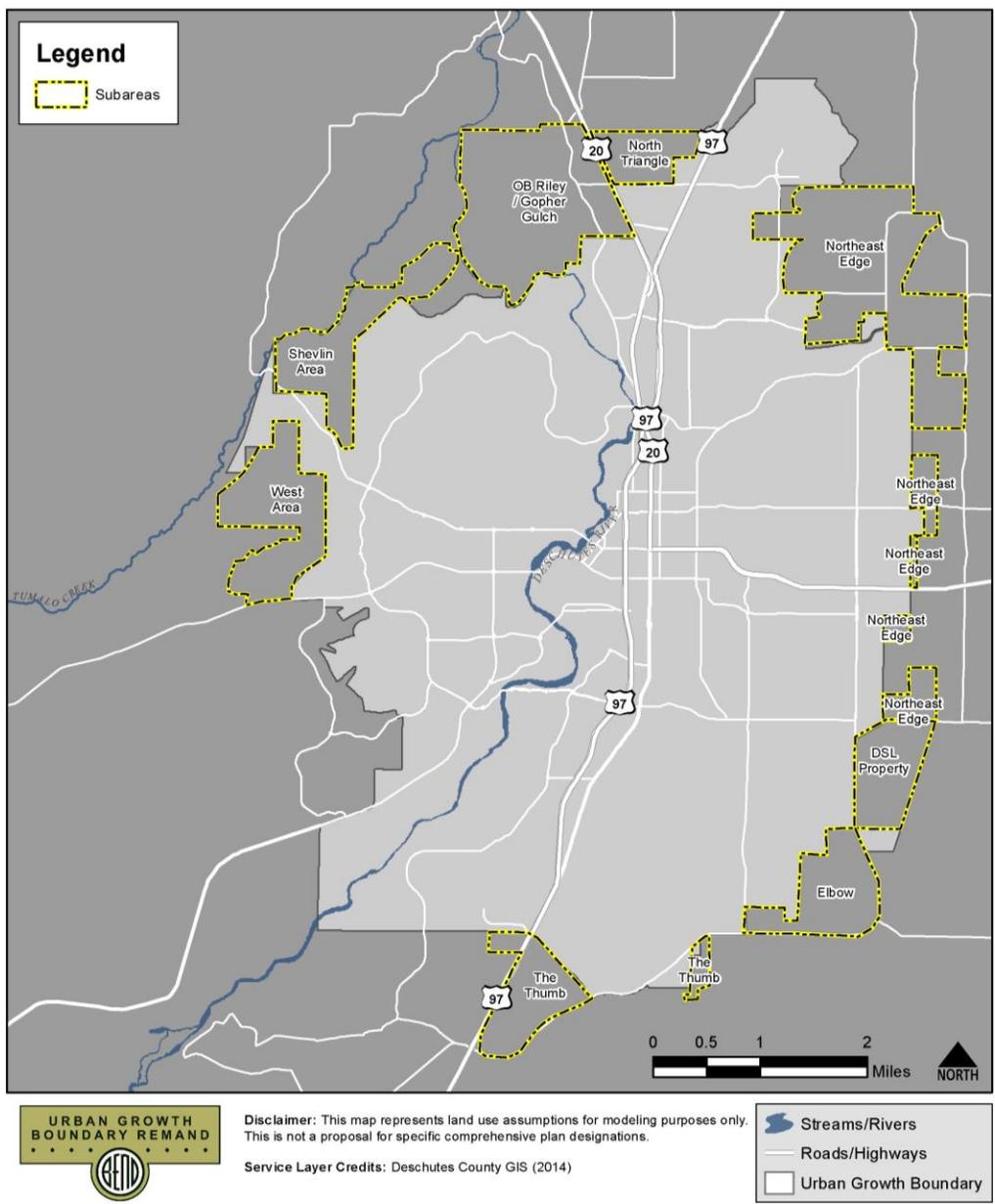
Legal and Planning Context

The key regulatory drivers reside in Goals 12 (Transportation) and 14 (Urbanization), and their administrative rules, as well as the Remand Order. Division 24 implements Goal 14, and requires that the relative advantages and disadvantages and costs of alternative UGB expansion areas with respect to transportation be compared. This should be done through coordination with ODOT. The City and Bend MPO have been meeting regularly with ODOT to coordinate this modeling work. Impacts to existing facilities inside the current UGB, and proposed areas for addition, as well as the need for new transportation facilities such as highways and other roadways, interchanges, arterials and collectors, additional travel lands, and other major improvements on existing roadways, and public transit services be considered. The

rule requires a balancing of these impacts with other public infrastructure systems and other Goal 14 factors. Division 12 generally requires city TSPs to be coordinated and consistent with MPO regional plans. In the case of Bend, the MPO recently updated its Metropolitan Transportation Plan (MTP) to reflect needed improvements to major roadways (such as arterials, the highway, vs. local streets) for the time period between 2010 and 2040. This plan was approved by ODOT as well as the FHWA, and thus, establishes the major system improvements which are anticipated to be funded and built between 2010 and 2040. It is a financially constrained plan, which reflects anticipated funding streams leading to system improvements. The MTP also makes assumptions about Bend's major road network, which in this case is based upon recently approved (and Acknowledged by DLCD) finance plan residing in the Bend TSP. The modeling work reflected in this memorandum uses the MTP system improvements assumed by 2028 for consistency with the Division 12 requirements.

Key Travel Demand Model Assumptions

The Bend MPO Regional Travel Demand Model is a tool that utilizes an evaluation of supply (the transportation network) and demand (trip making generated from land use) to forecast the movement of people throughout the City. The model provides outputs that help assess network performance such as roadway volume and congestion at a regional scale, meaning that the network is limited primarily arterials and collectors (not local streets). Key inputs developed for the travel demand model evaluation, as described in the following sub-sections, include land use, transit service, regional growth, and transportation network.

Land Use

The land use inputs are aggregations of population and employment in transportation analysis zones for all areas in the Bend MPO boundary. Population (and corresponding demographic data) is represented by the number of households, the size of households, the income level of the households, and the average age of the head of household. Existing census data and outputs of the Envision Tomorrow development evaluation were used to update the population demographics.

The location and amount of land use by type was determined from updated buildable land inventories, economic opportunities analysis, and land use designations. For each of the six scenarios developed, the land use assigned to zones within the current UGB are the same, and also reflect the Opportunity Sites and efficiency measures underlying the UGB capacity and expansion analysis. Land use data for the proposed UGB expansion areas were developed based on the proposed development mixes. In all scenarios, the same population and employment totals for the City were maintained (approximately 122,000 people and 68,000 jobs).

Transit Service

The public transit system routes and frequency are an important factor for determining mode-split in the travel forecasts. For each of the six scenarios evaluated, the Bend MPO Metropolitan Transportation Plan (MTP) mid-term transit system improvements were incorporated. This system is very close to the recently funded transit system improvements that

are just beginning service. This assumption is consistent with the MPO RTP assumptions for transit service.

Regional Growth

The Bend MPO travel demand model includes roadways and traffic volumes that enter/exit the Bend urban area via major roadways such as US 97 and US 20. Traffic growth on these corridors takes into account regional growth (i.e., growth in surrounding cities or other parts of the state) that would travel to or through Bend. Previous versions of the Bend MPO travel demand model, such as the 2003 and 2030 scenarios utilized for the prior UGB study, utilized estimations from ODOT on these corridors that relied heavily upon historical growth trends. For the six scenarios evaluated for 2028, an updated estimate for growth on these corridors was utilized that is based on interpolating from the recent Bend MTP 2040 scenario. This is a key difference, as the Bend MTP 2040 scenario model was estimated by a newer technique that integrates with the statewide travel demand model to enhance predictions of growth on major regional corridors. The outcome of this revised approach is that the forecasted year 2028 traffic volumes on US 20 west of Cooley Road and US 97 south of Knott Road are significantly lower than prior year 2030 estimates, resulting in less congestion on the transportation network.

Transportation Network

The travel demand model transportation network for the six scenarios was based on the Bend MPO MTP financially constrained planned improvements, which is a subset of the City, County, and State planned improvements that was determined to be reasonably likely given anticipated funding sources. Key roadway capacity projects within the current UGB area from the MTP that are assumed in the 2028 future travel model networks include:

- State Highway System (implementation by 2028 from the overall 2040 project list[1])
  - US 97 / Murphy Road Interchange, including northbound on-ramps and southbound off-ramps
  - US 97 / Cooley Road grade-separation and control improvements (the "mid-term" improvements)
  - US 97 / Empire Avenue northbound off-ramp widening
  - US 20 / 4th Street traffic signal
- City Roadway System
  - Reed Market Road 3rd Street to 27th Street G.O. Bond improvements
  - Murphy Road Phase I, including the US 97 overcrossing and the 3rd Street roundabout
  - Empire Avenue widening from 3rd Street to US 97
  - Empire Avenue extension from Purcell Boulevard to 27th Street
  - Murphy Road extension from Brosterhous Road to 15th Street
  - Frontage roads near the US 97 / Murphy Road interchange

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[1] Additional State Highway improvements are identified in the MTP for implementation beyond 2028 through 2040. This subset of projects identifies projects that are assumed to be reasonably implemented by 2028.

- o Britta Street extensions from Robal Road to Empire Avenue and from Ellie Lane to Halfway Road
- o Purcell Boulevard extension from Holiday Avenue (north) to Holiday Avenue (south)
- o Mervin-Samples Road extension from 3rd Street to Empire Avenue
- o O.B. Riley Road widening from Glen Vista Road to Archie Briggs Road
- o 18th Street widening from Cooley Road to Empire Avenue
- o 27th Street widening from Bear Creek Road to Ferguson Road

In addition to the roadway capacity projects included in model scenarios, each expansion scenario included unique roadway connections to provide access to proposed growth areas. Project tables and graphics showing these improvements are provided as an attachment (see Figures 62-73).

Balanced Transportation System

Performance Measure 2.A.1: Vehicle Miles Traveled per Capita

Purpose

The Remand requires an evaluation of vehicle miles traveled (VMT) per capita to determine if State Transportation Planning Rule requirements are met. In addition to this requirement, VMT per capita generally demonstrates the combined reliance on the automobile, proximity between land uses, and efficiency of the transportation system. Lower VMT can result from short auto trips and/or trips made by other modes such as walking, biking, or transit. Lower VMT values can indicate that the population has access to other travel modes and/or that the desired destinations (such as school, work, or shopping) are close to home or well connected. These causes for VMT reduction are generally seen as improvements to quality of life.

Data Sources

The regional travel demand model was used to measure VMT for each scenario. The travel demand model scenarios were based on land use quantities and demographics from the Envision Tomorrow tool and the Housing Needs Analysis. The base roadway network was based on assumptions from the Bend MPO's Metropolitan Transportation Plan and additional links developed by the project team to connect to the potential expansion areas.

Methodology

The methodology for measuring VMT was based on requirements in the Transportation Planning Rule and coordination with the Department of Land Conservation and Development (DLCD). The technical methodology details have been previously documented[2]. In general, the methodology seeks to estimate daily VMT for internal trips (beginning and ending in the Bend UGB) by analyzing the total daily trips over the transportation network. The rating for each

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[2] Memorandum: Bend UGB Remand Phase 2 (Task 9.10.1-2 – Scenario Evaluation Methodology), prepared by DKS Associates, June 15, 2015.

scenario's results are relative to a base year target for VMT/Capita reduction (e.g., less than 9.64 VMT/Capita from the 2010 year model[3]). Good would be a reduction in VMT/Capita. Fair is an increase of less than 4%.

Summary of Results

The range of VMT results is from 9.92 (a 2.9% increase over 2010 and 8.1% increase over 2003) to 10.13 (a 5.1% increase over 2010 and 10.3% increase over 2003) daily VMT per capita, with Scenario 2.1 performing best and SAAM-1 performing worst. See Data Sheet for this Performance Measure for full results. In general, each scenario increased VMT relative to 2010 due to the amount of growth located outside the geographic center of the city, which is a primary draw for shopping, services, work, and other activities. Scenarios that focused expansion area growth along major corridors connecting to the center of the City (e.g., a node of growth along Butler Market Road) and have a mix of uses to create complete neighborhoods performed better. Details of trip-lengths for each subarea, provided in Measured 2.A.2, combined with the amount of growth assigned to each subarea also explains the differences between scenarios (i.e., more growth to assigned to areas with lower average trip-lengths improves overall VMT).

The following ranking was applied to the overall scenarios based on VMT per capita relative to year 2010:

- 5 (best) – VMT/capita reduction from 2010 (no scenarios)
- 4 – VMT/capita unchanged from 2010 (no scenarios)
- 3 – VMT/capita minor increase from 2010 (less than 4%)
    - Scenario 2.1 and Scenario 3.1
- 2 – VMT/capita moderate increase from 2010 (4% to 9%)
    - Scenario 1.2, SAAM-1, SAAM-2, SAAM-3
- 1 (worst) – VMT/capital major increase from 2010 (greater than 9%) – no scenarios

Performance Measure 2.A.2: Average Trip Length

Purpose

Average trip length serves the same general purpose of VMT per capita. However, this measure also provides additional detail relative to individual growth areas compared to each other (or other areas of the City). In essence, this measure, combined with the amount of growth in each subarea, informs how a particular area is contributing to the citywide VMT/capita.

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[3] The project team is working with DLCD to determine whether Bend may use the base 2010 model for the VMT analysis, given that the Remand specifies 2003 as the baseline year, but the 2010 model is a better reflection of 2008 and includes other important updates and improvements. The distinction is important because VMT increased by nearly 5% between 2003 and 2010 (VMT per capita in 2003 was estimated at 9.18, versus 9.64 in 2010). For purposes of analysis, the project team is evaluating both 2003 and 2010 as baseline years.

Data Sources

The regional travel demand model was used to measure the average trip length for each scenario and growth area. The travel demand model scenarios were based on land use quantities and demographics from the Envision Tomorrow tool and the Housing Needs Analysis. The base roadway network was based on assumptions from Bend MPO's Metropolitan Transportation Plan.

Methodology

The methodology used to measure average trip length generally follows the methodology used for calculating VMT per capita, with the difference being that the total distance (or VMT) is reported relative to the number of trips in an analysis zone rather than the population. The per trip, not per capita, distance measure an important variation as it captures both employment and residential trip ends. This measure was obtained and reported for each of the four area types (individual growth areas, sum of growth areas, existing UGB, and overall future UGB).

Summary of Results

The average trip length by scenario for each Transportation Analysis Zone (TAZ), the geographic units used for transportation modeling, is shown in attached Figure 1 through Figure 6. In general, areas that are located more centrally to Bend's core, and those areas that have a balance of uses (within the subarea and/or adjacent subareas) will typically have shorter average trip lengths. Outer areas that do not have a well-balanced mix of uses (e.g., primarily residential or primarily employment) typically have longer average trip lengths due to the need for further travel to/from origins or destinations (e.g., outer residential use traveling to the central city core for retail needs).

Overall, the scenarios perform with a relatively similar ranking to the results of Measure 2.A.1.

- Scenario 2.1 (7.51 miles per trip - Score: 5) - Less growth in the "Thumb" and more in the better performing areas on the east-side improve overall average scenario trip-length. Bringing in the entire "Elbow" area to allow a connection from 15th/Murphy area to Rickard Rd. significantly improved the scenario.
- Scenario 3.1 (7.57 miles per trip – Score: 4) - Increased growth in the "Shevlin" area increased overall average scenario trip-length. More mixed-use development in OB Riley/Gopher Gulch helps this scenario.
- SAAM-3 (7.62 miles per trip – Score: 3) - More employment focus in the "North Triangle", the lack of connection from Rickard to 15th, and more growth in the West Area increases the overall average scenario trip length.
- Scenario 1.2 (7.64 miles per trip – Score: 2) - Significant magnitude of growth in the "Thumb" area, the worst performing sub-area, increased overall average scenario trip length.
- SAAM-2 (7.66 miles per trip – Score: 2) - Less growth in the eastside, combined with the lack of connection from Rickard to 15th, increases the overall average scenario trip length.
- SAAM-1 (7.68 miles per trip – Score: 2) - Increased growth in the "Shevlin" area increased overall average scenario trip-length.

General subarea observations include:

- The existing UGB has a lower average trip length than all growth areas due to proximity to existing uses inside the UGB.
- The central core of the City has trip lengths lower than the average for the existing UGB. Therefore, more growth in this area, relative to other areas of the City, would improve the system VMT.
- The eastern subareas typically perform better (lower average trip length) than others, including:
  - DSL Property generally has the lowest average trip length, ranging from 8.41 to 9.02 miles per trip.
  - NE Edge generally has the second lowest average trip length, ranging from 8.93 to 9.17 miles per trip.
  - The Elbow ranges from 8.82 to 9.47 miles per trip, with the lower trip lengths occurring when a complete grid is provided from 15th Street to 27th near Rickard Road.
- The Thumb and Shevlin area both typically have the highest average trip length, ranging from 10.23 to 12.15 miles per trip.
- Other northern and western subareas (North Triangle, West Area, OB Riley/Gopher Gulch) typically have intermediate average trip lengths that range from 9.05 to 9.83 miles per trip.

See Data Sheet for this Performance Measure for a roll-up of results by subarea and alternative.

Performance Measure 2.A.4: Miles of Roadway that Exceed Mobility Standards & Relative Contribution to Congested Roadways

Purpose
The level of congestion on the transportation system can indicate the quality of the system from a motor vehicle standpoint. Increasing levels of congestion may not only require more time spent in a vehicle, but may also affect the time of trips or, ultimately, reduce trips. These actions can reduce quality of life and may also lead to economic impacts due to delayed goods movement and/or reduced trips to local merchants.

Data Sources
The regional travel demand model was used to measure the travel network congestion for each scenario and relative contributions from each growth area. The travel demand model scenarios were based on land use quantities and demographics from the Envision Tomorrow tool and the Housing Needs Analysis. The base roadway network was based on assumptions from Bend MPO's Metropolitan Transportation Plan.

Methodology
The weekday p.m. peak hour travel demand model for each scenario was used to identify future congestion for the roadway network. Congested roadways were defined as any location with a demand to capacity (V/C) ratio above 1.0. These locations indicated roadway segments that the model identifies would be congested since there would be demand for more trips than can be

served. For each scenario, the total miles of roadway that have a V/C >1.0 were reported. For each growth area, the proportion of total trip distance (or VMT) using those congested corridors was reported.

Good scores represent less impact on congested roadway areas. Impact to highway corridors (US 97 or US 20) that do not have planned improvements are weighted more significant than congested City corridors. This is due to the link capacity in the model for City corridors generally not reflecting the additional through capacity on urban arterial 3-lane arterials that have center turn lanes, good access control, and high capacity intersections (e.g., roundabouts), which in most cases can serve the forecasted demand.

For the overall proposed UGB Boundary, the values are not VMT (just total miles of congested roadways) to provide a measure of the overall level of congestion in the system.

Summary of Results

Total congestion and volume for each scenario is shown in attached Figure 7 through Figure 12. Traffic contribution on congested links for each scenario and growth area is shown in attached Figure 13 through Figure 54. Figure 55 includes a table of congested model links for each scenario.

The following observations were made about the growth areas across the scenarios:

- The North Triangle and OB Riley/Gopher Gulch generally contribute to congested facilities on the north end of Bend and therefore typically have higher levels of congestion.
- The DSL Property and The Elbow both contribute to a congested segment of 27th Street and generally have higher levels of congestion contribution than other growth areas.
- The Shevlin area has the smallest contribution to congested corridors.
- The NE Edge, The Thumb, and West Area all have low/medium contribution to congested corridors.

The following observations were made at the scenario level:

- SAAM-1 performs the best overall with 13.43 peak hour miles of congested roadway. There is less growth in the North Triangle and OB Riley Area, which (across scenarios) typically contribute to congested roads. There is more growth in the Shevlin Area, which reduces the overall corridor congestion.
- Scenario 3.1 performs the worst overall with 14.66 peak hour miles of congested roadway. This scenario has the most growth in the North Triangle and OB Riley/Gopher Gulch, causing significant impact on state highways.
- Other remaining scenarios (Scenario 1.2, Scenario 2.1, SAAM-2, and SAAM-3) generally perform between the other two.

See Data Sheet for this Performance Measure for a roll-up of results by subarea and alternative.

Performance Measure 2.A.5: Walk/Bike Safety and Connectivity

Purpose

Providing transportation options for various modes of travel supports a balanced transportation system. Pedestrian and bicycle activity are encouraged by providing safe and well-connected networks. If potential pedestrian and bicycle users do not feel safe or do not have adequate facilities, they may be forced to rely on the automobile, leading to a less-balanced transportation system.

Data Sources

GIS data provided by City of Bend and Deschutes County and aerial photography was used to identify features that would present potential opportunities and constraints to pedestrians and bicycles. The travel demand model for each scenario was used to identify potential locations for future roadway widening that could result in a barrier for pedestrians and bicycles.

Methodology

The qualitative evaluation included three primary components that were considered for each growth area in each scenario:

- Connectivity to adjacent areas – This criterion considered the potential connectivity to the surrounding transportation system (via collectors and arterials[4]) adjacent to the growth area. Growth areas that were isolated would have poor connectivity, while those that bordered adjacent roadways would have some connectivity and those that were connected to roadways and trails would have the preferred level of connectivity to surrounding areas.
- Connectivity within the subarea – Each growth area was reviewed to determine how well pedestrian and bicycle connectivity could be provided on-site to promote movement within the areas. Areas with the ability to design a well-connected roadway grid would provide the best connectivity within the area, while the presence of constraints such as rail or canals would limit the connectivity potential for the area and would require longer trips for pedestrians and bicyclists.
- Safety barriers within the subarea – The presence of major roads within the growth areas provides mobility for motor vehicles, but it also reduces safety for pedestrians crossing these streets and/or bicyclists that travel on these roads. Each growth area was reviewed to determine if the collector and arterial grid would require roadways larger than a 3-lane section based on a review of the roadway capacity needs. The presence of these roadways would decrease the safety of pedestrians and bicycles.

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[4] Collectors and arterials serve as the spine of the transportation system. Connections to these routes generally provide opportunities for connecting to other routes and local streets as well as potential for future transit connections (pending future service enhancements). Local streets adjacent to subareas can also be used for pedestrian and bicycle travel, however they may be indirect (depending on individual alignment and destination). Further, since the local street detail of growth areas has not been identified, it is unknown how well such streets would align with the adjacent areas and adjacent collectors/arterials may be needed for intermediate route connections.

Based on the opportunities and constraints identified in the qualitative assessment of the three combined factors noted above, each area was rated good, fair, or poor. In general, good areas are locations with good connectivity to the adjacent transportation infrastructure and few barriers within the site. Fair areas have either worse connectivity or some site barriers. No internal roadways are planned to be larger than 3-lanes for the potential growth areas, so significant safety barriers within the sites was not a key differentiator. Figure 56 through Figure 61 map the opportunities and constraints for each scenario and growth area.

Summary of Results

See Data Sheet for this Performance Measure for full results by growth area for each scenario. The following general observations were made about each growth area:

- Areas that generally perform well
  - DSL Property generally offers both a good grid within the area and adjacent trail connections to surrounding areas.
  - The NE Edge generally has good trail connections, with the exception of Scenario 1.2 and SAAM-1, where the dispersed development location would reduce the connectivity to trails.
- Areas that generally fare moderately
  - The Elbow would generally fare moderately due to the partial collector grid, except the additional buildout under Scenario 2.1 could allow the extension of Murphy Road, which would further enhance the connectivity in the area.
  - The Thumb would generally fare moderately due to the partial collector grid, except the additional buildout under Scenario 1.2 could allow the bisecting collector to be extended and improve connectivity.
  - The Shevlin area would have limited connections in Scenario 3.1 but the additional expansion in SAAM-1 would provide good connectivity.
  - North Triangle does not include trail connections, but does include a grid system for roadways.
  - The West area has a good collector grid and limited trail system.
  - The OB Riley/Gopher Gulch area includes connectivity via OB Riley. However, as the area expands further west (Scenario 3.1 and SAAM-2) growth areas become isolated and spread further from the connections to OB Riley.

Performance Measure 2.A.6: System Connectivity & Progression of System Hierarchy.

Purpose

Transportation systems are constructed by a hierarchy of streets using a functional classification system. All streets provide some balance of mobility (getting traffic through the "pipe") and access (getting travelers to their desired building or destination). Arterial streets (a higher designation) typically provide high mobility and result in less access, while local streets (a lower designation) provide less through-traffic mobility but more direct access or driveways. Maintaining a well-spaced system of roadways is critical for ensuring that both access and mobility are achieved in the transportation system grid.

Data Sources

The functional class map from the City of Bend GIS data provided by City of Bend and Deschutes County, and aerial photography was used to identify existing roadway system and opportunities for future enhancements to the grid system.

Methodology

This qualitative measure was based on the ability of the growth area to support an ideal roadway grid spacing of one mile for arterials and one-half mile for collectors. The assumed potential for the new arterials and collectors within each growth area was based on the existing roadway grid system and other constraints (e.g., development, terrain, rail, etc.). The assumed roadway network by scenario for each growth area is shown in attached Figure 62 through Figure 67. Good areas have the ability to provide access to development areas via a hierarchy of local, collector, and arterial roadways. Poor areas would likely provide access directly to higher class roadways. Overall results are for variations of sub-areas, not combined scenario results.

Summary of Results

See Data Sheet for this Performance Measure for full results by growth area for each scenario. In general, partial expansion in areas would limit opportunities for connecting system roadways, while scenarios that include full development of a growth area would have a greater opportunity to enhance complete the system and improve connectivity in that area.

The following general observations were made about each growth area:

- Areas that generally perform well
    - OB Riley/Gopher Gulch includes a local grid opportunity with OB Riley as a spine roadway for the area. However, as the area expands further west (Scenario 3.1 and SAAM-2) growth areas become isolated and spread further from the connections to OB Riley.
- Areas that generally perform moderately
    - Shevlin and West Areas includes some ability to provide collectors, but difficult to connect local streets.
- Areas that generally perform moderately, but may be enhanced with broader development in the expansion area.
    - The Thumb allows some collector connection, but only with Scenario 1.2 does it allow a full extension from China Hat to Knott.
    - The DSL property would allow only a partial north/south collector under partial development, but would allow a complete north/south collector to Stevens Road under Scenario 2.1
    - North Triangle would have some connectivity, but it would not include a connection to the west under half of the scenarios (Scenario 1.2, Scenario 2.1, and SAAM-1), The other scenarios that expand to Old Bend-Redmond highway would enhance the connectivity in the subarea.
- Areas that generally perform poorly

- o The NE Edge includes direct access onto major roadways and does not provide a hierarchy that feeds onto local roads that then distribute traffic to collectors.
- o The Elbow does not allow for a complete east/west collector connection and has poor connectivity, except for Scenario 2.1 that extends Murphy Road from 15th to Rickard.

Cost-Effective Infrastructure

Performance Measure 2.B.1: Total Cost of Transportation Infrastructure Improvements

Purpose

Transportation improvements will be needed to provide access to new growth areas and to provide adequate capacity and multi-modal connectivity within the existing urban area to integrate and manage the growth. Funding required to address transportation improvements can be substantial (such as the $156M of roadway capacity improvements identified in the Bend MPO MTP) and may be an important factor for selecting a preferred boundary alternative.

Data Sources

The following data sources were used to develop the cost of transportation improvements for each cost component (described further in the following section):

- Base roadways – The total distance for new roadways was measured using GIS data for the framework of the collector and arterial grid sketched by the project team.
- Roadway capacity improvements – The travel demand model was used to identify locations where capacity improvements would be needed.
- Intersection capacity improvements – The travel demand model was used to estimate intersections that would exceed typical demand that would trigger a roundabout or traffic signal improvement. ODOT's preliminary signal warrants were also used to establish thresholds for potential intersection control improvements for all regional intersections (both local Bend system and State system).
- Roadway unit costs - The City of Bend provided unit costs for roadway improvements based on recent construction projects in Bend. Since these recent costs were for a subset of the overall project types, a cost-index factor[5] was determined to update the set of unit costs used in prior Bend SDC analysis. The following unit costs were used:
    - o Intersection capacity – $2.37 million[6]
    - o New 2 lane collector - $1,195 per foot

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[5] Recent unit costs for Reed Market Road of $1,085 per foot were divided by the prior comparable SDC costs of $492 per foot, which resulted in an escalation factor of 2.21 from prior project costs. This factor was applied to the prior cost estimates for other roadway types to derive the unit costs listed for each item.

[6] Based on average roundabout cost at Empire/18th ($2.7 million), Simpson/Mt Washington ($2.2 million), and Powers/Brookswood ($2.2 million)

- o New 2 lane arterial - $1,447 per foot
- o Upgrade 2 to 3 lane arterial - $1,085 per foot
- o Canal crossing - $3.7 million per location
- o RR overpass - $14.2 million per location

Methodology

The following methodologies were applied to identify transportation costs related to each component:

- Base roadways – The locations for the base collector and arterial grid system were developed using an ideal spacing of one mile for arterials and one-half mile for collectors. The assumed locations for the new arterials and collectors within each growth area were based on the existing roadway grid system and other constraints (e.g. development, terrain, rail, etc.). The distances for new roads were measured using GIS. Costs for each road were estimated by applying an average roadway unit cost to the total roadway distance. Unit costs varied by type of roadway improvement (e.g., new two-lane collector, upgrade two-lane rural arterial, etc.). Right of way costs were also considered (assumed to be $10 per square foot).
- Roadway capacity improvements – The congested roadways from the travel demand model were reviewed to identify streets that would require capacity improvements beyond the improvement projects identified in the Bend MPO MTP and the City TSP reasonably funded projects. On the state highway system, if corridor demand was forecasted to exceed capacity, but the volumes were less than those in the Bend MPO MTP, additional mitigations were not recommended. On the City roadway system, the congested roadways were reviewed to determine if the demand exceeded capacity or would just be a congested condition, the latter not requiring widening mitigation. Like the base roadway costs, the unit costs for each capacity improvement were applied to the improvement length to derive the total cost.
- Intersection capacity improvements – The travel demand model was used to identify intersections that were forecasted to have traffic volumes that exceed levels that are typically served by stop-control. ODOT's preliminary signal warrants were used to set volume thresholds for major and minor street intersection approaches for roads in the regional travel demand model. Intersections that exceeded the threshold and are currently planned for stop-controlled were identified as candidates for intersection control improvements. The high level analysis did not identify control specifics related to traffic signals or roundabouts. Since roundabouts are preferred in Bend and typically have higher initial installation costs, average roundabout costs from City data were assumed for each identified intersection improvement location.

The costs for the three components were summed to provide an overall transportation cost for each scenario. These costs do not reflect currently planned transportation improvement programs such as the Bend MPO MTP and the City's SDC and CIP program. Therefore, the costs identified for each scenario are costs that are in addition previously planned (and reasonably funded) improvements. This high-level infrastructure analysis does not capture

additional urban upgrades that may be needed, such as frontage improvements that may be required by development along arterial, collector, or local roads.

Summary of Results

Table 2 summarizes the total Scenario cost for each cost component attributed to the UGB Expansion. Individual scenario project maps (Figure 62 through Figure 67) and tables (Figure 68 through Figure 73) are attached that summarize the project details and costs included in each component.

Table 2. Scenario Transportation Costs ($ Millions) Attributed to the UGB Expansion

Cost Element	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Base Roadways	175.0	146.7	160.4	148.7	134.0	130.9
Roadway Capacity	16.0	0.0	4.8	2.5	4.8	4.8
Intersection Capacity	9.5	7.1	4.7	9.5	11.8	7.1
Total	200.5	153.8	169.9	160.8	150.6	142.8

In addition to the costs listed in Table 2, there are two improvement projects identified through the analysis that appear to be necessary with or without the proposed UGB expansion, which would be attributable to growth in the current UGB, but are not currently planned/funded:

- US 20 / Old Bend-Redmond Highway intersection improvements - $2.4M
- US 20 / Cooley Road intersection improvements - $1.6M

General observations about each scenario include:

- SAAM-3 has the lowest overall transportation cost, resulting from low costs in base roadways and low to moderate costs for capacity improvements. The West Area has the highest cost for this scenario due to the extent of development in that subarea.
- SAAM-2 has a low overall cost due to the low base roadway costs and moderate costs for capacity improvements. Base roadway and capacity costs would be slightly higher than SAAM-3, due to higher costs in OB Riley/Gopher Gulch, where most of the growth is focused (which offsets low cost in the West Area).
- Scenario 2.1 has low/moderate overall cost relative to the other scenarios, resulting from a moderate subarea connectivity cost and low mitigation cost. The Elbow would have high subarea costs due to the extent of development in that subarea.
- SAAM-1 has moderate overall cost, resulting from a moderate subarea cost and moderate mitigation cost.
- Scenario 3.1 has a moderate/high overall cost, resulting from the highest subarea cost and a moderate mitigation cost.
- Scenario 1.2 has the highest overall cost, resulting from the highest subarea cost and the highest mitigation cost. While NE Edge and The Elbow would have a high overall cost, the other subareas have low/moderate costs.

See Data Sheet for this Performance Measure for a roll-up of results by subarea and alternative.

Performance Measure 2.B.2: Cost per Acre of Transportation Infrastructure Improvements

Purpose

Transportation improvements will be needed to provide access to new growth areas and to provide adequate capacity and multi-modal connectivity within the growth areas to integrate and manage the growth. The purpose of this measure was to identify cost-effective subareas that consider the cost relative to the overall development potential.

Data Sources

The following data sources were used to develop the cost of transportation improvements for each cost component (described further in the following section):

- Base roadways – The total distance for new roadways was measured using GIS data for the framework of the collector and arterial grid sketched by the project team.
- Development area – The total acres of development for each subarea were summarized using GIS mapping tools and were provided by the project team for each scenario.

Methodology

The following methodologies were applied to identify cost-efficiency:

- Base roadways and cost – The location and cost of base roadways for each subarea were determined using the methodology described in Measure 2.B.1.
- Cost-efficiency – The total costs for each subarea were divided by the total developable acres to identify the cost/acre.

This measure focused on base roadway cost (new arterials and collectors); mitigation costs were not included at the subarea level.

Summary of Results

For each subarea in each alternative, transportation costs for the new roadway network ranged from $0/acre (in infill sites where the network already exists) to nearly $300/acre in some subareas. The general observations about the average cost for growth areas include:

- The Elbow has the highest average cost for each scenario, ranging from approximately $150K to $280K per acre for each scenario. These costs include the extension of east-west roads within the existing UGB (including Murphy Road east of 15th St) that would be needed to serve these areas.
- The North Triangle has a high average cost, ranging from approximately $110K to $150K per acre based on moderate/high connectivity costs and moderate acreage.
- The NE Edge is unique in that it has varies widely depending on scenario:
    - Scenarios that focus on in-fill (all SAAMs) make use of the existing system, do not spread enough to provide additional connectivity, and have a lower overall base network cost.

- - Scenarios that have a broader expansion (allowing more connectivity and base road construction), including Scenario 1.2, 2.1 and 3.1 all have high average costs.
- The DSL property has fairly moderate costs for most alternatives, including Scenario 2.1 which includes both higher overall growth and additional completion of the base transportation grid. The subarea has a higher average cost in SAAM-3 due to the moderate connectivity costs and lower total growth area.
- The West and Shevlin areas both have low to moderate costs, with increased average cost in Scenario 3.1 due to the West having additional roadway costs and Shevlin having less overall acreage in the alternative.
- The Thumb has low average costs when development is minimized, but average costs increase along with the opportunity to extend the collector system between China Hat and Knott (Scenario 1.2) and when the total acreage is reduced (Scenario 3.1).
- OB Riley/Gopher Gulch have low average costs due to the amount of developable acres included.

The following observations were made when aggregating all growth areas across individual scenarios:

- SAAM-1 has the lowest overall cost due to having the lowest subarea costs in most growth areas except North Triangle (moderate costs with low development), DSL (low costs with low development) and The Elbow (moderate costs with low development).
- Scenario 2.1, Scenario 3.1, SAAM-2, and SAAM-3 have moderate costs, when aggregated across the entire alternative, as they each include subareas with a mix of per-acre cost. These scenarios have high costs in the North Triangle and The Elbow and low costs/acre in OB Riley/Gopher Gulch, while other subareas vary by scenario as described above.
    - Scenario 2.1 has additional development in the Elbow that reduces the cost per acre relative to other scenarios.
    - Scenario 3.1 has lower cost per acre in the Triangle due to higher land uses and higher cost per acre in The Thumb due to less land uses and network connection to Knott Road.
    - SAAM-2 has decreased costs by using the existing network for NE Edge.
    - SAAM-3 has decreased costs by using the existing network for NE Edge. However, the DSL area includes additional network with moderate growth, providing a relatively higher cost per acre in that subarea.
- Scenario 1.2 has a high overall cost per acre due to a moderate total cost and low acreage relative to the other alternatives. This scenario includes the highest cost/acre reported for some individual growth areas (NE Edge, The Elbow) and has cost/acre that approach the highest for other areas (North Triangle, DSL property and The Thumb).

Factor 2: Orderly and Economic Provision of Public Facilities and Services

Author: CSM — DKS Associates

Community Outcome B.	Cost Effective Infrastructure	Date:	10/7/2015

Performance Measure 1	**Total Cost of Transportation Infrastructure Improvements**
Brief Description of Evaluation:	Cost of Transportation Improvements for serving the expansion area and mitigating impacts in the City system. Cost for expansion areas include new roadway network only (not congestion mitigation)
Data Sources	Bend SDC Unit Costs, Travel Demand Model link congestion plots
Interpretation and Key	Lower overall costs perform better. The overall scenario cost includes new arterials and collectors to serve expansion areas and capacity improvements in the system to mitigate congestion impacts. The Expansion area total excludes improvements identified as needed to serve growth inside the existing UGB. Costs at the subarea level (excluding the existing UGB) include the new arterial and collector grid system only. At the subarea level, costs under $15 million are rated "Good"; $15-35 million are rated "Fair"; over $35 million are rated "Poor". Ratings at the scenario/SAAM level are relative to one another.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Total Future UGB (Including Current UGB)	$204.5	Million	$157.8	Million	$173.9	Million	$164.8	Million	$154.6	Million	$146.8	Million
Total Expansion Area (excluding current UGB)	$200.5	Million	$153.8	Million	$169.9	Million	$160.8	Million	$150.6	Million	$142.8	Million
Subareas												
North Triangle	27.8	Millions $	27.8	Millions $	27.8	Millions $	27.8	Millions $	27.8	Millions $	27.8	Millions $
NE Edge	42.2	Millions $	8.4	Millions $	8.4	Millions $	46.8	Millions $	0.0	Millions $	0.0	Millions $
DSL Property	20.6	Millions $	21.6	Millions $	16.5	Millions $	12.1	Millions $	9.1	Millions $	16.5	Millions $
The "Elbow"	56.3	Millions $	66.3	Millions $	34.3	Millions $	34.3	Millions $	34.3	Millions $	34.3	Millions $
The "Thumb"	19.7	Millions $	10.5	Millions $	10.5	Millions $	4.3	Millions $	10.5	Millions $	10.5	Millions $
West Area	5.8	Millions $	9.7	Millions $	24.9	Millions $	0	Millions $	0	Millions $	39.1	Millions $
Shevlin Area	0	Millions $	0	Millions $	16.3	Millions $	20.9	Millions $	0	Millions $	0	Millions $
OB Riley / Gopher Gulch Area	2.7	Millions $	2.7	Millions $	21.7	Millions $	2.7	Millions $	52.4	Millions $	2.7	Millions $
Existing UGB (if applicable)	$4.0	Millions $	$4.0	Millions $	$4.0	Millions $	$4.0	Millions $	$4.0	Millions $	$4.0	Millions $
Overall Score	1 ●		4 ◒		3 ○		3 ○		4 ◒		5 ◉	
	Highest cost for connecting growth areas and highest cost for capacity improvements (intersections and widening Knott Road corridor).		Low to moderate cost for connecting growth areas and lowest cost for capacity improvements.		High cost for connecting growth areas and moderate cost for capacity improvements (requires widening of US 20 from Robal Rd to 3rd Street but low intersection improvement costs).		Moderate cost for connecting growth areas, moderate costs for capacity improvements (low cost for roadway widening, high cost for intersection improvements).		Low cost for connecting growth areas, moderate to high costs for capacity improvements (highest cost for required intersection capacity improvements, and requires widening of US 20 from Robal Rd to 3rd Street).		Lowest cost for connecting growth areas, low to moderate costs for capacity improvements (requires widening of US 20 from Robal Rd to 3rd Street).	

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

06869

Factor 2: Orderly and Economic Provision of Public Facilities and Services		Author:	CSM	DKS Associates
Community Outcome B. **Cost Effective Infrastructure**		Date:	10/7/2015	

Performance Measure 2	Cost of Transportation Infrastructure Improvements per Acre
Brief Description of Evaluation:	Cost of Transportation Improvements for serving the expansion area (collector and arterial grid) per acre developed
Data Sources	Bend SDC Unit Costs, Travel Demand Model link congestion plots
Interpretation and Key	Growth areas and scenarios that have the lowest cost/acre rank the best, with "good" rating for growth areas given where costs are $50K/acre or less, "fair" for $50-$100K/acre, and "poor" for >$100K/acre. For overall scenarios, "good" rating given where costs are $60K/acre or less, "fair" for $60-$90K/acre, and "poor" for >$90K/acre.

"Good"	"Fair"	"Poor"	No Data	Not appropriate to rank

Evaluation Geography	Scenario 1.2 Value / Units	Scenario 2.1 Value / Units	Scenario 3.1 Value / Units	SAAM-1 Value / Units	SAAM-2 Value / Units	SAAM-3 Value / Units
Total Future UGB (Including Current UGB)						
Total Expansion Area (excluding current UGB)	104 $1,000/Acre	81 $1,000/Acre	85 $1,000/Acre	53 $1,000/Acre	67 $1,000/Acre	78 $1,000/Acre
Subareas						
North Triangle	143.8 $1,000/Acre	148.5 $1,000/Acre	120.2 $1,000/Acre	138.8 $1,000/Acre	111.1 $1,000/Acre	111.1 $1,000/Acre
NE Edge	92.7 $1,000/Acre	63.9 $1,000/Acre	52.0 $1,000/Acre	32.6 $1,000/Acre	0.0 $1,000/Acre	0.0 $1,000/Acre
DSL Property	92.9 $1,000/Acre	59.4 $1,000/Acre	86.2 $1,000/Acre	93.0 $1,000/Acre	43.1 $1,000/Acre	132.4 $1,000/Acre
The "Elbow"	278.7 $1,000/Acre	153.7 $1,000/Acre	192.8 $1,000/Acre	228.7 $1,000/Acre	186.5 $1,000/Acre	186.5 $1,000/Acre
The "Thumb"	56.2 $1,000/Acre	26.5 $1,000/Acre	59.4 $1,000/Acre	17.8 $1,000/Acre	46.5 $1,000/Acre	47.5 $1,000/Acre
West Area	43.8 $1,000/Acre	55.9 $1,000/Acre	75.8 $1,000/Acre	$1,000/Acre	$1,000/Acre	58.4 $1,000/Acre
Shevlin Area	$1,000/Acre	$1,000/Acre	92.6 $1,000/Acre	38.3 $1,000/Acre	$1,000/Acre	$1,000/Acre
OB Riley / Gopher Gulch Area	20.9 $1,000/Acre	19.7 $1,000/Acre	48.1 $1,000/Acre	20.4 $1,000/Acre	48.1 $1,000/Acre	14.7 $1,000/Acre
Existing UGB (if applicable)	$1,000/Acre	$1,000/Acre	$1,000/Acre	$1,000/Acre	$1,000/Acre	$1,000/Acre
Overall Score	2 🔴	3 ⚪	3 ⚪	4 🟢	3 ⚪	3 ⚪
	High overall cost per acre due to a moderate total cost and low acreage relative to the other alternatives. This scenario includes the highest or nearly the highest cost/acre reported for some individual growth aras.	Moderate cost/acre due to mix of subarea performance. Elbow includes additional development to decrease cost per acre relative to other scenarios.	Moderate cost/acre due to mix of subarea performance. Lower cost/acre in Triangle due to higher land use.	Lowest overall cost due to having lowest subarea costs in most growht areas except North Triangle (moderate costs and low dev), DSL (low costs and low dev) and The Elbow (moderate costs with low dev)	Moderate cost/acre due to mix of subarea performance. Lower cost/acre in Triangle due to higher land use. NE Edge uses existing network and Thumb network is minimized.	Moderate cost/acre due to mix of subarea performance. Lower cost/acre in Triangle due to higher land use. NE Edge uses existing network and Thumb network is minimized. DSL includes additional network with moderate growth.

For more information about this performance measure, see accompanying technical memorandum from DKS Associates.

Figure 1

Scenario 2: Average Trip Length

Legend

— Model Links
▢ Exp Areas
▨ River

Avg Trip Length
▢ Outside UGB
▨ 0-5.5
▨ 5.5-6.25
▨ 6.25-6.56
▨ 6.56-7.25
▨ 7.25-9.64
▨ >9.64

Figure 2

06872

Scenario 3: Average Trip Length

Legend

— Model Links

▭ Exp Areas

▦ River

Avg Trip Length

Outside UGB

0-5.5

5.5-6.25

6.25-6.56

6.56-7.25

7.25-9.64

>9.64

Figure 3

06873

SAA 1: Average Trip Length

Legend

— Model Links

▭ Exp Areas

░ River

Avg Trip Length

- Outside UGB
- 0-5.5
- 5.5-6.25
- 6.25-6.56
- 6.56-7.25
- 7.25-9.64
- >9.64

Figure 4

06874

SAA 2: Average Trip Length

Legend

— Model Links

▢ Exp Areas

▢ River

Avg Trip Length

▢ Outside UGB

▢ 0-5.5

▢ 5.5-6.25

▢ 6.25-6.56

▢ 6.56-7.25

▢ 7.25-9.64

▢ >9.64

Figure 5

06875

SAA 3: Average Trip Length

Legend

— Model Links

▭ Exp Area

▨ River

Avg Trip Length

☐ Outside UGB

☐ 0-5.5

☐ 5.5-6.25

☐ 6.25-6.56

☐ 6.56-7.25

☐ 7.25-9.64

☐ >9.64

Figure 6

06876

Scenario 1 Average PM Peak Volume

Legend

Volume-Capcaity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <100
— 100 - 200
— 200 - 500
— 500 - 1000
— 1000 - 2000
— >2000

▮ Exp Area
▒ River

Figure 7
06877

Scenario 2 Average PM Peak Volume

Legend

Volume-Capcaity Ratio
- <0.80
- 0.80 - 0.89
- 0.90 - 1.0
- >1.0

Volume
- <100
- 100 - 200
- 200 - 500
- 500 - 1000
- 1000 - 2000
- >2000
- Exp Area
- River

Figure 8
06878

Scenario 3 Average PM Peak Volume

Legend

Volume-Capcaity Ratio

— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume

— <100
— 100 - 200
— 200 - 500
— 500 - 1000
— 1000 - 2000
— >2000

Exp Area
River

Figure 9

06879

Scenario SAA1 Average PM Peak Volume

Legend

Volume-Capcaity Ratio

———	<0.80
———	0.80 - 0.89
———	0.90 - 1.0
———	>1.0

Volume

———	<100
———	100 - 200
———	200 - 500
———	500 - 1000
———	1000 - 2000
———	>2000
▓▓▓	Exp Area
▒▒▒	River

Figure 10

Scenario SAA2 Average PM Peak Volume

Legend

Volume-Capcaity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <100
— 100 - 200
— 200 - 500
— 500 - 1000
— 1000 - 2000
— >2000
▉ Exp Area
▨ River

Figure 11

06881

Scenario SAA3 Average PM Peak Volume

Legend

Volume-Capcaity Ratio

— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume

— <100
— 100 - 200
— 200 - 500
— 500 - 1000
— 1000 - 2000
— >2000

Exp Area

River

Figure 12
06882

Scenario 1: West Area Volume

513
Total Subarea
Peak Hour Trips

4.8%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

▦ Exp Area
▦ River

Figure 13

06883

Scenario 1: OB Riley/Gopher Gulch Volume

456
Total Subarea
Peak Hour Trips

12.6%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

Exp Area
River

Figure 14

06884

Scenario 1: North Triangle Area Volume

842
Total Subarea
Peak Hour Trips

13.2%
Percent Subarea VMT
on roadways with
volume > capacity
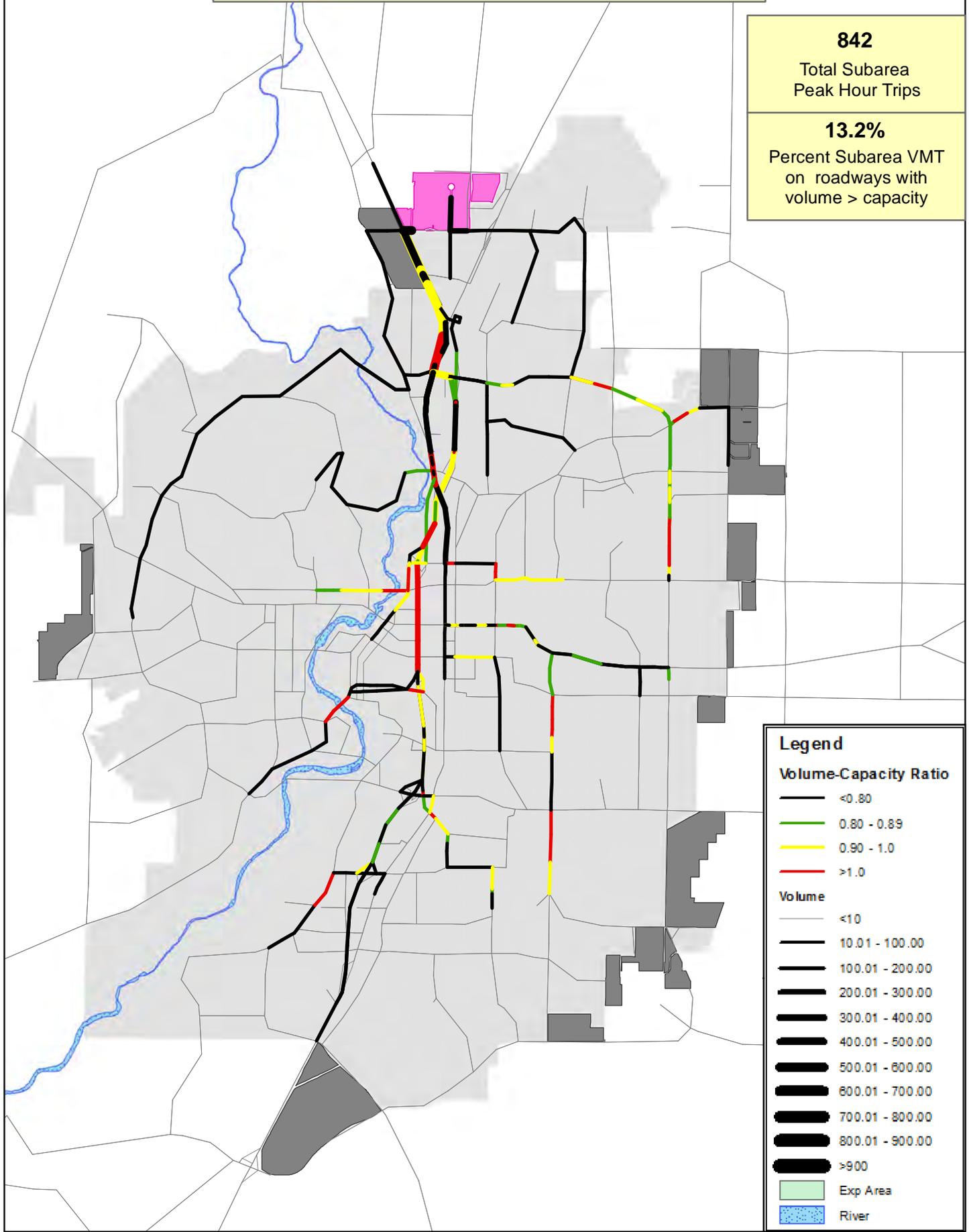
Legend

Volume-Capacity Ratio

— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume

— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

Exp Area
River

Figure 15

06885

Scenario 1: Northeast Edge Volume

1323
Total Subarea
Peak Hour Trips

10.2%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

▬	<0.80
▬	0.80 - 0.89
▬	0.90 - 1.0
▬	>1.0

Volume

▬	<10
▬	10.01 - 100.00
▬	100.01 - 200.00
▬	200.01 - 300.00
▬	300.01 - 400.00
▬	400.01 - 500.00
▬	500.01 - 600.00
▬	600.01 - 700.00
▬	700.01 - 800.00
▬	800.01 - 900.00
▬	>900

▬	Exp Area
▬	River

Figure 16

06886

Scenario 1: DSL Property Volume

900
Total Subarea
Peak Hour Trips

14.9%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

—	<0.80
—	0.80 - 0.89
—	0.90 - 1.0
—	>1.0

Volume

—	<10
—	10.01 - 100.00
—	100.01 - 200.00
—	200.01 - 300.00
—	300.01 - 400.00
—	400.01 - 500.00
—	500.01 - 600.00
—	600.01 - 700.00
—	700.01 - 800.00
—	800.01 - 900.00
—	>900
Exp Area
River

Figure 17
06887

Scenario 1: Elbow Volume

442
Total Subarea
Peak Hour Trips

13.7%
Percent Subarea VMT on roadways with volume > capacity

Legend

Volume-Capacity Ratio

———	<0.80
———	0.80 - 0.89
———	0.90 - 1.0
———	>1.0

Volume

———	<10
———	10.01 - 100.00
———	100.01 - 200.00
———	200.01 - 300.00
———	300.01 - 400.00
———	400.01 - 500.00
———	500.01 - 600.00
———	600.01 - 700.00
———	700.01 - 800.00
———	800.01 - 900.00
———	>900

Exp Area

River

Figure 18

06888

Scenario 1: Thumb Volume

1635
Total Subarea
Peak Hour Trips

11.0%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
<0.80
0.80 - 0.89
0.90 - 1.0
>1.0

Volume
<10
10.01 - 100.00
100.01 - 200.00
200.01 - 300.00
300.01 - 400.00
400.01 - 500.00
500.01 - 600.00
600.01 - 700.00
700.01 - 800.00
800.01 - 900.00
>900
Exp Area
River

Figure 19
06889

Scenario 2: West Area Volume

654
Total Subarea
Peak Hour Trips

4.7%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

———	<0.80
———	0.80 - 0.89
———	0.90 - 1.0
———	>1.0

Volume

———	<10
———	10.01 - 100.00
———	100.01 - 200.00
———	200.01 - 300.00
———	300.01 - 400.00
———	400.01 - 500.00
———	500.01 - 600.00
———	600.01 - 700.00
———	700.01 - 800.00
———	800.01 - 900.00
———	>900
	Exp Area
	River

Figure 20

06890

Scenario 2: OB Riley/Gopher Gulch Volume

226
Total Subarea
Peak Hour Trips

11.6%
Percent Subarea VMT
on roadways with
volume > capacity
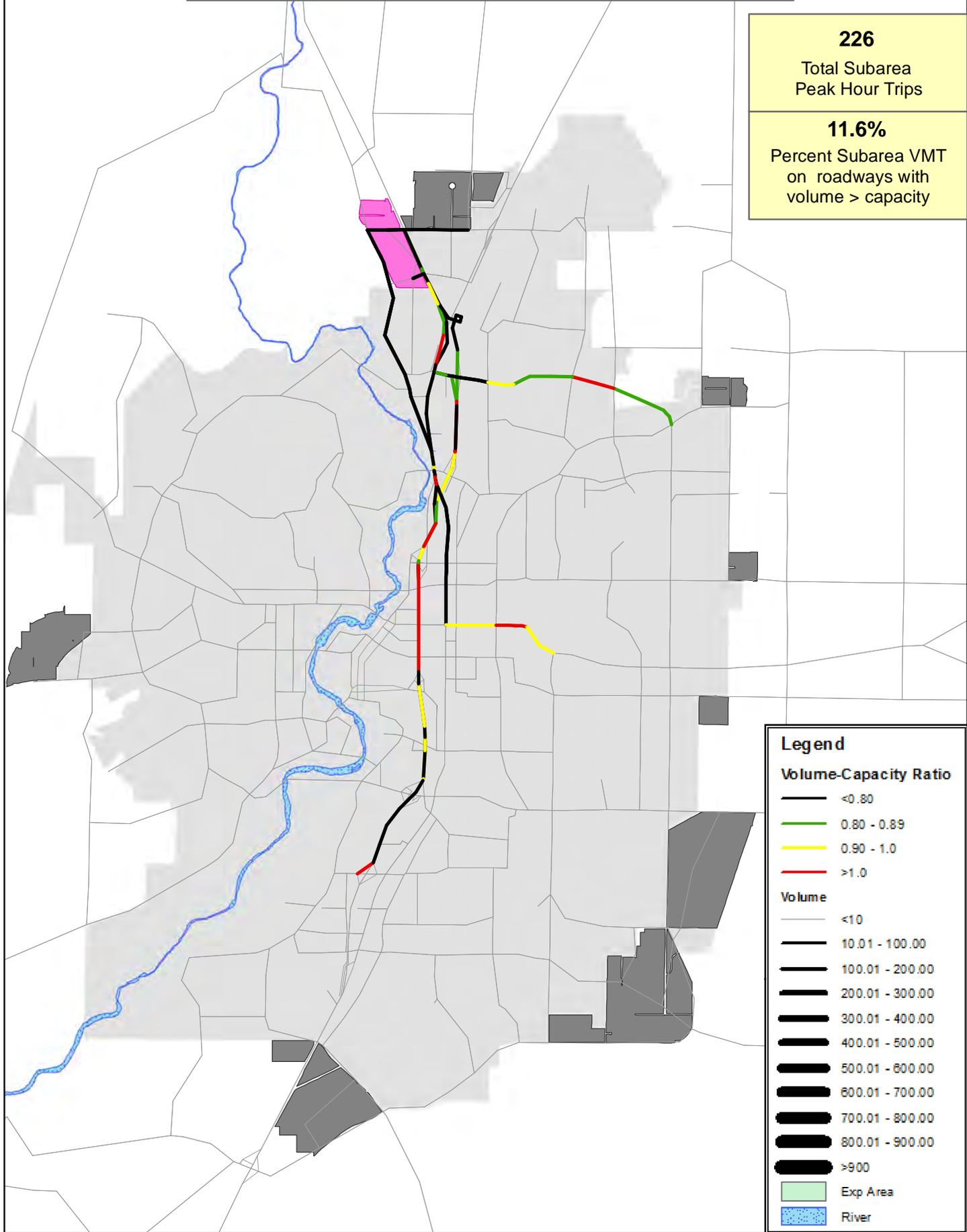
Legend

Volume-Capacity Ratio
———	<0.80
———	0.80 - 0.89
———	0.90 - 1.0
———	>1.0

Volume
———	<10
———	10.01 - 100.00
———	100.01 - 200.00
———	200.01 - 300.00
———	300.01 - 400.00
———	400.01 - 500.00
———	500.01 - 600.00
———	600.01 - 700.00
———	700.01 - 800.00
———	800.01 - 900.00
———	>900

Exp Area

River

Figure 21

06891

Scenario 2: North Triangle Volume

613
Total Subarea
Peak Hour Trips

12.7%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
- <0.80
- 0.80 - 0.89
- 0.90 - 1.0
- >1.0

Volume
- <10
- 10.01 - 100.00
- 100.01 - 200.00
- 200.01 - 300.00
- 300.01 - 400.00
- 400.01 - 500.00
- 500.01 - 600.00
- 600.01 - 700.00
- 700.01 - 800.00
- 800.01 - 900.00
- >900
- Exp Area
- River
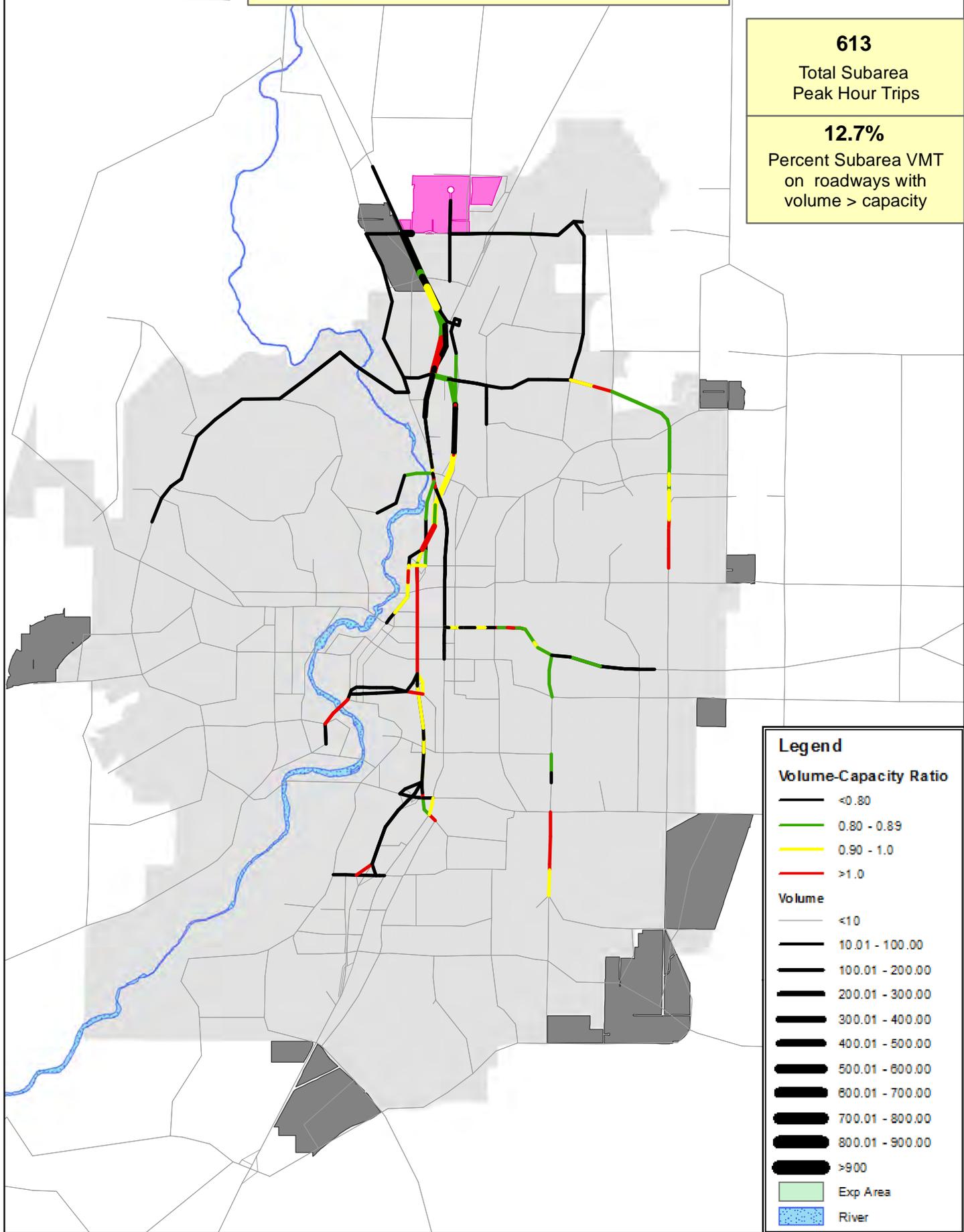
Figure 22

06892

Scenario 2: Northeast Edge Volume

459
Total Subarea
Peak Hour Trips

9.8%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
<0.80
0.80 - 0.89
0.90 - 1.0
>1.0

Volume
<10
10.01 - 100.00
100.01 - 200.00
200.01 - 300.00
300.01 - 400.00
400.01 - 500.00
500.01 - 600.00
600.01 - 700.00
700.01 - 800.00
800.01 - 900.00
>900

Exp Area
River

Figure 23

06893

Scenario 2: DSL Property Volume

1122
Total Subarea
Peak Hour Trips

14.9%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

———	<0.80
———	0.80 - 0.89
———	0.90 - 1.0
———	>1.0

Volume

	<10
	10.01 - 100.00
	100.01 - 200.00
	200.01 - 300.00
	300.01 - 400.00
	400.01 - 500.00
	500.01 - 600.00
	600.01 - 700.00
	700.01 - 800.00
	800.01 - 900.00
	>900
	Exp Area
	River

Figure 24
06894

Scenario 2: Elbow Volume

935
Total Subarea
Peak Hour Trips

15.6%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
—— <0.80
—— 0.80 - 0.89
—— 0.90 - 1.0
—— >1.0

Volume
—— <10
—— 10.01 - 100.00
—— 100.01 - 200.00
—— 200.01 - 300.00
—— 300.01 - 400.00
—— 400.01 - 500.00
—— 500.01 - 600.00
—— 600.01 - 700.00
—— 700.01 - 800.00
—— 800.01 - 900.00
—— >900

     Exp Area
     River

Figure 25

Scenario 2: Thumb Volume

1177
Total Subarea
Peak Hour Trips

8.7%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

Exp Area
River

Figure 26

06896

Scenario 3: West Area Volume

910
Total Subarea
Peak Hour Trips

7.6%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
- <0.80
- 0.80 - 0.89
- 0.90 - 1.0
- >1.0

Volume
- <10
- 10.01 - 100.00
- 100.01 - 200.00
- 200.01 - 300.00
- 300.01 - 400.00
- 400.01 - 500.00
- 500.01 - 600.00
- 600.01 - 700.00
- 700.01 - 800.00
- 800.01 - 900.00
- >900

- Exp Area
- River

Figure 27

Scenario 3: Shevlin Area Volume

257
Total Subarea
Peak Hour Trips

4.6%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

Exp Area

River
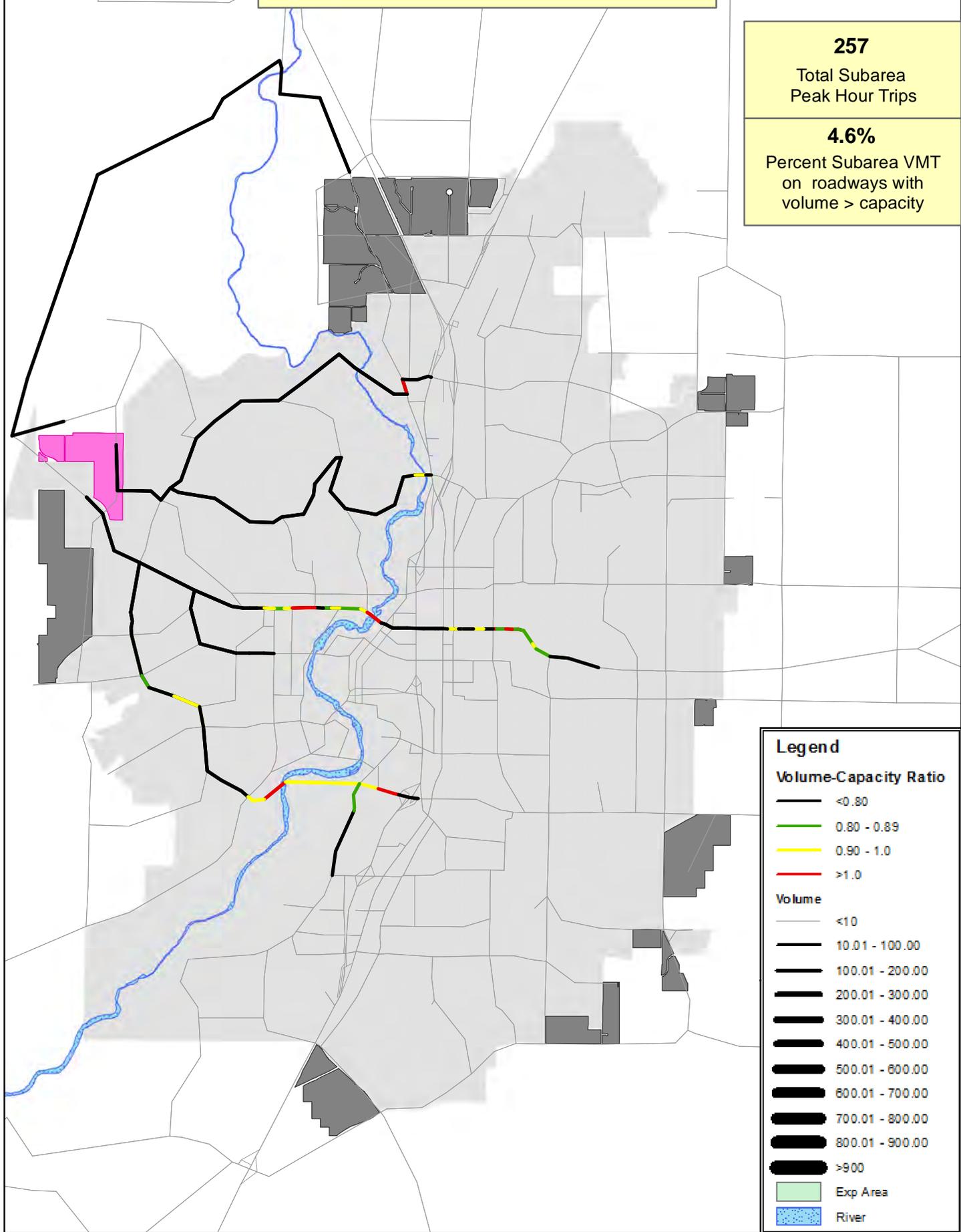
Figure 28

06898

Scenario 3: OB Riley/Gopher Gulch Area Volume

1797
Total Subarea
Peak Hour Trips

15.3%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

——	<0.80
——	0.80 - 0.89
——	0.90 - 1.0
——	>1.0

Volume

——	<10
——	10.01 - 100.00
——	100.01 - 200.00
——	200.01 - 300.00
——	300.01 - 400.00
——	400.01 - 500.00
——	500.01 - 600.00
——	600.01 - 700.00
——	700.01 - 800.00
——	800.01 - 900.00
——	>900
	Exp Area
	River
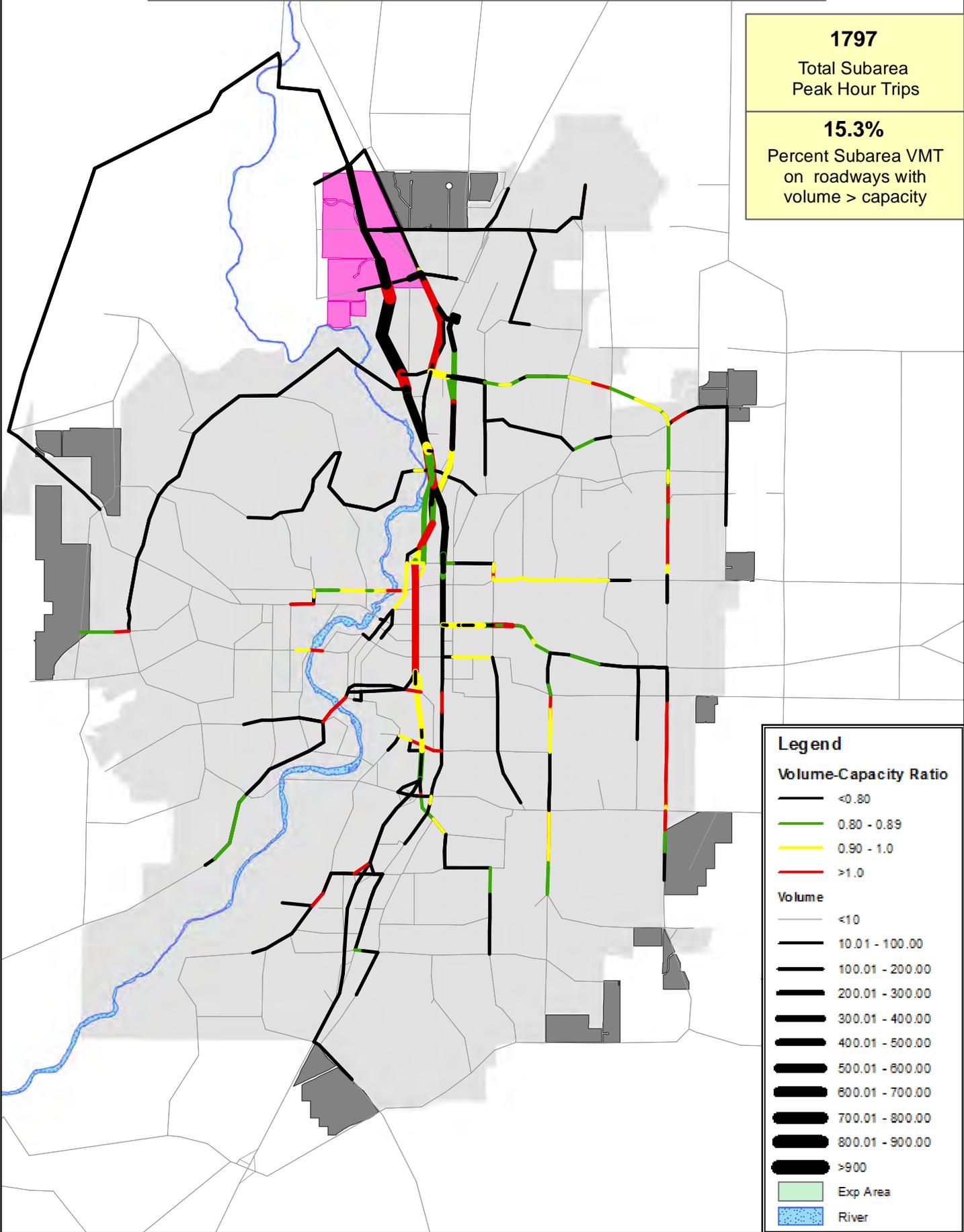
Figure 29

06899

Scenario 3: North Triangle Area Volume

876
Total Subarea
Peak Hour Trips

17.1%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

Exp Area
River
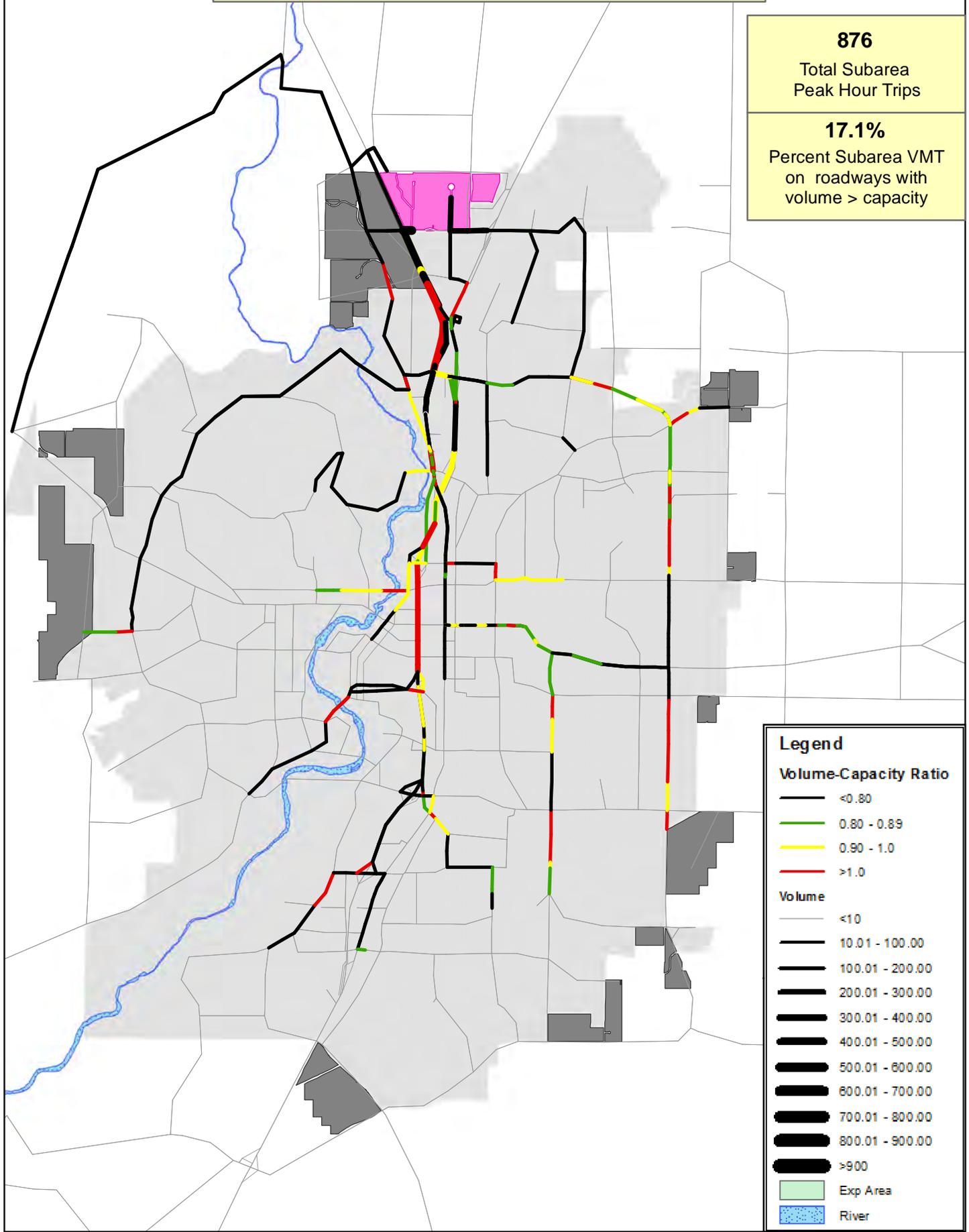
Figure 30

06900

Scenario 3: Northeast Edge Area Volume

513
Total Subarea
Peak Hour Trips

10.5%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900
Exp Area
River
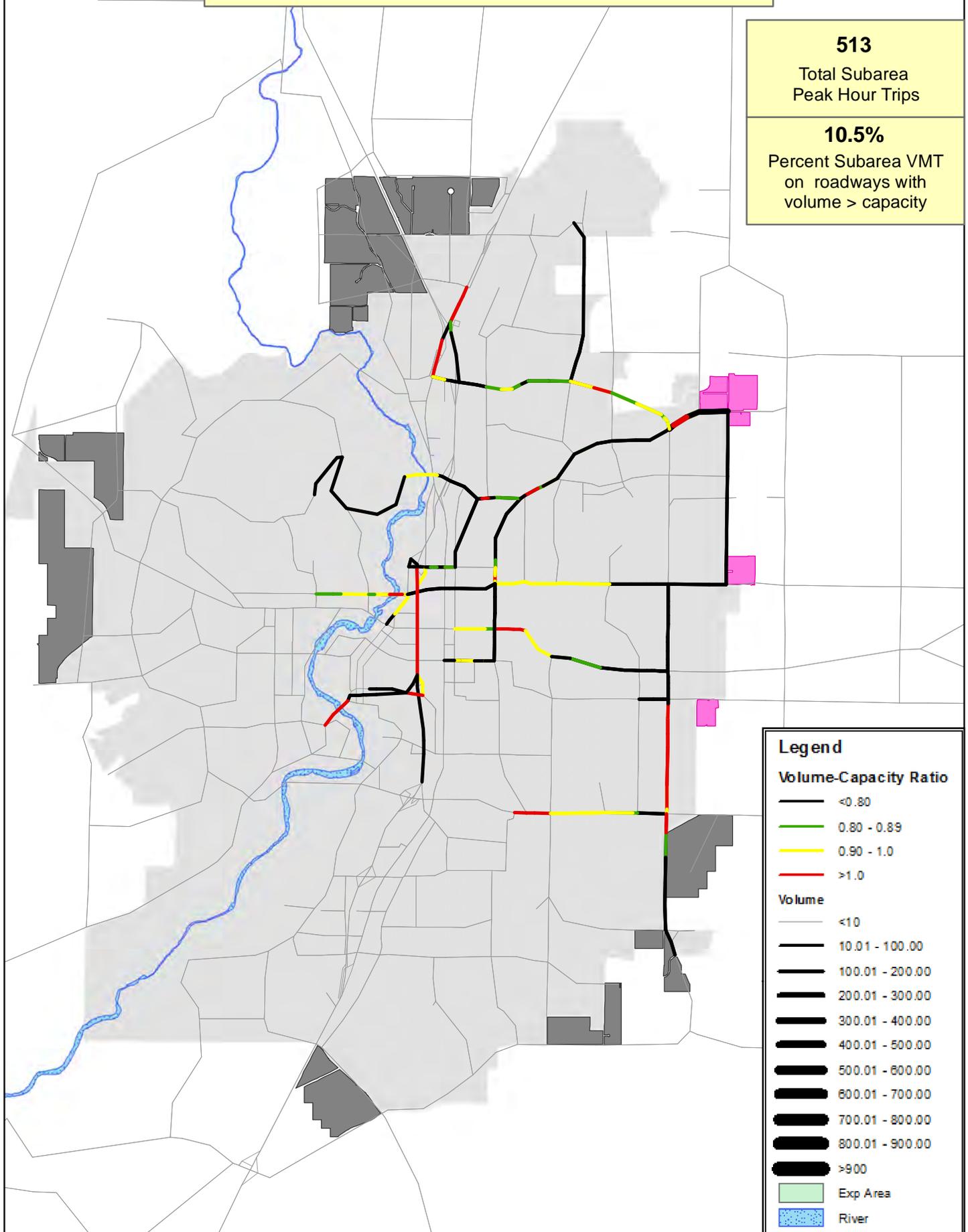
Figure 31

06901

Scenario 3: DSL Property Area Volume

1066
Total Subarea
Peak Hour Trips

18.3%
Percent Subarea VMT
on roadways with
volume > capacity
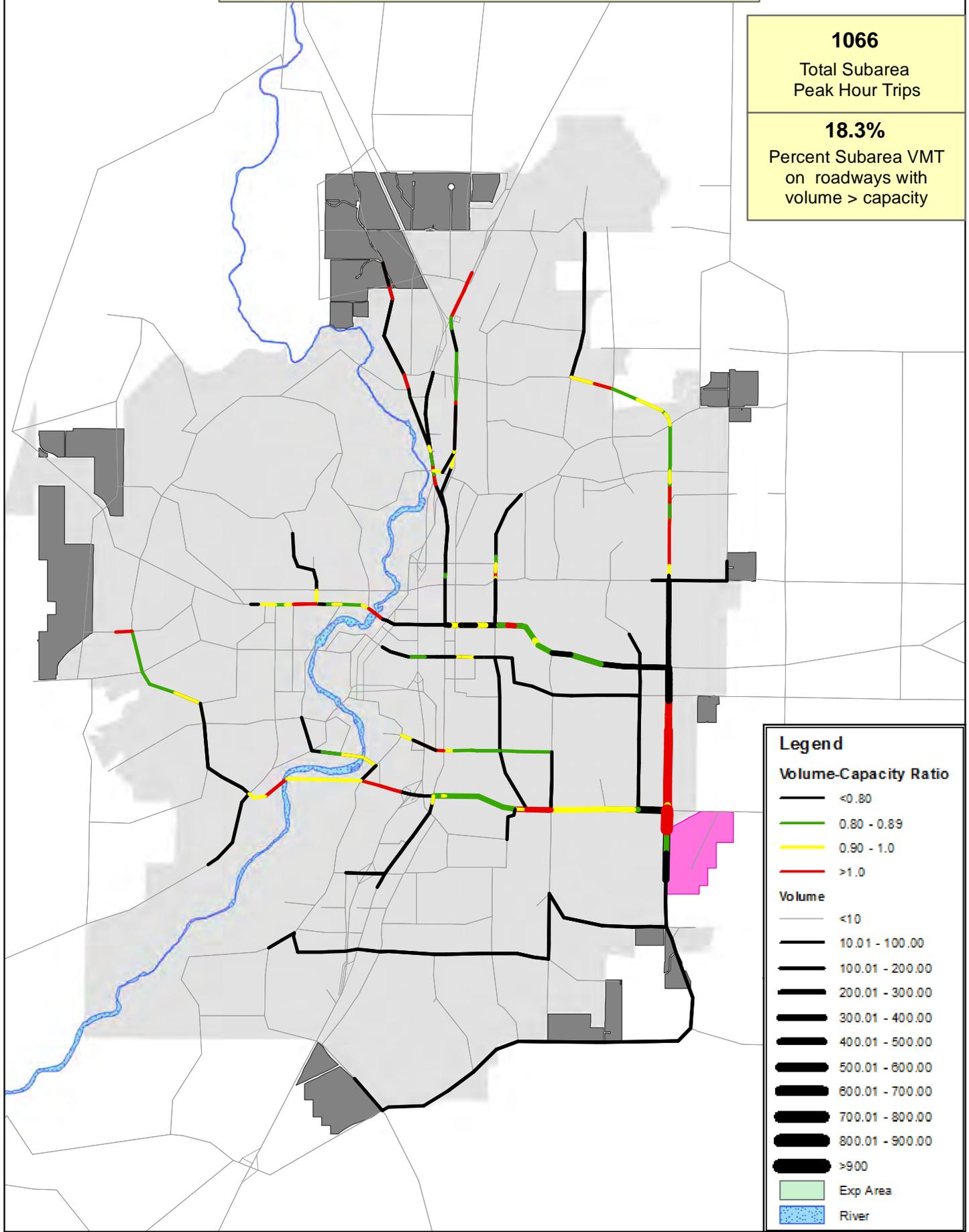
Legend

Volume-Capacity Ratio

——	<0.80
——	0.80 - 0.89
——	0.90 - 1.0
——	>1.0

Volume

——	<10
——	10.01 - 100.00
——	100.01 - 200.00
——	200.01 - 300.00
——	300.01 - 400.00
——	400.01 - 500.00
——	500.01 - 600.00
——	600.01 - 700.00
——	700.01 - 800.00
——	800.01 - 900.00
——	>900
Exp Area	
River	

Figure 32

06902

Scenario 3: Elbow Area Volume

282
Total Subarea
Peak Hour Trips

15.5%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

▨ Exp Area
▨ River

Figure 33
06903

Scenario 3: Thumb Area Volume

797
Total Subarea
Peak Hour Trips

9.1%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

——	<0.80
——	0.80 - 0.89
——	0.90 - 1.0
——	>1.0

Volume

——	<10
——	10.01 - 100.00
——	100.01 - 200.00
——	200.01 - 300.00
——	300.01 - 400.00
——	400.01 - 500.00
——	500.01 - 600.00
——	600.01 - 700.00
——	700.01 - 800.00
——	800.01 - 900.00
——	>900

	Exp Area
	River

Figure 34

06904

SAA 1: Shevlin Area Volume

797
Total Subarea
Peak Hour Trips

2.6%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

▬	<0.80
▬	0.80 - 0.89
▬	0.90 - 1.0
▬	>1.0

Volume

|	
▬	<10
▬	10.01 - 100.00
▬	100.01 - 200.00
▬	200.01 - 300.00
▬	300.01 - 400.00
▬	400.01 - 500.00
▬	500.01 - 600.00
▬	600.01 - 700.00
▬	700.01 - 800.00
▬	800.01 - 900.00
▬	>900
▬	Exp Area
▬	River

Figure 35

06905

SAA 1: OB Riley/Gopher Gulch Volume

454
Total Subarea
Peak Hour Trips

11.2%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

**Volume-Capacity Ratio**

— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume

— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

▢ Exp Area
▢ River

Figure 36

06906

SAA 1: North Triangle Volume

840
Total Subarea
Peak Hour Trips

12.1%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
—	<0.80
—	0.80 - 0.89
—	0.90 - 1.0
—	>1.0

Volume
—	<10
—	10.01 - 100.00
—	100.01 - 200.00
—	200.01 - 300.00
—	300.01 - 400.00
—	400.01 - 500.00
—	500.01 - 600.00
—	600.01 - 700.00
—	700.01 - 800.00
—	800.01 - 900.00
—	>900
	Exp Area
	River

Figure 37

06907

SAA 1: Northeast Edge Volume

1476
Total Subarea
Peak Hour Trips

11.2%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

▨ Exp Area
▨ River

Figure 38
06908

SAA 1: DSL Property Volume

728
Total Subarea
Peak Hour Trips

17.5%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
<0.80
0.80 - 0.89
0.90 - 1.0
>1.0

Volume
<10
10.01 - 100.00
100.01 - 200.00
200.01 - 300.00
300.01 - 400.00
400.01 - 500.00
500.01 - 600.00
600.01 - 700.00
700.01 - 800.00
800.01 - 900.00
>900

Exp Area
River

Figure 39

SAA 1: Elbow Volume

286
Total Subarea
Peak Hour Trips

14.8%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
	<0.80
	0.80 - 0.89
	0.90 - 1.0
	>1.0

Volume
	<10
	10.01 - 100.00
	100.01 - 200.00
	200.01 - 300.00
	300.01 - 400.00
	400.01 - 500.00
	500.01 - 600.00
	600.01 - 700.00
	700.01 - 800.00
	800.01 - 900.00
	>900
	Exp Area
	River

Figure 40
06910

SAA 1: Thumb Volume

1413
Total Subarea
Peak Hour Trips

12.0%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
- <0.80
- 0.80 - 0.89
- 0.90 - 1.0
- >1.0

Volume
- <10
- 10.01 - 100.00
- 100.01 - 200.00
- 200.01 - 300.00
- 300.01 - 400.00
- 400.01 - 500.00
- 500.01 - 600.00
- 600.01 - 700.00
- 700.01 - 800.00
- 800.01 - 900.00
- >900
- Exp Area
- River

Figure 41

06911

Scenario SAA2: OB Riley/Gopher Gulch Area Volume

3151
Total Subarea
Peak Hour Trips

16.1%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

———	<0.80
———	0.80 - 0.89
———	0.90 - 1.0
———	>1.0

Volume

———	<10
———	10.01 - 100.00
———	100.01 - 200.00
———	200.01 - 300.00
———	300.01 - 400.00
———	400.01 - 500.00
———	500.01 - 600.00
———	600.01 - 700.00
———	700.01 - 800.00
———	800.01 - 900.00
———	>900
Exp Area
River
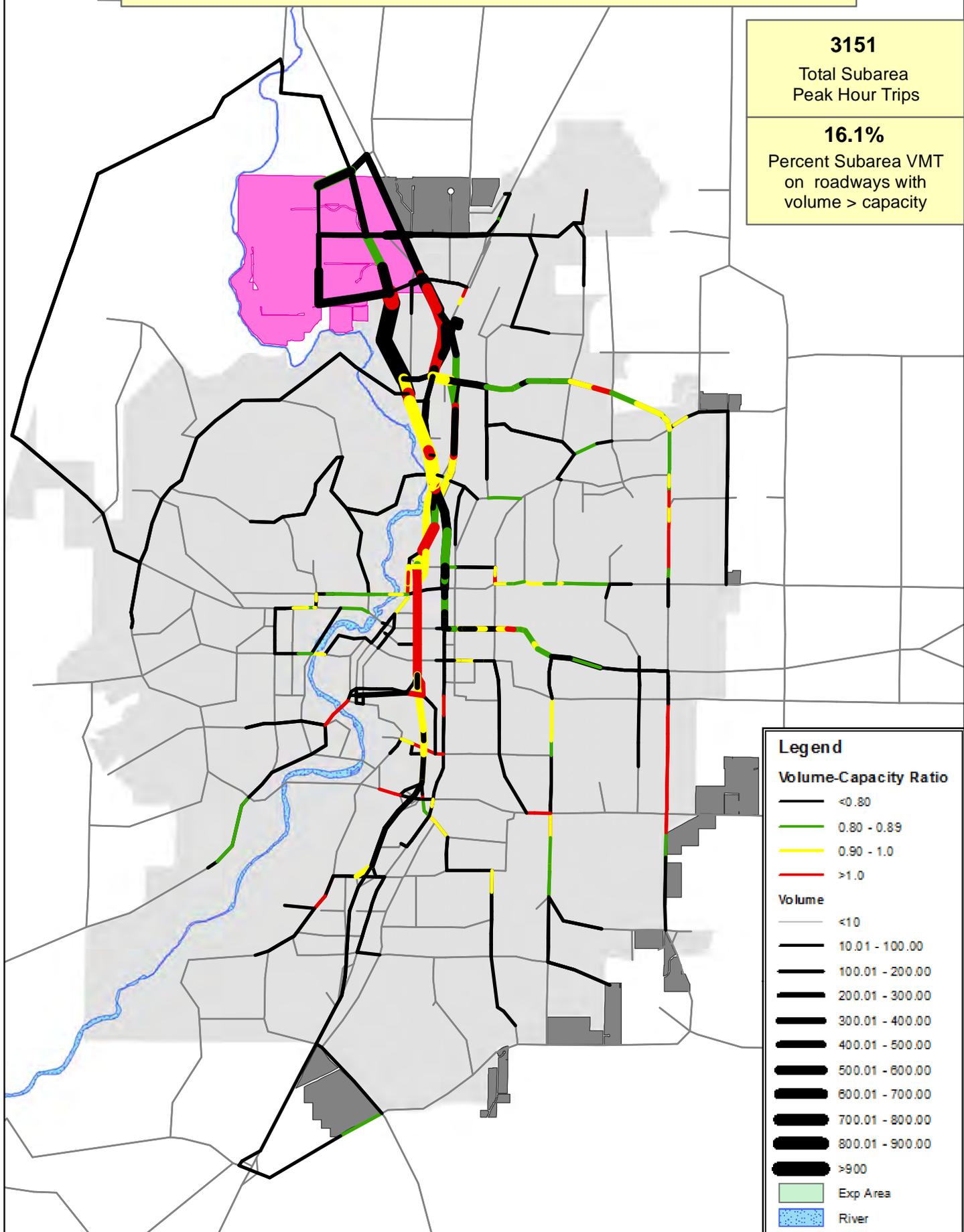
Figure 42

06912

Scenario SAA2: North Triangle Area Volume

878
Total Subarea
Peak Hour Trips

17.0%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

<0.80
0.80 - 0.89
0.90 - 1.0
>1.0

Volume

<10
10.01 - 100.00
100.01 - 200.00
200.01 - 300.00
300.01 - 400.00
400.01 - 500.00
500.01 - 600.00
600.01 - 700.00
700.01 - 800.00
800.01 - 900.00
>900

Exp Area
River
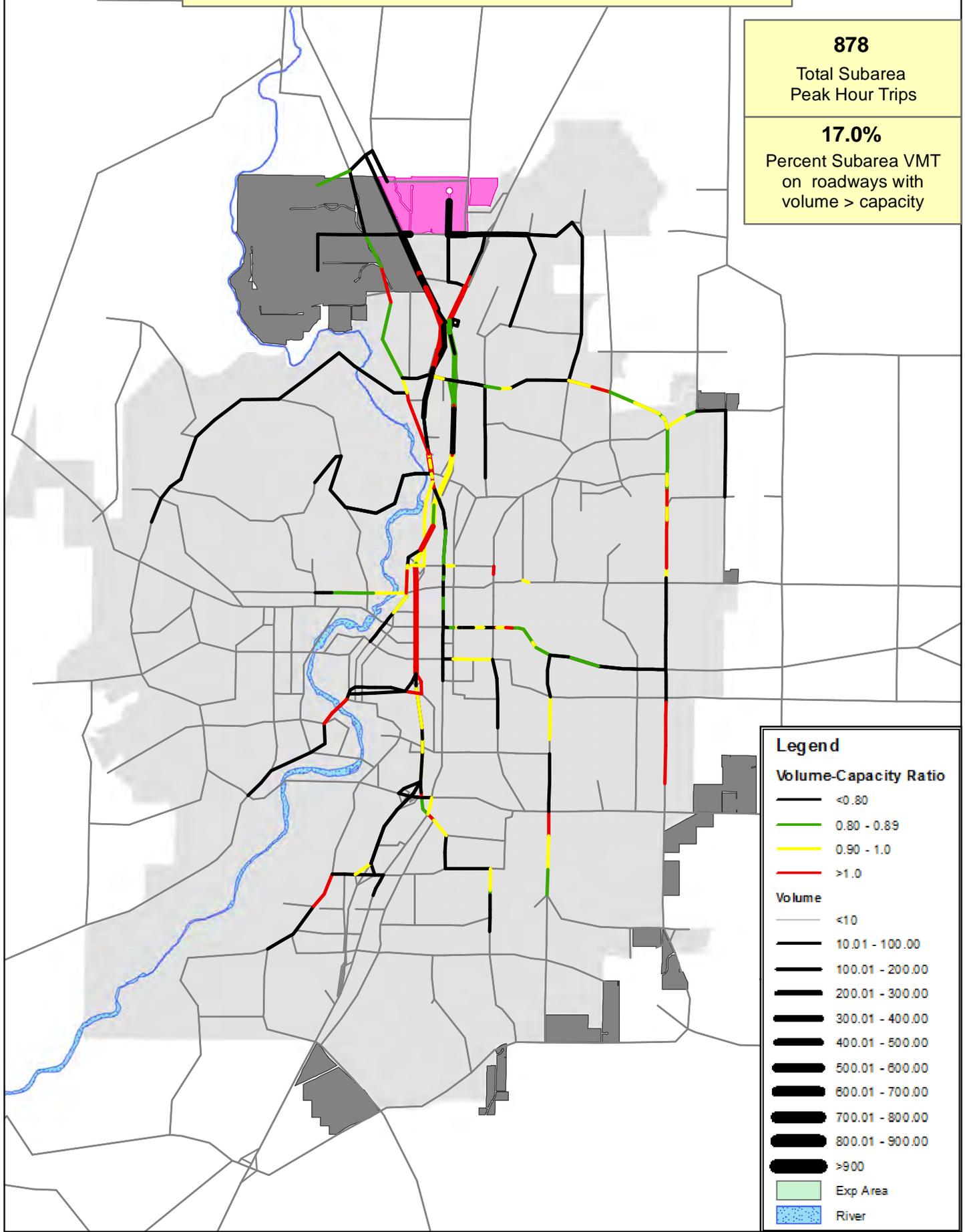
Figure 43
06913

Scenario SAA2: Northeast Edge Area Volume

351
Total Subarea
Peak Hour Trips

9.0%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

Exp Area

River
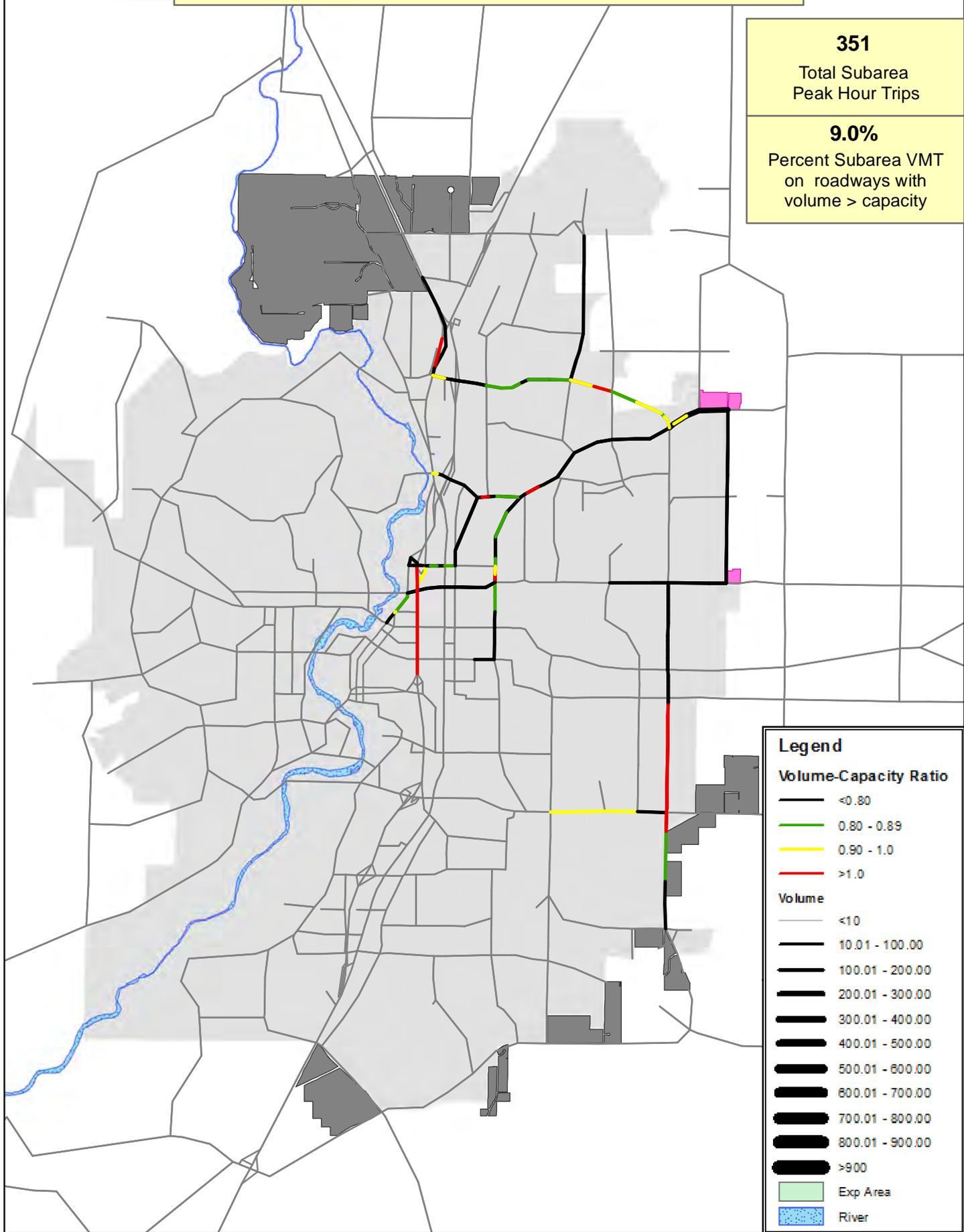
Figure 44

06914

Scenario SAA2: DSL Property Area Volume

1346
Total Subarea
Peak Hour Trips

16.4%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
—	<0.80
—	0.80 - 0.89
—	0.90 - 1.0
—	>1.0

Volume
	<10
	10.01 - 100.00
	100.01 - 200.00
	200.01 - 300.00
	300.01 - 400.00
	400.01 - 500.00
	500.01 - 600.00
	600.01 - 700.00
	700.01 - 800.00
	800.01 - 900.00
	>900
	Exp Area
	River
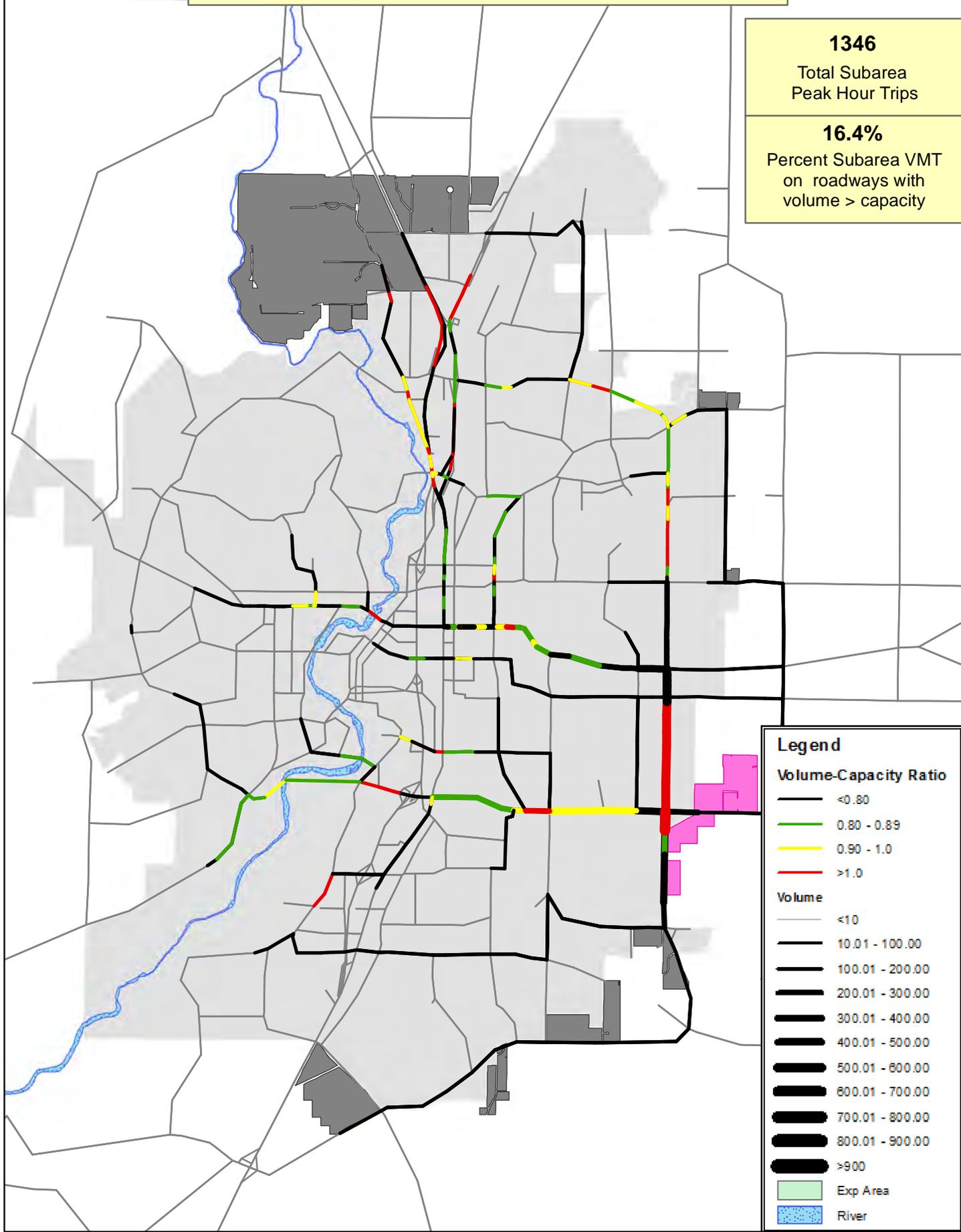
Figure 45
06915

Scenario SAA2: Elbow Area Volume

280
Total Subarea
Peak Hour Trips

16.6%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

———	<0.80
———	0.80 - 0.89
———	0.90 - 1.0
———	>1.0

Volume

———	<10
———	10.01 - 100.00
———	100.01 - 200.00
———	200.01 - 300.00
———	300.01 - 400.00
———	400.01 - 500.00
———	500.01 - 600.00
———	600.01 - 700.00
———	700.01 - 800.00
———	800.01 - 900.00
———	>900
Exp Area	
River	
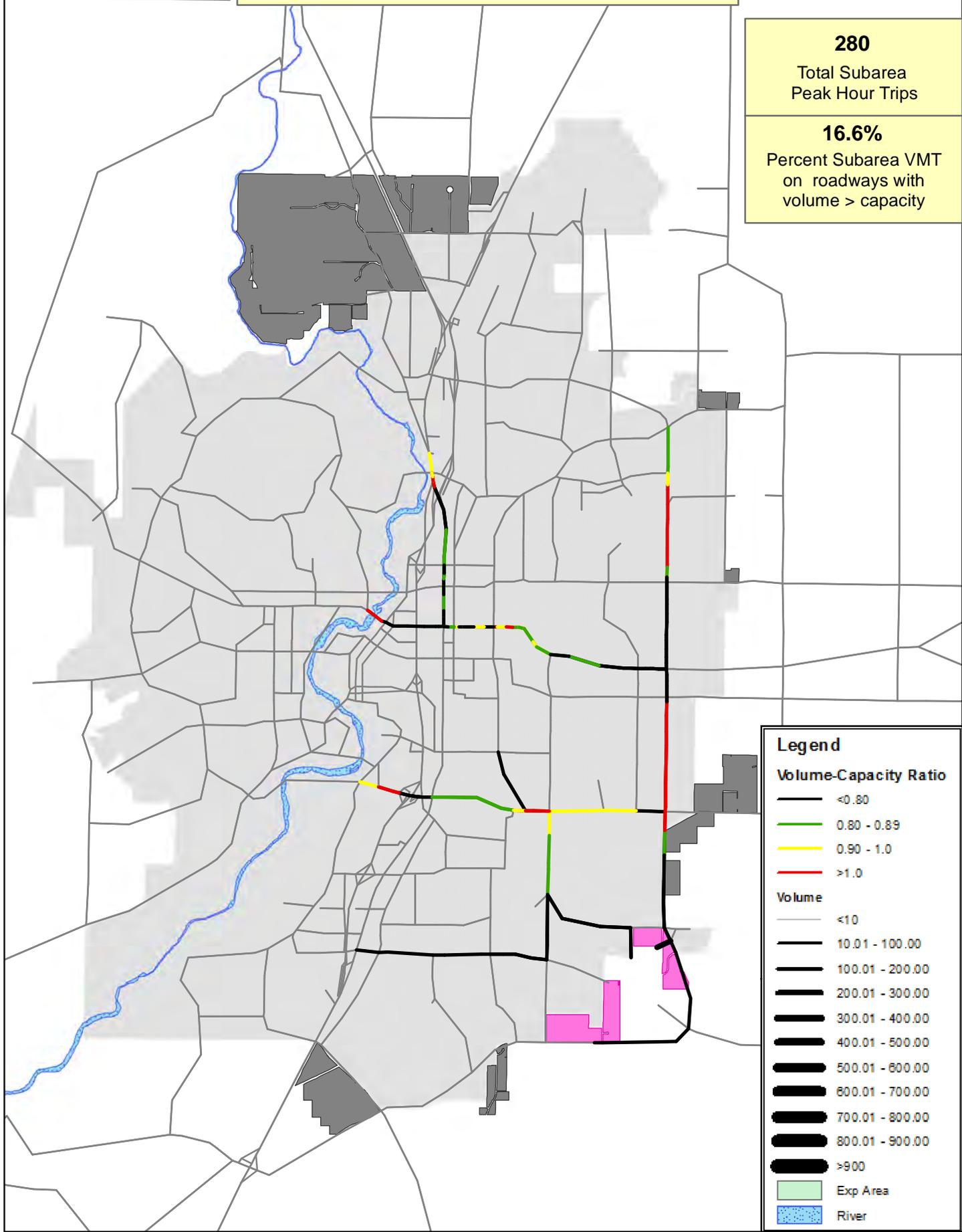
Figure 46

06916

Scenario SAA2: Thumb Area Volume

791
Total Subarea
Peak Hour Trips

8.0%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio

<0.80
0.80 - 0.89
0.90 - 1.0
>1.0

Volume

<10
10.01 - 100.00
100.01 - 200.00
200.01 - 300.00
300.01 - 400.00
400.01 - 500.00
500.01 - 600.00
600.01 - 700.00
700.01 - 800.00
800.01 - 900.00
>900

Exp Area
River
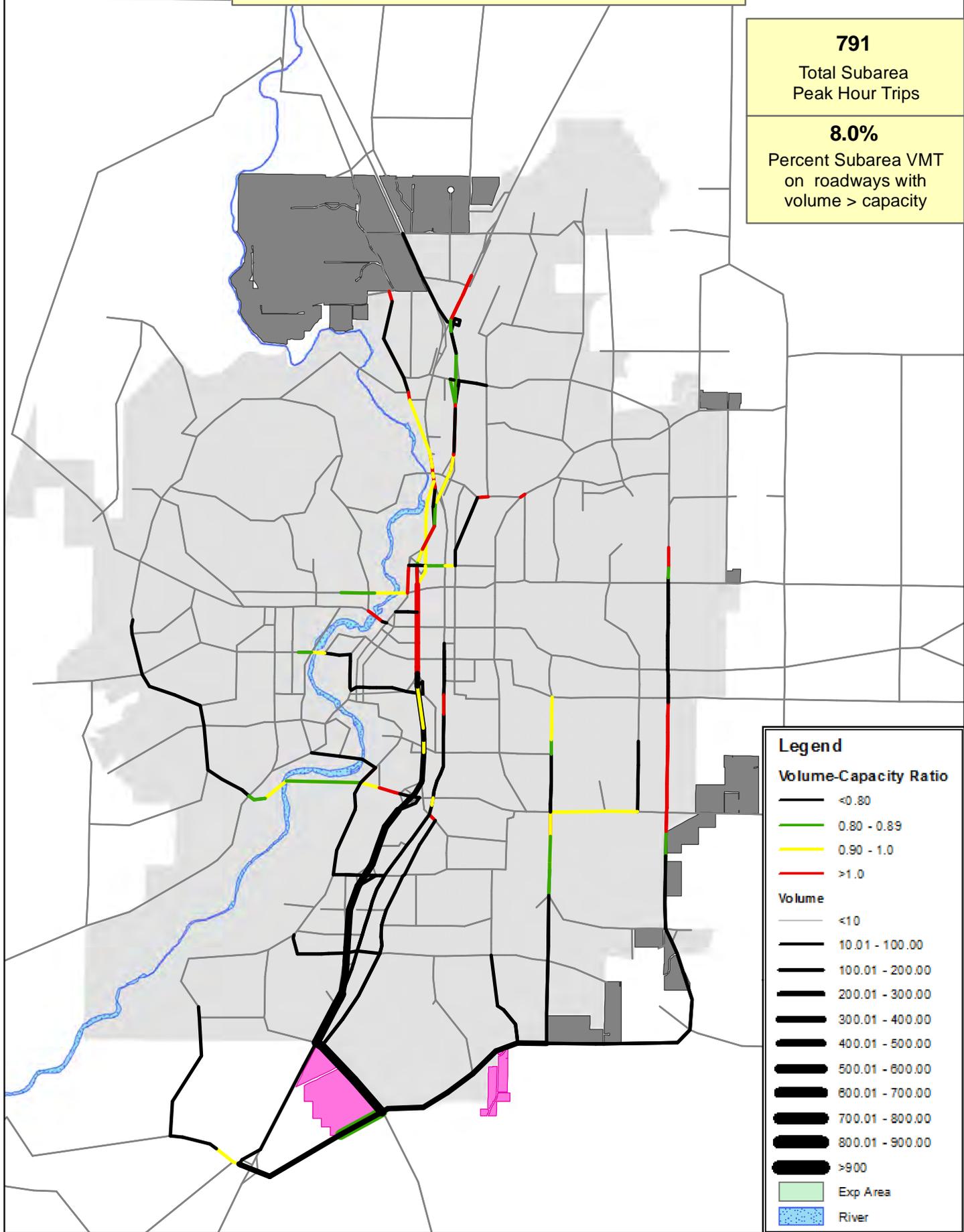
Figure 47

06917

Scenario SAA3: West Area Volume

1643
Total Subarea
Peak Hour Trips

9.8%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
- <0.80
- 0.80 - 0.89
- 0.90 - 1.0
- >1.0

Volume
- <10
- 10.01 - 100.00
- 100.01 - 200.00
- 200.01 - 300.00
- 300.01 - 400.00
- 400.01 - 500.00
- 500.01 - 600.00
- 600.01 - 700.00
- 700.01 - 800.00
- 800.01 - 900.00
- >900

- Exp Area
- River
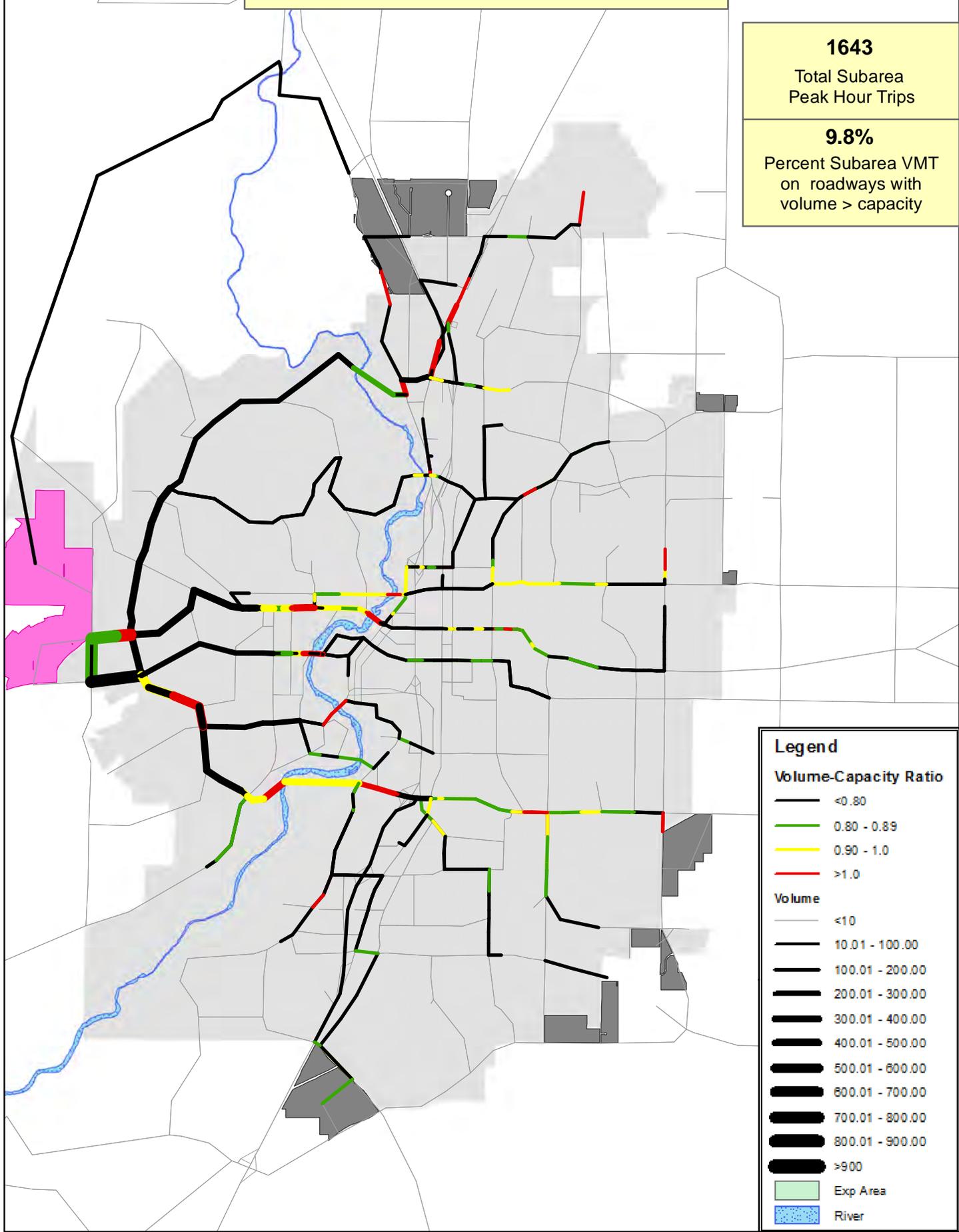
Figure 48
06918

Scenario SAA3: OB Riley/Gopher Gulch Area Volume

1293
Total Subarea
Peak Hour Trips

16.9%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
- <0.80
- 0.80 - 0.89
- 0.90 - 1.0
- >1.0

Volume
- <10
- 10.01 - 100.00
- 100.01 - 200.00
- 200.01 - 300.00
- 300.01 - 400.00
- 400.01 - 500.00
- 500.01 - 600.00
- 600.01 - 700.00
- 700.01 - 800.00
- 800.01 - 900.00
- >900
- Exp Area
- River
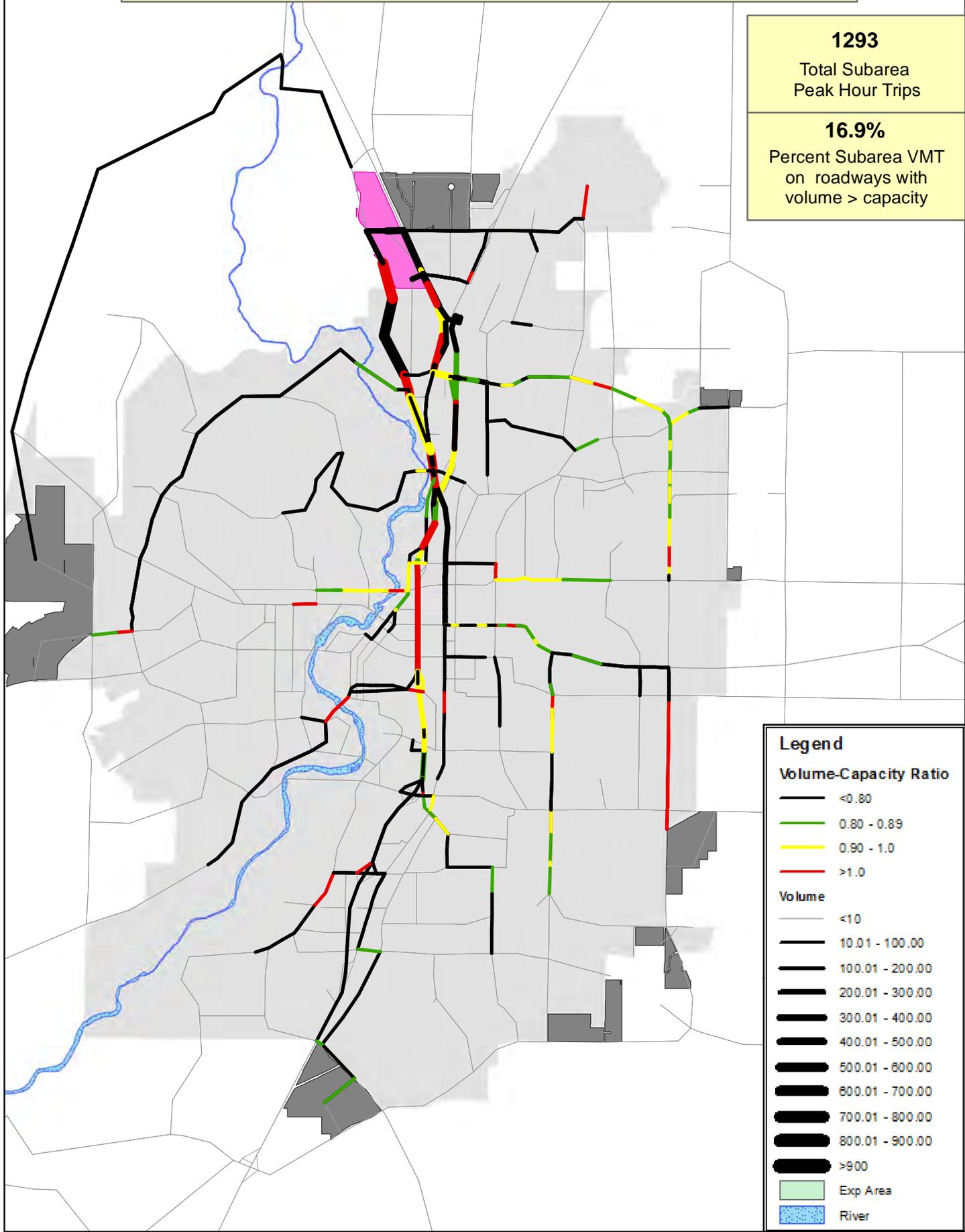
Figure 49

06919

Scenario SAA3: North Triangle Area Volume

859
Total Subarea
Peak Hour Trips

15.1%
Percent Subarea VMT
on roadways with
volume > capacity
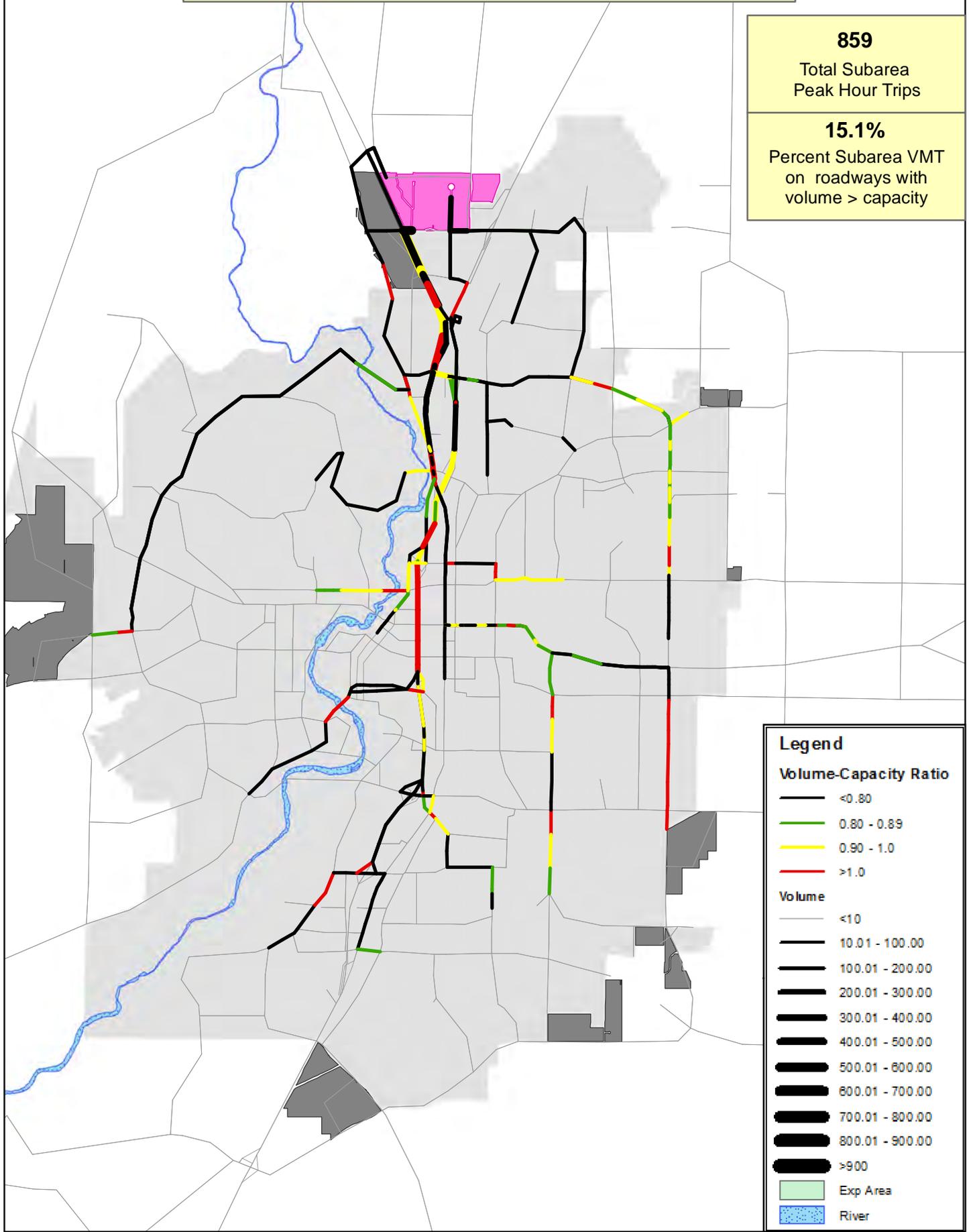
Legend

Volume-Capacity Ratio

⎯⎯	<0.80
⎯⎯	0.80 - 0.89
⎯⎯	0.90 - 1.0
⎯⎯	>1.0

Volume

⎯⎯	<10
⎯⎯	10.01 - 100.00
⎯⎯	100.01 - 200.00
⎯⎯	200.01 - 300.00
⎯⎯	300.01 - 400.00
⎯⎯	400.01 - 500.00
⎯⎯	500.01 - 600.00
⎯⎯	600.01 - 700.00
⎯⎯	700.01 - 800.00
⎯⎯	800.01 - 900.00
⎯⎯	>900
▮	Exp Area
▮	River

Figure 50

06920

Scenario SAA3: Northeast Edge Area Volume

346
Total Subarea
Peak Hour Trips
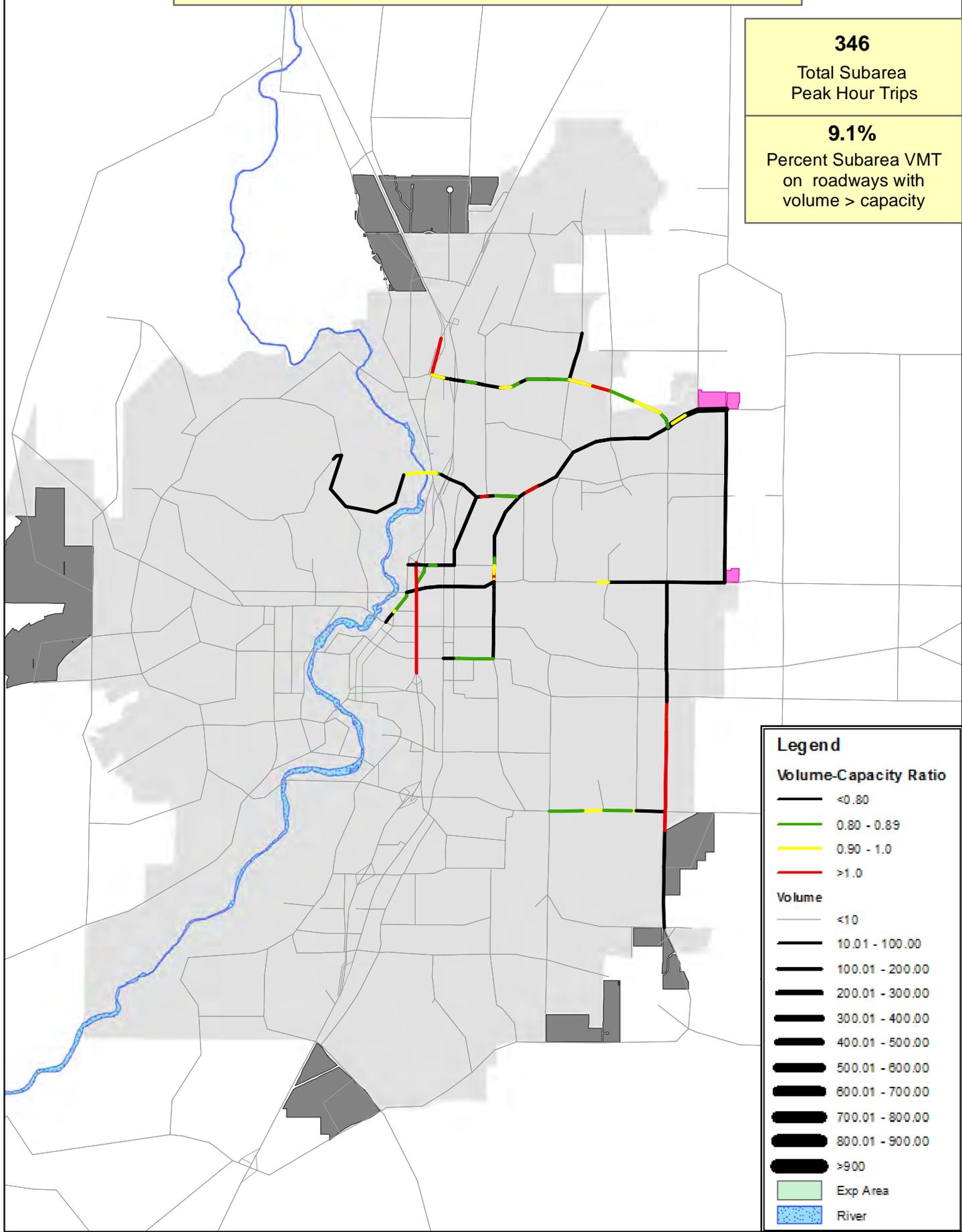
9.1%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
———	<0.80
———	0.80 - 0.89
———	0.90 - 1.0
———	>1.0

Volume
———	<10
———	10.01 - 100.00
———	100.01 - 200.00
———	200.01 - 300.00
———	300.01 - 400.00
———	400.01 - 500.00
———	500.01 - 600.00
———	600.01 - 700.00
———	700.01 - 800.00
———	800.01 - 900.00
———	>900

Exp Area

River

Figure 51
06921

Scenario SAA3: DSL Property Area Volume

1180
Total Subarea
Peak Hour Trips

18.4%
Percent Subarea VMT
on roadways with
volume > capacity
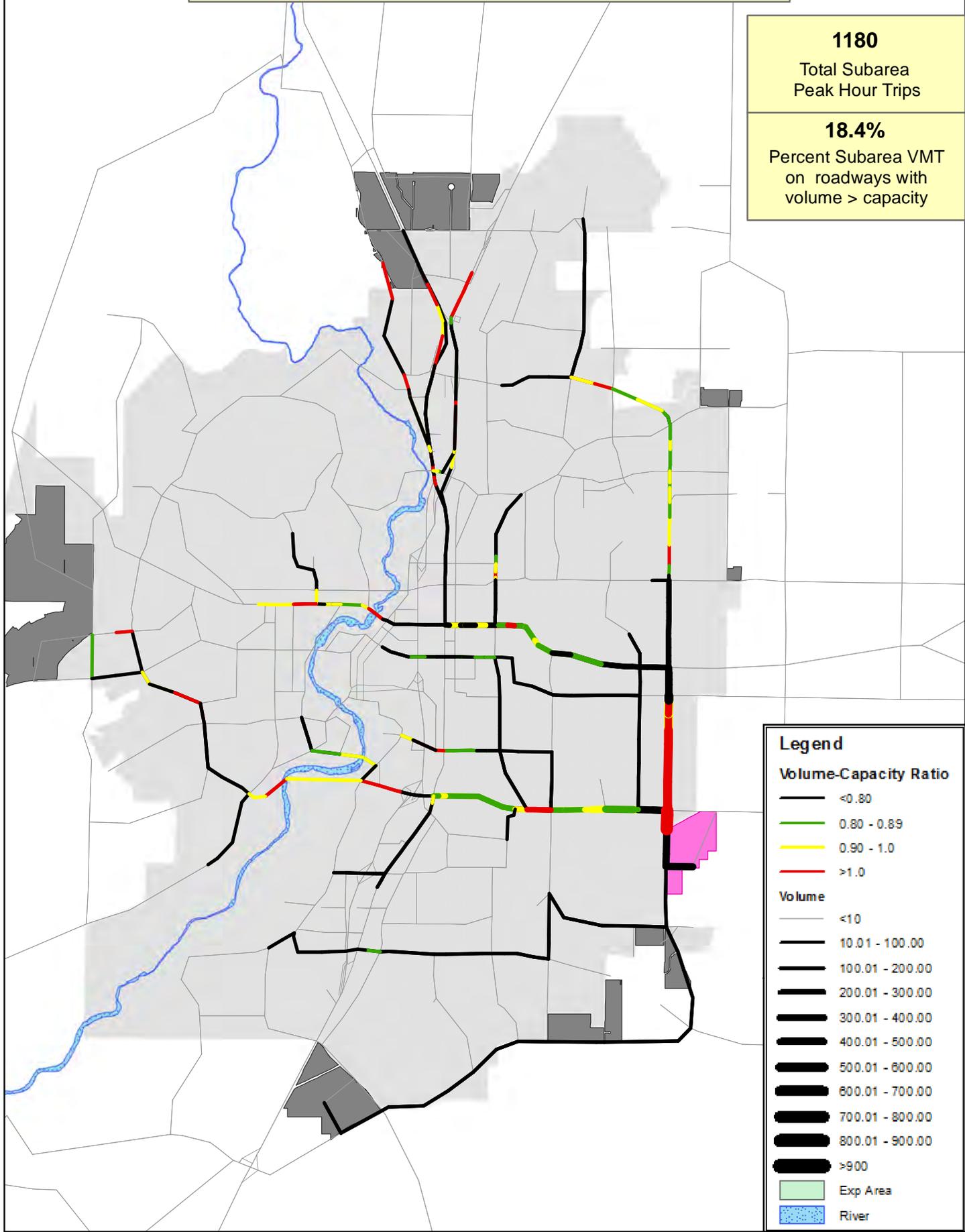
Legend

Volume-Capacity Ratio

───	<0.80
───	0.80 - 0.89
───	0.90 - 1.0
───	>1.0

Volume

───	<10
───	10.01 - 100.00
───	100.01 - 200.00
───	200.01 - 300.00
───	300.01 - 400.00
───	400.01 - 500.00
───	500.01 - 600.00
───	600.01 - 700.00
───	700.01 - 800.00
───	800.01 - 900.00
───	>900
Exp Area	
River	

Figure 52

06922

Scenario SAA3: Elbow Area Volume

277
Total Subarea
Peak Hour Trips

15.0%
Percent Subarea VMT
on roadways with
volume > capacity
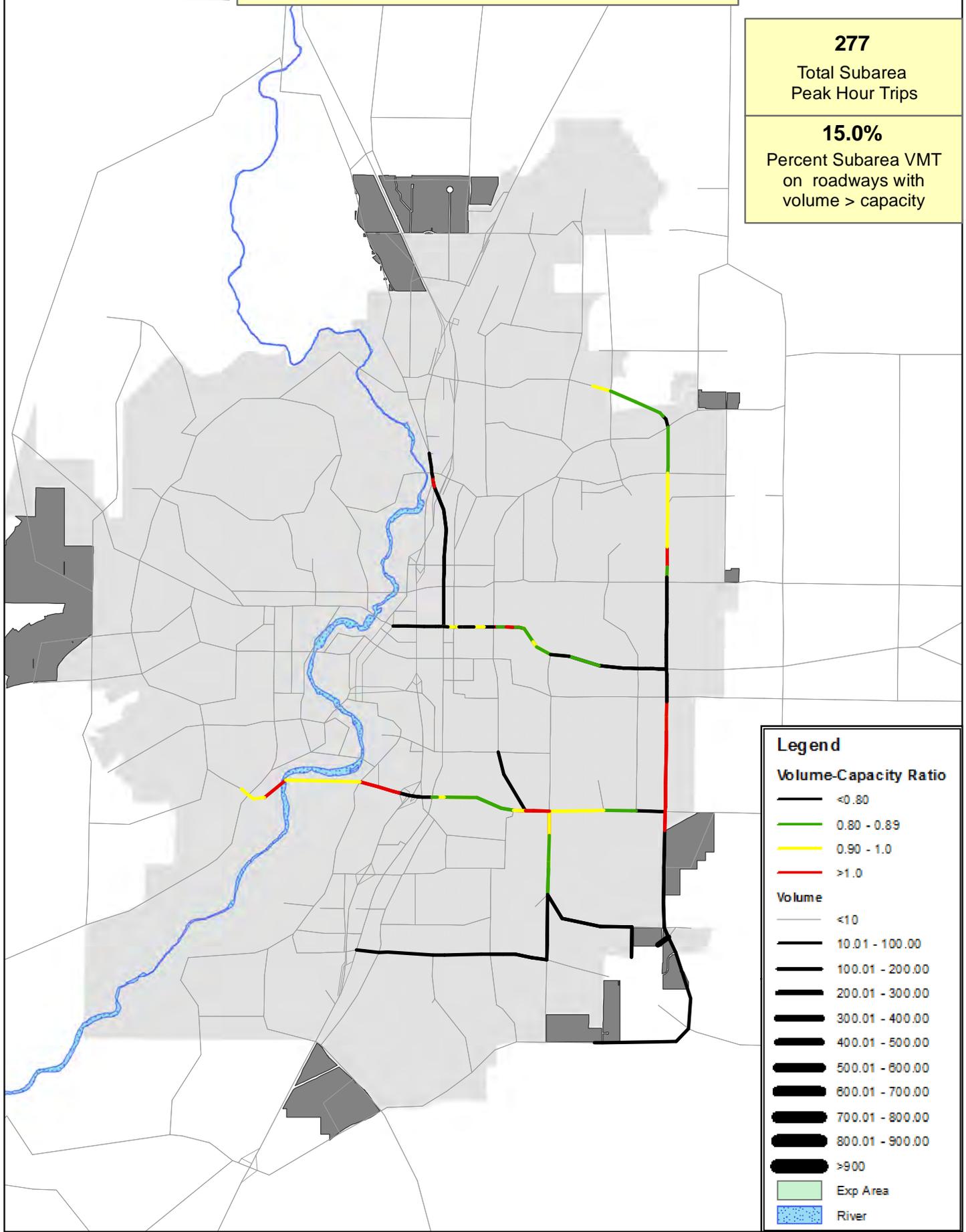
Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

Exp Area
River

Figure 53

06923

Scenario SAA3: Thumb Area Volume

1153
Total Subarea
Peak Hour Trips

8.7%
Percent Subarea VMT
on roadways with
volume > capacity

Legend

Volume-Capacity Ratio
— <0.80
— 0.80 - 0.89
— 0.90 - 1.0
— >1.0

Volume
— <10
— 10.01 - 100.00
— 100.01 - 200.00
— 200.01 - 300.00
— 300.01 - 400.00
— 400.01 - 500.00
— 500.01 - 600.00
— 600.01 - 700.00
— 700.01 - 800.00
— 800.01 - 900.00
— >900

Exp Area
River
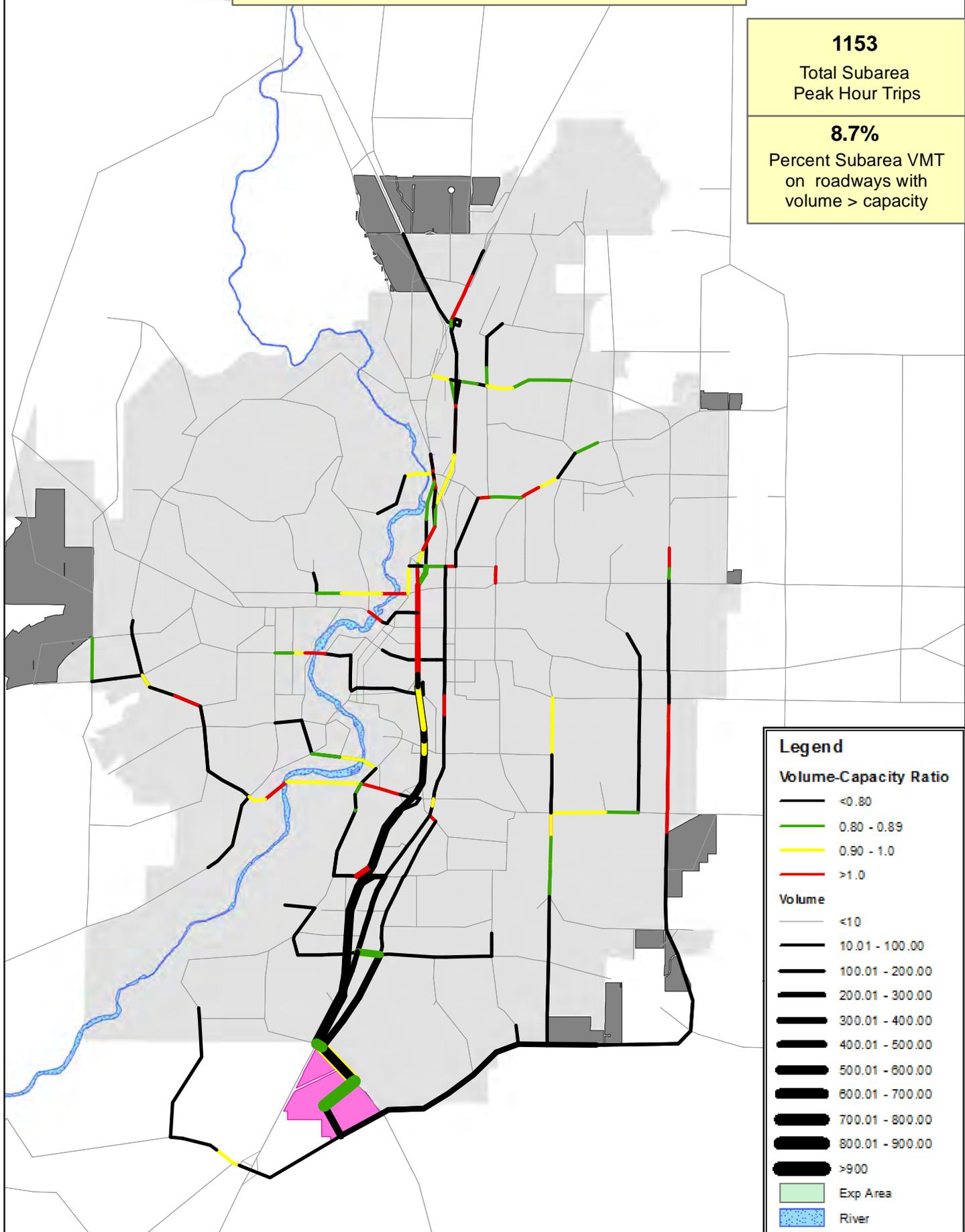
Figure 54

06924

SUMMARY OF CONGESTED MODEL LINKS

Street Name	To	From	Scenario 1	Scenario 2	Scenario 3	SAA 1	SAA 2	SAA 3
15th Street	Desert Wood Drive	Reed Market Road	y	y	y	n	n	n
15th Street	Wilson Avenue	Bear Creek Road	y	y	n	y	n	n
27th Street	Reed Market Road	Bear Creek Road	y	y	y	y	y	y
27th Street	Stevens Road	Reed Market Road	n	y	y	y	y	y
27th Street	Neff Road	~ Yellow Ribbon Drive	y	y	n	y	n	n
27th Street	Neff Road	Conners Avenue	n	n	n	n	n	y
27th Street	Rainier Drive	Faith	n	y	n	n	n	n
3rd Street	Davis Avenue	~(south of) Burnside Avenue	y	y	y	y	y	y
8th Street	Olney Avenue	Revere Avenue	y	y	y	n	y	y
Bond Street	Reed Market Road	Columbia Street	y	y	y	y	y	n
Brookswood Boulevard	Porcupine Road	Powers Road	y	y	y	y	y	y
Brosterhous Road	3rd Street	Parrell Road	y	y	y	y	y	n
Brosterhous Road	Kalahani Drive	American Lane	n	y	n	n	n	n
Butler Market Road	Studio Road	Boyd Acres Road	y	y	y	y	y	y
Butler Market Road	8th Street	Wells Acres Road	y	n	n	y	n	n
Butler Market Road	8th Street	Pilot Butte Drive	n	y	y	n	y	y
Butler Market Road	27th Street	Sandalwood Drive	y	n	y	y	n	n
China Hat	US 97	New Road (Thumb)	y	n	n	y	n	n
Colorado Avenue	Simpson Avenue	Industrial Way	y	y	y	y	y	y
Division Street	3rd Street	Hayes Avenue	y	n	n	n	n	n
Division Street	Reed Market Road	US 97	n	y	y	y	y	n
Empire Avenue	18th Street	Purcell Boulevard	y	y	y	y	y	y
Newport Avenue	Awbrey Road	Wall Street	y	y	y	n	n	y
Newport Avenue	9th Street	11th Street	n	y	y	n	n	y
Newport Avenue	11th Street	14th Street	n	n	y	n	n	y
Portland Avenue	1st Street	Wall Street	y	y	y	y	y	y
Reed Market Road	American Lane	15th Street	y	y	y	y	y	y
Reed Market Road	Brookswood Boulevard	US 97	y	y	y	y	y	y
Reed Market Road	Bachelor Drive	West Roundabout near Farewell Bend Park	y	y	y	y	n	y
Revere Avenue	4th Street	US 20	y	y	y	y	n	y
Scott Street	US 97 NB Ramps	US 97 SB Ramps	y	y	y	y	y	y
Talus Place	Cooley Road	North Boundary	y	y	y	y	y	y
Tumalo Avenue	Columbia Street	Riverside Boulevard	y	y	n	n	n	y
US 20	Butler Market Road	Division Street Off Ramp	n	y	n	y	n	n
US 20	8th Street	11th Street	y	y	y	n	y	y
US 20	Division Street	OB Riley Road	y	n	y	n	y	y
US 20	Empire Boulevard Ramp	US 97/US 20 Junction	y	y	y	y	y	y
US 20	US 97/US 20 Junction	Robal Road	n	n	y	y	y	y
US 97	~ Scott Street	Revere Avenue	y	n	y	y	y	y
US 97	Revere Avenue Ramps	~Lakeside Place	y	y	y	y	y	y
US 97	Revere Avenue Ramps	Empire Boulevard Ramps	y	y	n	n	n	n
US 97	US 97/US 20 Junction	Chavre Way	y	y	y	n	n	y
US 97	Butler Market Road	~Builders Court	n	y	y	y	y	y
US 97 NB on-ramp	Reed Market Road	US 97	y	n	n	n	n	n
US 97 SB Off-Ramp	US 97	Powers Road	n	y	y	y	n	y
Wall Street	Portland Avenue/Olney	Revere Avenue	y	y	n	y	y	n
Wilson Avenue	3rd Street	Bond Street	y	y	y	y	n	n
Wilson Avenue	3rd Street	Hill Street	n	n	n	n	n	y
15th Street	Virginia Road	Bear Creek Road	n	n	y	n	n	y
Crossing Drive	Clearwater Drive	Mount Washington Drive	n	n	y	n	n	y
15th Street	Neff Road	Wells Acres Road	n	n	y	n	n	n
OB Riley Road	Archie Briggs Road	Empire Avenue	n	n	y	n	y	y
OB Riley Road	Glen Vista Road/Hardy	Mathers Drive	n	n	y	n	y	y
15th Street	Twin Lakes Loop	Reed Market Road	n	n	n	n	y	y
US 97 NB on-ramp	Scott Street	US 97	n	n	n	n	n	n
27th Street	~Neff Road	~ Faith	n	n	n	n	y	n
US 97	US 97/US 20 Junction	Robal Road	n	n	n	n	y	n
Mount Washington Drive	Simpson Avenue	Flagliner Drive	n	n	n	n	n	y

Figure 55

Scenario 1: Pedestrian and Bicycle Barriers

Legend

New Roadways
State Route
Street

Bicycle & Pedestrian Paths

Existing
Planned
Future
Railroad
>25% Grade
River
Canal
Exp Area
Exp UGB
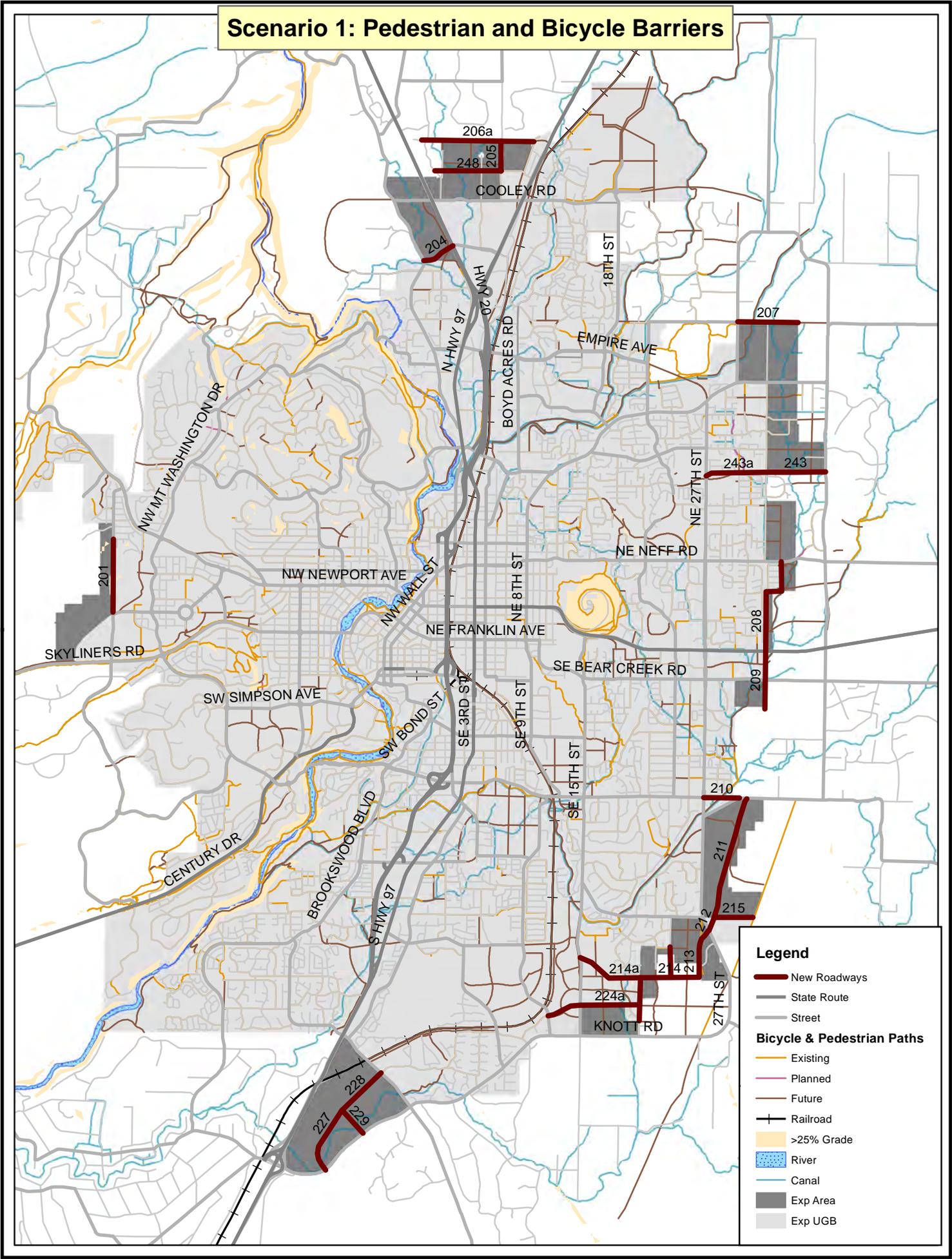
Figure 56

06926

Scenario 2: Pedestrian and Bicycle Barriers

Legend

New Roadways
State Route
Street

Bicycle & Pedestrian Paths
Existing
Planned
Future
Railroad
>25% Grade
River
Canal
Exp Area
Exp UGB
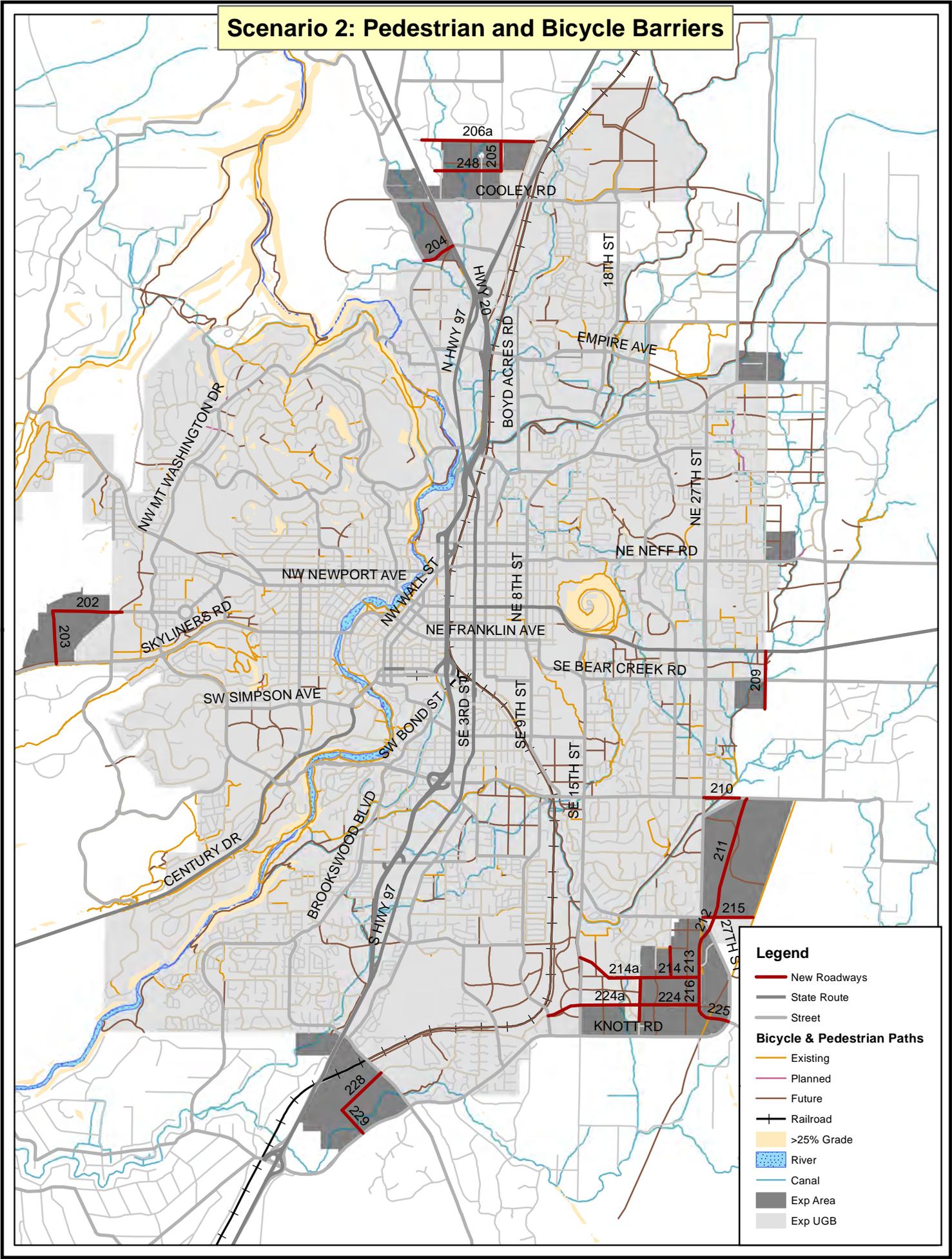
Figure 57

06927

Scenario 3: Pedestrian and Bicycle Barriers

COOLEY RD

ROBAL LN

18TH ST

N HWY 97

HWY 20

BOYD ACRES RD

EMPIRE AVE

NW MT WASHINGTON DR

NE 27TH ST

NE NEFF RD

NW NEWPORT AVE

NW WALL ST

NE 8TH ST

SKYLINERS RD

NE FRANKLIN AVE

BEAR CREEK RD

SW SIMPSON AVE

SW BOND ST

SE 3RD ST

SE 9TH ST

SE 15TH ST

REED MARKET RD

CENTURY DR

BROOKSWOOD BLVD

S HWY 97

27TH ST

KNOTT RD

Legend

New Roadways
State Route
Street

Bicycle & Pedestrian Paths
Existing
Planned
Future
Railroad
>25% Grade
River
Canal
Exp Area
Exp UGB

Figure 58

06928

SAAM 1: Pedestrian and Bicycle Barriers
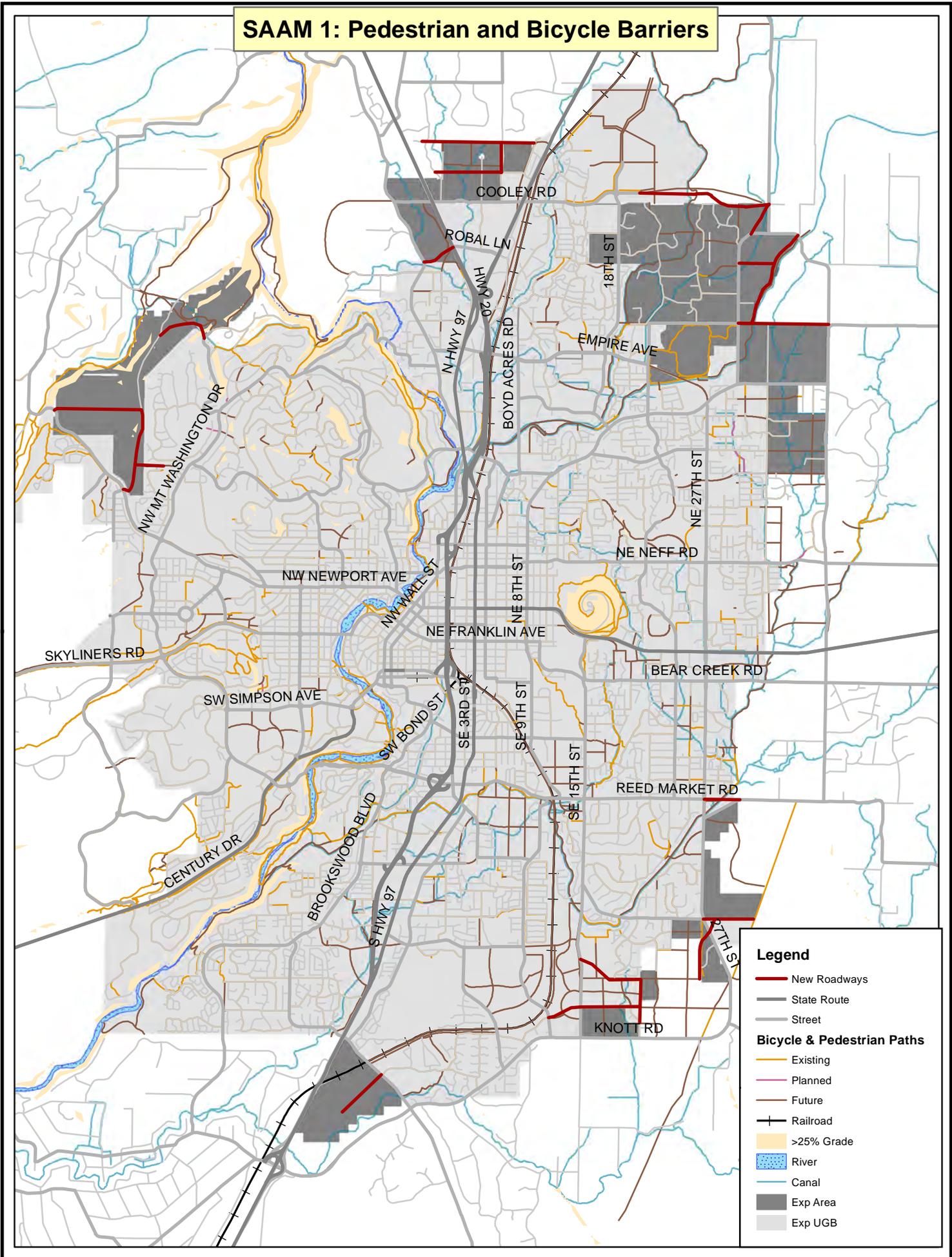
Legend

- New Roadways
- State Route
- Street

Bicycle & Pedestrian Paths

- Existing
- Planned
- Future
- Railroad
- >25% Grade
- River
- Canal
- Exp Area
- Exp UGB

Figure 59

06929

SAAM 2: Pedestrian and Bicycle Barriers

238
206a
248
205
239
222
221
COOLEY RD
223
204a
ROBAL LN
242

18TH ST

NW MT WASHINGTON DR
BOYD ACRES RD
EMPIRE AVE

NE 27TH ST

NE NEFF RD

NW NEWPORT AVE
NW WALL ST
NE 8TH ST

NE FRANKLIN AVE

SKYLINERS RD
BEAR CREEK RD

SW SIMPSON AVE
SW BOND ST
SE 3RD ST
SE 9TH ST

SE 15TH ST

210

212
213
27TH ST

CENTURY DR
BROOKSWOOD BLVD
S HWY 97

214a
224a
KNOTT RD

228
229

N HWY 97
HWY 20

Legend

New Roadways
State Route
Street

Bicycle & Pedestrian Paths

Existing
Planned
Future
Railroad
>25% Grade
River
Canal
Exp Area
Exp UGB

06930

SAAM 3: Pedestrian and Bicycle Barriers

Legend

New Roadways
State Route
Street

Bicycle & Pedestrian Paths
Existing
Planned
Future
Railroad
>25% Grade
River
Canal
Exp Area
Exp UGB

06931

Scenario 1: Network Improvements

Figure 62

06932

Scenario 2: Network Improvements

Figure 63

06933

Scenario 3: Network Improvements

206a
248 205
222a
223a
204b
ROBAL LN
HWY 20
S-4
COOLEY RD
18TH ST
EMPIRE AVE
BOYD ACRES RD
I-13
HWY N
HWY 97
NE 27TH ST
220
230
219
NW MT WASHINGTON DR
NE NEFF RD
217
201
202
203
NW NEWPORT AVE
NW BOND ST
SKYLINERS RD
NE 8TH ST
NE FRANKLIN AVE
SE BEAR CREEK RD
209
SW SIMPSON AVE
SE 3RD ST
SW BOND ST
SE 9TH ST
SE 15TH ST
210
211a
CENTURY DR
I-5
212
BROOKSWOOD BLVD
S HWY 97
213
214a
235
27TH ST
224a
KNOTT RD
228
229

Legend

- Intersection Improvements
- Capacity Improvements
- New Roadways
- State Route
- Street
- Street
- River
- Exp Area
- Exp UGB

Figure 64
06934

SAAM 1: Network Improvements

Legend

- ● Intersection Improvements
- ▬ Capacity Improvements
- ▬ New Roadways
- ▬ State Route
- — Street
- — Street
- ▦ River
- ▦ Exp Area
- ▢ Exp UGB

Figure 65

06935

SAAM 2: Network Improvements

06936

SAAM 3: Network Improvements

Legend

- ● Intersection Improvements
- ▬ Capacity Improvements
- ▬ New Roadways
- ▬ State Route
- ── Street
- ── Street
- ▒ River
- ▓ Exp Area
- ░ Exp UGB

06937

Scenario 1.2

New Roadways Cost Summary

Road ID	Roadway Name	Subarea	Length (miles)	Number of Lanes	Functional Class	Railroad Crossing	Number of Bridges	Road String	Unit Cost	Base Cost	ROW Cost	Crossing Cost	Total Cost
201	Skyline Ranch Road Extension	West	0.61	2	Collector	no	0	2Collector	$1,195	$3,848,874	$1,932,480	$0	$5,782,549
204	New Road	OB Riley	0.28	2	Collector	no	0	2Collector	$1,195	$1,766,696	$887,040	$0	$2,654,931
205	Hunnell Road Extension	Triangle	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407	$792,000	$0	$2,370,602
206a	New Road	Triangle	0.94	2	Collector	no	1	2Collector	$1,195	$5,931,051	$2,977,920	$3,724,450	$12,634,617
207	Yeoman Road Extension	NE Edge	0.5	2	Collector	no	2	2Collector	$1,195	$3,154,815	$1,584,000	$7,448,900	$12,188,910
208	New Road	NE Edge	0.88	2	Collector	no	0	2Collector	$1,195	$5,552,474	$2,787,840	$0	$8,341,509
209	New Road	NE Edge	0.49	2	Collector	no	1	2Collector	$1,195	$3,091,718	$1,552,320	$3,724,450	$8,369,683
210	New Road to Stevens	DSL	0.3	2	Arterial	no	1	2Arterial	$1,447	$2,292,241	$950,400	$3,724,450	$6,968,538
211	New Road	DSL	1	2	Collector	no	0	2Collector	$1,195	$6,309,629	$3,168,000	$0	$9,478,824
212	New Road	DSL	0.12	2	Collector	no	0	2Collector	$1,195	$757,155	$380,160	$0	$1,138,510
213	New Road	Elbow	0.42	2	Collector	no	0	2Collector	$1,195	$2,650,044	$1,330,560	$0	$3,981,799
214	New Road	Elbow	0.5	2	Arterial	yes	1	2Arterial	$1,447	$3,820,401	$1,584,000	$14,212,303	$19,618,152
214a	New Road	UGB	0.56	2	Collector	yes	1	2Collector	$1,195	$3,533,392	$1,774,080	$14,212,303	$19,520,971
215	New Road	DSL	0.32	2	Collector	no	0	2Collector	$1,195	$2,019,081	$1,013,760	$0	$3,034,036
224a	New Road	UGB	0.78	2	Collector	no	0	2Collector	$1,195	$4,921,511	$2,471,040	$0	$7,393,746
226	New Road	Elbow	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407	$792,000	$0	$2,370,602
227	New Road	Thumb	0.58	2	Collector	no	1	2Collector	$1,195	$3,659,585	$1,837,440	$3,724,450	$9,222,670
228	New Road	Thumb	0.45	2	Collector	no	0	2Collector	$1,195	$2,839,333	$1,425,600	$0	$4,266,128
229	New Road	Thumb	0.26	2	Collector	no	1	2Collector	$1,195	$1,640,504	$823,680	$3,724,450	$6,189,829
234	Raintree Courth Extension	Elbow	0.13	2	Collector	no	0	2Collector	$1,195	$820,252	$411,840	$0	$1,233,287
235	Raintree Courth Extension north	Elbow	0.23	2	Collector	no	0	2Collector	$1,195	$1,451,215	$728,640	$0	$2,181,050
243	New Road	NE Edge	0.5	2	Collector	no	1	2Collector	$1,195	$3,154,815	$1,584,000	$3,724,450	$8,464,460
243a	New Road	NE Edge	0.51	2	Collector	no	0	2Collector	$1,195	$3,217,911	$1,615,680	$0	$4,834,786
248	Loco Road Extension	Triangle	0.56	2	Collector	no	2	2Collector	$1,195	$3,533,392	$1,774,080	$7,448,900	$12,757,568
												Total (New Roadways)	**$174,997,755**

Corridor Improvement Projects

P#	Corridor	Begin	End	Improvement	Distance	Unit Cost	Cost
S-1	China Hat Road	US 97 NB Ramps	New Road (thumb)	widen from 2 lane to 3 lane	2,350	$ 1,085	$ 2,549,750
S-2	Knott Road	US 97	15th Street	widen from 2 lane to 3 lane	15,600	$ 1,085	$ 13,447,902
						Total (Corridor)	**$15,997,652**

Intersection Improvement Projects

P#	Begin	End	Improvement	Cost
I-1	US 97 SB Ramps	Baker Road/Knott Road	roundabout or trafic signal	$2,366,666
I-2	China Hat Road	New Road	roundabout or trafic signal	$2,366,666
I-4	27th Street	New Road	roundabout or trafic signal	$2,366,666
I-5	15th Street	Sherwood Forest Drive/Ferguson Road	roundabout or trafic signal	$2,366,666
			Total (Intersection)	**$9,466,664**

Cost Summary

New Roadways	$174,997,755
Corridor Capacity	$15,997,652
Intersection Capacity	$9,466,664
TOTAL	**$200,462,071**

06938

Scenario 2.1

New Roadways Cost Summary

Road ID	Roadway Name	Subarea	Length (miles)	Number of Lanes	Functional Class	Railroad Crossing	Number of Bridges	Road String	Unit Cost	Base Cost	ROW Cost	Crossing Cost	Total Cost
202	Crossing Drive Extension	West	0.58	2	Collector	no	0	2Collector	$1,195	$3,659,585	$1,837,440	$0	$5,498,220
203	McClain Drive Extension South	West	0.44	2	Collector	no	0	2Collector	$1,195	$2,776,237	$1,393,920	$0	$4,171,352
204	New Road	OB Riley	0.28	2	Collector	no	0	2Collector	$1,195	$1,766,696	$887,040	$0	$2,654,931
205	Hunnell Road Extension	Triangle	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407	$792,000	$0	$2,370,602
206a	New Road	Triangle	0.94	2	Collector	no	1	2Collector	$1,195	$5,931,051	$2,977,920	$3,724,450	$12,634,617
209	New Road	NE Edge	0.49	2	Collector	no	1	2Collector	$1,195	$3,091,718	$1,552,320	$3,724,450	$8,369,683
210	New Road to Stevens	DSL	0.3	2	Arterial	no	1	2Arterial	$1,447	$2,292,241	$950,400	$3,724,450	$6,968,538
211	New Road	DSL	1	2	Collector	no	0	2Collector	$1,195	$6,309,629	$3,168,000	$0	$9,478,824
212	New Road	DSL	0.12	2	Collector	no	0	2Collector	$1,195	$757,155	$380,160	$0	$1,138,510
213	New Road	Elbow	0.42	2	Collector	no	0	2Collector	$1,195	$2,650,044	$1,330,560	$0	$3,981,799
214	New Road	Elbow	0.5	2	Arterial	yes	1	2Arterial	$1,447	$3,820,401	$1,584,000	$14,212,303	$19,618,152
214a	New Road	UGB	0.56	2	Collector	yes	1	2Collector	$1,195	$3,533,392	$1,774,080	$14,212,303	$19,520,971
215	New Road	DSL	0.32	2	Collector	no	0	2Collector	$1,195	$2,019,081	$1,013,760	$0	$3,034,036
215a	New Road	DSL	0.1	2	Collector	no	0	2Collector	$1,195	$630,963	$316,800	$0	$948,958
216	New Road	Elbow	0.23	2	Collector	no	0	2Collector	$1,195	$1,451,215	$728,640	$0	$2,181,050
224	New Road	Elbow	0.5	2	Collector	no	0	2Collector	$1,195	$3,154,815	$1,584,000	$0	$4,740,010
224a	New Road	UGB	0.78	2	Collector	no	0	2Collector	$1,195	$4,921,511	$2,471,040	$0	$7,393,746
225	New Road	Elbow	0.32	2	Collector	no	0	2Collector	$1,195	$2,019,081	$1,013,760	$0	$3,034,036
226	New Road	Elbow	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407	$792,000	$0	$2,370,602
228	New Road	Thumb	0.45	2	Collector	no	0	2Collector	$1,195	$2,839,333	$1,425,600	$0	$4,266,128
229	New Road	Thumb	0.26	2	Collector	no	1	2Collector	$1,195	$1,640,504	$823,680	$3,724,450	$6,189,829
234	Raintree Courth Extension	Elbow	0.13	2	Collector	no	0	2Collector	$1,195	$820,252	$411,840	$0	$1,233,287
235	Raintree Courth Extension north	Elbow	0.23	2	Collector	no	0	2Collector	$1,195	$1,451,215	$728,640	$0	$2,181,050
248	Loco Road Extension	Triangle	0.56	2	Collector	no	2	2Collector	$1,195	$3,533,392	$1,774,080	$7,448,900	$12,757,568
												Total (New Roadways)	**$146,736,498**

Corridor Improvement Projects

P#	Corridor	Begin	End	Improvement	Distance	Unit Cost	Cost
						Total (Corridor)	$0

Intersection Improvement Projects

P#	Begin	End	Improvement	Cost
I-4	27th Street	New Road	roundabout or trafic signal	$2,366,666
I-5	15th Street	Sherwood Forest Drive/Ferguson Road	roundabout or trafic signal	$2,366,666
I-13	Dechutes Market Road	Butlet Market Road	roundabout or trafic signal	$2,366,666
			Total (Intersection)	**$7,099,998**

Cost Summary

New Roadways	$146,736,498
Corridor Capacity	$0
Intersection Capacity	$7,099,998
TOTAL	**$153,836,496**

06939

Scenario 3.1

New Roadways Cost Summary

Road ID	Roadway Name	Subarea	Length (miles)	Number of Lanes	Functional Class	Railroad Crossing	Number of Bridges	Road String	Unit Cost	Base Cost	ROW Cost	Crossing Cost	Total Cost
201	Skyline Ranch Road Extension	West	0.61	2	Collector	no	0	2Collector	$1,195	$3,848,874	$1,932,480	$0	$5,782,549
202	Crossing Drive Extension	West	0.58	2	Collector	no	0	2Collector	$1,195	$3,659,585	$1,837,440	$0	$5,498,220
203	McClain Drive Extension South	West	0.44	2	Collector	no	0	2Collector	$1,195	$2,776,237	$1,393,920	$0	$4,171,352
204b	New Road	OB Riley	0.82	2	Collector	no	0	2Collector	$1,195	$5,173,896	$2,597,760	$0	$7,772,851
205	Hunnell Road Extension	Triangle	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407	$792,000	$0	$2,370,602
206a	New Road	Triangle	0.94	2	Collector	no	1	2Collector	$1,195	$5,931,051	$2,977,920	$3,724,450	$12,634,617
209	New Road	NE Edge	0.49	2	Collector	no	1	2Collector	$1,195	$3,091,718	$1,552,320	$3,724,450	$8,369,683
210	New Road to Stevens	DSL	0.3	2	Arterial	no	1	2Arterial	$1,447	$2,292,241	$950,400	$3,724,450	$6,968,538
211a	New Road	DSL	0.79	2	Collector	no	0	2Collector	$1,195	$4,984,607	$2,502,720	$0	$7,488,522
212	New Road	DSL	0.12	2	Collector	no	0	2Collector	$1,195	$757,155	$380,160	$0	$1,138,510
213	New Road	Elbow	0.42	2	Collector	no	0	2Collector	$1,195	$2,650,044	$1,330,560	$0	$3,981,799
214a	New Road	UGB	0.56	2	Collector	yes	1	2Collector	$1,195	$3,533,392	$1,774,080	$14,212,303	$19,520,971
215a	New Road	DSL	0.1	2	Collector	no	0	2Collector	$1,195	$630,963	$316,800	$0	$948,958
217	McClain Drive Extension North	West	1	2	Collector	no	0	2Collector	$1,195	$6,309,629	$3,168,000	$0	$9,478,824
219	Skyline Ranch Road	Shevlin	0.75	2	Collector	no	0	2Collector	$1,195	$4,732,222	$2,376,000	$0	$7,109,417
220	New Road	Shevlin	0.73	2	Collector	no	0	2Collector	$1,195	$4,606,029	$2,312,640	$0	$6,919,864
221a	New Road	OB Riley	0.33	2	Collector	no	0	2Collector	$1,195	$2,082,178	$1,045,440	$0	$3,128,813
222a	New Road	OB Riley	0.72	2	Collector	no	0	2Collector	$1,195	$4,542,933	$2,280,960	$0	$6,825,088
223a	New Road	OB Riley	0.42	2	Collector	no	0	2Collector	$1,195	$2,650,044	$1,330,560	$0	$3,981,799
224a	New Road	UGB	0.78	2	Collector	no	0	2Collector	$1,195	$4,921,511	$2,471,040	$0	$7,393,746
228	New Road	Thumb	0.45	2	Collector	no	0	2Collector	$1,195	$2,839,333	$1,425,600	$0	$4,266,128
229	New Road	Thumb	0.26	2	Collector	no	1	2Collector	$1,195	$1,640,504	$823,680	$3,724,450	$6,189,829
230	New Road	Shevlin	0.24	2	Collector	no	0	2Collector	$1,195	$1,514,311	$760,320	$0	$2,275,826
234	Raintree Courth Extension	Elbow	0.13	2	Collector	no	0	2Collector	$1,195	$820,252	$411,840	$0	$1,233,287
235	Raintree Courth Extension north	Elbow	0.23	2	Collector	no	0	2Collector	$1,195	$1,451,215	$728,640	$0	$2,181,050
248	Loco Road Extension	Triangle	0.56	2	Collector	no	2	2Collector	$1,195	$3,533,392	$1,774,080	$7,448,900	$12,757,568
												Total (New Roadways)	**$160,388,409**

Corridor Improvement Projects

P#	Corridor	Begin	End	Improvement	Distance	Unit Cost	Cost
S-4	US 20	Robal Road	(about) Empire Avenue	Add second SB lane			$ 4,800,000
					Total (Corridor)		**$4,800,000**

Intersection Improvement Projects

P#	Begin	End	Improvement	Cost
I-5	15th Street	Sherwood Forest Drive/Ferguson Road	roundabout or trafic signal	$2,366,666
I-13	Dechutes Market Road	Butlet Market Road	roundabout or trafic signal	$2,366,666
			Total (Intersection)	**$4,733,332**

Cost Summary

New Roadways	$160,388,409
Corridor Capacity	$4,800,000
Intersection Capacity	$4,733,332
TOTAL	**$169,921,741**

06940

SAAM-1

New Roadways Cost Summary

Road ID	Roadway Name	Subarea	Length (miles)	Number of Lanes	Functional Class	Railroad Crossing	Number of Bridges	Road String	Unit Cost	Base Cost	ROW Cost	Crossing Cost	Total Cost
204	New Road	OB Riley	0.28	2	Collector	no	0	2Collector	$1,195	$1,766,696	$887,040	$0	$2,654,931
205	Hunnell Road Extension	Triangle	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407	$792,000	$0	$2,370,602
206a	New Road	Triangle	0.94	2	Collector	no	1	2Collector	$1,195	$5,931,051	$2,977,920	$3,724,450	$12,634,617
207a	Yeoman Road Extension	NE Edge	0.76	2	Collector	no	2	2Collector	$1,195	$4,795,318	$2,407,680	$7,448,900	$14,653,093
210	New Road to Stevens	DSL	0.3	2	Arterial	no	1	2Arterial	$1,447	$2,292,241	$950,400	$3,724,450	$6,968,538
212	New Road	DSL	0.12	2	Collector	no	0	2Collector	$1,195	$757,155	$380,160	$0	$1,138,510
213	New Road	Elbow	0.42	2	Collector	no	0	2Collector	$1,195	$2,650,044	$1,330,560	$0	$3,981,799
214a	New Road	UGB	0.56	2	Collector	yes	1	2Collector	$1,195	$3,533,392	$1,774,080	$14,212,303	$19,520,971
215	New Road	DSL	0.32	2	Collector	no	0	2Collector	$1,195	$2,019,081	$1,013,760	$0	$3,034,036
215a	New Road	DSL	0.1	2	Collector	no	0	2Collector	$1,195	$630,963	$316,800	$0	$948,958
219	Skyline Ranch Road	Shevlin	0.75	2	Collector	no	0	2Collector	$1,195	$4,732,222	$2,376,000	$0	$7,109,417
220	New Road	Shevlin	0.73	2	Collector	no	0	2Collector	$1,195	$4,606,029	$2,312,640	$0	$6,919,864
224a	New Road	UGB	0.78	2	Collector	no	0	2Collector	$1,195	$4,921,511	$2,471,040	$0	$7,393,746
228	New Road	Thumb	0.45	2	Collector	no	0	2Collector	$1,195	$2,839,333	$1,425,600	$0	$4,266,128
230	New Road	Shevlin	0.24	2	Collector	no	0	2Collector	$1,195	$1,514,311	$760,320	$0	$2,275,826
232	New Road	Shevlin	0.48	2	Collector	no	0	2Collector	$1,195	$3,028,622	$1,520,640	$0	$4,550,457
233	New Road	NE Edge	0.29	2	Collector	no	1	2Collector	$1,195	$1,829,792	$918,720	$3,724,450	$6,474,158
234	Raintree Courth Extension	Elbow	0.13	2	Collector	no	0	2Collector	$1,195	$820,252	$411,840	$0	$1,233,287
235	Raintree Courth Extension north	Elbow	0.23	2	Collector	no	0	2Collector	$1,195	$1,451,215	$728,640	$0	$2,181,050
237	237 - Cooley Road Extension	NE Edge	0.65	2	Collector	no	0	2Collector	$1,195	$4,101,259	$2,059,200	$0	$6,161,654
237a	237 - Cooley Road Extension	NE Edge	0.47	3	Collector	no	0	3Collector	$1,213	$3,010,226	$1,786,752	$0	$4,798,191
246	New Road	NE Edge	0.86	2	Collector	no	0	2Collector	$1,195	$5,426,281	$2,724,480	$0	$8,151,956
247	New Road	NE Edge	0.3	2	Collector	no	1	2Collector	$1,195	$1,892,889	$950,400	$3,724,450	$6,568,934
248	Loco Road Extension	Triangle	0.56	2	Collector	no	2	2Collector	$1,195	$3,533,392	$1,774,080	$7,448,900	$12,757,568
												Total (New Roadways)	**$148,748,290**

Corridor Improvement Projects

P#	Corridor	Begin	End	Improvement	Distance	Unit Cost	Cost
S-1	China Hat Road	US 97 NB Ramps	New Road (thumb)	widen from 2 lane to 3 lane	2,350	$1,085	$2,549,750
						Total (Corridor)	**$2,549,750**

Intersection Improvement Projects

P#	Begin	End	Improvement	Cost
I-4	27th Street	New Road	roundabout or trafic signal	$2,366,666
I-5	15th Street	Sherwood Forest Drive/Ferguson Road	roundabout or trafic signal	$2,366,666
I-13	Deschutes Markete Road	Butler Market Road	roundabout or trafic signal	$2,366,666
I-14	Knott Road	China Hat (Arnold ice Cave Road)	roundabout or trafic signal	$2,366,666
			Total (Intersection)	**$9,466,664**

Cost Summary

New Roadways	$148,748,290
Corridor Capacity	$2,549,750
Intersection Capacity	$9,466,664
TOTAL	**$160,764,704**

SAAM-2

New Roadways Cost Summary

Road ID	Roadway Name	Subarea	Length (miles)	Number of Lanes	Functional Class	Railroad Crossing	Number of Bridges	Road String	Unit Cost	Base Cost	ROW Cost	Crossing Cost	Total Cost
204a	New Road	OB Riley	1	2	Collector	no	0	2Collector	$1,195	$6,309,629	$3,168,000	$0	$9,478,824
205	Hunnell Road Extension	Triangle	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407	$792,000	$0	$2,370,602
206a	New Road	Triangle	0.94	2	Collector	no	1	2Collector	$1,195	$5,931,051	$2,977,920	$3,724,450	$12,634,617
210	New Road to Stevens	DSL	0.3	2	Arterial	no	1	2Arterial	$1,447	$2,292,241	$950,400	$3,724,450	$6,968,538
212	New Road	DSL	0.12	2	Collector	no	0	2Collector	$1,195	$757,155	$380,160	$0	$1,138,510
213	New Road	Elbow	0.42	2	Collector	no	0	2Collector	$1,195	$2,650,044	$1,330,560	$0	$3,981,799
214a	New Road	UGB	0.56	2	Collector	yes	1	2Collector	$1,195	$3,533,392	$1,774,080	$14,212,303	$19,520,971
215a	New Road	DSL	0.1	2	Collector	no	0	2Collector	$1,195	$630,963	$316,800	$0	$948,958
221	New Road	OB Riley	0.54	2	Collector	no	0	2Collector	$1,195	$3,407,200	$1,710,720	$0	$5,119,115
222	New Road	OB Riley	0.86	2	Collector	no	0	2Collector	$1,195	$5,426,281	$2,724,480	$0	$8,151,956
223	New Road	OB Riley	0.44	2	Collector	no	0	2Collector	$1,195	$2,776,237	$1,393,920	$0	$4,171,352
224a	New Road	UGB	0.78	2	Collector	no	0	2Collector	$1,195	$4,921,511	$2,471,040	$0	$7,393,746
228	New Road	Thumb	0.45	2	Collector	no	0	2Collector	$1,195	$2,839,333	$1,425,600	$0	$4,266,128
229	New Road	Thumb	0.26	2	Collector	no	1	2Collector	$1,195	$1,640,504	$823,680	$3,724,450	$6,189,829
234	Raintree Courth Extension	Elbow	0.13	2	Collector	no	0	2Collector	$1,195	$820,252	$411,840	$0	$1,233,287
235	Raintree Courth Extension north	Elbow	0.23	2	Collector	no	0	2Collector	$1,195	$1,451,215	$728,640	$0	$2,181,050
238	New Road	OB Riley	1.96	2	Collector	no	0	2Collector	$1,195	$12,366,873	$6,209,280	$0	$18,577,348
239	New Road	OB Riley	0.47	2	Collector	no	0	2Collector	$1,195	$2,965,526	$1,488,960	$0	$4,455,681
242	New Road	OB Riley	0.26	2	Collector	no	0	2Collector	$1,195	$1,640,504	$823,680	$0	$2,465,379
248	Loco Road Extension	Triangle	0.56	2	Collector	no	2	2Collector	$1,195	$3,533,392	$1,774,080	$7,448,900	$12,757,568
												Total (New Roadways)	**$134,005,256**

Corridor Improvement Projects

P#	Corridor	Begin	End	Improvement	Distance	Unit Cost	Cost
S-4	US 20	Robal Road	(about) Empire Avenue	Add second SB lane			$ 4,800,000
						Total (Corridor)	**$4,800,000**

Intersection Improvement Projects

P#	Begin	End	Improvement	Cost
I-4	27th Street	New Road	roundabout or trafic signal	$2,366,666
I-5	15th Street	Sherwood Forest Drive/Ferguson Road	roundabout or trafic signal	$2,366,666
I-13	Deschutes Markete Road	Butler Market Road	roundabout or trafic signal	$2,366,666
I-17	OB Riley Road	Old Bend Redmond Highway	roundabout or trafic signal	$2,366,666
I-18	OB Riley Road	New Road	roundabout or trafic signal	$2,366,666
			Total (Intersection)	**$11,833,330**

Cost Summary

New Roadways	$134,005,256
Corridor Capacity	$4,800,000
Intersection Capacity	$11,833,330
TOTAL	**$150,638,586**

06942

SAAM-3

New Roadways Cost Summary

Road ID	Roadway Name	Subarea	Length (miles)	Number of Lanes	Functional Class	Railroad Crossing	Number of Bridges	Road String	Unit Cost	Base Cost	ROW Cost	Crossing Cost	Total Cost
201	Skyline Ranch Road Extension	West	0.61	2	Collector	no	0	2Collector	$1,195	$3,848,874	$1,932,480	$0	$5,782,549
202	Crossing Drive Extension	West	0.58	2	Collector	no	0	2Collector	$1,195	$3,659,585	$1,837,440	$0	$5,498,220
203	McClain Drive Extension South	West	0.44	2	Collector	no	0	2Collector	$1,195	$2,776,237	$1,393,920	$0	$4,171,352
204	New Road	OB Riley	0.28	2	Collector	no	0	2Collector	$1,195	$1,766,696	$887,040	$0	$2,654,931
205	Hunnell Road Extension	Triangle	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407	$792,000	$0	$2,370,602
206a	New Road	Triangle	0.94	2	Collector	no	1	2Collector	$1,195	$5,931,051	$2,977,920	$3,724,450	$12,634,617
210	New Road to Stevens	DSL	0.3	2	Arterial	no	1	2Arterial	$1,447	$2,292,241	$950,400	$3,724,450	$6,968,538
211a	New Road	DSL	0.79	2	Collector	no	0	2Collector	$1,195	$4,984,607	$2,502,720	$0	$7,488,522
212	New Road	DSL	0.12	2	Collector	no	0	2Collector	$1,195	$757,155	$380,160	$0	$1,138,510
213	New Road	Elbow	0.42	2	Collector	no	0	2Collector	$1,195	$2,650,044	$1,330,560	$0	$3,981,799
214a	New Road	UGB	0.56	2	Collector	yes	1	2Collector	$1,195	$3,533,392	$1,774,080	$14,212,303	$19,520,971
215a	New Road	DSL	0.1	2	Collector	no	0	2Collector	$1,195	$630,963	$316,800	$0	$948,958
217	McClain Drive Extension North	West	1	2	Collector	no	0	2Collector	$1,195	$6,309,629	$3,168,000	$0	$9,478,824
224a	New Road	UGB	0.78	2	Collector	no	0	2Collector	$1,195	$4,921,511	$2,471,040	$0	$7,393,746
228	New Road	Thumb	0.45	2	Collector	no	0	2Collector	$1,195	$2,839,333	$1,425,600	$0	$4,266,128
229	New Road	Thumb	0.26	2	Collector	no	1	2Collector	$1,195	$1,640,504	$823,680	$3,724,450	$6,189,829
234	Raintree Courth Extension	Elbow	0.13	2	Collector	no	0	2Collector	$1,195	$820,252	$411,840	$0	$1,233,287
235	Raintree Courth Extension north	Elbow	0.23	2	Collector	no	0	2Collector	$1,195	$1,451,215	$728,640	$0	$2,181,050
240	New Road	West	0.73	2	Collector	no	0	2Collector	$1,195	$4,606,029	$2,312,640	$0	$6,919,864
241	New Road	West	0.77	2	Collector	no	0	2Collector	$1,195	$4,858,414	$2,439,360	$0	$7,298,969
248	Loco Road Extension	Triangle	0.56	2	Collector	no	2	2Collector	$1,195	$3,533,392	$1,774,080	$7,448,900	$12,757,568
												Total (New Roadways)	**$130,878,833**

Corridor Improvement Projects

P#	Corridor	Begin	End	Improvement	Distance	Unit Cost	Cost
S-4	US 20	Robal Road	(about) Empire Avenue	Add second SB lane			$ 4,800,000
						Total (Corridor)	**$4,800,000**

Intersection Improvement Projects

P#	Begin	End	Improvement	Cost
I-4	27th Street	New Road	roundabout or trafic signal	$2,366,666
I-5	15th Street	Sherwood Forest Drive/Ferguson Road	roundabout or trafic signal	$2,366,666
I-13	Deschutes Markete Road	Butler Market Road	roundabout or trafic signal	$2,366,666
			Total (Intersection)	**$7,099,998**

Cost Summary

New Roadways	$130,878,833
Corridor Capacity	$4,800,000
Intersection Capacity	$7,099,998
TOTAL	**$142,778,831**

APPENDIX C: PERFORMANCE MEASURE WEIGHTING EXAMPLES AND RESULTS

Updated October 7, 2015

Index:

- Equally Weighted
- Lightly Weighted
- Heavily Weighted
- Focus on Difference-Makers

Weighting: **Equally Weighted**

Updated: 10/7/2015

Note on rating symbols below: VG = Very Good, G = Good, F = Fair, P = Poor, VP = Very Poor (per key).

Factor / Community Outcome / Performance Measure	Weighting*	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Factor 1: Efficient accommodation of identified land needs							
A. Complete Communities and Great Neighborhoods	H 1	3.4 (F)	5.0 (VG)	4.0 (G)	2.4 (P)	3.8 (G)	3.2 (F)
(1) Housing units within walking distance of existing & planned schools in 2028	M 1	2 (P)	5 (VG)	3 (F)	5 (VG)	4 (G)	2 (P)
(2) Housing units within walking distance of existing & planned parks and trails in 2028	L 1	5 (VG)	5 (VG)	5 (VG)	4 (G)	5 (VG)	5 (VG)
(3) Housing units within walking distance of commercial services in 2028	H 1	4 (G)	5 (VG)	5 (VG)	1 (VP)	3 (F)	2 (P)
(4) Jobs/housing balance (by subarea)	M 1	3 (F)	5 (VG)	4 (G)	1 (VP)	4 (G)	2 (P)
(5) Opportunities for master planning	M 1	3 (F)	5 (VG)	3 (F)	1 (VP)	3 (F)	5 (VG)
B. Efficient, Timely Growth	H 1	5.0 (VG)	4.2 (G)	3.8 (G)	2.6 (F)	3.6 (G)	4.2 (G)
(1) Total urbanized acres	L 1	5 (VG)	4 (G)	4 (G)	3 (F)	4 (G)	5 (VG)
(2) Gross density for new housing in 2028	VH 1	5 (VG)	5 (VG)	3 (F)	1 (VP)	4 (G)	5 (VG)
(3) net density for new jobs in 2028	L 1	5 (VG)	5 (VG)	5 (VG)	5 (VG)	5 (VG)	5 (VG)
(4) percent of urbanized acres on parcels under 20 acres and contiguous to existing UGB	M 1	5 (VG)	3 (F)	3 (F)	2 (P)	2 (P)	1 (VP)
(5) vacant vs. developed land included	L 1	5 (VG)	4 (G)	4 (G)	2 (P)	3 (F)	5 (VG)
Factor 2: Orderly and economic provision of public facilities and services							
A. Balanced Transportation System	H 1	3.1 (F)	3.7 (G)	3.0 (F)	2.9 (F)	2.5 (F)	3.1 (F)
(1) Total VMT per capita	VH 1	2 (P)	3 (F)	3 (F)	2 (P)	2 (P)	2 (P)
(2) Average trip length	M 1	2 (P)	5 (VG)	4 (G)	2 (P)	2 (P)	3 (F)
(3) Household VMT per capita	M 1	4 (G)	5 (VG)	3 (F)	1 (VP)	2 (P)	2 (P)
(4) Congestion	H 1	4 (G)	3 (F)	2 (P)	5 (VG)	3 (F)	4 (G)
(5) walk/bike safety and connectivity	M 1	4 (G)	5 (VG)	3 (F)	4 (G)	3 (F)	4 (G)
(6) System connectivity & progression of system hierarchy	M 1	3 (F)	4 (G)	3 (F)	3 (F)	3 (F)	4 (G)
(7) Mode split	M 1	3 (F)	3 (F)	3 (F)	3 (F)	2 (P)	3 (F)
(8) Average weekly walk trips per capita	L 1	3 (F)	3 (F)	3 (F)	3 (F)	2 (P)	3 (F)
(9) Proximity to transit corridors	M 1	3 (F)	3 (F)	3 (F)	3 (F)	3 (F)	3 (F)
(10) Percent of housing and jobs within 1/4 mile of transit	L 1	3 (F)	3 (F)	3 (F)	3 (F)	3 (F)	3 (F)
(11) Intersection density	M 1	3 (F)	2 (P)	2 (P)	3 (F)	3 (F)	3 (F)
B. Cost Effective Infrastructure	H 1	3.0 (F)	3.5 (G)	3.0 (F)	2.7 (F)	3.4 (F)	2.7 (F)
Transportation Infrastructure							
(1) Total cost of transportation improvements required	VH 1	1 (VP)	4 (G)	3 (F)	3 (F)	4 (G)	5 (VG)
(2) Cost per acre of transportation improvements	M 1	2 (P)	3 (F)	3 (F)	4 (G)	3 (F)	3 (F)
(3) New linear miles of roadway	L 1	3 (F)	4 (G)	3 (F)	2 (P)	3 (F)	3 (F)
Sanitary Sewer Infrastructure							
(4) Efficiency of additional sewer system improvements required	VH 1	4 (G)	3 (F)	3 (F)	2 (P)	2 (P)	1 (VP)
(5) Initial capital cost of sewer system improvements required	M 1	4 (G)	3 (F)	3 (F)	1 (VP)	3 (F)	1 (VP)
(6) Initial capital cost of sewer system improvements per acre of development	M 1	3 (F)	4 (G)	3 (F)	2 (P)	2 (P)	1 (VP)
Drinking Water Infrastructure							
(7) Water system improvements required in city water district	L 1	5 (VG)	5 (VG)	4 (G)	5 (VG)	4 (G)	5 (VG)
(8) Capacity of Avion Water system							
Storm Water Infrastructure							
(9) Total impervious area for new development	L 1	4 (G)	4 (G)	3 (F)	3 (F)	3 (F)	4 (G)
(10) Acres of new development with welded tuff geology	L 1	3 (F)	3 (F)	2 (P)	2 (P)	5 (VG)	1 (VP)
(11) Acres of new development within DWPA	L 1	1 (VP)	2 (P)	3 (F)	3 (F)	5 (VG)	3 (F)
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)							
A. Quality Natural Environment (Environmental and Energy Consequences)	H 1	3.5 (G)	3.7 (G)	2.8 (F)	2.2 (P)	3.2 (F)	3.2 (F)
(1) Development in wildlife areas	M 1	4 (G)	3 (F)	2 (P)	1 (VP)	5 (VG)	2 (P)
(2) Linear distance of riparian areas adjacent to development	M 1	5 (VG)	5 (VG)	4 (G)	3 (F)	3 (F)	5 (VG)
(3) Wildfire hazard	H 1	3 (F)	3 (F)	2 (P)	2 (P)	3 (F)	3 (F)
(4) Greenhouse gas emissions	L 1	3 (F)	4 (G)	3 (F)	2 (P)	2 (P)	3 (F)
(5) Energy Use	L 1	3 (F)	3 (F)	3 (F)	3 (F)	3 (F)	3 (F)
(6) Average Water Consumption per Household	L 1	3 (F)	4 (G)	3 (F)	2 (P)	3 (F)	3 (F)
B. Housing Options and Affordability (Social Consequences)	H 1	4.0 (G)	4.5 (VG)	3.0 (F)	4.5 (VG)	4.0 (G)	2.5 (F)
(1) Average cost of new single family housing	VH 1	5 (VG)	5 (VG)	2 (P)	4 (G)	3 (F)	2 (P)
(2) Housing mix of new housing (subarea balance)	L 1	3 (F)	4 (G)	4 (G)	5 (VG)	5 (VG)	3 (F)
C. Strong Diverse Economy (Economic Consequences)	H 1	4.0 (G)	3.7 (G)	4.0 (G)	4.3 (G)	4.3 (G)	4.0 (G)
(1) site suitability for large lot industrial use	L 1	4 (G)	3 (F)	3 (F)	4 (G)	3 (F)	3 (F)
(2) site suitability for areas identified for industrial uses	H 1	4 (G)	3 (F)	5 (VG)	5 (VG)	5 (VG)	4 (G)
(3) site suitability for areas identified for commercial uses	H 1	4 (G)	5 (VG)	4 (G)	4 (G)	5 (VG)	5 (VG)
Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occu							
A. Compatibility with Farms and Forests	H 1	3.7 (G)	3.3 (F)	2.3 (P)	3.0 (F)	2.7 (F)	3.3 (F)
(1) Farm practices & high value farm land adjacent to expansion areas	H 1	3 (F)	3 (F)	2 (P)	3 (F)	2 (P)	4 (G)
(2) impact to irrigation districts	M 1	4 (G)	3 (F)	2 (P)	3 (F)	1 (VP)	3 (F)
(3) Proximity of expansion areas to designated forest land	M 1	4 (G)	4 (G)	3 (F)	3 (F)	5 (VG)	3 (F)
Overall		3.7 (G)	3.9 (G)	3.2 (F)	3.1 (F)	3.4 (F)	3.3 (F)

Key: H = High Importance; M = Moderate Importance; L = Low Importance; N = Excluded. ● Very Good   ◗ Good   ○ Fair   ◗ Poor   ◉ Very Poor

* Weighting for performance measures is relative to others within a single community outcome. Weighting for community outcomes is against other community outcomes. Weighting is provided as an example only and is subject to further refinement.

06945

Weighting: **Lightly Weighted**

Updated: 10/7/2015

Factor	Community Outcome	Performance Measure	Weighting*		Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Factor 1: Efficient accommodation of identified land needs										
	A. Complete Communities and Great Neighborhoods		H	1	3.3 ○	5.0 ●	4.0 ◗	2.1 ◖	3.6 ◗	2.9 ○
		(1) Housing units within walking distance of existing & planned schools in 2028	M	0.6	2 ◖	5 ●	3 ○	5 ●	4 ◗	2 ◖
		(2) Housing units within walking distance of existing & planned parks and trails in 2028	L	0.3	5 ●	5 ●	5 ●	4 ◗	5 ●	5 ●
		(3) Housing units within walking distance of commercial services in 2028	H	1	4 ◗	5 ●	5 ●	1 ●	3 ○	2 ◖
		(4) Jobs/housing balance (by subarea)	M	0.6	3 ○	5 ●	4 ◗	1 ●	4 ◗	2 ◖
		(5) Opportunities for master planning	M	0.6	3 ○	5 ●	3 ○	1 ●	3 ○	5 ●
	B. Efficient, Timely Growth		H	1	5.0 ●	4.5 ◗	3.3 ○	1.8 ◖	3.7 ◗	4.3 ◗
		(1) Total urbanized acres	L	0.3	5 ●	4 ◗	4 ◗	3 ○	4 ◗	5 ●
		(2) Gross density for new housing in 2028	VH	2	5 ●	5 ●	3 ○	1 ●	4 ◗	5 ●
		(3) net density for new jobs in 2028	L	0.3	5 ●	5 ●	5 ●	5 ●	5 ●	5 ●
		(4) percent of urbanized acres on parcels under 20 acres and contiguous to existing UGB	M	0.6	5 ●	3 ○	3 ○	2 ◖	2 ◖	1 ●
		(5) vacant vs. developed land included	L	0.3	5 ●	4 ◗	4 ◗	2 ◖	3 ○	5 ●
Factor 2: Orderly and economic provision of public facilities and services										
	A. Balanced Transportation System		H	1	2.9 ○	3.6 ◗	2.9 ○	2.8 ○	2.4 ◖	2.9 ○
		(1) Total VMT per capita	VH	2	2 ◖	3 ○	3 ○	2 ◖	2 ◖	2 ◖
		(2) Average trip length	M	0.6	2 ◖	5 ●	4 ◗	2 ◖	2 ◖	3 ○
		(3) Household VMT per capita	M	0.6	4 ◗	5 ●	3 ○	1 ●	2 ◖	2 ◖
		(4) Congestion	H	1	4 ◗	3 ○	2 ◖	5 ●	3 ○	4 ◗
		(5) walk/bike safety and connectivity	M	0.6	4 ◗	5 ●	3 ○	4 ◗	3 ○	4 ◗
		(6) System connectivity & progression of system hierarchy	M	0.6	3 ○	4 ◗	3 ○	3 ○	3 ○	4 ◗
		(7) Mode split	M	0.6	3 ○	3 ○	3 ○	3 ○	2 ◖	3 ○
		(8) Average weekly walk trips per capita	L	0.3	3 ○	3 ○	3 ○	3 ○	2 ◖	3 ○
		(9) Proximity to transit corridors	M	0.6	3 ○	3 ○	3 ○	3 ○	3 ○	3 ○
		(10) Percent of housing and jobs within 1/4 mile of transit	L	0.3	3 ○	3 ○	3 ○	3 ○	3 ○	3 ○
		(11) Intersection density	M	0.6	3 ○	2 ◖	2 ◖	3 ○	3 ○	3 ○
	B. Cost Effective Infrastructure		H	1	2.8 ○	3.5 ○	3.0 ○	2.6 ○	3.1 ○	2.7 ○
		Transportation Infrastructure								
		(1) Total cost of transportation improvements required	VH	2	1 ●	4 ◗	3 ○	3 ○	4 ◗	5 ●
		(2) Cost per acre of transportation improvements	M	0.6	2 ◖	3 ○	3 ○	4 ◗	3 ○	3 ○
		(3) New linear miles of roadway	L	0.3	3 ○	4 ◗	3 ○	2 ◖	3 ○	3 ○
		Sanitary Sewer Infrastructure								
		(4) Efficiency of additional sewer system improvements required	VH	2	4 ◗	3 ○	3 ○	2 ◖	2 ◖	1 ●
		(5) Initial capital cost of sewer system improvements required	M	0.6	4 ◗	3 ○	3 ○	1 ●	3 ○	1 ●
		(6) Initial capital cost of sewer system improvements per acre of development	M	0.6	3 ○	4 ◗	3 ○	2 ◖	2 ◖	1 ◖
		Drinking Water Infrastructure								
		(7) Water system improvements required in city water district	L	0.3	5 ●	5 ●	4 ◗	5 ●	4 ◗	5 ●
		(8) Capacity of Avion Water system								
		Storm Water Infrastructure								
		(9) Total impervious area for new development	L	0.3	4 ◗	4 ◗	3 ○	3 ○	3 ○	4 ◗
		(10) Acres of new development with welded tuff geology	L	0.3	3 ○	3 ○	2 ◖	2 ◖	5 ●	1 ●
		(11) Acres of new development within DWPA	L	0.3	1 ●	2 ◖	3 ○	3 ○	5 ●	3 ○
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)										
	A. Quality Natural Environment (Environmental and Energy Consequences)		H	1	3.6 ◗	3.6 ◗	2.7 ○	2.1 ◖	3.3 ○	3.2 ○
		(1) Development in wildlife areas	M	0.6	4 ◗	3 ○	2 ◖	1 ●	5 ●	2 ◖
		(2) Linear distance of riparian areas adjacent to development	M	0.6	5 ●	5 ●	4 ◗	3 ○	3 ○	5 ●
		(3) Wildfire hazard	H	1	3 ○	3 ○	2 ◖	2 ◖	3 ○	3 ○
		(4) Greenhouse gas emissions	L	0.3	3 ○	4 ◗	3 ○	2 ◖	2 ◖	3 ○
		(5) Energy Use	L	0.3	3 ○	3 ○	3 ○	3 ○	3 ○	3 ○
		(6) Average Water Consumption per Household	L	0.3	3 ○	4 ◗	3 ○	2 ◖	3 ○	3 ○
	B. Housing Options and Affordability (Social Consequences)		H	1	4.7 ●	4.9 ●	2.3 ◖	4.1 ◗	3.3 ○	2.1 ◖
		(1) Average cost of new single family housing	VH	2	5 ●	5 ●	2 ◖	4 ◗	3 ○	2 ◖
		(2) Housing mix of new housing (subarea balance)	L	0.3	3 ○	4 ◗	4 ◗	5 ●	5 ●	3 ○
	C. Strong Diverse Economy (Economic Consequences)		H	1	4.0 ◗	3.9 ◗	4.3 ◗	4.4 ◗	4.7 ●	4.3 ◗
		(1) site suitability for large lot industrial use	L	0.3	4 ◗	3 ○	3 ○	4 ◗	3 ○	3 ○
		(2) site suitability for areas identified for industrial uses	H	1	4 ◗	3 ○	5 ●	5 ●	5 ●	4 ◗
		(3) site suitability for areas identified for commercial uses	H	1	4 ◗	5 ●	4 ◗	4 ◗	5 ●	5 ●
Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occu										
	A. Compatibility with Farms and Forests		H	1	3.5 ◗	3.3 ○	2.3 ◖	3.0 ○	2.5 ○	3.5 ○
		(1) Farm practices & high value farm land adjacent to expansion areas	H	1	3 ○	3 ○	2 ◖	3 ○	2 ◖	4 ◗
		(2) impact to irrigation districts	M	0.6	4 ◗	3 ○	2 ◖	3 ○	1 ●	3 ○
		(3) Proximity of expansion areas to designated forest land	M	0.6	4 ◗	4 ◗	3 ○	3 ○	5 ●	3 ○
Overall					3.7 ◗	4.0 ◗	3.1 ○	2.9 ○	3.3 ○	3.2 ○

Key: H = High Importance; M = Moderate Importance; L = Low Importance; N = Excluded.   ● Very Good   ◗ Good   ○ Fair   ◖ Poor   ◉ Very Poor

* Weighting for performance measures is relative to others within a single community outcome. Weighting for community outcomes is against other community outcomes. Weighting is provided as an example only and is subject to further refinement.

Weighting: **Heavily Weighted**

Updated: 10/7/2015

Factor / Community Outcome / Performance Measure	Weighting*	Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Factor 1: Efficient accommodation of identified land needs							
A. Complete Communities and Great Neighborhoods	H 1	3.3 (Fair)	5.0 (Very Good)	4.0 (Good)	1.9 (Poor)	3.5 (Fair)	2.7 (Fair)
(1) Housing units within walking distance of existing & planned schools in 2028	M 0.5	2 (Poor)	5 (Very Good)	3 (Fair)	5 (Very Good)	4 (Good)	2 (Poor)
(2) Housing units within walking distance of existing & planned parks and trails in 2028	L 0.1	5 (Very Good)	5 (Very Good)	5 (Very Good)	4 (Good)	5 (Very Good)	5 (Very Good)
(3) Housing units within walking distance of commercial services in 2028	H 1	4 (Good)	5 (Very Good)	5 (Very Good)	1 (Very Poor)	3 (Good)	2 (Poor)
(4) Jobs/housing balance (by subarea)	M 0.5	3 (Fair)	5 (Very Good)	4 (Good)	1 (Very Poor)	4 (Good)	2 (Poor)
(5) Opportunities for master planning	M 0.5	3 (Fair)	5 (Very Good)	3 (Fair)	1 (Very Poor)	3 (Fair)	5 (Very Good)
B. Efficient, Timely Growth	H 1	5.0 (Very Good)	4.7 (Very Good)	3.1 (Fair)	1.3 (Very Poor)	3.7 (Good)	4.5 (Good)
(1) Total urbanized acres	L 0.1	5 (Very Good)	4 (Good)	4 (Good)	3 (Fair)	4 (Good)	5 (Very Good)
(2) Gross density for new housing in 2028	VH 3	5 (Very Good)	5 (Very Good)	3 (Fair)	1 (Very Poor)	4 (Good)	5 (Very Good)
(3) net density for new jobs in 2028	L 0.1	5 (Very Good)	5 (Very Good)	5 (Very Good)	5 (Very Good)	5 (Very Good)	5 (Very Good)
(4) percent of urbanized acres on parcels under 20 acres and contiguous to existing UGB	M 0.5	5 (Very Good)	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	1 (Very Poor)
(5) vacant vs. developed land included	L 0.1	5 (Very Good)	4 (Good)	4 (Good)	2 (Poor)	3 (Fair)	5 (Very Good)
Factor 2: Orderly and economic provision of public facilities and services							
A. Balanced Transportation System	H 1	2.8 (Fair)	3.5 (Fair)	2.9 (Fair)	2.7 (Fair)	2.4 (Poor)	2.8 (Fair)
(1) Total VMT per capita	VH 3	2 (Poor)	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	2 (Poor)
(2) Average trip length	M 0.5	2 (Poor)	5 (Very Good)	4 (Good)	2 (Poor)	2 (Poor)	3 (Fair)
(3) Household VMT per capita	M 0.5	4 (Good)	5 (Very Good)	3 (Fair)	1 (Very Poor)	2 (Poor)	2 (Poor)
(4) Congestion	H 1	4 (Good)	3 (Fair)	2 (Poor)	5 (Very Good)	3 (Fair)	4 (Good)
(5) walk/bike safety and connectivity	M 0.5	4 (Good)	5 (Very Good)	3 (Fair)	4 (Good)	3 (Fair)	4 (Good)
(6) System connectivity & progression of system hierarchy	M 0.5	3 (Fair)	4 (Good)	3 (Fair)	3 (Fair)	3 (Fair)	4 (Good)
(7) Mode split	M 0.5	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	2 (Poor)	3 (Fair)
(8) Average weekly walk trips per capita	L 0.1	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	2 (Poor)	3 (Fair)
(9) Proximity to transit corridors	M 0.5	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)
(10) Percent of housing and jobs within 1/4 mile of transit	L 0.1	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)
(11) Intersection density	M 0.5	3 (Fair)	2 (Poor)	2 (Poor)	3 (Fair)	3 (Fair)	3 (Fair)
B. Cost Effective Infrastructure	H 1	2.6 (Fair)	3.5 (Fair)	3.0 (Fair)	2.5 (Fair)	3.0 (Fair)	2.8 (Fair)
Transportation Infrastructure							
(1) Total cost of transportation improvements required	VH 3	1 (Very Poor)	4 (Good)	3 (Fair)	3 (Fair)	4 (Good)	5 (Very Good)
(2) Cost per acre of transportation improvements	M 0.5	2 (Poor)	3 (Fair)	3 (Fair)	4 (Good)	3 (Fair)	3 (Fair)
(3) New linear miles of roadway	L 0.1	3 (Fair)	4 (Good)	3 (Fair)	2 (Poor)	3 (Fair)	3 (Fair)
Sanitary Sewer Infrastructure							
(4) Efficiency of additional sewer system improvements required	VH 3	4 (Good)	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	1 (Very Poor)
(5) Initial capital cost of sewer system improvements required	M 0.5	4 (Good)	3 (Fair)	3 (Fair)	1 (Very Poor)	3 (Fair)	1 (Very Poor)
(6) Initial capital cost of sewer system improvements per acre of development	M 0.5	3 (Fair)	4 (Good)	3 (Fair)	2 (Poor)	2 (Poor)	1 (Very Poor)
Drinking Water Infrastructure							
(7) Water system improvements required in city water district	L 0.1	5 (Very Good)	5 (Very Good)	4 (Good)	5 (Very Good)	4 (Good)	5 (Very Good)
(8) Capacity of Avion Water system							
Storm Water Infrastructure							
(9) Total impervious area for new development	L 0.1	4 (Good)	4 (Good)	3 (Fair)	3 (Fair)	3 (Fair)	4 (Good)
(10) Acres of new development with welded tuff geology	L 0.1	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	5 (Very Good)	1 (Very Poor)
(11) Acres of new development within DWPA	L 0.1	1 (Very Poor)	2 (Poor)	3 (Fair)	3 (Fair)	5 (Very Good)	3 (Fair)
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)							
A. Quality Natural Environment (Environmental and Energy Consequences)	H 1	3.7 (Good)	3.5 (Good)	2.6 (Fair)	2.0 (Poor)	3.4 (Fair)	3.2 (Fair)
(1) Development in wildlife areas	M 0.5	4 (Good)	3 (Fair)	2 (Poor)	1 (Very Poor)	5 (Very Good)	2 (Poor)
(2) Linear distance of riparian areas adjacent to development	M 0.5	5 (Very Good)	5 (Very Good)	4 (Good)	3 (Fair)	3 (Fair)	5 (Very Good)
(3) Wildfire hazard	H 1	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	3 (Fair)	3 (Fair)
(4) Greenhouse gas emissions	L 0.1	3 (Fair)	4 (Good)	3 (Fair)	2 (Poor)	2 (Poor)	3 (Fair)
(5) Energy Use	L 0.1	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)
(6) Average Water Consumption per Household	L 0.1	3 (Fair)	4 (Good)	3 (Fair)	2 (Poor)	3 (Fair)	3 (Fair)
B. Housing Options and Affordability (Social Consequences)	H 1	4.9 (Very Good)	5.0 (Very Good)	2.1 (Poor)	4.0 (Good)	3.1 (Fair)	2.0 (Poor)
(1) Average cost of new single family housing	VH 3	5 (Very Good)	5 (Very Good)	2 (Poor)	4 (Good)	3 (Fair)	2 (Poor)
(2) Housing mix of new housing (subarea balance)	L 0.1	3 (Fair)	4 (Good)	4 (Good)	5 (Very Good)	5 (Very Good)	3 (Fair)
C. Strong Diverse Economy (Economic Consequences)	H 1	4.0 (Good)	4.0 (Good)	4.4 (Good)	4.5 (Good)	4.9 (Very Good)	4.4 (Good)
(1) site suitability for large lot industrial use	L 0.1	4 (Good)	3 (Fair)	3 (Fair)	4 (Good)	3 (Fair)	3 (Fair)
(2) site suitability for areas identified for industrial uses	H 1	4 (Good)	3 (Fair)	5 (Very Good)	5 (Very Good)	5 (Very Good)	4 (Good)
(3) site suitability for areas identified for commercial uses	H 1	4 (Good)	5 (Very Good)	4 (Good)	4 (Good)	5 (Very Good)	5 (Very Good)
Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occu							
A. Compatibility with Farms and Forests	H 1	3.5 (Good)	3.3 (Fair)	2.3 (Poor)	3.0 (Fair)	2.5 (Fair)	3.5 (Good)
(1) Farm practices & high value farm land adjacent to expansion areas	H 1	3 (Fair)	3 (Fair)	2 (Poor)	3 (Fair)	2 (Poor)	4 (Good)
(2) impact to irrigation districts	M 0.5	4 (Good)	3 (Fair)	2 (Poor)	3 (Fair)	1 (Very Poor)	3 (Fair)
(3) Proximity of expansion areas to designated forest land	M 0.5	4 (Good)	4 (Good)	3 (Fair)	3 (Fair)	5 (Very Good)	3 (Fair)
Overall		3.7 (Good)	4.0 (Good)	3.0 (Fair)	2.7 (Fair)	3.3 (Fair)	3.2 (Fair)

Key: H = High Importance; M = Moderate Importance; L = Low Importance; N = Excluded.   ● Very Good   ◓ Good   ○ Fair   ◓ Poor   ◉ Very Poor

* Weighting for performance measures is relative to others within a single community outcome. Weighting for community outcomes is against other community outcomes. Weighting is provided as an example only and is subject to further refinement.

06947

Weighting: **Focus on Difference Makers**

Updated: 10/7/2015

Factor	Community Outcome	Performance Measure	Weighting*		Scenario 1.2	Scenario 2.1	Scenario 3.1	SAAM-1	SAAM-2	SAAM-3
Factor 1: Efficient accommodation of identified land needs										
	A. Complete Communities and Great Neighborhoods		H	1	3.7 (Good)	5.0 (Very Good)	4.6 (Very Good)	1.3 (Poor)	3.2 (Fair)	2.2 (Poor)
		(1) Housing units within walking distance of existing & planned schools in 2028	M	0.1	2 (Poor)	5 (Very Good)	3 (Fair)	5 (Very Good)	4 (Good)	2 (Poor)
		(2) Housing units within walking distance of existing & planned parks and trails in 2028	L	0	5 (Very Good)	5 (Very Good)	5 (Very Good)	4 (Good)	5 (Very Good)	5 (Very Good)
		(3) Housing units within walking distance of commercial services in 2028	H	1	4 (Good)	5 (Very Good)	5 (Very Good)	1 (Poor)	3 (Good)	2 (Poor)
		(4) Jobs/housing balance (by subarea)	M	0.1	3 (Fair)	5 (Very Good)	4 (Good)	1 (Poor)	4 (Good)	2 (Poor)
		(5) Opportunities for master planning	M	0.1	3 (Fair)	5 (Very Good)	3 (Fair)	1 (Poor)	3 (Fair)	5 (Very Good)
	B. Efficient, Timely Growth		H	1	5.0 (Very Good)	5.0 (Very Good)	3.0 (Fair)	1.0 (Poor)	4.0 (Good)	5.0 (Very Good)
		(1) Total urbanized acres	L	0	5 (Very Good)	4 (Good)	4 (Good)	3 (Fair)	4 (Good)	5 (Very Good)
		(2) Gross density for new housing in 2028	VH	10	5 (Very Good)	5 (Very Good)	3 (Fair)	1 (Poor)	4 (Good)	5 (Very Good)
		(3) net density for new jobs in 2028	L	0	5 (Very Good)	5 (Very Good)	5 (Very Good)	5 (Very Good)	5 (Very Good)	5 (Very Good)
		(4) percent of urbanized acres on parcels under 20 acres and contiguous to existing UGB	M	0.1	5 (Very Good)	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	1 (Very Poor)
		(5) vacant vs. developed land included	L	0	5 (Very Good)	4 (Good)	4 (Good)	2 (Poor)	3 (Fair)	5 (Very Good)
Factor 2: Orderly and economic provision of public facilities and services										
	A. Balanced Transportation System		H	1	2.2 (Poor)	3.1 (Fair)	2.9 (Fair)	2.3 (Poor)	2.1 (Poor)	2.2 (Poor)
		(1) Total VMT per capita	VH	10	2 (Poor)	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	2 (Poor)
		(2) Average trip length	M	0.1	2 (Poor)	5 (Very Good)	4 (Good)	2 (Poor)	2 (Poor)	3 (Fair)
		(3) Household VMT per capita	M	0.1	4 (Good)	5 (Very Good)	3 (Fair)	1 (Poor)	2 (Poor)	2 (Poor)
		(4) Congestion	H	1	4 (Good)	3 (Fair)	2 (Poor)	5 (Very Good)	3 (Fair)	4 (Good)
		(5) walk/bike safety and connectivity	M	0.1	4 (Good)	5 (Very Good)	3 (Fair)	4 (Good)	3 (Fair)	4 (Good)
		(6) System connectivity & progression of system hierarchy	M	0.1	3 (Fair)	4 (Good)	3 (Fair)	3 (Fair)	3 (Fair)	4 (Good)
		(7) Mode split	M	0.1	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	2 (Poor)	3 (Fair)
		(8) Average weekly walk trips per capita	L	0	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	2 (Poor)	3 (Fair)
		(9) Proximity to transit corridors	M	0.1	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)
		(10) Percent of housing and jobs within 1/4 mile of transit	L	0	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)
		(11) Intersection density	M	0.1	3 (Fair)	2 (Poor)	2 (Poor)	3 (Fair)	3 (Fair)	3 (Fair)
	B. Cost Effective Infrastructure		H	1	2.5 (Fair)	3.5 (Fair)	3.0 (Fair)	2.5 (Poor)	3.0 (Fair)	3.0 (Fair)
		Transportation Infrastructure								
		(1) Total cost of transportation improvements required	VH	10	1 (Very Poor)	4 (Good)	3 (Fair)	3 (Fair)	4 (Good)	5 (Very Good)
		(2) Cost per acre of transportation improvements	M	0.1	2 (Poor)	3 (Fair)	3 (Fair)	4 (Good)	3 (Fair)	3 (Fair)
		(3) New linear miles of roadway	L	0	3 (Fair)	4 (Good)	3 (Fair)	2 (Poor)	3 (Fair)	3 (Fair)
		Sanitary Sewer Infrastructure								
		(4) Efficiency of additional sewer system improvements required	VH	10	4 (Good)	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	1 (Very Poor)
		(5) Initial capital cost of sewer system improvements required	M	0.1	4 (Good)	3 (Fair)	3 (Fair)	1 (Very Poor)	3 (Fair)	1 (Very Poor)
		(6) Initial capital cost of sewer system improvements per acre of development	M	0.1	3 (Fair)	4 (Good)	3 (Fair)	2 (Poor)	2 (Poor)	1 (Very Poor)
		Drinking Water Infrastructure								
		(7) Water system improvements required in city water district	L	0	5 (Very Good)	5 (Very Good)	4 (Good)	5 (Very Good)	4 (Good)	5 (Very Good)
		(8) Capacity of Avion Water system								
		Storm Water Infrastructure								
		(9) Total impervious area for new development	L	0	4 (Good)	4 (Good)	3 (Fair)	3 (Fair)	3 (Fair)	4 (Good)
		(10) Acres of new development with welded tuff geology	L	0	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	5 (Very Good)	1 (Very Poor)
		(11) Acres of new development within DWPA	L	0	1 (Very Poor)	2 (Poor)	3 (Fair)	3 (Fair)	5 (Very Good)	3 (Fair)
Factor 3: Comparative environmental, social, economic and energy consequences (ESEE)										
	A. Quality Natural Environment (Environmental and Energy Consequences)		H	1	3.3 (Fair)	3.2 (Fair)	2.2 (Poor)	2.0 (Poor)	3.2 (Fair)	3.1 (Fair)
		(1) Development in wildlife areas	M	0.1	4 (Good)	3 (Fair)	2 (Poor)	1 (Very Poor)	5 (Very Good)	2 (Poor)
		(2) Linear distance of riparian areas adjacent to development	M	0.1	5 (Very Good)	5 (Very Good)	4 (Good)	3 (Fair)	3 (Fair)	5 (Very Good)
		(3) Wildfire hazard	H	1	3 (Fair)	3 (Fair)	2 (Poor)	2 (Poor)	3 (Fair)	3 (Fair)
		(4) Greenhouse gas emissions	L	0	3 (Fair)	4 (Good)	3 (Fair)	2 (Poor)	2 (Poor)	3 (Fair)
		(5) Energy Use	L	0	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)	3 (Fair)
		(6) Average Water Consumption per Household	L	0	3 (Fair)	4 (Good)	3 (Fair)	2 (Poor)	3 (Fair)	3 (Fair)
	B. Housing Options and Affordability (Social Consequences)		H	1	5.0 (Very Good)	5.0 (Very Good)	2.0 (Poor)	4.0 (Good)	3.0 (Fair)	2.0 (Poor)
		(1) Average cost of new single family housing	VH	10	5 (Very Good)	5 (Very Good)	2 (Poor)	4 (Good)	3 (Fair)	2 (Poor)
		(2) Housing mix of new housing (subarea balance)	L	0	3 (Fair)	4 (Good)	4 (Good)	5 (Very Good)	5 (Very Good)	3 (Fair)
	C. Strong Diverse Economy (Economic Consequences)		H	1	4.0 (Good)	4.0 (Good)	4.5 (Very Good)	4.5 (Very Good)	5.0 (Very Good)	4.5 (Very Good)
		(1) site suitability for large lot industrial use	L	0	4 (Good)	3 (Fair)	3 (Fair)	4 (Good)	3 (Fair)	3 (Fair)
		(2) site suitability for areas identified for industrial uses	H	1	4 (Good)	3 (Fair)	5 (Very Good)	5 (Very Good)	5 (Very Good)	4 (Good)
		(3) site suitability for areas identified for commercial uses	H	1	4 (Good)	5 (Very Good)	4 (Good)	4 (Good)	5 (Very Good)	5 (Very Good)
Factor 4: Compatibility of proposed urban uses with nearby agricultural and forest activities occu										
	A. Compatibility with Farms and Forests		H	1	3.2 (Fair)	3.1 (Fair)	2.1 (Poor)	3.0 (Fair)	2.2 (Poor)	3.8 (Good)
		(1) Farm practices & high value farm land adjacent to expansion areas	H	1	3 (Fair)	3 (Fair)	2 (Poor)	3 (Fair)	2 (Poor)	4 (Good)
		(2) impact to irrigation districts	M	0.1	4 (Good)	3 (Fair)	2 (Poor)	3 (Fair)	1 (Very Poor)	3 (Fair)
		(3) Proximity of expansion areas to designated forest land	M	0.1	4 (Good)	4 (Good)	3 (Fair)	3 (Fair)	5 (Very Good)	3 (Fair)
Overall					3.6 (Good)	4.0 (Good)	3.0 (Fair)	2.6 (Fair)	3.2 (Fair)	3.2 (Fair)

Key: H = High Importance; M = Moderate Importance; L = Low Importance; N = Excluded.   ● Very Good   ◡ Good   ○ Fair   ◠ Poor   ◉ Very Poor

* Weighting for performance measures is relative to others within a single community outcome. Weighting for community outcomes is against other community outcomes. Weighting is provided as an example only and is subject to further refinement.

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City of Bend Comprehensive Plan

Chapter 5: **Economy**

Adopted Amendments

EFFECTIVE DATE	ORD #	CHANGES
7/14/2015	-	Created template.

BACKGROUND

Context

Bend's economy is shaped by its historic role as a trade, service, education and tourist center for Central Oregon. Bend is attractive to expanding companies primarily because of its quality of life, growing population dominated by in-migration, and access to a labor force that is young and well-educated. As Bend's economy grows, its role as a regional center will guide and stimulate economic growth throughout Central Oregon and beyond.

This regional economic role will influence the number and types of jobs that existing and future businesses create. Downtown Bend is the cultural, culinary, and specialty retail hub of the region. Bend hosts the region's largest medical facility, the largest news media organization, and numerous governmental agencies, from federal (U.S. Forest Service), to regional (Deschutes County seat), to local (City of Bend). Bend is also home to a majority of the region's largest and most influential employers.

Bend's role as a regional social and cultural center is also an important consideration as a driver of economic growth. Bend's high quality cultural and natural amenities are repeatedly cited by business owners and employees as reasons to relocate to, or remain in, Bend. They are also the driver of much of the tourism industry, which is a significant portion of the economy. Such amenities play an important role in continuing to attract tourist dollars, new households and future firms.

Bend's economic growth relies on the City's ability to create an environment for businesses of the future to thrive. The industries of the past are not the industries of the future. Governments, economic development groups, and developers must play complementary roles in retaining, expanding, and recruiting businesses that will serve Bend's 21st century economy.

Economic Trends

Economic development in Bend will continue to occur in the context of long-term national, state and regional trends. A number of those trends, and their implications for Bend's economy, are highlighted below.

- **Moderate growth rates and recovery from the national recession.** The "Great Recession" is widely considered to have ended in 2009; however, economies take time to recover and Bend's economy is no exception. After 2009, Bend experienced a period of minimal growth, followed by a period of dramatic growth. Bend can expect continued economic growth (measured by employment growth, unemployment rates and wage growth) over the coming years.

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- **Growth of service-oriented industries.** As the goods-producing industries decline, service-oriented industries are on the rise. This trend will continue to impact the composition of Bend's economy, leading to an even higher percentage of jobs in health care, government, retail trade, personal services and food services. Historically, Bend's economy was heavily dependent on manufacturing and resource extraction industries such as sawmills and pumice mines. Similar to state and national trends, Bend's economy has undergone fundamental changes over several decades as employment in traditional manufacturing sectors declined and growth in service-oriented sectors increased.

- **Availability of trained and skilled labor.** In Bend, population and in-migration growth rates are generally high and residents are more likely to have a Bachelor's degree (relative to state and national rates). This results in a pool of available labor in Bend, a trend that is forecast to continue over the coming years.

Vision for Economic Development in Bend

What does a healthy Bend economy look like?

- Bend attracts and retains targeted industries. The city targets employment sectors that are projected to grow, that are a good fit for the city, and that help Bend achieve its economic goals – including an emphasis on jobs that pay higher than median wages. Targeted sectors include higher education, health care, recreation equipment, and specialty manufacturing.

- Bend's downtown is strong. The downtown continues to be an active focal point for residents and visitors with strong businesses, urban housing, civic services, arts and cultural opportunities, and gathering places. Parking downtown is adequate and strategically located.

- Bend maintains an adequate supply of serviceable industrial and commercial lands. There is enough suitable land within Bend's UGB to accommodate future jobs and businesses. The city monitors and maintains the land supply.

- Bend builds a diversified economy. Bend continues to move toward a more diversified economy that provides professional service, high-skill manufacturing, high-tech, and other higher than median wage jobs.

- Bend provides opportunities for university education and research. A high-quality university in Bend provides education and training for the next generation of Central Oregonian workers whose ideas, talents and energy will create the foundation of Bend's future economy.

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■ **Aging population.** While Bend's population is younger than the state's as a whole, it is still aging and the percentage of people over age 60 is expected to increase. Businesses in Bend will need to replace workers as they retire, at a rate that will likely outpace job growth.

■ **Importance of natural resource amenities.** Bend is widely acclaimed as one of the top "smaller" cities in the country. The city has a distinctive and appealing vibe, a growing national profile, a fun and relaxed way of life, and a beautiful natural setting for outdoor living and recreation. As a fast-growing city, Bend's attractiveness brings a central challenge: how to accommodate more people and jobs while preserving what the community values so Bend gets better, not just bigger.

Employment and Mixed Use Plan Districts

The role of the Comprehensive Plan is to provide and maintain an adequate supply of industrial, commercial, and mixed-use land to accommodate and promote quality economic growth and assure a diverse economy. The Plan also provides the policy framework to guide on-going land use decisions and public infrastructure investments relating to employment lands.

The Comprehensive Plan designates lands for a range of commercial, industrial and mixed-use districts that are shown on the Comprehensive Plan Map and described in Table 5-1 below. These employment districts provide for a variety of locations with different characteristics to support the continued growth and diversity of Bend's economy. With the exception of the Industrial General district, there is a significant amount of "mixing" of uses in different employment districts as allowed by the Bend Development Code. This trend is expected to continue, with plan policies and code provisions that allow and support a mix of employment and residential uses in commercial and mixed use districts, particularly in centers and along transit corridors.

Table 5-1.   Employment and Mixed-Use Plan Districts

Employment District	Implementing Zone(s)	Characteristics
Commercial		
Central Business District	Central Business (CB)	Encompasses the historic downtown and central business district that has commercial and/or mixed-use development with a storefront character. Areas with this designation have higher employment densities and building mass, and require high-quality pedestrian, bicycle, and multi-modal transportation systems.

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Employment District	Implementing Zone(s)	Characteristics
Convenience Commercial	Convenience Commercial (CC)	Adjacent to and connected to the residential districts it is intended to serve. Provides for frequent shopping and service needs of nearby residents. New convenience commercial districts shall develop as commercial centers rather than a commercial strip and be limited in size up to 5 acres. Areas with this designation have lower employment densities and building scales than the Central Business District, but require high-quality pedestrian, bicycle, and multi-modal transportation systems.
Limited Commercial	Limited Commercial (CL)	Provides locations for a wide range of retail, service, and tourist commercial uses in the community along highways or in new centers. This designation is intended for small and large commercial uses which may be more auto-oriented, yet also provide multi-modal access.
General Commercial	General Commercial (CG)	Provides a broad mixing of commercial uses that have large site requirements, are oriented to the higher classification roadways and provide services to the entire City and surrounding area.
Industrial		
Industrial General	General Industrial (IG)	Provides for light and heavier industrial uses in an industrial environment with a minimum conflict between industrial uses and nonindustrial uses.
Industrial Light	Light Industrial (IL)	Provides for heavier and limited commercial and office uses and light industrial uses in areas with easy access to collector and arterial streets.
Surface Mining	Surface Mining (SM)	Provides for the extraction of pumice, ash, and rock to serve the construction needs of the urban area.
Mixed Use		
Mixed Employment	Mixed Employment (ME)	Provides broad mix of uses that offer a variety of employment opportunities in areas that already exhibit a pattern of mixed development, or in new areas which provide a transition between different employment and residential uses.
Mixed Use	Mixed Use Riverfront (MR)	Provides a mix of commercial, industrial, and residential uses to implement policies for redevelopment of mill site properties adjacent to the Deschutes River.
	Mixed Use - Urban (MU-U)	Provides opportunities for vibrant mixed use centers and districts in areas with high-quality connectivity to and within the area.
	Mixed Use - Neighbrohood (MU-N)(MU)	Provides neighborhood-scaled, pedestrian-oriented mixed use centers and corridors with a range of residential retail, service, and office uses that are compatible with adjacent development.
Professional Office	Professional Office (PO)	Provides for professional offices in locations near arterial or collector street and a transition of uses between residential areas and other more intensive zones.

Additional information about how Bend forecasts employment growth, identifies target industries, and evaluates its ability to accommodate future employment can be found in the 2015 Economic Opportunities Analysis (EOA). The EOA is adopted and incorporated as Appendix X of the comprehensive plan and it provides the factual base to support the goals and policies for the economy in this chapter of the Plan. It estimates the amount of employment that can be accommodated on existing land in the UGB and the amount of residual employment that will require new land.

The need for employment growth correlates strongly to the need for land within Bend's urban growth boundary. The Urbanization Chapter of the Comprehensive Plan provides a discussion about how employment land needs are determined and how Bend will meet those needs over time.

GOALS

The intent of the Comprehensive Plan is to provide sufficient land to meet the city's goals of promoting quality economic growth and assuring a diverse economy. The following goal statements describe the economic hopes of the community and serve as the foundation for policy statements in this chapter. The citizens and elected officials of Bend wish to:

- promote a vital, diverse and sustainable economy, while enhancing the community's overall livability.

- ensure an adequate supply of appropriately zoned land for industrial, commercial, and mixed-use development opportunities.

- strengthen Bend's position as a regional economic center.

- create more opportunities in Bend for jobs that pay a higher than median wage.

- create commercial areas that support multimodal access.

- encourage more small neighborhood commercial developments and convenience commercial centers to reduce the number and length of single occupancy vehicle (SOV) trips.

POLICIES

General Policies

5-1   Bend's economic lands (commercial, mixed employment, and industrial) serve Bend residents and the needs of a larger region.

5-2   Bend is a regional center for health care, art and culture, higher education, retail, tourism, and employment. The economic land policies recognize Bend's role in the region, and the need to support uses that bolster the local and regional economy:

○ The Medical District Overlay Zone provides economic lands for a variety of health care and related services to a population much larger than the City of Bend.

○ Commercial and Mixed Use-designated lands support retail, tourism, and arts and culture uses to serve a local and regional role.

○ Public Facility and Special Plan Districts support higher education to serve Bend residents and the needs of the region.

○ Industrial and Mixed Employment-designated land located at Juniper Ridge has a local and regional role.

5-3   Investment in transportation, water, sewer, fiber, and other utility infrastructure should be prioritized to serve economic lands.

5-4   Infrastructure will be planned, designed, and constructed to support continued economic growth and orderly development.

5-5   The Bend Municipal Airport is one of the City's highest-value economic development assets. Bend will coordinate with Deschutes County to create policies and development regulations that ensure long-term employment growth at the airport.

5-6   Employment lands for Bend's target sectors will be provided and protected to promote expansion of existing businesses and attract new businesses.

5-7   Bend will diversify its economic base to withstand expansions and contractions in the business cycle.

5-8   The City will recognize the statements of the City's overall economic development objectives and desirable types of employment contained in the 2015 Economic Opportunities Analysis (EOA).

5-9   The City will prioritize providing an adequate number of suitable industrial sites while also providing a variety of commercial sites.

5-10   The City will seek opportunities to designate or allow additional sites for employment use and increase the use of existing employment land within the existing urban growth boundary prior to expanding the UGB.

5-11   The City will periodically review existing development and use patterns on industrial and commercial lands. The City may consider modifying General Plan designations and zoning to better respond to opportunities for redevelopment and revitalization of employment lands in underutilized areas.

Short Term Supply Policies

5-12   The City establishes a goal to have at least 25% of the predicted economic land need identified in the adopted EOA qualify as competitive short-term land supply.

5-13   Beginning in 2019, and every two years thereafter, the City will:

○ Update the economic lands Buildable Lands Inventory to identify developed and vacant economic lands by General Plan designation;

○ Estimate the acreage of vacant economic lands that qualify as competitive short-term supply;

○ If the acreage of vacant lands that qualify as competitive short-term supply is less than the 25% goal, then staff will deliver a report to the City Council that details:

- Economic lands that have a relatively good opportunity to qualify as competitive short-term land supply to meet the 25% goal,

- Obstacles preventing those lands from qualifying as competitive short-term supply, and

- Efforts, plans, and potential funding mechanisms to prepare the lands to qualify as competitive short-term supply.

Industrial Development

5-14   Large-lot industrial sites (over 50 acres) are important to the overall inventory of available economic land. Any sites included in the UGB to meet this special site need will be protected with specific plan and/or code provisions.

5-15   The City supports the redevelopment of brownfield sites to make efficient use of existing economic lands and improve the

quality of the City's land and water resources.

5-16   The Juniper Ridge District inside the Bend UGB will be used to help meet the long-term need for future industrial and employment development.

5-17   At least 30% of the total net buildable area of the portion of Juniper Ridge District inside the UGB should be reserved for sites of ten acres and larger in size.

5-18   The City will work to preserve prime industrial lands for industrial purposes and protect them from incompatible commercial and residential uses.

5-19   The community will attempt to diversify its industrial base.

5-20   Existing industrial operations are encouraged to reduce waste discharge levels and improve air quality conditions.

5-21   Industrial developments along highways will be subject to special development standards relating to setbacks, landscaping, signs, and outside storage.

5-22   Wherever industrial uses abut residential uses or residential zoning, special development standards relating to setbacks, screening, signs, and building height will be established for the industrial uses.

Mixed Use Development

5-23   Mixed-use development may be regulated through one or more plan designations and zoning districts to encourage the development of a mix of employment, or a mix of employment and residential uses.

5-24   Mixed-use development will achieve the following purposes:

- provide a variety of employment opportunities and housing types;

- foster pedestrian and other non-motor vehicle access within and to the site;

- ensure compatibility of mixed-use development with the surrounding area and minimize off-site impacts associated with the development;

- ensure the site planning, access, parking areas and building designs are functionally coordinated and aesthetically pleasing; and

○ where applicable, improve the natural conditions along the Deschutes River, and encourage access to and enjoyment of the Deschutes River.

5-25   The City will encourage vertical mixed use development in commercial and mixed use zones, especially along transit corridors and in the Central Area (generally described as east of the Bend Parkway, west of 4th Street, north of Franklin Avenue, and south of Revere Avenue).

Commercial Development

5-26   The existing pattern of commercial designations shown on the Comprehensive Plan Map along arterial and collector streets such as, but not limited to, Newport Avenue, Galveston Avenue, SW 14th Street, and 27th Street will not be extended further along these corridors.

5-27   New employment areas with a mix of employment designations such as commercial, industrial, and mixed use may be created along Highway 97, Highway 20, and O.B. Riley Road. Residential uses to support these employment uses should be encouraged.

5-28   The City will discourage continuous strips of primarily commercial designations along expressways, principal arterials, arterials or collector streets. Designations allowing a mix of employment and residential uses should be permitted when proposed as a cohesive development.

5-29   New commercially designated areas are encouraged to develop with mixed-use centers to include housing, open space, commercial development, and other employment designations.

5-30   The City shall strive to retain and enhance desirable existing commercial areas and encourage property owners' efforts to rehabilitate or redevelop older commercial areas.

5-31   Proposed Comprehensive Plan Map amendments for new commercial centers shall meet the location and size standards in the Comprehensive Plan text in addition to Plan amendment and/or zone change criteria.

5-32   All commercial developments shall be subject to development standards relating to setbacks, landscaping, physical buffers, screening, access, signs, building heights, parking areas, and design review.

5-33   The City will encourage the development of Neighborhood

Commercial centers. Such centers should be small, and serve the frequent needs of the people within a one mile radius of the site.

5-34   Except in UGB expansion areas, new Convenience Commercial centers may be up to five acres in area and should be from one to one and one-half miles from another commercial use.

5-35   Commercial developments that abut residential zones or residential uses shall be subject to special setback and screening provisions.

5-36   The City shall continue the revitalization process in the Central Business District through rehabilitation or redevelopment of existing areas.

5-37   The City will provide a process through the development code to review and approve exceptions to height limits where it supports city goals and policies.

5-38   Commercial development adjacent to arterial streets and highways shall be subject to City of Bend and/or Oregon Department of Transportation access management standards (as applicable) and shall provide for multimodal access.

5-39   The City will limit the amount of ground-floor residential development in the commercial zones and mixed employment zones to preserve economic lands for economic uses.

5-40   The City will monitor parking needs for commercial uses and set requirements at the lowest level to meet the community needs.

5-41   The City will write parking requirements to encourage walkable commercial development while providing for adequate parking.

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Chapter 6: **Housing**

ADOPTED **A**MENDMENTS

EFFECTIVE DATE	ORD #	CHANGES
7/14/2015	-	Created template.

BACKGROUND

Context

Oregon Statewide Planning Goal 10 (Housing) requires cities to "encourage the availability of adequate numbers of needed housing units at price ranges and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type and density." Goal 10 requires the city to adopt and incorporate two important documents into the Comprehensive Plan.

The first is a buildable lands inventory (BLI) that catalogues the development status (developed, vacant, etc.) and capacity (housing units) that can be accommodated on lands within the UGB. Bend's BLI for growth to 2028 is adopted and incorporated as Appendix X of the Comprehensive Plan.

The second is a housing needs analysis (HNA) that includes an analysis of national, state, and local demographic and economic trends, and recommendations for a mix and density of needed housing types. Bend's HNA for growth to 2028 is adopted and incorporated as Appendix X of the Comprehensive Plan. The HNA documents historical housing and demographic trends, the projection of population and housing growth, and analysis of housing affordability. Based on this analysis, the HNA estimates needed housing density and mix for growth to 2028.

The BLI and the HNA provide the factual base to support the housing goals and policies in this chapter of the Comprehensive Plan. A major objective of the Comprehensive Plan is to establish residential areas that are safe, convenient, healthful, and attractive places to live, and which will provide a maximum range of housing choices for the people in Bend. The City of Bend will face a variety of issues over the coming years in meeting these needs, including:

- Maintaining an adequate supply of land available and zoned appropriately to provide opportunities for a range of housing types needed in Bend in the face of rapid population growth.

- Responding to a land and housing market that has appreciated significantly in recent years, driving the cost of housing up significantly and leaving relatively few market opportunities for low-cost owner-occupied housing.

- Affordable housing for service workers, both for individuals and families, is in short supply in Bend. Rapid increases in home and rental prices have combined with growth in the (low wage) service sector to make it difficult for much of Bend's workforce to live in the city.

- The increasing gap of housing affordable to low and moderate income households is resulting in many area workers living in other Central Oregon cities

and commuting to Bend for work. This is exacerbating traffic congestion and it also affects the ability of area employers to attract workers for jobs at many income levels, including service and professional workers.

■ The City is currently limited to some degree in what it can do by state and other regulations that restrict the ability to enact funding mechanisms or regulatory approaches to meeting housing needs.

As summarized in the HNA, Bend's population grew rapidly between 1990 and 2014, increasing from about 20,000 to 80,000 people during that period. At the same time, Bend's housing stock nearly tripled. Most new housing development during this time was single-family detached housing.

This rapid population growth increased the demand for all types of housing. During the same period, average wages were flat and the combined result was a decline in housing affordability. Housing sales prices more than doubled between 2000 and 2014, while household income levels increased by only about 18 percent. In addition to wage stagnation, several other factors contributed to a decline in affordability between 1990 and 2014, including

■ High demand for second homes in Bend

■ Significant growth in the tourism/recreation economy and the associated jobs that tend to pay lower wages

■ Demographic changes, as described in the Demographic Trends section below

As growth continues, Bend must carefully plan for new housing that meets the needs of its changing population. The Comprehensive Plan's goals and policies support a range of housing choices matched to Bend's needs. One of the challenges facing the community is how to plan for a variety of housing options in existing neighborhoods and new residential areas that support the changing demographics and lifestyles of Bend's current and future residents.

Demographic Trends

There are a number of factors that will increasingly affect the choices people make when it comes to housing type; three primary factors are a person's age, the number of people in the household and household income. In Bend, and across the country, the first two decades of the 21st century saw some key demographic changes that will impact the way communities plan for the housing needs of their existing and future populations.

■ **Growth in Baby Boomers.** The number of people over age 65 is projected to increase significantly. Households over 65 tend to have less income than younger households and are more likely to choose lower-cost multifamily housing. Some baby boomers may also choose to downsize their housing, resulting in greater demand for small dwellings.

■ **Growth in Millennials.** Millennials are people who will be between 31 and 44 years old in the year 2028. This segment of the population is also expected to increase in Bend. Younger millenials typically have lower incomes and may have higher debt. Growth in millennials will increase need for affordable housing rental and ownership options.

■ **Growth in Hispanic and Latino population.** The Hispanic and Latino population in Bend more than doubled between 2000 and 2014, and growth is expected to continue. Many Hispanic and Latino residents in Bend are also within the Millennial age range. To the extent that Hispanic and Latino households currently have lower household incomes than the population as a whole, demand for more affordable housing, both rental and ownership options, will increase.

In 2016, Bend will also see the opening of its first dedicated four-year university campus, which will ultimately bring up to 5,000 students into the mix. While some of these students will live on campus, there will also be a need for affordable student housing off campus.

Based on these trends, the future housing mix in Bend will look different than it has in the past. There is a growing need to provide a wider range of housing sizes and prices to accommodate the shifting demographics. Evidence suggests that a substantial portion of Bend's residents will live in attached housing, such as townhouses, cottage housing, duplexes, garden apartments, or urban apartments. At the same time, Bend also has a continuing demand for single family detached housing, primarily on small or moderately sized lots (5,000 to 7,000 square feet). A growing share of households will be renters, either by choice (e.g., Baby Boomers who prefer to rent smaller units) or by economic necessity. Demand for these types of homes will be particularly high in areas close to Bend's commercial and recreational amenities. In planning for future housing, Bend must pay close attention to the following housing issues:

■ **Widening demand for a range of housing types by retirees.** Older households tend to move less frequently than younger households, and a large majority would like to age in place. Being near family, friends, and social organizations in walkable neighborhoods also becomes increasingly important with age.

■ **Increasing demand for family housing.** Millennials and Hispanic households are poised to account for the largest percentages of growth in Bend over the next 20 years. Millennial will be entering the phase of life when they form families and have children. In addition, Hispanic households have larger than average household size because they often live in multi-generational households and have a larger average number of children. Growth in households with families will drive need for housing that is both affordable and has sufficient space.

■ **Increasing demand for affordable housing.** A substantial proportion of

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Bend's households cannot afford housing in Bend. Many workers in Bend live in nearby communities because affordable housing is in short supply in Bend, and the demand for small-lot housing with nearby amenities is increasing. For two of the fastest growing demographics in Bend, the Millennials and Hispanic and Latino population, affordability is more likely to be a barrier to homeownership or higher-cost rental housing.

■ **Location and design of housing.** The location of housing is becoming increasingly important, with increased demand for housing in walkable neighborhoods near retail and other amenities. Integrated multi-family and compact single-family homes located in neighborhoods can provide opportunities for a wider range of housing and transportation options.

Neighborhood Livability

While the range of housing types and prices in Bend will expand, Bend will continue to emphasize livability in all neighborhoods, old and new. What does a livable neighborhood look like?

■ Safe and convenient for travel by foot, car and bike

■ Natural features, parks, open space

■ Small-scale shops and places to eat and drink in the neighborhood or nearby

■ Quality housing that provides diverse housing types and flexibility that meets market demand

■ Comfortable integration and transitions between housing types and commercial uses

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RESIDENTIAL PLAN DISTRICTS

The Comprehensive Plan has five residential districts that are shown on the Comprehensive Plan Map and described in Table 6-1 below. These districts provide for variety and choice in housing types, lot sizes, and locations needed to serve the existing and future housing markets. In addition to these residential districts, some future housing will occur in the Plan's mixed use districts and as secondary uses in some commercial areas.

Table 6-1.   Residential Plan District

Residential District	Implementing Zone(s)	Density Range (dwellings per gross acre)*	Characteristics
Urban Reserve Area	Urban Area Reserve (UAR-10)	No min. Max 1 per 10 acres.	The Urban Area Reserve District is a holding zone for urban development.

Areas with Suburban Low Density Residential zoning reflect the existing development patterns and presence of community water systems.

Primary uses: single-family detached homes

Secondary uses: destination resorts in specific areas only, accessory dwelling units (SR-2½ only) |
| | Suburban Residential (SR-2½) | No min. Max: 1 per 2.5 acres | |
| Urban Low Density | Residential Low Density (RL) | Min: 1.1 Max: 4.0 | This district applies primarily to areas developed with single-family homes that are away from the city center.

Primary uses: single-family detached homes

Secondary uses: duplexes, manufactured home parks, accessory dwelling units |
| Urban Standard Density | Residential Standard Density (RS) | Min: 4.0 Max: 7.3 | This is the primary district for existing and future single family homes, and is distributed throughout the urban area.

Primary uses: single-family detached homes, duplexes

Secondary uses: manufactured home parks, cluster/cottage housing, accessory dwelling units |

* See Bend Development Code for methodology to calculate minimum and maximum densities

Residential District	Implementing Zone(s)	Density Range (dwellings per gross acre)*	Characteristics
Urban Medium Density	Residential Medium Density (RM)	Min: 7.3 Max: 21.7	This district is distributed throughout the urban area in a pattern that reflects both existing developments and land for future development or redevelopment. These areas are generally adjacent to commercial areas and along or near major transportation and transit corridors. Primary uses: attached housing, manufactured home parks, accessory dwelling units Secondary uses: single-family detached homes, boarding houses, cluster/cottage housing, neighborhood commercial uses
Urban High Density	Residential High Density (RH)	Min: 21.7 Max: 43.0	This district allows the greatest concentration of population in the city and is generally applied in proximity to downtown and adjacent to commercial areas and/or transit corridors. Primary uses: multifamily and attached housing Secondary uses: neighborhood commercial uses

The following goals and policies set the framework for the City of Bend to adopt amendments to the Development Code and to make more efficient use of lands within the UGB, to permit a broader range of housing types in different zones, and to require a mix of housing types in larger master plan areas.

GOALS

The intent of the Comprehensive Plan is to provide and maintain sufficient residential land to accommodate needed housing units under Statewide Planning Goal 10 (Housing). The following goals set the context for the policies in this chapter. The citizens and elected officials of Bend wish to:

■ Keep our neighborhoods livable by offering a variety of living styles and choices, creating attractive neighborhoods located close to schools, parks, shopping and employment.

■ Accommodate the varied housing needs of citizens with particular concern for safety, affordability, open space, and a sense of community.

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■ Recognize the importance of transportation linkages (streets, bikeways, side-walks and paths) in connecting neighborhoods and building and maintaining a sense of community.

■ Promote more flexibility in development standards to balance the need for more efficient use of residential land and preservation of natural features.

■ Zone adequate land in specific designations to allow for production of needed housing units.

POLICIES

Population Forecasts

6-1   The City will coordinate with and provide data to Portland State University for their preparation and regular update of a coordinated 50-year population forecast for the Urban Growth Boundary.

6-2   Using the new coordinated 50-year forecast, the City will, within 5 years after acknowledgment of the current update becomes final and no longer subject to appeal, initiate a sup-plemental legislative review to demonstrate continuing com-pliance with state needed housing laws for a new full 20-year planning period .

6-3   The City will use regular updates of population forecasts and Housing Needs Analyses to monitor housing trends relative to the planned housing mix, densities, location, and affordability assumed within the Urban Growth Boundary.

Housing Mix, Density, and Affordability

6-4   The City will apply plan designations, zoning districts and development code regulations to implement the mix of housing indicated in the adopted Housing Needs Assessment.

6-5   The main purpose of maximum densities shown on the Plan Map is to maintain proper relationships between proposed public facilities and services and population distribution. One purpose of minimum densities is to assure efficiency of land use, particularly for larger sites. Another is to encourage de-velopment of housing in locations and at densities that support healthy, accessible, and affordable housing choices.

6-6   Upon application, the City shall zone residential lands in ac-cordance with their plan designations, and without a separate

showing of public need, subject only to conditions, if applicable, requiring annexation or availability of public sewer or public water before occupancy.

6-7   The City will continue to create incentives for and remove barriers to development of a variety of housing types in all residential zones, consistent with the density ranges and housing types allowed in the zones. This policy is intended to implement the City's obligation under the State Housing Goal to "encourage the availability of adequate numbers of needed housing units at price ranges and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type, and density".

6-8   The City will apply innovative and flexible zoning tools to support a mix of housing types and densities.

6-9   The City and County will support public and private non-profit and for-profit entities that provide affordable housing in Central Oregon.

6-10   The City and County will coordinate with each other and other affected governments as required by the State Housing Goal to ensure that "the needs of the region are considered in arriving at a fair allocation of housing types and densities" and that "needed housing is provided on a regional basis through coordinated comprehensive plans".

6-11   The City will continuously monitor the yield of efficiency measures as required by the state needed housing statute and publish the results on its Growth Management Documents website not less than once a year.

6-12   To promote complete neighborhoods and the integration of other supporting uses, the City will employ a master planning process for large development sites which are 20 acres or greater. The master plan process will offer two options for approval 1) applying clear and objective standards or 2) applying discretionary standards for more flexibility.

6-13   Existing Residential Standard density areas that are adjacent to commercial or mixed use development may be re-designated for Residential Medium and High density development.

6-14   The City will support re-designation of suitable low density areas that are within a 15-minute walk to transit corridors for medium-density development.

6-15 The City shall employ special redevelopment standards and other strategies for manufactured home parks as an incentive to retain and redevelop existing affordable housing stocks at affordable prices and rent levels.

6-16 The City may consider density bonuses as an incentive to providing affordable housing.

6-17 The City will monitor parking needs for residential uses and set parking requirements to the lowest standards that will meet the community's needs in order to reduce land utilized for parking, reduce the cost of housing development, and encourage a more walkable development pattern.

6-18 The City will assist in identifying, obtaining and leveraging funding sources for the development of new housing for very low, low, and moderate - income residents, as determined by appropriate percentages of Area Median Family income in the Housing Needs Assessment.

6-19 The City will monitor the results of actions and programs funded through the use of the City's Affordable Housing Fee Trust Fund.

Residential Compatibility

6-20 Private and public nonresidential uses are necessary and will be encouraged within residential areas for the convenience and safety of the residents. Such facilities shall be compatible with surrounding developments, and their appearance should enhance the area.

6-21 Of necessity, nonresidential uses may abut residentially planned and zoned areas in different parts of the community. In these instances, nonresidential uses will be subjected to special development standards such as setbacks, landscaping, sign regulations, and building design that harmonize and provide transitions consistent with the primary purposes of the adjacent zones.

6-22 Homes built to HUD Class A manufactured home standards will be permitted either in manufactured home parks, or on individual lots. Non-Class A manufactured homes may be allowed in manufactured home parks or as replacement for non-conforming manufactured homes subject to conditional use approval standards that are clear and objective and that encourage retention and replacement of existing affordable housing stock.

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6-23 Homes built to HUD manufactured home standards located on individual lots in areas already developed with conventional housing shall be subject to special siting standards as provided by the state needed housing law.

6-24 Manufactured and modular homes meeting IRC Modular and CABO building code standards shall be permitted on the same basis as site-built homes.

6-25 Private covenants and deed restrictions recorded hereafter that support compact urban form, higher densities and better access to affordable housing are encouraged as supportive of City policy while those that undermine these goals are discouraged and should be considered as contrary to City policy in any legal proceedings to enforce, interpret or apply them.

6-26 Neighborhood commercial shopping areas may be located within residential districts and shall have development standards that appropriately limit their scale and recognize their residential setting.

6-27 In many cases, small home-based businesses are a legitimate use within residential areas, and may be permitted subject to design and nuisance standards in the Development Code.

6-28 Certain private recreational uses, such as golf courses or tennis courts, may be successfully integrated into residential areas provided the location, design, and operation are compatible with surrounding residential developments and do not prevent development of lands inventoried for needed housing to minimum density standards.

6-29 Residential areas will offer a wide variety of housing types in locations best suited to a range of housing types, needs and preferences.

Neighborhood Appearance

(See related policies in Chapter 9, Community Appearance.)

6-30 Above-ground installations, such as water and sewer pumping stations, power transformer substations or natural gas pumping stations, shall be screened and designed to blend with the character of the area in which they are located.

6-31 All new developments shall include trees in the road right of way, as practical, in the planter strip between the curb and sidewalk.

6-32   Walls and fences along arterial or collector streets shall be subject to special design standards. The fence or wall, and the area between the fence or wall and the curb or pavement, shall be landscaped.

6-33   All residential development will respect the natural ground cover of the area and existing and mature trees within the community should be preserved where practicable.

6-34   The City encourages flexibility in design to promote safety, livability and preservation of natural features. To that end, the City will provide development code standards to allow flexibility on dimensional standards, such as lot size and setbacks, to achieve these objectives.

6-35   Hillside areas shall be given special consideration in site design by both the developer and local regulations. Building sites, streets, and other improvements shall be designed and permitted in a manner that will minimize excessive cuts and fills and other erosion-producing changes. (Note: see related policies in Chapter 10, Natural Forces.)

Transportation connectivity

(See related policies in Chapter 7, Transportation Systems, and Chapter 3, Community Connections.)

6-36   Medium-and high-density residential developments should have good access to transit (preferably within ¼ mile of transit corridors), K-12 public schools, commercial services, employment and public open space to provide the maximum access to the highest concentrations of population.

6-37   Street widths on residential local streets shall be as narrow as reasonably possible to preserve safety, and limit the effects of surface runoff and excessive vehicle speed.

6-38   The City may require adjustments to the street design in order to discourage high speed traffic on local residential streets.

6-39   In all residential areas the City shall encourage the use of open space amenities such as landscaped traffic islands or extra-width planting strips.

6-40   Schools and parks may be distributed throughout the residential sections of the community, and dwelling units should have safe and convenient access to schools and parks.

6-41   The City will coordinate with the school and parks districts to

ensure that the respective plans of each local government are coordinated and consistent with state law.

6-42   Sidewalks will be required in all new developments. Separated sidewalks will be required on all new streets. However, an alternative system of walkways that provide adequate pedestrian circulation may be approved.

6-43   Per the City's Transportation Systems Plan, the City will complete or connect priority walkways on routes to schools, parks, or commercial areas.

6-44   Bikeways shall be considered as a transportation element, and adequate facilities shall be provided as a part of new development.

6-45   Efforts will be made to extend trails, pedestrian ways, and bikeways through existing residential areas. Existing trails, pedestrian ways, and bikeways will be extended through new developments to allow further extension and promote alternative modes of travel.

6-46   The City will encourage pedestrian scale block length to encourage connectivity and pedestrian access. When existing conditions or topography prevent a cross street, a pedestrian accessway to connect the streets may be required.

6-47   Residential local streets shall be developed whenever practicable to increase connectivity within and between neighborhoods.

6-48   Cul-de-sac and "hammer-head" residential streets may be allowed only where existing development, steep slopes, open space, or natural features prevent connections, or when the objectives of connectivity are met within the neighborhood.

6-49   The City will consider the need for emergency equipment access for any new development.

Public utilities and services

(See related policies in Chapter 1, Plan Management and Citizen Involvement and Chapter 8, Public Facilities and Services.)

6-50   All residential areas will be provided with community water and sewer services and other facilities necessary for safe, healthful, convenient urban living consistent with the density of development.

6-51   Residential development shall be coordinated with other land

use elements and community facilities which are consistent with projected housing densities.

6-52   Electric power, telephone, and cable TV distribution and service lines shall be located underground in new developments.

6-53   Street names shall be unique within the County.

Destination Resorts

6-54   A destination resort within the Urban Area Reserve may be served by municipal water and sewer service or an approved community water and sewer service for domestic use compliant with state law.

6-55   Properties that are eligible for destination resort development will lose that eligibility upon inclusion into the UGB.

Refinement Plan Areas

(See related policies in Chapter 1, Plan Management and Citizen Involvement.)

6-56   A refinement plan that includes residential areas may prescribe residential density limits on specific properties which differ from the density range provided for in the General Plan. However, the average density of residential development allowed within a refinement plan area shall not be less than 80 percent or more than 100 percent of the maximum density, including applicable density bonuses or transfers, prescribed for the area by its pre-existing comprehensive plan map designations.

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PROPOSED POLICY AMENDMENTS: EMPLOYMENT POLICIES

Proposed amendments are presented in an annotated table with language in underline/strikeout format; underlined text indicates new policy language and ~~strikeout~~ text indicates deleted language. The left column contains the amended policy language and the right column provides a brief explanation for the change. Policy language that has not been amended is retained in plain text. Policies will need to be renumbered as appropriate for final adoption.

Chapter 6 The Economy and Lands for Economic Growth

Proposed Amendment	Rationale for Amendments
GOALS *"The intent of the ~~General~~ Comprehensive Plan is to provide ~~the community with~~ sufficient land to meet the city's goals of promoting quality economic growth and assuring a diverse economy. The following goal statements describe the future economic hopes of the community and serve as the foundation for policy statements in this chapter. The citizens and elected officials of Bend wish to:* • *~~have~~ promote a vital, diverse and sustainable economy, while enhancing the community's overall livability.* • *ensure an adequate supply of appropriately zoned land ~~in Bend to provide~~ for ~~a full range of~~ industrial, commercial, and ~~professional~~ mixed-use development opportunities.* • *~~stimulate economic development that will diversify and strengthen economic activity and provide primary and secondary job opportunities for local residents.~~* • *strengthen Bend's position as a regional economic center.* • *~~improve the income levels of Bend residents.~~ create more opportunities in*	These existing goals have been amended to: • Clarify and clean up language based on input from the TAC • Reflect UGB Remand requirements and findings, including new policy direction on opportunity sites and efficiency measures • Changed word from professional to mixed-use for better consistency with policy headings in this chapter. • Goal in 3rd bullet deleted because 1) we don't refer to primary & secondary jobs anywhere else 2) we already mention diversity 3) we already mention more jobs. • The goal in the 5th bullet (beginning with "improve income levels") is revised to clarify the intent of the goal in response to

Proposed Amendment	Rationale for Amendments
Bend for jobs that pay a higher than median wage. • *create commercial areas* ~~in outlying sections of the community as neighborhood centers rather than extending the existing strips along major roads~~ *that support multimodal access.* • *encourage* ~~more~~ *small neighborhood commercial developments and convenience commercial centers to reduce* ~~vehicle trips and trip lengths~~ *the number and length of single occupancy vehicle (SOV) trips.*	comments from the TAC. • The goal in the 6th bullet (beginning with "create commercial areas") is revised to focus on multimodal access to commercial areas rather than prioritize centers over corridors.

POLICIES
 	
 General Policies
 	
 • Bend's economic lands (commercial, mixed employment, and industrial) serve Bend residents and the needs of a larger region.
 	
 • Bend is a regional center for health care, art and culture, higher education, retail, tourism, and employment. The economic land policies recognize Bend's role in the region, and the need to support uses that bolster the local and regional economy:
 	
     ○ The Medical District Overlay Zone provides economic lands for a variety of health care and related services to a population much larger than the City of Bend.
 	
     ○ Commercial and Mixed Use-designated lands support retail, tourism, and arts and culture uses to serve a local and regional role.
 	
     ○ Public Facility and Special Planned Districts support higher education to serve Bend residents and the needs of the region.
 	
     ○ Industrial and Mixed Employment-designated land located at Juniper
	New general policy language added to recognize and support the updated EOA and to comply with remand directives. The EOA focuses on Bend's regional role as a job importer. The proposed policies have been clarified for readability based on input from the TAC. Note: Policies will need to be renumbered when finalized.
	
	 The terms "art and culture" and "tourism" are used in the 2nd bullet because they align with the way the city's Economic Development Department tracks the impact of these economic sectors.
	
	 Proposed policies related to commercial and

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Proposed Amendment	Rationale for Amendments
Ridge has a local and regional role.	mixed use lands are revised and combined into one based on input from staff and the TAC.
• Investment in transportation, water, sewer, fiber, and other utility infrastructure should be prioritized to serve economic lands.	
• Infrastructure will be planned, designed, and constructed to support continued economic growth and orderly development.	
• The Bend Municipal Airport is one of the City's highest-value economic development assets. Bend will coordinate with Deschutes County to create policies and development regulations that ensure long-term employment growth at the airport.	Adequate infrastructure for employment lands is needed to support development and the economy. The new policies provide this perspective.
• Employment lands for Bend's target sectors will be provided and protected to promote expansion of existing businesses and attract new businesses.	
• Bend will diversify its economic base to withstand expansions and contractions in the business cycle.	
• The City will recognize the statements of the City's overall economic development objectives and desirable types of employment contained in the 2015 Economic Opportunities Analysis (EOA).	New language to recognize the Bend Municipal Airport. It is not in the UGB, so the policy encourages coordination.
• The City will prioritize providing an adequate number of suitable industrial sites while also providing a variety of commercial sites.	Reference to targeted sectors to support economic development in those sectors as reflected in the EOA.
• The City will seek opportunities to designate or allow additional sites for employment use and increase the use of employment land within the existing urban growth boundary prior to expanding the UGB.	Overall goal of Economic Development to create more stability in the local economy.

Using term "expansions and contractions" per input from city staff. |
| • The City will periodically review existing development and use patterns on industrial and commercial lands. The City may consider modifying General | |

Proposed Amendment	Rationale for Amendments

Plan designations and Zoning to better respond to opportunities for redevelopment and revitalization of employment lands in underutilized areas.
 	
Short-term Supply Policies
 	
• The City establishes a goal to have at least 25% of the predicted economic land need identified in the adopted EOA qualify as competitive short-term land supply.
 	
• Beginning in 2019, and every two years thereafter, the City will:
 	
    o Update the economic lands Buildable Lands Inventory to identify developed and vacant economic lands by General Plan designation;
 	
    o Estimate the acreage of vacant economic lands that qualify as competitive short-term supply;
 	
    o If the acreage of vacant lands that qualify as competitive short-term supply is less than the 25% goal, then staff will deliver a report to the City Council that details:
 	
        ▪ Economic lands that have a relatively good opportunity to qualify as competitive short-term land supply to meet the 25% goal,
 	
        ▪ Obstacles preventing those lands from qualifying as competitive short-term supply, and
 	
        ▪ Efforts, plans, and potential funding mechanisms to prepare the lands to qualify as competitive short-term supply.
	Large industrial users are frequently sensitive to timing of land being available, making it especially important that the city maintain an adequate supply of industrial sites.
	
	The policies relating to short-term supply were initially proposed by the city as part of the 2008 UGB proposal.

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Proposed Amendment	Rationale for Amendments
Industrial Development	
• <u>Large-lot industrial sites (over 50 acres) are important to the overall inventory of available economic land. Any sites included in the UGB to meet this special site need will be protected with specific plan and/or code provisions.</u>	Policy language added to recognize and support the updated EOA and to comply with remand directives for special large-lot site need.
• <u>The City supports the redevelopment of brownfield sites to make efficient use of existing economic lands and improve the quality of the City's land and water resources.</u>	Proposed policy regarding evaluation of large-lot sites (2nd bullet) dropped based on input from TAC and to better align with the regulations from the regional large lot industrial program, which do not specify a time frame for re-evaluation. Specific plan and/or code provisions will still need to be developed to implement the bullet above.
1. ~~In order to help meet the long-term need for future industrial development, at least 500 acres of the City-owned property known as Juniper Ridge shall be brought into the Urban Growth Boundary, annexed to the city, and designated on the Bend Urban Area General Plan Map as Industrial Light.~~ <u>The Juniper Ridge District inside the Bend UGB will be used to help meet the long-term need for future industrial and employment development.</u>	
2. ~~Prior to permitting industrial development on the Juniper Ridge site, the City shall prepare and adopt a development plan for the area. Preparation of the plan shall include an assessment of public facilities improvements, including transportation facility improvements that may be needed to support industrial development.~~	Update Policy 1 to reflect Juniper Ridge is inside the UGB and clarify the way the area in question is described. This policy was originally drafted when it was added to the UGB. Revisions to this policy also address staff and TAC input and provide more flexibility for other employment uses besides industrial.
3. ~~The development plan for the Juniper Ridge site shall allocate at~~ <u>At</u> least 30% of <u>the</u> total net buildable area <u>of the Juniper Ridge District inside the UGB should be reserved</u> for sites of ten acres and larger in size. ~~Through the use of deed restrictions or other appropriate instruments, the City shall ensure that these large-lot sites will not be further subdivided prior to development.~~	Delete Policy 2: Much of this has been done already with the Juniper Ridge Special Planned District.
4. The City ~~shall~~ <u>will</u> work to preserve prime industrial lands for industrial	Updated to clarify the way Juniper Ridge is

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Proposed Amendment	Rationale for Amendments
purposes <u>and protect them from incompatible commercial and residential uses</u>.	described.
5. The community ~~shall~~ <u>will</u> attempt to diversify its industrial base.	Relative to Policy 3, the TAC raised a question about whether 30% is too low for sites over 10 acres in size, since the private community will have a hard time delivering large lots and if the public lands provide for large lots, there is very little if any competition with the private land owners. This has not been changed at this time because it would represent a substantial change in policy direction and requires additional discussion and input from City Council.
6. Existing industrial operations are encouraged to ~~improve~~ <u>reduce</u> waste discharge levels and improve air quality conditions.	
7. ~~Since it has been established that the quality of the air may be adversely affected by additional discharges, the development of new industrial sites will be closely monitored in cooperation with the DEQ to prevent substantial degradation of the air shed.~~	
8. ~~Industrial areas shall be protected from incompatible commercial and residential uses.~~	Policy 7 was determined unnecessary since DEQ regulates such facilities without city oversight.
9. Industrial developments along highways ~~shall~~ <u>will</u> be subject to special development standards relating to setbacks, landscaping, signs, and outside storage.	Policies 9 and 10 contain provisions that direct the development code. Standards exist currently to achieve these aims.
10. Wherever industrial uses abut residential uses or residential zoning, special development standards relating to setbacks, screening, signs, and building height ~~shall~~ <u>will</u> be established <u>for the industrial uses.</u>	
11. ~~Community efforts should be directed toward improving the general appearance of industrial areas so that they make a positive contribution to the environment of the community.~~	Policy 11 deleted because it is too general and doesn't provide guidance for planning or land use decisions.
12. ~~Development of the industrial lands at the West edge of the urban area between Skyliners Road and Shevlin Park Road shall be limited to the Industrial Park and Mixed Employment land use categories to minimize additional heavy truck traffic on Newport Avenue and Galveston Avenue.~~	Policy 12 deleted because the NW Crossing Master Plan already defines the uses in the ME and IP zone districts.

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Proposed Amendment	Rationale for Amendments
13. ~~The 95 acre industrial area at the West edge of the urban area shall be designed and developed as part of an overall master plan for future industrial, commercial and residential development between Skyliners Road and Shevlin Park Road.~~	Policy 13 deleted: This has been done and is reflected in the Northwest Crossing Special Planned District.

Mixed Use Development
 	
• <u>Mixed-use development may be regulated through one or more plan designations and zoning districts to encourage the development of a mix of employment, or a mix of employment and residential uses.</u>
 	
14. Mixed-use development ~~shall~~ <u>will</u> ~~along the river in the old mill sites shall be subject to facility plan, master plan, and design review processes to~~ achieve the following purposes:
 	
    • provide a variety of employment opportunities and housing types;
 	
    • foster pedestrian and other non-motor vehicle access within and to the site;
 	
    • ensure compatibility of mixed-use development with the surrounding area and minimize off-site impacts associated with the development;
 	
    • ensure the site planning, access, parking areas and building designs are functionally coordinated and aesthetically pleasing; and
 	
    • <u>where applicable,</u> improve the natural conditions along the Deschutes River, and ~~to~~ encourage access to, and enjoyment of, the Deschutes River.
 	
15. ~~Designation of the Mixed-Use Riverfront Plan category and corresponding MR zoning along the Deschutes River shall not be used to justify rezoning~~
	
	Policy 15 deleted because this could prevent

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Proposed Amendment	Rationale for Amendments
~~adjacent properties or neighborhoods to a mixed use or commercial zone.~~ 16. ~~The property south of Cooley Road between Highway 20 West and the Mountain View Mall, as shown on the General Plan Map, shall be designated for mixed industrial and commercial development. Because this area is along the state highway and is an entrance to the community, it shall be subject to access controls and design review standards.~~ 17. ~~The area west of Highway 97 North and north of Empire Avenue, as shown on the General Plan Map, shall have a mixed-use designation for industrial and commercial development. Properties in this area shall take access from the frontage road or other internal roads that are shown on the transportation plan. Because of the high visibility of these properties, they shall be subject to design review standards.~~ 18. ~~The area of existing industrial and commercial development in the middle of the urban area north of Franklin Avenue to Addison Avenue shall have a mixed use designation for industrial and commercial development.~~ 19. ~~The City may designate other areas for mixed use development to encourage a variety of jobs and services close to residential areas.~~ • <u>The City will encourage vertical mixed use development in commercial and mixed use zones, especially along transit corridors and in the Central Area (generally described as east of the Bend Parkway, west of 4th Street, north of Franklin Avenue, and south of Revere Avenue).</u>	the implementation of Opportunity Sites (Core Pine and SW Century) and the initial findings of the Central Westside Plan. Policies 16, 17, 18 are currently reflected by the existing ME plan designations which are not proposed to change through the UGB Remand project. Design review standards are applied through the development review process. Access controls are established through ODOT. Policy 19 part of same group of policies related to the ME plan designation (16, 17, 18) and is no longer needed. Policy added to support efficiency measures.
Commercial Development 20. ~~The existing pattern of commercial designations shown on the Plan Map along Highway 97 and Highway 20, and along arterial streets such as Newport Avenue, Galveston Avenue, SW 14th Street, 27th Street, and O.B.~~	Policy 20 separated into two new policies below. Note: Commercial Development policies will

Proposed Amendment	Rationale for Amendments
~~Riley Road shall not be extended farther along the street corridors.~~ • <u>The existing pattern of commercial designations shown on the Comprehensive Plan Map along arterial and collector streets such as, but not limited to, Newport Avenue, Galveston Avenue, SW 14th Street, and 27th Street will not be extended further along these corridors.</u> • <u>New employment areas with a mix of employment designations such as commercial, industrial, and mixed use may be created along Highway 97, Highway 20, and O.B. Riley Road. Residential uses to support these employment uses should be encouraged.</u> 21. ~~No new strip commercial development or extensions of the commercial designations shall be permitted along arterial or collector streets.~~ <u>The City will discourage continuous strips of primarily commercial designations along expressways, principal arterials, arterials or collector streets. Designations allowing a mix of employment and residential uses should be permitted when proposed as a cohesive development.</u> • <u>New commercially designated areas are encouraged to develop with mixed-use centers to include housing, open space, commercial development, and other employment designations.</u> 22. The City shall strive to retain and enhance desirable existing commercial areas and encourage property owner<u>s'</u> efforts to rehabilitate or redevelop older commercial areas. 23. ~~Zoning~~ <u>Proposed Comprehensive Plan Map amendments</u> for <u>new</u> commercial centers ~~other than those shown on the Comprehensive~~ Plan Map shall ~~will~~ meet the location and size standards in the <u>Comprehensive</u> Plan text in addition to the Plan amendment and/or zone change criteria.	need to be examined in the context of the Central Westside Plan and UGB expansion scenarios. Policy 21 still discourages strip commercial development. However, it is revised and supplemented by the new policy below to reinforce support for the concept of mixed-use development in centers (and potentially along transit corridors). Policy 23 revised for clarity based on input from city staff. Size and location standards are intended to be incorporated into the urbanization chapter.

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Proposed Amendment	Rationale for Amendments
24. All commercial developments shall be subject to ~~special~~ development standards relating to setbacks, landscaping, physical buffers, screening, access, signs, building heights, parking areas, and design review. 25. The City ~~shall~~ will encourage the development of Neighborhood Commercial centers. Such centers ~~shall~~ should be small, and ~~one-quarter to one-half acre developments which~~ serve the frequent needs of the people within a ~~one-fourth to one-half~~ a one mile radius of the site. ~~A zone change request shall l meet the standards in the Comprehensive Plan text.~~ 26. Except in UGB expansion areas, new Convenience Commercial centers ~~should~~ may be up to five acres in area and should be from one to one and one-half miles from another commercial use. 27. Commercial developments that abut residential zones or residential uses shall be subject to special setback and screening provisions. 28. The City shall continue the revitalization process in the Central Business District through rehabilitation or redevelopment of existing areas. 29. ~~Proposed buildings that exceed the maximum allowable height limit in the zone shall be reviewed through the conditional use permit process, except in the Central Business (CB) Zone. Proposed buildings that exceed the maximum allowable building height limit in the CB Zone shall be reviewed through the variance process.~~ The City will provide a process through the development code to review and approve exceptions to height limits where it supports city goals and policies. 30. ~~An area south of Murphy Road on the west side of Highway 97 has been marked for highway commercial with a flexible "sawtooth" boundary. This area shall be approved for development only when a system of frontage road and limited access control is created that will protect the capacity and safety~~	Policy 25 edited to apply to walkers and bikers with larger service radii. The Code has standards (including size and location) for Neighborhood Commercial Centers. A rezone to neighborhood commercial is not required. Policy 26 revised to be less prescriptive. Policy 29 is outdated. All Districts except industrial have additional height reviewed via variance. It is also unnecessarily specific – the details are better handled in the development code. Policy 30 deleted - no longer necessary because refinement plan for Murphy Road has been adopted.

Proposed Amendment	Rationale for Amendments
~~of Highway 97 and South 3rd Street.~~	
31. ~~It is the intent of the Plan to allow commercial development adjacent to arterial streets and highways in areas designated for commercial development, provided that the developments access onto frontage roads or interior roads, and that access onto the highway or arterial will be limited. Points of access will be encouraged that provide for adequate and safe entrances and exits, and that favor right turns and merging over the use of traffic signals.~~ <u>Commercial development adjacent to arterial streets and highways shall be subject to City of Bend and/or Oregon Department of Transportation access management standards (as applicable) and shall provide for multimodal access.</u>	Policy 31 revised based on input from TAC and city staff. It is unnecessarily specific – the details are better handled in the development code or in Chapter 7 (Transportation).
~~32.~~ ~~The 25 acre commercial area at the West edge of the urban area shall be designed and developed as part of an overall master plan for future commercial, industrial, and residential development between Skyliners Road and Shevlin Park Road.~~	Policy 32 no longer relevant due to Northwest Crossing approval and adopted overlay zone.
• <u>The City will limit the amount of ground-floor residential development in the commercial zones and mixed employment zones to preserve economic lands for economic uses.</u> • <u>The City will monitor parking needs for commercial uses and set requirements at the lowest level to meet the community needs.</u> • <u>The City will write parking requirements to encourage walkable commercial development while providing for adequate parking.</u>	New bulleted policies to address economic land supply, efficiency measures, and encourage walkable mixed use areas.

PROPOSED POLICY AMENDMENTS: RESIDENTIAL POLICIES

Proposed amendments are presented in an annotated table with language in underline/strikeout format; underlined text indicates new policy language and ~~strikeout~~ text indicates deleted language. The left column contains the amended policy language and the right column provides a brief explanation for the change. Policy language that has not been amended is retained in plain text. Policies will need to be renumbered as appropriate for final adoption.

Chapter 4 Population and Demographics

Proposed Policy Amendment	Rationale for Amendments
POLICIES • ~~The City shall review and update the urban area population forecast every five years.~~ • ~~The City shall update income levels, household size, and other demographic information for the urban area after every U.S. census, or when other data for the City of Bend are available.~~	Deleting this chapter reflects approved legislation assigning coordinated population forecasting to the Population Research Center (PRC) at Portland State University (PSU). The PRC will provide coordinated forecasts with a 50-year forecast horizon for Oregon counties and cities no less than once every 4 years.

Chapter 5 Housing and Residential Lands

Proposed Policy Amendment	Rationale for Amendments
GOALS The intent of the Comprehensive Plan is to provide and maintain sufficient residential land to accommodate needed housing units under Statewide Planning Goal 10 (Housing). The following goals set the context for the policies in this chapter. The citizens and elected officials of Bend wish to: • Keep our neighborhoods livable by offering a variety of living styles and choices, creating attractive neighborhoods located close to schools, parks, shopping and employment. • Accommodate the varied housing needs of citizens with particular concern for safety, affordability, open space, and a sense of community.	These existing goals are presented in paragraph format at the beginning of Chapter 5. Format revised for consistency with the bulleted goals in the Economy and other Plan chapters. Last bullet added after August 25th TAC meeting (this goal was included in 2008 update to Housing Chapter that wasn't acknowledged by LCDC).

Proposed Policy Amendment	Rationale for Amendments
• Recognize the importance of transportation linkages (streets, bikeways, sidewalks and paths) in connecting neighborhoods and building and maintaining a sense of community. • Promote more flexibility in development standards to balance the need for more efficient use of residential land and preservation of natural features. • Zone adequate land in specific designations to allow for production of needed housing units. *"Throughout the public workshops, visioning exercises, and committee meetings, one of the common themes was the desire to keep our neighborhoods livable. Bend will continue to offer a variety of living styles and residential choices, creating attractive neighborhoods located close to schools, parks, shopping and employment. It is a goal of the General Plan to accommodate the varied housing needs of citizens with particular concern for safety, affordability, open space, and a sense of community.* *A transportation system of streets, bicycle ways, and trails that connect our neighborhoods to schools, parks, shopping and employment and to other neighborhoods is an important factor in building and maintaining a sense of community. It is a goal that these neighborhood transportation linkages shall provide ways to move about the community, and also create a positive community image through design elements that provide for safe and attractive neighborhoods.* *The need for more housing in the urban area and the ever-increasing price of land can both work against preserving natural features in new developments. It is a goal that the General Plan policies and development standards promote more flexible and creative subdivision designs will help preserve natural features, while containing development within the Urban Growth Boundary."*	
POLICIES ***Population Forecasts*** • The City will coordinate with and provide data to Portland State University for their preparation and regular update of a coordinated 50-year forecast for the Urban	New policy language to reflect the new approach to regular updates to population forecasts and related updates to HNA. Population forecasts and HNA will be updated every 4-5 years and adopted as ancillary documents to the Comprehensive Plan. HNA is considered part of the Comprehensive Plan and provides factual base to support

Proposed Policy Amendment	Rationale for Amendments
<u>Growth Boundary.</u> • <u>Using the new coordinated 50-year forecast, the City will, within 5 years after acknowledgment of the current update becomes final and no longer subject to appeal, initiate a supplemental legislative review for the UGB and/or urban reserve area planning to demonstrate continuing compliance with state needed housing laws for a new full 20-year planning period.</u> • <u>The City will use regular updates of population forecasts and Housing Needs Analyses to monitor housing trends relative to the planned housing mix, densities, location, and affordability assumed within the Urban Growth Boundary.</u>	policies in Housing Chapter as required by Goal 2. Revised second bullet and deleted initial rationale (below) based on TAC input. Commit to initiating legislative review for full 20-year planning period within 5 years after UGB decision is acknowledged and final. At the November TAC meeting, the wording of the policy was revised to provide the option for urban reserve area planning in advance of or in conjunction with UGB planning.
Housing <u>mix,</u> density and affordability • <u>The City will apply plan designations, zoning districts, and development code regulations to implement the mix of housing indicated in the adopted Housing Needs Assessment .</u> 21. <u>The main purpose of maximum</u> densities shown on the Plan <u>Map</u> ~~shall be recognized in order~~ <u>is</u> to maintain proper relationships between proposed public facilities and services and population distribution. <u>One purpose of minimum densities is to assure efficiency of land use, particularly for larger sites. Another is to encourage development of housing in locations and at densities that support healthy, accessible, and affordable housing choices.</u> 22. ~~In developing a subdivision, Planned Unit Development, or multifamily housing project the following uses and natural conditions may be deducted from the gross acreage of the property for the purpose of density calculations:~~ • ~~areas dedicated for public park use or public open space;~~ • ~~areas developed for active recreational uses such as golf courses, tennis courts, swimming pools, and similar uses;~~ • ~~land in excess of 25 percent slope that is not developed;~~ • ~~natural wetlands and riparian areas that remain in a natural condition; and,~~	These policies have been moved up earlier in Chapter 5. Renumbering of policies will be done later. New policy to recognize and implement the updated HNA. Wording revised based on TAC input. Policy 21 revised to articulate the purpose for minimum and maximum densities and provide policy support for proposed efficiency measures relating to minimum densities. Wording revised based on TAC input. Policy 22 is more appropriate as code language and may conflict with existing code provisions. Additional discussion will be needed regarding calculation of minimum/maximum densities (gross/net acres), particularly for master plan areas.

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Proposed Policy Amendment	Rationale for Amendments
• ~~"Areas of Special Interest" designated on the General Plan Land Use Map.~~	
~~23. The City shall rezone residential lands to the designated General Plan densities when sewer service is available to the area~~ Upon <u>application</u>, <u>the City shall</u> zone residential lands in accordance with their plan designations, and without a separate showing of public need, subject only to conditions, if applicable, requiring annexation or availability of public sewer or public water before occupancy.	Policy 23 is overly broad and compels the City to upzone when it may not be supported by the residents. The modification of this policy reflects TAC input and links zone change to availability of adequate public facilities.
<u>The City will continue to create incentives for and remove barriers to development of a variety of housing types in all residential zones, consistent with the density ranges and housing types allowed in the zones. This policy is intended to implement the City's obligation under the State Housing Goal to "encourage the availability of adequate numbers of needed housing units at price ranges and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type, and density".</u>	New policies to generally support efficiency measures and achieve housing mix identified in the updated HNA. Expanded policy language reflects TAC input and emphasizes City obligations under the State Housing Goal.
<u>The City will apply innovative and flexible zoning tools to support a mix of housing types and densities.</u> ~~24. Accessory dwellings to a single family home may be allowed in new subdivisions or Planned Unit Developments, provided that the maximum General Plan density is not exceeded. The City will calculate accessory dwelling density using the same fraction of a full dwelling unit provided in the Systems Development Charges resolution.~~	Policy 24 deleted - accessory dwellings are considered a housing type and therefore do not need to be called out in policy.
25. The City and County will support public and private non-profit and for-profit entities that provide affordable housing in Central Oregon.	Policy 25 revised and bulleted policy added based on TAC input and to reflect Goal 2 coordination requirements.
• The <u>City</u> and <u>County</u> will coordinate with each other and other affected governments as required by the State Housing Goal to ensure that "the needs of the region are considered in arriving at a fair allocation or housing types and densities" and that "needed housing is provided on a regional basis through coordinated comprehensive plans".	
~~26. The City shall evaluate the community's housing mix and density levels every five years beginning in 2000.~~	Policy 26 replaced with new policies under Population Forecasts above. Trying to avoid reference to specific years in the Comprehensive Plan that are quickly out of date.
	New policy to implement and monitor efficiency measures

Proposed Policy Amendment	Rationale for Amendments
• The City will continuously monitor the yield of efficiency measures as required by state needed housing statute and publish the results on its Growth Management Documents website not less than once a year. To promote complete neighborhoods and the integration of other supporting uses the City will employ a master planning process for large development sites which are 20 acres or greater. The master plan process will offer two options for approval 1) applying clear and objective standards or 2) applying discretionary standards for more flexibility. 27. When new commercial centers are created in developing residential areas, the City and County may allow up to 20 acres of medium-density residential housing within one-eighth of a mile of the commercial center.	and achieve the housing mix/densities identified in the updated HNA through master planning. Policies revised based on TAC input, including new policy directive to offer two options for master plan approval. There was substantial discussion of the two options for master plans at the August 25th TAC meeting. Targeted amendments to the master plan chapter, including Type II and Type III options, were on the agenda for the November 19th TAC meeting.
28. Existing Residential Standard density areas that are adjacent to commercial or mixed use development may be re-designated for Residential Medium and High density development. • The City will support re-designation of suitable low density areas that are within a 15-minute walk to transit corridors for medium-density development. 29. The City shall employ special redevelopment standards and other strategies for manufactured home parks as an incentive to retain and redevelop existing affordable housing stocks at affordable prices and rent levels. 30. The City may consider density bonuses as an incentive to providing affordable housing.	Policy 27 is old and more multi-family housing may be needed on a case by case basis. New policy to support transition to transit-supportive densities where appropriate. Wording of policies 28-30 revised based on TAC input.
• The City will monitor parking needs for residential uses and set parking requirements to the lowest standards that will meet the community's needs in order to reduce land utilized for parking, reduce the cost of housing development, and encourage a more walkable development pattern. • The City will assist in identifying, obtaining and leveraging funding sources for the development of new housing for very low, low, and moderate - income residents, as determined by appropriate percentages of Area Median Family income in the	New policy to support efficiency measures related to reduced parking.

Proposed Amendments to Residential Policies (12/1/15) 　　　　　　　　　　　　　　　　　　　　　　　　*Page 5 of 13*

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Proposed Policy Amendment	Rationale for Amendments
<u>Housing Needs Assessment.</u> • <u>The City will monitor the results of actions and programs funded through the use of the City's Affordable Housing Fee Trust Fund.</u>	New policy to implement efficiency measures and achieve the housing mix/densities identified in the updated HNA. The City Council recently extended the sunset date for the Affordable Housing Fee. It makes sense to monitor the results of all adopted efficiency measures, but the details and schedule for monitoring do not need to be specified in the plan policy.
Residential compatibility 1. ~~Future development and local development standards shall recognize and respect the character of existing areas.~~ 2. ~~In areas where existing urban level development has an established lot size pattern, new infill subdivision or PUD developments shall respect have a compatible lot transition that respects the number of adjoining lots, lot size and building setbacks of the existing development while developing residential densities within the range for the underlying zone. New developments may have smaller lots or varying housing types internal to the development.~~ 3. ~~The development of infill areas may, as an alternative to the standard subdivision review process, proceed through a public involvement process that would allow the maximum flexibility of design and provide for neighborhood participation.~~ 4. Private and public nonresidential uses are necessary and ~~should~~ <u>will</u> be encouraged within residential areas for the convenience and safety of the ~~people~~ <u>residents</u>. Such facilities shall be compatible with surrounding developments, and their appearance should enhance the area. 5. Of necessity, nonresidential uses may ~~to~~ abut residentially planned and zoned areas in different parts of the community. In these instances, nonresidential uses ~~shall~~ <u>will</u> be subjected to special development standards such as setbacks, landscaping, sign regulations, and building design that harmonize and provide transitions consistent with the primary purposes of the adjacent zones.	Policies 1-3 deleted based on staff/TAC input. As worded, policies provide a barrier to efficiency measures and infill development. Wording of policies 4 and 5 revised based on TAC input.

06992

Proposed Policy Amendment	Rationale for Amendments
6. Homes built to HUD Class A manufactured home standards ~~shall~~ will be permitted in ~~as part of~~ a manufactured home parks, ~~or part of a planned unit development~~and on individual lots. Non-Class A manufactured homes may be allowed in manufactured home parks or as replacement for non-conforming manufactured homes subject to conditional use approval standards that are clear and objective and that encourage retention and replacement of existing affordable housing stock.	Policies 6 and 7 revised and supplemented based on TAC input relating to manufactured home standards.
7. Homes built to HUD manufactured home standards located on individual lots in areas already developed with conventional housing shall be subject to special siting standards as provided by state needed housing law.	
• Manufactured and modular homes meeting IRC Modular and CABO building code standards shall be permitted on the same basis as site-built homes.	
• Private covenants and deed restrictions recorded hereafter that support compact urban form, higher densities and better access to affordable housing are encouraged as supportive of City policy.	New policy recommended by TAC to address private covenants.
8. Neighborhood commercial shopping areas may be located within residential districts and ~~shall~~shall have development standards that appropriately limit their scale and recognize their residential setting.	Wording of policies 8 through 11 revised based on TAC input. Revised Policy 10 clarifies that private recreational uses shall not prevent development of lands inventoried for needed housing.
9. In many cases, ~~home occupations~~ small home-based businesses are a legitimate use within residential areas, and ~~shall~~ may be permitted subject to design and nuisance standards in the Development Code. ~~provided that the use displays no outward manifestations of a business.~~	
10. Certain private recreational uses, such as golf courses or tennis courts, may be successfully integrated into residential areas provided the location, design, and operation are compatible with surrounding residential developments and do not prevent development of lands inventoried for needed housing to minimum density standards ~~as assumed in the current Residential Lands Update~~.	
11. Residential areas ~~shall~~ will offer a wide variety of housing types in locations best	

Proposed Policy Amendment	Rationale for Amendments
suited to a range of housing types, needs and preferences. 12. ~~Rehabilitation or redevelopment of older residential areas shall be encouraged.~~	Policy 12 deleted because it is so broad and doesn't provide guidance for planning or land use decisions.
Neighborhood Appearance (See related policies in Chapter 9, Community Appearance.) 13. Above-ground installations, such as water and sewer pumping stations, power transformer substations or natural gas pumping stations, shall be screened and designed to blend with the character of the area in which they are located. 14. All new developments shall include trees in the road right of way, as practical, in the planter strip between the curb and sidewalk. ~~Such trees shall be consistent with the City's Urban Forestry Plan.~~ 15. Walls and fences along arterial or collector streets shall be subject to special design standards. The fence or wall, and the area between the fence or wall and the curb or pavement, shall be landscaped ~~16. Walls and fences in the setback area between the front of the house and the adjacent street shall not exceed 3½ feet in height.~~ 17. All residential development ~~should~~ will respect the natural ground cover of the area ~~insofar as possible,~~ and existing and mature trees within the community should ~~should~~ be preserved where practicable. 18. The City encourages flexibility in design to promote safety, livability and preservation of natural features. ~~Lot sizes as small as 4,000 square feet may be applied for in the RS zone to meet these objectives.~~ To that end, the City will provide development code standards to allow flexibility on dimensional standards, such as lot size and setbacks, to achieve these objectives. 19. ~~To encourage flexibility in design and preservation of natural features in areas planned for medium density housing, lots as small as 2,500 square feet shall be allowed in the RM-10 and RM zoning districts.~~ 20. Hillside areas shall be given special consideration in site design by both the	Revise Policy 14 - City does not have an Urban Forestry Plan. Wording of Policies 15 through 18 revised based on TAC input. Policy 16 deleted because it is not policy language and is more appropriate for code standards (implemented in 3.2.500) Policy 18 revised to support efficiency measures and remove development standards (lot sizes) from the policy language. Policy 19 deleted and replaced with more general language in Policy 18.

Proposed Policy Amendment	Rationale for Amendments
developer and local regulations. Building sites, streets, and other improvements shall be designed and permitted in a manner that will minimize excessive cuts and fills and other erosion-producing changes. (Note: see related policies in Chapter 10, Natural Forces.)	
Transportation connectivity (See related policies in Chapter 7, Transportation Systems, and Chapter 3, Community Connections.) 31. Medium-and high-density residential developments ~~shall~~ <u>should</u> have good access to transit (preferably ~~where they~~ <u>within ¼ mile of transit corridors),</u> <u>K-12 public schools,</u> ~~have good access to arterial streets~~ and ~~be near~~ commercial services, employment and public open space to provide the maximum ~~convenience~~ <u>access</u> to the highest concentrations of population. 32. Street widths on ~~public~~ residential local streets <u>shall be as narrow as reasonably possible to preserve safety, and limit the effects of surface runoff and excessive vehicle speed.</u> ~~may vary depending on topography, anticipated traffic volumes, natural features that warrant protection, and existing street patterns in the neighborhood. Narrower streets may have limited on-street parking to ensure emergency vehicle access.~~ 33. The City may require adjustment<u>s</u> to the street<u> design</u> ~~pattern or installation of traffic calming devices~~ in order to discourage high speed traffic on local residential streets. 34. In all residential areas the City shall encourage the use of open space amenities such as landscaped traffic islands or extra-width planting strips. 35. Schools and parks may be distributed throughout the residential sections of the community, and ~~every~~ dwelling unit<u>s</u> ~~in the area~~ should ~~be within convenient distance of~~ <u>have safe and convenient access to</u> ~~a~~ school<u>s</u> ~~or~~ <u>and a</u> park<u>s</u>. • The <u>City </u>will coordinate with the school and parks districts to ensure that the respective plans of each local government are coordinated and consistent with state law.	Policies revised by staff to streamline and clarify language. Modifications to wording of Policies 31 through 43 based on TAC input. New policy added for Goal 2 coordination with school and

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Proposed Policy Amendment	Rationale for Amendments
36. Sidewalks ~~shall~~ will be required in all new ~~residential~~ developments. Separated sidewalks ~~shall~~ will be required~~, as practical,~~ on all new streets ~~that provide or will provide access to schools, parks, or commercial areas~~. However, an alternative system of walkways ~~and trails~~ that provide adequate pedestrian circulation may be approved.	park districts.
37. Per the City's Transportation Systems Plan ~~Efforts shall the City shall continue to~~ the City will complete or connect ~~existing walks along~~ priority walkways on routes to schools, parks, or commercial areas.	
38. Bikeways shall be considered as ~~both a circulation and recreation~~ a transportation element ~~in the Plan~~, and adequate facilities ~~should~~ shall be ~~obtained for this purpose in all~~ provided as a part of new development.	
39. Efforts ~~shall~~ will be made to extend trails, pedestrian ways, and bikeways through existing residential areas. Existing trails, pedestrian ways, and bikeways will be extended through new developments to allow further extension and promote alternative modes of travel.	
40. The City will encourage pedestrian scale block length to encourage connectivity and pedestrian access. When existing conditions or topography prevent a cross street, a pedestrian accessway to connect the streets may be required.	
41. Residential local streets shall be developed whenever practicable to increase connectivity within and between neighborhoods.	
42. Cul-de-sac and "hammer-head" residential streets may be allowed only where existing development, steep slopes, open space, or natural features prevent connections, or when the objectives of connectivity are met within the neighborhood.	
43. The City will consider the need for emergency ~~Emergency~~ equipment access for any new ~~residential~~ development.	
Public utilities and services (See related policies in Chapter 1, Plan Management and	

Proposed Policy Amendment	Rationale for Amendments
Citizen Involvement and Chapter 8, Public Facilities and Services.)	
44. All residential areas ~~shall~~ will be provided with community water and sewer services and other facilities necessary for safe, healthful, convenient urban living consistent with the density of development.	Minor changes to wording based on TAC input.
45. Residential development shall be coordinated with other land use elements and community facilities which are consistent with projected housing densities.	
46. Electric power, telephone, and cable TV distribution and service lines shall be located underground in new developments. ~~Efforts shall be made to place existing utility lines underground in established residential areas.~~	Policy 46 revised and Policy 47 deleted because they are implemented through the Development Code.
~~47. Street lighting shall be provided in all new subdivisions at the time of development. Street light fixtures shall be shielded to direct light down.~~	
48. Street names shall be unique within the County.	
Destination Resorts	
~~49. In addition to lands excluded from eligibility for destination resort siting under state law, the following lands within the Urban Area Reserve shall not be mapped as eligible for destination resort siting:~~	Policies 49 and 50 deleted: Destination resorts in the UAR are regulated by Deschutes County, and are therefore not under the City's jurisdiction. These policies are not required in the Bend UGB. Same explanation applies to policies 52-55.
~~(a) All lands owned by public agencies.~~	
~~(b) All lands zoned for surface mining.~~	
~~(c) All lands zoned SR-2 ½ and all lands platted for subdivisions.~~	
~~(d) Land for which contiguous area not otherwise removed from eligibility is less than 160 acres, except where adjoining land under the same ownership outside the Urban Area Reserve is mapped with the Deschutes County destination resort (DR) overlay.~~	
~~(e) Single parcels, or adjoining parcels in the same or related ownership~~	

Proposed Policy Amendment	Rationale for Amendments
~~(including lands outside the Urban Area Reserve) of less than 160 acres.~~ ~~(f) Lands not adjacent to either (1) F1 zoning, or (2) Deschutes County destination resort (DR) overlay adjoining F1 zoning.~~ ~~50. Destination resorts, as defined by state law, shall only be allowed in areas designated for such use as shown on the adopted destination resort map. An exception to statewide goals relating to agricultural lands, forestlands, public facilities and services or on the eligible lands in the urban area.~~ 51. A destination resort within the Urban Area Reserve ~~shall~~ <u>may</u> be served by municipal water and sewer service or an approved community water and sewer service for domestic use,compliant with state law. • <u>Properties that are eligible for destination resort development will lose that eligibility uponinclusion into the UGB.</u> ~~52. No destination resort master plan shall be approved in the Urban Area Reserve until the County, pursuant to its management agreement with the City, has adopted destination resort development standards that, at a minimum, satisfy the standards in state law.~~ ~~53. Any destination resort developed within the Urban Area Reserve shall provide a sufficient open space buffer between any development and the Deschutes National Forest lands to protect against wildfires and to protect the scenic values and wildlife values of the forest.~~ ~~54. Destination resorts shall provide for any arterial or collector streets that are shown on the transportation system plan map to be extended through the site, or as needed as a result of a traffic study.~~ ~~55. Destination resorts shall provide for pedestrian and bicycle access through the development from the urban area to the National Forest and/or other public lands such as parks, scenic areas, and designated trails.~~	Policy 51 revised because destination resort developers may not want urban services. New policy language to assure that any land added to the UGB is developed for urban uses and densities. The project team recommended (and the TAC supported) moving remaining policies addressing Destination Resorts and Refinement Plans from the Housing Chapter to the new Urbanization Chapter.

Proposed Policy Amendment	Rationale for Amendments
Refinement Plan Areas (See related policies in Chapter 1, Plan Management and Citizen Involvement.) 56. A refinement plan that includes residential areas may prescribe residential density limits on specific properties which differ from the density range provided for in the Comprehensive Plan. However, the average density of residential development allowed within a refinement plan area shall be not less than 80 percent or more than 100 percent of the maximum density, including applicable density bonuses or transfers, prescribed for the area by its pre-existing comprehensive plan map designations. 57. ~~The Lava Ridge Refinement Plan is adopted as part of the Bend Area General Plan.~~ 58. ~~If the City and County do not adopt refinement plans for the two study areas shown on Figures 22A and 22B by January 2000, the RL zoned land in those areas shall be rezoned to RS.~~	The project team recommended (and the TAC supported) removing Policy 56 from the Housing Chapter and including it in the new Urbanization Chapter. Wording may be revised as needed for consistency with revised minimum/maximum density provisions for master plans. Policies 57 and 58 no longer necessary because refinement plans have been adopted.

April 28, 2015

Mr. Brian T. Rankin
Principal Planner & Metropolitan Planning Organization Staff
City of Bend
710 NW Wall Street
Bend, OR 97701

Brian:

The purpose of this letter is to provide comment and perspective on your recent memorandum dated April 24, 2015 to the UGB Steering Committee as well as Residential, Employment, and Boundary & Growth Scenario TACs regarding an overview of the Juniper Ridge development. I understand that the purpose of this document was for an April 30, 2015 UGB workshop where recommendations will be made regarding 194 acres of land at Juniper Ridge.

First, I would like to commend you on bringing together a comprehensive but relatively concise, high-level briefing paper. This development certainly has a long history, complex infrastructure development issues, and strategic importance to Bend's future economic development of which TAC and UGB Steering Committee membership should be aware.

EDCO has been involved with many of these issues at Juniper Ridge over the past 15 years, so our perspective is one that comes with experience and knowledge. **On behalf of EDCO, I would like to strongly recommend that the current zoning on the 194 acres in question remain for employment uses and not be changed to allow residential and commercial development.**

Strategic Location
Despite the fact that the Juniper Ridge development has languished in recent years (as have most industrial parks across our region and state), it remains strategically located near the geographic workforce center of the tri-county region. EDCO believes that this location can simply not be replicated elsewhere within Bend, so it's conversion to residential and commercial uses would have lasting negative impacts to the community's economic future. For example, large-scale employment lands on Bend's west side are completely impractical given current transportation infrastructure. Similarly, location of employment lands on the east side would require significant east-west travel (truck transport, employees, etc.) from the region's primary transportation corridor, U.S. Hwy 97 on already overloaded city streets and Hwy 20. Large scale industrial and light industrial development is unlikely to happen in southern Bend, which would have to abut upscale residential development. It is also further from the geographic center of the region and would require residents of Bend, Redmond, Sisters, Prineville and Madras to travel the length of the community to commute for work.

Juniper Ridge's close proximity to Hwy 97 combined with the fact that most land north (east and west of the highway) is publicly owned makes it an ideal location for industrial users and other employers. That public land ownership is a critical part of future transportation improvements that could pave the way for more cost effective access to Juniper Ridge within or beyond the 2028 planning horizon.

Infrastructure Costs and Funding Sources
As you have illustrated in your memo, future funding sources for needed infrastructure improvements at Juniper Ridge could be very different with a shift to commercial and residential uses. EDCO has had considerable experience with some of these resources over the years and for most, residential and commercial development uses are not eligible. The most important of these is transportation, for which there are no effective mechanisms available to concentrate peak hour trips as can be accomplished by working with employers on shift releases or distribution start and end times. Transportation is the biggest driver of infrastructure costs in development, here in Bend and elsewhere in the region, so for this reason alone, any plans to convert land in Juniper Ridge to other uses should be avoided at this time. Granted, perhaps there could be mixed use/live-work development down the road to the east and potentially to the west (with a well-placed overpass) but this should be many years down the road.

Consistency with Urban Renewal District
The current Urban Renewal District is consistent with the zoning in place today and expected future uses on the 194 acres in question. Throughout our tri-county region and communities across Oregon, urban renewal is an effective tool to help develop or redevelop areas that would struggle otherwise. In the case of Juniper Ridge, it is an important mechanism in the complicated formula to cover needed infrastructure development. In our region, development of residential areas has not been how this tool has been used and it is not the purpose of the Juniper Ridge Urban Renewal Area. Granted, this could be altered, but not without considerable time and resources expended to modify the existing plan and guidelines.

Redmond and Bend School District Boundaries
An issue perhaps outside the scope of your memorandum is the fact that the entire 194 acres lies within the Redmond School District, yet is less than one mile from Bend-La Pine School District's Lava Ridge/Sky View Elementary and Middle School complex. It is unlikely that many of the families that would occupy newly zoned land in Juniper Ridge would want the daily commute to Redmond School District schools for themselves or their children. We expect most would petition to attend schools in Bend, which would place an additional burden on that school district without the benefit of the taxation base. Central Oregon school districts have a long history of working well together, however the close proximity of Redmond's current border to that of the City of Bend makes a rezone of land in Juniper Ridge to residential even more problematic. Inter-school redistricting is an issue that carries with it a great deal of energy and emotion. This may be an unintended consequence that has not been fully considered by TAC and UGB Steering Committee Members.

Summary
Bend is at a critical crossroads with this UGB expansion process. Time will prove that Juniper Ridge is one of the key economic development assets of Bend's future. Now is the time to keep a strategic focus on where in Bend it is most logical and practical to locate our employment lands. Residential is also very important and is perhaps the issue most frequently cited by the local businesses we are working with as an impediment to their growth and ability to attract human talent.

However, residential development has much greater flexibility on where it can be located than does industrial. EDCO urges the City and its volunteers engaged in the City's UGB expansion to maintain a long-term vision for the community and its employment base. If we squeeze these uses out at Juniper Ridge, then where will they go?

Should you have any questions about EDCO's position on this important issue, please do not hesitate to contact me.

Sincerely,

Roger J. Lee
Executive Director

Cc: Carolyn Eagan, Bend Business Advocate

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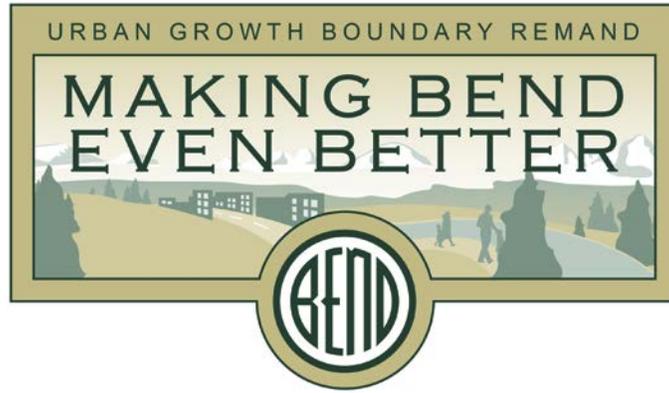
Bend Housing Needs Analysis

Bend's Growth to 2028
Draft Document: August 14, 2015

DRAFT

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*Denotes Ex-Officio, non-voting members

** Member of Residential / Employment TAC in Phase 1, participating in Boundary TAC in Phase 2

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Bend Housing Needs Analysis   *August 14, 2015*

EXECUTIVE SUMMARY

Bend's population grew from about 20,000 people in 1990 to 78,000 people in 2013, more than tripling over this period. Over the same period, Bend's housing stock grew from about 9,000 dwelling units to nearly 34,000 dwelling units, also more than tripling. Most new housing development in Bend was single-family detached housing.

As Bend has grown, housing has become less affordable, especially since 2000. Housing sales prices more than doubled between 2000 and 2013, while household income (not adjusted for inflation) increased by 18%. Rental costs also increased in Bend, with the percentage of households paying $1,000 or more in monthly rent increasing from 9% of households in 2000 to more than 40% of households in 2013.

Bend is planning for growth of about 38,500 people between 2008 and 2028, requiring nearly 16,700 new dwelling units. Bend's housing needs are changing, based the following key demographic changes occurring in Bend and across the nation:

- **Growth in Baby Boomers (Age in 2014: 48 to 67 years old; Age in 2028: 62 to 81 years old).** People over age 65 years old are projected to grow by more than 37,000 people over the planning period. Given that Bend's population accounts for about half of the County's population, about half of this growth will be in Bend. Households over 65 typically have lower income than younger households. Those without accumulated wealth (e.g., housing equity or investments) may choose lower-cost multifamily housing. Some Baby Boomers may choose to downsize their housing, resulting in greater demand for small single-family dwellings, cottages, accessory dwelling units, townhomes, apartments, and condominiums.

- **Growth Millennials (Age in 2014: 17 to 30 years old; Age in 2028: 31 to 44 years old).** Millennials are expected to grow by about 14,000 people in Deschutes County over the planning period. Given that Bend's population accounts for about half of the County's population, about half of this growth will be in Bend. Younger Millennials typically have lower income and may have higher debt. Growth in Millennials will increase need for affordable housing for renters and homeowners such as: small single-family dwellings, cottages, accessory dwelling units, duplexes, townhomes, garden apartments, and apartments.

- **Growth in Hispanic and Latino population.** Hispanic and Latino population more than doubled between 2000 and 2013, growing by nearly 6,000 people. Hispanic and Latino population is expected to continue to grow throughout the State, including in Bend, through 2028. To the extent that in-migrating Hispanic and Latino households have lower than average income, then in-migration of ethnic groups will increase demand for housing affordable to low- and moderate-income households relative to demand for other types of housing. Growth in Hispanic and Latino households will increase need for affordable housing for renters and homeowners such as: single-family dwellings (both smaller and larger sized dwellings), duplexes, larger townhomes, garden apartments, and apartments. Ownership opportunities for Hispanic and Latino households will focus

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on moderate-cost ownership opportunities, such as single-family dwellings on a small lot or in a more suburban location, duplexes, and townhomes.

These demographic changes, combined with the existing and growing needed for affordable housing, shows a growing need for single-family attached housing (such as townhomes) and multifamily housing. While the majority of new housing will continue to be single-family detached housing, the type of single-family detached dwellings may change, with more emphasis on smaller and more affordable new single-family detached housing and a decrease in demand for large-lot single-family detached housing.

The preliminary conclusion of the housing needs analysis is that Bend's current housing policies result in a mix of housing that is not consistent with Bend's needed mix, for an increase in percentage of single-family attached housing, multifamily housing, and more affordable single-family detached housing. The on-going discussions of land use efficiency measures and policy changes that Bend adopts will result in a change in the opportunity for development of comparatively affordable housing types.

CHAPTER 1. INTRODUCTION

Role of the HNA

This report presents a housing needs analysis (HNA) for the City of Bend. The purpose of this analysis is to address the requirements for planning for needed housing in urban areas with a population of 25,000 or more under ORS 197.296(3) and (5). These requirements include, but are not limited to, an inventory of buildable lands for housing, an analysis of national, state, and local demographic and economic trends, and recommendations for a mix and density of needed housing types.

The HNA is a supporting document of the City of Bend Comprehensive Plan. The HNA documents historical housing and demographic trends, the projection of population and housing growth, and analysis of housing affordability. Based on this analysis, the HNA estimates needed housing density and mix for the 2008 to 2028 period. The HNA compares the forecast of needed housing with the capacity of Bend's land base to accommodate new housing from the Bend Buildable Lands Inventory Report (BLI). The BLI is one of four inter-related documents that are central in the City's planning related to the UGB. The major components of each are summarized below in Table 1.

Table 1: Four Key Documents for Bend's Urban Growth Boundary Planning

Document	Buildable Land Inventory (BLI)	Housing Needs Analysis (HNA)	Economic Opportunities Analysis (EOA)	Urbanization Report (UR)
Purpose	Identify buildable residential & employment land by category	Address the requirements for planning for needed housing, including analysis of national, state, and local demographic and economic trends, and recommendations for a mix and density of needed housing types	Document historical housing and demographic trends, the projection of employment growth, identification of target industries, and evaluation of site characteristics needed to accommodate target industries	Analysis of where and how Bend's future growth will be accommodated, both inside the existing Urban Growth Boundary (UGB) and in expansion areas
Primary Legal Standards[1]	ORS 197.296 OAR 660, Divisions 8 and 9	Statewide Planning Goal 10: Housing ORS 197.296 and 197.303 OAR 660, Division 8	Statewide Planning Goal 9: Economic Development OAR 660, Division 9	Statewide Planning Goal 14: Urbanization ORS 197.298 OAR 660, Division 24
Key Subject Matter	Development status categories and definitions Methodology for assigning categories and conducting inventory Inventory results: acres by plan designation and development status	Projection of population and total housing growth Housing market and development trends Demographic characteristics and trends Analysis of affordability Estimate of needed housing (mix and density) Comparison of housing capacity to need	Existing policy and vision National, state, local trends Employment projections Target industries Site needs and characteristics Special site needs Redevelopment analysis Comparison of employment capacity to need and characteristics	Methodology for capacity estimates Pre-policy ("base case") capacity estimate for current UGB Efficiency measures (EMs) proposed Current UGB capacity with EMs UGB alternatives evaluation methodology and results Proposed UGB expansion and summary of Goal 14 evaluation results

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[1] OAR = Oregon Administrative Rules; ORS = Oregon Revised Statutes

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This HNA uses the 2008 HNA adopted by the City of Bend as a foundation. The information and conclusions of the updated HNA are the basis for determination of residential land sufficiency for the 2008-2028 period. This HNA collects the most recent works on residential land need for the City of Bend, addresses issues identified in the 2010 Remand Order, and incorporates direction from the Remand Task Force (RTF) and the Bend Urban Growth Boundary (UGB) Remand project's Residential Technical Advisory Committee (Residential TAC) and Urban Growth Boundary Steering Committee (USC).

An important consideration for the HNA update is that it must address issues identified in the Remand and partial acknowledgement of a decision made in December 2008. A key issue is the planning horizon for the project. The HNA uses the 2008-2028 timeframe, but updates key elements of the HNA to reflect changes that have occurred since 2008. This updated HNA relies on the 2008-2028 population and housing forecasts that were acknowledged by the Land Conservation and Development Commission's (LCDC) 2010 remand order.[2] The HNA presents data from the updated buildable land inventory, which was updated to reflect development that occurred in Bend between 2008 and 2014. The HNA also analyzes changes in Bend's housing market between 2008 and 2013 to account for housing from the 2008-2028 forecast that already occurred.

Framework for a Housing Needs Analysis

The following section describes the state requirements for a housing needs analysis and some key concepts necessary for understanding the housing needs analysis. This section concludes with a discussion of the steps in completing a housing needs analysis, based on a 1997 guidebook, "Planning for Residential Growth."

State Statutes and Administrative Rules

In an effort to address all requirements in statutes and administrative rules for an HNA, this document follows the suggested framework of "Planning for Residential Growth," a guide book prepared in 1997 by the Oregon Transportation and Growth Management (TGM) Program to assist local governments in developing an HNA that complies fully with applicable portions of ORS 197.296 and 197.303, as well as OAR 660-008.[3]

Statewide Planning Goal 10, Housing, is to provide for the housing needs of the citizens of the state.[4] Goal 10 requires cities to inventory lands for residential use and to develop plans that encourage the development of adequate numbers of needed housing units at price ranges and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type and density.

ORS 197.296 provides further requirements for complying with Goal 10. ORS197.296 requires the city to conduct an analysis of housing need by type and density range in accordance with

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[2] The Commission's Remand Order is available on-line at:
http://bendoregon.gov/modules/showdocument.aspx?documentid=5343.

[3] The guidebook is available on-line at
http://www.oregon.gov/LCD/docs/publications/planning_for_residential_growth.pdf.

[4] See OAR 660-0015-0000(10)

ORS 197.303 and statewide planning goals and rules relating to housing. The purpose of this is to determine the amount of land needed for each needed housing type for the next 20 years.

ORS 197.296 requires cities to inventory buildable residential lands and determine the capacity of that land. It requires cities to determine housing capacity and housing need based on: (1) analysis of residential development, (2) trends in residential density and mix, and (3) demographic and economic trends.

ORS 197.296 requires the analysis of housing mix and density to include the past five years or since the most recent periodic review, whichever time period is greater.[5] Bend completed periodic review in 1998. The City had relatively little development over the 2008 to 2014 period, resulting in little change in development densities since 1998. However, the 2007-2009 recession resulted in substantial and long-lasting changes in the housing market, including changes that will affect future housing mix in Bend. As a result, the analysis of housing density is based on analysis of data from 1998 to 2008 but this HNA presents an update the analysis of trends affecting housing mix to include changes in the housing market, demographics, and other factors over the 2008 to 2014 period. These changes will affect Bend's housing market throughout the HNA's planning period.

ORS 197.303 defines needed housing as: single-family detached housing, single-family attached housing, multifamily housing, government assisted housing, and mobile or manufactured homes on lots or in parks.

Appendix B provides the text of key sections of ORS 197.296 and 197.303.

LCDC has adopted an administrative rule at OAR 660-008 to ensure opportunity for the provision of adequate numbers of needed housing units, the efficient use of buildable land within urban growth boundaries and to provide greater certainty in the development process so as to reduce housing costs[6], This rule is intended to define standards for compliance with Goal 10 and to implement ORS 197.303 through 197.307.

Key definitions for the Housing Needs Analysis

This section defines key terms used in the HNA: housing need, housing market demand, and affordable housing.

The language of Goal 10 and ORS 197.296 refers to housing *need*: it requires communities to provide needed housing types for households at all income levels. Put another way, a city's comprehensive plan must show that an adequate supply of land has been planned and zoned for all types of needed housing. Goal 10's broad definition of need covers all households—from those with no home to those with second homes. State policy does not make a clear distinction between need and demand. Following is the definition commonly used in housing needs analysis, which is consistent with definitions in state policy:

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[5] Specifically, ORS 197.296(5) (b) states: "A local government shall make the determination described in paragraph (a) of this subsection using a shorter time period than the time period described in paragraph (a) of this subsection if the local government finds that the shorter time period will provide more accurate and reliable data related to housing capacity and need. The shorter time period may not be less than three years."

[6] See OAR 660-008-0000, Purpose

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- *Housing need* can be defined broadly or narrowly. The broad definition is based on the mandate of Goal 10 that requires communities to plan for housing that meets the needs of households at all income levels. Goal 10, though it addresses housing, emphasizes the impacts on the households that need that housing. Since everyone needs shelter, Goal 10 requires that a jurisdiction address, at some level, how every household will be affected by the housing market over a 20-year period. Public agencies that provide housing assistance (primarily the Department of Housing and Urban Development – HUD, and the Oregon Housing and Community Services Department - HCS) define housing need more narrowly. For them, households in need do not include most of the households that can purchase or rent housing at an "affordable" price, consistent with the requirements of their household characteristics. Households that cannot find and afford such housing have need: they are either unhoused, in housing of substandard condition, overcrowded, or spending more of their monthly income on housing than their income and federal standards say they can afford.
- *Housing market demand* is what households demonstrate they are willing to purchase in the market place. Growth in population means growth in the number of households and implies an increase in demand for housing units. That demand is met, to the extent it is, primarily by the construction of new housing units by the private sector based on its judgments about the types of housing that will be absorbed by the market. ORS 197.296 includes a market demand component: buildable land needs analyses must consider the density and mix of housing developed over the previous five years or since their most recent periodic review, whichever is greater. In concept, what got built in that period was the effective demand for new housing: it is the local equilibrium of demand factors, supply factors, and price.

In short, a housing needs analysis should make a distinction between housing that people might need (a normative, social judgment) and what the market will produce (an observable outcome).

Another term using in the housing needs analysis is "affordable housing." The terms "affordable" and "low-income" housing are often used interchangeably. These terms, however, have different meanings:

- *Affordable housing* refers to a household's ability to find housing within its financial means. This term does not refer to either the development or the occupancy of housing through a public subsidy. A number of indicators exist that can be used to determine whether housing is affordable. One indicator is cost burden: households that spend more than 30% of their income on housing and certain utilities are considered to experience cost burden.[7] Any household that pays more than 30% experiences cost burden and does not have affordable housing. Thus, affordable housing applies to all households in the community.

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[7] Cost burden is a concept used by HUD. Utilities included with housing cost include electricity, gas, and water, but do not include telephone expenses. All of the indicators ECO has reviewed, including cost burden, have limitations that can distort results. Cost burden does not consider the impact of household size or accumulated assets. As a result a single-person household with an annual income of $20,000 and accumulated assets of $500,000 would be in the same category as a family of seven with an annual income of $20,000 and no accumulated assets.

- *Low-income housing* refers to housing for "low-income" households. HUD considers a household low-income if it earns 80% or less of median family income. In short, low-income housing is targeted at households that earn 80% or less of median family income, which equated to an annual household income of $47,760 or less in 2013. Low-income households may include those that need some type of financial assistance to close the gap between what they can afford to spend on housing and the prices of housing available in the market.

- *Workforce housing* generally refers to housing that is affordable to households that earn between 60% and 120% of the median family income, which was an annual household income of between $35,800 and $71,640 in 2013.

Steps in the Housing Needs Analysis

The methodology used in the HNA is consistent with the DLCD guidebook, "Planning for Residential Growth," that outlined what steps to perform to complete a housing needs analysis that satisfies state law.[8] These six steps are:

Step 1 – Project the number of new housing units needed in the next 20 years,

Step 2 – Identify relevant national, state, and local demographic and economic trends and factors that may affect the 20-year projection of structure type mix.

Step 3 – Describe the demographic characteristics of the population, and, if possible, household trends that relate to demand for different types of housing.

Step 4 – Determine the types of housing that are likely to be affordable to the projected households based on household income.

Step 5 – Estimate the number of additional needed units by structure type.

Step 6 – Determine the needed density ranges for each plan designation and the average needed net density for all structure types.

To summarize, the City is required to consider its needs for future housing based on type and density over a 20-year planning period. This analysis of housing must examine current and future demographic and economic trends that will influence the types of housing produced and purchased or rented, In addition, this analysis must consider the types of housing needed at various price ranges and rent levels. One of the final steps in this process is an estimate of the number of additional units that will be needed by structure type. Once the City has done this, the City must show that an adequate supply of land for needed housing has been or will be planned and zoned within the existing UGB, and if necessary any area added through an expansion, to demonstrate that the General Plan satisfies Goal 10.

The housing needs analysis is organized by these steps. The next section of the report presents residential development trends, which forms the basis for the housing needs analysis.

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[8] See pages 25 through 33, Planning for Residential Growth: A Workbook for Oregon's Urban Areas, Transportation and Growth Management Program, Lane Council of Governments, and ECO-Northwest (1997) -: http://www.oregon.gov/LCD/docs/publications/planning_for_residential_growth.pdf.

Prior Housing Needs Analyses and Remand Issues

The purpose of this section is to provide a brief review of the city's past work on completing a housing needs analysis consistent with Goal 10. The City provided this information to the Department of Land Conservation and Development (DLCD) and LCDC in January of 2010 as a component of the City's Appeal of the Director's January 8, 2010 Order and Report on the City's Proposed UGB Expansion,

In 2005, the City completed a buildable lands inventory (2005 BLI) (Supp. Rec. 1987) and a housing needs analysis (2005 HNA) (Rec. 2046). The City followed DLCD's Goal 10 guidebook to develop both products. After further work with a technical advisory committee (TAC), the City updated the 2005 HNA in April 2006 (Supp. Rec. 2157).

In 2007, consultant Angelo Planning Group (APG) prepared a final report that presented land need estimates for housing, schools, parks, and institutional uses (Rec. 2137). This 2007 report also presented a series of forecasts for residential land needs, following Oregon Revised Statutes (ORS) 197.296 and DLCD's Goal 10 workbook. Another consultant, Cogan Owens, prepared a draft General Plan housing element that, along with the 2007 APG land need report, were submitted to DLCD with a 45-day notice on June 11, 2007. (Supp. Rec. 1587, 1789.) Following the initial public hearings in July and August of 2007, the City, working in public work sessions of the Bend Planning Commission and with liaisons of the Deschutes County Planning Commission, reviewed and amended the proposed elements of the UGB expansion, including the work that supported the housing element.

From September 2007 through October 2008, the Bend Planning Commission held 35 public work sessions on the UGB expansion. Through these work sessions, which included extensive public input, the City revised its draft buildable lands inventory, housing needs analysis, and residential land need estimate. This work resulted in 2008 versions of the buildable lands inventory, housing needs analysis (Rec. 1280, 1728), and residential land needs analysis that were incorporated in the 2008 version of the housing element submitted to DLCD in 2009.

On November 2, 2010, LCDC issued its final order of remand and partial acknowledgement on the UGB expansion and its components. The final order was not appealed, and became final in January 2011. With respect to the HNA adopted as part of the UGB expansion, the Commission's order remands the city's decision for it to revise its findings and chapter 5 of its comprehensive plan consistent with a detailed analysis contained in the order.[9] That analysis is based on the January 2010 Director's Report and Order which specifies those tasks the City must complete, described in Appendix B.

Time Periods and Data used in the Housing Needs Analysis

This housing needs analysis uses three periods of time for historical analysis and for the forecast of housing need:

- **Planning Period**, ORS 197.296(2) further requires the City to ensure a 20-year supply of buildable land for needed housing. The statute stats that the 20-year period shall

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[9] See Remand and Partial Acknowledgment Order ACKNOW-001795, LCDC, November 2, 2010, Sub-Issue 2.3, p. 33.

commence on the date initially scheduled for completion of the legislative review. For this HNA, the 20-year period begins in 2008 and ends in 2028.

- **Trend Period**, ORS 197.296(5)(a) requires the HNA to be based on data relating to land within the City's UGB that has been collected since the last periodic review or five years, whichever is greater. In Bend's situation, the last periodic review ended in 1998 with the adoption of the City of Bend Comprehensive Plan. This HNA relies on data collected from 1998 to 2008.

- **Extended Trend Period**. The HNA was originally developed with data available up to 2008. This HNA extends the trend data to include data available between 2008 and 2013. This additional data provides information about changes in Bend's housing market since 2008.

This analysis uses data from multiple well-recognized and reliable data sources. One of the key sources for data about housing and household data is the U.S. Census. This report primarily uses data from two Census sources:

- The **Decennial Census**, which is completed every ten years and is a survey of all households in the U.S. The Decennial Census is considered the best available data for information such as demographics (e.g., number of people, age distribution, or ethnic or racial composition); household characteristics (e.g., household size and composition); and housing occupancy characteristics. As of the 2010 Decennial Census, it does not collect more detailed household information, such as income, housing costs, housing characteristics, and other important household information. The HNA uses Decennial Census data from 1990, 2000, and 2010.

- The **American Community Survey (ACS)**, which is completed every year and is a sample of households in the U.S. The ACS collects detailed information about households, such as demographics (e.g., number of people, age distribution, ethnic or racial composition, country of origin, language spoken at home, and educational attainment); household characteristics (e.g., household size and composition); housing characteristics (e.g., type of housing unit, year unit built, or number of bedrooms); housing costs (e.g., rent, mortgage, utility, and insurance); housing value; income; and other characteristics. This report uses three types of data from the 2013 ACS: (1) one-year ACS data for 2013, (2) three-year ACS data for 2011-2013, and (3) five-year ACS data for 2009-2013. In some cases, one-year data from the 2013 ACS is not available in Bend (as a result of sampling and statistical reasons). In those instances, this report uses 3-year estimates for 2011-2013 data or 5-year estimates for 2009-2013 for Bend.

The housing needs analysis incorporates key information from the 2008 adopted Housing Needs Analysis, such as the forecast of new housing for the 2008-2028 period. This analysis addresses the issues identified in the 2008 Housing Needs Analysis, described in Appendix B.

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CHAPTER 2. HISTORICAL AND RECENT DEVELOPMENT TRENDS

Analysis of historical development trends in Bend provides insights into how the local housing market functions. The housing type mix and density are also key variables in forecasting future land need. Moreover, such an analysis is required by ORS 197.296. The specific steps are described in Task 2 of the Transportation Growth Management's *Planning for Residential Lands* Workbook:

1. Determine the time period for which the data must be gathered
2. Identify types of housing to address (all needed housing types)
3. Evaluate permit/subdivision data to calculate the actual mix, average actual gross density, and average actual net density of all housing types

ORS 197.296 requires the analysis of housing mix and density to include the past five years or since the most recent periodic review, whichever time period is greater.[10] Bend's last periodic review was completed in 1998. The period used in the analysis of housing mix is 1999 to 2013, to account for trends in housing mix beyond 2008. The period used in the analysis of housing density was 1999 to 2008, from the adopted 2008 housing needs analysis.

The HNA presents information about residential development by housing types. There are multiple ways that housing types could be grouped. For example, housing types could be grouped by:

1. Structure type (e.g., single-family detached, apartments, etc.)
2. Tenure (e.g., distinguishing unit type by owner or renter units)
3. Housing affordability (e.g., units affordable at given income levels)
4. Some combination of these categories

LCDC's November 2010 order identifies the types of housing the City must consider through this housing needs analysis. The Commission's disposition of this matter was based, in part, on ORS 197.303(3)(a), which identifies "needed housing:"

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[10] Specifically, ORS 197.296(5) (b) states: "A local government shall make the determination described in paragraph (a) of this subsection using a shorter time period than the time period described in paragraph (a) of this subsection if the local government finds that the shorter time period will provide more accurate and reliable data related to housing capacity and need. The shorter time period may not be less than three years."

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(a) Housing that includes, but is not limited to, attached and detached single-family housing and multiple family housing for both owner and renter occupancy;

(b) Government assisted housing;

(c) Mobile home or manufactured dwelling parks as provided in ORS 197.475 to 197.490; and

(d) Manufactured homes on individual lots planned and zoned for single-family residential use that are in addition to lots within designated manufactured dwelling subdivisions.

The Commission's rules further define the three types of housing that must be considered in the housing needs analysis. The following table lists these three types of housing and how they are classified under the Bend Development Code.

Table 2. Comparison of OAR 660, Division 8 Definitions with Types of Housing Allowed under the Bend Development Code

OAR 660-008-005, Definitions	Bend Development Code (See BDC Chapter 1.2)
"Attached Single Family Housing" means common-wall dwellings or rowhouses where each dwelling unit occupies a separate lot. OAR 660-008-0005(1).	Dwelling, single family attached
"Detached Single Family Housing" means a housing unit that is free standing and separate from other housing units. OAR 660-008-0005(3).	Courtyard housing Dwelling, single family detached Accessory dwelling units Manufactured home on individual lot Manufactured homes in parks
"Multiple Family Housing" means attached housing where each dwelling unit is not located on a separate lot. OAR 660-008-0005(5).	Condominium Two and three family housing (duplex and triplex) Multi-family housing (more than 3 units)

Residential Development Trends

Trends in Housing Mix

Housing mix is the mixture of housing (structure) types (e.g., single-family detached, single-family attached, or multi-family housing) within a city. This section presents data on the distribution of housing by type, or the number of units in each structure. The purpose for considering this data is to see whether the distribution of housing has changed, thereby reflecting different housing choices among Bend households. Figure 1 shows changes in units by structure type from 1990 to 2013 in Bend. Since 1990:

- The supply of housing units in Bend grew by 150% (about 13,500 units) between 1990 and 2000 because of housing construction and annexation. Growth of housing between 2000 and 2013 (nearly 11,700 units) was primarily the result of new construction; no additional units were added through annexation.

- The distribution of units by type did not change significantly over the 23 year period; single family detached dwellings represented 71% to 77% of the supply of housing units.

- Single family attached units increased slightly from 3% to 4% of the housing units.

- Multi-family attached units (all other units), decreased slightly, from 26% to 25%, of all units. Between 2000 and 2013, more than 4,000 multi-family dwellings were built in Bend. As of July 2015, more than 1,300 multifamily units were in the permitting process (not shown in Figure 2).

Figure 1. Mix of Housing and Number of Dwelling Units by Housing Type, Bend, 1990, 2000, and 2013
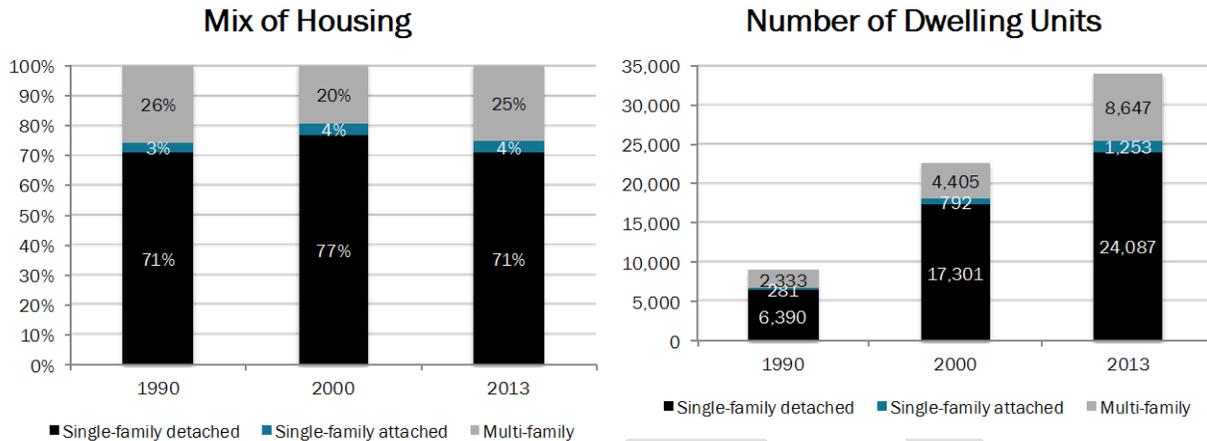
Source: 1990 and 2000 Census SF3, 2013 American Community Survey 1-Year Estimates

Figure 2 shows the mix of housing by unit type (for all housing units in the housing stock) at the national, state, and local levels in 2013. About 71% of Bend's housing was single-family-detached, compared to the state average of 72% and the national average of 68%.

Figure 2. Mix of Housing by Type for all Dwelling Units, US, Oregon, Deschutes Co. and Bend, 2013
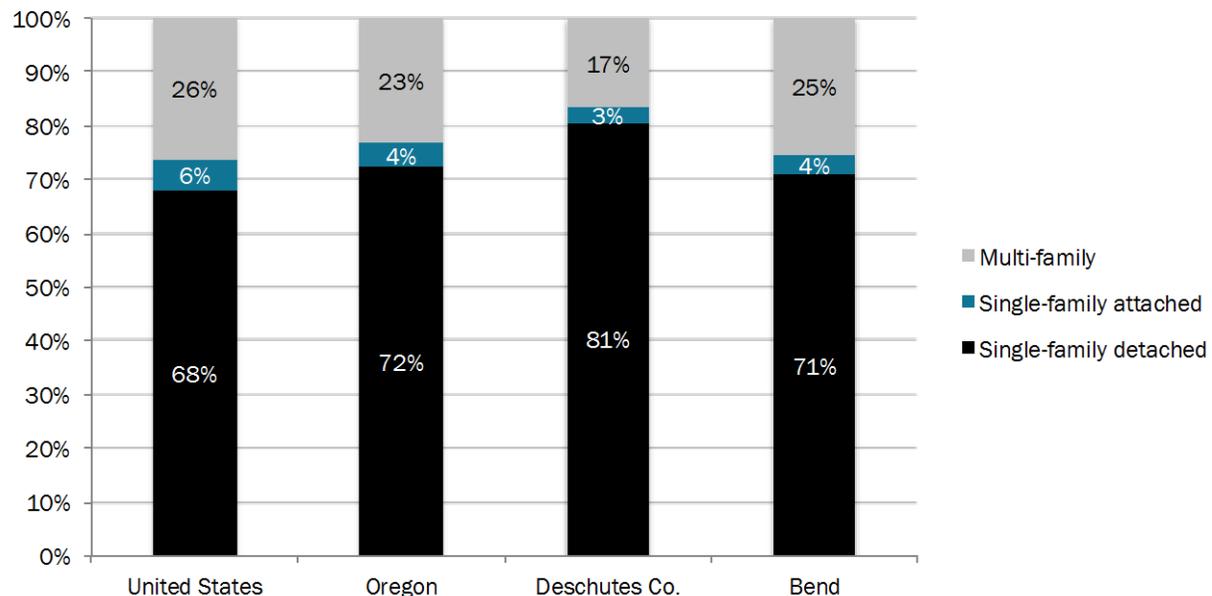
Source: 2013 American Community Survey 1-Year Estimates

Building permit activity

Figure 3 shows total number of dwelling units permitted for housing of all types in Bend between 1999 and 2013. The data show growth of building permit activity between 2001 and 2005 and a significant decline in residential development activity between 2006 and 2009, which corresponds with the national growth and decline of the housing market bubble. Development has steadily increased since 2009 to a total of 907 permits issued for 2013 and 512 permits issued through the first six months of 2014.

Figure 3. Total Permits Issued for New Residential Development (in dwelling units) by Year, 1999 through July 2014, Bend

Source: City of Bend building permit data; analysis by ECONorthwest

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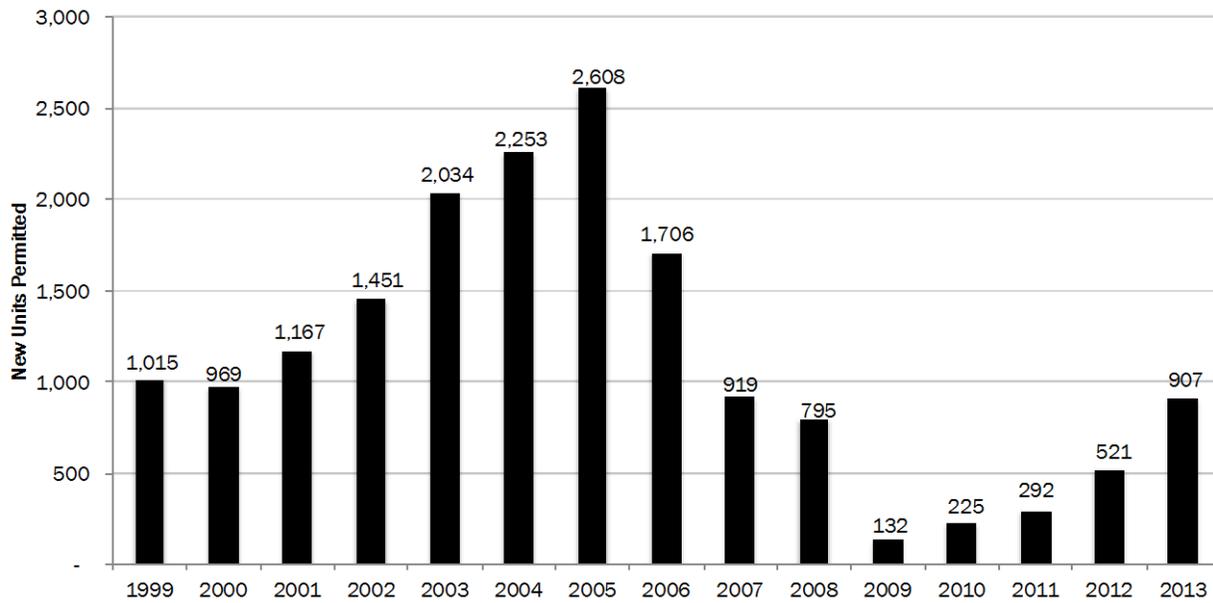
Figure 4. Total Permits Issued by Type of Unit for New Residential Development (in dwelling units) by Year, 1999 through July 2014, Bend

Source: City of Bend building permit data; analysis by ECONorthwest

07021
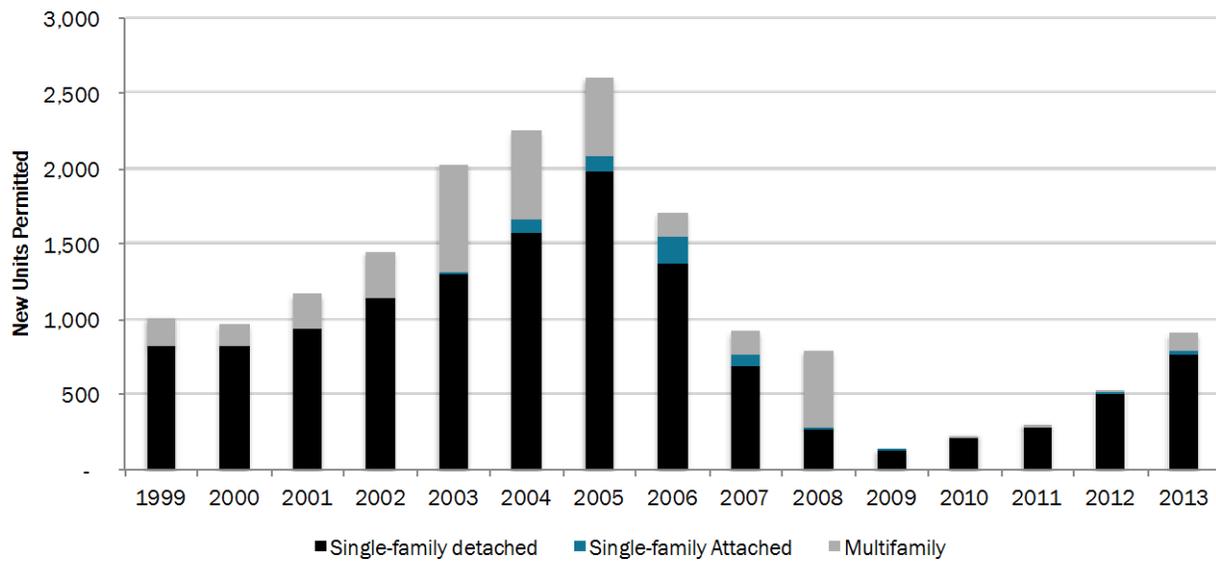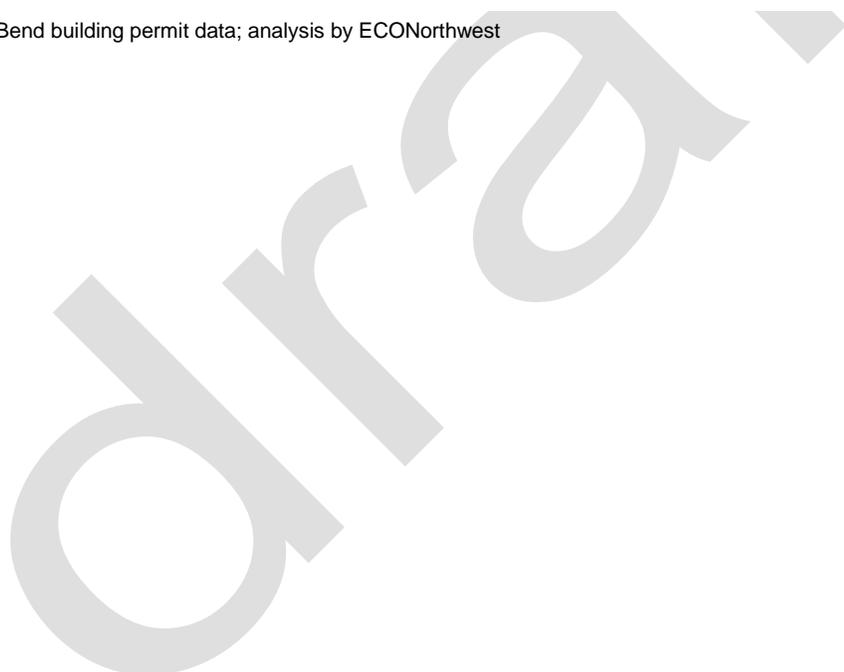
Table 3 shows new dwellings permitted in Bend for the January 1999 and June 2008, between July 2008 and 2008 through 2013 periods by housing type. The data shows that the majority (about 3/4) of housing development in Bend during these periods was single-family detached housing.

Between January 2014 and June 2015, the City has issued permits for more than 1,300 additional permits, 85% of which were single-family detached. However, by July 2015, 16 multifamily projects were in the permitting process, with a total of 1,367 multifamily units.[11] If these units are permitted, then the City will have permitted in one year almost half as many multifamily units as the City permitted over the entire 1999 to 2014 period. Including these multifamily units, more than 55% of new housing permitted for the January 2014 to mid-2015 period.

Table 3. Total Permits Issued for New Residential Development (in dwelling units) by Housing Type and Year, 1999 through July 2014, Bend

Housing Type	1999-June 2008		July 2008-June 2014		Total Units		Annual Average (1999-July 2014)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Single-family detached	10,875	77%	2,411	83%	13,286	78%	949	78%
Single-family Attached	463	3%	112	4%	575	3%	41	3%
Multifamily	2,741	19%	389	13%	3,130	18%	224	18%
Total	14,079	100%	2,912	100%	16,991	100%	1,214	100%

Source: City of Bend building permit data; analysis by ECONorthwest

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[11] These units are at different parts of the permitting process, ranging from pre-application conference to site plan review to site plan approval.

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Trends in Tenure

Figure 5 and Figure 6 present data on occupancy and tenure trends for Bend between 1990 and 2013. The data on occupancy presents the numbers of housing units either occupied or vacant. The data on tenure informs the analysis by describing the numbers of units that are either owner-occupied or renter occupied. Please note that the number of units described by tenure are occupied and also describe household choices on whether to purchase or rent housing.

Figure 5 shows that homeownership rates increased from 1990 to 2000 (from 54% to 63%) but returned to roughly 1990 levels by 2013 (55%).

Figure 5. Occupied Housing and Number of Occupied Dwellings by Tenure, Bend, 1990, 2000, and 2013
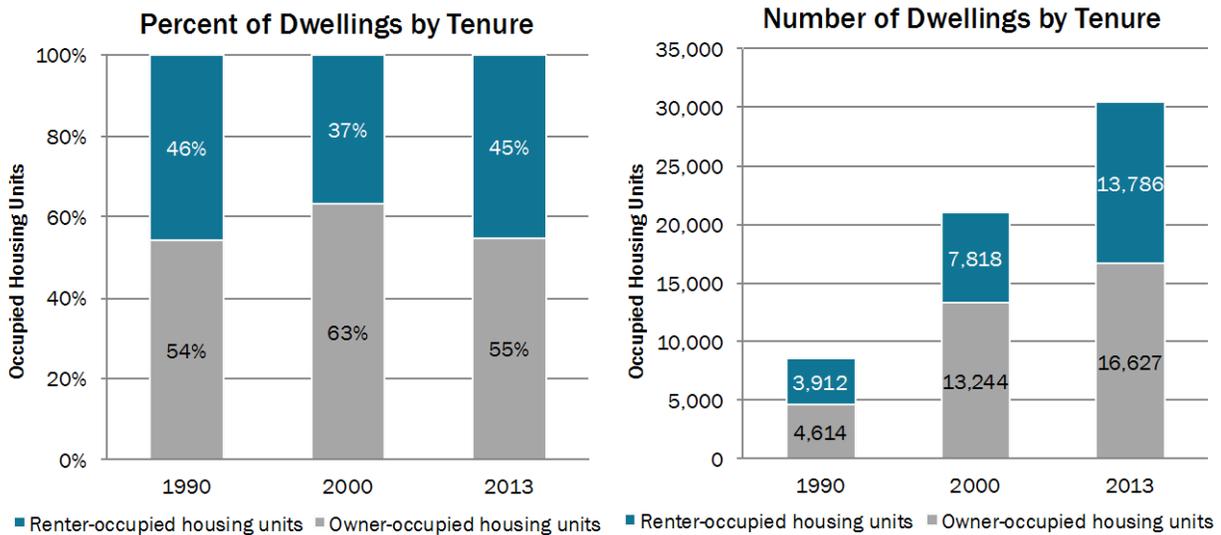
Source: 1990 and 2000 Census SF3, 2013 American Community Survey 1-Year Estimates

Figure 6 presents data on tenure by housing type for 2000 and 2011-2013.[12]

- The number of dwelling units of all types and tenure increased between 2000 and 2011-2013.

- Nearly all owner-occupied housing was and remains in single-family detached housing types, with a 1% increase in the percentage of owner-occupied single-family attached housing between 2000 and 2011-2013.

- The number and percentage of single-family detached units that were renter-occupied increased over this period, with single-family detached units accounting for 41% of rent-occupied units in 2000 and 48% in 2011-2013. This change may, in part, be the continued effects of the recent recession and housing market downturn, where some single-family detached units that were foreclosed on were used for rental units.

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[12] This figure presents data from the American Community Survey for the 2011 to 2013 period, known as a 3-year estimate from the American Community Survey, because data was not available in Bend for a 1-year estimate for 2013.

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Compared to other Oregon cities, Bend has a relatively large percentage of rental housing that is single-family detached housing. In 2011-2013, single-family detached housing accounted for the following percentages of rental housing: 26% in Portland, 29% in Eugene, 32% in Salem, and 40% in Medford.

Figure 6. Occupied Units by Tenure and Type, Bend, 2000 and 2011-2013
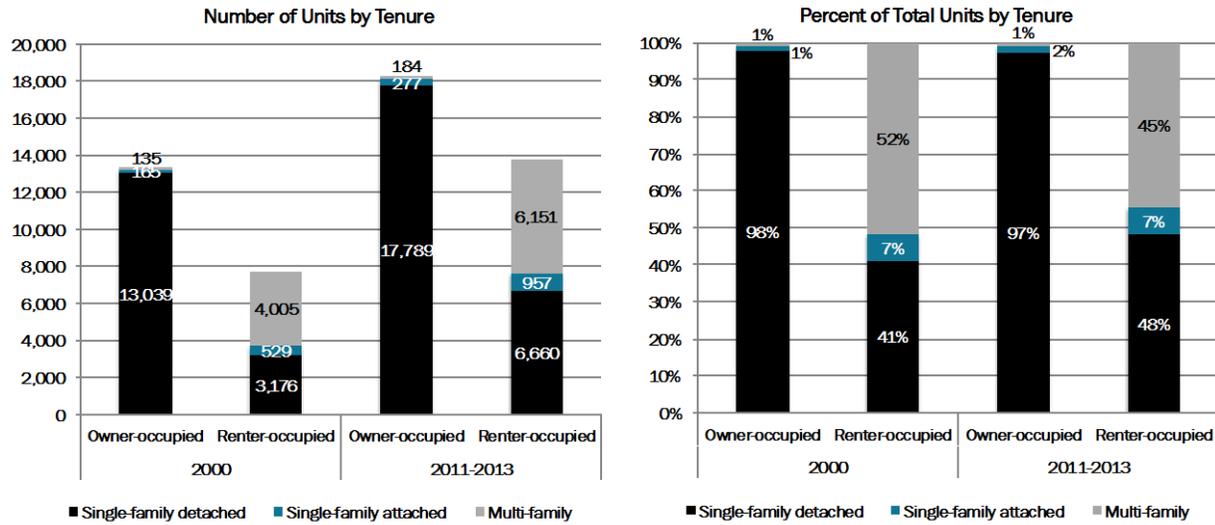
Source: 2000 Census SF3, 2013 American Community Survey 3-Year Estimates

Vacancy Rates

Vacancy rates are cyclical and represent the lag between housing demand and the market's response to that demand by producing additional dwelling units. Figure 7 shows that housing vacancies were about 5% in 1990 and 6% in 2000. In 2013, Bend vacancies were 11%. While vacancy rates were relatively high in 2013 when compared to 1990 and 2013, it is reasonable to expect Bend's vacancy rates to decrease to historical averages (e.g., 5%) with changes in the housing market. In 2015, a survey of rental properties showed that rental vacancy rates were below 2% in Bend, demonstrating a sharp decrease in vacancy rates in Bend since 2013.[13] [14]

Figure 7. Percentage and Number of Units by Occupancy, Bend, 1990, 2000, and 2013
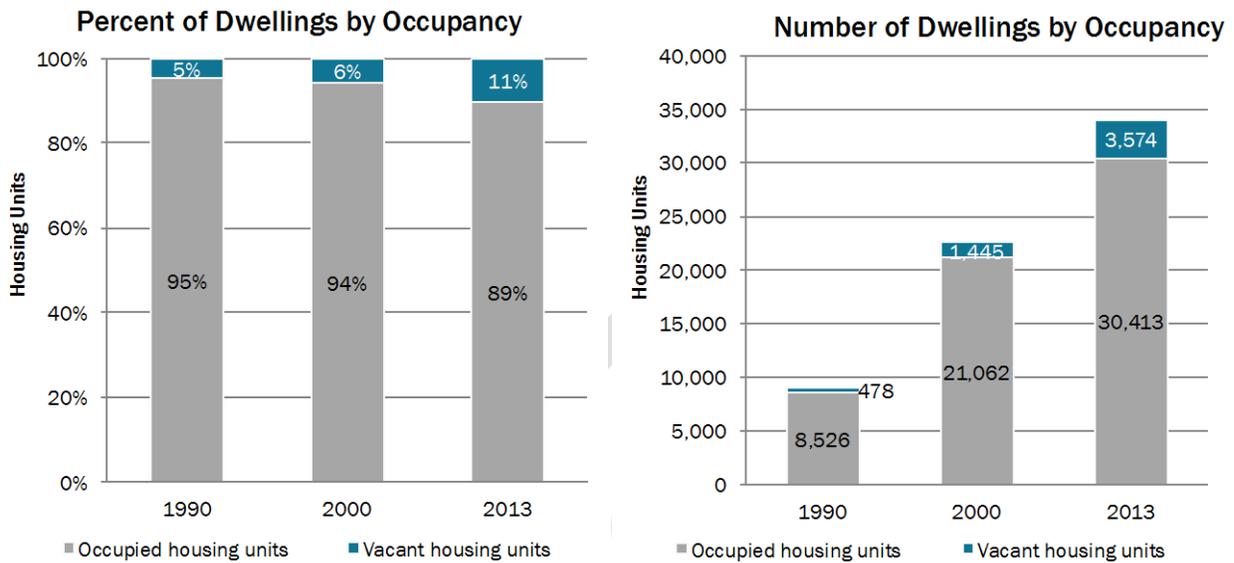
Source: 1990 and 2000 Census SF3, 2013 American Community Survey 1-Year Estimates

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[13] Article in the Bend Bulletin; Survey of rental properties by the Central Oregon Rental Owners Association http://www.bendbulletin.com/business/3176538-151/apartment-complex-slated-for-bend

[14] The residential vacancy rate was not a subject questioned in the Remand. As a result, this analysis uses the vacancy rate from the 2008 HNA. The additional information presented in this section simply shows that assuming a 6% vacancy rate is reasonable, given changes in vacancy rate between 2008 and 2015.

Residential Development Densities

Table 4 shows allowed densities by zone in Bend by gross and net acres. OAR 660-024-0010(6) defines Net Buildable Acres as follows: "Net Buildable Acre" consists of 43,560 square feet of residentially designated buildable land after excluding future rights-of-way for streets and roads. A gross acre does not exclude land for future rights-of-way for streets and roads.

Table 4. Range of Allowed Densities, Dwelling Units per Acre, Bend

Density	Low Density Residential (RL)	Standard Density Residential (RS)	Medium Density Residential (RM)	High Density Residential (RH)
Dwelling Units per Gross Acres	1.1 - 2.2	2.0 - 7.3	7.3 - 21.7	21.7 - 43.0
Dwelling Units per Net Acres	1.4 - 2.8	2.5 - 9.1	9.1 - 23.9	23.9 - 47.3

Source: City of Bend
Note: The net densities shown in Table 4 are an approximation based on gross densities, accounting for land needed for rights of way. Bend's development code only regulates density based on gross densities.

Table 5 shows historical development trends in residential zones for three periods: (1) units built before 1998, (2) units built during the 1998-2008 period, and (3) all units in Bend by 2008. Table 5 shows that average net densities increased over time in most zones. Note that Bend adopted minimum densities for each zone for the first time in 2006.

- **Single-family detached densities.**
  - The overall density in the low-density RL zone remained around 2.1 units/net acre (the RL zone contains less than 10% of total housing units).
  - Density in the RS, RM, and RH zones increased from the pre-1998 period to 2008.
  - The majority of housing built in Bend was single-family detached, most of which was developed in the RS zone. Average net densities in the RS zone increased from 3.1 units/acre overall as of 1998 to 3.8 units/acre as of 2008.
  - The average density for single-family detached units increased by 24%, from 2.9 units/net acre as of 1998 to 3.6 units/net acre by 2008.

- **Single-family attached densities.**
  - Single-family attached units were relatively new to Bend's housing inventory, Only 48 units (less than 1% of total housing units) existed prior to 1998. During 1998-2008 they made up 9.5% (610) of total new housing units permitted. Most of those (71%) were built in the RS zone, with the rest built in the RM zone.
  - Table 5 shows that the average net density for single-family attached units built in the RS zone during 1998-2008 was 71% above the overall average for that type existing prior to 1998. Overall, the average density of single-family attached units in all zones increased from 7.8 units/net acre prior to 1998 to 9.4 units/net acre in 2008.

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- o The average density for single-family attached units across all zones was 21% higher for units built over the 1998-2008 period than for those existing in 1998.

- **Multi-family densities.**

  - o The average net density for multi-family units in the RM zone held steady at 16.6 units/net acre from 1998 to 2008, and decreased slightly in the RH zone from 20.9 to 18.8 units/net acre.

  - o At the same time, multi-family density in the RS zone (consisting primarily of duplex units) increased from 9.7 to 11.3 units per net acre during that period.[15]

  - o The average density for multi-family attached units across all zones increased by 2% from 15.5 units/net acre before 1998 to 15.8 units/net acre as of 2008.

- **All housing types and zones.**

  - o The average net density for development in the 1998 to 2008 period was 5.7 dwelling units per net acre.

  - o The average density for the 1998-2008 period for all housing types in the RH zone is lower than the current allowed density in the RH zone, based on the minimum densities implemented in 2006.

Table 5. Historical Average Net Density by Zone, Dwelling Units per Net Acre, Bend

	RL			RS			RM			RH			All Res. Zones		
	Pre-1998	1998-2008	2008	Pre-1998	1998-2008	2008	Pre-1998	1998-2008	2008	Pre-1998	1998-2008	2008	Pre-1998	1998-2008	2008
Single-family detached	2.0	2.1	2.0	3.1	4.6	3.8	4.7	8.6	5.6	6.6	13.4	7.2	2.9	4.7	3.6
Single-family attached	-	-	-	5.1	8.7	8.4	21.5	12.5	13.1	-	-	-	7.8	9.5	9.4
Multi-family attached	8.8	-	8.8	9.7	14.2	11.3	16.6	16.1	16.6	20.9	17.1	18.8	15.5	16.0	15.8
Manufactured homes in parks	2.7	-	2.7	3.4	-	3.4	6.5	-	6.5	-	-	-	4.1	-	4.1
Manufactured homes on lots	2.9	3.1	2.9	3.2	6.6	3.6	5.8	7.0	6.2	-	-	-	3.1	5.1	3.4
Average Density – All Housing Types	2.1	2.1	2.1	3.2	4.9	3.9	8.5	13.4	9.9	14.4	16.9	15.5	3.7	5.7	4.4

Source: City of Bend memorandum: "Bend Buildable Lands Inventory – Sub-Issue 2.2" revised January 9, 2014

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[15] This density of development for duplexes exceeds the maximum density of the RS Zone.

Summary of Key Findings about Historical Residential Development in Bend

The majority of housing in Bend is single-family detached housing.

- The mix of housing stock in Bend was relatively consistent over the past two decades, with about 70% of Bend's housing stock in single-family detached housing in 1990 and in 2013.

Building activity has varied substantially over the 1999 to 2013 period.

- Bend permitted an average of about 1,200 units per year between 1999 and 2014, the majority of which were single-family detached units.

- Building permit activity peaked in 2005 with 2,600 units permitted. In 2009 to 2011, fewer than 300 units were permitted per year. The number of units permitted exceeded 900 in 2013, showing that development activity in Bend is returning to historical levels.

- More than three-quarters of units permitted between 1999 and 2013 were single-family detached units.

- Permits issued for multi-family housing averaged about 225 units per year, peaking in number in 2003. Between 2009 and 2012, very few multi-family units were permitted. Between 2010 and 2012, the only multi-family attached units permitted in Bend were duplexes.

Bend's housing tenure remained stable between 1990 and 2013.

- About 55% of dwellings were owner-occupied in 1990 and 2013.

- Nearly all owner-occupied units were single-family detached housing, with a small number of owner-occupied single-family attached and multi-family units.

- Renter-occupied units were generally divided among single-family detached and multi-family, with single-family attached units accounting for about 7% of renter-occupied units.

Housing density generally increased for housing built between 1998 and 2008, compared to housing built before 1998.

- Single-family detached densities in the RS, RM, and RH zones increased, with densities in the RL remaining flat.

- Multi-family densities increased in the RS zone and decreased slightly in the RM and RH zones.

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CHAPTER 3. HOUSING NEEDS ANALYSIS

Step 1 – Project the number of new housing units needed in the next 20 years

The first step in the HNA process is to forecast the number of housing units that will be needed to house the projected population growth over the planning period. In 2008, the City developed and relied on a 2028 population forecast for Bend of 115,063, reflecting an increase in population of 38,512 people between 2008 and 2028.[16] The January 2010 DLCD Director's Report and Order on the UGB Expansion concluded that the forecast complied with applicable law.[17] The 2028 population forecast for Bend was prepared using the 2004 Coordinated Population Forecast for Bend as a base. The Coordinated Population Forecast for Bend is 109,389 people by 2025.[18] Staff extended the forecast out another three (3) years to 2028 using the same growth rate used to forecast population beyond 2025 in the Housing Needs Analysis.[19]

The City relied on this 2028 population forecast to develop a housing unit forecast for Bend from 2008 to 2028.

The forecast of housing units is based on data from the 2000 Census results for Bend.[20] The steps in the forecast are:[21]

- Determine the amount of new population growth by subtracting Bend's population in 2008 (76,551 people) from the 2028 population forecast (115,063 people). The result shows that Bend's population will grow by 38,512 between 2008 and 2028.

- Remove population in group quarters (2.3% or 886 people) to determine the amount of new population in households (37,626 people) over 2008 and 2028.

- Identify the number of new occupied housing units by dividing the population by average household size (2.4 persons per household), which results in growth of 15,678 new households and new occupied housing units in Bend between 2008 and 2028.

- Account for vacant units, with a vacancy rate of 6.4%, which results in 1,003 more housing units, the vacancy rate in Bend in 2000 (Figure 7).

The DLCD Director also concluded that the housing unit forecast of 16,681 new units between 2008 and 2028 complied with the applicable law in his January 2010 Report and Order.[22] Table 6 presents the 2008 to 2028 housing unit forecast for the City of Bend.

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[16] See September 2, 2011 memorandum to the Remand Task Force, presented at the RTF's September 8, 2011 meeting.

[17] See page 25 of 156, January 8, 2010 Director's Report and Order

[18] See Exhibit L-2, Deschutes County Coordinated Population Forecast 2000-2025 (2004) to 45-Day notice

[19] See Exhibit L-3, City of Bend Housing Needs Analysis (2005) to 45-day notice, pages 7-8.

[20] See the 2000 Demographic profile for Bend at: http://censtats.census.gov/data/OR/1604105800.pdf.

[21] These steps are consistent with the Residential Land Needs 2005-2030 Memorandum (April 25, 2007); Table 3, Page 5.

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Table 6. Housing Unit Forecast, 2008 to 2028

Variable	Housing Need 2008-2028
Population forecast for 2028	115,063
(-) Less Population on 7/1/08	76,551
(=) New population 2008 to 2028	38,512
(-) Less population in group quarters (2.3%)	886
(=) New population in households	37,626
(/) Divided by household size (2.4)	
(=) Equals new occupied housing units	15,678
(+) Plus vacancy factor (6.4%)	1,003
= New housing units 2008 to 2028	**16,681**

Between 2009 and the end of July 2014, Bend issued building permits for 2,912 new dwelling units, shown in Table 3. As a result, **the number of additional units that Bend will need to accommodate over the 2014-2028 period is 13,769 units.**

Summary of Key Findings about Needed Housing Units

Step 1 of the housing needs analysis shows that:

- Bend is projected to grow by 16,681 dwelling units over the 2008 to 2028 period.

- Bend issued building permits for 2,912 units between 2009 and July 2014.

- Bend will need to accommodate an additional 13,769 units over the 2014 to 2028 period.

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Step 2 – Identify relevant national, state, and local demographic and economic trends and factors that may affect the 20-year projection of structure type mix

ORS 197.296(5) requires communities to examine demographic and economic trends that will inform the city's analysis of what types of housing will be needed in the future. This section presents an examination of relevant national, state, and local demographic and economic trends and factors that may affect the 20-year projection of the types and mix of housing.[23] The analysis of trends focuses on the period following the acknowledgement of the 1998 City of Bend Comprehensive Plan to 2013. For many variables, this analysis will include data from 1998 or 1999 to 2013; for others, two periods will be presented to look at trends. These periods will include 1990 to 2000, between the two Censuses, and from 2000 to 2013. For 2013, the City is relying on data collected about the State of Oregon and Bend from the American Community Survey.[24] In addition, this analysis incorporates previous work from the 2005 Housing Needs Analysis and the 2007 Residential Land Need Analysis.[25] Most of this data and background was shared with the Residential technical advisory committee (TAC) during their August 5, 2014 meeting.[26]

National Housing Market Trends

This section briefly summarizes national housing trends and builds on previous work by ECONorthwest, Urban Land Institute (ULI) reports, and conclusions from *The State of the Nation's Housing, 2014* report from the Joint Center for Housing Studies of Harvard University. The Harvard report summarizes the national housing outlook as follows:

> "With promising increases in home construction, sales, and prices, the housing market gained steam in early 2013. But when interest rates notched up at mid-year, momentum slowed. This moderation is likely to persist until job growth manages to lift household incomes. Even amid a broader recovery, though, many hard-hit communities still struggle and millions of households continue to pay excessive shares of income for housing."

Several challenges to a strong domestic housing market remain. Demand for housing is closely tied to jobs and incomes, which are taking longer to recover than in previous cycles. While trending downward, the number of underwater homeowners, delinquent loans, and vacancies remains high. *The State of the Nation's Housing* report projects that it will take several years for market conditions to return to normal and, until then, the housing recovery will likely unfold at a moderate pace.

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[23] See September 2, 2011 memorandum to the UGB Remand Task Force, presented at their September 8, 2011 meeting.

[24] For more information about the American Community Survey (ACS), See http://www.census.gov/acs/www/. The ACS data can be accessed from the Census Bureau's American Factfinder website at http://factfinder.census.gov/home/saff/main.html?_lang=en.

[25] See 2005 Housing Needs Analysis at Rec p 2046 and 2007 Residential Land Need Analysis at Rec. P. 2114,

[26] See meeting packet for Residential TAC meeting #1 - http://bendoregon.gov/Modules/ShowDocument.aspx?documentid=17619.

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National housing market trends include: [27]

- **Post-recession recovery slows down**. Despite strong growth in the housing market in 2012 and the first half of 2013, by the first quarter of 2014, housing starts and existing home sales were both down by 3% from the same time a year before, while existing home sales were down 7% from the year before. Increases in mortgage interest rates and meager job growth contributed to the stall in the housing market.

- **Continued declines in homeownership**. After 13 successive years of increases, the national homeownership rate declined each year from 2005 to 2013, and is currently at about 65%. The Urban Land Institute projects that homeownership will continue to decline to somewhere in the low 60% range.

- **Housing affordability**. In 2012, more than one-third of American households spent more than 30% of income on housing. Low-income households face an especially dire hurdle to afford housing. Among those earning less than $15,000, more than 80% paid over 30% of their income and almost 70% of households paid more than half of their income. For households earning $15,000 to $29,000, more than 60% were cost burdened, with about 30% paying more than half of their income on housing.

- **Changes in housing characteristics**. National trends show that the size of single-family and multi-family units, and the number of household amenities (e.g., fireplace or two or more bathrooms) has increased since the early 1990s. Between 1990 and 2013 the median size of new single-family dwellings increased 25% nationally from 1,905 square feet to 2,384 square feet and 18% in the western region from 1,985 square feet to 2,359 square feet. Moreover, the percentage of units smaller than 1,400 square feet nationally decreased from 15% in 1999 to 8% in 2013. The percentage of units greater than 3,000 square feet increased from 17% in 1999 to 29% of new one-family homes completed in 2013. In addition to larger homes, a move towards smaller lot sizes is seen nationally. Between 2009 and 2013, the percentage of lots less than 7,000 square feet increased from 26% of lots to 30% of lots. Similarly, in the western region, the share of lots less than 7,000 square feet increased from 43% to 48% of lots.

- **Long-term growth and housing demand**. The Joint Center for Housing Studies forecasts that demand for new homes could total as many as 13.2 million units nationally between 2015 and 2025. Much of the demand will come from Baby Boomers, Millennials,[28] and immigrants.

- **Changes in housing preference**. Housing preference will be affected by changes in demographics, most notably the aging of the Baby Boomers, housing demand from the Millennials, and growth of foreign-born immigrants. Baby Boomers' housing choices will affect housing preference and homeownership, with some boomers likely to stay in their

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[27] These trends are based on information from: (1) The Joint Center for Housing Studies of Harvard University's publication "The State of the Nation's Housing 2013," (2) Urban Land Institute, "2011 Emerging Trends in Real Estate," and (3) the U.S. Census.

[28] Millennials are, broadly speaking, the children of Baby Boomers, born from the early 1980's through the early 2000's.

home as long as they are able and some preferring other housing products, such as multi-family housing or age-restricted housing developments.

In the near-term, Millennials and new immigrants may increase demand for rental units. The long-term housing preference of Millennials and new immigrants is uncertain. They may have different housing preferences as a result of the current housing market turmoil and may prefer smaller, owner-occupied units or rental units. On the other hand, their housing preferences may be similar to the Baby Boomers, with a preference for larger units with more amenities. Recent surveys about housing preference suggest that Millennials want affordable single-family homes in areas that offer transportation alternatives to cars, such as suburbs or small cities with walkable neighborhoods.[29]

State Economic Trends and Cycles

Oregon's *2011-2015 Consolidated Plan* includes a detailed housing needs analysis as well as strategies for addressing housing needs statewide.[30] The plan concludes that, "Oregon's changing population demographics are having a significant impact on its housing market." It identified the following population and demographic trends that influence housing need statewide.

- Oregon's households have higher rates of cost burden, with increases due to higher unemployment and lower wages, when compared to the nation.

- Oregon's foreclosure rates have been at a historical high since 2005, compared with the previous two decades.

- Oregon, like other states, is continuing to loose federal housing subsidies, with losses of about 8% of federally subsidized Section 8 housing units.

- Oregon's communities are losing manufactured housing parks over time, with a 25% decrease in the number of manufactured home parks between 2003 and 2010.

- Oregon's population is increasingly older, more diverse, and, has less affluent households.[31]

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[29] The American Planning Association, "Investing in Place; Two generations' view on the future of communities." 2014. "Survey Says: Home Trends and Buyer Preferences," National Association of Home Builders International Builders Show, accessed January, 2015, http://www.buildersshow.com/Search/isesProgram.aspx?id=17889&fromGSA=1. "Access to Public Transportation a Top Criterion for Millennials When Deciding Where to Live, New Survey Shows," Transportation for America, accessed January 2015, http://t4america.org/wp-content/uploads/2014/04/Press-Release_Millennials-Survey-Results-FINAL-with-embargo.pdf.

[30] http://www.ohcs.oregon.gov/OHCS/HRS_Consolidated_Plan_5yearplan.shtml

[31] State of Oregon *Consolidated Plan 2011 to 2015*. http://www.oregon.gov/ohcs/hd/hrs/consplan/2011_2015_consolidated_plan.pdf

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Step 3 – Describe the demographic characteristics of the population, and, if possible, household trends that relate to demand for different types of housing[32]

Regional and local demographic trends largely follow the statewide trends and provide additional insight into how demographic trends might affect housing in Bend. National and state demographic trends that might affect the key assumptions used in the baseline analysis of housing need are: (1) the aging population, (2) changes in household size and composition, and (3) increases in diversity. This section describes how those trends are playing out at the local level. Most of this data and background was shared with the Residential technical advisory committee (TAC) during their August 5, 2014 meeting[33].

Demographic and socioeconomic factors affecting housing choice

In the context of housing markets, past and current housing conditions demonstrate *the intersection of the forces of housing supply and demand at a price of housing.* Housing demand is derived from the characteristics of households that create or are correlated with *preferences* for different types of housing, and *the ability to pay* (the ability to exercise those preferences in a housing market by purchasing or renting housing; in other words, income or wealth).

One way to forecast housing demand is with detailed analysis of demographic and socioeconomic variables. If one could measure housing demand for each household, one might find that every household has a unique set of preferences for housing. But no city-wide housing analysis can expect to build from the preferences of individual households.[34] Most housing market analyses that get to this level of detail describe *categories* of households on the assumption that households in each category will share characteristics that will make their preferences similar.

The main demographic and socioeconomic variables that may affect housing choice include: age of householder, household composition (e.g., married couple with children or single-person household), size of household, ethnicity, race, household income, or accumulated wealth (e.g., real estate or stocks). The literature about housing markets identify the following household characteristics as those most strongly correlated with housing choice: age of the householder, size of the household, and income:[35]

- **Age of householder** is the age of the person identified (in the Census) as the head of household. Households make different housing choices at different stages of life. For example, a person may choose to live in an apartment when they are just out of high

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[32] The Residential TAC reviewed the information in this section during the August 5, 2014 meeting.

[33] See meeting packet for Residential TAC meeting #1 - http://bendoregon.gov/Modules/ShowDocument.aspx?documentid=17619.

[34] Not only could one not measure the preferences of all existing households (now and in the future); one could not know what specific households would be migrating to the region.

[35] The research in this section is based on numerous articles and sources of information about housing. The memorandum "Demographic Characteristics and Trends that will Affect Housing Demand in Bend for the 2008-2028 period" to the Residential Lands Technical Advisory Committee (July 23, 2014) presents an analysis of our research of the academic literature about the relationship between demographics and housing demand.

school or college but if they have children, they may choose to live in a single-family detached house.

- **Size of household** is the number of people living in the household. Household size is related to household composition, which describes the age and relationships of people living within the household. Younger and older people are more likely to live in single-person households and people in their middle years are more likely to live in multiple person households (often with children).

- **Income** is the income from all people in the household who have income. Income is probably the most important determinant of housing choice. Income is strongly related to the type of housing a household chooses (e.g., single-family detached, duplex, or a building with more than five units) and to household tenure (e.g., rent or own). A review of census data that analyzes housing types by income in most cities will show that as income increases, households are more likely to choose single-family detached housing types. Consistent with the relationship between income and housing type, higher income households are also more likely to own than rent.

Growing Population

Bend has a rapidly growing population. Population growth figures for Oregon, Deschutes County, and Bend, between 1990 and 2013, are shown in Figure 8.

Deschutes County's 2013 population was an estimated 162,525.

- Between 2000 and 2013, the county's population grew by 53%, or 61,475. Of this growth, net migration accounted for 53,163 in population growth, or 87% of the population growth between 2000 and 2013. In comparison, net migration accounted for 60% of Oregon's growth over the 13-year period.
- Natural increase accounted for 13% of the county's population growth between 2000 and 2013.
- Deschutes County's estimated population growth of 61,475 represents 12% of the state's population growth between 2000 and 2013.

Bend's population has grown significantly since 1990.

- Between 1990 and 2000, Bend's population grew from 20,469 to 52,029, an increase of 31,560 people. About 17,060 of this growth was the result of annexations to the city between 1990 and 1998. Actual population growth accounted for an increase of 14,500 people, representing a 71% increase over the city's 1990 population.
- The city's population grew by 26,251 over between 2000 and 2013. This growth occurred during a period where the City did not annex new housing with population. This new growth in population occurred through natural increase and positive net migration.
- Bend's population grew at an average annual rate of 6.3% over the 1990 to 2013 period, compared to the state average of 1.5%. Bend's average annual growth rate between 2000 and 2013 was 3.5% per year, compared to 1.1% statewide. This growth includes annexations that occurred over the 1990 to 1999 period.

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Figure 8. Population Growth, Oregon, Deschutes County, Bend, 1990 through 2013

	1990	2000	2013	1990 - 2013 Change		
				Change	% Change	Average Annual Growth Rate
Oregon	2,842,321	3,421,399	3,919,020	1,076,699	38%	1.5%
Deschutes County	74,958	115,367	162,525	87,567	117%	3.6%
Bend	20,469	52,029	78,280	57,811	282%	6.3%

Source: Population Research Center, Portland State University

Aging Population

In 2013, the median age in Bend was 36.6, compared to the median of 42.3 in Deschutes County and 39.1 across the State. Figure 9 shows that Bend had a larger share of population between age 20 and 39 than either the county or state averages.

Figure 9. Population by Age, Bend, Deschutes County, and Oregon, 2013
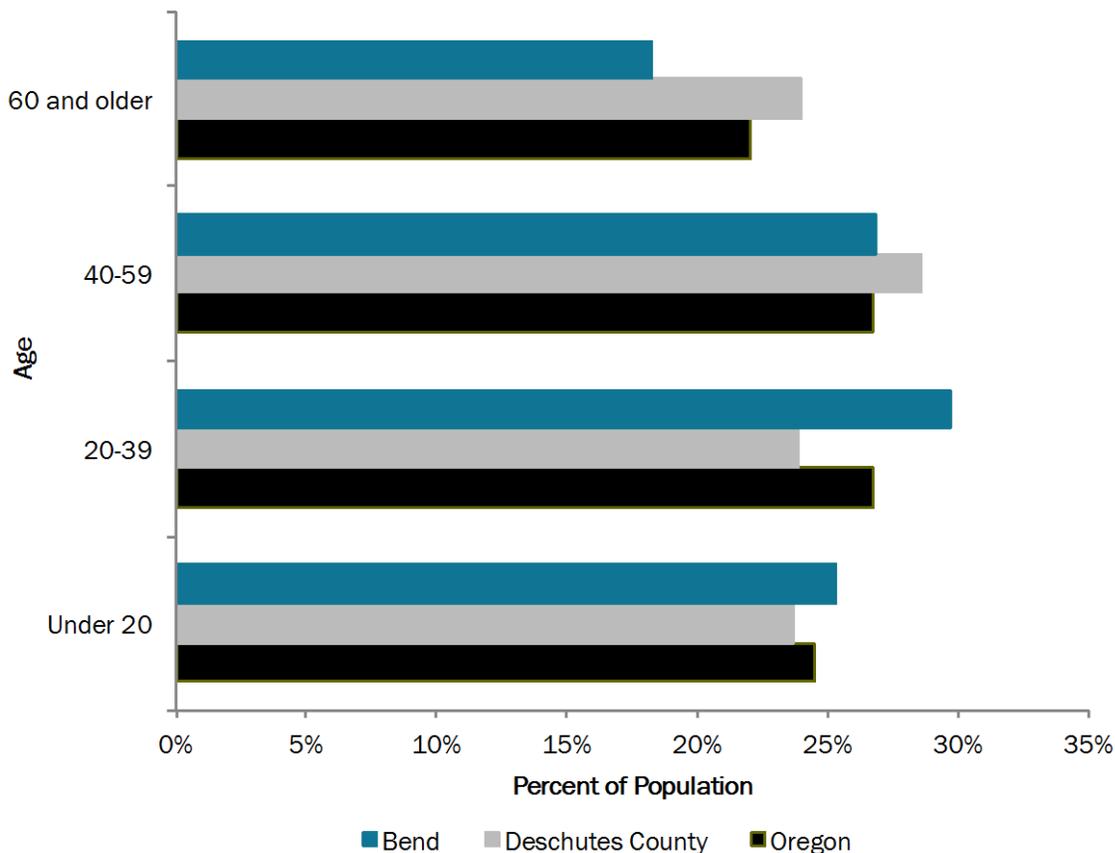
Source: 2013 American Community Survey 1-Year Estimates

Figure 10 shows the age change in Bend's population between 2000 and 2013. While all age groups grew over the 13-year period, people between the ages of 50 and 59 years added the largest number of people, followed by people aged 60 to 69 years. Together, people aged 50 to 69 accounted for growth of more than 10,000 people or one-third of Bend's growth. People 20 to 39 years old accounted for growth of about 8,000 people over the 13-year period.

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Figure 10. Age of Population, Bend, 2000 and 2013
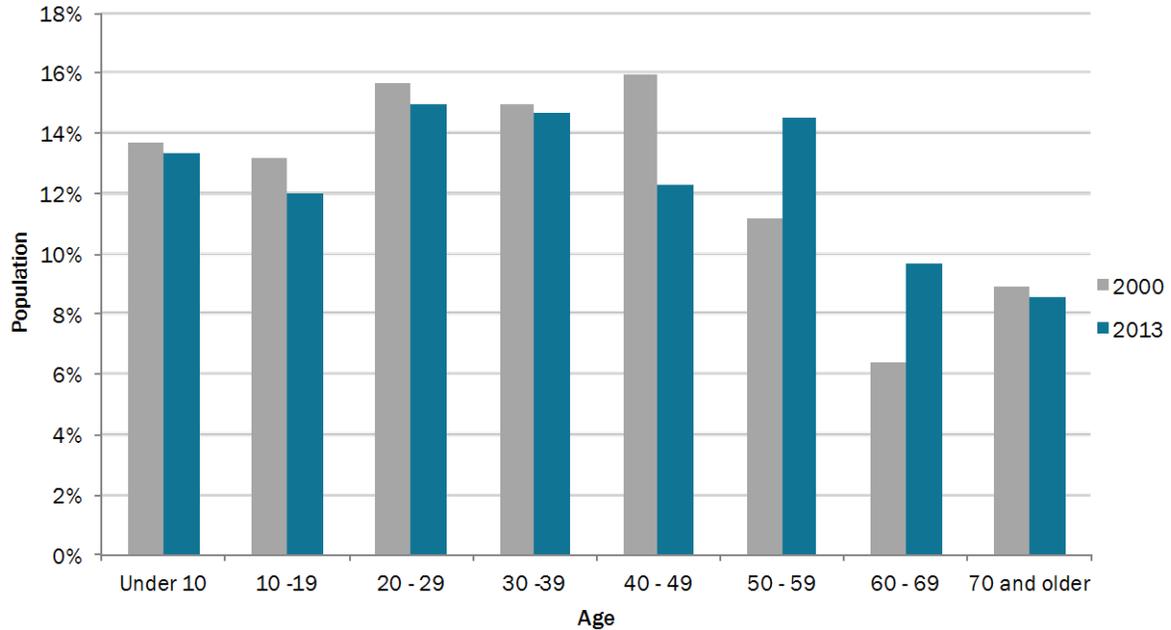
Source: 2000 Census SF3, 2013 American Community Survey 1-Year Estimates

Figure 11 shows a comparison of the current and 2035 projected population for Oregon and Deschutes County by age.[36]

- The entire population of Deschutes County is projected to increase by 37%, compared to a total population increase of 25% across the state.
- Oregon and Deschutes County are projected to see an increase in the share of the population over 60 years of age. 56% of the population growth in Deschutes County through 2035 is projected to come from this age group.
- The Deschutes County population between 20 and 59 years of age are projected to increase by roughly 15%, at a slower rate than across the state.
- While the age distribution of Bend's population is different from the County average (Figure 9), Bend accounts for nearly half of Deschutes County's population. The growth in people over 60 years old in Deschutes County (Figure 11) will be reflected in growth in the percentage of population over 60 years old in Bend.

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[36] See the Long-Term County Forecast "2013 Release" through the OEA website: http://www.oregon.gov/DAS/OEA/Pages/demographic.aspx

Figure 11. Forecast of Population by Age, Oregon and Deschutes County, 2015 and 2035
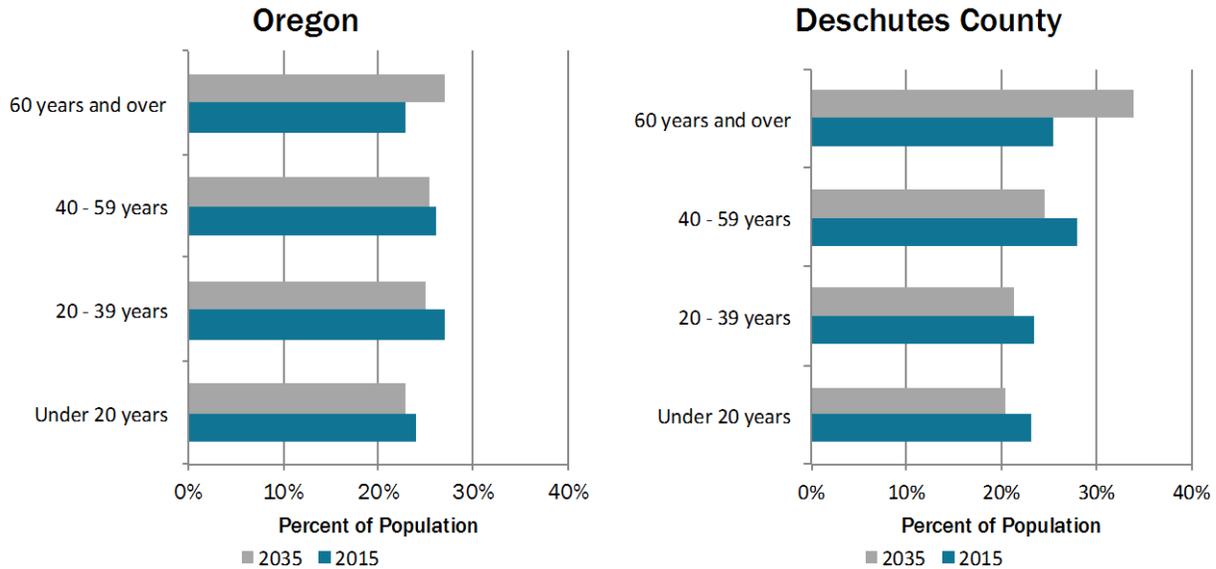
Source: Oregon Office of Economic Analysis.
See the Long-Term County Forecast "2013 Release" through the OEA website:
http://www.oregon.gov/DAS/OEA/Pages/demographic.aspx

Increased ethnic diversity

Figure 12 shows the percentage of the total population that is of Hispanic or Latino origin for Oregon, Deschutes County, and Bend, in 2000 and 2013. Between 2000 and 2013, Hispanic or Latino population increased from 5% of the population to 10% of the population, adding nearly 6,000 additional Hispanic or Latino residents. Bend has a greater percentage of Hispanic or Latino population than the county average, but a smaller percentage than the state average.

07038

Figure 12. Hispanic or Latino Population by Percentage, Oregon, Deschutes County, Bend, in 2000 and 2013
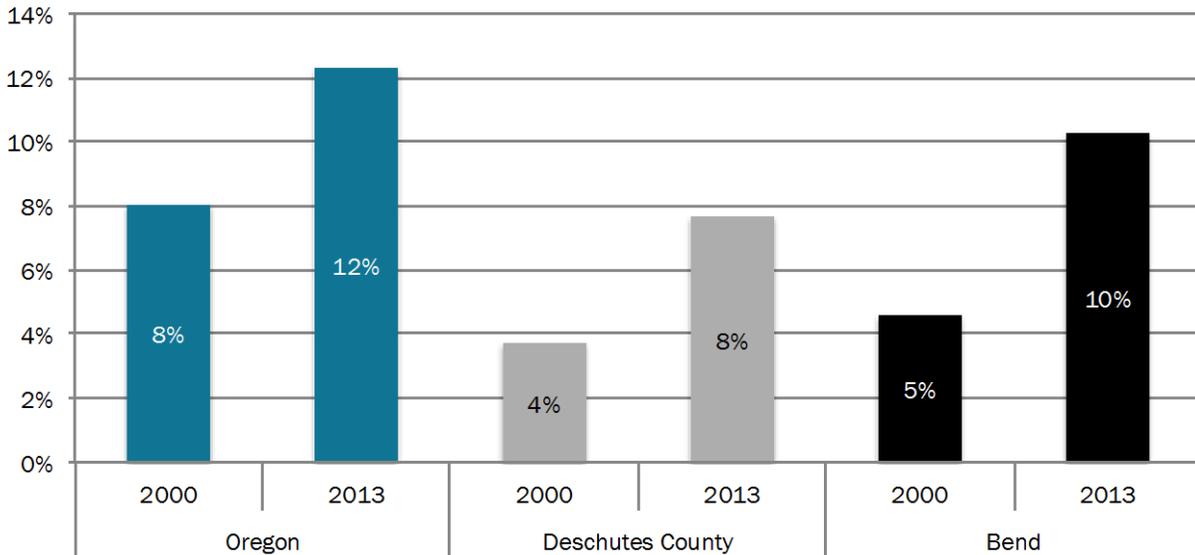
Source: U.S. Census 2000 SF1, American Community Survey 2013 1-year Estimates

Household Size and Composition

This section of the report considers household types (family or nonfamily) by size and how this information relates to household-level decisions to purchase or rent housing.

Household Size

Figure 13 shows change in household size in Bend between 1990, 2000, and 2013. The percentage of one-person households held stable at about 29% of households. The percent of two-person household increased from 36% to 39%. The percentage of households with three or more persons decreased slightly between 1990 and 2013. The trend towards an increase in single-person households between 2000 and 2013 is consistent with national and statewide trends.

Figure 13. Households by Household Size, Bend, 1990, 2000, and 2013
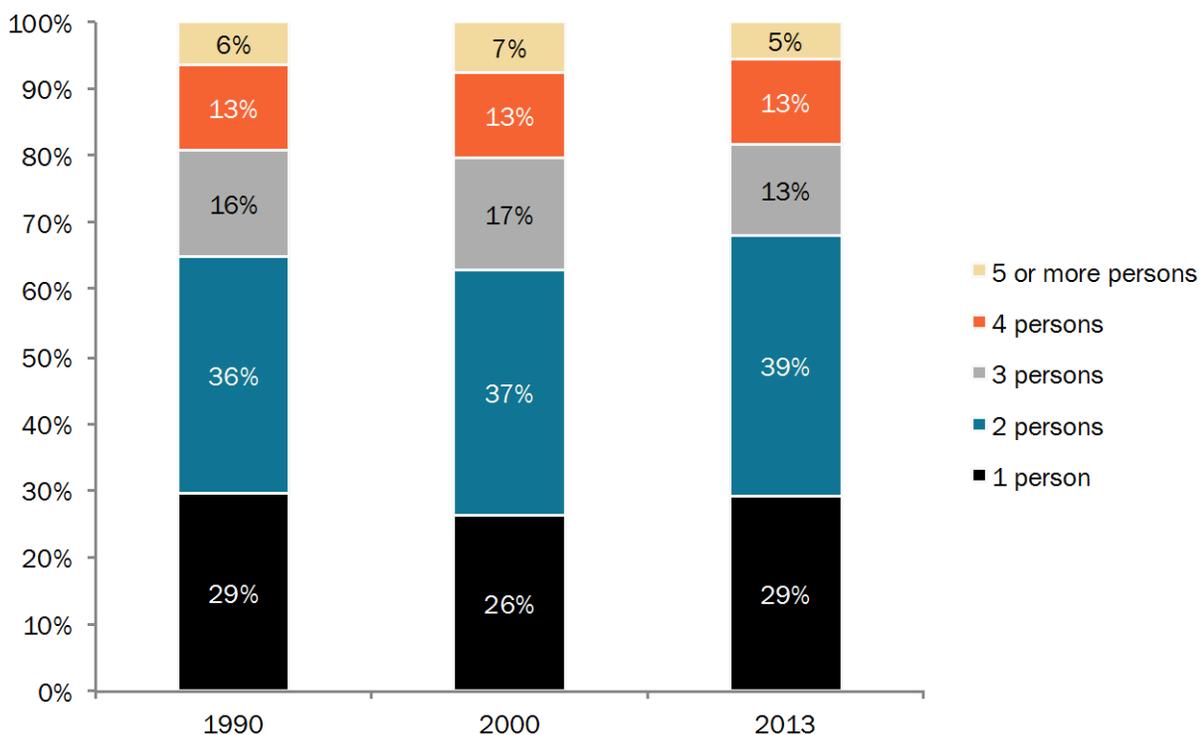
Source: 1990 and 2000 Census SF3, 2013 American Community Survey 1-Year Estimates

Figure 14 compares household size in Bend with the state and county averages. Bend has a slightly larger share of single-person and two person households than the state average. Bend has a smaller percentage of households with four or more people than the state average. Over the next 20 years, households with one or two persons per household are expected to represent the largest category of households by size.

07040

Figure 14. Households by Household Size, Oregon, Deschutes County, Bend, 2013
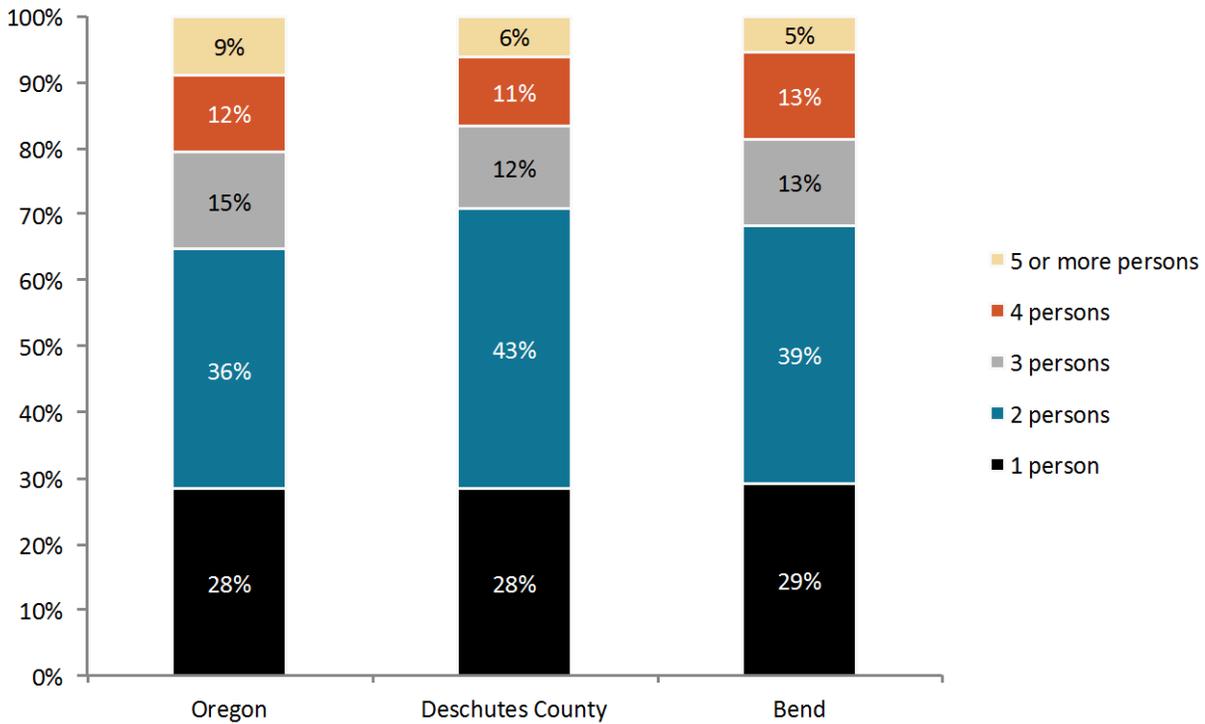
Source: 2013 American Community Survey 1-Year Estimates

Figure 15 shows Bend households by size, and the proportions that were owner-occupied and renter-occupied in 2000 and 2013.

- The share of households with one or two persons increased between 2000 and 2013 for both owner occupied and renter occupied households.

- Between 2000 and 2013, 1-person households saw the most growth (43%) among owner occupied households and 2-person and 4-person households saw the most growth (105% and 92%, respectively) among renter occupied households.

07041

Figure 15. Mix of Households by Tenure and Household Size, Bend, 2000 and 2013
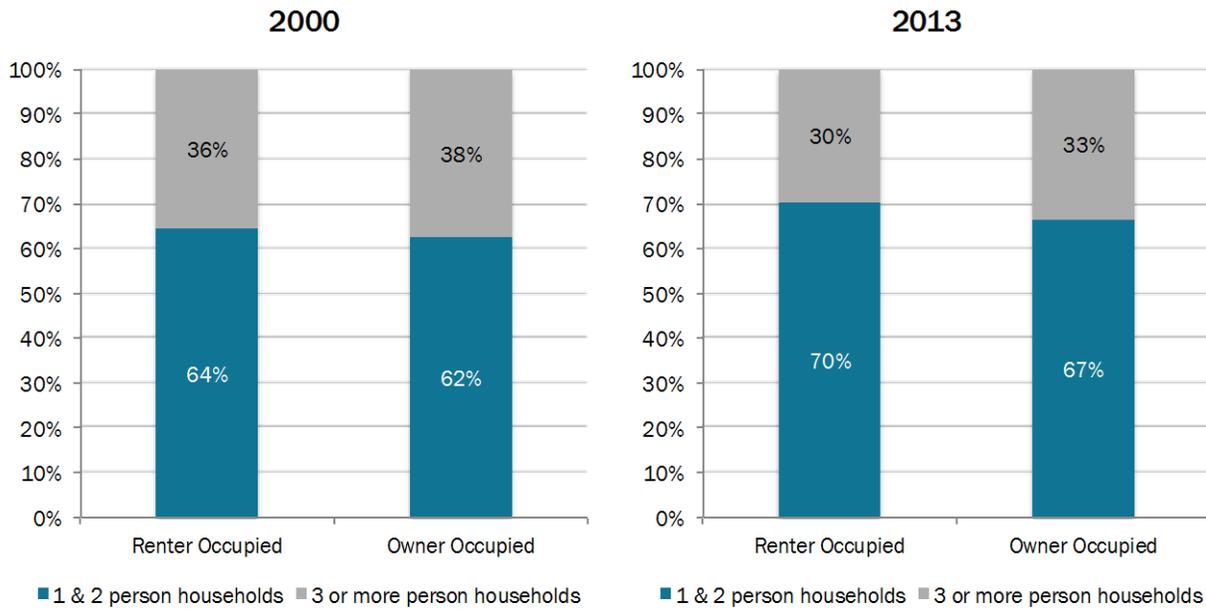
Source: 2000 Census SF3, 2013 American Community Survey 1-Year Estimates

Household Composition

Figure 16 shows household composition in Oregon, Deschutes County, and Bend in 2013.

- A larger share of Bend's housing composition is family households with children (30%) compared to that of Deschutes County (24%) and Oregon (27%).
- Bend also has a larger share of non-family households (e.g., unrelated people living in the same house) than compared to the county and state.

07042

Figure 16. Household Composition of Oregon, Deschutes County, and Bend, 2013
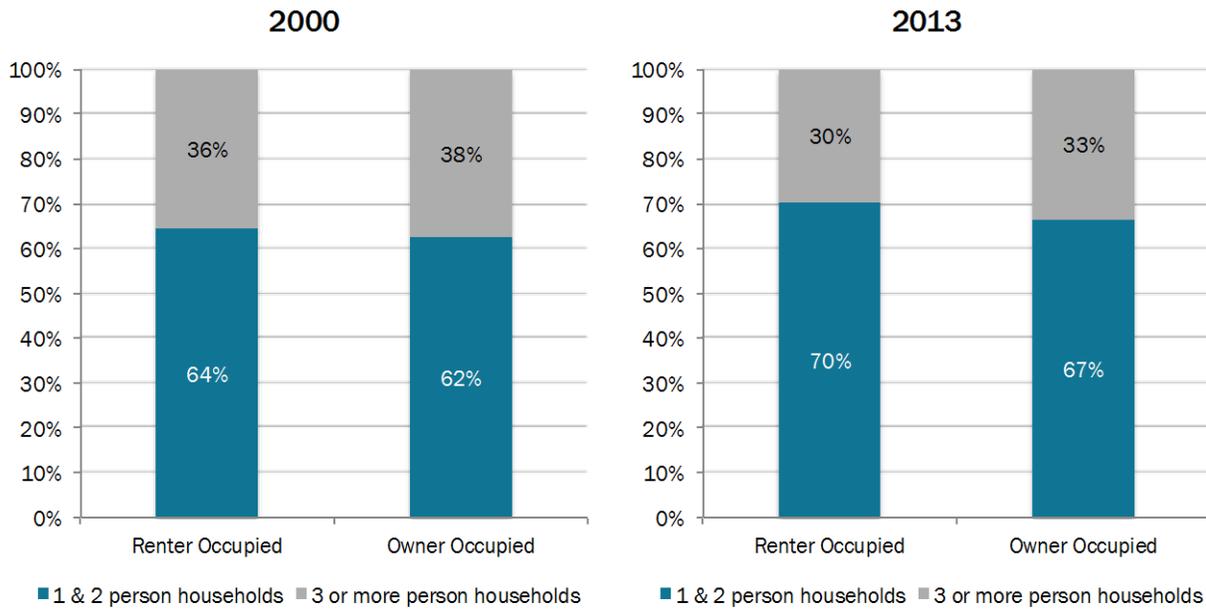
Source: American Community Survey 2013 1-year Estimates

Householder Age

Figure 17 shows the distribution of owner-occupied and renter-occupied housing by age groups in Bend in 2013. The majority of householders younger than 35 years old were renters. Homeownership increased with age. Two-thirds of householders aged 45 to 54 were homeowners. Homeownership rates typically remain stable until age 65 or older, when they begin to decline; however, in Bend, households 55 to 64 years had lower homeownership rates than people 65 years or older.

Figure 17. Households by Age of Householder and Tenure, Bend, 2011-2013
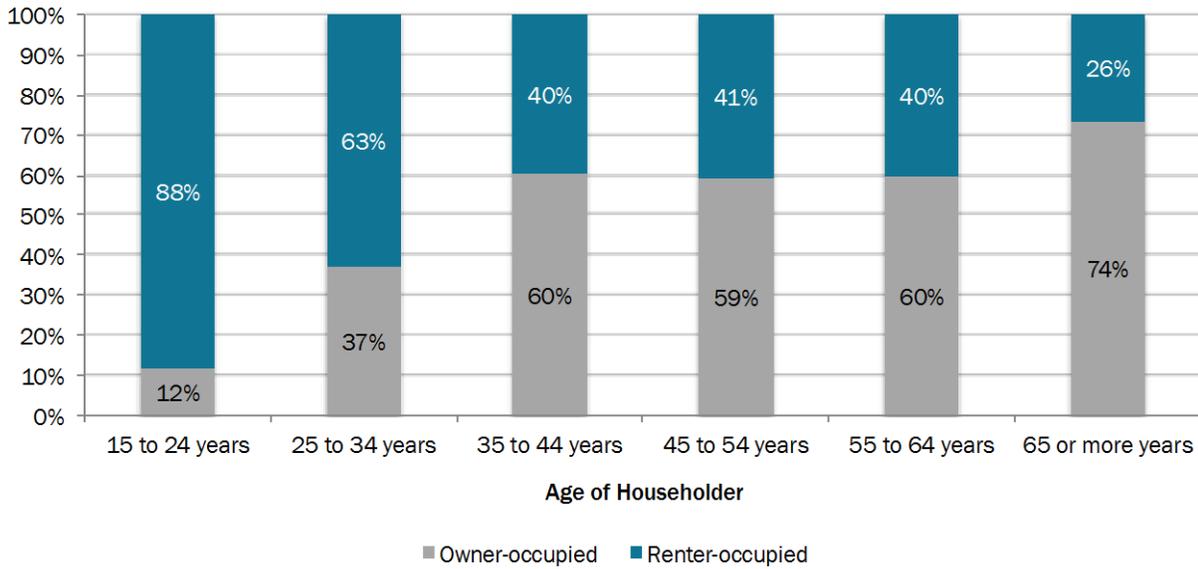
Source: 2013 American Community Survey 3-Year Estimates

Figure 18 shows that the percentage of single-person households increases with age. For householders under age 64, 25% or fewer households are single person households. By age 65, 53% of households are single-person households.

07044

Figure 18. Households by Age of Householder and Household Size, Bend, 2013
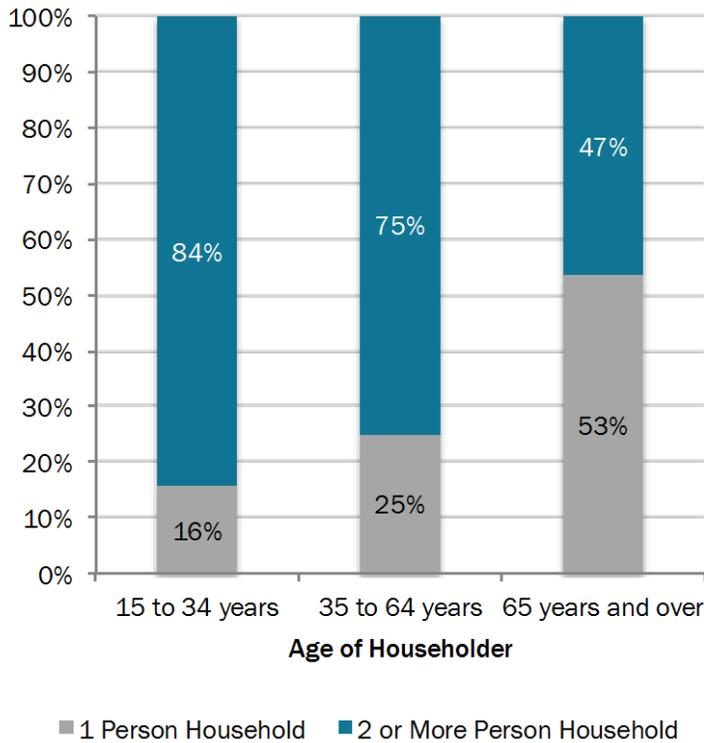
Source: 2013 American Community Survey 1-Year Estimates

Summary of demographic and socioeconomic factors effect on housing choice in Bend
The prior sections described key demographic and socioeconomic factors that affect housing choice in Bend based on historical data.

Over the next decades, the national demographic trends that will affect housing demand across the U.S., as well as Oregon and Bend are:

- **Aging of the baby boomers.** By 2030, the youngest baby boomers will be over 65 years old. By 2030, people 65 years and older are projected to account for about 20% of the U.S. population, up from about 12% of the population in 2000.

- **Growth in Millennials.** Millennials are a large group of people (i.e., Echo Boomers or Generation Y) born from the early 1980's to early 2000's, with the largest concentration born between 1982 and 1995. By 2030, Millennials will all be older than 35 years old, with the oldest Millennials over 50 years old. The Millennials will form households and enter their prime earnings years during the 20-year planning period.

- **Growth of Hispanic and Latino population.** One of the fastest growing groups in the U.S. will be the Hispanic and Latino population. By 2030, Hispanic and Latino population is projected to account for about 20% of the U.S. population, an increase from about 13% of the U.S. population in 2000. Growth in the Hispanic population will be the result of natural increase (more births than deaths) and immigration from other countries.

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Table 7 through Table 9 describe the changes in these demographic and socioeconomic trends and their potential effect on housing choice in Bend over the next 20 years. These tables discuss the characteristics of the householder, which is the person identified (by the household) as the head of household on the Census. The tables combine past trends (documented in the prior sections) with future demographic projections and information about housing preferences for these key demographic groups. Appendix A provides the background research that forms the basis for the conclusions in these tables.[37]

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[37] The data presented in Tables 7 through 9 were reviewed with the Residential TAC during their August 5, 2014 meeting. Some of the data has been updated since this meeting.

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Table 7. Baby boomers (Age in 2014: 48 to 67 years old; Age in 2028: 62 to 81 years old)

<table>
<tr>
<td colspan="2" rowspan="1">Demographic trends</td>
<td>Baby boomers are the fastest growing segment of Deschutes County's population.

People over 65 years are forecast to grow from 15% of Deschutes County's population in 2010 to 27% in 2035.[38]
Growth in people over 65 years old in Deschutes County will result in growth of more than 37,000 people in this age group in Deschutes County or 24% of population growth over the 2010 to 2035 period.[39]

Bend's population accounts for about half of the population in Deschutes County. As population over 65 grows in the County over time, this age group will grow in Bend as well.</td>
</tr>
<tr>
<td rowspan="3">Effect of trends on household choice</td>
<td>Age of household head</td>
<td>Bend's older householders are more likely to own their home.

Homeownership peaks for householders 65 years and older. Nearly 75% of householders 65 years and older in Bend are homeowners.

National studies about the housing preferences of older residents show that the majority express an interest in remaining in their home or in their community as long as possible, a trend that increases with age.[40]

Between about 65% and 80% of people over 65 would like to stay in their homes as long as possible.[41]
The Baby Boomers who want to move generally want to live in a typical community setting, with a mixture of people of different ages, and in a setting where recreational amenities are available.[42]
Of people over 65 who expect to move in the next five years, a smaller proportion of these households expect to live in a single-family home and to be homeowners, compared with households of all ages who expect to move in the next 5 years.[43]
Seniors who moved recently were much more likely to have moved into a smaller home, compared to households of all ages who moved recently.[44]
</td>
</tr>
<tr>
<td>Household size and composition</td>
<td>Household size decreases with age after age 65 in Bend.

More than 54% of households 65 years and older were single-person households in Bend.
Growth in households 65 years and older will result in growth in single-person households.
</td>
</tr>
<tr>
<td>Household income</td>
<td>Bend's household income peaks around age 45.

Household income decreases after age 65. About 65% of Bend's households over 65 had income of less than $50,000, compared with 49% of households 45 to 64.
</td>
</tr>
</table>

[38] Oregon Office of Economic Analysis, *Forecasts of Oregon's County Populations by Age and Sex, 2010 – 2050*, [Excel Workbook] (March 2013).

[39] Ibid.

[40] Ada-Helen Bayer, Ph.D. and Leon Harper, Fixing to Stay: A National Survey of Housing and Home Modification Issues (Washington, D.C.: AARP, 2000).
William H. Frey, Mapping the Growth of Older America: Seniors and Boomers in the Early 21st Century, (Conducted for the Metropolitan Policy Program at the Brookings Institution, May 2007).
Teresa A. Keenan, Home and Community Preferences of the 45+ Population, (Conducted for AARP, November 2010).

[41] Ada-Helen Bayer, Ph.D. and Leon Harper, *Fixing to Stay: A National Survey of Housing and Home Modification Issues* (Washington, D.C.: AARP, 2000).
Andrew Kochera, Audrey Straight, and Thomas Guterbock, *Beyond 50: A Report to the Nation on Livable Communities: Creating Environments for Successful Aging*, (Washington, D.C.: AARP, 2005).
Stephen Engblom, Greg Ault, and Lisa Fisher, *Boomer Residential Preferences*, (Conducted for the Urban Land Institution, Multi-family Trends, May/June 2007).
Teresa A. Keenan, *Home and Community Preferences of the 45+ Population*, (Conducted for AARP, November 2010).

[42] Stephen Engblom, Greg Ault, and Lisa Fisher, *Boomer Residential Preferences*, (Conducted for the Urban Land Institution, Multi-family Trends, May/June 2007).

[43] Teresa A. Keenan, *Home and Community Preferences of the 45+ Population*, (Conducted for AARP, November 2010).

[44] Ibid.

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		• Households with householders over 65 years have a lower than average household income, at about 70% of Bend's median household income, compared with ages 45 to 64 years with 107% of Bend's median household income.
		• Lower income does not necessarily result in greater problems with housing affordability or lower homeownership rates for people over 65 years because:
		   • Some householders over 65 have paid off their mortgage. For households who have paid off their mortgage, lower income does not necessarily result in lower disposable income or affect their ability to continue to own their home.
		   • Older households may have more accumulated wealth, which could include assets like the value of their house or investments.

	Potential effect on housing demand	The major impact of the aging of the baby boomers on demand for new housing will be through demand for housing types specific to seniors, such as assisted living facilities. Baby boomers will make a range of housing choices in Bend: • Many will choose to remain in their houses as long as they are able. • Those that do move are more likely to move into smaller homes, attached homes, or apartments and are more likely to rent than other households headed by other generations. • Some may downsize to smaller single-family homes (detached and attached) or multi-family units. These will be a mixture of owner and renter units. Nationally, of the 20% Baby Boomers that expect to move, 11% plan to move to an apartment, 16% to attached housing, 65% to single family housing, and 6% to a mobile home.[45] • Baby Boomers who move are likely to choose housing in areas with nearby shopping and other services, such as neighborhoods with integrated services or in downtown Bend. • As their health fails, some will choose to move to group housing, such as assisted living facilities or nursing homes.

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[45] Ibid.

Table 8. Millennials (Age in 2014: 17 to 30 years old; Age in 2028: 31 to 44 years old)

Demographic trends		Millennials are one of the fastest growing segments of Deschutes County's population • By 2035, the State projects that there will be nearly 67,000 people 25 to 49 years in Deschutes County, up from more than 52,000 people in 2010.[46] • There will be an increase of about 14,000 people between the ages of 25 to 49 years. This group will account for 20% of total population growth over the 2010 to 2035 period.[47] Bend's population accounts for about half of the population in Deschutes County. As Millennials grow in the County, this age group will grow in Bend as well.
Effect of trends on household choice	**Age of household head**	Housing preferences shift for householders as they get older. • Under 25 years old: 88% were renters in Bend • 25 to 34 years old: 76% were renters in Bend • 35 to 44 years old: 44% were renters in Bend
	Household size and composition	Household size increases until householder age 35 in Bend. • 84% of householders in Bend between ages 15-34 years live in households with two or more persons. • About 16% of Bend's householders between 15 to 34 years live in single-person households, compared with 25% of householders 35 to 64 years and 53% of householders over 65 years old.
	Household income	Younger households have lower income and homeownership rates on average. • Younger households generally had less accumulated wealth, such as housing equity. • About 33% of households under 25 years had an income of less than $25,000 in Bend. About 40% of households between 25 and 44 had income of less than $50,000. • Households between 25 and 44 years had higher than average income, at about 129% of Bend's median household income. Higher incomes in this age group suggest greater opportunities for homeownership among people in this age group. • Higher incomes generally correlate with homeownership. The median income for homeowners in Bend was $67,755 (in 2013), compared with $33,121 for renters.
	Potential effect on housing demand	Growth in Millennials will result in increased demand for all housing types in Bend. Recent research hypothesizes that Millennials may make different housing choices than their parents as a result of the on-going recession and housing crisis. Some studies suggest that Millennials will prefer to rent and will prefer to live in multi-family housing, especially in large cities. Other studies suggest that the majority of Millennials' housing preference is to own a single-family home. Recent surveys suggest that as Millennials age and form families, they will increasingly prefer to live in single-family homes in suburban locations or in walkable communities with alternatives to driving. Based on review of recent research it seems unlikely that the majority of Millennials will make fundamentally different housing choices than previous generations as they age and have families, but their housing choices may be constrained by what they can afford due to student loan debt, and prolonged entry into higher paying positions due to the Baby Boomers putting off retirement. These trends are consistent with national housing trends, such as decreased homeownership rates and increases in housing affordability issues. • Millennials are more interested in living within a city (including in a downtown area) or a suburb closer to a city than prior generations.[48] • Millennials are more willing than other age groups to choose to live in a community with a wider range of housing and denser housing, where it is easier to talk to work or nearby urban amenities, and where transportation by automobile is less common.[49]

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[46] Oregon Office of Economic Analysis, Forecasts of Oregon's County Populations and Components of Change, 2010 – 2050, [Excel Workbook] (March 2013).

[47] Ibid.

[48] American in 2013 Focus on Housing and Community, Urban Land Institute
Belden Russonello & Stewart Research and Communications, 2004 National Community Preference Survey,(Conducted for Smart Growth America and National Association of Realtors, 2004).
Eugenia L. Birch, Who Lives Downtown, Living Cities Census Series(Washington, D.C.: The Brookings Institute, November 2005).

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		• Millennials are likely to choose to rent and are more likely to rent a multi-family unit than older households. This choice may be made from preference but is likely to be necessitated by lower income.
		• Millennials who prefer single-family units may prefer, or only be able to afford, smaller single-family units.[50]
		• As they establish their careers, their incomes increase, and they form families, it seems likely that a large share of Millennials in Bend will choose to live in an owner-occupied single family house. Some Millennials may prefer to rent or own a multi-family unit in or near Bend's downtown.
		• Bend is a suburban market, with urban amenities that may appeal to Millennials who prefer to live in a smaller city but in an area with a wide range of access to outdoor recreational activities. Bend itself does not have distant suburbs but nearby smaller cities have filled the role of distant suburbs for Bend. Millennials may choose to live in Bend's suburban neighborhoods, rather than in nearby smaller cities, if housing in Bend is affordable.

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[49] *American in 2013 Focus on Housing and Community*, Urban Land Institute
Belden Russonello & Stewart Research and Communications, *2004 National Community Preference Survey*,(Conducted for Smart Growth America and National Association of Realtors, 2004).

[50] Joint Center For Housing Studies of Harvard University, *State of the Nation's Housing,* (Cambridge, MA: President and Fellows of Harvard College, 2013).

07050

Table 9. Growth of immigrants and change in ethnic composition[51]

<table>
<tr>
<td rowspan="5">Effect of trends on household choice</td>
<td colspan="2">Demographic trends</td>
<td>Bend is becoming more ethnically diverse, with growth in the Hispanic and Latino population (both from immigration and from current residents in Bend).

• Bend became more ethnically diverse, with Hispanic and Latino population growing by almost 250% between 2000 and 2013, an addition of 5,963 Hispanic or Latino residents.
• Nationally, growth in Hispanics is driving population growth, both from immigration and from natural increase of Hispanics living in the U.S.[52]</td>
</tr>
</table>

	Age of household head	The Hispanic population in Bend has a different age structure than Bend's overall population. • In 2013, median age for Hispanics (23.0 years) was lower with the median age for the total population (36.6 years) in Bend. Nationally, growth in Hispanic population between 2013 and 2023 will help off-set decreases in white householders between the ages of 30 and 49.[53]
	Household size and composition	Nationally, Hispanic households with children grew at a faster rate than other minority populations between 1995 and 2005, resulting in increased demand for housing to accommodate families.[54] • In 1999, 51% of Hispanic households had children, compared with 33% of all households.[55] Hispanic households in Bend are more likely to be larger and less likely to be homeowners. • In 2010, the average size of Hispanic households in Bend was 3.4 persons per household, compared with an average of 2.4 persons per household for all households in Bend.[56] • Hispanic households in Bend live in single-family houses (detached and attached) less often than non-Hispanic households. About one-third of Hispanic households live in single-family dwellings, as compared to about 75% of non-Hispanic households. • About one-third of Hispanic households are homeowners, compared with an ownership rate of almost 60% for all households in Bend. In 2013, Oregon's Hispanic households were more likely to be younger homeowners. Nearly three-quarters of Hispanic homeowners in Oregon were younger than 45 years old. In comparison, about one-third of non-Hispanic homeowners were younger than 45 years old.[57].
	Household income	Hispanic households in Bend have lower than average income. • Hispanic households in Bend have lower than average income, with household income at 78% of Bend's median ($37,586) and family income at 81% of Bend's median ($39,052).[58] Immigrants generally have lower income than U.S.-born workers but income increases for immigrants the longer they have been in the U.S. and through successive generations. • First generation immigrants may take several decades to earn sufficient incomes to become homeowners[59] and to have income comparable to a person born in the U.S., of a similar age and education. This is true of Hispanic immigrants.[60]

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[51] This table contains information from the U.S. Census 2010 and 2011 American Community Survey. Information at the national (U.S.) level about Hispanics in this section is from the Pew Research Center report *Second-Generation Americans: A Portrait of the Adult Children of Immigrants.*

[52] Ibid.

[53] Ibid.

[54] Ibid.

[55] Martha F. Riche, *The Implications of Changing U.S. Demographics for Housing Choice and Location in Cities*, (Washington, D.C.: The Brookings Institution Center on Urban and Metropolitan Policy, March 2001).

[56] U.S. Census, 2000 Decennial Census.

[57] U.S. Census, 2013 American Community Survey

[58] U.S. Census, 2013 American Community Survey, 3-year estimates

[59] James P. Allen, How Successful Are Recent Immigrants to the United States and Their Children? Presidential Address delivered to the Association of Pacific Coast Geographers, 68th annual meeting, Phoenix, Arizona, October 22, 2005 (Los Angeles: The Association of Pacific Coast Geographers, 2006)

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		• Income generally increases for second-generation immigrants, who have higher educational attainment.[61] This is true of recent Hispanic immigrants.[62] • In 2012, the national median household income for first generation Hispanic households was $34,600, compared to $48,400 for second-generation Hispanic households, compared with the U.S. average of $58,200.[63] Hispanic households suffered steeper drops in household wealth than non-Hispanic white households during the recession, which may affect their ability to own homes, although the desire for homeownership remains strong.[64]
	Potential effect on housing demand	Growth in Hispanic and Latino households may result in increased demand for multi-family and single-family housing in Bend. Growth in Hispanic and Latino households will increase need for affordable housing for renters and homeowners such as: single-family dwellings (both smaller and larger sized dwellings), duplexes, larger townhomes, garden apartments, and apartments. Ownership opportunities for Hispanic and Latino households will focus on moderate-cost ownership opportunities, such as single-family dwellings on a small lot or in a more suburban location, duplexes, and townhomes. • Affordability is likely to be a more common problem for Hispanic and Latino households, especially recent immigrants, because they have lower income on average. • Homeownership increases the longer immigrants stay in the U.S. Longer-term first generation immigrants and second-generation immigrants may become home owners, depending on their ability to afford owning a home.[65] • Hispanic population with lower income is more likely to choose lower-cost housing, such as multi-family housing because that is what they can afford. • Hispanics are more likely to rent but when they are homeowners, they are more likely to live in a more urban area, compared with white households.[66] • Growth in Hispanics will increase demand for smaller "starter homes" and entry-level apartments.[67]

[60] Pew Research Center report Second-Generation Americans: A Portrait of the Adult Children of Immigrants, 2013.

[61] Allen, James P. "How Successful Are Recent Immigrants to the United States and Their Children?" Presidential Address delivered to the Association of Pacific Coast Geographers, 68th annual meeting, Phoenix, Arizona, October 22, 2005.

[62] Pew Research Center report Second-Generation Americans: A Portrait of the Adult Children of Immigrants, 2013.

[63] Pew Research Center report Second-Generation Americans: A Portrait of the Adult Children of Immigrants, 2013.

[64] Joint Center for Housing Studies of Harvard University, *The State of the Nation's Housing*, 2013.

[65] Gregory Rodriguez, *Immigrants Today: Where they Come From, Where They Live in the US*, Emergences, Volume 9, Number 2 (Washington, D.C.: Taylor & Francis Ltd 1999).

[66] Martha F. Riche, *The Implications of Changing U.S. Demographics for Housing Choice and Location in Cities*, (Washington, D.C.: The Brookings Institution Center on Urban and Metropolitan Policy, March 2001).

[67] Joint Center For Housing Studies of Harvard University, *State of the Nation's Housing,* (Cambridge, MA: President and Fellows of Harvard College, 2007).

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Summary of key findings about how demographic trends may affect housing choice

Identifying future housing needs based on expected demographic changes requires making qualitative assessments of the future housing market. Demographic changes are likely to affect housing in Bend's housing market in the following ways over the next 20 years. The future housing mix will look different than the recent past. Based on the future demographic trends, the most pressing need is to increase the range (both in size and in pricing) of housing products in walkable neighborhoods.

- **Recession may have delayed some effects of demographic shifts.** The impacts of major demographics shifts are being delayed due to the financial effects of the recession, however, substantial housing demand shifts are underway that will change land use patterns. Baby Boomers are working longer and may not be moving because of a loss of home equity. Millennials have taken on college debt, are having a hard time getting a foothold in the workforce, and are therefore delaying household formation. The extended effects of the recession will mean that more households are renting for an extended period of time before being able to make a home purchase, or will only be financially capable of purchasing a smaller, less-expensive home. In summary, this delay means more near-term demand for rental housing or smaller less-expensive ownership housing.

- **Continued but slower demand for large-lot single-family housing.** In Bend, demand for large-lot single-family housing is likely to take the form of three or four bedroom houses on a lot of about 8,000 to 10,000 square feet. Generation X (the generation born after the Baby Boomers and before the Millennials), is currently in its prime family raising years, and the demographic group most likely to need larger single family homes. Generation X is much smaller than either the Baby Boomer or Echo Boomer generations. As the Baby Boomers move out of their existing single-family homes, there will be fewer households to take them over in the short-term. In recent years, Bend has been attracting retirees who are purchasing (and, in some cases, renting) available single-family dwellings.

  In the future, growth of Millennials and shrinking of the Baby Boomer generation may slow demand for new large-lot single-family housing. The Echo Boomer's preferences are generally for more walkable communities and they are willing to accept smaller homes in closer proximity to amenities. In addition, Millennials have lower income and higher debt.

  However, much of Bend's growth results from in-migration of people from outside of Central Oregon, many of whom are attracted to Bend's access to outdoor amenities, open space, and rural quality of life that Bend offers. Interviews with Bend's development community noted that demand for single-family housing that offers ample parking and storage for outdoor equipment is strong.

  All of these factors contribute to continued demand for large-lot single-family detached

housing but suggest that demand for this type of housing is likely to slow between the 2008 to 2028 period. Demand for this type of housing is likely to be driven by migration of people to Bend with wealth, as well as increase in income overtime from people living in Bend, especially households with growing families.

- **Demand will increase for a wider range of housing types.** Most of the evidence suggests that the bulk of the change will be in the direction of smaller average house and lot sizes for single-family housing. An aging population, increase in single-person households, increasing housing costs, and other variables are factors that support the conclusion that the future housing supply will include smaller and less expensive units and a broader array of housing choices. A substantial portion of Bend's residents will live in attached housing, such as townhouses, cottage housing, duplexes, garden apartments, or urban apartments. While most households may prefer to own their home, a growing share of households will be renters, either from choice (e.g., Baby Boomers who prefer to rent smaller units) or by economic necessity. Demand for these units will be particularly high in close-in areas near Bend's commercial and recreational amenities.

  - **Demand for a wider range of housing types by retirees**. Older households tend to move less frequently than younger households, and a large majority would like to age in place—a desire that grows stronger with age. Being near family, friends, and social organizations in walkable neighborhoods also becomes increasingly important with age. Of those that have moved recently, a third of Baby Boomers and half of the generation older than Baby Boomers have moved to smaller housing units. Those Baby Boomers who do move may be more likely than they were earlier in their lives to choose smaller homes (both smaller lots and smaller dwellings) and homes in locations with more amenities located near friends and family. These choices apply to both older households already living in Bend who choose to move and to older households who move to Bend from other communities. Interviews with members of Bend's development community indicated that small lot, cluster, or cottage housing might be appropriate housing types to meet this need.

  - **Housing for families will be in demand.** Millennials and Hispanic households are poised to account for the largest percentages of growth in Bend over the next 20 years. Millennials will be entering the phase of life when they form families and have children. In addition, Hispanic households have larger than average household size because they live in multi-generational households and have a larger number of children on average. Growth in households with families will drive need for housing that is both affordable and has sufficient space for a family.

  - **Housing affordability will continue to be an issue.** More than one-third of Bend's households were cost burdened in 2013.[68] This shows that a substantial proportion of Bend's households cannot afford housing in Bend. Interviews with

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[68] A household is considered "cost-burdened" if they pay 30% or more of their gross household income on housing costs. Bend's rate of cost burden was comparable to the State average in 2013.

members of Bend's development community suggest a shortage of homes priced for first-time homebuyers. Many workers in Bend live in nearby communities because affordable housing is in short supply in Bend, and that the demand for small-lot housing with nearby amenities is increasing. The interviewees also indicate that, while there is demand for urban housing products (particularly rental apartments), the wages in Bend's service and tourism economy may not allow workers to afford rents sufficient to pay for units in newly-constructed buildings, which may inhibit further development of these types of housing. For two of the fastest growing demographics in Bend, the Millennials and Hispanic and Latino population, affordability is more likely to be a barrier to homeownership or higher-cost rental housing.

- **Location of housing will be increasingly important.** The location of housing is becoming increasingly important, with increased demand for housing in walkable neighborhoods near retail and other amenities. Where they can afford it, the Millennials generally prefer housing in walkable areas with retail and other amenities nearby, rather than housing in more suburban areas or in outlying cities. Some Baby Boomers who are downsizing are also choosing to live in similar walkable areas.

- **Design of housing and neighborhoods is important.** Well-designed multi-family and compact single-family located in a desirable neighborhood can provide opportunities for a wider range of housing options. Consumers are more likely to make the tradeoff of a smaller lot and home size when neighborhood parks, schools, and retail amenities are within walking distance. Therefore, there will be steady demand for multi-family and small-lot or attached single family housing in close-in locations proximate to Bend's downtown amenities and jobs.

Step 4 – Determine the types of housing that are likely to be affordable to the projected households based on household income

This section summarizes regional and local income, and housing cost trends. Income is a key determinant in housing choice and a household's ability to afford housing. A review of historical income and housing price trends provides insight into the local and regional housing markets. This section presents information about changes in income, housing costs, and housing affordability, including:

- Identifying the types of housing that are likely to be affordable to the projected population based on household income.

- Organizing data gathered on household incomes by income range categories (e.g., high, medium, and low) and calculating the percent of total households that fall into each category.

- Considering local housing prices for the same timeframe as the income data, identifying the structure types financially attainable by each income.[69]

Income

As of 2013, median household income in Bend was about $48,000, compared to $46,800 in Deschutes County and $50,250 for Oregon. Between 1999 and 2013, income in Bend decreased by 16% in inflation adjusted dollars, consistent with state and county trends.

Table 10. Median Household Income (2013 dollars), Oregon, Deschutes County, Bend, 1999 and 2013, Inflation-adjusted

	1999	2013	Change, 1999 to 2013	% Change, 1999 to 2013
Oregon	$57,282	$50,251	-$7,031	-12.3%
Deschutes County	$58,230	$46,791	-$11,439	-19.6%
Bend	$57,200	$48,014	-$9,186	-16.1%

Source: 2000 Census and American Community Survey 2013 1-year Estimates

Figure 19 summarizes data from the 2000 Census and 2013 ACS for household income in Bend.

- Note that, by 2000, 62% of Bend's households had household incomes less than $50,000. A total of 31% of households had incomes between $50,000 and $99,999. The remaining 9% of households had incomes of $100,000 or more. The median household income in 2000 was $40,857.
- In 2013, the median household income had increased to $48,014, representing an 18% increase over 2000 levels.

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[69] Please note that the 1997 guidebook directs the reader to consider structure types and tenure, For the purpose of this analysis, LCDC concluded that the city is not required to consider tenure in this HNA because the City does not regulate housing by tenure, <u>See</u> LCDC's Order pages 26-33.

Figure 19. Share of Households by Household Income (in nominal dollars), Bend, 2000 and 2013
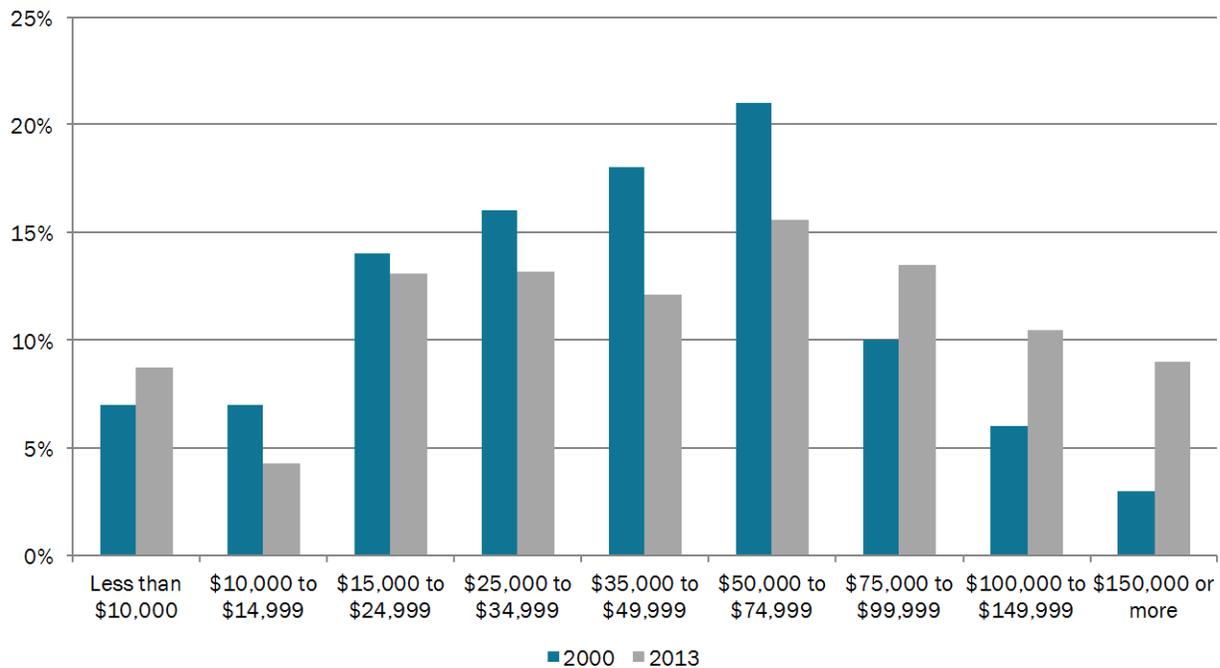
Source: 2000 Census SF3, 2013 ACS 1-Year Estimates
Note: Household income is shown in 1999 dollars for 2000 Census data and in 2013 dollars for 2013 Census data.

Figure 20 divides Bend's income data into one of four categories of Median Family Income (MFI): lower, lower middle, upper middle, and higher. These categories correspond to households that make less than 50%, 50% to 80%, 80% to 120%, and greater than 120% of the 2013 Deschutes County median family income ($59,700).[70] The purpose for this organization of the data is to better estimate the types of housing that will be affordable to each group based on household income.

- Households in the "lower" category are those that have household incomes of less than $29,850 (50% of MFI); these households represent 34% of all households in 2013. These households are generally considered "low-income" and may be eligible for government-subsidized housing. The types of housing that these households can afford are generally rental housing, such as older apartments, duplexes, or manufactured housing in parks (which could be either owner- or renter-occupied).

- Households in the "lower middle" category are those that have household incomes between $29,850 and $47,760 (50% to 80% of MFI); these households represent 17% of all households in 2013. These households are in the lower-earnings category of "workforce housing." While they can generally afford market-rate rents, they are more likely to be renters than homeowners. The types of housing households in this category can generally afford include smaller single-family detached houses, manufactured homes on lots or in parks, townhouses, duplexes, and apartments.

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[70] HUD publishes Median Family Income by county each year. http://www.huduser.org/portal/datasets/il/il13/index.html

- Households in the "upper middle" category are those that have household incomes between $47,760 and $71,640 (80% to 120% of MFI); these households represent 16% of all households in 2013. These households are in the higher-earnings category of "workforce housing." These households are a mixture of renters and homeowners. The types of housing households in this category can generally afford include single-family detached houses, manufactured homes on lots or in parks, townhouses, duplexes, and apartments.

- Households in the "higher" category have household incomes of $71,640 or more (120% or more of MFI); these households represent 33% of all households in 2013. These households can afford most types of housing, with the majority of these households living in owner-occupied single-family detached housing.

Figure 20. Distribution of Households by Income Level, Bend, 2013
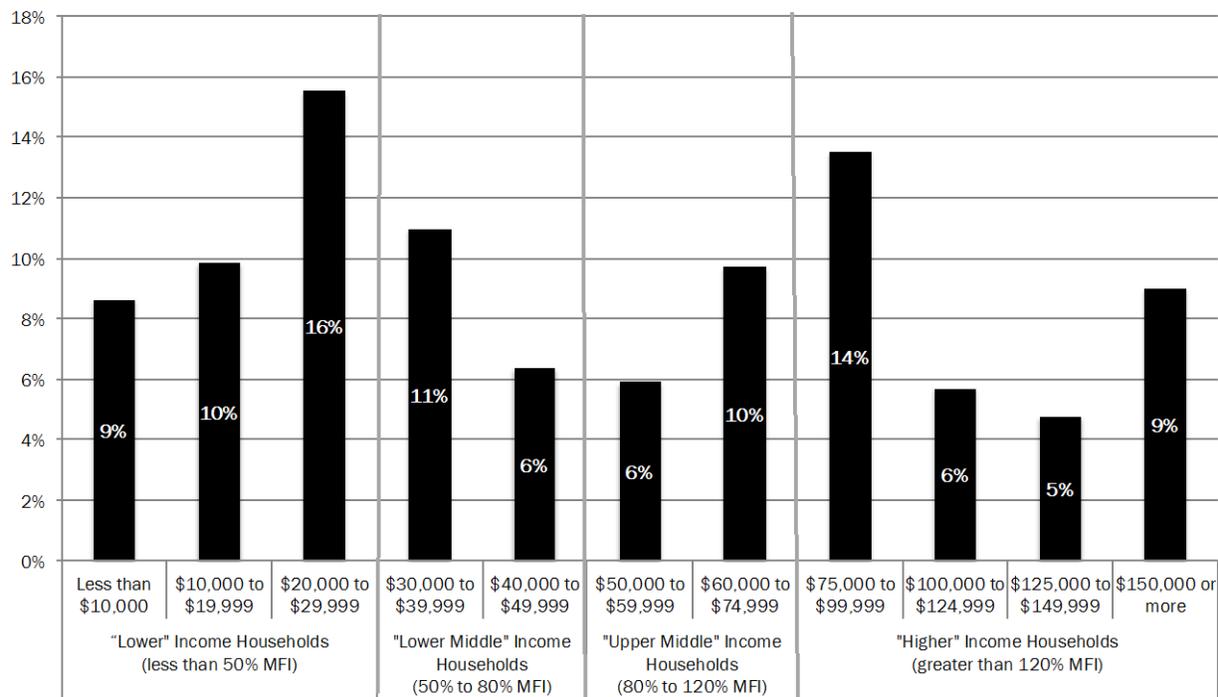
Source: 2013 American Community Survey 1-Year Estimates

Figure 21 presents data on age of householder by household income. These two variables are valuable indicators for identifying the housing choices that households make at different points in life, based on what they can afford.

- 33% of households with a householder under 25 years of age had household incomes under $25,000; 56% of these households had incomes between $25,000 and $49,999.

- 69% of households with a householder between 25 and 44 years of age had incomes between $50,000 and $100,000 or more.

- 55% of households with a householder between 45 and 64 years of age had incomes between $50,000 and $100,000 or more.

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- 36% of households with a householder that was 65 years of age and over had incomes less than $25,000.

Figure 21. Distribution of Households by Household Income and Age of Householder, Bend, 2013
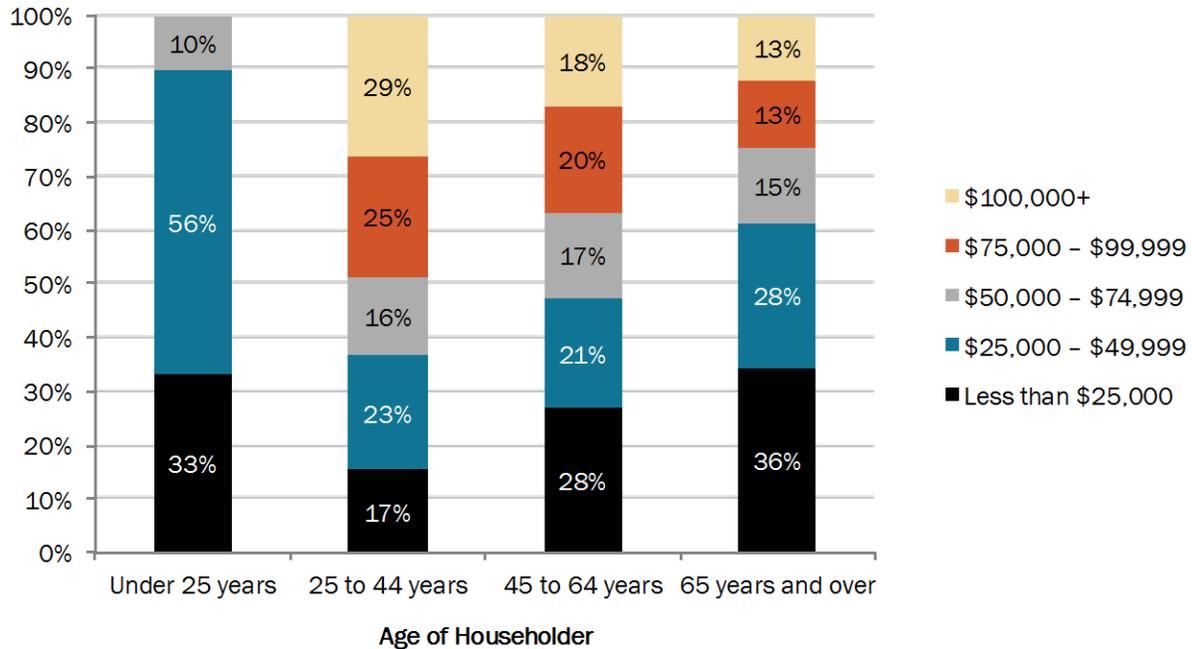
Source: 2013 American Community Survey 1-Year Estimates

Figure 22 shows this same information for Hispanic households in 2009 through 2013.

- 45% of households with a householder under 25 and 41% of households with a householder 65 years of age or older had incomes of less than $25,000.
- Households with householders between the age of 45 and 65 had the greatest share of incomes over $75,000 (61%).

Figure 22. Distribution of Hispanic Households by Household Income and Age of Householder, Bend, 2009-2013
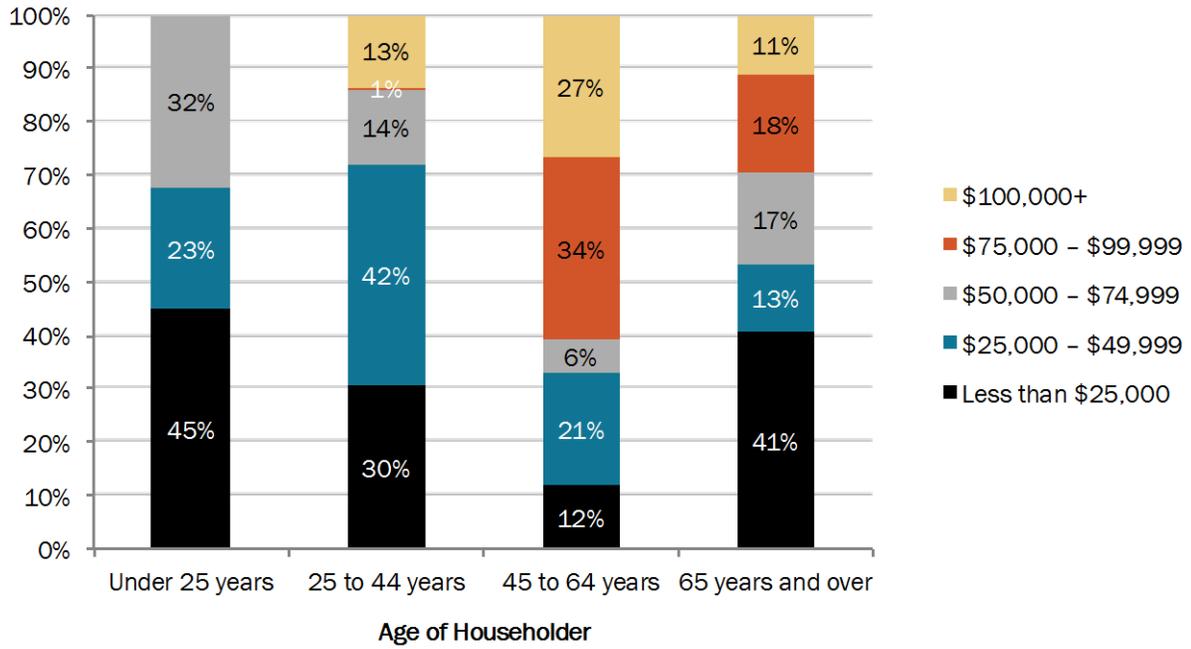
Source: 2013 American Community Survey 5-Year Estimates

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Housing values

Figure 23 shows the median sales price in Oregon, Deschutes County, and Bend between 2000 and February 2015. As of February 2015, median sales prices in Bend were $314,000, higher than in Deschutes County ($274,400) and Oregon ($238,250).

Figure 23. Median Sales Price, Oregon, Deschutes County, Bend, Jan 2000 through Feb 2015
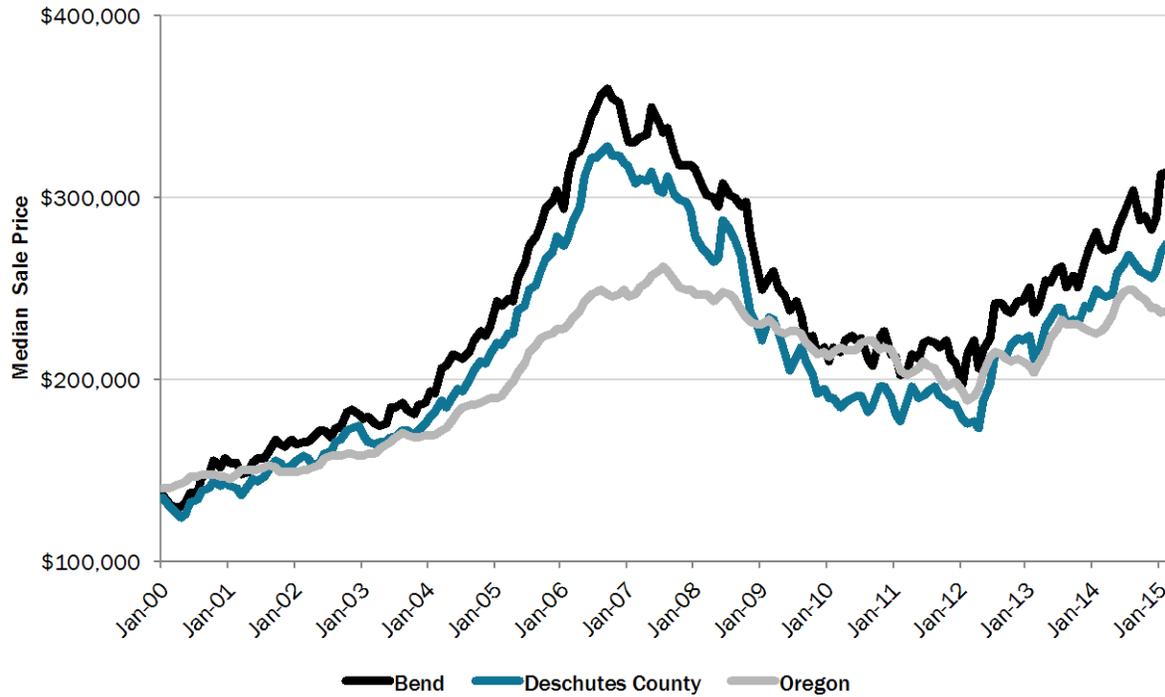
Source: Zillow Real Estate Research

Figure 24 shows median home sales prices for Bend and regional cities in February 2015. In that month, median home sale prices in Bend were about $314,000, above sales prices in Oregon's largest cities, like Eugene, Salem, and Portland, and other central and southern Oregon communities, such as Redmond, and Medford.

Figure 24. Median Home Sales Price, Bend, Portland, Eugene, Medford, Redmond, Salem, February 2015

Source: Zillow Real Estate Research.

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Figure 25 shows median home sales price per square foot for Oregon, Portland MSA, and Bend MSA from January 2000 through February 2015. Prices per square foot rose in Bend from $91 per square foot in January 2000 to $199 in July 2006. Prices fell after 2007 and rose again starting in 2012. In February 2015, the median price per square foot in Bend was about $165 dollars, comparable to the price in the Portland Region (about $170) and above that of the state as a whole ($154 per square foot).

Figure 25. Median Sales Price per Square Foot, Bend, Oregon, and Portland, Jan 2000 - Feb 2015
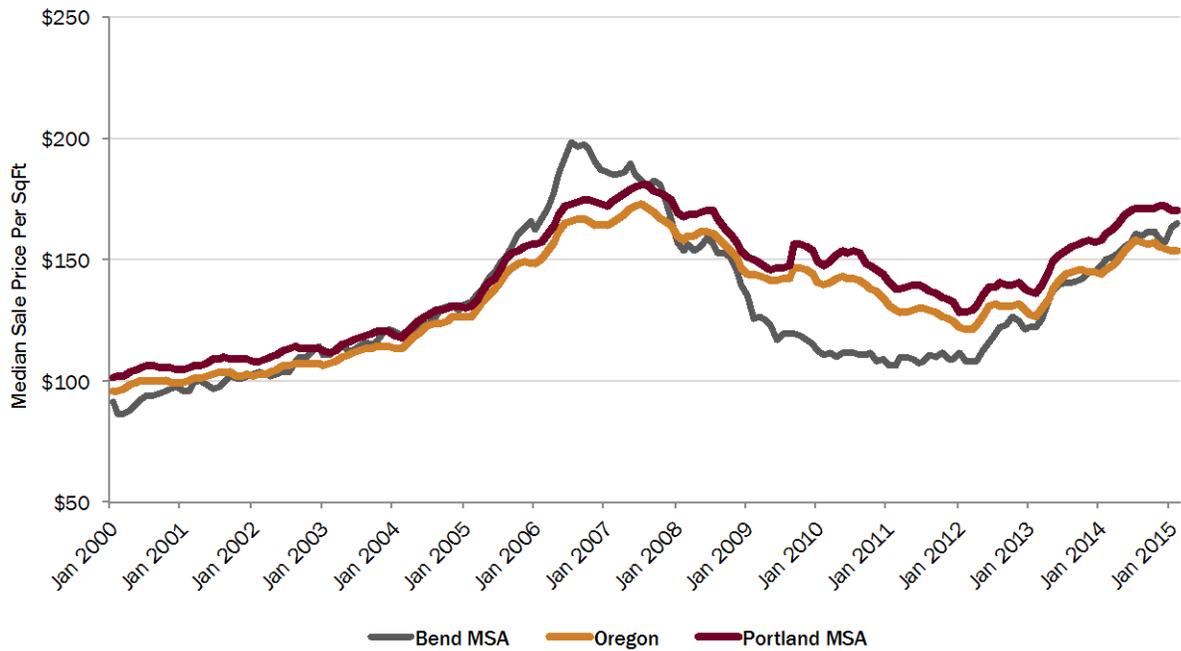
Source: Zillow Real Estate Research
MSA is metropolitan statistical area. The Bend MSA is Deschutes County.

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Figure 26 shows median home sales price per square foot for the Bend MSA and other large urban areas in Oregon in February 2005 and February 2015. Of the area sampled, Bend had the second-highest price per square foot, at $165 per square foot. Bend also saw the second highest growth in price per square foot ($32), with Portland just ahead at an increase of $39 per square foot and Eugene just behind at an increase of $21 per square foot.

Figure 26. Median Sales Price Per Square Foot, Salem, Medford, Eugene, Bend, Portland, Feb 2005 and Feb 2015
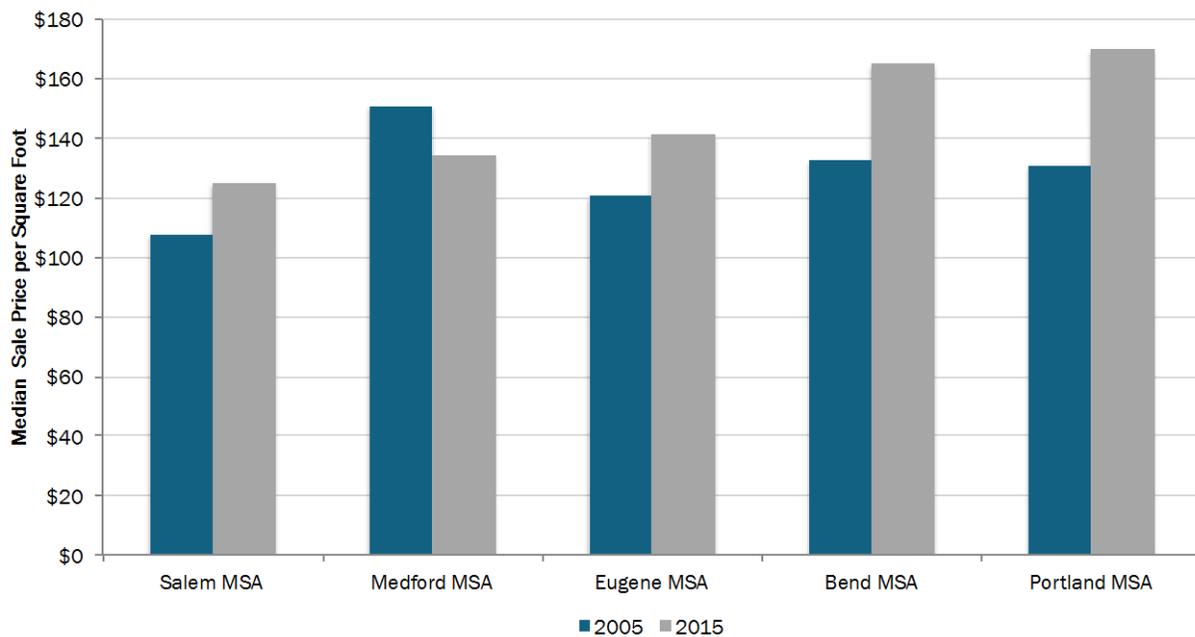
Source: Zillow Real Estate Research.
MSA is metropolitan statistical area.

Table 11 shows median household income and owner value (the estimated value of owner-occupied housing) in Bend between 1999 and 2013. During this period, housing costs increased faster than incomes, with an 18% increase observed in median household income, compared to an 81% increase in median owner value. Results show that the median owner value was 3.4 times the median household income in 1999—a figure that had increased to 5.2 by 2013.

Table 11. Comparison of Household Income and Housing Value Trends, Bend, 1999 to 2013

Indicator	1999	2013	% Change 1999 to 2013
Median Household Income	$40,857	$48,014	18%
Median Owner Value	$138,100	$250,300	81%
Ratio of Housing Value to Income	3.4	5.2	

Source: 2000 Census SF3, 2013 ACS 1-Year Estimates

Housing rental costs

Figure 27 shows gross rent for renter-occupied units in Oregon, Deschutes County, and Bend, for 2011-2013.

- Almost 23% of all renter occupied dwellings in Bend had gross rent of more than $1,250, compared to roughly 18% of county and state renter occupied dwellings.
- About 10% of renter occupied dwellings in Bend had gross rent of less the $600, compared to 11% for Deschutes County and 15% for Oregon.

Figure 27. Gross Rent for Renter-Occupied Units, Oregon, Deschutes County, and Bend, 2011-13
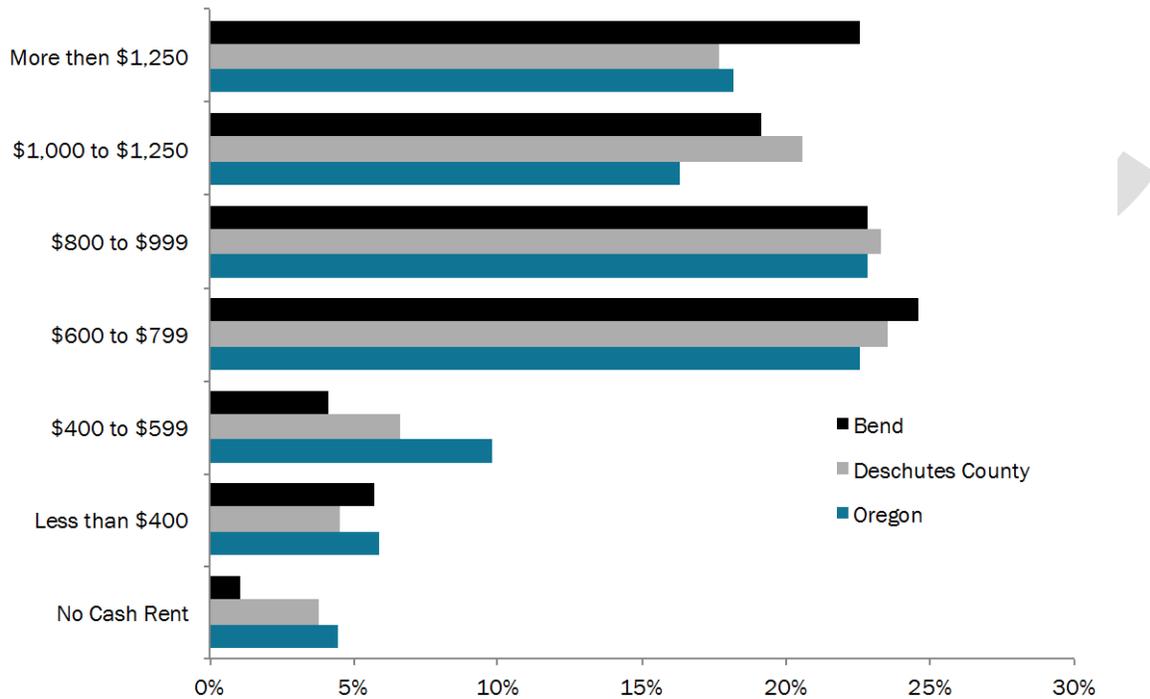
Source: 2013 American Community Survey 3-Year Estimates

Table 10 shows median gross rent for Oregon, Deschutes County, and Bend from 2000 to 2013, adjusted for inflation. Rent increased in Bend by 6%, comparable to increases in Deschutes County, and the state. Over roughly the same period, median household income fell by 16% in Bend (See Table 11), showing that the cost of rent grew faster than incomes.

Table 12. Median Gross Rent, Oregon, Deschutes County, Bend, 2000 and 2013, Inflation-adjusted

	2000	2013	Change, 2000 to 2013	% Change, 2000 to 2013
Oregon	$837	$877	$40	4.8%
Deschutes County	$869	$918	$49	5.6%
Bend	$876	$928	$52	5.9%

Source: 2000 Census American Community Survey 2013 1-year Estimates

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Figure 28 describes changes in gross rent in Bend in between 2000 and 2013. Units with gross rent of $1,000 or more accounted for 84% of the growth in units available to rent between 2000 and 2013.

- The number of rental units that cost $499 or less decreased between 2000 and 2013.
- Conversely, the proportion of units available for rent for $600 or more increased between 2000 and 2013. By 2007, units renting for $600 or more represented 89% of the units rented.

Figure 28. Gross Rent in Bend, 2000 and 2013
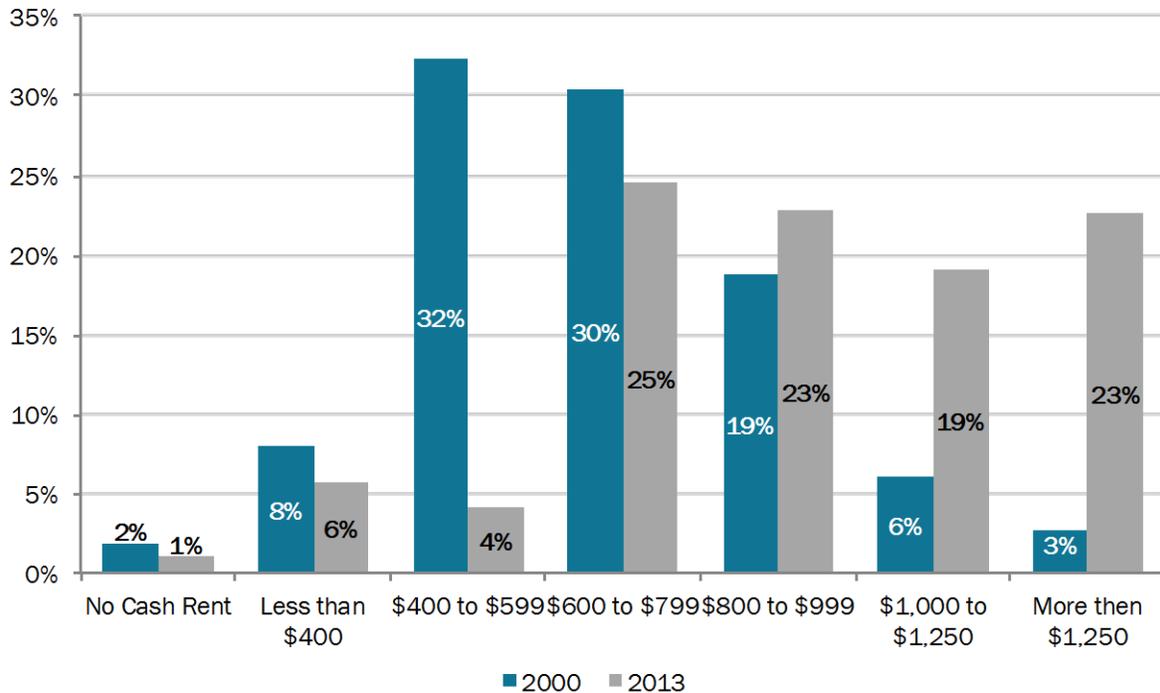
Note: The number of units included in this table includes all types of units available for rent in Bend in 2000 and 2013.
Source: 2000 Census SF3, 2013 American Community Survey 1-Year Estimates

Housing Affordability

As noted previously, a widely used standard for determining housing affordability is that a household should pay no more than a certain percentage of household income for housing (including payments, interest, rent, utilities, and insurance). HUD guidelines place this percentage at 30%, indicating that households paying more than 30% of their income on housing experience "cost burden". Households paying more than 50% of their income on housing, meanwhile, experience "severe cost burden."

Figure 29 shows the share of households that were cost burdened in 2013 in Oregon, Deschutes County, and Bend. In Deschutes County as a whole, roughly the same percentage of all households – 40% – were cost burdened in 2013, with about 54% of renter households and 31% of owners experiencing cost burden. For comparison, 38% of Oregon's households were cost burdened in 2013, corresponding to 50% of renter households and 29% of owner households.

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Figure 29. Cost Burdened, Oregon, Deschutes County, Bend, 2013
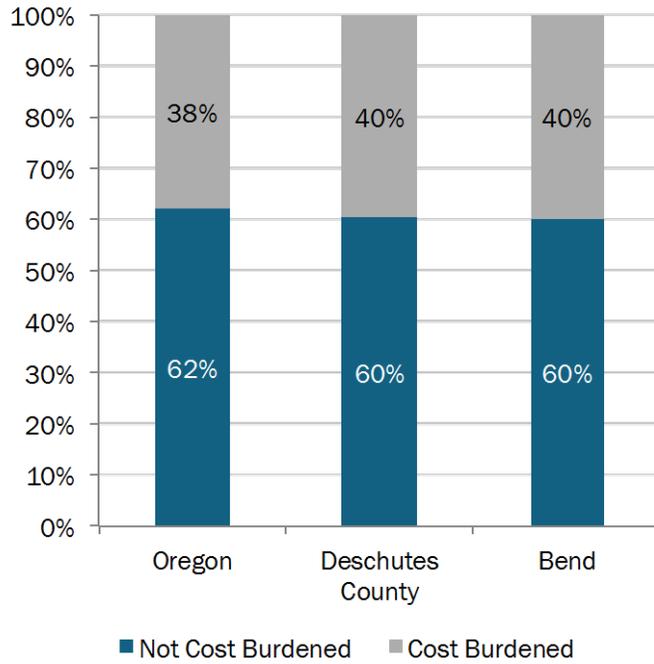
Source: American Community Survey 2013 1-year Estimates

Figure 30 shows the share of Bend households by tenure that were cost burdened in 2013. According to the U.S. Census, approximately 12,119 households in Bend—40% of all households—paid more than 30% of their income for housing expenses in 2013. About 49% of renter households in Bend were cost burdened, compared with 33% of owner households. In 2000, 42% of renter households and 26% of owner households in Bend were cost burdened.

Figure 30. Cost Burden by Tenure, Bend, 2013
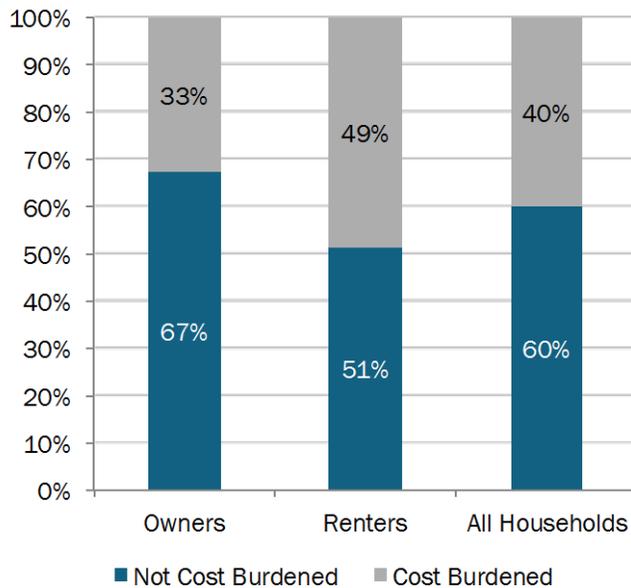
Source: 2013 American Community Survey 1-Year Estimates

Cost burden is only one indicator of housing affordability. Another way of exploring the issue of financial need is through analysis of wages relative to housing affordability. Table 13 shows an illustration of the affordable housing wage and rent gap for households in Bend at several different percentages of median family income (MFI).

Table 13 uses HUD's estimate of fair market rent for a two-bedroom dwelling in Deschutes County. Fair market rent is estimated as the 40th percentile of gross rents for typical, non-substandard rental units occupied by recent movers in a local housing market.

Table 13 shows that a typical family of four must earn $15.44 an hour to be able to afford a two-bedroom unit.

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Table 13. Affordable Housing Wage and Rent Gap for Households, Bend, 2013

Value	Minimum Wage	30% MFI	50% MFI	80% MFI	100% MFI	120% MFI
Annual Hours	2088	2088	2088	2088	2088	2088
Derived Hourly Wage	$8.95	$8.58	$14.30	$22.87	$28.59	$34.31
Annual Wage At Minimum Wage	$18,688	$17,910	$29,850	$47,760	$59,700	$71,640
Annual Affordable Rent	$5,606	$5,373	$8,955	$14,328	$17,910	$21,492
Monthly Affordable Rent	$467	$448	$746	$1,194	$1,493	$1,791
HUD Fair Market Rent (2 Bedroom)	$803	$803	$803	$803	$803	$803
Is HUD Fair Market Rent Higher Than The Monthly Affordable Rent?	Yes	Yes	Yes	No	No	No
Rent Paid Monthly OVER 30% of Income	$336	$355	$57	na	na	na
Rent Paid Annually OVER 30% of Income	$4,030	$4,263	$681	na	na	na
Percentage of Income Paid OVER 30% of Income for Rent	22%	24%	2%	na	na	na
Total Spent on Housing	52%	54%	32%	20%	16%	13%
For this area what would the "Affordable Housing Wage" be?	$15.38	$15.38	$15.38	$15.38	$15.38	$15.38
The Affordable Housing Wage Gap IS:	**$6.43**	**$6.81**	**$1.09**	**na**	**na**	**na**

Source: US Department of Housing and Urban Development 2013 Fair Market Rents , HUD 2013 MFI
HUD sets fair market rents based on an of market rent costs within a county, based on gross rent.
The values in Table 13 are:
Annual hours are the number of hours per year worked at a year-round, 40-hour per week job.
Derived hourly wage is the average annual wage divided by 2,080. For a household earning 80% of MFI, the hourly wage is $22.96.
Annual wage is the average wage made per year. For example, a household earning 80% of MFI has an annual wage of $47,760 (80% of $59,700 (Median Family Income)).
Annual affordable rent is 30% of the annual wage. For a household earning 80% of MFI, this is $14,328 (30% times $47,760).
Monthly affordable rent is the annual affordable rent divided by 12 months.
HUD Fair Market Rent (2 Bedrooms) is the fair market rent in Deschutes County in 2013.
Is HUD Fair Market Rent Higher Than The Monthly Affordable Rent? says whether the fair market rent is greater than the monthly affordable rent.
Rent Paid Monthly OVER 30% of Income is the difference between fair market rent and monthly affordable rent, if fair market rent is greater than monthly affordable rent.
Rent Paid Annually OVER 30% of Income is rent paid monthly over 30% of income multiplied by 12 months.
Percentage of Income Paid OVER 30% of Income for Rent is the annual percentage of the household's rent paid over the amount of rent that is affordable (30% of gross income).
Total Spent on Housing is the percentage of income spent on fair market rent per year.
For this area what would the "Affordable Housing Wage" be? is the wage that a household has to earn to afford a two-bedroom dwelling at fair market rent. This is the same amount for all households, regardless of income.
The Affordable Housing Wage Gap IS: is the difference between the derived hourly wage and the Affordable Housing Wage.

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Table 14 shows a rough estimate of affordable housing cost and units by income levels for Bend in 2013 based on Census data about household income, the value of owner occupied housing, and rental costs in the city. The table shows the number and percentage of households in each income level in Bend (e.g., Bend has about 2,631 households (9% of households) with income less than $10,000) based on Census data about income. The table shows the affordable monthly housing costs and affordable housing price, using HUD's standards for affordability. The Table shows the estimated number of owner and renter units in Bend based on Census data about the housing costs of people in Bend. The column "surplus (deficit)" subtracts the estimated number of owner and renter units from the number of households, showing whether Bend has enough housing to meet demand at each income level.

The data indicate that, in 2013:

- About one-fifth of Bend's households could not afford a studio apartment according to HUD's estimate of $557 as fair market rent;

- Almost 40% of households in Bend could not afford a two-bedroom apartment at HUD's fair market rent level of $803;

- A household earning median family income ($59,700) could afford a home valued up to around $149,250.

Based on the data presented in Table 14, in 2013 Bend had a deficit of approximately 5,243 affordable housing units for households that earn less than $25,000 annually (26% of households in the city earn this amount or less).[71]

Table 14. Affordable Housing Costs and Units by Income Level, Bend, 2011-2013

Income Level	Number of HH	Percent	Affordable Monthly Housing Cost	Crude Estimate of Affordable Purchase Owner-Occupied Unit	Est. Number of Owner Units	Est. Number of Renter Units	Surplus (Deficit)	HUD Fair Market Rent (FMR) in 2013
Less than $10,000	2,631	9%	$0 to $250	$0 to $25,000	509	360	(1,763)	
$10,000 to $14,999	1,299	4%	$250 to $375	$25,000 to $37,000	254	364	(681)	
$15,000 to $24,999	3,996	13%	$375 to $625	$37,500 to $62,500	176	1,021	(2,800)	Studio: $557
$25,000 to $34,999	4,028	13%	$625 to $875	$62,500 to $87,500	226	4,262	460	1 bdrm: $645 2 bdrm: $803
$35,000 to $49,999	3,676	12%	$875 to $1,250	$87,500 to $125,000	959	4,556	1,839	3 bdrm: $1,147
$50,000 to $74,999	4,753	16%	$1,250 to $1,875	$125,000 to $187,500	4,004	2,015	1,265	4 bdrm: $1,373
Deschutes County 2013 MFI: $59,700			$1,493	$149,250				
$75,000 to $99,999	4,107	14%	$1,875 to $2,450	$187,500 to $245,000	2,434	904	(769)	
$100,000 to $149,999	3,181	10%	$2,450 to $3,750	$245,000 to $375,000	4,289	154	1,262	
$150,000 or more	2,742	9%	More than $3,750	More than $375,000	3,877	51	1,186	
Total	30,413	100%			16,727	13,686	0	

Source: American Community Survey 2013 3-year Estimates, HUD 2013 Fair Market Rents, HUD 2013 MFI

Based on the forgoing analysis of household and economic trends, the City concludes that the following types of housing will be those types that are needed and financially attainable by each income group listed above in Table 13 and Table 14.

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[71] The Surplus or deficit in Table 14 is calculated by subtracting the estimated number of owner units and renter units from the number of households in the income category. For example, for households with an income of $10,000 to $14,999, the math is 1,299 households minus 254 owner units minus 364 renter units equals a deficit of 681 units.

Table 15 shows the type of housing that is attainable at different household income categories (relative to the 2013 Deschutes County MFI), and the distribution of these households in Bend in 2013.

Table 15. Housing Attainability, Bend, 2013

Market Segment by Income	Income Range	Number of households	Percent of Households	Financially Attainable Products		
				Owner-occupied	Renter-occupied	
High (120% or more of MFI)	$71,640 or more	10,622	35%	All housing types; higher prices	All housing types; higher prices	
Upper Middle (80%-120% of MFI)	$71,640 to $47,760	4,618	15%	All housing types; lower values	All housing types; lower values	Primarily New Housing
Lower Middle (50%-80% of MFI)	$47,760 to $29,850	4,817	16%	Manufactured on lots; single-family attached; duplexes	Single-family attached; detached; manufactured on lots; apartments	Primarily Existing Housing
Lower (30%-50% of less of MFI)	$29,850 to $17,910	5,068	17%	Manufactured in parks	Apartments; manufactured in parks; duplexes	
Very Low (Less than 30% of MFI)	Less than $17,910	5,288	17%	None	Apartments; new and used government assisted housing	

Source: American Community Survey 2013 1-year Estimates

Manufactured homes

Manufactured homes are and will be an important source of affordable housing in Bend. They provide a form of homeownership that can be made available to low- and moderate-income households. Cities are required to plan for manufactured homes—both on lots and in parks (ORS 197.475-492).

Generally, manufactured homes in parks are owned by the occupants who pay rent for the space. Monthly housing costs are typically lower for a homeowner in a manufactured home park for several reasons, including the fact that property taxes levied on the value of the land are paid by the property owner rather than the manufactured homeowner. The value of the manufactured home generally does not appreciate in the way a conventional home would, however. Owners of manufactured homes in parks are also subject to the mercy of the property owner in terms of rent rates and increases. It is generally not within the means of an owner of a manufactured home to relocate the home to escape rent increases. Living in a park is desirable to some because it can provide a more secure community with on-site managers and amenities, such as laundry and recreation facilities.

OAR 197.480(4) requires cities to inventory the mobile home or manufactured dwelling parks sited in areas planned and zoned or generally used for commercial, industrial or high-density residential development. Table 16 presents the inventory of mobile and manufactured home parks within Bend in 2015. The results show that there are 12 manufactured home parks with 1,348 spaces and 27 vacant spaces in or adjacent to Bend. Table 16 shows that two

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manufactured home parks are in commercial zones and non are in industrial or high-density residential zones (although two parks are in a medium density zone).

In response to dwindling numbers of affordable mobile home units, City Council has adopted a program to promote re-zoning of closed manufactured home parks to higher-density zoning to provide an incentive for park owners to replace those units with affordable rental housing.

Table 16. Inventory of Mobile/Manufactured Home Parks, City of Bend, 2014

Name	Location	Park Type	Total Spaces	Vacant Spaces	Zone
Bend Trailer Park	335 SE Roosevelt	Family	7	0	Commercial Limited
Cascade Village - Bend	63700 Cascade Village Dr	55+	89	0	Residential Standard Density
Country Sunse	61445 SE 27th St	Family	148	0	Residential Low Density
Fox Hills Mobile Home Court	61058 Alopex Ln	Family	62	5	Residential Standard Density
Golfside Park	61055 Parrell Rd	Family	94	0	Residential Standard Density
Parrell/Sisters Mobile Home Park	61310 & 61292 Parrell Road	Family	87	6	Residential Standard Density
Rock Arbor Villa Mobile Home Park	2200 NE Hwy 20	55+	77	0	General Commercial
Romaine Village Country Estates	19940 Mahogany St	Family	177	5	Residential Low Density
Snowberry Village	1188 NE 27th	55+	132	0	Residential Standard Density
Suntree Village Mobile Home Park	1001 SE 15th St	55+	214	0	Residential Medium Density
The Pines	61000 Brosterhous Rd	Family	191	11	Residential Standard Density
West Side Pines Cooperative	141 SW 15th St	Family	71	0	Residential Medium Density
Total			1,349	27	

Source: Oregon Manufactured Dwelling Park Directory; http://o.hcs.state.or.us/MDPCRParks/ParkDirQuery.jsp
Note: Several of these mobile/manufactured home parks are located on Bend's periphery, outside of the city and UGB.

Summary of Key Findings about Housing Affordability

The analysis of housing affordability shows the following trends that will result in increased need for a broader range of housing in Bend:

- **Housing sales prices for owner-occupied units grew substantially faster than incomes over the 2000 to 2013 period.** Since 2000, household income increased by 18% ($7,200 per year) and median sales price increased by 110% ($151,600). The median owner value increased from 3.4 times the median household income in 1999 to 5.2 by 2013. Cost burden for owners increased from 26% of owner-occupied households being cost burdened in 2000 to 33% of owners in 2013.

  The decreases in housing affordability for homeowners shows an increased need for less costly smaller single-family detached housing, both smaller lots and smaller units, such as cottages or cluster housing, and for townhouses. Demand for owner-occupied multifamily housing, such as garden apartments or urban condominiums, may increase, especially in walkable areas with access to services. These types of more affordable owner-occupied units are the types likely to be preferred by some downsizing Baby Boomers and Millennials, especially as the first houses for Millennials.

- **Bend has a substantial level of demand for rental housing affordable to low- and moderate-income households.** The share of renter households paying $1,000 or more in rent per month increased from 9% of households in 2000 to 42% in 2013. Cost burden for renters increased from 42% in 2000 to 49% of owners in 2013.

  The increase in rent costs, combined with expected growth of households who will need

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affordable rental housing, such as young Millennials and some Hispanic and Latino households, suggest that Bend will have increased need for affordable types of housing such as townhouses, duplexes, garden apartments, urban apartments, and other multifamily housing types.

Step 5 – Estimate the number of additional needed units by structure type and Step 6 – Determine the needed density ranges for each plan designation and the average needed net density for all structure types

This section summarizes the most important facts and conclusions presented in previous sections, focusing on the specific requirements of ORS 197.296. Cities are required to determine the average density and mix of *needed* housing over the 20-year planning period (ORS 197.296(5)). The statute requires the determination of the Housing Needs Projection (e.g., needed density and mix) consider the following factors that may affect future housing need:

A. The number, density and average mix of housing types of urban residential development that have actually occurred;

B. Trends in density and average mix of housing types of urban residential development;

C. Demographic and population trends;

D. Economic trends and cycles; and

E. The number, density and average mix of housing types that have occurred on the buildable lands.

Thus, the HNA must consider a range of factors, and they do not lend themselves to an empirical formula. The data and analysis are intended to inform the community's discussion of what types of housing will be needed. The remainder of this section presents the estimate of additional needed units by structure type and the rationale for the estimate.

The needed housing density and mix for the 2008 to 2028 period in Bend is different than actual housing density and mix, based on the following factors:

Housing mix (ORS 197.296(5)(A) and (E)). The most common type of housing developed in Bend was single-family housing types.

- While the mix of housing types in Bend has varied over time, single-family detached housing has historically accounted for the majority of housing in Bend. In 2013, about 71% of Bend's total housing stock was single-family detached, 4% was single-family attached, and 25% was multifamily.

- Bend permitted an average of about 1,200 units per year between 1999 and 2014, 78% of which were single-family detached units.

- Fifty-five percent of housing in Bend was owner-occupied in 2013, a changed from 63% in 2000 and 54% in 1990.

Housing Density (ORS 197.296(5)(A), (B) and (E)). The average density of single-family housing was 4.7 dwelling units per net acre and for multi-family housing was 15.8 dwelling units per acre over the 1998 to 2008 period.[72]

- The average density for residential development in Bend was 5.7 dwelling units per net acre during the 1998 to 2008 period, compared to an average for Bend's housing stock before 1998 of 3.7 dwelling units per net acre.

- The average density by zone during the 1998 to 2008 period was: 2.1 dwelling units per net acre (du/net acre) in RL, 4.9 du/net acre in RS, 13.4 du/net acre in RM, and 16.9 du/net acre in RH.

- The average density for single-family detached housing developed over the 1998 to 2008 period was 4.7 du/net acre and 5.1 du/net acre for manufactured homes on lots.

- The average density for single-family attached housing developed over the 1998 to 2008 period was 9.5 du/net acre and 16.0 du/net acre for manufactured homes on lots.

Regional Growth (ORS 197.296(5)(C). Bend's existing mix of housing is a result of a range of historical factors, related to both local and regional growth.

- The City grew rapidly from a small city in 1990 to a city of more than 78,000 people by 2013. The largest source of pressure for housing over this period was the Baby Boomers (especially younger Baby Boomers), who needed housing to accommodate children.

- Between 1990 and 20013, Bend's growth accounted for two-thirds of population growth in Deschutes County. Population and economic growth in Bend drives regional growth in Deschutes County and Central Oregon.

- The predominant type of housing built in many of Oregon's communities during the 1990's and early 2000's was single-family housing. In particular, single-family housing types dominated residential development during the high growth "boom" period from 2004 to 2007.[73]

- Between 1990 and 2013, about 85% of Deschutes County's population growth was from positive net migration (in-migration exceeded out migration) from other parts of Oregon or from outside of Oregon. Interviews with real estate professionals suggest Bend attracts in-migrants who have sufficient capital and income to afford higher-cost housing in Bend. In addition, Bend is attracting Millennials, many of whom prefer to live in an area with easy access to outdoor recreation.

- Bend annexed more than 17,000 people between 1990 and 1999. The majority of areas annexed were developed with relatively low-density single-family housing. All of Bend's population growth since 2000 has been due to natural increase (# births > # deaths) and positive net migration.

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[72] The analysis about historical housing density used the density analysis from the 2008 housing needs analysis, for the 1998 to 2008 period, because the majority of residential development took place over that period and the majority of new housing developed between 2009 and 2013 was single-family detached. There was no reason to expect that development densities over the 2009 to 2013 period would have been substantially different from the 1998 to 2008 period, given the fact that Bend's development policies did not change over that period.

[73] This statement is based on ECONorthwest's experience developing housing needs analysis since 2007 for cities across Oregon, such as Salem, Eugene, Madras, Newport, Harrisburg, as well as other cities.

Economic Trends (ORS 197.296(5)(D). The economy in Bend grew over the last two decades. A separate analysis of economic opportunities shows that employment in Bend will continue to grow over the 20-year period.

- Between 2001 and 2013, Deschutes County added nearly 10,800 jobs. The majority of new jobs were in commercial sectors, such as health care and professional services, accommodations and food services, and administrative support.

- The per capita income (accounting for inflation), in Deschutes County increased by about 20% ($7,100 in 2014 dollars) between 1990 and 2013.

- Between 2008 and 2028, Bend is forecast to add 22,891 jobs, mostly in office and service sectors. While the economy and the housing market recently experienced a severe downturn in growth, Bend can expect to experience one to two complete economic cycles (from faster growth to little or no growth) over the planning period.

Demographic trends (ORS 197.296(5)(C). The population is aging and household sizes are generally decreasing within the region, with small increase in the share of single-person households.

- Future housing demand will be driven by in-migration, changes in age-demographics, and changes in household composition, with an increase in single-person households. New households and existing households are likely to undergo similar changes in age-demographics.

- Baby Boomers are the fastest growing segment of Deschutes County's population. People over 65 years old are projected to grow from 13% of the County's population in 2000 to 24% in 2030. These households will make a variety of housing choices. The major impact of the aging of the Baby-Boomers on demand for new housing will be through demand for housing types specific to seniors, such as assisted living facilities.

  In 2013, about 36% of householders over 65 years old in Bend had incomes of $25,000 or below. While people over 65 years old may have financial reserves (beyond income) or may own their home outright, the large share of households with incomes below $25,000 suggest that many older households will need access housing costing about $600 per month or less. About 28% of householders over 65 years old had incomes between $25,000 to $50,000 (near or below the median family income), suggesting that this group will need access to housing costing between $600 and $1,200 per month.

  Implications for Housing Product Types. Baby Boomers will make a range of housing choices as they age, from continuing to remain in their homes as long as possible, to downsizing to smaller dwellings, to moving into group housing (e.g., assisted living facilities or nursing homes) as their health fails. The aging of the Baby Boomers will increase need for: small single-family dwellings, cottages, accessory dwelling units, townhomes, apartments, and condominiums. Baby Boomers who move are likely to choose housing in areas with nearby shopping, health care and other services, such as neighborhoods with integrated services or in downtown Bend.

- Millennials are the second fastest growing segment of Deschutes County population. People aged 25 to 49 years old are projected grow by nearly 27,500 people between 2000 and 2030, an increase of 64%. This will result in between 2,200 to 2,600 more households in Bend with a head of household who is between 30 and 45 years old.

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In 2013, about 17% of householders 25 to 45 years old in Bend had incomes of $25,000 or below and could afford $600 in housing costs per month. About 23% of householders in this age grouping had incomes between $25,000 to $50,000 (near or below the median family income), and could afford housing costing between $600 and $1,200 per month. About 16% of households in this age group had incomes of $50,000 to $75,000 and could afford monthly housing costs of about $1,200 to $1,900, which is the range when homeownership begins to be financially feasible in Bend. As Millennials age, the amount that they can afford to spend on housing may be lower than people in this age range in 2013 because of increases in debt, as discussed in the prior section about demographic characteristics and trends affecting housing demand in Bend.

Implications for Housing Product Types. Growth in Millennials will increase need for affordable housing for renters and homeowners such as: small single-family dwellings, cottages, accessory dwelling units, duplexes, townhomes, garden apartments, and apartments. The size of dwelling units will vary depending on household size, from single-person households to households with children. Millennials who move are likely to choose housing in areas closer to services and activities, such as downtown Bend and nearby neighborhoods, as discussed previously.

- Hispanic and Latino population grew by more than 200% in Bend between 2000 and 2013, growing from about 2,400 people to about 8,400 people. The U.S. Census projects that Hispanic and Latino population will grow from about 16% of the nation's population in 2010 to 22% of the population in 2030, with growth fastest in the western U.S., as discussed in the prior section about demographic characteristics and trends affecting housing demand in Bend. This will result in between 2,000 to 3,000 new households in Bend with a Hispanic or Latino head of household.

  In the previous period from 2009 to 2013, 28% of Hispanic and Latino households in Bend had incomes of $25,000 or below and could afford rents of $600 or less. About 30% of Hispanic and Latino households had incomes between $25,000 and $50,000, (near or below the median family income), and could afford housing costing between $600 and $1,200 per month. About 15% of Hispanic and Latino households had incomes of $50,000 to $75,000 and could afford monthly housing costs of about $1,200 to $1,900, which is within the range of when homeownership begins to be financially feasible in Bend.

  Implications for Housing Product Types. Hispanic and Latino households will need affordable housing that can accommodate larger households, including multi-generational households. Growth in Hispanic and Latino households will increase need for affordable housing for renters and homeowners such as: single-family dwellings (both smaller and larger sized dwellings), duplexes, larger townhomes, garden apartments, and apartments. Ownership opportunities for Hispanic and Latino households will focus on moderate-cost ownership opportunities, such as single-family dwellings on a small lot or in a more suburban location, duplexes, and townhomes.

- In addition to these large-scale demographic changes affecting Bend, development of the OSU Cascades Campus will impact housing need in Bend. OSU projects that the campus will grow to 5,000 students by 2025. The City recently approved a site plan for

development of 10 acres of OSU's campus. This approval included some on-site student housing in a dormitory for 300 students.[74]

Some students may live on campus in dormitories, may already live in Bend, or may commute to the campus from a nearby community. Some students, however, will move to Bend specifically to attend the University and will need student housing. Demand for off-campus student housing may significantly affect Bend's housing market, depending on how many students need off-campus housing and how soon they need it.[75] This analysis assumes that dormitory-style student housing will be accommodated on OSU's campus and is not accounted for in the land need estimate. Demand for off-campus student housing is not accounted for in the projection of population growth. As the timing of OSU's growth becomes more certain, the City should update its policies to address this need.

Housing Affordability (ORS 197.296(5)(C) and (D)). Bend's housing became less affordable for both renting and owning over the last decade.

- Between 1999 and 2013, growth in homeownership costs outpaced growth in income. In Bend, median owner value increased by 81% between 1999 and 2013, while median household income grew by 18%.

- Between 2000 and 2014, average sales price more than doubled, increasing from $137,000 to $288,000.

- Forty percent of Bend's households were cost burdened in 2013, with renters cost burdened more frequently than owners (49% compared to 33%). In comparison, 40% of households in Deschutes County and 38% of State households were cost burdened in 2013.

- In 2013, Bend had a gap in affordable housing for households that earn less $25,000.

  o Bend had a deficit of about 5,200 dwelling units that would be affordable to households earning $25,000 or less based on the U.S. Department of Housing and Urban Development's (HUD) affordability guidelines.

  o More than 13% of Bend's households could not afford a studio apartment at HUD's fair market rent level of $557, and just under one-third of households could not afford a two-bedroom apartment at HUD's fair market rent level of $803.

  o A household earning median family income ($59,700) could afford a home valued up to about $149,250, about half of the median sales price in Bend in 2014.

- Continued increases in housing costs may increase demand for denser housing (e.g., multifamily housing or smaller single-family housing) or locating outside of Bend. To the extent that denser housing types are more affordable than larger housing types, continued increases in regional housing cost will increase demand for denser housing.

When the balance of factors required by ORS 197.296(5) are considered, we conclude that the needed density and mix for the 20-year planning period is different than the actual density and mix achieved between 1999 and 2013. This is in part because the analysis period largely covers

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[74] See Final Decision of the City of Bend Hearings Officer on PZ-14-0210.

[75] Final Recommendations (2014) OSU Cascades Housing Task Force

the housing boom period between 2004 and 2007—a period when an extraordinary number of higher cost single-family detached dwellings were built. It is also reflective of the fact that the data suggest the region has a significant affordability gap. This gap suggests that the region needs more lower cost housing, which in turn may be addressed through higher densities of certain types of housing and smaller housing types.

Table 17 presents the assessment of needed mix for housing built in Bend over the 2008 to 2028 period. The analysis in Table 17 is based on the following information and assumptions:

- The number of new dwelling units is based on the forecast for new dwelling units in Table 6.

- The majority of new housing will continue to be single-family detached housing. The type of single-family detached dwellings may change, with more emphasis on smaller and more affordable new single-family detached housing and a decrease in demand for large-lot single-family detached housing.

- Bend's housing need will change, with an increase in demand for single-family attached housing and multifamily housing. The forecast concludes that the needed mix of new housing is different from the mix of existing housing stock (Figure 1) and the mix of housing produced over the last decade (Table 3). The following demographic trends will result in an increase in demand for multifamily and single-family attached housing:

    o Growth in Baby Boomers. Households over 65 typically have lower income than younger households. Those without accumulated wealth (e.g., housing equity or investments) may choose lower-cost multifamily housing. Some Baby Boomers may choose to downsize their housing, resulting in greater demand for small single-family dwellings, cottages, accessory dwelling units, townhomes, apartments, and condominiums.

    o Growth Millennials. Younger Millennials typically have lower income and may have higher debt. Growth in Millennials will increase need for affordable housing for renters and homeowners such as: small single-family dwellings, cottages, accessory dwelling units, duplexes, townhomes, garden apartments, and apartments.

    o Growth in Hispanic and Latino population. To the extent that in-migrating Hispanic and Latino households have lower than average income, then in-migration of ethnic groups will increase demand for housing affordable to low- and moderate-income households relative to demand for other types of housing. Growth in Hispanic and Latino households will increase need for affordable housing for renters and homeowners such as: single-family dwellings (both smaller and larger sized dwellings), duplexes, larger townhomes, garden apartments, and apartments. Ownership opportunities for Hispanic and Latino households will focus on moderate-cost ownership opportunities, such as single-family dwellings on a small lot or in a more suburban location, duplexes, and townhomes.

    o The growing need for affordable housing in the Bend, much of which is likely to be located in Bend, the largest metropolitan area in the region.

    o The current deficit of housing units (5,244) affordable to households earning $25,000 or less a year (See Table 14).

Table 17. Needed mix for housing built in Bend, 2008 to 2028

	Units	Percent of New Units
Single-family detached	9,175	55%
Single-family attached	1,668	10%
Multi-family	5,838	35%
Total	**16,681**	**100%**

Source: ECONorthwest

Table 18 shows that, between 2009 and the end of June 2014, 2,912 new units were developed in Bend. The City is considering policy options to achieve the needed mix shown in Table 17. Those policies were not in place between 2008 and 2014. Because the City had not adopted any policies to help achieve the needed mix, the mix of housing developed between 2009 and July 2014 did not show substantial changes in the development pattern from housing developed in Bend between 1999 and 2008.

As a result, Table 18 applies the needed mix (Table 17) to the remaining need. Table 18 shows that Bend has a need for 13,769 additional dwellings for the remainder of the 2008-2028 forecast period, between 2014 and 2028[76].

Table 18. Needed housing by needed mix, Bend, 2014-2028

	Needed Units (2008 - 2014)	Units permitted 2009 to end of July 2014	Remaining Need (Mix applied to remaining total)	
			Units	Percent of New Units
Single-family detached	9,175	2,411	7,573	55%
Single-family attached	1,668	112	1,377	10%
Multi-family	5,838	389	4,819	35%
Total	**16,681**	**2,912**	**13,769**	**100%**

Source: ECONorthwest

Based on the analysis above, we come to the following conclusions about Bend's needed densities:

- **Average development densities increased over time in most zones.** The densities in the RS, RM, and RH zones increased for development over the 1998-2008 period, when compared with the densities before 1998 (Table 5). Density in the RL zone did not change over the 1998-2008 period, compared to densities before 1998. The reasons for this increase in density include the historically high levels of residential development

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[76] See meeting packets for the Residential TAC dated August 25, 2014 and January 26, 2015

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during the 1998-2008 period, with an emphasis on high demand for single-family detached housing.

- **Bend's average development density will change with a shift in the type of housing developed in Bend over the 2014-2028 period.** The conclusion of the housing needs analysis is that Bend will have increased demand for a wider range of housing types, especially more affordable housing types. These housing types include: small lot single-family detached, smaller single-family detached units such as cottages, townhouses (aka rowhouses), duplexes, tri-plexes and quad-plexes, garden apartments, and urban apartments and condominiums. Development of these housing types will generally be at higher densities than Bend's historical densities. These housing types will be developed primarily in the RS and RM zones, with some denser multifamily housing in the RH zone.

The starting point for discussion of needed future densities in Bend is the historical development densities for the 1998-2008 period (Table 5). These densities serve as the basis for the base case capacity analysis, presented in the *Bend Urbanization Report*. Bend's needed density for development over the 2014-2028 period will be determined through additional analysis of future development patterns.

The *Bend Urbanization Report* provides information and analysis of efficiency measures that will increase housing density in Bend over the 2014-2028 period.

The next step in estimating units by structure type is to evaluate income as it relates to housing affordability. Table 19 shows an estimate of needed dwelling units by income level for the 2014-2028 period. The analysis uses market segments consistent with HUD income level categories, based on the income distribution in Bend in 2013 (See Table 15).

The analysis shows that about 50% of households in Bend could be considered high or upper-middle income in 2013 and that about half of the housing need in the 2014-2028 period will derive from households in these categories. The analysis also shows that 50% of Bend's households could be considered lower-middle, low, or very low income in 2013 and that about half of the housing need in the 2014-2028 period will derive from households in these categories. Housing that is affordable to these households will generally be existing housing.

While the housing needs analysis focuses on housing that will be built in the future, many households in Bend (as in other Oregon cities) will be able to afford existing housing and newly built housing will be too expensive. In most cities, the stock of housing affordable to low-income households increases through the addition of new subsidized units, smaller market rate units, and older market rate units that become more affordable over time. Most new market rate development is affordable to moderate and high income households. Through the market filtering process, these stocks become affordable to lower-income households over time, as the housing stock ages.[77]

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[77] Based on analysis presented in the ECONorthwest report "Seattle Housing Affordability Policy Framework and Recommendations," March 2015.

Table 19. Estimate of needed dwelling units by income level, Bend, 2014-2028

Market Segment by Income	Income Range	New Households 2014-2028		Financially Attainable Products		
		Number of households	Percent of Households	Owner-occupied	Renter-occupied	
High (120% or more of MFI)	$71,640 or more	4,809	35%	All housing types; higher prices	All housing types; higher prices	
Upper Middle (80%-120% of MFI)	$71,640 to $47,760	2,091	15%	All housing types; lower values	All housing types; lower values	Primarily New Housing
Lower Middle (50%-80% of MFI)	$47,760 to $29,850	2,181	16%	Manufactured on lots; single-family attached; duplexes	Single-family attached; detatched; manufactured on lots; apartments	Primarily Existing Housing
Lower (30%-50% of less of MFI)	$29,850 to $17,910	2,295	17%	Manufactured in parks	Apartments; manufactured in parks; duplexes	
Very Low (Less than 30% of MFI)	Less than $17,910	2,393	17%	None	Apartments; new and used government assisted housing	

Source: Analysis by ECONorthwest;
Number of households by income range from the 2011-2013 American Community Survey, Table B19001
Income range based on HUD's 2013 Median Family Income of $59,700 for the Bend MSA

Additional Residential Housing Needs

This section presents estimates of residential land needs for: (1) second homes; (2) persons in group quarters; (3) government assisted housing, and; (4) manufactured housing.

Second Homes

The 2008 Housing Needs Analysis identified a land need of 500 acres for second homes.[78] In a 2011 memorandum to the Remand Task Force, staff summarized the issue as follows:

> "Findings adopted with the 2009 UGB amendment estimated that second homes could be expected to absorb 500 acres of residential land during the 2008-28 planning period. This estimate was based on evidence in the record that the number of second homes forecasted to develop in the future could be expressed as a proportion of total housing units for permanent residents. Specifically, the City estimated that new second homes, equivalent to 18% of needed housing units, could be expected to be built in Bend during 2008-28. This would amount to slightly over 3,000 units. Based on an average density assumption of 6 units per acre, these second homes would occupy 500 residential acres that would otherwise be available for permanent residents (see Record p. 7692). The total amount of residential acres needed for the

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[78] The memorandum titled *Rationale for Second Homes Land Absorption Estimate*, April 24, 2008, documented the analysis for second homes.

planning period was adjusted to include these 500 acres (see Record p. 1058)."

In summary, LCDC accepted the City's findings on this issue, and the factual base which supports them. LCDC added:

"If during the remand process the density assumption of 6 units/acre for second homes is revised, the 500-acre estimate adopted in 2009 will be revised upward or downward accordingly."

Second homes can be any type of housing, such as single-family detached housing, townhouses, or condominiums in a multifamily structure. The mix of housing types for second homes is similar to the mix of housing for needed units, with 55% of secondary housing in single-family detached, 10% in single-family attached, and 35% in multifamily housing types[79].

Persons in Group Quarters

The forecast of new housing (Table 6) assumes that the percentage of persons in group quarters in Bend would remain the same as reported in the 2000 Census (2.3%), resulting in 886 persons who would require group housing for the 2008-2028 period. People in group quarters will need housing, beyond the forecast for new housing (Table 6). This housing will be located in group quarters, such as assisted living facilities, nursing homes, or jails and will require land.

For the purposes of determining land needs, we will assume that group quarters are similar to multifamily housing with a similar amount of space per individual. In 2000, Bend had an average of 1.92 persons per household in multifamily dwellings.[80] Based on this analysis, Bend will need the equivalent of 461 additional multifamily units to provide adequate capacity for group quarters.

Government assisted housing

ORS 197.303 requires cities to plan for government-assisted housing. Government-subsidies can apply to all housing types (e.g., single family detached, apartments, etc.). Bend allows development of government-assisted housing in all residential plan designations, with the same development standards for market-rate housing. This analysis assumes that Bend will continue to allow government housing in all of its residential plan designations. Because government assisted housing is similar in character to other housing (with the exception the subsidies), it is not necessary to develop separate estimates of land needed for government-assisted housing.

Manufactured housing

ORS 197.303 also requires cities to plan for manufactured housing on lots and manufactured housing in parks.

Bend allows manufactured housing on lots as a permitted use in the following zones: Urban Area Reserve (UAR10, Suburban Low Density Residential (SR 2 ½), Low Density Residential (RL), Standard Density Residential (RS), Medium-10 Density Residential (RM-10), and Medium

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[79] See meeting packet for January 26, 2015 Residential TAC meeting – http://bendoregon.gov/Modules/ShowDocument.aspx?documentid=20303.

[80] 2000 Decennial Census

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Density Residential (RM)[81]. These zones allow for a range of densities, from 1 to 2.5 dwelling units per gross acre in SR 2 ½ to 7.3 to 21.7 dwelling units per gross acre in in RM. As a result, Bend is not required to estimate the need for manufactured dwellings on individual lots per OAR 660-024-0040(8)(c).

OAR 197.480(4) requires cities to inventory the mobile home or manufactured dwelling parks sited in areas planned and zoned or generally used for commercial, industrial or high density residential development. Bend allows manufactured home parks in Medium-10 Density Residential (RM-10), and Medium Density Residential (RM), and the High Density Residential (RH) zones. According to the Oregon Housing and Community Services' Manufactured Dwelling Park Directory,[82] Bend has 12 manufactured home parks with 1,349 spaces and 27 vacant spaces (Table 16). These parks are either located within the city or adjacent to it.

ORS 197.480(2) requires Bend to project need for mobile home or manufactured dwelling parks based on: (1) population projections, (2) household income levels, (3) housing market trends, and (4) an inventory of manufactured dwelling parks sited in areas planned and zoned or generally used for commercial, industrial or high density residential.

- Table 18 shows that the Bend planning area will need another 16,681 dwelling units over the 2008 to 2028 period to house the forecasted growth in population of 38,512 new people. Between 2014 and 2028, an additional 13,769 dwelling units will be needed to house the forecasted growth in population.

- Analysis of housing affordability (in Table 15) shows that about 34% of Bend's existing households are low income, earning 50% or less of the region's median family income. One type of housing affordable to these households is manufactured housing.

- Manufactured housing in parks accounts for about 4% (about 1,349 dwelling units) of Bend's current housing stock.

- National, state, and regional trends during the 2000 to 2010 period showed that manufactured housing parks were closing, rather than being created. For example, between 2003 and 2010, Oregon had a statewide decrease of 25% in the number of manufactured home parks. Before the housing market crash in 2008, there were discussions in Bend about the potential closing of several manufactured home parks.

- The longer-term trend for closing manufactured home parks is the result of manufactured home park landowners selling or redeveloping their land for uses with higher rates of return, rather than lack of demand for spaces in manufactured home parks. Manufactured home parks contribute to the supply of lower-cost affordable housing options, especially for affordable homeownership. The concurrent trends of manufactured home parks closing and no development new of manufactured home parks will exacerbate the shortage of affordable manufactured home park spaces. . Without some form of public investment to encourage continued operation of existing

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[81] See Bend Development Code (BDC) Table 2.1.200 – Permitted Land Uses

[82] Oregon Housing and Community Services, Oregon Manufactured Dwelling Park Directory, http://o.hcs.state.or.us/MDPCRParks/ParkDirQuery.jsp

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manufactured home parks and construction of new manufactured home parks, this shortage will continue.

The households most likely to live in manufactured homes in parks (shown in Table 15) are those with incomes between $18,000 and $30,000 (30% to 50% of median family income).

Assuming that about 5% of Bend's new single-family detached households (13,769 new dwellings) choose to live in manufactured housing parks, the City may need about 690 new manufactured home spaces. The City allows development of manufactured housing parks in residential zones, except the RH. This need for land for manufactured home parks is included in the projection of need for land for single-family detached housing.

However, development of a new manufactured home park in Bend over the planning period may be unlikely, given the trend towards closing manufactured home parks. If manufactured home parks are not developed in Bend in the future, demand will increase for other types of smaller, affordable owner-occupied housing, such as affordable cottage housing or single-family attached housing.

CHAPTER 5. RESIDENTIAL LAND SUFFICIENCY AND CONCLUSIONS

This chapter provides a brief summary of the implications of the housing needs analysis for Bend. This chapter begins with an estimate of Bend's residential capacity. This chapter includes a general comparison of land supply and demand for housing, including second homes and group quarters.

Residential Land Capacity

Pre-policy Base Case Capacity

The *Bend Urbanization Report* provides an explanation of the assumptions used in the Base Case analysis. Table 20 presents the "Base Case" housing capacity estimate before changes to housing policies (referred to as land use efficiency measures) are applied. Refer to the *Bend Urbanization Report* for more detail on the analysis of residential land capacity.

The "Base Case" is a spatial projection of housing and employment growth through 2028 within the current UGB based on past trends and current policies. The Base Case represents the current UGB's remaining capacity **prior** to applying assumptions regarding new residential efficiency measures. It does not identify housing need; rather, it provides an estimate of how much of the identified need can be met within the current UGB if no policy changes are made. The Base Case generally assumes development builds out according to current plan designations and uses the results of the *Bend Buildable Lands Inventory Report*, applying the historical densities observed for development over the 1998-2008 period (Table 4).

Table 20. Base Case Housing Capacity

Housing Type	New Housing Units	Mix Based on Capacity
Single Family Detached	5,870	70%
Single Family Attached	440	5%
Multi-Family	2,090	25%
Total	**8,400**	**100%**

Source: Draft *Bend Urbanization Report*

Residential Land Sufficiency

Table 21 compares the Base Case capacity with demand for housing. Table 21 shows:

- Capacity of Bend's residential land under the Base Case scenario (Table 20)

- Housing demand for the following types of housing:

  - Needed housing for 2014-2028 (Table 18)

  - Second homes need for 3,002 dwellings in the needed housing mix of 55% single-family detached, 10% single-family attached, and 35% multifamily.

  - Group quarters, all of which is assumed to be accommodated through additional equivalent multifamily units

- Comparison of the Base Case capacity and the total demand.

Under the Base Case capacity estimate, Bend has a deficit for land to accommodate 8,208 new dwelling units. Each category of housing shows a deficit in the Base Case capacity estimate.

Table 21. Base Case Residential Land Sufficiency, Bend, 2014-2028

	Capacity (Base Case)	Housing Demand				Comparison (Capacity *minus* Total Demand)
		Needed Housing 2014-2028	Second Homes	Group Quarters	Total Demand	
Single Family Detached	5,870	7,573	1,651		9,224	-3,354
Single Family Attached	440	1,377	300		1,677	-1,237
Multi-Family	2,090	4,819	1,051	461	6,331	-4,241
Total	**8,400**	**13,769**	**3,002**	**461**	**17,232**	**-8,832**

Source: ECONorthwest and Angelo Planning Group

Employment Land Needs in Residential Areas

The *Bend Urbanization Report* provides details about employment land needs in residential areas. In the Base Case, approximately, 70 jobs are expected to be accommodated in the following zones: RS, RM, and RH. See the *Bend Urbanization Report* for more information.

Conclusions

The preliminary conclusions of the housing needs analysis are:

- **Bend's current policies result in a housing mix (in the Base Case scenario) that is not consistent with needed mix.** Bend's land base, under current policies, would result in a mix of housing similar to the historical mix, with 70% of new housing in single-family housing types. The discussions of land use efficiency measures and policy changes that Bend adopts will result in a change in the capacity of Bend's residential land base.

- **The densities in the Base Case scenario may not be Bend's needed densities.** The needed densities will be determined based on the land use efficiency measures and policy changes that Bend adopts to better meet the identified need for additional development of more affordable housing, such as townhouses and multifamily housing.

Discussion of land use efficiency measures and narrowing of preferred growth scenarios will result in changes to the estimate of capacity for Bend's residential land base.

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APPENDIX A. RESEARCH ABOUT DEMOGRAPHIC CHANGES AND IMPLICATIONS FOR FUTURE HOUSING MIX

This appendix provides greater detail on the research conducted on the demographic trends that are summarized in the Table 7 through Table 9 in the HNA. This appendix is extracted from the memorandum to the Residential Lands Technical Advisory Committee called "Demographic Characteristics and Trends that will Affect Housing Demand in Bend for the 2008-2028 period" and dated July 23, 2014.

Key Findings by Topic

Aging Boomers

Question: Are aging Baby Boomers downsizing or staying put?

- **Some are downsizing.** "Thirty-two percent of Americans have moved in the past five years. More than half of the gen Yers report moving, and 31 percent of gen Xers have moved. Baby boomers and the oldest Americans are the least likely to have moved…Baby boomers and war babies/members of the silent generation are the most likely to have downsized in their most recent move. In fact, 50 percent of the oldest Americans report that their new home is smaller than their old one. One-third of baby boomers report moving into a smaller home, and 44 percent say they have moved into a larger home."[83]

Table A-22. Recent Movers Change in Home Size

	Recently moved?		Recent Change in Home Size			Expected Homeownership Status	
	Yes	No	Larger	Smaller	Same	Own	Rent
All Adults	32%	**67%**	**48%**	**27%**	**25%**	**73%**	**25%**
Gen Y	53%	47%	48%	25%	27%	69%	31%
Gen X	31%	69%	59%	20%	20%	81%	16%
Baby Boomers	20%	80%	44%	33%	22%	79%	20%
War babies/silent generation	19%	80%	24%	50%	25%	55%	36%

Source: ULI America in 2013, Leland Consulting Group

- **Preference for staying put increases with age.** The AARP conducted a housing preference survey of people age 45 or older and found that 73 percent of them strongly agreed with the statement, *"what I'd really like to do is stay in my current residence for as long as possible".* This preference increases with age. Seventy-eight percent of the respondents over 65 strongly agreed with the statement, whereas only 72 percent of those 50-64 and 60 percent of those age 45-49 strongly agreed with the statement.[84]

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[83] American in 2013 Focus on Housing and Community, Urban Land Institute

[84] "Home and Community Preferences of the 45+ Population" November 2010, AARP, Keenan Teresa A.

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"The aging of the population poses a different policy challenge. Most seniors prefer to age in place. While many of these households are currently well housed, their needs will change over time. Meeting those needs will require modifications to existing homes, the expansion of transportation networks and supportive services, and additions to the housing stock aimed specifically at the senior population. Many older Americans are also heading into their retirement years with little financial cushion and may find it difficult to find suitable housing that fits within their budgets. Expanding the range of housing options available to the country's growing senior population will require concerted efforts from both the public and private sectors."[85]

"Despite their shrinking households and declining labor force participation, Boomers do not appear to be altering their housing consumption by abandoning their detached single-family homes…In fact, contrary to the downsizing perception, the percent of Baby Boomers residing in single-family detached homes was at least as high in 2012 as at any time since the onset of the housing crisis. Even the oldest members of the Boomer generation, who have largely exited the childrearing stage and begun to retire in large numbers, show no major shift away from single-family residency….One likely mobility constraint is the substantial decline in Boomers' home values during the housing bust. Between 2006 and 2012, the average value of an owner-occupied single-family detached home with a Boomer householder declined by 13 percent."[86]

- **Being near friends, family, and social organizations grows increasingly important with age.** An AARP Housing Preference survey of householders 45 years and older, found that "Roughly two-thirds of respondents agreed that they want to stay in their home because *I like what my community has to offer me."* In contrast, roughly one-quarter agreed with the statement that they want to stay in their home because *"I cannot afford to move."…*When asked about seven different community aspects and the level of importance they have for them, two-thirds of respondents said that being near friends/and or family and being near where one wants to go (i.e., grocery stores, doctor's offices, the library) is *extremely* or *very important* to them. Roughly half noted that being near church or social organizations or being somewhere where it's easy to walk are *extremely* or *very important* to them, while somewhat fewer said the same thing about being near good schools or being near work. Only about one-fifth of respondents report that being near transit (bus or rail) was *extremely* or *very important* to them."[87]

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[85] Joint Center for Housing Studies of Harvard University, The State of the Nation's Housing, 2013

[86] "Are Aging Baby Boomers Abandoning the Single-Family Nest?" June 12, 2014. Fannie Mae Housing Insights, Volume 4, Issue 3.

[87] "Home and Community Preferences of the 45+ Population," Keenan Teresa A. November 2010, AARP

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Table A-23. Importance of Community Aspects for Staying in One's Community

Extremely or Very Important	Age		
	45-49	50-64	65+
Being near friends and/or family	60%	64%	71%
Being near where you want to go	68%	62%	70%
Being near church or social organizations	42%	43%	57%
It's easy to walk	46%	43%	51%
Being near good schools	64%	38%	31%
Being near work	43%	36%	21%
Being near transit	16%	22%	21%

Source: AARP

- **Retiring later.** "To put these trends in perspective, incomes among households under age 35 are back to 1990s levels. The recession had an even bigger impact on households between the ages of 35 and 54, whose incomes are now lower than those of similarly aged households in 1971. Now in what are typically the peak earning years, 45–54 year-olds have instead seen their real median incomes fall 6.0 percent from what they made ten years earlier (when they were aged 35–44). Over the next ten years, these households will be approaching typical retirement age, but the loss of income at such a critical point in their careers will make it difficult for many to save enough to stop working."[88]

- **Affordability for seniors.** "Affordability is a serious problem for seniors, especially for renters. According to a U.S. Department of Housing and Urban Development (HUD) report to Congress earlier this year, 1.33 million elderly renters (where the householder or spouse is age 62 or over, with no children under 18 present) had "worst case" housing needs in 2009. This meant that they earned less than half their metropolitan area's median income, received no government housing assistance and either paid more than half their income for rent, lived in severely inadequate housing, or both. Compared to 2007, the number of older renters in this category had increased by 120,000 (10 percent) – a change that the HUD report attributes to fallout from the foreclosure crisis and recession, as shrinking incomes drove increased competition for already scarce affordable housing. Seventy percent of senior renters spend at least 30 percent of their income on housing costs. Senior homeowners are not immune from affordability problems either: about three in 10 senior homeowners spend at least 30 percent of their income on housing and 17 percent pay at least half their income. Even seniors who own their houses free and clear face rising energy costs and, in some locations, rising property taxes."[89]

- **Housing released by seniors.** "Some seniors occupy newly constructed housing (so the total release of housing exceeds the net release). In 2009, for example, housing built since 2000 accounted for about seven percent of owner-occupied dwellings occupied by seniors

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[88] Joint Center for Housing Studies of Harvard University, The State of the Nation's Housing, 2013

[89] Demographic Challenges and Opportunities for U.S. Housing Markets, March 2012, Bipartisan Policy Center

and 10 percent of rentals. Seniors' consumption of new housing may rise in the next two decades as Baby Boomers – whose wealth and income are higher than that of today's retirees and who are entering retirement in vastly larger numbers – seek new options to downsize, accommodate disabilities or live in different types of neighborhoods. Just as demand created by Baby Boomers spurred new apartment construction in the 1970s, the sheer size of the Baby Boom generation could cause a dramatic increase in the construction of senior-accessible housing over the coming decades. Baby Boomers' ability to move into new housing, however, will depend on where, when and for how much they will seek to sell their current residences…..Despite potential increases in new construction, most of the houses that seniors will release in coming years were built when energy was inexpensive, nuclear families were the rule, incomes were increasing for most Americans, and mortgages were generally predictable and easy to obtain. Most observers expect the next 20 to 30 years to depart from this historic picture, with more expensive energy, growing diversity in race, ethnicity and in household structure, and more intense international economic competition. All of these factors will likely reduce demand for large single-family homes on large lots far away from established centers of employment and entertainment."[90]

- **Fewer elderly living alone in multifamily buildings.** The percent of people 70 years or older that head households in multifamily buildings has been in decline since 1979.[91]

Table A-24. Aging Alone

Aging Alone

Share of households living in multi-unit buildings, by age of head of household

── Age 50-69   ── Age 70+

** No data for 1988, Source: Trulia, Census Bureau | WSJ.com
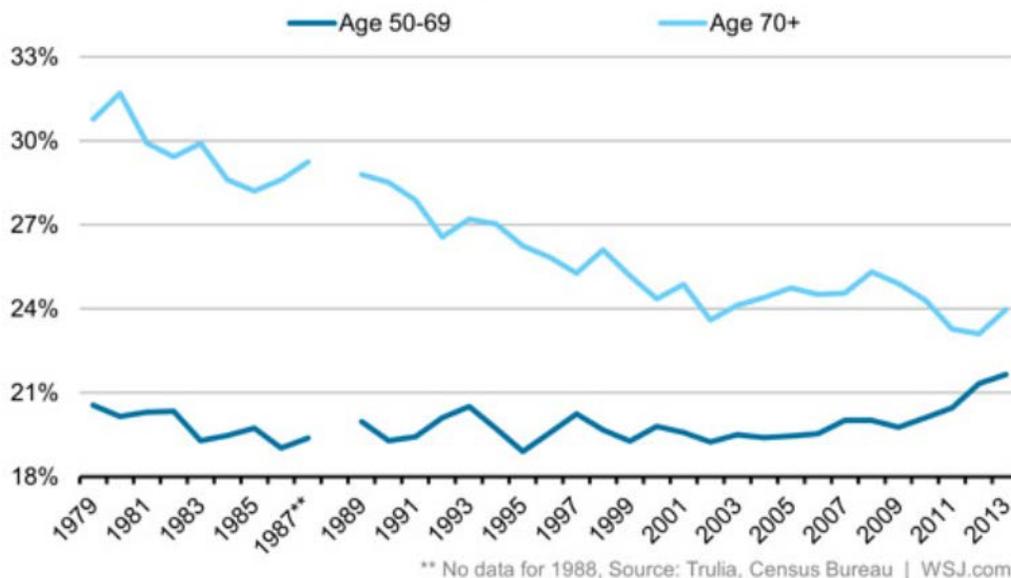
Source: The Wall Street Journal, Trulia, Census Bureau

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[90] Demographic Challenges and Opportunities for U.S. Housing Markets, March 2012, Bipartisan Policy Center

[91] "Baby Boomers Aren't (Yet) Downsizing in Droves", Nick Timiraos, June 27, 2014, The Wall Street Journal

Delayed Millennial Household Formation

Are Millennials putting off housing formation as a short-term response to the recession or are there other underlying factors that will impact their housing decisions much farther into the future?

- **Student debt.** "For today's younger households, student loan debt may make the transition to homeownership more difficult. According to the Federal Reserve Bank of New York, the number of young adults under age 30 with student loan debt outstanding increased by 39 percent between the start of 2005 and the end of 2012, with the average amount rising from $13,300 to $21,400. However, concerns over rising student loan debt often overlook the fact that the trend also affects older households. The increase was even larger among adults in their 30s, with the number of borrowers up 76 percent and average debt climbing from $20,000 to $29,400. Moreover, of the $600 billion increase in student loans outstanding in 2005–12, fully 38 percent was among households over age 40. Since many of these older households already own homes, the sharp rise in student loan debt could affect their ability to meet their mortgage obligations."[92]

- **Diversity and household formation.** "To estimate the magnitude of the demand that Millennials may (or may not) bring to housing markets in the next 20 years, we developed three scenarios. We began with the 1990, 2000 and 2010 Census results and the Census Bureau's national population projections assuming a constant net rate of immigration at 975,000 people per year. Using the observed and projected population series, we computed national rates of household formation and homeownership for people grouped by age cohort (10-year groups starting at age 15) and by race/ethnicity (white non-Hispanic, black non-Hispanic, other non-Hispanic and Hispanic)…The range of estimates in these scenarios can be attributed to different rates of household formation for Millennials. Under the low scenario, people between 15 and 34 years old in 2010 (a span that includes Millennials plus five years of the Baby Bust generation) would form 15.6 million new households between 2010 and 2020. Other cohorts would account for the formation of an additional 5.4 million households over the same time period. The medium scenario would result in 17.1 million new Echo Boomer households and 6.1 million other households. The high scenario, finally, yields 18.8 million new Echo Boomer households and 6.7 million new households from other generations. Because changes in the number of older households are less sensitive to differences in economic assumptions, the decline in older households is more consistent across the three scenarios, ranging from 10.6 million fewer old households in the high scenario to 11.6 million fewer old households in the low scenario."[93]

- **Education.** "Compared to previous generations at the same age, Millennials are more likely to have completed high school, and more than half (54 percent) have at least some college education, compared to 49 percent of people in the Baby Bust generation and 36 percent of Baby Boomers when they were 18 to 28 years old. In terms of educational achievement, women of the Echo Boom generation have vaulted far above women of previous generations; in fact, among Millennials, more women than men and more women than in

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[92] Joint Center for Housing Studies of Harvard University, The State of the Nation's Housing, 2013

[93] Demographic Challenges and Opportunities for U.S. Housing Markets, March 2012, Bipartisan Policy Center

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any previous generation have attained a college education…The growth in female educational attainment may also portend higher levels of household formation if it results in greater gender equity and gives women more financial independence. Other factors, however, could inhibit household formation and homeownership. Young adults carry high levels of credit card and student loan debt; even young people who already had formed households had higher debt loads in 2009 than people of the same age 10 years earlier.[31] Rates of marriage declined in the 2000s from 8.2 per thousand to 6.8 per thousand.[32] Finally, while all households lost wealth during the recession, average household wealth fell well below $10,000 for Hispanic and black households. Considering the diversity of the young population, this reduction in wealth among older adults will reduce the purchasing power of a significant fraction of young people who can no longer count on their parents' housing wealth."[94]

- **Household formation.** "At a basic level, changes in the number of adults and the rates at which adults head independent households determine household growth. On the plus side, the number of adults aged 18 and older rose by 18.1 million from 2005 to 2012 and fully 2.4 million in the past year alone. The echo-boom generation (born after 1985) fueled much of this growth, helping to boost the number of adults in their mid-20s—the group most likely to form new households. But while the young adult population has been growing, the rate at which members of this age group head their own households has declined. As a result, household growth has not kept pace with population growth. Going forward, though, even if today's low household formation rates persist, the aging of the large echo-boom cohort into their 30s will raise household headship rates because of lifecycle effects. Indeed, one out of every two 30–34 year-olds heads an independent household, compared with just one in four 20–24 year-olds. Since household headship rates continue to rise (albeit more slowly) through older adulthood, the rates for the Millennials will likely increase for years to come."[95]

- **Mobility and homeownership.** "While mobility rates have fallen for nearly all household types, the decline was particularly steep for homeowners that have mortgages. Mobility rates for this group fell from 7.1 percent in 2007 to only 4.9 percent in 2011. The reasons for this short-term drop are numerous and include the lock-in effect of home price declines, falling incomes, fewer new employment opportunities, and tightened credit standards making it more difficult to qualify for a new mortgage Mobility rates are highest among renters and young adults. In 2011, fully 28.8 percent of renter households changed residences, compared with just 4.4 percent of homeowners. Young householders are also more mobile, with rates at 52.7 percent for those under age 25—significantly higher than the 19.7 percent for household heads in the next older age group…The oldest Millennials are just beginning to swell the ranks of young adult movers. Having more young adults in the population may thus change the composition of housing demand in the coming years, given that younger households are more likely than older households to move into rentals (82

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[94] Demographic Challenges and Opportunities for U.S. Housing Markets, March 2012, Bipartisan Policy Center

[95] Joint Center for Housing Studies of Harvard University, The State of the Nation's Housing, 2013

percent vs. 67 percent) and less likely to move into single-family homes (42 percent vs. 50 percent)."[96]

- **Gen Y has more urban community characteristic preferences.** "Gen Y expresses preferences that differ from those of the other generations in interesting ways. Gen Y is the least likely to value neighborhood safety or space between neighbors, but the most likely to want high-quality public schools, a short distance to work or school, walkability, and proximity to amenities like shopping and transit...Among gen Yers, 54 percent—representing nearly 39 million people—would trade a larger home for a shorter commute. Among all generations, gen Y is the most attracted to living in a neighborhood close to a mix of shops, restaurants, and offices. Sixty-two percent of gen Yers (representing more than 44 million people) prefer this type of mixed-use community over one where shops, restaurants, and offices are farther away. Gen Y is also the only age cohort that shows a preference for living in a neighborhood where there is a mix of housing types. Fifty-nine percent of gen Yers— representing more than 42 million people—would like to live in a community where there is a range of housing. Similarly, 52 percent of gen Yers (representing more than 37 million people) would like to live in a community where there is a range of incomes."[97]

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[96] Joint Center for Housing Studies of Harvard University, The State of the Nation's Housing, 2013

[97] American in 2013 Focus on Housing and Community, Urban Land Institute

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Table A-25. Community Characteristics

Importance of Community Characteristics	Homeownership status		By Generation				
Percentage ranking each characteristic 6 or higher in importance on a scale of 1 to 10	Owners	Renters	All Adults	Gen Y	Gen X	Baby boomers	War babies/ silent generation
Neighborhood safety	94%	88%	**92%**	88%	97%	92%	92%
Quality of local public schools	77%	83%	**79%**	87%	82%	74%	68%
Space between neighbors	75%	68%	**72%**	69%	79%	70%	70%
Short distance to work or school	66%	76%	**71%**	82%	71%	67%	57%
Distance to medical care	68%	65%	**71%**	73%	63%	72%	78%
Walkability	75%	79%	**70%**	76%	67%	67%	69%
Distance to shopping/entertainment	63%	71%	**66%**	71%	58%	67%	69%
Distance to family/friends	59%	70%	**63%**	69%	57%	60%	66%
Distance to parks/recreational areas	63%	64%	**64%**	68%	62%	63%	60%
Convenience of public transportation	44%	67%	**52%**	57%	45%	50%	56%

Source: Urban Land Institute

Housing choices of Hispanic and Latino households

Does the growing Hispanic population have different housing needs/preferences than the average household and how will this impact Bend's housing supply in the future?

- **Growth in home ownership.** "U.S. Census data over the past 12 years shows that despite suffering significant losses during the recent foreclosure crisis, Hispanics have achieved homeownership gains in all but two of those years. During the same 12-year period, the number of Hispanic homeowners grew from 4.24 million in 2000 to 6.69 million in 2012, a remarkable increase of 58 percent at a time when the rest of the U.S. population saw a net increase of only 5 percent. In 2012, home prices increased significantly in most markets across the country for the first time in half a decade. Hispanic household growth and home purchases were arguably the most important drivers of the housing recover."[98]

- **Recession and home value drop.** "Between 1995 and 2004, rates of homeownership among blacks rose by seven percentage points; among Hispanics, homeownership grew even more quickly – from about 40 percent in 1993 to 50 percent in 2005–2006. Between 2004–2006 and 2010, however, homeownership rates dropped sharply, and more so for Hispanic and black households than for white non-Hispanics. The overall homeownership rate of 65.1 percent in April 2010 was 1.1 percentage points lower than 10 years earlier. While the housing crisis has hurt people of all races and ethnicities, it has been devastating for many Hispanic and black families, reducing their median wealth by one half to two-thirds

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and significantly increasing the number of households with negative net worth."[99]

"The recession-induced drop in home values has been especially damaging to minority and low-income households. On average, real home values for Hispanic owners plummeted nearly $100,000 (35 percent) between 2007 and 2010, while the decline for black owners was nearly $69,000 (31 percent). By comparison, average values for white homeowners fell just 15 percent over this period…Moreover, white homeowners still had $166,800 in home equity on average in 2010—about twice the amount that blacks and Hispanics held…Over the next decade, minorities will make up an increasing share of young households and represent an important source of demand for both rental housing and starter homes. While their housing aspirations are similar to those of whites, minorities face greater constraints in pursuing those goals because of their lower incomes and wealth."[100]

- **Hispanic population is younger.** "Hispanics are also a much younger demographic averaging a full 10 years younger than the overall population…Every month 50,000 young Hispanics reach the age of 18**…**With a median age of 27, the Hispanic population is 10 years younger than the total U.S. median age of 37 years. In particular, Hispanics are heavily represented in the 26 to 46 age range involved in most home sales."[101]

- **Hispanic households are larger.** Hispanic households are typically larger than the households of non-Hispanic Whites….Sixty-one percent of all Hispanic households consist of a married couple with children younger than 18."[102]

- **Hispanics believe that home ownership is a good investment.** "Despite being hit hard by the housing market downturn, three-in-four (75%) Latinos agree that buying a home is the best long-term investment a person can make in the U.S. This compares with 81% of the general population who say the same….Fully 83% of Latino homeowners say owing a home is the best long-term investment, while 70% of renters say the same. All of these demographic and cultural characteristics make Hispanics ideal homebuyers in the housing market. In fact, Hispanics are expected to comprise half of all new homebuyers by 2020"[103]

- **First-time homebuyers.** "Forward thinking companies are already changing their strategy to reflect this shift. Case in point: D.R. Horton, the nation's largest residential homebuilder, achieved huge profits in 2012 by constructing low-priced homes. Rather than focus on the move-up market, Horton cornered the entry-level market—the market most heavily represented by minority Hispanic and Asian first-time homebuyers…By virtue of their

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[99] Demographic Challenges and Opportunities for U.S. Housing Markets, March 2012, Bipartisan Policy Center

[100] Joint Center for Housing Studies of Harvard University, The State of the Nation's Housing, 2013

[101] State of Hispanic Homeownership Report, National Association of Hispanic Real Estate Professionals (NAHREP), 2012

[102] State of Hispanic Homeownership Report, National Association of Hispanic Real Estate Professionals (NAHREP), 2012

[103] Pew Research Hispanic Trends Project, "III. Latinos and Homeownership", January 26, 2012.

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population growth, rate of household formation and purchasing power, Hispanics are expected to drive demand for small starter homes in vibrant, high-density communities."[104]

- **Multigenerational.** "Indeed, as the Hispanic share of the U.S. population continues to grow, a substantial increase in demand is being created for building new homes that meet the structural housing needs of large and multi-generational Hispanic families…Some builders are already creating products that meet the shifting demand and needs of these consumer segments who want home with enough space to accommodate parents, adult children or tenants. These new floor plans feature a second, self-contained unit with its own entrance, bathroom and kitchenette—a development that meets both the short- and long-term needs of many Hispanic households."[105]

- **Demand for smaller units.** "Hispanics, in particular, will stimulate demand for condominiums, smaller starter homes, first trade-up homes and the estimated 11 million housing units that will become available between 2010 and 2020 as baby boomers retire."[106]

- **Preference for walkable neighborhoods.** According to the Pew Research Center, Hispanics prefer to live in neighborhoods where houses are smaller and closer together, but schools/stores are within walking distance by 60 percent compared to 44 percent of non-Hispanic Whites.[107]

Opportunities to provide housing development through infill and redevelopment

Are Bend residents really willing to trade single-family homes on larger lots for urban walkable neighborhoods?

- **Shorter commute for a smaller home.** According to the ULI, "among older Americans, many of whom have spent substantial time in the workforce and may continue working beyond the traditional retirement age, the preference for a shorter commute is very strong, even if it means living in a smaller home. Seventy-two percent of baby boomers, or nearly 53 million people, would make that tradeoff. Similarly, 65 percent of war babies and members of the silent generation—nearly 23 million people—would trade a larger home for a shorter commute. Almost 51 percent of these older Americans (representing 18 million people) also show a slight preference for living in areas close to a mix of shops, restaurants, and offices, reinforcing their preference, particularly as they age, for walkable communities near amenities."[108]

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[104] State of Hispanic Homeownership Report, National Association of Hispanic Real Estate Professionals (NAHREP), 2012

[105] State of Hispanic Homeownership Report, National Association of Hispanic Real Estate Professionals (NAHREP), 2012

[106] State of Hispanic Homeownership Report, National Association of Hispanic Real Estate Professionals (NAHREP), 2012

[107] 2014 Political Polarization Survey, Table 3.1 Preferred Community, Pew Research Center for the People and the Press, June 12, 2014

[108] American in 2013 Focus on Housing and Community, Urban Land Institute

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Table A-26. Community Attribute Preferences

Community Attribute Preferences	Homeownership status		By Generation				
Percentage preferring listed attribute	Owners	Renters	All Adults	Gen Y	Gen X	Baby boomers	War babies/ silent generation
Shorter commute/smaller home	63%	56%	**61%**	54%	54%	72%	65%
Close to mix of shops, restaurants, and offices	49%	60%	**53%**	62%	50%	49%	51%
Mix of incomes	50%	53%	**52%**	52%	53%	53%	47%
Public transportation options	44%	62%	**51%**	55%	45%	52%	48%
Mix of homes	43%	57%	**48%**	59%	47%	42%	44%
Percentage choosing three or more of these compact development attributes	-	-	**54%**	*59%*	*49%*	*57%*	*51%*

Source: Urban Land Institute

- **Likelihood of moving and anticipated new housing.** "Many Americans report that they are likely to change homes during the next five years. *"America in 2013"* found that 42 percent of Americans—representing 98 million people—are likely movers. Making up that 42 percent are 25 percent who are very likely to move and 17 percent who are somewhat likely. Gen Yers are the most likely to move: 63 percent say they expect to move during the next five years. America's oldest generations are the least likely to move. Lower-income people are more likely to move than those with higher incomes. Fifty-one percent of the people making less than $25,000 report that they are likely to move in the next five years, compared with 43 percent of those making more than $75,000. Most movers—73 percent— believe they will own the primary residence they move into; one-quarter expect to rent. Gen Yers and the oldest Americans are the most likely to expect to rent their new home, and gen Xers are the least likely to expect to rent. Just 20 percent of the baby boomers expect to rent…Most movers in Generation X—87 percent—expect to live in a single-family home. For the oldest generations, 30 percent of movers expect to move to apartments or compact homes like townhouses or rowhouses."[109]

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[109] *American in 2013 Focus on Housing and Community, Urban Land Institute*

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Table A-27. Recently Moved and Change in Home Size

	Recently moved?		Recent Change in Home Size		
	Yes	No	Larger	Smaller	Same
All Adults	32%	**67%**	**48%**	**27%**	**25%**
Gen Y	53%	47%	48%	25%	27%
Gen X	31%	69%	59%	20%	20%
Baby Boomers	20%	80%	44%	33%	22%
War babies/silent generation	19%	80%	24%	50%	25%

Source: Urban Land Institute

Table A-28. Likelihood of Moving and Expected Type of New Home

	Likely to Move		Expected Homeownership Status		Movers' Expected Type of Home			
	Likely to move	Not likely to move	Expect to own	Expect to rent	Single-family	Apartment	Duplex, townhouse, rowhouse	Manufactured/ mobile home
All Adults	42%	**57%**	**73%**	**25%**	**65%**	**15%**	**14%**	**2%**
Gen Y	63%	36%	69%	31%	60%	21%	17%	1%
Gen X	41%	59%	81%	16%	87%	6%	4%	1%
Baby Boomers	31%	68%	79%	20%	65%	11%	16%	6%
War babies/silent generation	22%	76%	55%	36%	58%	17%	13%	0%

Source: Urban Land Institute

- **Community preference.** "Americans prefer walkable communities, but only to a point. In most comparisons tested, a majority prefers the community where it is easier to walk or the commute is shorter. But when comparing a detached single-family house to an apartment or townhouse, the detached home wins out—even with a longer commute and more driving.

  o A majority prefers houses with small yards and easy walks to schools, stores and restaurants over houses with large yards but where you have to drive to get to schools, stores and restaurants (55 percent to 40 percent).

  o An even larger majority prefers houses with smaller yards but a shorter commute to work over houses with larger yards but a longer commute to work (57 percent to 36 percent).

o   A neighborhood with a mix of houses, stores and businesses that are easy to walk to is preferred over a neighborhood with houses only that requires driving to stores and businesses (60 percent to 35 percent).

o   Nevertheless, when given a choice between a detached, single family house that requires driving to shops and a longer commute to work and an apartment or condominium with an easy walk to shops and a shorter commute to work, a strong majority prefers the single family home –even with the longer commute (57 percent to 39 percent)."[110]

Table A-29. Current Community Versus Preferred Community

	Where You Live Now	Where you Prefer to Live
City -Near mix of offices, apartments, and shops	16%	15%
City - Mostly residential neighborhood	19%	13%
Suburban neighborhood with a mix of houses, shops, and businesses	27%	30%
Suburban neighborhood with houses only	15%	11%
Small Town	11%	14%
Rural Area	11%	16%

Source: National Association of Realtors, 2013 Survey

- **Housing demand will shift.** According to the Director of the Metropolitan Research Center at the University of Utah, Arthur Nelson, housing demand is shifting from large lot homes to small lot, townhomes and attached housing and the current supply of housing will not meet future needs.[111]

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[110] National Association of Realtors, National Community Preference Survey, 2013

[111] "Reshaping America's Built Environment", Arthur C. Nelson

Table A-30. US Housing Demand Shift 2010-2030

House Type	2010 Supply 2030 Demand	2030 Demand	Difference
Attached/Other	26%	34%	8%
Townhome	6%	18%	12%
Small Lot	11%	50%	39%
Large Lot	69%	34%	-35%

Source: Arthur C. Nelson, Presidential Professor & Director, Metropolitan Research Center, University of Utah

- **Political influence on housing preference.** "Given the choice, three-quarters (75%) of consistent conservatives say they would opt to live in a community where "the houses are larger and farther apart, but schools, stores and restaurants are several miles away," and just 22% say they'd choose to live where "the houses are smaller and closer to each other, but schools, stores and restaurants are within walking distance." The preferences of consistent liberals are almost the exact inverse, with 77% preferring the smaller house closer to amenities, and just 21% opting for more square footage farther away."[112]

- **Fewer households with children.** "Currently, only one third of U.S. households have children, and over the next two decades only 12% of new households being formed will have children. Childfree households are prime candidates for locating in denser areas of cities, within walking range of commercial services and entertainment. Households with two working parents are also increasingly seeking to live in urban areas to simplify their lives, taking advantage of child-care services and after-school educational opportunities available in urban areas."[113]

- **Recent movers prefer walkable communities.** "There is a wider divide among those who have moved in the last three years or are planning to move in the next three years. Recent movers prefer the walkable community by 20 points (58 to 38 percent), almost identical to the walkable community preference expressed by those who plan to move in the next three years (+18 points, 57 to 39 percent)."[114]

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[112] Pew Research, Center for the People and the Press, Political Polarization in the American Public, Section 3: Political Polarization and Personal Life. June 12, 2014

[113] Business Performance in Walkable Shopping Areas, November 2013, Robert Wood Johnson Foundation.

[114] National Association of Realtors, National Community Preference Survey, 2013

Sources

The following list provides examples of key articles used in the research for this memorandum.

American Association of Retired Persons (AARP)

Multiple studies show that people over age 45 prefer to stay in their home or community as long as possible, including multiple surveys by AARP.

The AARP survey *Home and Community Preferences of the 45+ Population* shows that 85% of respondents want to stay in their current residence and community as long as possible.

The AARP survey *Approaching 65: A Survey of Baby Boomers Turning 65 Years Old* of people 65 years old shows that about 15% of responding households are planning to downsize to smaller homes over the next few years.

http://www.aarp.org/research/surveys

Bipartisan Policy Center

The *Demographic Challenges and Opportunities for U.S. Housing Markets* report discusses the housing implications of demographic trends and change including the growing senior population, the Millennials, the setbacks suffered by minorities during the recession, and the increasing demand for rental housing.

http://www.urban.org/UploadedPDF/412520-Demographic-Challenges-and-Opportunities-for-US-Housing-Markets.pdf

Fannie Mae

The report *Are Aging Baby Boomers Abandoning the Single-Family Nest?* by Fannie Mae notes that Baby Boomers are becoming empty-nesters, but they have not been giving up single family homes as once expected.

http://www.fanniemae.com/resources/file/research/datanotes/pdf/housing-insights-061214.pdf

Joint Center for Housing Studies of Harvard University

The State of the Nation's Housing is an annual report by Harvard University discussing national demographic trends, the housing recovery from the recession, mortgage markets and the implications for the ownership and rental housing.

http://www.jchs.harvard.edu/research/state_nations_housing

Metropolitan Research Center, University of Utah

Arthur C. Nelson, Presidential Professor & Director of the Metropolitan Research Center at the University of Utah, is well regarded for his research on the changing nature of housing in the US. He frequently posts research and presentations on his findings. The *"Reshaping America's Built Environment"* presentation in particular was referenced in this research.

http://faculty.utah.edu/u0621068-ARTHUR_C_NELSON/bibliography/index.hml

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National Association of Hispanic Real Estate Professionals (NAHREP)

The *State of Hispanic Homeownership Report*, delves into the demand and drivers behind Hispanic homeownership.

http://nahrep.org/downloads/state-of-homeownership.pdf

National Association of Realtors (NAR)

The *National Community Preference Survey* asks residents about specific housing preferences. According to their 2013 survey, 60 percent of respondents prefer to live in mixed-use, walkable communities, and are willing to trade a shorter commute for a smaller house.

http://www.realtor.org/reports/nar-2013-community-preference-survey

Pew Research Center

The Pew Research Center is well-known for producing surveys and reports on a variety of topics, one report researched in this effort includes the *Second-Generation Americans: A Portrait of the Adult Children of Immigrants,* which compares first generation immigrants to their children and to the general population.

http://www.pewsocialtrends.org/2013/02/07/second-generation-americans/

The Hispanic Trends Project produced a report *"Latinos and Homeownership"* which looked specifically at the growing Hispanic population and the implications for homeownership, and noted that Hispanics were particularly hard hit during the recession.

http://www.pewhispanic.org/2012/01/26/iii-latinos-and-homeownership/

Another report looks at the correlation between a person's political preferences and housing and community preferences. *Political Polarization in the American Public, Section 3: Political Polarization and Personal Life*. June 12, 2014

http://www.people-press.org/2014/06/12/political-polarization-detailed-tables/

Robert Wood Johnson Foundation

The report, *Business Performance in Walkable Shopping Areas,* quantifies the performance of walkable places compared to suburban locations in the same market area.

Urban Land Institute (ULI)

The ULI is well known for its expertise on land use issues. Examples of research include *Housing in America: The New Decade,* and the *Generation Y: America's New Housing Wave.* A national survey of Millennials in 2010 showing that: two-thirds of Millennials expect to own their home by 2015, that nearly two-thirds expect to live in a single-family home, one-quarter expects to live in an apartment or condominium. Another report, *America in 2013 Focus on Housing and Community,*

http://uli.org/wp-content/uploads/ULI-Documents/America-in-2013-Compendium_web.pdf

APPENDIX B. REMAND DIRECTIVES AND STATUTORY REQUIREMENTS

Remand Directives

Table B-1 lists the directives to the City from the Remand. Each of the directives are addressed in the housing needs analysis. Other remand directives about land use efficiency measures are addressed in the *Bend Urbanization Report*.

Table B-1. Policy Direction on BLI Issues to Date

HNA Issue	Directives to City on Remand	Where the HNA addresses the issue
Categories of housing used in the Housing Needs Analysis Section 2.3, Pages 26-33	While the City is free to *separate* the three basic housing types required to be analyzed by statute into subcategories, it may not *combine* categories as this effectively makes it impossible to do the analysis required by statute.[115] Goal 10, the Goal 10 implementing rule, and the needed housing statutes also require that the City analyze needed housing types at particular price ranges and rent levels commensurate with the financial capabilities of present and future area residents. [116]	Table 6
Comply with the analysis required in ORS 197.296, ORS 197.303 Section 2.3, Pages 26-33	Revise the Housing Needs Analysis to comply with ORS 197.296, OAR 660-008-0020, and ORS 197.303. The Housing Needs Analysis must include an evaluation of the need for at least three housing types at particular price ranges (owner occupancy) and rent levels (renter occupancy), and commensurate with the financial capabilities of current and future residents. Those housing types include: (a) attached single family housing (common-wall dwellings or rowhouses where each dwelling unit occupies a separate lot pursuant to OAR 660-008-0005(1)); (b) detached single family housing (a housing unit that is free standing and separate from other housing units pursuant to OAR 660-008-0005(3); and (c) multiple family housing (attached housing where each dwelling unit is not located on a separate lot pursuant to OAR 660-008-0005(5));[117]	Table 6 Table 19

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[115] Remand and Partial Acknowledgment Order ACKNOW-001795, LCDC, November 2, 2010, Sub-Issue 2.3 d, p. 31

[116] Remand and Partial Acknowledgment Order ACKNOW-001795, LCDC, November 2, 2010, Sub-Issue 2.3 d, p. 31

[117] Report on Bend and Deschutes County's Amendment to the Bend Urban Growth Boundary, DLCD Order 001775, January 8, 2010, p. 46

HNA Issue	Directives to City on Remand	Where the HNA addresses the issue
Future Housing Needs Section 2.3, Pages 26-33	…under Goals 10 and 14 the City also must consider the *future* housing needs of area residents during the (twenty-year) planning period. The purpose of the analysis of both past trends and future needs is that -- if there is a difference – the local government must show how it is planning to alter those past trends in order to meet the future needs. [118]	Table 19
Adequate supply of buildable lands for affordable housing Section 2.4, Pages 33-36	The City must (under Goal 10 and the needed housing statutes) plan for an adequate supply of buildable land for affordable housing, including workforce housing (whether that land is inside the prior UGB, on lands in a UGB expansion area, or both).[119]	Table 19
Future housing mix Section 2.4, Pages 33-36	The City must plan lands within its existing UGB and any expansion area so that there are sufficient buildable lands in each plan district to meet the city's anticipated needs for particular needed housing types. If the City continues to project a future housing mix of 65% single-family and 35% multi-family, it must explain why that housing mix will provide sufficient buildable lands to meet its projected future housing needs over the planning period, and that projection and explanation must be supported by an adequate factual base.[120]	The City is planning for a different housing mix, shown in Table 17.
HNA and Efficiency Measures		

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[118] Remand and Partial Acknowledgment Order ACKNOW-001795, LCDC, November 2, 2010, Sub-Issue 2.3 d, p. 32

[119] Remand and Partial Acknowledgment Order ACKNOW-001795, LCDC, November 2, 2010, Sub-Issue 2.3 d, p. 35

[120] Remand and Partial Acknowledgment Order ACKNOW-001795, LCDC, November 2, 2010, Sub-Issue 2.3 d, p. 35-36

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HNA Issue	Directives to City on Remand	Where the HNA addresses the issue
Residential development density assumptions\n\nSection 3.1, Pages 48-54	LCDC concluded that the City's densities for housing were, in their view, low, resulting in land use that is not sufficiently efficient to meet Bend's needed housing.\nNeed to determine if raising the minimum densities of the residential zones is necessary to encourage the development of needed housing\nOn remand, the City must address both prior trends (as required by ORS 197.296(5)) and recent existing steps it already has taken to increase density and meet its housing needs. The requirement of Goal 14 to reasonably accommodate future land needs within its UGB does not allow the city to use an unreasonably conservative projection of future development capacity\nNevertheless, given the apparent market demand for increasing density relative to existing planning and zoning designations, the City must explain why increasing the density allowed, particularly for large blocks of vacant land outside of existing established neighborhoods, is not reasonable during the 20-year planning period. [121]	This issue will be addressed in the HNA by the time it is finalized. For now, the HNA uses the Base Case scenario to estimate capacity, based on historical densities, shown in Table 20.
HNA and Employment Lane Needs		
Using residentially designated land for employment uses\n\nSection 5.8 Pages 82-	The City identified 119 gross acres of land as being necessary to accommodate employment on residentially zoned land. The analysis was presented in the City's economic opportunities analysis (EOA), not HNA. LCDC required the City's revised HNA to include analysis of land needed for employment uses within residential zones.	This issue will be addressed in the HNA by the time it is finalized.

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[121] Remand and Partial Acknowledgment Order ACKNOW-001795, LCDC, November 2, 2010, Sub-Issue 3.1 d, p. 50-53

Statutory Requirements

This section provides the full text of the key Oregon Revised Statutes that describe the requirements of a housing needs analysis.

ORS 197.296

(2) At periodic review pursuant to ORS 197.628 to 197.651 or at any other legislative review of the comprehensive plan or regional plan that concerns the urban growth boundary and requires the application of a statewide planning goal relating to buildable lands for residential use, a local government shall demonstrate that its comprehensive plan or regional plan provides sufficient buildable lands within the urban growth boundary established pursuant to statewide planning goals to accommodate estimated housing needs for 20 years. The 20-year period shall commence on the date initially scheduled for completion of the periodic or legislative review.

(3) In performing the duties under subsection (2) of this section, a local government shall:

(a) Inventory the supply of buildable lands within the urban growth boundary and determine the housing capacity of the buildable lands; and

(b) Conduct an analysis of housing need by type and density range, in accordance with ORS 197.303 and statewide planning goals and rules relating to housing, to determine the number of units and amount of land needed for each needed housing type for the next 20 years.

(4)(a) For the purpose of the inventory described in subsection (3)(a) of this section, "buildable lands" includes:

(A) Vacant lands planned or zoned for residential use;

(B) Partially vacant lands planned or zoned for residential use;

(C) Lands that may be used for a mix of residential and employment uses under the existing planning or zoning; and

(D) Lands that may be used for residential infill or redevelopment.

(b) For the purpose of the inventory and determination of housing capacity described in subsection (3)(a) of this section, the local government must demonstrate consideration of:

(A) The extent that residential development is prohibited or restricted by local regulation and ordinance, state law and rule or federal statute and regulation;

(B) A written long term contract or easement for radio, telecommunications or electrical facilities, if the written contract or easement is provided to the local government; and

(C) The presence of a single family dwelling or other structure on a lot or parcel.

(c) Except for land that may be used for residential infill or redevelopment, a local government shall create a map or document that may be used to verify and identify specific lots or parcels that have been determined to be buildable lands.

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(5)(a) Except as provided in paragraphs (b) and (c) of this subsection, the determination of housing capacity and need pursuant to subsection (3) of this section must be based on data relating to land within the urban growth boundary that has been collected since the last periodic review or five years, whichever is greater. The data shall include:

(A) The number, density and average mix of housing types of urban residential development that have actually occurred;

(B) Trends in density and average mix of housing types of urban residential development;

(C) Demographic and population trends;

(D) Economic trends and cycles; and

(E) The number, density and average mix of housing types that have occurred on the buildable lands described in subsection (4)(a) of this section.

(b) A local government shall make the determination described in paragraph (a) of this subsection using a shorter time period than the time period described in paragraph (a) of this subsection if the local government finds that the shorter time period will provide more accurate and reliable data related to housing capacity and need. The shorter time period may not be less than three years.

(c) A local government shall use data from a wider geographic area or use a time period for economic cycles and trends longer than the time period described in paragraph (a) of this subsection if the analysis of a wider geographic area or the use of a longer time period will provide more accurate, complete and reliable data relating to trends affecting housing need than an analysis performed pursuant to paragraph (a) of this subsection. The local government must clearly describe the geographic area, time frame and source of data used in a determination performed under this paragraph.

In addition, ORS 197.303 and 197.307 define needed housing and what actions a local government must take to ensure an adequate supply of land is available for the development of needed housing. The pertinent sections of these statutes are:

197.303 "Needed housing" defined. (1) As used in ORS 197.307, until the beginning of the first periodic review of a local government's acknowledged comprehensive plan, "needed housing" means housing types determined to meet the need shown for housing within an urban growth boundary at particular price ranges and rent levels. On and after the beginning of the first periodic review of a local government's acknowledged comprehensive plan, "needed housing" also means:

(a) Housing that includes, but is not limited to, attached and detached single-family housing and multiple family housing for both owner and renter occupancy;

(b) Government assisted housing;

(c) Mobile home or manufactured dwelling parks as provided in ORS 197.475 to 197.490; and

(d) Manufactured homes on individual lots planned and zoned for single-family

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residential use that are in addition to lots within designated manufactured dwelling subdivisions.

197.307 Effect of need for certain housing in urban growth areas; approval standards for certain residential development; placement standards for approval of manufactured dwellings.

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(3)(a) When a need has been shown for housing within an urban growth boundary at particular price ranges and rent levels, needed housing, including housing for farmworkers, shall be permitted in one or more zoning districts or in zones described by some comprehensive plans as overlay zones with sufficient buildable land to satisfy that need.

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